

**CM IMPACT Guidebook
(With Important Questions and Answers)
Social Science**

**Class X
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SOCIAL SCIENCE

Section-A

Multiple Choice Questions (MCQs) – 1 Mark

1. Which of the following best reflects the idea of Nationalism?
 - A. Believing that all nations should have the same culture
 - B. Recognising a shared identity and the desire for self-governance among people
 - C. Supporting only one's local community instead of the nation
 - D. Ignoring national identity in favour of regional identity

Answer: B

2. How did the ideas of liberty, equality, and fraternity during the French Revolution contribute to the growth of nationalism?
 - A. They encouraged people to support absolute monarchy.
 - B. They discouraged democratic movements
 - C. They promoted colonial rule in Europe.
 - D. They inspired people across Europe to demand freedom and nation-states.

Answer: D

3. Which event played a key role in the formation of a United German nation by bringing together Representatives from different German states?
 - A. The Frankfurt Parliament
 - B. The Congress of Vienna
 - C. The French Revolution
 - D. The Crimean War

Answer: A

4. Giuseppe Garibaldi worked with people from different regions and backgrounds to achieve the unification of Italy. What value does this best demonstrate?
 - A. Refusal to cooperate with others
 - B. Respect for diverse people working towards a common goal
 - C. Preference for regional identity over national unity
 - D. Dependence only on foreign powers

Answer: B

5. A group of young people from different regions of Europe met secretly to discuss liberty and national unity. They believed that people sharing a common history and culture should have the right to govern themselves rather than remain under foreign rule. Which idea is best reflected in the passage?
 - A. Colonial expansion
 - B. Nationalism
 - C. Conservatism
 - D. Industrialization

Answer: B

6. How did Otto von Bismarck contribute to the unification of Germany?
 - A. By promoting peaceful negotiations among all European countries.
 - B. By leading Prussia through wars and diplomatic strategies to unite the German states.
 - C. By organising the Frankfurt Parliament.
 - D. By supporting the French Revolution.

Answer: B

7. Which event laid the foundation for the Unification of Italy under the leadership of Cavour?
 - A. The European Revolutions
 - B. The Crimean War
 - C. The war against Denmark
 - D. The Congress of Vienna

Answer: B

8. The Unification of Germany became possible because different leaders, soldiers and states worked together towards a common goal. Which value is best reflected in this process?
- Competition
 - Isolation
 - Collaboration
 - Individualism

Answer: C

9. During the unification of Germany, leaders used different methods to achieve national unity. Some believed in peaceful discussions, while others supported the use of diplomacy and war when necessary. Both approaches aimed at achieving the same goal. Which conclusion can be drawn from the passage?

- There is only one correct way to achieve national unity.
- Different approaches may be used to achieve a common national goal.
- War is always the best solution to national problems.
- Peaceful methods never lead to success.

Answer: B

10. Match the following

List A	List B
a) Zollverein	1. Believed in gradual change
b) Liberalism	2. Economic Union
c) Conservatism	3. Right to self-governance
d) Nationalism	4. Equality for all before the law

Options:

- a-1, b-2, c-3, d-4
- a-2, b-4, c-1, d-3
- a-1, b-3, c-2, d-4
- a-4, b-3, c-1, d-2

Answer: B

11. There are two statements marked as Assertion (A) and Reason(R). Mark your answer as per the option given below:

Assertion (A): The Rowlatt Act was passed by the British government for the Indians in 1919.

Reason (R): The Rowlatt Act aimed to curb nationalist's sentiments and allow for arrest without trial for two years.

Option:

- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true and (R) is not the correct explanation of (A).
- (A) is correct but (R) is incorrect
- (A) is incorrect but (R) is correct.

Answer: A

12. Arrange the following activities of the Non-Cooperation Movement in India in the correct sequence.

- Boycott of government schools and colleges
- Boycott of foreign goods
- Resignation from government jobs and titles
- Boycott of law courts

- 1 → 2 → 3 → 4
- 3 → 1 → 4 → 2
- 2 → 1 → 3 → 4
- 4 → 2 → 1 → 3

Answer: B

13. During the Indian freedom struggle, some people argued that violent methods would bring independence faster, while Gandhi believed in non-violence. Which statement best explains why Gandhi's approach became more effective?

- It encouraged mass participation from different sections of society.
- It increased the use of weapons against the British.
- It discouraged people from joining the movement.
- It made the British immediately grant independence.

Answer: A

14. **Assertion (A):** The peasants of Awadh actively joined the Non-Cooperation Movement.

Reason (R): They opposed the exploitation of talukdars, high rents, and forced labour (begar).

- A. Both (A) and (R) are correct, and (R) is the correct explanation of (A).
- B. Both (A) and (R) are correct, but (R) is not the correct explanation of (A).
- C. (A) is correct, but (R) is incorrect.
- D. (A) is incorrect, but (R) is correct.

Answer: A

15. If Mahatma Gandhi had not suspended the Non-Cooperation Movement after the Chauri Chaura incident, which Gandhian principle would have been compromised?

- A. Social equality
- B. Self-reliance
- C. Self-discipline
- D. Non-violence (Ahimsa)

Answer: D

16. Arrange the following events related to the impact of the First World War on India in the correct sequence.

- 1. Prices of essential goods increased.
 - 2. People faced economic hardships.
 - 3. Taxes were increased to meet war expenses.
 - 4. Public dissatisfaction grew.
- A. 3 → 1 → 2 → 4
 - B. 1 → 3 → 2 → 4
 - C. 2 → 1 → 3 → 4
 - D. 3 → 2 → 1 → 4

Answer: A

17. Which sequence best explains how the HSRA planned to achieve its objective?

- A. Spread communalism → Support British rule → Gain power
- B. Organise revolutionaries → Fight colonial rule → Establish a socialist republic in India
- C. Start industries → Improve trade → Gain independence
- D. Promote non-cooperation → Boycott schools → Establish British rule

Answer: B

18. A student says, "*The Indian National Congress was formed mainly to start an armed revolt against the British.*" How would you evaluate this statement?

- A. It is correct because Congress was formed to wage war immediately.
- B. It is incorrect because the early Congress aimed to present Indian grievances peacefully and seek political reforms.
- C. It is correct because Congress wanted to end British rule in one year.
- D. It is incorrect because Congress was formed only for social reforms.

Answer: B

19. A group of villagers who practiced salt making decided to stop paying revenue to protest against an unjust British law. Which national movement are they following?

- A. Non-Cooperation Movement
- B. Boycott Movement
- C. Civil Disobedience Movement
- D. Revolutionary Movement

Answer: C

20. Read the statements and choose the correct answer.

Statement I: A rich peasant joined the Civil Disobedience Movement because he wanted the government to reduce land revenue.

Statement II: An industrialist joined the movement because he wanted protection from foreign competition

Statement III: Plantation workers participated mainly because they wanted complete political independence.

Options:

- A. Statement I and II are correct, but Statement III is incorrect
- B. Statement I and III are correct, but Statement II is incorrect
- C. Statement I is incorrect, but Statement II and III are correct.
- D. Statement I and II are incorrect, but statement III is correct

Answer: A

21. A factory owner wanted to recruit workers from different villages. Instead of doing it personally, he appointed a trusted person to bring labourers and supervise them. Who is this person?
- A. Jobber
 - B. Factory owner
 - C. Apprentice
 - D. Merchant

Answer: A

22. Two students are discussing proto-industrialisation in a classroom activity.
- **Student A:** "Industries began only after factories were established."
 - **Student B:** "Many goods were produced in villages by families even before factories came into existence."

Who has the more accurate understanding?

- A. Student A, because factories started all production.
- B. Student B, because proto-industrialisation existed even before factories established.
- C. Both are equally correct.
- D. Neither student is correct.

Answer: B

23. During the Industrial Revolution, a factory owner notices that child workers are made to work for long hours in unsafe conditions. Which action best reflects a sense of concern for the workers?
- A. Increasing their working hours to improve production
 - B. Providing safe working conditions and reducing child labour
 - C. Ignoring their problems because production is more important
 - D. Reducing wages to earn higher profits

Answer: B

24. A merchant from North India wants to export textiles to the Gulf through the Red Sea. He decides to use the port that provided the easiest access to this trade route. Which port should he choose?
- A. Kochi
 - B. Surat
 - C. Calcutta
 - D. Madras

Answer: B

25. Read the following statements about the work involved in textile production.
- Statement I:** A fuller gathered and finished cloth by pleating and processing it after weaving.

Statement II: Different workers performed different tasks to complete one piece of cloth.

Which of the following is correct?

- A. Both Statements I and II are correct, and Statement II explains the need for collaboration in textile production.
- B. Both Statements I and II are correct, but Statement II does not explain Statement I.
- C. Statement I is correct, but Statement II is incorrect.
- D. Statement I is incorrect, but Statement II is correct.

Answer: A

26. James Watt's improvement of Newcomen's steam engine had what major effect on industries?

- A. It reduced the use of machines in factories.
- B. It made steam engines more efficient and suitable for factories.
- C. It stopped the use of coal in industries.
- D. It increased the use of hand labour.

Answer: B

27. Why Richard Arkwright's Water Frame was considered an important invention during the Industrial Revolution?

- A. It enabled faster spinning using water power.
- B. It replaced the steam engine in factories.
- C. It was the first machine used in coal mines.
- D. It increased hand spinning at home.

Answer: A

28. A weaver refused to accept advances from the East India Company's gomashtha. What is the most likely reason?

- A. The gomashtha forced weavers to sell cloth at low prices and controlled their work.
- B. The gomashtha encouraged free trade among weavers.
- C. The gomashtha paid higher prices than local traders.
- D. The gomashtha supplied modern weaving machines.

Answer: A

29. The Indian weavers suffered in the early decades of the 19th century because:
- Export market collapsed
 - Cheap Manchester imports flooded Indian markets.
 - Raw cotton became costly
 - Sub-standard quality of raw cotton.

Answer: B

30. There are two statements marked as Assertion (A) and Reason (R). Select the correct answer as per the options given below:

Assertion (A): The growth of industries changed the pattern of human settlement.

Reason (R): People migrated to industrial centres in search of employment.

- Both A and R are true but R is not the correct explanation of A.
- Both A and R are true and R is the correct explanation of A
- A is True but R is False
- A is False but R is True

Answer: B

31. A village library receives many affordable printed books. What is the most likely result?
- People stop reading.
 - Literacy and awareness increase.
 - Handwritten books become more popular.
 - Trade decreases.

Answer: B

32. Why did rulers and religious authorities often fear the spread of printed books?
- Printing promoted questioning of authority and spread new ideas
 - Books were too expensive
 - Books occupied too much space.
 - Printing opened up new ways of living.

Answer: A

33. A reformer wants to spread social reform ideas quickly among common people. Which method would be most effective in the 19th century?
- Oral storytelling only
 - Printed pamphlets and newspapers
 - Stone inscriptions
 - Handwritten manuscripts

Answer: B

34. Which statement best justifies why print culture is considered a turning point in history?
- It made people economically more self-reliant.
 - It encouraged scientific discoveries
 - It enabled ideas and knowledge to reach large numbers of people
 - It opposed all forms of modern education.

Answer: C

35. A historian claims that print culture had little impact on the poor because most of them were illiterate. Which argument best challenges this claim?
- Printed books were available only in cities.
 - Only the rich were interested in social reforms
 - Printing was banned in all villages.
 - Many poor people accessed printed ideas through public readings, songs, and oral discussions

Answer D

36. Choose the correctly matched pairs
- Jyotiba Phule-----Gulamgiri.
 - Ram Chadda----- Sacchi Kavitaen.
 - Raja Ram Mohan Roy—Sambad Kaumudi.
 - Tulsidas----Ramcharitmanas.

Options:

- (i) , (ii) and (iv)
- (ii) , (iii) and (iv)
- (i) , (iii) and (iv)
- (i) , (ii) and (iii)

Answer: C

37. Read the statements carefully:
- A newspaper named *Bengal Gazette* was published in 1780.
 - It was started by James Augustus Hickey.
 - This marked the beginning of newspaper publishing in India.

Which conclusion can be drawn from these statements?

- Raja Ram Mohan Roy published the first newspaper in India.
- James Augustus Hickey introduced newspaper publishing in India.
- Printing in India began only after newspapers were published.
- Sambad Kaumudi was India's first newspaper.

Answer: B

38. A history teacher explains that after the introduction of printing, books and newspapers were produced in large numbers. As more people began reading the same printed materials, spelling, grammar, and vocabulary gradually became uniform. This made communication easier across different regions.

Question:

Based on the passage, which of the following was an important impact of the Print Revolution on languages?

- Regional languages completely disappeared.
- Languages became more standardized.
- New languages replaced old ones.
- Printed books reduced the use of written language.

Answer: B

39. A student prepared the following timeline on the growth of the press in India, but the events are not in the correct order. Arrange the events in the correct chronological order to show the growth of the press in India.

- Raja Ram Mohan Roy published *Sambad Kaumudi*.
- Newspapers started publishing cartoons and caricatures to comment on social and political issues.
- James Augustus Hickey published *Bengal Gazette*, the first newspaper in India.
- The Portuguese missionaries established the first printing press in Goa.

- III → IV → I → II
- IV → III → I → II
- IV → I → III → II
- III → I → II → IV

Answer: B

40. The British government introduced strict control over newspapers after the Revolt of 1857. What was the most likely reason for this action?

- To encourage the publication of more newspapers
- To encourage printing technology in the world.
- To prevent newspapers from spreading anti-colonial ideas and criticism of British rule
- To promote the use of regional languages in newspapers

Answer: C

41. Which action correctly explains how a resource is formed from a material found in nature?

- A rock becomes a resource as soon as it is found.
- A material becomes a resource only when humans identify its usefulness to satisfy his wants.
- All natural materials are resources by default.
- Only living things can become resources.

Answer: B

42. A country has plenty of minerals but is facing shortages of clean water and fertile land.

Which statement best explains why the country should plan its resource use carefully?

- Because all resources are available in equal amounts everywhere.
- Because some resources are unevenly distributed and limited in quantity.
- Because resources can never be exhausted.
- Because only mineral resources are important.

Answer: B

Options:

43. A country's Exclusive Economic Zone extends up to 200 nautical miles from its coast. Which statement correctly explains why resources found within this zone are called national resources?

- A. They belong to all countries equally.
- B. They cannot be used by anyone.
- C. They can be used only by private companies.
- D. They are under the country's control and can be used according to its laws

Answer: D

44. A scientist discovers a new mineral deposit. Its properties are studied, but no technology exists to use it. Into which category should this resource be placed?

- A. Developed resource
- B. Potential resource
- C. Stock
- D. Reserved resource

Answer: C

45. A village has a river, fertile land, and thick forests. However, the people lack the skills and technology to use these resources effectively. A development program is introduced to train villagers and improve infrastructure.

Which change is most likely to occur after the program?

- A. The resources will lose their value.
- B. More resources may become useful for the community.
- C. The natural resources will disappear.
- D. The village will stop depending on its resources.

Answer: B

46. On the basis of ownership, National Highway can be better considered as which of the following types of resources?

- A. Individual resources
- B. Community owned-resource
- C. National resource
- D. International resource

Answer: C

47. Which one of the following statements refers to the sustainable development?

- A. Overall development of various resources
- B. Development should take place without damaging the environment
- C. Economic development of people
- D. Development that meets the desires of the members of all communities

Answer: B

48. A district allows industries to cut trees for economic growth but ignores afforestation. Which long-term outcome is most likely to affect both the environment and the people living there?

- A. Ecological imbalances due to loss of forests
- B. Increase in wildlife population
- C. Increase in fertile land
- D. More regular rainfall

Answer: A

49. Which of the following soils is most commonly found in the Northern Plains of India, making the region highly suitable for agriculture?

- A. Red soil
- B. Laterite soil
- C. Alluvial soil
- D. Desert soil

Answer: C

50. A farmer in a hilly area noticed that heavy rainfall is washing away the fertile topsoil from his fields every year. He decided to make steps on the slopes and plant grass along the edges of the fields.

What is the main purpose of adopting these measures?

- A. To increase rainfall in the area
- B. To reduce soil erosion and conserve soil fertility
- C. To convert the land into forest land
- D. To increase the temperature of the soil.

Answer: B

51. A company plans to establish a plantation of tea and coffee in a region with heavy rainfall and high temperatures. Which type of soil would you recommend as the most suitable?

- A. Laterite soil
- B. Desert soil
- C. Red soil
- D. Alluvial soil

Answer: A

52. Read the statements and choose the correct answer.

Statement I: Terrace farming helps reduce soil erosion on hilly slopes.

Statement II: Shifting cultivation is the best method to prevent soil erosion.

- A. Both Statements I and II are true.
- B. Both Statements I and II are false.
- C. Statement I is true, but Statement II is false.
- D. Statement I is false, but Statement II is true.

Answer: C

53. Why is alluvial soil considered as most fertile soil?

- A. It contains abundant nutrients deposited by rivers.
- B. It is rich in sand only.
- C. It has very little moisture.
- D. It contains only clay.

Answer: A

54. Which of the following statements about soils is correct?

- A. Soil is a non-renewable resource that can never be conserved.
- B. Soil contains minerals, organic matter, water and air that support plant growth.
- C. All soil has the same fertility and texture.
- D. Soil is formed within a few years

Answer: B

Soil Type	States
1. Black soil	(a) Uttar Pradesh
2. Laterite soil	(b) Tamil Nadu
3. Desert soil	(c) Rajasthan
4. Alluvial Soil	(d) Maharashtra

Options:

- A. 1 - a , 2 - b , 3 - c , 4 - d
- B. 1 - b, 2 - c , 3 - d, 4 - a
- C. 1 - d 2 - b , 3 - c , 4 - a
- D. 1 - c 2 - a 3 - d 4 - b

Answer: C

56. Which statement best explains the importance of soil conservation?

- A. It reduces the salinity of soil
- B. It helps maintain soil fertility and agricultural productivity.
- C. It reduces the mineral content of soil
- D. It increases desertification.

Answer: B

57. **Assertion (A):** Transported soils do not have a well-defined soil profile.

Reason (R): They constitute soils that are transported by various agents of erosion.

Options:

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true but R does not explain A.
- C. A is true but R is false.
- D. A is false but R is true.

Answer A

58. A village is facing severe soil erosion on hill slopes during the rainy season. Which plan would be the best to conserve the soil?

- A. Cut down trees to increase farming area
- B. Practice terrace farming and plant trees
- C. Remove grass from the slopes
- D. Build more roads on the hills

Answer: B

55. **Match the following:**

59. Which situation best explains how overgrazing leads to land degradation?

- A. It increases the fertility of the soil.
- B. It helps more plants grow quickly.
- C. Animals eat too much vegetation, leaving the soil exposed to erosion.
- D. It improves the water-holding capacity of the soil.

Answer: C

60. There are two statements marked as Assertion (A) and Reason (R). Select the correct answer as per the options given below:

Assertion (A): Multipurpose projects are called the “Temples of Modern India.”

Reason (R): They integrate development of agriculture and industry.

Options:

- A. Both A and R are true and R is the correct explanation
- B. Both A and R are true but R is not the correct explanation
- C. A is true but R is false
- D. A is false but R is true

Answer: A

61. Why did Jawaharlal Nehru call multipurpose river valley projects the "Temples of Modern India"?
- A. They promote irrigation, electricity generation, and overall development.
 - B. They are places of religious worship.
 - C. They are built only for tourism.
 - D. They are used only for fishing.

Answer: A

62. Which of the following is the most sustainable strategy for managing water resources?
- A. Using ground water excessively
 - B. Recycling waste water and harvesting of rain water
 - C. Discharging untreated waste water in to rivers
 - D. Depending only on dams for water supply.

Answer: B

63. Which of the following environmental groups came under great scrutiny and opposition?
- A. Narmada Bachao Andolan

- B. Tehri Dam Andolan
- C. Beej Bachao Andolan
- D. Both A and B

Answer: D

64. A state plans to build a large multipurpose river project. During a public meeting, some villagers oppose it. Which concern best explains their opposition?
- A. It provides irrigation to dry regions.
 - B. It helps generate hydroelectric power.
 - C. It may cause displacement of people and loss of livelihood.
 - D. It helps control floods.

Answer: C

65. A city's population doubles within 20 years, but its water resources remain the same. What is the most likely result?
- A. Water scarcity increases.
 - B. Water availability increases automatically.
 - C. Rainfall increases.
 - D. Rivers become deeper.

Answer: A

66. What is the primary goal of mineral conservation?
- A. To increase mineral production
 - B. To reduce mineral waste
 - C. To protect the environment
 - D. To promote sustainable use of minerals

Answer: D

67. Which of the following is NOT a strategy for conserving minerals?
- A. Increasing recycling rates
 - B. Reducing mineral usage
 - C. Improving mining efficiency
 - D. Discourage the use substitutes and scraps

Answer: D

68. What is the term for the process of reusing minerals from waste materials?
- A. Recycling
 - B. Reusing
 - C. Reducing

D. Recovering

Answer: A)

69. Which one of the following is not a benefit of reducing mineral waste through conservation efforts?

- A. Increased economic benefits
- B. Decreased environmental impacts
- C. Improved public health
- D. Improvement in Transport and communication

Answer: D

70. Consider the following statements

- i. Minerals are non-renewable resources.
- ii. Conservation ensures minerals remain available for future generations.
- iii. Recycling has no role in conserving mineral resources.
- iv. Reducing wastage during mining helps conserve minerals.

Which statements are correct?

- A. i, ii and iv only
- B. i and iii only
- C. ii and iii only
- D. i, ii and iii only

Answer: A

71. A steel company wants to produce high-quality steel using the most widely used iron ore. Which ore should it choose?

- A. Magnetite
- B. Hematite
- C. Limonite
- D. Siderite

Answer: B

72. Two neighboring states disagree over where a new gas-based power plant should be built. The committee decides to locate it near the region with large natural gas reserves to avoid transport disputes. Which region is the most suitable?

- A. Damodar Basin
- B. Ganga Basin
- C. Krishna–Godavari Basin and Gulf of Cambay
- D. Indus Basin

Answer: C

73. A state has abundant coal but no major rivers for hydropower. Which type of power plant would you suggest the government to set up?

- A. Hydroelectric power plant
- B. Thermal power plant

C. Nuclear power plant

D. Wind power plant

Answer: B

74. **Assertion (A):** Non-conventional sources of energy are preferred for sustainable development.

Reason (R): Non-conventional sources of energy are renewable and generally cause less pollution than conventional sources.

Options:

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

75. Match the following and choose the correct option

List A (Minerals)	List B (Uses)
a. Bauxite	1. Cement production
b. Limestone	2. Electrical cables
c. Manganese	3. Raw material for aluminum
d. Copper	4. Bleaching powder, Paints

Options:

- A. a-2, b-1, c-4, d-3
- B. a-1, b-2, c-3, d-4
- C. a-3, b-1, c-4, d-2
- D. a-4, b-3, c-2, d-1

Answer: C

76. Why agriculture is called the backbone of the Indian economy?

- A. It employs a large population and supports industries.
- B. It is the only occupation in India.
- C. It produces only food grains.
- D. It depends only on exports.

Answer: A

77. Which of the following is not an example of subsistence farming?

- A. Shifting cultivation
- B. Intensive subsistence agriculture
- C. Commercial farming
- D. Extensive subsistence agriculture

Answer C

78. Identify the crop from the given geographical conditions

- It is a Kharif crop used as food and fodder
- It requires a temperature between 21°C to 27°C.
- It grows well in alluvial soil.

Options:

- A. Wheat
- B. Sugarcane
- C. Rice
- D. Maize

Answer D

79. What is common between primitive subsistence farming and intensive subsistence farming:

- A. Both require the use of modern machinery.
- B. Both are done on large land holdings.
- C. Both require large amounts of credit.
- D. Both are labor intensive

Answer: D

80. Pick the odd one out from the following given options

- A. Rice - Wheat—Maize.
- B. Tea - Rubber – Sugarcane
- C. Cotton – Jute – Mesta
- D. Linseed -- Coconut ---Mustard

Answer B

81. Which factor has contributed the most to the shift from subsistence farming to commercial farming in India?

- A. Increase in rainfall
- B. Use of modern technology and better market access
- C. Reduction in population
- D. Decrease in soil fertility

Answer: B

82. A farmer in a drought-prone region wants to reduce crop failure. Which farming practice is the best option?

- A. Plantation farming
- B. Dry farming with drought-resistant crops
- C. Shifting cultivation

D. Intensive subsistence farming

Answer: B

83. A farmer uses HYV seeds but gets poor yields despite adequate rainfall. What is the most likely reason?

- A. Lack of fertilizers and proper irrigation
- B. Sufficient sunlight
- C. Too much labour
- D. Small landholding

Answer: A

84. Which one of the following is an incorrect combination?

Crops	Major producers
A. Rubber	Kerala
B. Cotton	Maharashtra
C. Tea	West Bengal
D. Millets	Meghalaya

Answer D

85. Which of the following is the main objective of the food security policy in India?

- A. Food access to the people lives below poverty line.
- B. Growth in agricultural yield and production.
- C. Fixing of support price for procurement of all products.
- D. To help farmers to get food at subsidized price in open markets.

Answer: B

86. Which statements correctly explain how industries contribute to India's economy?

1. Industries generate employment opportunities.
2. Industries contribute to the country's GDP.
3. Industries reduce the need for exports.
4. Industries help earn foreign exchange through exports.

Options:

- A. 1 and 2 only
- B. 1, 2 and 4 only
- C. 2 and 3 only
- D. 1, 2, 3 and 4

Answer: B

87. A student says, "*Factories and farms belong to the same type of industry because both produce goods.*" Which response correctly creates awareness about the classification of industries?
- A. Agriculture is a secondary industry because it produces crops.
 - B. Manufacturing is a secondary industry because it converts raw materials into finished products.
 - C. Mining is a tertiary industry because it provides services.
 - D. Services are primary industries because they help people.

Answer: B

88. A cement company wants to establish a new plant. It compares four states based on the facilities available. Which state is likely to be the best choice?
- A. A state with abundant limestone and good transport connectivity.
 - B. A state with poor limestone reserves but many tourist attractions.
 - C. A state with fertile agricultural land only.
 - D. A state with dense forests with limited limestone deposits.

Answer: A

89. A district in India has encouraged the establishment of industries. As a result, locally made products are now exported to many countries, improving the quality and competitiveness of Indian goods in the global market."

What does this situation best show?

- A. Industries increase dependence on agriculture.
- B. Industries mainly promote rural-urban migration.
- C. Industries enhance India's global competitiveness.
- D. Industries reduce the demand for technology.

Answer: C

90. A state government is planning to invest either in setting up new industries or

expanding agricultural land to accelerate economic development. Which option would you recommend if the main objective is long-term economic growth and development?

- A. Expand agricultural land only.
- B. Invest only in healthcare facilities.
- C. Set up new industries because they generate employment, increase production, and boost economic growth.
- D. Avoid industrialisation to reduce pollution.

Answer: C

91. Imagine you are the District Industries Officer, planning to establish a new manufacturing unit. Which combination of factors would you choose to ensure the industry's success?
- A. A place with raw materials, good transport, and a nearby market.
 - B. A place with only cheap land.
 - C. A place far from markets and with minimum transport facilities.
 - D. A place with no access to raw materials.

Answer: A

92. Consider the following situations.

- **Factory X** is located where transport facilities are excellent but raw materials are scarce.
 - **Factory Y** is located in a remote area with abundant raw materials but poor transport facilities.
- Which factor best explains why Factory X may perform better despite limited raw materials?

- A. Government subsidies
- B. Availability of raw materials
- C. Well-developed transportation infrastructure
- D. Proximity to markets

Answer: C

93. Which of the following is a primary classification of industries in India on the basis of ownership?

- A. Primary, Secondary, and Tertiary
- B. Light, Heavy, and Cottage
- C. Public, Private, and Joint
- D. Manufacturing, Service, and Agriculture

Answer: A)

94. Which type of industry is concerned with the extraction and production of natural resources?

- A. Primary industry
- B. Secondary industry
- C. Tertiary industry
- D. Quaternary industry

Answer: C

95. A company needs to transport crude oil from a refinery to a port. Which is the best mode of transport the company should employ?

- A. Roadways
- B. Railways
- C. Air ways
- D. Pipeline

Answer: D

96. **Assertion (A):** Indian Railways are called the "Life Line of the National Economy."

Reason (R): They transport people and goods across the country, linking production centers with markets.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

97. Two students are debating the history of an important road in India.

- **Student A:** "The Golden Quadrilateral was built by Sher Shah Suri."
- **Student B:** "The Grand Trunk Road was built by Sher Shah Suri."

How can you help them to resolve their disagreement?

- A. Accept Student A's opinion without checking facts.
- B. Refer to reliable historical sources
- C. Decide by tossing a coin.
- D. Ignore the disagreement and continue the discussion.

Answer: B

98. The headquarters of the Central Railway Zone is Mumbai CSMT. What does this indicate?

- A. It is the place where all trains begin their journey.

B. It is the main administrative office of the Central Railway Zone.

C. It is the largest railway station in India.

D. It is the only station where express trains stop.

Answer: B

99. A tourist plans to travel by the National Highway connecting Amritsar and Delhi. Which highway should they use?

- A. National Highway No. 5
- B. National Highway No. 4
- C. National Highway No. 3
- D. National Highway No. 1

Answer: D

100. A government wants to transport large quantities of goods at the lowest cost while using an environmentally friendly mode of transport. Which mode should be given priority?

- A. Road transport
- B. Rail transport
- C. Air transport
- D. Inland water transport

Answer: D

101. A remote district has poor transport and communication facilities. Which plan would best promote its economic development?

- A. Build only shopping malls.
- B. Improve roads, railways, internet and communication networks.
- C. Close nearby markets.
- D. Reduce investment in transport.

Answer: B

102. A Student says that the Golden Quadrilateral connects the major metro cities in India to improve trade and transport. Which option correctly supports the student's statement?

- A. Chennai – Kolkata – Bengaluru – Mumbai – Delhi
- B. Delhi – Kolkata – Chennai – Mumbai – Delhi
- C. Kolkata – Silchar – Delhi – Mumbai

D. Mumbai – Delhi – Bengaluru – Chennai

Answer: B

103. If a country improves both in transport and communication systems, what is the most likely result?

- A. Reduced economic growth
- B. Faster trade, better connectivity and improved transport
- C. Limited trade relations
- D. Increased travel time.

Answer: B

104. The North eastern region prefers air transport over other mode of transport because:

- I. This area is covered with dense forests and many rivers with frequent flooding schedule
- II. This area has no accessibility of other mode of transport
- III. This area has dissected physiographic feature.
- IV. This mode of transport can traverse difficult terrain and dense forests.

Options:

- A. I and II are correct
- B. I, II and IV are correct
- C. I, III and IV are correct
- D. II and IV are correct

Answer: C

105. A ship carrying tea, jute, and engineering goods leaves a river port located on the banks of the Hooghly River. It serves the eastern and northeastern parts of India. Which port is being referred to?

- A. Kolkata Port
- B. Mumbai Port
- C. Kochi Port
- D. Vishakhapatnam Port

Answer: A

106. Which statement correctly describes the boundaries of Meghalaya?

- A. Meghalaya is surrounded by Assam on the west and east with Bangladesh on the north and south.
- B. Meghalaya is surrounded by Assam on the north and east with Bangladesh on the west and south.

C. Meghalaya is surrounded by Assam on the north, with Bangladesh on the east, west and south.

D. Meghalaya is surrounded by Assam on the east and south with Bangladesh on the north and west.

Answer: B

107. Which Act passed by the Parliament conferred full statehood on Meghalaya?

- A. State Reorganisation Act
- B. Assam Reorganisation Act
- C. Government of India Act
- D. North Eastern Areas (Reorganisation) Act.

Answer: D

108. Sohra and Mawsynram located in Meghalaya are the two areas which receives the highest rainfalls in the world mainly because:

- A. It is close to the Arabian Sea.
- B. Moist monsoon winds are forced to rise over the Khasi Hills
- C. It has dense forests
- D. It is surrounded by Mountains

Answer: B

109. Which of the following statement is incorrect with regards to the economy of Meghalaya?

- A. Meghalaya is predominantly an agrarian economy.
- B. About 80 per cent of the total population depends on agriculture.
- C. The state imports food grains from other states.
- D. Among the rural population, more than 65 percent live in below poverty line.

Answer: D

110. Meghalaya has significant potential for hydroelectric power because:

- A. It has fast flowing rivers and hilly terrain.
- B. It has large oil fields.
- C. It has favourable climatic conditions.
- D. Its vast Coal deposits using for generating electricity.

Answer: A

111. The Government of Meghalaya issues a public notice in three official languages. Which set of languages is most likely to appear in the notice?

- A. Khasi and Garo only
- B. English only
- C. Khasi, Garo and English
- D. Hindi, Khasi and English

Answer: C

112. Consider the following statements:

1. Nongkhnum Island is formed by the bifurcation of the Kynshi River.
2. It is the largest river island in Meghalaya and the second-largest river island in Asia.

Which of the following is correct?

- A. Only Statement 1 is correct
- B. Only Statement 2 is correct
- C. Both Statements 1 and 2 are correct
- D. Both Statements 1 and 2 are incorrect

Answer: C

113. "Meghalaya's forests are rich in biodiversity and provide timber, medicinal plants, clean water, and habitats for wildlife. However, deforestation and forest fires threaten these valuable resources".

Based on the passage, which is the best way to protect Meghalaya's forest resources?

- A. Encourage shifting cultivation.
- B. Encourage afforestation, prevent forest fires and involve local communities in conservation.
- C. Convert forests into settlement.
- D. Allow unrestricted mining inside forests.

Answer: B

114. A trader from Meghalaya wants to export agricultural products through the state's international border. Which neighbouring country would the most likely trade with?

- A. Nepal
- B. Myanmar
- C. Bhutan
- D. Bangladesh

Answer: D

115. Match the following

List A	List B
a. East Khasi Hills	1. Jowai

b. West Garo Hills	2. Resubelpara
c. West Jaintia Hills	3. Tura
d. North Garo Hills	4. Shillong

Options:

- A. a - 2 , b - 1 , c - 3 , d - 4
- B. a - 1 , b - 2 , c - 3 , d - 4
- C. a - 2 , b - 3 , c - 1 , d - 4
- D. a - 4 , b - 3 , c - 1 , d - 2

Answer: D

116. A student says, "In India, all powers belong only to the Central Government." Do you agree with the statement?

- A. Yes, because States have no powers.
- B. No, because powers are shared between the Centre and the States.
- C. Yes, because the Constitution gives all powers to Parliament.
- D. No, because only local governments have powers.

Answer: B

117. The President of India can proclaim a National Emergency under Article 352 in certain situations. Which situation correctly explains when a National Emergency can be declared?

- A. When the financial position of the country becomes weak
- B. When there is war, external aggression, or armed rebellion
- C. When a state government loses its majority
- D. When Parliament is dissolved

Answer: B

118. A dispute arises between the Union and a State regarding the interpretation of a Constitutional provision. Which institution should interpret the Constitution and settle the dispute to uphold the federal system?

- A. Supreme Court
- B. Election Commission
- C. Parliament
- D. Finance Commission

Answer: A

119. A student says, "Since some Indian states have only one House, the Indian

Parliament should also have only one House."

How would you respond based on your understanding of the Indian Parliament?

- A. All legislatures must have one House.
- B. Parliament has two Houses even though some states have one House.
- C. Parliament has no legislative Houses.
- D. The President alone is the Parliament.

Answer: B

120. Imagine you are helping prepare a revised Constitution for a new country. A new subject like **Artificial Intelligence** is not included in any legislative list. What would you suggest should be done with such a subject?

- A. Include it in the State List only
- B. Include it in the Union List only.
- C. Treat it as a residuary subject until assigned by law.
- D. Leave it permanently outside all lists.

Answer: C

121. A village school needs funds to repair classrooms. The Gram Panchayat cannot meet the entire cost. Which Panchayati Raj institution should be approached as the apex level body to consider broader district-level support?

- A. Gram Panchayat
- B. Block Panchayat (Panchayat Samiti)
- C. Zila anchayat (Zila Parishad)
- D. Village Panchayat.

Answer: C

122. Which sequence best explains the process that led to the creation of linguistic states in India?

- A. Demand for linguistic recognition → Reorganization of state boundaries → Better administrative convenience
- B. Creation of new states → Demand for languages → Independence
- C. Independence → Abolition of all states → Creation of Union Territories only
- D. Language differences → Separation from India → Formation of new countries

Answer A

123. A village decides to take up the construction, repair and maintenance of all roads, except the state and national

highways within village. This action demonstrates:

- A. De-centralization of power
- B. Inclusive decision-making
- C. Centralization of power
- D. Administrative control

Answer: A

124. Which of the following best explains the importance of decentralization in Indian democracy?

- A. It concentrates power in one authority.
- B. It reduces people's participation in democracy.
- C. It brings decision making closer to the people.
- D. It increases dependences on the central government.

Answer: C

125. **Assertion (A):** India's language policy reflects the country's cultural diversity.

Reason (R): The Constitution recognizes multiple languages and protects linguistic rights.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

126. A farmers' association demands better prices for crops and subsidies only for its members. Which type of interest group does it represent?

- A. Promotional interest group
- B. Sectional interest group
- C. Single issue Movement.
- D. Public interest group

Answer: B

127. **Consider the following statements:**

- 1. Political parties aim to capture political power through elections.

2. Pressure groups influence government policies without contesting elections.
3. Pressure groups are unconcerned about public issues.
4. Political parties and pressure groups perform the same functions.

Which of the above statements are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1, 2 and 4 only
- D. 1, 3 and 4 only

Answer: A

128. A group of doctors forms an association to improve the working conditions and welfare of doctors across the country. Which type of interest group does this association represent?

- A. Promotional interest group
- B. Sectional interest group
- C. Political party
- D. Public interest group

Answer: B.

129. These are the different views of two students in a class room.

Student A: "Only environmental movements can influence government decisions."

Student B: "Trade unions can also influence government policies by representing Workers' interests."

Whose opinion reflects a broader understanding of pressure groups?

- A. Student A only
- B. Student B only
- C. Both students
- D. Neither student

Answer: B.

130. Trade union and a political party jointly organise discussions with the government to improve labour laws. The trade union provides workers' concerns, while the political party raises the issue in the legislature. What does this situation best demonstrate?

- A. Pressure groups and political parties can collaborate while performing different roles.
- B. Pressure groups and political parties have exactly the same functions.
- C. Pressure groups always replace political parties in government.

- D. Political parties cannot work with pressure groups.

Answer A.

131. Match List I and List II and select the correct answer by using the option.

List I	List II
a. Organization that seek to promote the interest of a particular section	(i).Public interest groups
b. Organization that seek to promote Common interest	(ii).Sectional Interest groups
c. They are more like umbrella type movements	(iii).Multiple-issue movements
d. Their active life span is short.	(iv).Single -issue movement

Options:

- A. a (i) , b (ii), c (iii), d (iv)
- B. a (ii) , b (i) , c (iii) d (iv)
- C. a (iii), b (iv), c (ii), d (i)
- D. a (iv) , b (iii), c (ii), d (i)

Answer: B

132. In the question given below, there are two statements marked Assertion (A) and Reason (R). Read the statement and choose the correct option.

Assertion (A): Pressure groups and movements work for political power.

Reason (R): Pressure groups and movements act as a bridge between the government and citizen to ensuring that diverse voices are heard.

Options:

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. (A) is false but (R) is true
- C. Both (A) and (R) are false
- D. Both (A) and (R) are true, but (R) is not the correct explanation of (A)

Answer: B

133. A farmers' association launches a social media campaign and peaceful protests to demand better crop prices. Which statement best explains how the association is influencing politics?
- A. By contesting elections
 - B. By influencing public opinion through campaigns and demonstrations
 - C. By acting as the legislature
 - D. By replacing political parties

Answer: B

134. Which of the following statements is best described the relation between political parties and pressure groups.
- A. Pressure groups influence policy makers by supplying them accurate data and Information like political parties
 - B. Political parties have to face the people in elections, but pressure groups do not.
 - C. Many political parties are born out of movements.
 - D. Pressure groups are forced to compete with political parties

Answer: C

135. Narmada Bachao Andolan is a single issue movement that related to
- A. Education and unemployment
 - B. Environment and displacement
 - C. Trade and Commerce
 - D. Election and Political parties

Answer: B

136. Choose the correct sequence:
- A. Allots symbol → Register party → Apply symbol → Verify application
 - B. Verify application → Apply symbol → Register party → Allots symbol
 - C. Register Party → Apply symbol → Allots symbol → Verify application
 - D. Register Party → Apply symbol → Verify application → Allots symbol

Answer: D

137. A student is preparing a timeline of the major political parties in India. Which party should be placed first based on the year of its formation?
- A. Indian National Congress (INC)
 - B. Bharatiya Janata Party (BJP)
 - C. Communist Party of India (CPI)
 - D. All India Trinamool Congress (AITC)

Answer: A

138. Political parties often develop a strong presence in a particular region by addressing local issues and representing regional aspirations. Based on this understanding, which party has established a strong regional base in Tamil Nadu?
- A. All India Anna Dravida Munnetra Kazhagam (AIADMK)
 - B. Bahujan Samaj Party (BSP)
 - C. Indian National Congress (INC)
 - D. Bharatiya Janata Party (BJP)

Answer: A

139. **Statement I:** A Modern Democracy cannot function without Political Party
Statement II: Existence of Parties is a pre condition for existence of vibrant democracy.
- Options:**
- A. Only statement I is correct
 - B. Only Statement II is correct
 - C. Both the Statements are correct
 - D. Both the Statements are incorrect

Answer: C

140. A student is exploring different political ideologies in India and wants to identify the party that follows communist ideology. Which political party should the student choose?
- A. Bahujan Samaj Party (BSP)
 - B. Communist Party of India (Marxist) [CPI(M)]
 - C. Indian National Congress (INC)
 - D. Bharatiya Janata Party (BJP)

Answer: B

141. Which one of the following is **incorrectly** paired
- A. India - Multi party system
 - B. North Korea - Single party system
 - C. Canada - Two party system
 - D. Bangladesh - One party system

Answer: D

142. Observe the following statements with regards to the political parties. and choose the correct option
- Statement I:** It will be difficult to form a stable government without political parties.
- Statement II:** Opposition parties play a pivotal role in formation of public opinion.

Statement III: Since most of the parties have similar ideology, voters have better alternative

Statement IV: Parties do hold regular elections to select top leaders of the party.

Options:

- A. Statements I and II are correct, but Statements III and IV are incorrect.
- B. Statements III and IV are correct, but statement I and II are incorrect
- C. Statement II and III correct, but statement I and IV are incorrect
- D. Statements I and III are correct, but statement II and IV are incorrect

Answer: A

143. If a political party neither keep membership register nor conduct internal election regularly. Which of the following challenges being faced by that political party?

- A. Lack of internal democracy.
- B. Dynastic succession
- C. Growing role of money and muscle power
- D. Limited alternation to the voters.

Answer: A

144. A group of students is preparing an awareness poster titled "**Functions of Political Parties in a Democracy.**" Which of the following points **should NOT** be included in their poster as a function of a political party?

- A. Contest elections
- B. Form and run the government
- C. Make necessary arrangements for conducting elections to legislative bodies
- D. Play a decisive role in making laws for the country

Answer C

145. During a classroom discussion, Rima says, "*Our political party has only one leader who makes all the important decisions. Ordinary members have no role in choosing leaders or candidates.*" Based on this situation, which major challenge of political parties is illustrated?

- A. Lack of alternatives to voters
- B. Lack of internal democracy
- C. Lack of able leadership
- D. Lack of clear ideology

Answer: B

146. Which of the following international organizations works to improve women's access to justice and protect their rights?

- A. Human Rights Law Network
- B. World Health Organisation
- C. Women's Justice Initiative
- D. International Women's Organisation

Answer: C

147. Read the situations below. Which one violates Article 23 of the Indian Constitution?

- A. A person is forced to work without wages.
- B. A company pays workers according to their skills.
- C. A farmer hires labourers and pays them fairly.
- D. A student volunteers for a cleanliness drive.

Answer: A

148. A woman working in a factory is granted paid leave before and after childbirth. Which law provides this benefit?

- A. Equal Remuneration Act
- B. Medical Termination of Pregnancy Act
- C. Re marriage Act
- D. Maternity Benefit Act

Answer: D

149. Two employees, one man and one woman, performs the same work in a public sector undertaking with equal efficiency. The woman receives lower wages. Which law has been violated?

- A. Prohibition of Child Labour Act
- B. Equal Remuneration Act
- C. Dowry Prohibition Act
- D. Factories Act

Answer: B

150. A district plans to improve education, health care, and employment opportunities for women. What is the most likely long-term outcome?

- A. Decline in sustainable development
- B. Increase in gender inequality
- C. Progress towards sustainable development
- D. Reduction in literacy

Answer: C

151. **Assertion (A):** Men and women are not entitled for equal wages for equal work.

Reason (R): Equal remuneration promotes equality and prevents discrimination at the workplace.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

152. Which directive principle support equal employment opportunities for men and women?

- A. Article 39(a)
- B. Article 14
- C. Article 21
- D. Article 52

Answer A

153. Choose the correctly matched pair:

- A. Adequate means of livelihood for both men and women – Article 39(a)
- B. To renounce practices derogatory to the dignity of women--Article 243-D (3)
- C. Reservation of 1/3 seats to women in local bodies -- Article 23(1)
- D. No discrimination of the ground of sex --- Article 51-A (e)

Answer: A)

154. The word “Divyangam” denotes

- A. People with less qualification
- B. People with special needs
- C. People who excel in sports
- D. People with Disability

Answer: D

155. Which law in India does protect the rights of persons with disabilities by ensuring equality, accessibility, and inclusion?

- A. Right to Information Act, 2005
- B. Consumer Protection Act, 2019
- C. Rights of Persons with Disabilities Act, 2016
- D. Motor Vehicles Act, 1988

Answer: C

156. A government college refuses admission to a student with a certified benchmark disability even though seats are available under the reserved quota. Which principle of RPwD Act being violated?

- A. Availability.
- B. Equality and non – discrimination
- C. Guardianship
- D. Freedom of speech

Answer: B

157. Which of the following is **NOT** one of the objectives of the Rights of Persons with Disabilities (RPwD) Act, 2016?

- A. Promoting accessibility
- B. Ensuring equality
- C. Providing free employment to all persons with disabilities
- D. Preventing discrimination

Answer: C.

158. Which of the following is a provision for person with benchmark disabilities?

- A. Access to free education till he attains the age of 18 years.
- B. Provide reasonable accommodation.
- C. Provide free employment
- D. Provide separate school building and campus

Answer: A

159. A school installs ramps and lifts so that students using wheelchairs can access all classrooms. Which right is being protected?

- A. Right to recreation only
- B. Right to accessibility
- C. Right to get free education.
- D. Right to leisure

Answer: B

160. A new school policy ensures that students with disabilities study in regular classrooms with appropriate support and equal opportunities. Which principle does this policy promote?

- A. Segregation
- B. Inclusion
- C. Discrimination
- D. Attachment.

Answer: B

161. Rena's family grows cotton. The cotton is sent to a textile factory where it is made into cloth. The cloth is then transported by trucks to different shops."

Which sectors are involved in the correct order?

- A. Primary → Secondary → Tertiary
- B. Secondary → Tertiary → Primary
- C. Tertiary → Primary → Secondary
- D. Primary → Tertiary → Secondary

Answer: A

162. Which of the following best explains how the IT revolution has contributed to the growth of the service sector in India?

- A. It reduced agricultural production.
- B. It created new services such as software development, online banking, and IT-enabled services.
- C. It increased mining activities.
- D. It replaced all manufacturing industries.

Answer: B

163. A group of workers runs a small roadside food stall. They share responsibilities such as cooking, serving customers, and managing accounts. However, they receive low wages and have no paid leave or job security. Which characteristic of the informal sector is highlighted through their collaborative work?

- A. Paid leave and job security
- B. High salaries with fixed working hours
- C. Low wages and lack of employment benefits
- D. Government employment

Answer: C

164. **Assertion (A):** The economy can be classified into the primary, secondary, and tertiary sectors based on the nature of economic activity.

Reason (R): Organized and unorganized sectors are classified on the basis of ownership, not on the nature of economic activity.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.

- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: C

165. Read the following statements regarding the classification of the economy based on the nature of economic activity:

- i. The primary sector involves activities related to the extraction of natural resources.
- ii. The secondary sector includes manufacturing and processing activities.
- iii. The tertiary sector provides services that support individuals and other sectors of the economy.
- iv. Organized and unorganized sectors are classifications based on the nature of economic activity.

Choose the correct option:

- A. Statements I, II and III are correct.
- B. Statements II and IV are correct.
- C. Statements I and IV are correct.
- D. All statements are correct.

Answer: A

166. A village has 10 family members working on a small farm, but only 6 workers are actually needed to produce the same amount of crops. The government proposes skill training so that some workers can take up jobs in other sectors.

If you were a member of that village, what suggestion would you like to give?

Options:

- A. All family members should continue working on the farm because it is a traditional occupation.
- B. The extra workers should remain on the farm even if their work does not increase production.
- C. The family should consider new employment opportunities and skill training, as this can improve their income without reducing farm output.
- D. The government should not suggest any changes in employment patterns.

Answer: C

167. Kamal works in a rice mill. His job here is low paid and often not regular. There is no provision for paid leaves. In which Sector is Kamal working?

- A. Organized Sector
- B. Government Sector
- C. Unorganized Sector
- D. Joint Sector

Answer: C

168. Read the statements carefully and find out the incorrect option given below:

- A. MGNREGA has been implemented in whole country now.
- B. MGNREGA guarantees 200 days of assured work to the people in need of it.
- C. The scheme was launched initially in February, 2006.
- D. If the government fails to provide the work, the people are given unemployment Allowances.

Answer: B

169. A country produces rice, clothes, computers, healthcare services, and transport services in a year. While calculating the country's economic performance, only the value of goods and services meant for final use is counted to avoid double counting.

What does the above information try to convey?

- A. GDP shows the value of all final goods
- B. GDP shows all the services of a country
- C. GDP shows the value of final goods and services only
- D. GDP shows all the intermediate goods and final services only

Answer: C

170. In the question given below, there are two statements marked Assertion (A) and Reason (R). Read the statement and choose the correct option.

Assertion (A): The tertiary sector provides services

Reason (R): It produces goods from directly from nature.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.

C. A is true, but R is false.

D. A is false, but R is true.

Answer: C

171. Read the following statements about development:

- 1. Different people may have different developmental goals.
- 2. The developmental goals of different people may sometimes conflict with each other.
- 3. Everyone has the same idea of development.

Which of the above statement(s) is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: A

172. A Country has a total annual income of ₹12, 00,000 crore and a population of 120 crore.. Which concept helps compare the average income of people in the country?

- A. National income
- B. Per capita income
- C. Gross Domestic Product (GDP)
- D. Human Development Index (HDI)

Answer: B

173. A government plans to increase industries but also introduces strict rules to reduce pollution and conserve forests. Which development approach does this best represent?

- A. Economic growth only
- B. Environmental protection only
- C. Women empowerment only
- D. Sustainable development

Answer: D

174. A country has low average income, limited access to healthcare, and a lower life expectancy than most developed nations. Based on these indicators, the country is most likely to be classified as:

- A. A developed country
- B. A developing country
- C. A high-income country
- D. A highly industrialized country

Answer: B

175. Which of the following best explains the purpose of the Human Development Index (HDI)?

- A. To measure only the economic growth of a country
- B. To compare countries only on the basis of income
- C. To measure development using health, education, and income indicators
- D. To measure the availability of natural resources

Answer: C

176. Which of the following statement best describe that per capita income may not be the true indicator of economic development?

- A. Per capita income can be measured both at current prices and at constant prices.
- B. Per capita income includes only those goods and services sold in the market.
- C. High per capita income countries are considered as developed countries.
- D. Per capita income clearly indicates the distribution of income in the society.

Answer: B

177. In the question given below, there are two statements marked Assertion (A) and Reason (R) Read the statement and choose the correct option.

Assertion (A): Sex ratio in India is very low in India as compared to developed countries.

Reason (R): Female do not get good diet and medical care as compared to male.

Options:

- A. Both (A) and (R) are true and (R) is the correct reason of (A)
- B. (A) is false but (R) is true
- C. Both (A) and (R) are false
- D. Both (A) and (R) are true and (R) is not the correct reason of (A)

Answer: A

178. Two countries have equal national income, but one has fewer people. Which country is better developed?

- A. Country with more people
- B. Country with fewer people
- C. Both are equal
- D. Cannot be compared.

Answer B

179. Observe the table and say which state is more developed?

State	PCI	IMR	LR
Meghalaya	90,638	33	68.5
Mizoram	232126	3	71.8
Arunachal Pradesh	279396	21	71.6

(As per the latest Niti Aayog report)

- A. Meghalaya
- B. Mizoram
- C. Arunachal Pradesh
- D. All three States.

Answer: B

180. A government wants to reduce farmers' dependence on money lenders. Which measure would be the most effective?

- A. Increase the interest rate charge by banks.
- B. Make formal credit easier to access through bank and cooperative societies.
- C. Encourage borrowing only from relatives.
- D. Encourage borrowing from indigenous banks

Answer: B

181. A smart phone made in china sold by a Korean company in India This is an example of:

- A. Industrialisation
- B. Privatisation
- C. Globalisation
- D. Nationalisation

Answer: C

182. A farmer has surplus rice and wants to exchange it for a bicycle. The bicycle seller is willing to accept only vegetables instead of rice. This exchange cannot take place because of:

- A. Commodity money
- B. Medium of exchange
- C. Double coincidence of wants
- D. Banking system

Answer: C

183. Rita has extra wheat, while her neighbour has milk. They exchange wheat for milk

without using money. Which economic system does this illustrate?

- A. Credit system
- B. Banking system
- C. Barter system
- D. Digital payment system

Answer: C

184. Consider these statements and choose the correct option

Statement I: The barter system requires both parties to want each other's goods or services.

Statement II: This requirement often makes exchange difficult and inconvenient.

Options:

- A. Both Statements I and Statement II are true, and Statement II correctly explains Statement I.
- B. Both Statements I and Statement II are true, but Statement II does not explain Statement I.
- C. Statement I is true, but Statement II is false.
- D. Statement I is false, but Statement II is true.

Answer: A

185. A farmer wants a loan at a reasonable rate of interest with proper legal protection. Which source of credit is the most suitable?

- A. Moneylender
- B. Co-operative society
- C. Trader
- D. Indigenous bank

Answer B

186. Which of the following situations indicates that a group is **not** functioning as a Self Help Group (SHG)?

- A. Members save regularly and lend money to one another.
- B. The group has 15–20 members.
- C. Members depend mainly on high-interest loans from moneylenders instead of their pooled savings.
- D. Members collectively manage their savings and lending activities.

Answer: C

187. A customer buys groceries using currency notes. Which function of money is demonstrated in this situation?

- A. Store of value
- B. Medium of exchange
- C. Unit of production
- D. Means of barter

Answer: B

188. A newspaper reports that a bank has been penalized for not following the rules while giving loans to customers. The action was taken by the country's banking regulator to ensure that banks function fairly and protect the interests of depositors and borrowers.

Question: Which institution is responsible for supervising the functioning of formal sources of credit in India?

- A. Ministry of Finance
- B. Head Office of the Bank
- C. Reserve Bank of India (RBI)
- D. Co-operative Society

Answer: C

189. Which statement best explains the role of bank in economic development?

- A. They print currency notes.
- B. They act as intermediary between the depositors and borrowers.
- C. They discourage the collateral
- D. They collect various taxes for the government.

Answer: B

190. Rekha, who lives in an urban slum, wants to start a small tailoring business. She needs a loan and is considering different sources of finance. Which option would best help her make a flexible and beneficial financial decision?

- A. Borrow from a local moneylender who charges a high interest rate.
- B. Take a loan from a formal financial institution offering lower interest and transparent terms.
- C. Borrow from an informal lender without comparing the repayment conditions.
- D. Depend only on friends and relatives even if the amount is insufficient.

Answer: B

191. Match List A with List B

List A	List B
a. Barter system	1.Member based lending
b. Money lender	2.Papermoney issued by RBI
c. Currency notes	3.High interest rate
d. SHG	4.Exchange of goods and services

Options:

- A. a – 1, b -2, c – 3, d - 4
- B. a – 4, b -3, c – 2, d – 1
- C. a – 2, b – 1, c – 3, d – 4
- D. a – 3, b – 2, c – 4, d – 3

Answer B

192. A group of students is comparing different types of companies. One student says, *"This Company owns factories in India, Brazil, and South Africa and manages production from its headquarters."* Which type of company are the students describing?

- A. Foreign Company
- B. Government Company
- C. Multinational Company
- D. public -Private Partnership Company

Answer: C

193. Read the following statements about Multinational Companies (MNCs):

1. They own or control production in more than one country.
2. They establish factories close to markets to reduce transport costs.
3. They organise production across different countries.
4. They recruit workers only from their home country.

Which statement does not correctly describe an MNC?

- A. Statement 1
- B. Statement 2
- C. Statement 3
- D. Statement 4

Answer: D

194. A multinational company plans to establish a new manufacturing unit in another country. It considers the availability of skilled labour, government support, and access to markets. Which of the following factors is **least likely** to influence its decision?

- A. Availability of skilled and unskilled labour
- B. Nearness to markets
- C. Favourable government policies
- D. Presence of a large number of local competitors

Answer: D

195. A country encourages globalization by allowing foreign companies to invest and compete with local firms. Which outcome best supports this policy?

- A. Reduced economic growth
- B. Increased unemployment in every sector
- C. Increased competition leading to innovation and better choices for consumers
- D. Reduced cultural exchange among countries

Answer: C

196. In the question given below, there are two statements marked Assertion (A) and Reason (R). Read the statement and choose the correct option

Assertion (A): Many companies prefer to establish production units in Special Economic Zones (SEZs).

Reason (R): SEZs provide tax concessions, better infrastructure, and simplified business procedures.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Answer: A

197. During a classroom discussion, four students shared their opinions about the World Trade Organization (WTO).
- **Riya:** "The WTO gives every country an equal chance to compete in global trade."
 - **Aman:** "Some developing countries struggle because they cannot compete with large multinational companies."
 - **Neha:** "The WTO has no effect on small farmers or local industries."
 - **Rahul:** "All WTO policies benefit both developed and developing countries equally."

Which student's opinion best reflects a genuine concern about a **disadvantage of the WTO** while considering different perspectives?

- A. Riya, because the WTO provides equal opportunities to all countries.
- B. Aman, because developing countries may face difficulties competing with stronger economies.
- C. Neha, because WTO policies do not affect farmers or local industries.
- D. Rahul, because WTO benefits every country in the same way.

Answer: B

198. An Indian automobile manufacturer faces tough challenge after foreign car companies enter in the Indian market. What is the most likely impact on the manufacturer?

- A. The Indian manufacturer will stop producing cars immediately.
- B. The government will ban all foreign companies.
- C. The Indian manufacturer may improve quality and reduce prices to remain competitive.
- D. The government may re-introduce the trade barrier.

Answer: C

199. A group of artisans in a village wants to sell handmade products to international buyers. Which government initiative would make globalisation fairer for them?

- A. Reducing wages of artisans
- B. Providing training, better transport, and online marketing support
- C. Increasing taxes on small businesses
- D. Restricting the sale of local products

Answer: B

200. **Match the column**

List A	List B
a. Foreign Investment	1. Removal of trade restrictions
b) Liberalisation	2. Person who uses goods and services
c) SEZ	3. Investment by MNCs in another country
d) Consumers	4) Areas with special business rules

Options:

- A. a – 3, b – 1, c – 4, d – 2
- B. a – 1, b – 2, c – 3, d – 4
- C. a – 2, b – 3, c – 4, d – 1
- D. a – 4, b – 3, c – 2, d – 1

Answer: A

Section-B

Short Questions and answers: 2 marks

1. Do you think the Treaty of Vienna successfully maintained peace in Europe? Give two reasons.

Answer:

Yes, the treaty of Vienna could maintain peace in Europe to a great extent

- i. It restored political stability by re-establishing monarchies and maintaining a balance of power.
- ii. The treaty prevented any major European war for nearly four decades (1815–1853).

2. Napoleon Bonaparte introduced several administrative reforms that influenced many countries. Which two of the following reforms introduced by Napoleon are still followed in many parts of the world today?

Answer:

- i. Napoleonic Code (Civil Code): It established equality before the law and protected the right to property.
- ii. Uniform system of weights and measures (metric system): It introduced a standardized system that is widely used across the world today.

3. “King Charles Albert, the ruler of Piedmont was defeated by the Austrians in the Battle of Custoza”. If the king had won the battle, how might the history of Italy have been different? Give two possible outcomes.

Answer:

If **King Charles Albert** had won the battle:

- i. Austria’s domination over Italy would have ended earlier.
- ii. Italy might have become a united nation much before the actual unification.

4. After the Unification of Germany in 1871, European nations started competing in building armies and claimed superiority over others. Do you agree that this shows nationalism had become militaristic and chauvinistic? Explain with two points.

Answer:

Yes, I do agree that after the Unification of Germany in 1871, European nations started competing in building armies and claimed superiority over others.

Militaristic: Countries like Germany and Britain started an arms race, especially naval competition, to show power.

Chauvinistic: Nations like France and Germany developed extreme pride and believed their nation was superior, leading to hatred for others.

5. “The Civil Disobedience Movement was more aggressive than Non Cooperation.” Justify the statement.

Answer:

The Civil Disobedience Movement was more aggressive than the Non-Cooperation Movement because:

- i. People openly broke unjust laws, such as the Salt Law, and refused to pay certain taxes.
- ii. Unlike the Non-Cooperation Movement, which mainly involved boycotting British Institutions and goods, the Civil Disobedience Movement directly challenged British authority through mass law-breaking and defiance.

6. If you were asked to design a new Commission for India in 1927, what two principles would you include to make it acceptable to all Indians? Explain.

Answer.

- i. **Principle of Representation:** The Commission must have Indian members because Indians have the right to decide their own future.
- ii. **Principle of Self-Governance:** The commission should recommend Dominion Status instead of just reviewing the 1919 Act, to respect Indian demands.

7. 'The Rowlatt Act led to a nationwide protest in 1919'. Give two reasons to support the statement.

Answer:

The Rowlatt Act caused a nationwide protest in 1919 because:

- i. The Act allowed arrest without any trial which threatened every Indian's personal liberty.
- ii. Indians expected reforms after supporting Britain in the First World War but got repressive laws instead, causing anger.

8. Identify any two factors that contributed to the growth of industries during the Industrial Revolution in Europe.

Answer:

- i. The invention of new machines increased production.
- ii. The availability of coal and iron supported industrial development.

9. Mention any two ways in which the factory system transformed the method of production.

Answer:

- i. Goods were produced in factories using machines instead of by hand at home.
- ii. Large-scale production made manufacturing faster and more efficient.

10. Give two reasons why child labour should be abolished in industries.

Answer:

- i. Children have the right to education and healthy development.
- ii. Child labour affects their physical and mental well-being.

11. Mention any two ways in which Indian Nationalists opposed the Vernacular Press Act, 1878.

Answer:

- i. It allows the British Government to have more authority over publishing and also held it to repress seditious writing

- ii. The act clearly discriminated between the English and the Vernacular Press

12. Explain why Gutenberg's printing press is considered a revolutionary invention in the history of print culture?

Answer:

- i. Gutenberg developed the movable metal type printing press, making printing faster, cheaper, and more accurate.
- ii. It enabled the mass production of books, spreading knowledge and ideas to a larger number of people

13. Do you think print culture was essential for the spread of education? Justify your answers with any two points.

Answer:

- i. Print culture made books and learning materials easily available.
- ii. More people could read and gain knowledge at a lower cost.

14. Evaluate how the Union List, State List and Concurrent List help in ensuring efficient governance in India.

Answer:

- i. The Union, State and Concurrent Lists clearly divide legislative powers between the Centre and the States, preventing overlap and confusion in administration.
- ii. This division enables each level of government to manage its own responsibilities efficiently while promoting cooperation on matters of common interest.

15. 'During a quiz, a student claims that the Centre is stronger than the States in India. Analyse the statement using constitutional provisions.

Answer:

- i. The Centre is stronger because it has greater powers during emergencies and can create new states by changing their boundaries.
- ii. It also has greater legislative authority through the Union List, and Governors can reserve certain State Bills for the President's approval.

16. A group of doctors forms an association to protect their professional interests. Identify the type of pressure group and justify your answer.

Answer:

- i. It is a Sectional Interest Group because it represents the interests of a particular section of society, namely doctors.
- ii. Its main aim is to protect the professional rights and welfare of its members by influencing government policies.

17. Explain the process through which pressure groups influence government policies.

Answer:

- i. Pressure groups influence government policies by organising campaigns, demonstrations, protests and petitions to draw the government's attention to public issues.
- ii. They also create public awareness through the media and mobilise public opinion, encouraging the government to adopt favourable policies.

18. State any two criteria for political party to be recognized as a national party.

Answer:

A political party is recognized as a National Party if it meets the following criteria:

- i. It should get at least 6% of the valid votes in four or more States and wins at least 4 Lok Sabha seats.
- ii. It should win at least 2% of the total Lok Sabha seats which is 11 seats and must also be recognized as a State Party in at least four States.

19. Outline the procedures followed in conducting an election in India.

Answer:

The correct sequence of the procedures followed in conducting an election in India is:

- I. Filing of nomination
- II. Election campaign
- III. Polling (voting)
- IV. Counting of votes and declaration of election results
- V. Formation of the government

20. Analyse how the Women's Justice Initiative (WJI) helps in protecting women's rights.

Answer:

- i. WJI provides legal aid, counselling and court representation to women facing violence and discrimination, helping them access justice.
- ii. It creates awareness through legal education, files Public Interest Litigations (PILs) and works for the effective implementation of women's rights laws.

21. Do you think laws alone are enough to ensure a women's right? Give reasons.

Answer:

No, laws alone are not enough to ensure women's rights because:

- i. Laws must be effectively implemented, and those who violate women's rights should be punished to ensure justice.

- ii. Society must change its attitude towards women, and women should be educated and made aware of their rights so they can exercise them confidently.

22. Imagine you are a school principal. What two measures would you take to promote inclusive education in your school?

Answer:

- i. Admit students with disabilities without discrimination and provide reasonable accommodation according to their needs.
- ii. Make school buildings accessible and provide trained teachers and learning materials suitable for different disabilities.

23. How has women's reservation helped society?

Answer:

- i. Increased women's participation in governance: Reservation has enabled more women to become members of Panchayats and Municipalities, giving them an opportunity to participate in decision-making and public administration.
- ii. Promoted empowerment and equality: It has strengthened the social and political status of women by ensuring their representation in local self-government and encouraging equal participation in democratic processes.

24. Do pressure groups always have a positive impact? Give your opinion with one reason.

Answer:

No, pressure groups do not always have a positive impact. At times, they may promote the interests of only a particular section of society instead of the welfare of the entire public.

Reason: Some pressure groups may use strikes, protests, or demonstrations that disrupt normal public life and create inconvenience for others.

25. During a general election, no single political party wins enough seats to form the government. What is the most likely outcome in such a situation?

Answer:

- i. A coalition government is formed, where two or more political parties join together to secure a majority and form the government.
- ii. The coalition parties share power and work together on the basis of a common programme to run the government.

26. Evaluate how equal opportunities improve the status of women in India.

Answer:

- i. Equal opportunities in education, employment, and public life enable women to develop their talents, become economically independent, and actively contribute to the progress of their families and society.
- ii. They promote gender equality by ensuring that women enjoy the same rights and opportunities as men, thereby improving their social status, confidence, and overall quality of life.

27. Examine how the objectives of the Rights of Persons with Disabilities Act, 2016 strengthen the constitutional values of equality and justice.

Answer:

- i. The Act guarantees equal rights and opportunities for persons with disabilities by prohibiting discrimination and ensuring equal access to education, employment, healthcare, and public services. This upholds the constitutional principle of equality before the law.
- ii. The Act promotes inclusion, dignity, and social justice by creating a barrier-free environment, encouraging accessibility, and ensuring that persons with

disabilities can participate fully and independently in all aspects of social, economic, and political life. This reflects the constitutional values of justice, equality, and respect for human dignity.

28. Why should we use non-renewable resources carefully?

Answer:

- i. They are limited in quantity and take millions of years to form.
- ii. Careful use helps conserve them for future generations.

29. Suggest two ways to convert a potential resource into an actual resource.

Answer:

- i. Identification and preparation of inventory of resources which involves surveying, mapping and estimation and measurement of quantity, characteristics and properties of the resources.
- ii. Developing a planning structure empowered with appropriate technology, skill and setting up institutions for implementing the aims of resource planning.

30. Describe sustainable economic development and explain why it is necessary in today's world.

Answer:

Sustainable economic development aims at meeting human development goals while at the same time sustaining resources and ecosystem services upon which the economy and society depend. It is necessary to prevent resource depletion and ensure a healthy environment for future generations.

31. Explain how the distribution of alluvial soils influences population density.

Answer:

- i. Alluvial soil is highly fertile and supports cultivation of crops such as rice and wheat.
- ii. Agriculture provides employment and food, so people settle in fertile river plains, resulting in high population density.

32. Differentiate between Sheet Erosion and Gully Erosion.

Answer:

Sheet erosion occurs when water flows down the slope as a thin sheet and removes the top layer of a soil. It removes fertile topsoil over a large area. Whereas gully erosion occurs when running water cuts deep channels as gullies in clayey soil. It forms deep gullies and make the land uncultivable.

33. How can constructing a dam help farmers to overcome water shortages during the dry season?

Answer:

- i. Dams can ensure regular supply of water for agriculture helping the farmers to grow crops throughout the year.
- ii. Rainwater that is stored in the dams can be used for irrigation during the dry season.

34. How can dams affect aquatic life?

Answer:

- i. Dams destroy habitats for aquatic life.
- ii. Dams fragment rivers, making migration difficult for the aquatic fauna.

35. If a region has abundant coal but also many rivers, which source of electricity should be preferred for sustainable development? Justify the statement.

Answer:

- i. Hydroelectricity should be preferred because it is generated from fast-flowing water which is a renewable.
- ii. It helps in the conservation of non-renewable resources like coal, petroleum and natural gas.

36. A region is rich in bauxite. What industrial activity is likely to develop there and why?

Answer:

Aluminium industry is likely to develop a region is rich in bauxite. This is because Bauxite is the chief ore use for manufacturing aluminium and locating the industries near the raw material reduces transportation cost.

37. A farmer shifts from traditional seeds to HYV seeds. What impact will this have on production?

Answer:

- i. High Yielding Variety (HYV) seeds produce a much higher crop yield than traditional seeds when supplied with proper irrigation, fertilizers and pesticides.
- ii. This increases food grain production, improves farmer's income, and supports commercial farming with modern agricultural practices.

38. Suppose Farmers in your area want to earn income through sericulture. Suggest two steps they should take.

Answer:

- i. Rearing of healthy silkworms by maintaining proper hygiene and protecting them to ensure good quality silk production.
- ii. Cultivating mulberry plants, as their leaves are the main food for silkworm, helping them grow well and produce better silk cocoons.

39. Your school plans to promote eco-friendly products. Suggest any two ways to encourage the use of jute products.

Answer:

- i. Create awareness about the environmental benefits of jute as it is biodegradable, recyclable and eco-friendly.
- ii. Encourage the use of jute bags and other jute products instead of plastic to reduce pollution and to support sustainable development.

40. If you were planning to set up a cement factory, what factor related to raw material would you consider first and why?

Answer:

I would choose a location near limestone deposit, because limestone is the main raw material for cement factory.

Proximity to a limestone deposits will help to reduce transportation costs and ensures uninterrupted production.

41. How does the shift from 'Palanguin' to buses and trains reflect changes in the transport system? Give any two points.

Answer:

The shift from 'Palanguin' to buses and trains reflect changes in the transport system in the following ways:

- i. Transport systems have evolved to meet the growing needs of people.
- ii. Modern transport such as buses and trains, is faster, carries more passengers and makes travel more comfortable.

42. Explain any two ways in which tourism benefits both tourists and local communities.

Answer:

Tourism benefits both tourists and local communities.

- i. Tourism promotes national and international understanding and cultural exchange.

- ii. It create employment opportunities and supports local handicrafts and the economy.

43. State any two characteristics of the matrilineal system in Meghalaya?

Answer:

Meghalaya has historically followed a matrilineal system where Lineage and inheritance are traced through women. The youngest daughter inherits the family wealth and cares for her parents. This system gives women an important position in the family, preserves family property and strengthens family ties and social security.

44. Meghalaya often faces a deficit in food grains production. Explain any two reasons for this situation.

Answer:

- i. Agricultural productivity is low because many farmers still depend on traditional farming methods, including shifting cultivation and make limited use of scientific farming practices.
- ii. Inadequate irrigation facilities, limited use of improved seeds, fertilizers and modern agricultural technology also reduce crop yields and overall farm productivity.

45. State any two features of the tertiary sector.

Answer:

- i. It provides services instead of producing goods.
- ii. It supports the growth of the primary and secondary sectors.

46. A worker loses his wages whenever he is absent from work. Identify the sector and justify your answer with one reason.

Answer:

Sector: Unorganized sector.

Reason: There is no job security or paid leave in the unorganized sector.

47. Why should all sectors of the economy be given equal importance? Give any two reasons.

Answer:

- i. Each sector depends on the others for growth and development.
- ii. Balanced development creates more employment and improves the economy.

48. How are the primary and secondary sectors related? Give any two points.

Answer:

- i. The primary sector supplies raw materials to the secondary sector.
- ii. The secondary sector processes these raw materials into finished goods.

49. Explain how literacy improves the quality of life. Give any two points.

Answer:

- i. It increases employment opportunities.
- ii. It helps people make informed decisions about health and society.

50. Why should development benefit all sections of society? Give any two reasons.

Answer:

- i. It reduces inequality among people.
- ii. It improves the overall standard of living.

51. Explain how banks help people save and use money.

Answer:

- i. Banks provide a safe place to keep savings.
- ii. They lend money to individuals and businesses for productive activities.

52. State any two ways in which banks and borrowers work together in economic development.

Answer:

- i. Banks provide loans for business and farming activities.
- ii. Borrowers repay loans, enabling banks to lend to others.

53. State any two advantages of using bank deposits instead of keeping cash at home.

Answer:

- i. Money remains safe and earns interest.
- ii. Deposits can be used for digital payments and withdrawals when needed.

54. Suggest any two ways to reduce the negative effects of globalisation on small producers.

Answer:

- i. Provide financial and technical support to small producers.
- ii. Encourage the use and marketing of local products.

55. Suggest any two innovative ways in which technology can help local businesses compete in the global market.

Answer:

- i. Sell products through online platforms.
- ii. Use digital marketing to reach more customers.

56. Income alone is not enough to measure development. Explain why?

Answer:

Income alone is not enough to measure development because:

- i. Development includes quality of life, such as good health, education, clean environment, equality, and security, not just income.
- ii. Income may be unequally distributed, so even if the average income is high, many people may still live in poverty.

57. Differentiate between demand deposits and fixed deposits.

Answer:

Demand Deposits	Fixed Deposits
Money can be withdrawn at any time.	Money is deposited for a fixed period.
Used for daily transactions and payments.	Earns higher interest but cannot be withdrawn before maturity without conditions.

58. Why did the Government of India put barriers on foreign trade and foreign investment?

Answer:

The Government of India put barriers on foreign trade and foreign investment in order to:

- i. Protect domestic industries from foreign competition.
- ii. Promote the growth of Indian industries and prevent excessive dependence on foreign companies.

Section-C

Long Questions and answers: 5 marks

1. Analyze how the rise of nationalism in the Balkans contributed to the disintegration of the Ottoman Empire.

Support your answer with suitable examples.

Answer:

The rise of nationalism in the Balkans played a major role in weakening and eventually disintegrating the Ottoman Empire.

- i. **Growth of Nationalism:** Inspired by the ideas of liberty and self-rule, many ethnic groups in the Balkans wanted independent nation-states.
- ii. **Demand for Independence:** Countries such as **Greece, Serbia, Bulgaria, and Romania** revolted against Ottoman rule and gradually gained independence.
- iii. **Weakening of Ottoman Control:** As more territories broke away, the Ottoman Empire lost political power, land, and resources.
- iv. **Rivalry among Balkan States:** Newly independent Balkan nations competed with one another to expand their territories, increasing regional instability.
- v. **Interference by European Powers:** Powerful nations such as Russia and Austria-Hungary supported different Balkan groups to promote their own interests, further weakening the Ottoman Empire.

2. Explain the Gandhi-Irwin Pact. Do you think it was a success? Give reasons.

Answer:

The **Gandhi-Irwin Pact** was signed on **5 March 1931** between Mahatma Gandhi and Lord Irwin. It temporarily ended the Civil Disobedience Movement and paved the way for discussions between the British Government and the Indian National Congress.

The main terms of the Pact were:

- i. It promised dominion status to India
- ii. The Congress agreed to suspend the Civil Disobedience Movement.
- iii. Gandhi agreed to participate in the Second Round Table Conference in London.

- iv. The British Government agreed to release political prisoners who had not committed violent crimes.

It was a partial success because:

- i. It led to the release of thousands of political prisoners.
 - ii. The Congress was recognized as a major political force and invited to negotiate with the British.
- However, the demand for Complete Independence was not accepted.

3. The Non-Cooperation Movement marked a turning point in India's freedom struggle."

Do you agree with this statement?

Evaluate its achievements and limitations to justify your answer.

Answer:

Yes, I agree that the Non-Cooperation Movement was a turning point in India's freedom struggle because it transformed the nature of the national movement.

Achievements:

- i. It was the first nationwide mass movement led by Mahatma Gandhi, involving people from different regions, religions, and social groups.
- ii. It encouraged Indians to boycott foreign goods, government schools, law courts, and titles, promoting the spirit of Swadeshi and self-reliance.
- iii. The movement increased political awareness and inspired ordinary people, including women, students, and peasants, to participate in the freedom struggle.

Limitations:

- iv. The movement was withdrawn after the Chauri Chaura incident, disappointing many supporters.
- v. It did not achieve its immediate objective of Swaraj (self-rule).
- vi. The sudden withdrawal created confusion among many freedom fighters.

However, despite its limitations, the Non-Cooperation Movement was a major turning point because it united millions of Indians under a common cause and laid the foundation for future mass movements.

4. Construct an explanation showing how different social groups participated in the **Civil Disobedience Movement** and explain how their expectations and objectives influenced their participation.

Answer:

Different social groups participated in the **Civil Disobedience Movement** (1930) with different expectations and objectives. Although they united under Mahatma Gandhi's leadership, each group hoped to achieve its own goals.

Rich Peasants: Rich farmers from Gujarat, Uttar Pradesh, and Andhra Pradesh wanted a reduction in land revenue and protection from economic hardships. They actively joined the movement hoping the government would lower taxes.

Poor Peasants: Poor peasants expected relief from high rents and wanted remission of unpaid rent. However, the Congress did not support their demand to stop rent payments, so many later withdrew from the movement.

Business Class: Indian industrialists and traders supported the movement because they wanted protection from foreign competition, lower taxes, and freedom to expand Indian industries.

Women: Women from both urban and rural areas took part in processions, picketing, and boycotts. They hoped to contribute to India's freedom and gain greater respect and participation in public.

5. What is industrialization? Examine the impact of British policies on India weavers.

Answer:

Industrialization is the process of developing industries on a large scale by using machines, factories, and modern technology to produce goods efficiently.

Impact of British Policies on Indian Weavers: British policies had a severe impact on Indian weavers:

- i. Cheap machine-made cloth from Britain flooded Indian markets, reducing the demand for hand woven Indian textiles.
- ii. Heavy taxes and restrictions were imposed on Indian textiles, while British goods entered India with low duties.
- iii. Many weavers lost their livelihood because they could not compete with cheaper factory-made products.
- iv. Weavers were often forced to sell cloth at very low prices to British traders.

As a result, many weaving families fell into poverty and shifted to agriculture or other low-paying jobs.

6. **Statement:** A merchant wants to increase cloth production but faces restrictions from powerful guilds in towns. He decides to organise production in the countryside by involving peasants and artisans.

Explain how this system benefited both the merchants and the rural workers.

Answer:

- i. The powerful guilds in towns restricted merchants from expanding production, so merchants shifted production to the countryside.
- ii. Due to the enclosure movement, many poor peasants and cottagers lost access to common lands and looked for additional sources of income.
- iii. Merchants supplied raw wool to rural spinners, weavers, fullers, and dyers, while controlling every stage of production and marketing.
- iv. Rural families could continue farming on their small plots while earning extra income through cloth production, making full use of family labour.
- v. This proto-industrial system increased cloth production, benefited merchants by reducing costs and avoiding guild restrictions, and provided employment and supplementary income to rural households.

7. **Statement:** A company used advertisements, labels, and calendars with Indian cultural images to attract customers and increase the sale of its products.

Based on the above statement, explain how advertisements and labels were designed to influence Indian consumers. How did Indian manufacturers use advertisements differently during the Swadeshi Movement?

Answer:

- i. Advertisements made products appear attractive, useful, and necessary to consumers.

- ii. Labels carried the company's name and images of Indian gods, goddesses, and royal figures to gain the trust of buyers.
 - iii. Calendars with attractive pictures were distributed to homes, shops, and offices to keep the products popular.
 - iv. These methods helped foreign manufacturers increase the sale of their goods in India.
 - v. During the Swadeshi Movement, Indian manufacturers used advertisements to encourage people to buy Indian-made goods as a symbol of patriotism.
- 8. Statement:** With the spread of education and printing, books and magazines became available to children, women, and workers, creating opportunities for learning and social awareness.

Based on the above statement, explain how the growth of print culture showed sensitivity towards the educational and social needs of children, women, and workers.

Answer:

- i. The spread of primary education increased the demand for school textbooks and children's literature, helping children develop reading habits.
- ii. Women's magazines and books encouraged women to read, write, and express their ideas.
- iii. Women writers such as Jane Austen, the Bronte Sisters, and George Eliot presented educated and independent women in their works.
- iv. Lending libraries enabled workers, artisans, and lower middle-class people to borrow books and improve their knowledge at an affordable cost.
- v. Thus, print culture promoted equal access to education, encouraged social awareness, and empowered different sections of society.

- 9. "A social reformer wants to spread his ideas to people living in different parts of India".**
Explain how print culture would help the reformer spread his ideas and promote public debates.

Answer:

- i. He could publish newspapers, pamphlets, and books.
- ii. His ideas would reach many readers quickly.
- iii. Others could express agreement or disagreement through print.
- iv. Printing in local languages would increase public participation.
- v. This would encourage discussions and support social and religious reforms.

- 10. Evaluate the Role of Print in the Growth of Nationalism in India.**

Answer:

Print played a significant role in the growth of nationalism in India.

- i. Spread nationalist ideas: Newspapers, books, and pamphlets spread ideas of freedom, equality, and self-rule among people.
- ii. Created political awareness: Print informed people about British policies, social issues, and the need for national unity.
- iii. Inspired the freedom movement: Writings and speeches of nationalist leaders motivated people to join protests and movements.
- iv. Promoted unity: Newspapers published in different Indian languages connected people from different regions and communities.

- v. Encouraged public opinion: Print became a platform to criticize British rule and mobilize support for the nationalist cause.

11. Statement: Social and religious reformers used print media to work together with the public in spreading new ideas and promoting social change.

Based on the above statement, explain how print culture promoted collaboration between reformers and the public in bringing social and religious reforms in nineteenth-century India.

Answer:

- i. Print media such as books, newspapers, journals, and magazines enabled reformers to spread their ideas to a large number of people.
- ii. Reformers raised important issues like widow immolation, caste discrimination, idolatry, priesthood, and monotheism, encouraging people to think and participate in reforms.
- iii. Muslim scholars published fatwas and religious writings to guide people in their daily lives and explain Islamic teachings.
- iv. People from different communities read these publications, shared opinions, and participated in discussions and debates.
- v. This collaboration between reformers and the public helped create awareness, encouraged social and religious reforms, and strengthened public participation.

12. Explain the characteristics of arid soil and the challenges in its use.

Answer:

Arid soil is found mainly in the dry and desert regions of western India, especially Rajasthan and Gujarat. It is red to brown, sandy, and coarse in texture. The soil is porous, so it has low moisture-retaining capacity. It contains very little humus and nitrogen but is rich in mineral salts. A layer of calcium carbonate

(kankar) forms in the lower part of the soil, restricting water movement.

The main challenges are low fertility, poor moisture retention, scarce rainfall, and the hard kankar layer, which limits root growth. The soil is also prone to wind erosion. However, with proper irrigation, organic manure, fertilisers, and soil conservation measures, arid soil can be made suitable for agriculture.

13. Explain how different human activities lead to land degradation in India.

Suggest appropriate conservation measures to overcome these problems.

Answer:

The different human activities lead to land degradation in India.

- i. **Deforestation** removes vegetation cover, causing soil erosion.
- ii. **Overgrazing** exposes the soil, making it prone to erosion.
- iii. **Mining and quarrying** leave deep pits and damage the land.
- iv. **Excessive use of chemical fertilizers and pesticides** reduces soil fertility.
- v. **Improper irrigation** causes water logging and salinity.

These problems can be addressed through afforestation, watershed management, controlled grazing, reclamation of mined land, and sustainable farming practices, ensuring long-term environmental conservation and economic development.

14. Water scarcity in India is caused more by poor management of water resources than by the lack of rainfall."

Evaluate this statement.

Answer:

The statement is largely correct because many parts of India receive sufficient rainfall, but water is not managed efficiently.

- i. Rainwater is often not harvested or stored properly.
- ii. Excessive groundwater extraction has lowered the water table.
- iii. Rivers, lakes, and ponds are polluted or neglected.

- iv. Water is wasted in agriculture and urban areas due to inefficient practices.
- v. Better planning, conservation, and public awareness can reduce water scarcity.

Therefore, while irregular rainfall contributes to the problem, poor water management is a major reason for water scarcity in post-independence India.

A state government observes that despite providing high-yielding seeds and fertilisers, food grain production has not increased significantly.

- 15. Examine the factors responsible for the stagnation of food grain production in India.**

Answer:

- i. **Declining soil fertility:** Continuous cultivation of the same crops and the excessive use of chemical fertilisers and pesticides have reduced soil fertility, leading to lower crop yields over time.
- ii. **Shift to commercial crops:** Many farmers have shifted from growing food grains to commercial and horticultural crops such as cotton, sugarcane, fruits, and vegetables because these crops provide higher profits and better market demand.
- iii. **Reduction in agricultural land:** Agricultural land is gradually decreasing due to rapid urbanisation, industrialisation, and the construction of roads, housing, and other infrastructure, leaving less land available for food grain cultivation.
- iv. **Dependence on monsoon rainfall:** In many parts of India, irrigation facilities are still inadequate. As a result, farmers depend heavily on uncertain monsoon rains, which affect food grain production during years of poor rainfall.
- v. **Small landholdings and limited technology:** Most farmers own small and fragmented landholdings, making it difficult to use modern farming techniques and machinery efficiently. This limits productivity and contributes to the stagnation of food-grain production.

- 16. Imagine that all conventional energy resources become unavailable for one month in your area.**

Prepare an **Action plan** to reduce the use of conventional energy and promote sustainable development.

Answer: Action plan

- i. Install solar panels on homes, schools, and public buildings.
- ii. Promote biogas plants in rural areas.
- iii. Encourage the use of wind and small hydel power where suitable.
- iv. Replace conventional streetlights with solar-powered LED lights.
- v. Create awareness about energy conservation.
- vi. Encourage public transport, cycling, and electric vehicles powered by renewable energy.

This plan reduces dependence on fossil fuels, lowers pollution, conserves natural resources, and ensures a clean and sustainable future for coming generations.

- 17. Describe the different modes of occurrence of minerals.**

Answer:

Minerals occur in different forms in nature:

- i. **In igneous and metamorphic rocks:** Minerals fill cracks, crevices, faults, and joints. Smaller deposits are called veins, while larger ones are called lodes.
- ii. **In sedimentary rocks:** Minerals occur in beds or layers formed by deposition, accumulation, and concentration over millions of years. Coal and some iron ore are examples.
- iii. **By evaporation:** Minerals such as gypsum, potash, and salt are formed when water evaporates in arid regions.
- iv. **As alluvial deposits (placer deposits):** Minerals like gold, silver, tin, and platinum are found in sands of river valleys and at the base of hills.
- v. **In ocean water:** The oceans contain dissolved minerals, especially common salt, magnesium, and bromine.

18. Suppose you are a farmer who wants to cultivate or plant **one beverage crop**.

What is the **geographical condition** which will be suitable for the crop to be grown?

Mention **any two states** where that crop is produced in India, which you like to visit once to understand better before growing your favorite beverage crop. *(The following answer is only a sample. Students may choose anyone suitable beverage crop and answer accordingly)*

Answer:

If I wanted to cultivate my favorite beverage crop, I would choose **TEA**.

Tea grows best in a warm and humid climate with temperatures between 20°C and 30°C.

It requires well-distributed rainfall (150–300 cm) throughout the year and well-drained, fertile, acidic soil on hill slopes.

These conditions help the tea plants grow healthy and produce good-quality leaves.

Assam and West Bengal (Darjeeling) are the two leading tea-producing states in India.

19. Evaluate the importance of promoting manufacturing in economically underdeveloped and tribal areas for reducing poverty, generating employment, and ensuring balanced regional development.

Suggest five measures.

Answer:

- Provide financial incentives:** The government should offer subsidies, tax concessions, and other incentives to encourage industries to be established in economically underdeveloped and tribal areas.
- Develop infrastructure:** Adequate facilities such as roads, electricity, water supply, transport, and communication should be provided to attract industries to these regions.
- Promote employment opportunities:** Setting up industries in these areas will create jobs for local people, reduce poverty, and improve their standard of living.

iv. **Ensure balanced regional**

development: Industrial development in economically underdeveloped and tribal areas helps reduce regional disparities by spreading economic activities more evenly across the country.

v. **Encourage the use of local**

resources: Industries should make use of locally available raw materials and human resources, leading to the overall development of these regions and improving the economy.

20. Distinguish between an Integrated Steel Plant and a Mini Steel Plant.

Answer:

Integrated Steel Plant	Mini Steel Plant
Uses iron ore as the main raw material to produce steel.	Mainly uses scrap steel and sponge iron to manufacture steel.
Requires large capital investment and extensive infrastructure.	Requires less investment and can be set up on a smaller scale.
Produces steel on a large scale with high production capacity.	Produces steel on a small scale to meet local or regional demand.
Depends on the availability of iron ore, coal, limestone, power, and transport.	Depends mainly on electric furnaces and recycled scrap.
Examples: Bhilai, Bokaro, Rourkela, Durgapur, and Jamshedpur.	Examples: Salem Steel Plant and Visvesvaraya Iron and Steel Plant.

21. Shillong, the capital of Meghalaya, is located in a hilly region with steep slopes, deep valleys, and heavy rainfall, unlike the Northern Plains.

Examine why railway development in Shillong and other parts of Meghalaya is more difficult than in the Northern Plains.

Answer:

- The Northern Plains have flat and level land, making railway construction easier, whereas Shillong

- has rugged hills and steep slopes that make laying railway tracks difficult.
- ii. The plains have a dense railway network because construction is economical, while Meghalaya has limited railway connectivity due to difficult terrain.
- iii. Heavy rainfall in Meghalaya often causes landslides and soil erosion, disrupting railway construction and maintenance, whereas such problems are less common in the Northern Plains.
- iv. Railway construction in Shillong requires tunnels, bridges, and cutting through hills, making it more expensive than in the plains.
- v. The Northern Plains have a high population density and intensive agriculture, which support railway development, while the difficult terrain and scattered settlements in Meghalaya reduce the expansion of rail.

22. "India is a federal country with unitary features." Justify the statement.

Answer:

- i. Division of Powers: The Constitution clearly divides powers between the Union and the State Governments through the Union List, State List, and Concurrent List, which is a key feature of federalism.
- ii. Written and Supreme Constitution: India has a written Constitution that defines the powers of both the Union and the States, and it is the supreme law of the country.
- iii. Independent Judiciary: The Supreme Court safeguards the Constitution and settles disputes between the Union and the States.
- iv. Strong Central Government: India has unitary features because the Union Government has greater powers than the States, especially during a national emergency when it can exercise control over the States.

- v. Single Citizenship and Integrated Administration: India has single citizenship and All India Services, which promote national unity and strengthen the unitary character of the country.

23. A political party has been criticised for lack of internal democracy, criminalisation of politics, and poor representation of women.

As a responsible citizen, suggest reforms that can strengthen political parties in India.

Answer:

- i. Promote internal democracy by holding regular organisational elections and involving party members in decision-making.
- ii. Ensure transparency in political funding by maintaining proper accounts and disclosing the sources of party income.
- iii. Prevent criminalisation of politics by refusing to give party tickets to candidates with serious criminal backgrounds.
- iv. Increase women's representation by reserving more seats and encouraging greater participation of women in political parties.
- v. Strengthen the role of party members by following clear rules in candidate selection and reducing the concentration of power in the hands of a few leaders.

24. Analyse the measures that are necessary to ensure the protection and promotion of women's rights in India.

Answer:

- i. Ensure equal access to education so that women become aware of their rights, gain knowledge, and improve their social and economic status.
- ii. Provide equal employment opportunities and equal pay for equal work to promote economic

- independence and eliminate gender discrimination.
- iii. Strictly implement laws protecting women's rights and take effective action against practices such as domestic violence, dowry, child marriage, and workplace harassment.
- iv. Increase women's participation in decision-making and politics by encouraging their representation in public life and leadership positions.
- v. Spread awareness about gender equality through education, media, and community programmes to remove stereotypes and promote equal respect for women.

25. Evaluate the role of the Government in implementing the Rights of Persons with Disabilities Act, 2016 and ensuring an inclusive society.

Answer.

- i. Ensure inclusive education by providing barrier-free schools, trained teachers, assistive devices, and suitable learning materials for students with disabilities.
- ii. Promote equal employment opportunities by implementing reservation policies, skill development programmes, and preventing discrimination in recruitment and the workplace.
- iii. Create a barrier-free environment by making public buildings, roads, transport, and communication systems accessible to persons with disabilities.
- iv. Implement the provisions of the Act effectively by protecting the rights of persons with disabilities, preventing

discrimination, and ensuring equal access to healthcare, education, and public services.

- v. Spread awareness and monitor implementation by conducting awareness programmes, encouraging social inclusion, and ensuring that government departments properly enforce the provisions of the Act.

26. Examine how the Indian federal system promotes both unity and diversity.

Answer.

- i. The Constitution divides powers between the Union Government and the State Governments through the Union, State and Concurrent Lists, allowing States to manage regional affairs.
- ii. The Union List gives the Central Government authority over matters of national importance such as defence, foreign affairs and banking, helping maintain national unity.
- iii. The Concurrent List allows both the Centre and the States to make laws on common subjects, promoting cooperation in governance.
- iv. India has single citizenship and emergency provisions, which strengthen the Centre and help preserve the unity and integrity of the nation.
- v. Thus, by combining a strong Central Government with autonomous State Governments, the Indian federal system promotes both national unity and regional diversity.

27. How do pressure groups contribute to the effective functioning of democracy?

Examine with suitable points.

Answer:

- i. Pressure groups permit citizens to express their interests and desires, ensuring that different sections of society are represented.

- ii. They supplement the party system and the formal institutions of government by providing information and support between elections.
- iii. Different pressure groups balance one another and help accommodate conflicting interests, promoting democratic decision-making.
- iv. Pressure groups and movements deepen democracy by encouraging citizens to participate actively in public affairs.
- v. They remind the government of the needs and concerns of common people, making governance more responsive and accountable.

28. Analyse the major reforms suggested for improving the functions of political parties.

Answer:

- i. The Anti-Defection Law was introduced to discourage elected representatives from changing political parties.
- ii. Candidates are required to declare their criminal cases, assets and educational qualifications before elections.
- iii. Political parties should conduct regular internal elections and maintain internal democracy.
- iv. Greater transparency should be ensured in party funding and financial management.
- v. Citizens, the media and pressure groups should create public awareness and demand reforms in political parties.

29. Analyze the challenges faced by women in achieving equality and suggest measures to overcome them.

Answer:

- i. Gender discrimination and unequal opportunities: Women are often treated unequally in families, workplaces and society. They may

also receive lower wages than men for doing similar work.

- ii. Limited access to education and leadership: In some areas, girls do not receive equal educational opportunities, and women remain underrepresented in political and decision-making positions.
- iii. Violence and harassment: Many women face domestic violence, sexual harassment, trafficking and other forms of abuse, which affect their safety, dignity and freedom.
- iv. Social customs and stereotypes: Traditional beliefs and gender stereotypes restrict women's rights, independence and participation in social and economic activities.
- v. Measures to overcome these challenges: Gender equality should be promoted through education and awareness, laws must be strictly implemented, equal opportunities in education and employment should be ensured, and women should be encouraged to participate in leadership and decision-making roles.

30. Examine the measures that can promote an inclusive society for persons with disabilities.

Answer:

- i. Ensure inclusive education by admitting children with disabilities without discrimination, making schools accessible, and providing reasonable accommodation and necessary support.
- ii. Promote accessibility by making public buildings, transport, campuses, polling stations, courts, and other public facilities easily accessible to persons with disabilities.
- iii. Provide equal opportunities in employment and skill development through vocational training, self-employment schemes, and by

- prohibiting discrimination in recruitment and employment.
- iv. Create awareness and encourage participation by mobilising the community, promoting social awareness, and ensuring persons with disabilities can participate fully in social, cultural, and sporting activities.
- v. Implement welfare and rehabilitation measures by providing healthcare, rehabilitation services, social security, scholarships, assistive support, and Government schemes for independent living.

31. "Indian federalism is unique in its structure and functioning."

Justify this statement with suitable arguments.

Answer:

Indian federalism has certain unique features that distinguish it from many other federal systems:

- i. Holding Together Federation: India is a holding together federation, where powers are divided between the Union and the States by the Constitution. Unlike countries such as the USA, the states did not come together to form the federation.
- ii. Strong Central Government: The Constitution gives greater powers to the Union Government, especially during emergencies, to maintain national unity and integrity.
- iii. Single Citizenship: India has single citizenship, meaning every citizen is only a citizen of India, unlike some federal countries that have dual citizenship.
- iv. Flexible Formation of States: Parliament has the power to create new states or alter the boundaries and names of existing states, which is not common in many federations.
- v. Independent Judiciary: The Supreme Court acts as the guardian of the Constitution and settles disputes

between the Union and the States, ensuring the smooth functioning of the federal system.

Indian federalism combines a strong Union with autonomous State governments. Its unique features help maintain national unity while accommodating the country's vast regional, linguistic, and cultural diversity

32. Statement: A district is facing high unemployment and underemployment. The local administration plans to improve irrigation, promote small industries, provide concessional loans, and expand skill-based employment opportunities.

Explain the process by which the above measures can reduce unemployment and improve the economic condition of the people. Support your answer with suitable reasons.

Answer:

- i. Better irrigation facilities enable farmers to grow two or three crops a year, creating more employment opportunities in agriculture.
- ii. Concessional loans help farmers invest in irrigation facilities and modern farming, leading to higher production and increased demand for labour.
- iii. Promoting small-scale industries and service sectors in semi-rural areas provides alternative employment for people who cannot depend only on agriculture.
- iv. Improving education, healthcare, and skill development creates jobs for teachers, doctors, nurses, and skilled workers while enhancing human capital.
- v. Government schemes such as MGNREGA provide guaranteed wage employment, ensuring income security and reducing seasonal unemployment in rural areas.

33. Statement: Two students are discussing the development of a country. One believes that a rise in National Income alone indicates development, while the other argues that Real National Income and investment are also important for sustainable development.

Based on the above statement, explain why it is important to consider different viewpoints while measuring the development of a country.

Justify why Real National Income and investment provide a better understanding of development than National Income alone.

Answer:

- i. National Income measures the total value of final goods and services produced in a country, but it may increase due to rising prices rather than higher production.
- ii. Real National Income removes the effect of price changes and reflects the actual increase in the production of goods and services.
- iii. Considering different viewpoints helps us understand that economic development should be measured by real growth, not only by money value.
- iv. Investment in maintaining and improving capital equipment ensures continuous production and sustainable economic growth in the future.

Therefore, an open-minded approach helps us use better indicators, such as Real National Income and investment, to assess a country's true economic development

34. A country has achieved rapid economic growth, but many people still suffer from poor health, low literacy, and lack of access to basic services.

- (a) Explain why per capita income alone is not an adequate indicator of development.
- (b) Describe the three dimensions of Human Development Index (HDI) used

by the United Nations Development Programme (UNDP) to measure human development.

Answer:

- (a) Per capita income alone is not an adequate indicator because:
 - i. It measures only income and ignores people's health and education.
 - ii. It does not reflect the overall quality of life or human well-being.
 - iii. A country may have high income but poor health and low literacy.
- (b) The three dimensions of HDI are:
 - i. A long and healthy life – measured by life expectancy at birth.
 - ii. Knowledge – measured by adult literacy rate (and educational attainment).
 - iii. A decent standard of living – measured by per capita GDP (PPP).

35. Do you think IMR is an important indicator of the economic development of a country? Justify your answer.

Answer:

Yes, Infant Mortality Rate (IMR) is an important indicator of the economic development of a country because:

- i. A low IMR reflects better healthcare facilities and medical services.
- ii. It indicates good nutrition and proper maternal and child care.
- iii. It shows that people have better living conditions, including safe drinking water and sanitation.
- iv. A low IMR reflects a higher standard of living and improved quality of life.
- v. Healthy children grow into productive adults, contributing to the country's human capital and economic growth.

Conclusion:

Therefore, IMR is an important indicator of economic development because it reflects the overall health, well-being, and quality of life of a country's population.

36. “Money has eliminated many of the problems of the barter system and has become an essential medium of exchange in modern economies.”

Explain how money overcomes the limitations of the barter system. Also describe any two important functions of money that make economic transactions easier.

Answer

Money overcomes the major limitation of the barter system by eliminating the need for the double coincidence of wants. Under the barter system, a person had to find someone who not only possessed the desired goods but also wanted what they offered in exchange. Money acts as a medium of exchange, allowing people to sell their goods or services for money and use that money to buy whatever they need. This makes buying and selling faster, simpler, and more convenient.

Money also performs other important functions in the economy. It serves as a unit of account, enabling the value of different goods and services to be measured in a common unit. It also acts as a standard of deferred payment, making borrowing and lending possible because payments can be made in the future. These functions make trade efficient, encourage economic activities, and support the smooth functioning of the modern economy.

37. Multinational Corporations (MNCs) have become an important force in the globalisation process.

Explain any three ways in which MNCs invest in developing countries.

How do these methods help in linking production across different regions of the world?

Answer:

Multinational Corporations (MNCs) invest in developing countries in several ways. They set up production jointly with local companies by providing additional investment and modern technology. They also buy existing local companies to expand production and make use of their established markets and distribution networks. Another common method is placing orders with small producers, who manufacture goods according to the quality, price and delivery standards fixed by the MNCs.

These methods create strong links between producers in different countries and make production more efficient. Goods produced by local companies and small producers are sold under the MNCs' brand names in global markets. As a result, production activities across different regions of the world become interconnected, promoting foreign investment, technology transfer and globalisation.

38. Suggest any four measures that the Government can adopt to make globalisation fair for all sections of society.

Explain how these measures can benefit workers, small producers and developing countries.

Answer:

The Government can make globalisation fair by ensuring that labour laws are properly implemented so that workers receive fair wages, safe working conditions and other legal rights. It can also protect and support small producers by providing financial assistance, modern technology and training, enabling them to compete successfully with large multinational companies. If necessary, the Government may introduce suitable trade

and investment barriers to safeguard domestic industries.

The Government can also work with other developing countries to negotiate fairer trade rules at the World Trade Organization (WTO). These measures ensure that the benefits of globalisation are shared more equally, protect the interests of workers and small producers, promote fair competition, and contribute to sustainable economic growth.

39. Why is the public sector important for the development of a country? Explain with examples.

Answer:

The public sector plays a vital role in the economic and social development of a country because it works for public welfare rather than profit.

- i. It provides essential services such as education, healthcare, electricity, water supply, transport, and postal services that are necessary for people's well-being.
- ii. It develops basic infrastructure like roads, railways, dams, and power projects, which support overall economic growth.
- iii. It undertakes activities requiring large investments and long gestation periods, where private companies are reluctant to invest, such as steel plants and railways.
- iv. It creates employment opportunities and helps reduce regional imbalances by promoting development in backward areas.
- v. It ensures social justice by providing affordable services and safeguarding resources that are important for the public.

Examples: Indian Railways, Bharat Heavy Electricals Limited (BHEL), and public hospitals.

The public sector is essential because it promotes balanced development, provides basic

services, and works in the larger public interest, contributing to the country's overall progress.

40. Analyse the importance of per capita income for comparing countries.

Answer:

Per capita income is the average income earned per person in a country. It is calculated by dividing the total national income by the total population.

Importance of per capita income:

- i. It provides a fair basis for comparing countries with different population sizes.
- ii. It indicates the average standard of living of the people.
- iii. It helps governments and organisations classify countries as developed or developing.
- iv. It assists in planning economic policies and allocating resources for development.
- v. It enables comparisons of economic progress over time and between different countries.

Although per capita income is an important indicator of development, it should be considered along with other factors such as health, education, equality, and environmental quality for a complete picture of development.

41. A village has good income levels, but there are no schools or hospitals nearby. Suggest measures to improve the situation.

Answer:

To improve the situation in the village, the following measures should be taken:

- i. Establish schools to provide quality education and improve literacy among children.
- ii. Set up hospitals or primary health centres to ensure timely and affordable healthcare.
- iii. Improve infrastructure by constructing better roads and

providing transport facilities for easy access to essential services.

- iv. Increase government investment in education, healthcare, drinking water, sanitation, and other basic amenities.
- v. Encourage community participation and create awareness about the importance of education, health, and hygiene.

A village is truly developed only when people have access to quality education, healthcare, and basic facilities, along with a good income.

widely accepted as the most efficient medium of exchange.

42. In an economy people accept money in exchange for goods and services without hesitation.

Explain why money is accepted as a medium of exchange.

Answer:

Money is accepted as a medium of exchange because it is authorised by the government and trusted by everyone.

- i. It is **accepted by all** in exchange for goods and services.
- ii. It **eliminates the problems of the barter system**, especially the need for double coincidence of wants.
- iii. It acts as a **common measure of value**, making it easy to compare prices.
- iv. It enables **buying and selling of goods and services conveniently**.
- v. It facilitates **saving, borrowing, and making digital or bank payments**, thereby promoting economic activities.

Conclusion:

Thus, money simplifies trade, promotes economic growth, and is

Section-D

Case-Based Question – 4 Marks (Opened-ended questions)

Civics:

1. **Case 1.** A state Government launched a health programme with financial assistance from the union Government. The district administration supervised its implementation, while the Gram Panchayat identified beneficiaries and created awareness among the villagers.

Questions:

- a. Which features of Indian federalism is reflected in the passage? (1 mark)
- b. Explain why the participation of different levels of government was necessary. (1 mark)
- c. How does such cooperation benefit citizens? (1 mark)

- d. Suggest one more area where similar cooperation is required. (1 mark)

2. **Case 2.** For the past several months, residents of a locality have been experiencing frequent power cuts, affecting students' studies, business activities, healthcare services, and daily household work. Although many people have complained individually, the problem remains unresolved. The resident now decides to work together to draw the attention of the concerned authority and seek a lasting solution.

Questions:

- a. Explain how the residents can collectively raise this issue in a democratic manner. (1 mark)
- b. Which democratic methods can they adopt to communicate their concerns effectively? (1 mark)
- c. Why is cooperation among citizens important for resolving such public issues? (1 mark)
- d. Suggest one additional step the authorities should take to address the residents' concerns promptly. (1 mark)

3. **Case 3:** People living near a river found that factory waste was polluting the water. Concerned citizens formed an environmental group and organized peaceful protests, public meetings, and cleanliness drives. They also submitted a petition to the government and requested strict action against the industries responsible for the pollution.

Questions

- a. Which democratic methods are used by the citizens in the passage? (1 mark)
- b. Why is peaceful protest important in a democracy? (1 mark)
- c. How can pressure groups influence government action in such situations? (1 mark)

- d. Suggest one more step that the authorities should take to solve the problem. (1 mark)

4. **Case 4.** A Political party launched a programme to encourage young people to participate actively in politics. The programme included leadership training, public discussion, and voter awareness campaign and community service activities. Young people were encouraged to express their views, understand public issues and contribute ideas for the party's policies. The initiative also aimed to ensure the participation of youth from different social and regional backgrounds.

Questions:

- a. Analyse how youth participation can strengthen democracy. (1 mark)
- b. Evaluate the importance of involving young people in political parties. (1 mark)
- c. Why political parties should encourage the participation of people from diverse backgrounds. (1 mark)
- d. Suggest one additional initiative that could increase youth participation in politics. (1 mark)

5. **Case 5.** Imagine you have been elected as the School leader. While forming different committees, you ensure equal opportunities for boys and girls and include student from different classes and backgrounds. You also organize regular meetings to listen to students' suggestions before making important decisions.

Questions:

- a. Which democratic principles are reflected in your leadership? (1 mark)
- b. Why is it important to include students from different backgrounds? (1 mark)
- c. How would regular meetings improve decision-making? (1 mark)

- d. Explain how your leadership would strengthen democracy in the school. (1 mark)

6. **Case 6.** Sengname and her brother Sanja both completed Class 10 with excellent marks. While Sanja was encouraged to continue his education in a reputed college, Sengname was asked to stay at home to help with household work. Her parents believed that investing in a boy's education was more beneficial because he would become the family's main breadwinner.

Questions:

- a. Identify the social issue highlighted in the passage. (1 mark)
- b. Examine how such attitudes affect the status and development of women in society. (1 mark)
- c. Suggest two measures that can promote equal educational opportunities for girls. (1 mark)
- d. How does providing equal education to girls contribute to a stronger democracy? (1 mark)

7. **Case 7.** The local municipal office recently opened a new public service centre. Although the building is modern, it has no ramps, lifts or accessible washrooms. Persons using wheelchairs and those with visual impairments face great difficulty in entering the building and accessing government services. Many citizens have complained that this prevents equal participation in public life.

Questions:

- a. Evaluate whether the municipal office has fulfilled its responsibilities under the Rights of Persons with Disabilities Act, 2016. (1 mark)
- b. Which right of persons with disabilities has been affected? (1 mark)
- c. Suggest two steps the Government should take to improve accessibility. (1 mark)

- d. Why is accessibility important for creating an inclusive society? (1 mark)

8. **Case 8.** In a city of Bolivia, the government handed over the water supply to a private company. The company immediately increased the prices of water, making it unaffordable for many people. This led to widespread protests by citizens, workers, and local organisations. People demanded the cancellation of the contract and restoration of public control over water. The movement became powerful due to mass participation and unity among different groups.

Questions:

- a. Why did people protest against water privatization? (1 mark)
- b. How did mass participation contribute to the success of the movement? (1 mark)
- c. What lesson can other countries learn from this struggle? (1 mark)
- d. Do you think privatization of essential resources should be allowed? Give a reason. (1 mark)

9. **Case 9.** The Women's Justice Initiative collaborated with schools, colleges and community organisations to organise workshops on gender equality and women's legal rights. These programmes encouraged young people to respect women's rights and report incidents of discrimination and violence.

Question:

- a. Evaluate the importance of educational programmes organised by WJI. (1 mark)
- b. How can such programmes change people's attitudes towards women? (1 mark)
- c. Mention two objectives achieved through these workshops. (1 mark)
- d. Do you think awareness campaigns are as important as legal action? Give reasons. (1 mark)

10. Case. 10. During a general election, several political parties campaigned with different promises and programmes. No single party won a clear majority. Two parties decided to work together to form the government. At the same time, many citizens demanded greater transparency in party funding, more internal democracy, and increased participation of women in politics.

Questions

- a. Why political parties are considered essential in a democracy? (1 mark)
- b. What type of government is formed when no political party wins a clear majority? (1 mark)
- c. Analyse one reform that can strengthen political parties in India. (1 mark)
- d. Evaluate why greater participation of women in political parties is important for democracy. (1 mark)

Economics:

11. CASE: 1. People have different goals in life. Besides earning a higher income, they also value equal treatment, freedom, security, respect and a healthy working environment. Sometimes these non-material goals are even more important than money. For example, a person may choose a job with lower pay but better job security, or reject a high-paying job that offers no time for family. Therefore, development is not only about increasing income but also about improving the overall quality of life.

Questions

- a. Why is development not measured only by a person's income? (1 mark)
- b. A person is offering you two jobs: one with high salary but no job security, and another with lower salary but regular employment.

Which job would you choose? Give one reason for your answer. (1 mark)

- c. Explain how both material and non-material goals together contribute to the overall development of an individual. (2 marks)

12. CASE: 2. Development is not measured only by national income or per capita income. A truly developed society also focuses on people's well-being, quality education, good health, equality, cultural values and environmental protection. Therefore, development includes both economic progress and improvements in the quality of life.

Questions

- a. Why is per capita income alone not sufficient to measure the development of a nation? (2 marks)
- b. Explain any two supplementary indicators of development and how they contribute to the overall development of a nation. (2 marks)

13. CASE: 3. Globalisation is the increasing integration of countries through trade, investment and technology. Multinational Corporations (MNCs) play a key role in this process by investing in different countries and expanding international trade. As a result, goods, services, technology and capital move more freely across national borders, linking the economies of different countries.

Questions

- a. Explain any two ways in which MNCs promote globalisation. (2 marks)
- b. How does the movement of goods, services, technology and investment across countries strengthen global economic integration? (2 marks)

14. Case: 4. In ancient times, people exchanged goods through the barter

system. A farmer exchanged rice for clothes, while a potter exchanged pots for grain. However, barter often failed because people could not always find someone who wanted exactly what they offered. To overcome these difficulties, money was introduced as a common medium of exchange, making trade easier and more efficient.

Questions

- a. Why did people shift from the barter system to the use of money? Explain any two reasons. (2 marks)
- b. How did the introduction of money improve trade and economic activities? (2 marks)

15. CASE: 5. Kyrmen wanted to expand his tailoring business but did not have enough savings to buy new sewing machines. He obtained a loan from a bank and agreed to repay it with interest in monthly instalments. With the loan, he increased production, earned higher income and repaid the loan on time.

Questions

- a. What is credit? Explain how it helped Kyrmen in the given case. (2 marks)
- b. Explain how credit can support economic development when used for productive purposes. (2 marks)

16. Case 6: A multinational company (MNC) entered India and established a manufacturing unit in partnership with a local company. It introduced modern technology and invested additional capital to increase production. The company also placed orders with small producers and sold the finished products under its own brand name in international markets. As a result, production activities in different countries became closely connected.

Questions

- a. Explain any two ways in which MNCs invest and expand production in developing countries. (2 marks)
- b. How do the activities of MNCs help in linking production across different countries? Explain with reference to the case. (2 marks)

17. Case 7: In 2023–24, a district recorded an increase in the production of rice, the establishment of a new textile factory and the expansion of transport and banking services. These economic activities increased the total value of goods and services produced within the district during the year, contributing to the country's Gross Domestic Product (GDP).

Questions

- a. What is Gross Domestic Product (GDP)? Identify **any two economic activities** from the case that contribute to GDP. (2 marks)
- b. Explain why GDP is considered an important indicator of a country's economic performance. (2 marks)

18. Case 8: A Government hospital provides free or low-cost treatment to people, especially those from economically weaker sections. In the same town, a private hospital offers advanced medical facilities but charges high fees for its services. While the government hospital focuses on public welfare, the private hospital aims to earn profits.

Questions

- a. State two differences between the public sector and the private sector based on the case. (2 marks)
- b. Why is the public sector essential even when private hospitals provide better facilities? Explain with reference to the case. (2 marks)

19. Case 9: A village has good income from farming, but there are no proper schools or

hospitals. Many children do not go to school, and people travel far for treatment.

Questions:

- a. What does development mean in this situation? (1 Mark)
- b. Why this village is not fully developed despite good income? (1 Mark)
- c. What facilities are lacking in the village? (1 Mark)
- d. Suggest any two steps to improve the situation. (1 Mark)

20. **Case 10:** Chinese toy manufacturers started exporting plastic toys to India. Their toys were cheaper and better designed, so Indian buyers preferred them. As a result, local toy maker Raju suffered losses.

Questions:

- a. Which processes increased the availability of Chinese toys in India? (1 Mark)
- b. How did Chinese toys affect local producers? (1 Mark)
- c. Which organisation regulates international trade? (1 Mark)
- d. How can the government make globalisation fairer? (1 Mark)

Section-D

Map skill Based Question – 4 Marks

1. The place associated with Jallianwalla Bagh Tragedy
Answer: Amritsar
2. The place where Gandhiji launched satyagraha for the indigo planters.
Answer: Champaran
3. The Indian National Congress finally adopted Non-cooperation programme from here.
Answer: Nagpur
4. One area of North east India where the Non-cooperation movement became forceful.
Answer: Assam

5. The place where the violent incident took place that forced Gandhiji to call off the Non-cooperation movement in 1922.
Answer: Chauri-chaura
6. The place where widespread printing of literature experienced from the early 20th century.
Answer: Punjab
7. The place where Ramcharitmanas of Tulsidas was published in the year 1810.
Answer: Calcutta.
8. The first cotton industry was set up here in 1853.
Answer: Bombay.
9. The region from where 50% of the workers migrated to Bombay cotton industries.
Answer: Ratnagiri.
10. A place where Naval Kishore Press was located.
Answer: Lucknow.
11. Shade the region where Late rite soil is found in India.
Answer: Western Ghats and parts of Kerala, Karnataka, Tamil Nadu, Odisha, and Assam.
12. Shade the soil region suitable for rice and wheat cultivation.
Answer: Alluvial Soil Region (Northern Plains).
13. The place where the Kaveri River flows into the Bay of Bengal.
Answer: Tamil Nadu.
14. The place where Chilika Lake is located.
Answer: Odisha.
15. The place where copper is found in Madhya Pradesh.
Answer: Balaghat.
16. Locate one state where Tertiary coal deposits are mainly found.
Answer: Meghalaya / Assam / Nagaland / Arunachal Pradesh (Any one).

17. Mark any one region of Gondwana coal deposits on the map of India.

Answer: Damodar Valley / Godavari Valley / Mahanadi Valley / Son Valley / Wardha Valley (Any one).

18. Mark the state where the Konkan Railway route passes.

Answer: Goa

19. Mark a pipeline route connecting Gujarat up to Punjab.

Answer: Hazira–Vijaipur–Jagdishpur (HVJ) Gas Pipeline.

20. One national park near Daribok located in Garo hills.

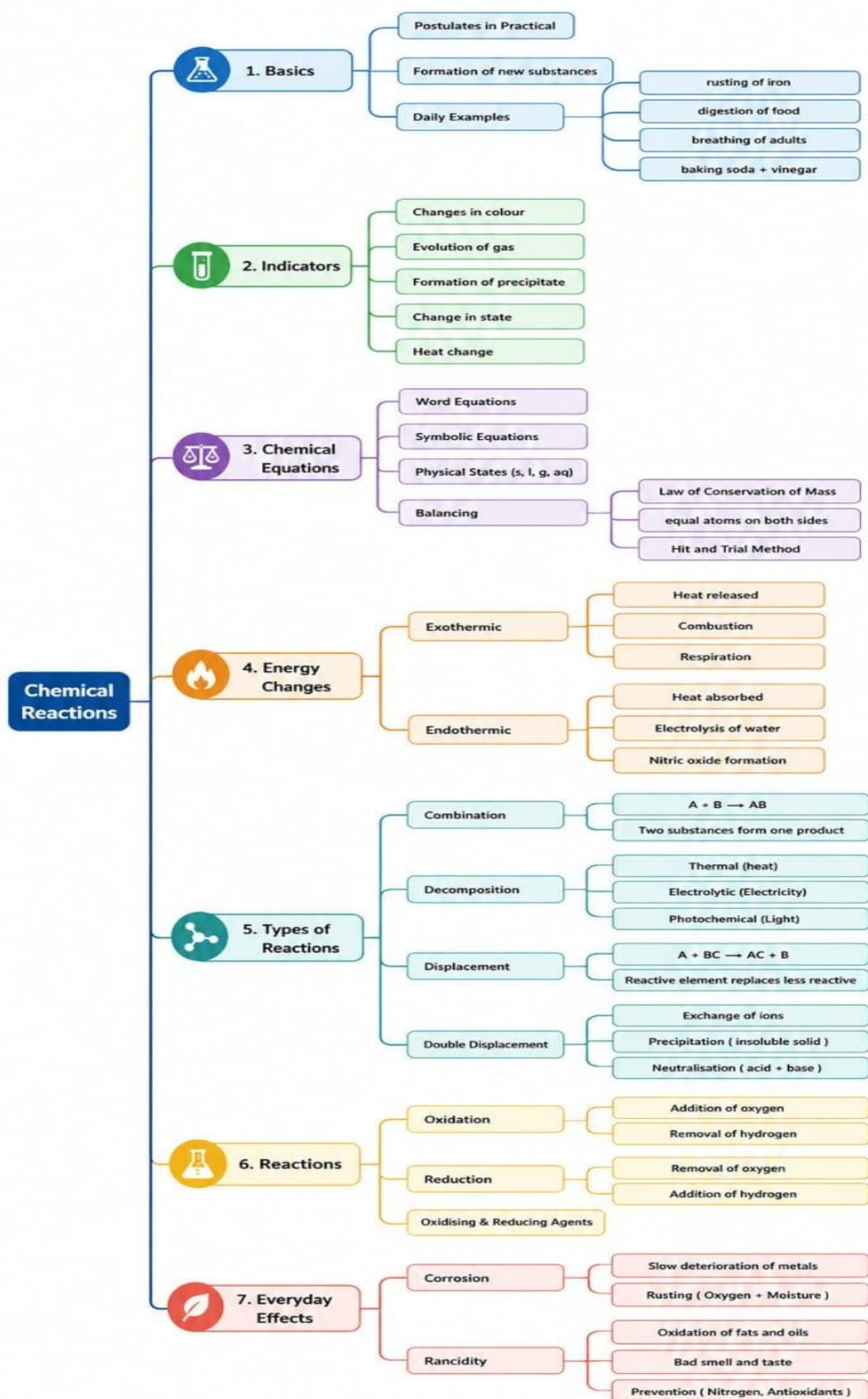
Answer: Nokrek national park

21. The place known for living Root Bridge.

Answer: Nongriat

CHAPTER 1: CHEMICAL REACTIONS AND EQUATIONS

(A) MIND MAP

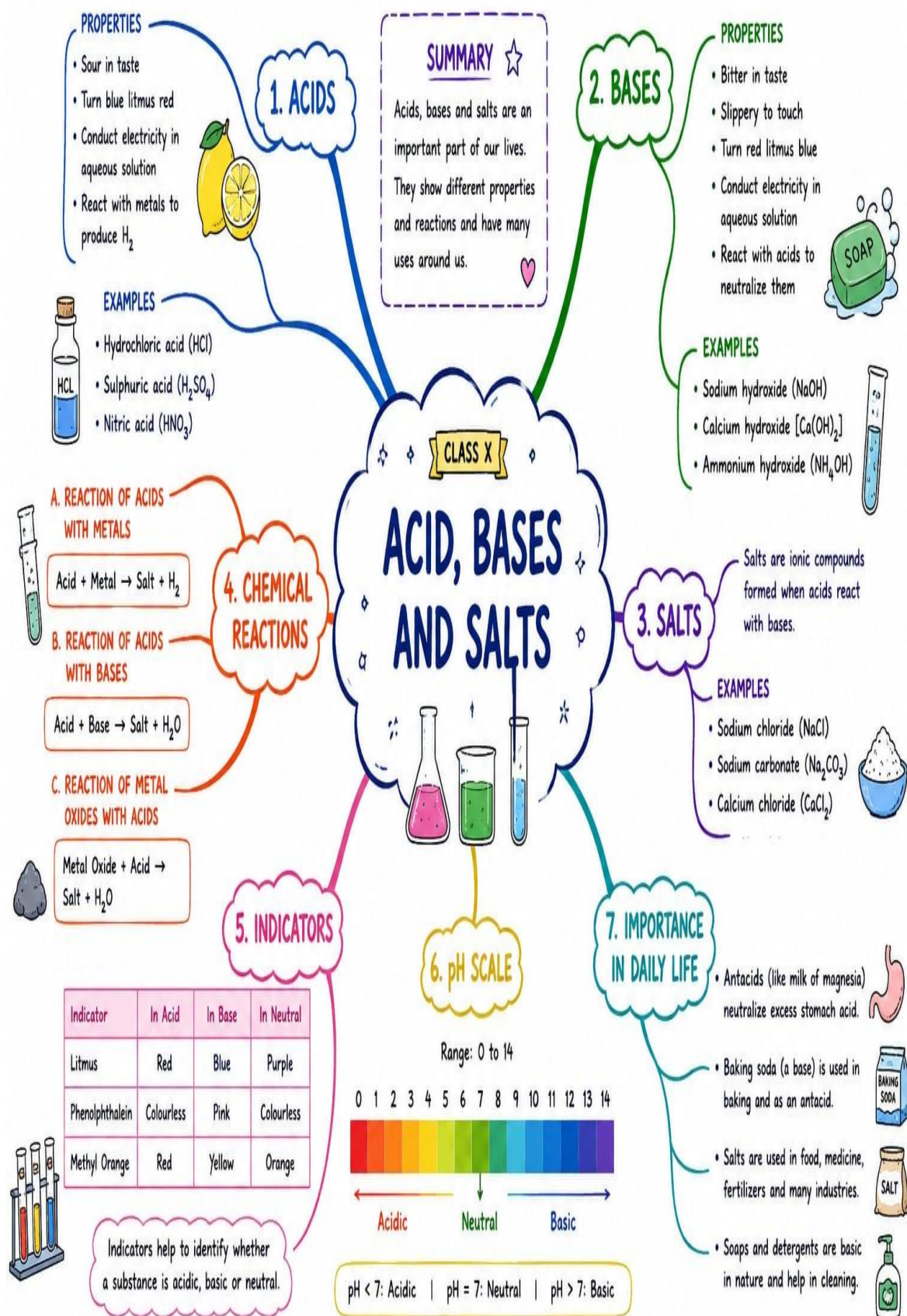


(B) SUMMARY

- **Chemical Reaction:** When one or more substance, undergo a chemical change, with the absorption or release of energy so as to form one or more products.
- **Reactant:** Substance(s) that take(s) part in chemical reaction.
- **Product:** The new substance(s) formed as a result of a chemical reaction
- **Chemical Equation:** The statement that describe a chemical reaction in terms of symbols and formulae.
- **Skeletal equation:** A chemical equation expressed in symbols and formulae, such that the numbers of atoms of different elements towards the side of reactants is not equal to the number of atoms of the same element towards the side of products.
- **Balance chemical equation:** A chemical equation in which the number of atoms of each element is same on both sides of reactant and product.
- **Chemical combination reaction:** When two substances react to form a new compound.
- **Chemical decomposition reaction:** When a compound decomposes on heating or absorbing some kind of energy so as to form two or more substances.
- **Thermal decomposition reaction:** A chemical compound when decomposes on heating so as to form two or more substances(elements or compounds).
- **Photo chemical decomposition reaction:** A chemical reaction in which a compound decomposes into simpler substances on the absorption of light energy.
- **Electrolytic decomposition reaction:** A chemical reaction in which a compound decomposes into simpler substances on passing electric current.
- **Chemical displacement reaction:** When a more active element displaces a less active element from its aqueous ionic compound.
- **Chemical double displacement reaction:** A chemical reaction in which two ionic compounds in their aqueous solution, react by exchanging their ions/ radicals, to form two new compounds.
- **Precipitation reaction:** The aqueous solution of two ionic compounds when reacts by exchanging their ions /radicals to form two or more new compounds such that one of the products formed is an insoluble salt, and hence formed as precipitate. The double displacement reactions are said to be precipitation reactions.
- **Precipitate:** An insoluble solid that is formed when two solutions react with each other and separate out from the solution.
- **Neutralisation:** When an acid reacts with a base to form salt and water.
- **Exothermic reaction:** A chemical reaction which proceeds with the release of heat energy.
- **Endothermic Reaction:** A chemical reaction which proceeds with the absorption of heat energy.
- **Oxidation:** is a process in which there is addition of oxygen or removal of hydrogen.
- **Reduction:** is a process in which there is addition of hydrogen or removal of oxygen.
- **Corrosion:** the slow destruction of metals on exposure to the environment due to oxidation.
- **Rancidity:** The oxidative deterioration of food stuff containing fats/oils.

CHAPTER 2: ACIDS, BASES AND SALTS

(A) MIND MAP



(B) SUMMARY

- **Acids:** Substances that donate hydrogen ions (H^+) in solution. They are characterised by a sour taste, the ability to turn blue litmus red, and a pH less than 7. Examples: hydrochloric acid (HCl), sulphuric acid (H_2SO_4), lemon juice, vinegar etc.
- **Bases:** Substances that accept hydrogen ions (H^+) or donate hydroxyl ions (OH^-) in solution. They are characterised by a bitter taste, the ability to turn red litmus blue, and a pH greater than 7. Examples: sodium hydroxide (NaOH), potassium hydroxide (KOH), soap, baking soda etc.
- **Indicators:** Substances that change colour in the presence of acids or bases, helping to identify them. Examples include litmus solution, turmeric, and phenolphthalein.
- **Litmus:** Blue litmus turns red in acids; red litmus turns blue in bases.
- **Turmeric:** Remains yellow in acids but turns reddish-brown in bases.
- **Phenolphthalein:** Colourless in acids and pink in bases.
- **Methyl Orange:** Red in acids and yellow in bases.
- Chemical Properties of Acids and Bases

Acids react with:

- **Metals** to produce salt and hydrogen gas.
- **Metal carbonates and metal hydrogen carbonates** to produce salt, carbon dioxide and water.
- **Bases** to form salt and water (neutralisation).

Bases react with:

- **Acids** to produce salt and water (neutralisation).
- **Certain metals** like zinc and aluminium to produce salt and hydrogen gas.
- The strength of **acids/bases** depends on the number of H^+ or OH^- ions produced in water.
- **Strong acids/bases** ionise completely in water.
- **Weak acids/bases** ionize partially in water.
- **pH:** pH measures the acidity or basicity of a solution.
- **pH Scale:**

A scale used to measure the acidity or basicity of a solution, ranging from 0 to 14.

Solutions with:

- **pH less than 7:** Acidic
- **pH = 7:** Neutral
- **pH greater than 7:** Basic

• Importance of pH in everyday life

- Our body functions properly within a narrow pH range (7-7.8)
- Tooth decay begins when the mouth pH falls below 5.5.
- Antacids help reduce excess stomach acid.
- Farmers treat acidic soil with quick lime or slaked lime to improve soil fertility.

- **Salts:** Ionic compounds formed when the hydrogen of an acid is replaced by a metal or ammonium ion.
- Salts may be acidic (NH_4Cl), basic (Na_2CO_3) or neutral (NaCl) depending on the acids and bases from which they are formed.
- **Chemicals from Common Salt**

(a) Sodium Hydroxide (NaOH)

Prepared by the **chlor-alkali process**.

Used in making soaps, paper and detergents.

(b) Bleaching Powder [$CaOCl_2$]

Prepared by passing chlorine over dry slaked lime.

Used for bleaching cotton and paper, disinfecting drinking water and as an oxidising agent.

(c) Baking Soda ($NaHCO_3$)

Used in baking powder, fire extinguishers and as an antacid.

(d) Washing Soda ($Na_2CO_3 \cdot 10H_2O$)

Used for cleaning clothes, softening hard water and in glass, soap and paper industries.

- **Water of Crystallisation:** It is the fixed number of water molecules chemically attached to a salt.

Examples:

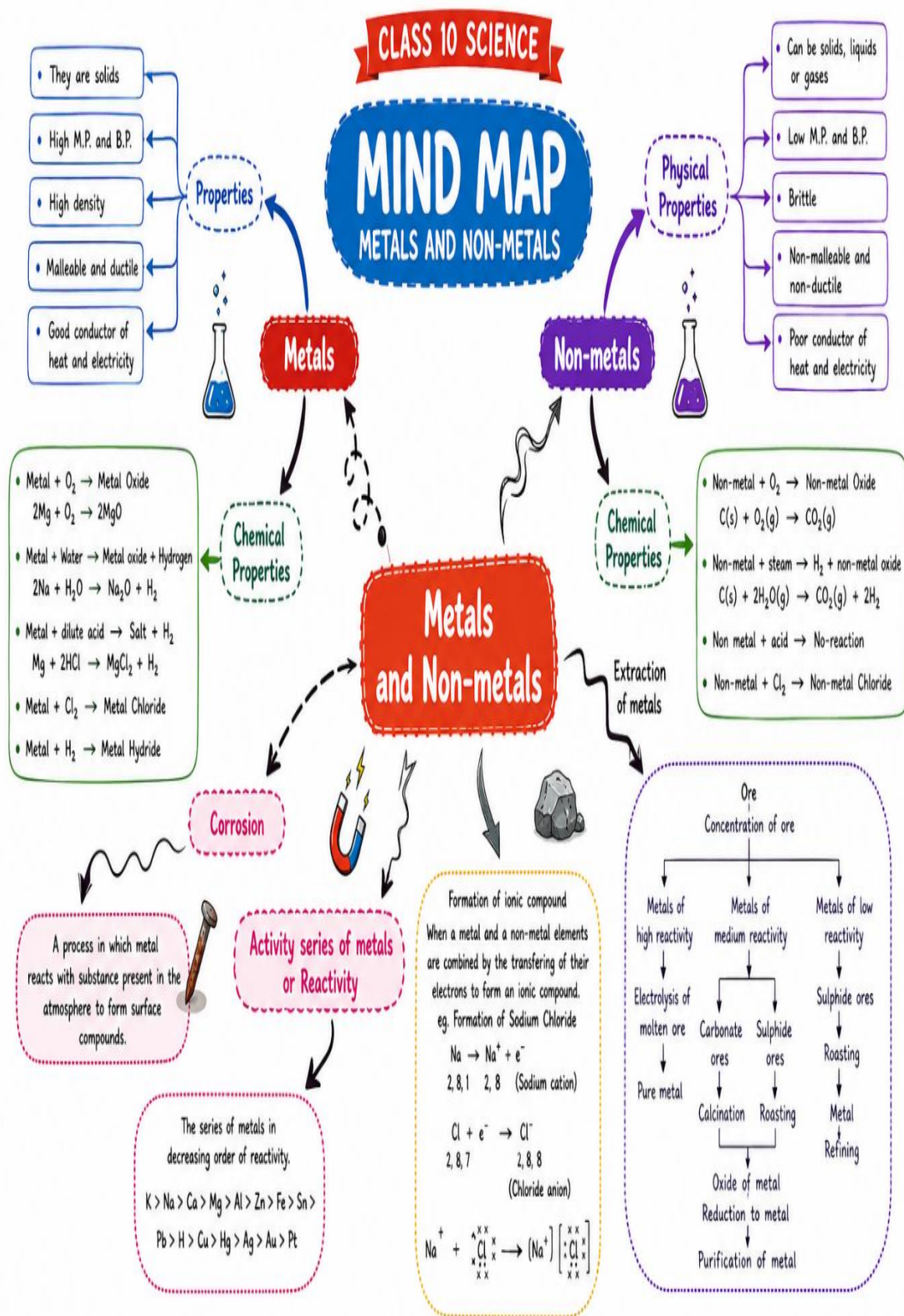
- Copper sulphate: $CuSO_4 \cdot 5H_2O$
- Washing soda: $Na_2CO_3 \cdot 10H_2O$

- **Plaster of Paris:** $CaSO_4 \cdot \frac{1}{2} H_2O$.

Uses: for casts to immobilise broken bones, cast for statues, toys and for making fire proof materials etc.

CHAPTER 3: METALS AND NON-METALS

(A) MIND MAP



(B) SUMMARY

Metals and non-metals are distinct categories of elements, differentiated by their physical and chemical properties.

Physical Properties:

- Metals are:
 - **Lustrous** (shiny).
 - They are **malleable** (can be beaten into thin sheets).
 - They are **ductile** (can be drawn into wires).
 - They are **good conductors** of heat and electricity.
 - They are **sonorous** (produce a ringing sound when struck).
 - Most metals are **hard** except **Sodium (Na)** and **Potassium (K)** which are soft metals.
 - Most metals are **solid** at room temperature except **Mercury (Hg)** (liquid at room temperature). **Gallium (Ga)** and **Caesium (Cs)** (melt at room temperature).
- Non-Metals are:
 - Generally **dull** (non-lustrous) except **Iodine**.
 - **Soft and Brittle** (break easily) except **Diamond** (hardest substance known).
 - Neither **malleable** nor **ductile**.
 - **Poor conductors** of heat and electricity except **Graphite** (conductor of electricity).
 - Usually not **sonorous**.

Chemical Properties Metals and Non-metals:

- **Reaction with Oxygen**
 - **Metals** react with oxygen to form **metal oxides**, which are generally **basic** in nature.
 - **Non-metals** also react with oxygen to form non-metal oxides, which are generally acidic.
 - **Amphoteric oxides:** Metal oxides which react with both acids and bases to form salt and water. Eg. Aluminium oxide (Al_2O_3), Zinc oxide (ZnO)
- **Reaction with Water**

Different **metals** react differently with water.

 - Potassium and sodium react vigorously with cold water.
 - Calcium reacts less vigorously with cold water.
 - Magnesium reacts with hot water.
 - Iron reacts with steam.
 - Copper, silver and gold do not react with water.

Non-metals generally do not react with water.
- **Reaction with Dilute Acids**

Metals above hydrogen in the reactivity series react with dilute acids to produce salt and hydrogen gas. **Non-metals** generally do not react with dilute acids.
- **Reaction with Salt Solutions**

A more reactive metal displaces a less reactive metal from its salt solution.
- **Reactivity Series:** The arrangement of metals in decreasing order of their reactivity. Metals can be arranged in a reactivity series based on their tendency to lose electrons and form positive ions. This series helps predict the outcome of reactions between metals and other substances.

The decreasing order of reactivity is:

K > Na > Ca > Mg > Al > Zn > Fe > Pb > (H) > Cu > Hg > Ag > Au

Ionic Compounds

- Metals lose electrons to form **positive ions (cations)**. Eg: Iron, copper, zinc, aluminium etc.
- Non-metals gain electrons to form **negative ions (anions)**. Eg: Oxygen, carbon, sulphur, nitrogen etc.

The attraction between oppositely charged ions forms an **ionic bond**.

Properties of Ionic Compounds

- Hard and brittle.
- High melting and boiling points.
- Conduct electricity in molten or aqueous state.
- Usually soluble in water.

Occurrence of Metals

Metals occur:

- In **Free State** (gold, silver, platinum).
- **Combined state** as ores (iron, aluminium, zinc).

An **ore** is a mineral from which a metal can be extracted economically.

Extraction of Metals

- Highly Reactive Metals are obtained by **electrolysis**. Eg: Sodium, Potassium, Calcium.
- Moderately Reactive Metals are extracted by **reduction using carbon**. Eg: Zinc, Iron, Lead.
- Less Reactive Metals are obtained by simply heating their ores or by simple reduction.
Eg: Mercury, Copper.

Refining of Metals

Impure metals are purified by **electrolytic refining**. Eg: Copper

Corrosion

Corrosion is the gradual destruction of metals due to reaction with air, moisture or chemicals. Examples:

- Rusting of iron.
- Black coating on silver.
- Green coating on copper.

Prevention of Corrosion

- Painting, Oiling or greasing, Galvanisation, Alloying, Electroplating

Alloys

An alloy is a homogeneous mixture of a metal with another metal or non-metal.

Examples:

Brass = Copper + Zinc

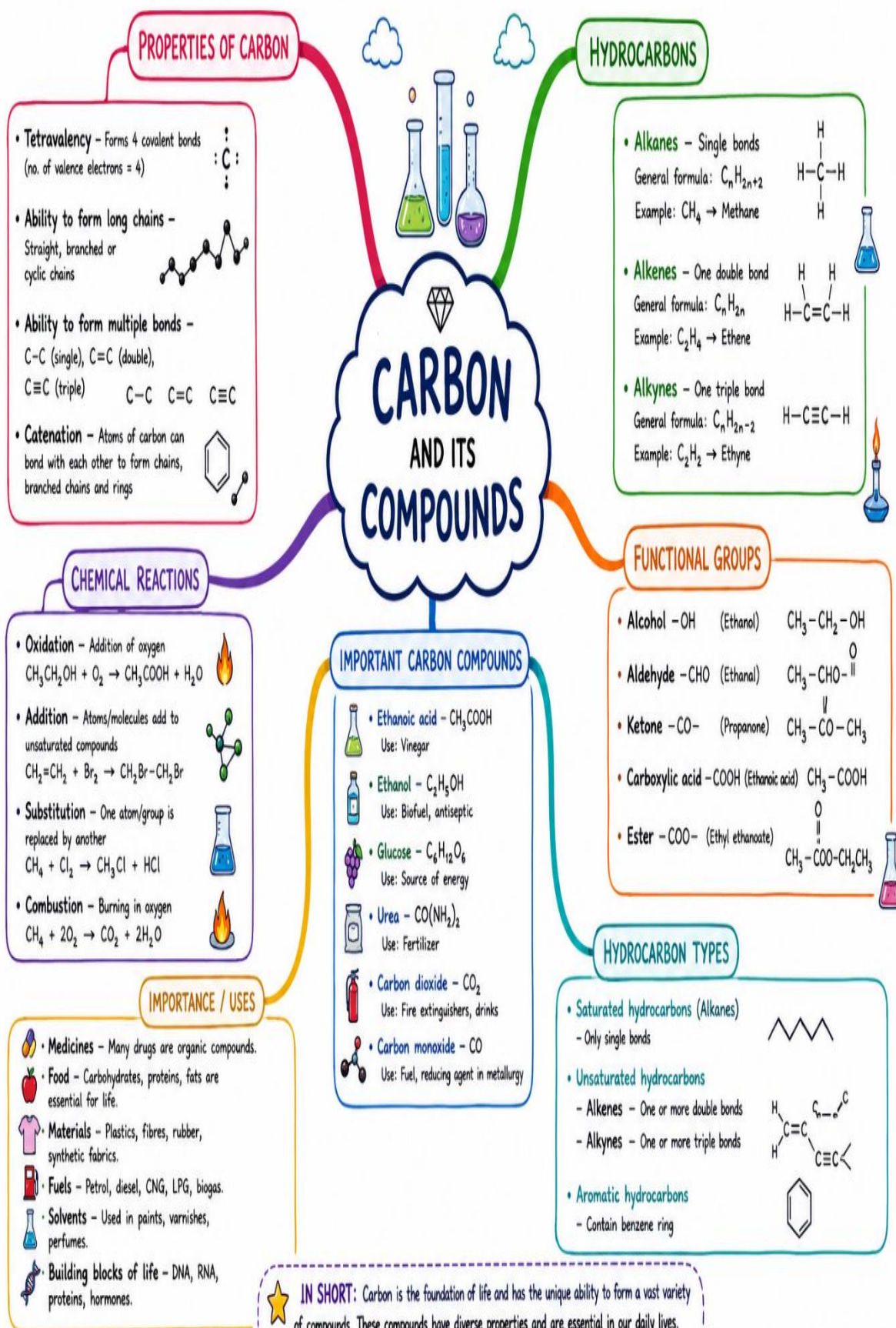
Bronze = Copper + Tin

Solder = Lead + Tin

Stainless Steel = Iron + Chromium + Nickel + Carbon

CHAPTER 4: CARBON AND ITS COMPOUNDS

(A) MIND MAP



(B) SUMMARY

- Carbon is a versatile element and carbon compounds play important roles in life processes and by meeting our daily needs
- Covalent bonds are formed between two similar or different atoms by sharing electrons in their valence shell such that both of them can achieve the structure of the nearest noble gas.

Tetravalency: Carbon has four valence electrons and forms **covalent bonds** by sharing electrons with other atoms. Carbon also forms compounds containing single, double and triple covalent bonds between carbon atoms.

Catenation: Catenation is the ability of an atom to form strong covalent bonds with other atoms of the same element, creating long straight chains, branched chains, or ring structures

Saturated and Unsaturated Compounds:

- **Saturated hydrocarbons (Alkanes):** Contain only single bonds between carbon atoms.
- **Unsaturated hydrocarbons (Alkenes and Alkynes):** Contain double or triple bonds.

Homologous Series: A family of organic compounds with the same functional group and similar chemical properties. Successive members differ by a $-\text{CH}_2-$ group.

Functional Groups: Atoms or group of atoms that determine the chemical properties of carbon compounds.

- Alcohol ($-\text{OH}$)
- Aldehyde ($-\text{CHO}$)
- Ketone ($>\text{C}=\text{O}$)
- Carboxylic acid ($-\text{COOH}$)

Chemical Properties of Carbon Compounds:

- **Combustion** – burns in oxygen to produce carbon dioxide, water, and heat.
- **Oxidation** – addition of oxygen or removal of hydrogen.
- **Addition reaction** – occurs in unsaturated compounds.
- **Substitution reaction** – occurs in saturated compounds.

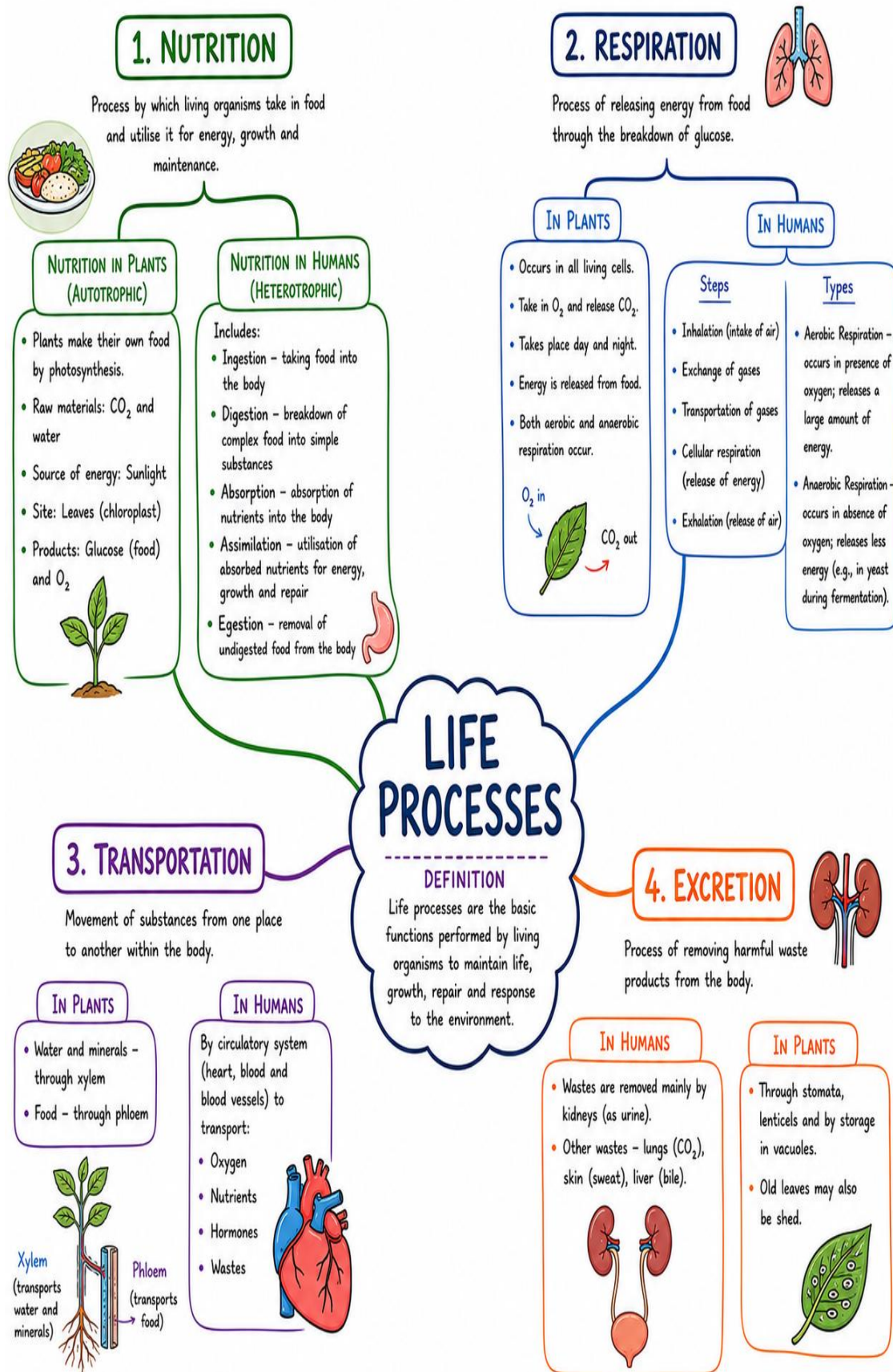
Ethanol ($\text{C}_2\text{H}_5\text{OH}$) is used as a fuel, solvent, and in medicines.

Ethanoic acid (CH_3COOH), also called acetic acid, is the main component of vinegar and is used as a preservative.

- When ethanol reacts with ethanoic acid, an **ester** is formed, producing a pleasant smell.
This reaction is called **esterification**.
- **Soaps:** Soaps are sodium or potassium salts of long-chain carboxylic acids (fatty acids).
- **Detergents:** Detergents are ammonium or alkyl benzene sulphonate salts of a long chain of carboxylic acids.
- Soaps clean by forming **micelles**, which trap oil and grease in water. However, soaps do not work well in hard water because they form scum. Detergents work effectively in both soft and hard water.

CHAPTER 5: LIFE PROCESSES

(A) MIND MAP



(B) SUMMARY

Life Processes

Life processes are the basic functions that keep living organisms alive:
Nutrition, Respiration, Transportation and Excretion.

1. Nutrition

- Definition: The process of obtaining and using food for energy, growth, and repair.
- Types:

- Autotrophic – organisms make their own food.
It is of two types: Photosynthesis; Chemosynthesis.
- Heterotrophic – organisms depend on others.
It is primarily of three types; Parasitic, Saprophytic and Holozoic.

Photosynthesis:

- $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{(Sunlight, Chlorophyll)}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- Requirements: Sunlight, chlorophyll, carbon dioxide, water.
- Human digestion pathway:
Mouth → Oesophagus → Stomach → Small Intestine → Large Intestine → Rectum → Anus
- Enzymes: Salivary amylase, Pepsin, Bile, Pancreatic enzymes.

2. Respiration

- Breakdown of food to release energy.
- Aerobic: Uses oxygen, more energy, $\text{CO}_2 + \text{H}_2\text{O}$.
- Anaerobic: No oxygen, less energy, lactic acid (muscles) or alcohol + CO_2 (yeast).
- Respiratory pathway: Nostrils → Nasal cavity → Trachea → Bronchi → Lungs → Alveoli.

3. Transportation

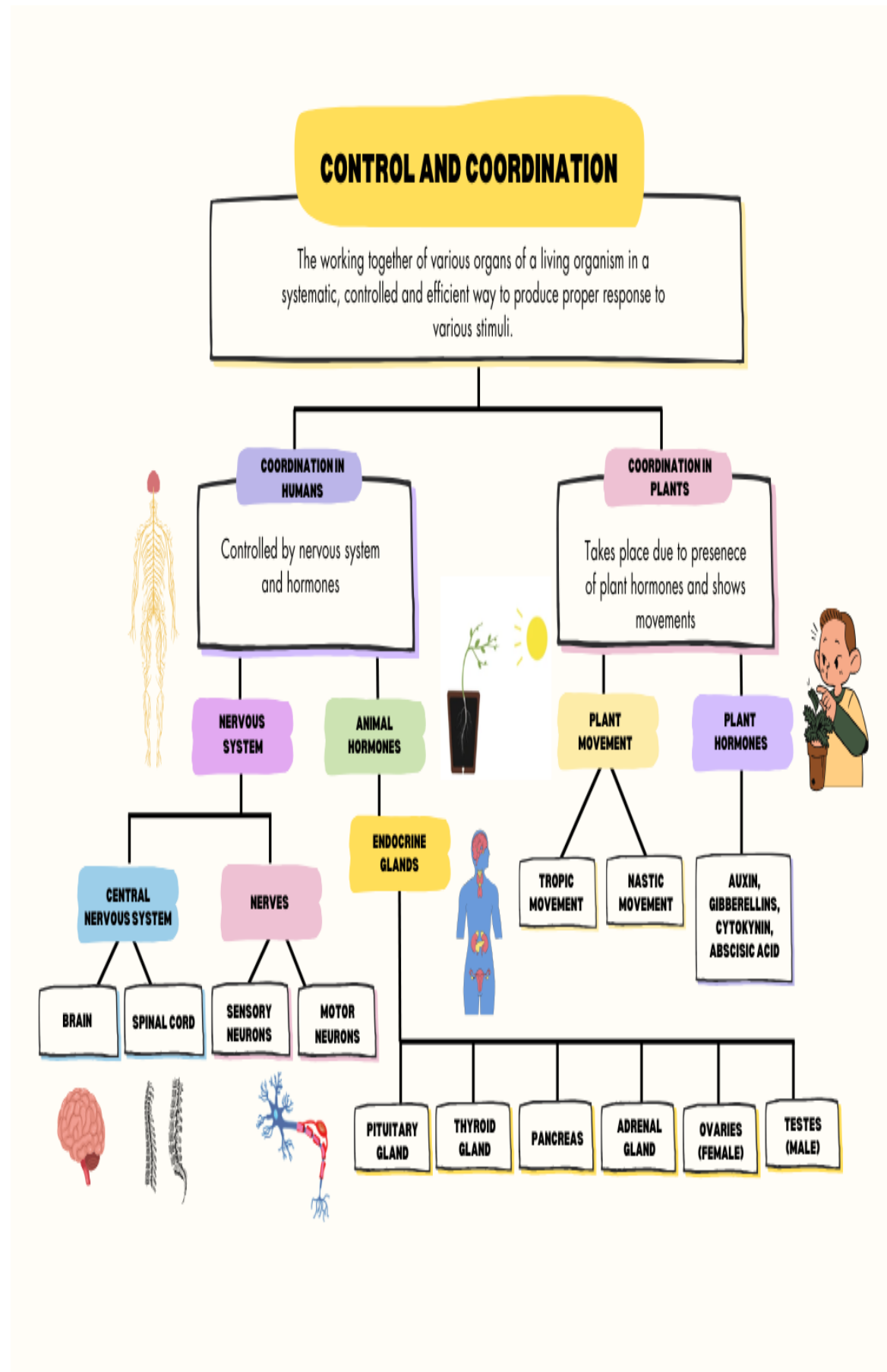
- Humans: Heart, blood and blood vessels.
- Arteries carry blood away from heart;
- veins carry blood toward the heart;
- capillaries exchange materials.
- Blood:
 - RBCs carry oxygen,
 - WBCs fight infection,
 - Platelets clot blood,
 - Plasma transports substances.
 - Double circulation: Pulmonary and systemic.
 - Plants: Xylem transports water/minerals; phloem transports food.

4. Excretion

- Removal of metabolic wastes.
- Parts: Kidneys, ureters, urinary bladder, urethra.
- Nephron is the functional unit.
- Urine formation: Filtration, reabsorption, secretion.
- Plants remove wastes via storage, stomata and shedding leaves.

CHAPTER 6: CONTROL AND COORDINATION

(A) MIND MAP

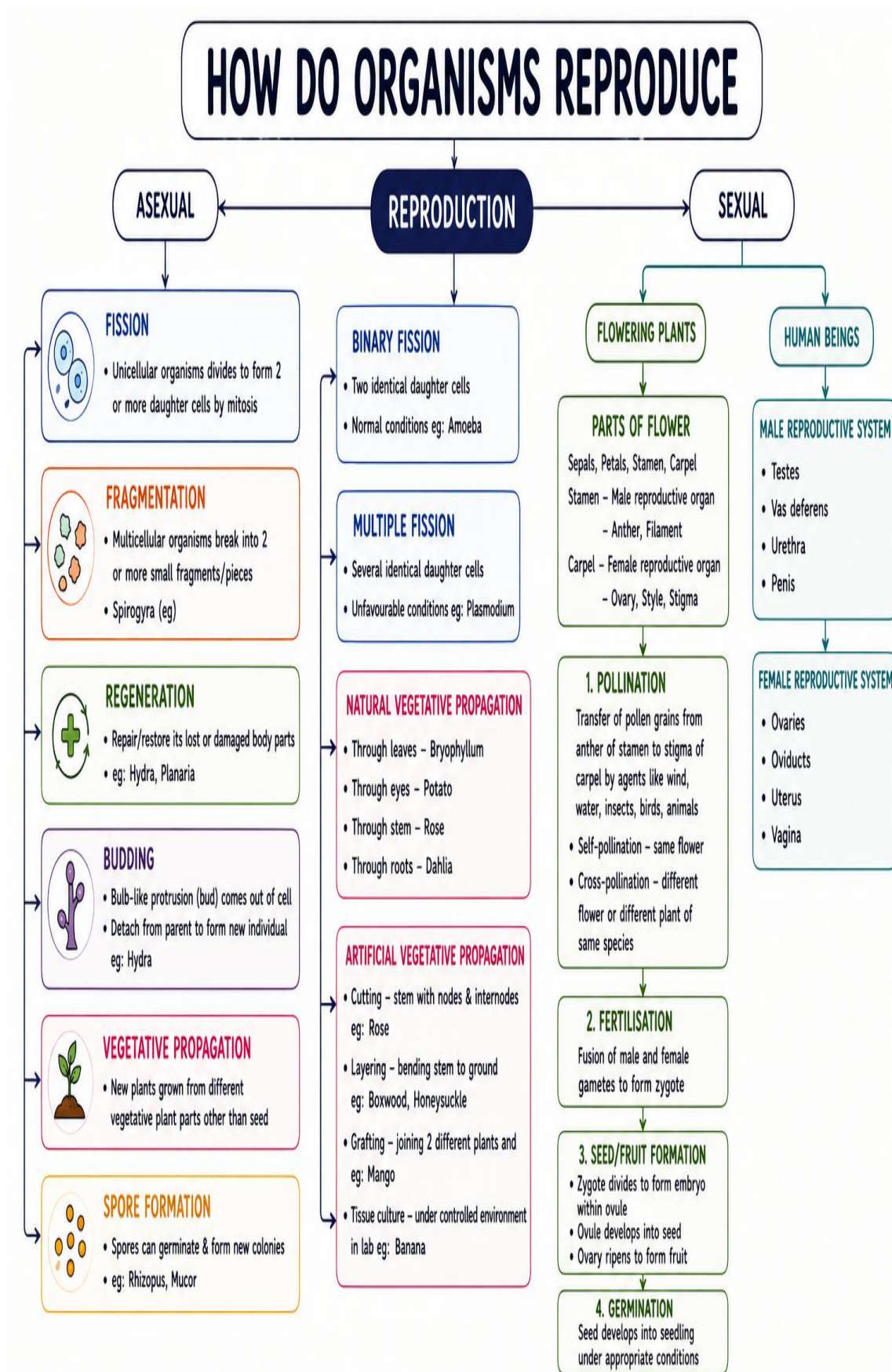


(B) SUMMARY

- What is Control and Coordination?
 - Control and coordination help organisms respond to stimuli. Animals use the nervous and endocrine systems.
 - Plants use hormones and growth responses.
- Control and Coordination in Animals
 - **Neuron** is the structural and functional unit.
 - **Parts:** Dendrites, Cell body (Cyton), Axon.
 - **Nerve impulses** travel from receptors to brain/spinal cord and then to effectors.
- Reflex Action
 - A quick automatic, involuntary response.
Example: Pulling hand from a hot object.
 - Reflex Arc: Receptor → Sensory neuron → Spinal cord → Motor neuron → Effector.
- Human Brain
 - Forebrain: Thinking, memory, voluntary actions.
 - Midbrain: Visual and auditory reflexes.
 - Hindbrain: Balance, breathing, heartbeat, swallowing.
 - Protection: Skull, meninges, cerebrospinal fluid.
- Coordination in Plants
 - Tropic movements: Phototropism, Geotropism, Hydrotropism, Thigmotropism, Chemotropism.
 - Nastic movement: Mimosa leaves fold on touch.
- Plant Hormones
 - Auxin—growth;
 - Gibberellin—stem growth/seed germination;
 - Cytokinin—cell division;
 - ABA—growth inhibition and dormancy.
 - Ethylene—ripening of fruits
- Hormones in Animals
 - Pituitary—Growth hormone;
 - Thyroid—Thyroxine;
 - Pancreas—Insulin;
 - Adrenal—Adrenaline;
 - Testes—Testosterone;
 - Ovaries—Oestrogen.
- Nervous vs Hormonal Control
 - Nervous: electrical, fast, short-lasting, through nerves.
 - Hormonal: chemical, slow, long-lasting, through blood.

Chapter 7: How Do Organisms Reproduce?

(A) MIND MAP

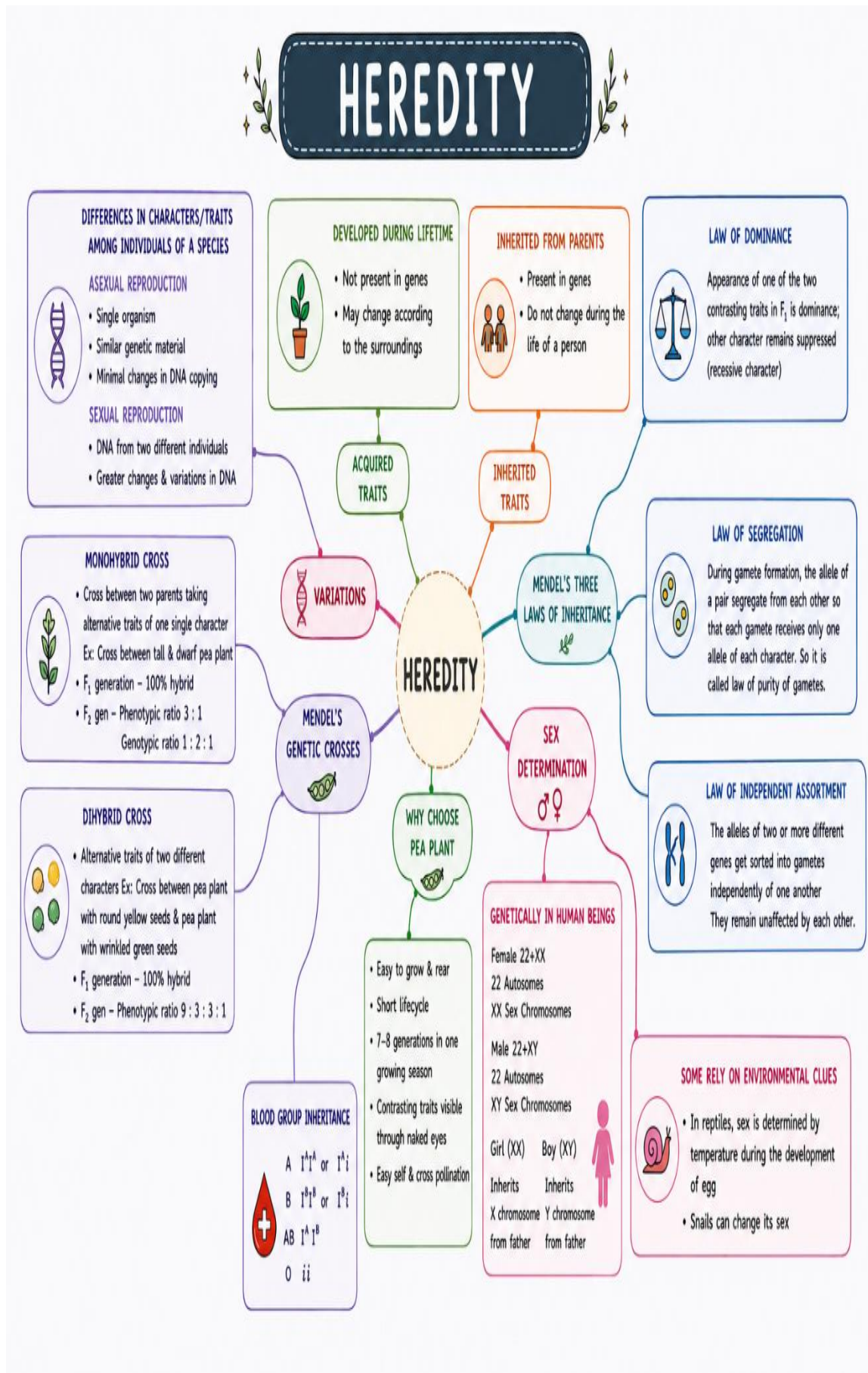


(B) SUMMARY

- Reproduction is the biological process by which organisms produce new individuals of the same species. It ensures continuity of species and introduces variations.
- **Types of Reproduction**
 - Asexual reproduction: One parent, no gametes, genetically similar offspring.
 - Methods: Binary fission, Multiple fission, Budding, Fragmentation, Regeneration, Spore formation, Vegetative propagation.
- **Sexual Reproduction**
 - Involves two parents. Male and female gametes fuse during fertilisation to produce genetically varied offspring.
- **Reproduction in Flowering Plants**
 - Flower parts: Stamen (male), Carpel/Pistil (female).
 - Pollination: Self and Cross.
 - Fertilisation forms a zygote.
 - After fertilisation: Zygote→Embryo, Ovule→Seed, Ovary→Fruit.
- **Reproduction in Human Beings**
 - Male: Testes, Scrotum, Vas deferens, Penis.
 - Female: Ovaries, Fallopian tubes, Uterus, Vagina.
 - Fertilisation occurs in the fallopian tube. Embryo develops in the uterus.
- **Puberty**
 - Growth of reproductive organs, hormonal changes, secondary sexual characteristics, reproductive maturity.
- **Reproductive Health**
 - Contraceptive methods: Condoms, Oral pills, Copper-T, Vasectomy, Tubectomy.
 - Importance: Prevents unwanted pregnancy, family planning, reduces STIs.
- **Important Diagrams**
 - Binary fission in Amoeba, Budding in Hydra, Spore formation in Rhizopus
 - Flower structure
 - Male and Female reproductive systems.
- **Must Remember**
 - Asexual vs Sexual reproduction,
 - Methods with examples
 - Parts of flower
 - Pollination
 - Fertilisation
 - Human reproductive systems
 - Embryo development
 - Contraceptive methods.

CHAPTER 8: HEREDITY

(A) MIND MAP

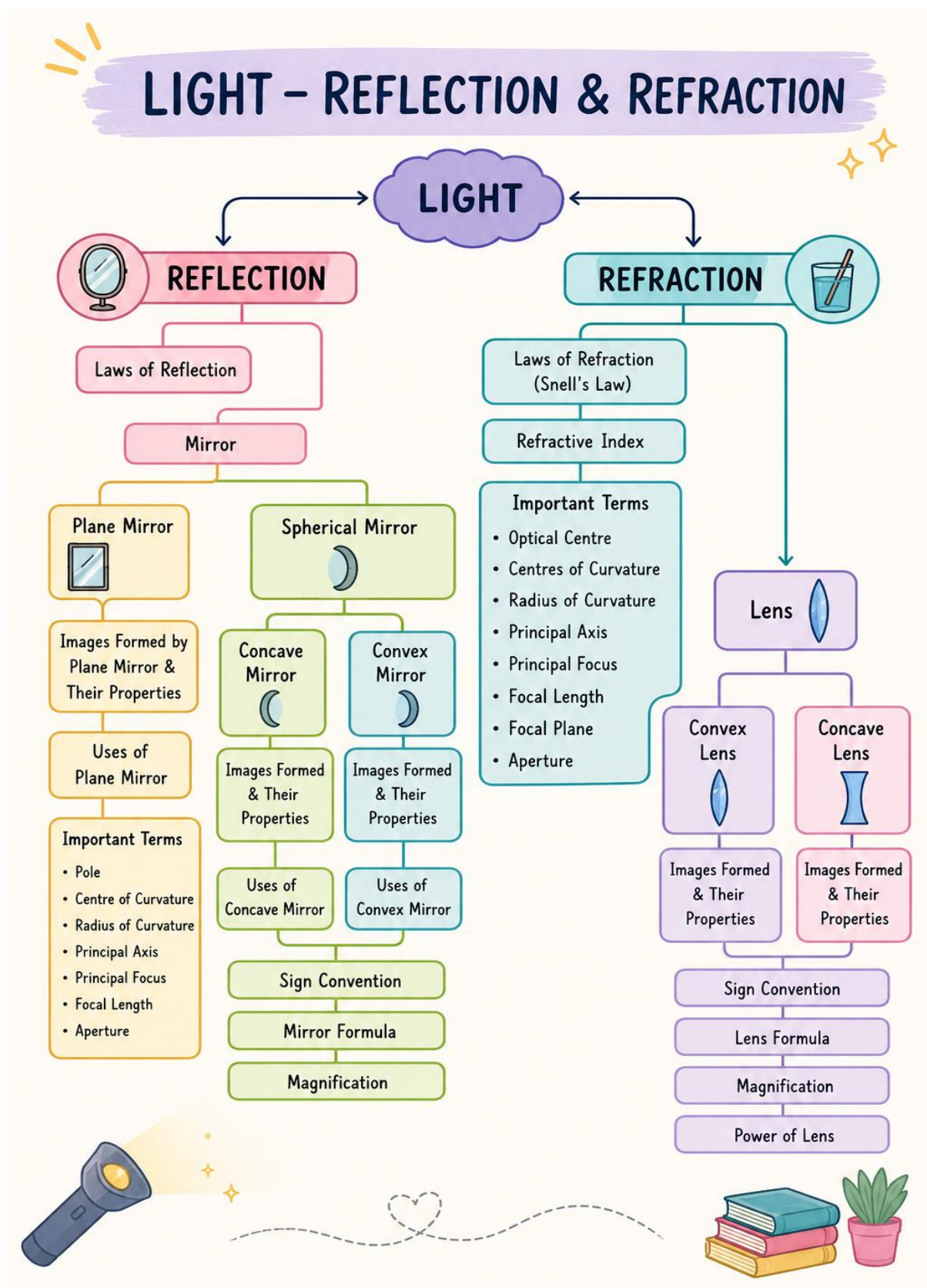


(B) SUMMARY

- Heredity is the transmission of traits from parents to offspring through genes. It explains similarities and differences between parents and offspring.
- Variations: Variation is the difference in characteristics among individuals.
- Importance:
 - Helps adaptation.
 - Increases survival.
 - Basis of evolution.
 - Types:
 - Inherited variations.
 - Acquired variations (not inherited).
- Mendel's Experiments
 - Gregor Johann Mendel is the Father of Genetics.
 - He experimented on pea plants and concluded that traits are controlled by genes.
 - Some traits are dominant while others are recessive.
- Important Terms
 - Gene: Basic unit of heredity.
 - Alleles: Different forms of the same gene.
 - Dominant trait: Expressed with one dominant allele.
 - Recessive trait: Expressed only with two recessive alleles.
- Monohybrid Cross
 - Example: $TT \times tt$
 - F1 Generation: All Tall (Tt)
 - F2 Generation:
 - Genotypic ratio: 1 TT : 2 Tt : 1 tt
 - Phenotypic ratio: 3 Tall : 1 Dwarf
- Sex Determination in Humans
 - Humans have 23 pairs of chromosomes.
 - Female: XX
 - Male: XY
 - The father's sperm determines whether the child is XX (girl) or XY (boy).

CHAPTER 9: LIGHT – REFLECTION AND REFRACTION.

(A) MIND MAP



(B) SUMMARY

- Light is a form of energy that produces the sensation of sight.
- Reflection is the bouncing back of light into the same medium after striking a surface.
 - Laws of Reflection
 - The angle of incidence ($\angle i$) is equal to the angle of reflection ($\angle r$).
 - The incident ray, reflected ray, and the normal at the point of incidence all lie in the same plane.
- **Spherical Mirrors:**
 - **Concave Mirror:** A spherical mirror whose reflecting surface is curved inwards. It converges parallel rays to a point. It forms a virtual and erect image when the object is placed between focus (F) and pole (P) of the mirror. In other cases, it always forms a real, inverted image of the object, if the object is placed beyond focus (F).
 - **Uses:** as Shaving mirrors, Dentist's mirrors, Vehicle headlights and torches, Solar furnaces
 - **Convex Mirror:** A spherical mirror whose reflecting surface is curved outwards. It Diverges light rays. It always forms virtual, erect and diminished image of the object whatever may be the position of the object in front of the mirror.
 - **Uses:** as a Rear-view mirrors in vehicles, Security mirrors in shops
- **Important Terms**
 - Pole (P): Centre of the mirror.
 - Centre of Curvature (C): Centre of the sphere of which the mirror is a part.
 - Radius of Curvature (R): Distance between P and C.
 - Principal Axis: Straight line passing through P and C.
 - Principal Focus (F): Point where rays parallel to the principal axis meet (in case of concave) or appear to diverge (in case of convex) mirror.
 - Focal Length (f): Distance between P and F.
 - Relation: $R = 2f$
 - Real image: The image which can be obtained on the screen is called real image. It is inverted with respect to the object.
 - Virtual image: The image which cannot be obtained on the screen is called a virtual image. It is erect with respect to the object.
 - Mirror Formula
 - $$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$
 - Magnification of Mirror
 - $$m = \frac{h'}{h} = -\frac{v}{u}$$
- **Refraction of Light:** is the bending of light when it passes from one transparent medium to another because its speed changes.
- **Laws of Refraction**
 - The incident ray, refracted ray and normal lie in the same plane.

- The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media.

$$\frac{\sin i}{\sin r} = \text{constant (Snell's Law)}$$

- This constant is called the refractive index (n).

- **Lenses**

- **Convex Lens:** Thicker at the centre. It converges light rays. It can form real or virtual images. It forms a virtual and erect image when the object is placed between focus (F1) and the optical centre (O) of the lens. In other cases, it always forms a real, inverted image of the object, if the object is placed beyond focus (F1).
- **Uses:** in Magnifying glass, Camera, Microscope, Human eye correction (Hypermetropia)
- **Concave Lens:** Thinner at the centre. It diverges light rays. It Always forms a virtual, erect and diminished image.
- **Uses:** in Spectacles for Myopia, door eye viewers

- Lens Formula: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

- Magnification of Lens: $m = \frac{h'}{h} = \frac{v}{u}$

- Power of a Lens: the reciprocal of its focal length in metre. Its SI Unit is Dioptre (D)

$$P = \frac{1}{f}$$

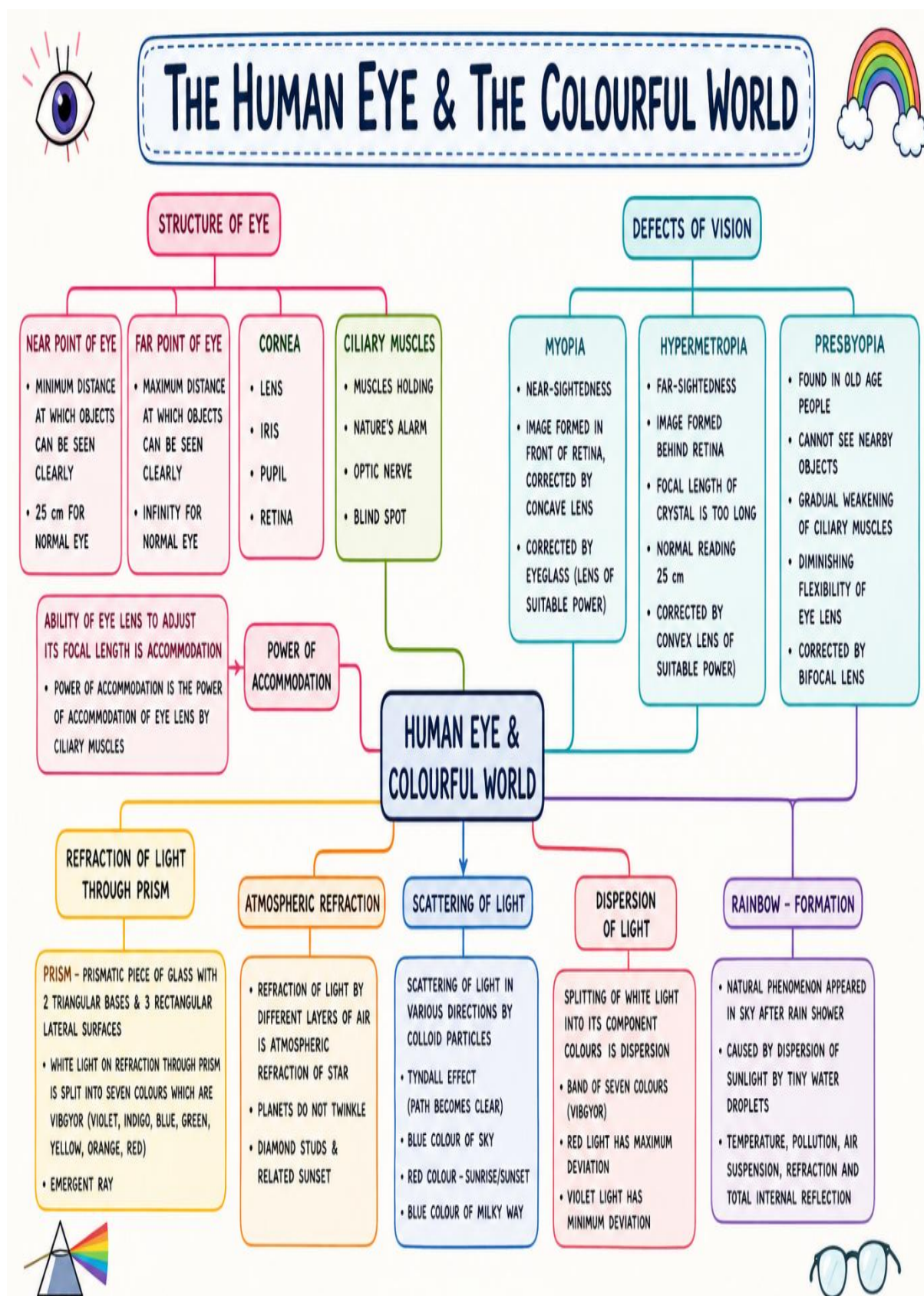
- Convex lens → Positive power
- Concave lens → Negative power
- **Important Sign Convention**

According to the New Cartesian Sign Convention:

- All distances are measured from the pole (mirror) or optical centre (lens).
- Distances measured in the direction of incident light are positive.
- Distances measured opposite to the direction of incident light are negative.
- Heights above the principal axis are positive.
- Heights below the principal axis are negative.

CHAPTER 10: THE HUMAN EYE AND THE COLOURFUL WORLD.

(A) MIND MAP



(B) SUMMARY

- **Human Eye – Structure & Function**

The human eye is a light sensitive organ that helps us see objects by forming images on the retina.

- **Main Parts:**

- Cornea: Transparent front layer; allows light to enter.
- Iris: Controls the size of the pupil.
- Pupil: Opening through which light enters the eye.
- Lens: Convex lens that focuses light on the retina.
- Ciliary muscles: Change the curvature of the lens (for focusing).
- Retina: Screen where a real and inverted image is formed.
- Optic nerve: Sends signals to the brain.

- **Power of Accommodation**

- The ability of the eye lens to adjust its focal length to see objects at different distances clearly.
- Near point of the eye is 25 cm. The eye Lens becomes thicker to see nearby objects.
- Far point of the eye is infinity. The eye Lens becomes thinner to see distance objects.

- **Defects of Vision & Correction**

- Myopia (near-sightedness)
 - Can see nearby objects clearly, distant objects appear blurred.
 - Image forms in front of retina.
 - Corrected using concave lens.
- Hypermetropia (far-sightedness)
 - Can see distant objects clearly, nearby objects appear blurred.
 - Image forms behind retina.
 - Corrected using convex lens.
- Presbyopia
 - Age-related defect; difficulty seeing nearby objects.
 - Corrected using convex lenses.

- **Refraction of Light Through a Prism**

- Dispersion of light: Splitting of white light into its component colours on passing through a glass prism is called dispersion of light.
- Spectrum: The band of colour components of a light beam obtained on a white screen when passed through a glass prism is called spectrum.

- **Atmospheric Refraction:** When the light rays pass through the atmosphere having different densities and refractive indices, then refraction takes place. This is known as atmospheric refraction.

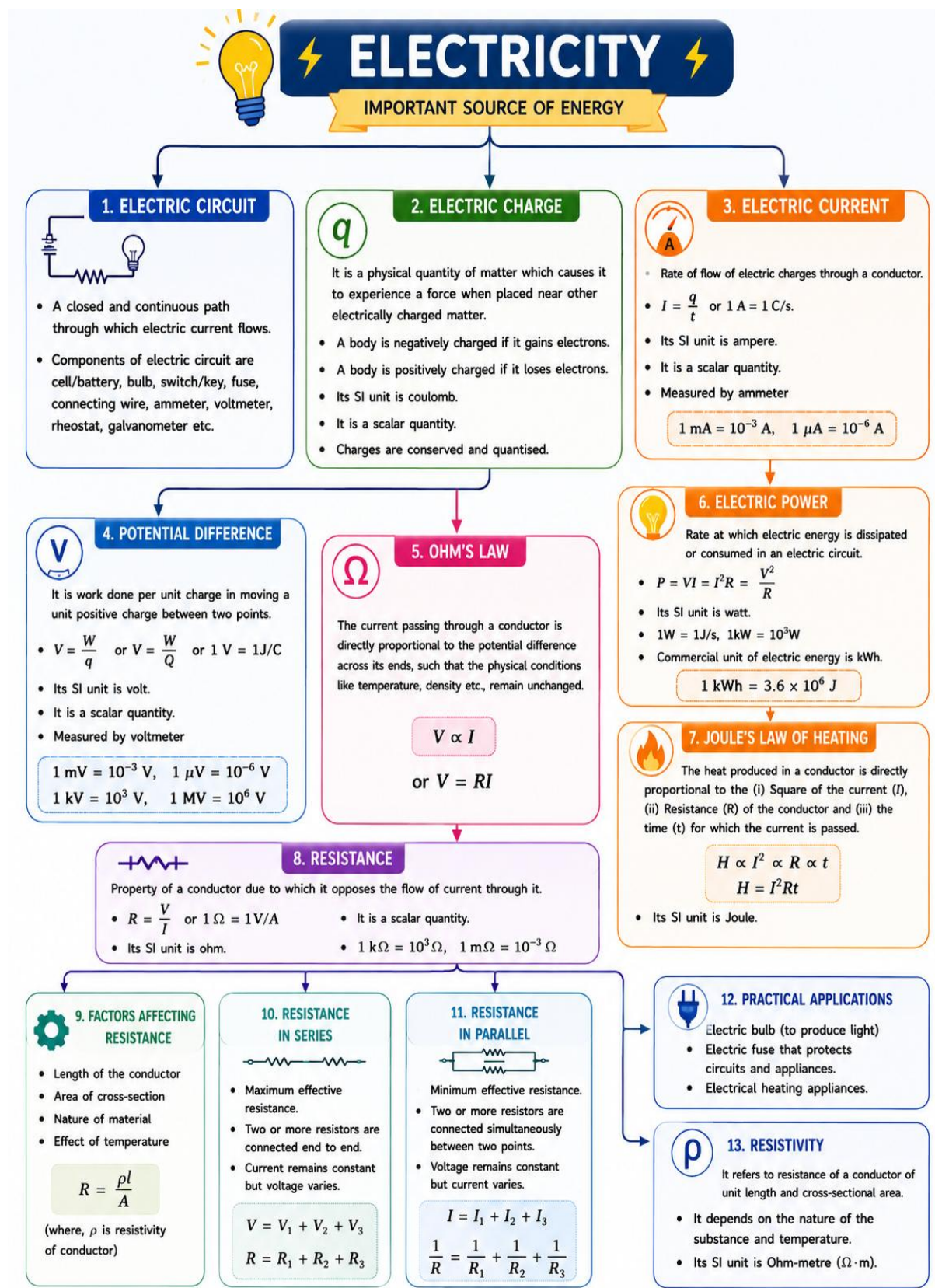
- Twinkling of stars occurs due to atmospheric refraction.
- Advanced sunrise and delayed sunset happen due to bending of light.

- **Scattering of Light**

- The sky appears blue because shorter wavelengths scatter more.
- Sun appears red at sunrise/sunset due to scattering of blue light.

CHAPTER 11: ELECTRICITY.

(A) MIND MAP

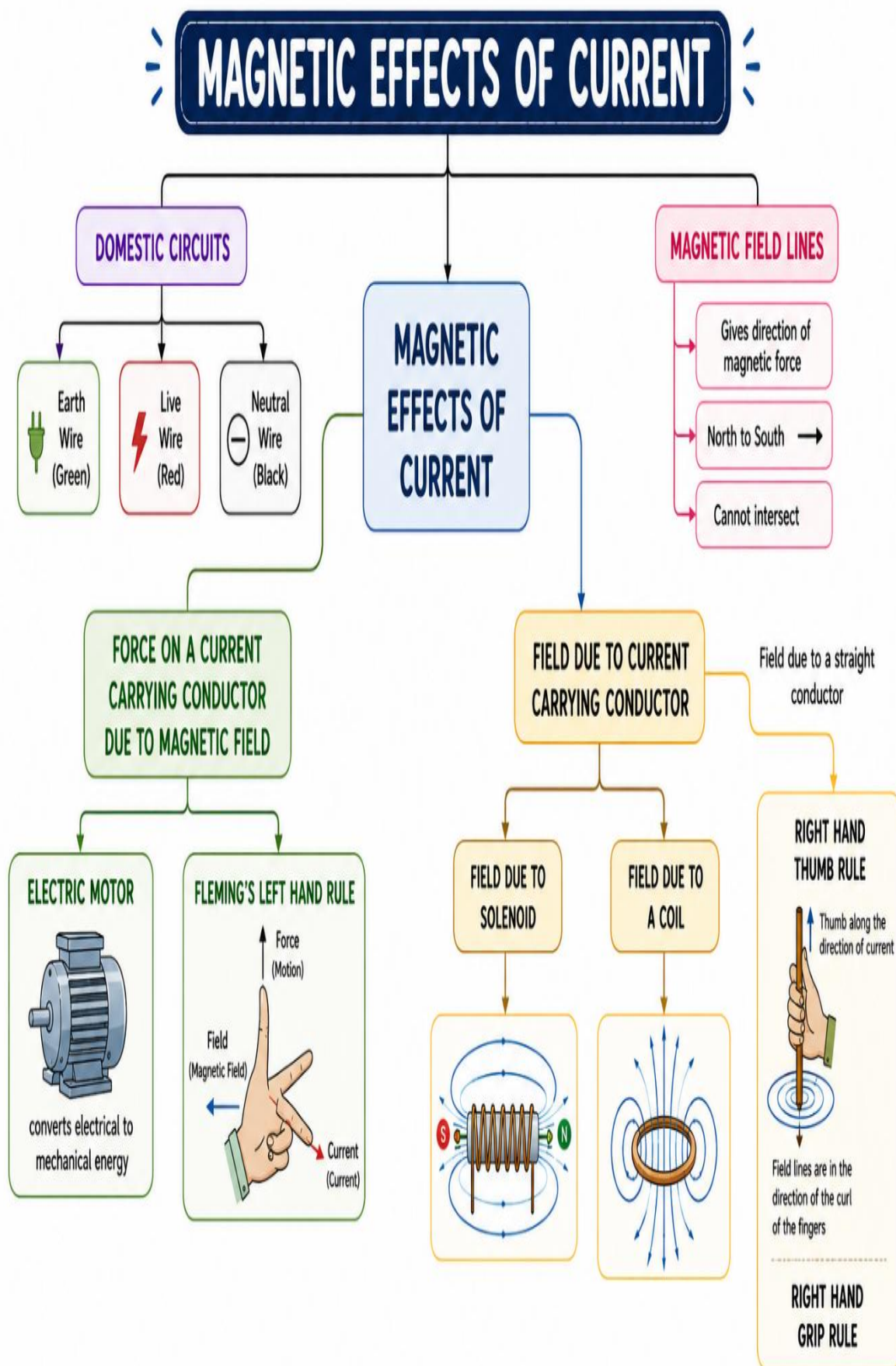


(B) SUMMARY

- **Electric Charge:** Property of matter that causes attraction or repulsion.
 - Two types: Positive (+), Negative (–)
 - Like charges repel, unlike attract.
 - SI unit: Coulomb (C)
- **Electric Current (I):** The flow of electric charge (electrons) in a definite direction in a conductor. $I = \frac{Q}{t}$.
 - SI Unit: Ampere (A)
 - 1 Ampere = 1 Coulomb of charge flowing per second.
 - The electric current is measured by ammeter
- **Potential Difference:** is the work done to move a unit charge from one point to another.
 - Formula: $V = \frac{W}{Q}$
 - SI Unit: Volt (V).
 - The potential difference is measured by voltmeter
- **Ohm's Law:** at constant temperature, the current flowing through a conductor is directly proportional to the potential difference across its ends.
 - Formula: $V = IR$
- **Resistance (R):** The opposition or obstruction offered by a conductor to the flow of electrons is called electric resistance.
 - SI unit of resistance is ohm (Ω).
 - Resistance depends on: length of a conductor, area of cross section, temperature and nature of the material.
 - Resistance $R = \rho \frac{l}{A}$
- **Resistivity:** Resistivity is a property of the material of a conductor.
 - SI unit is Ohm-metre (Ωm).
- **Combination of Resistors**
 - (a) Series Combination: Same current flows through all resistors.
 - Total resistance: $R = R_1 + R_2 + R_3 + \dots$
 - (b) Parallel Combination: Same potential difference across each resistor.
 - Formula: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$
- **Electric Power:** Electric power is the rate at which electrical energy is consumed.
 - SI of electric power Unit: Watt (W).
 - 1 kilowatt (kW) = 1000 W.
 - Formula: $P = VI$, $P = I^2R$, $P = V^2/R$
- **Electrical Energy:** Electrical energy consumed is:
 - $E = Pt$
 - Commercial unit: kilowatt-hour (kWh)
- **Heating Effect of Electric Current:** When current passes through a resistor, heat is produced.
- **Joule's Law of Heating:** $H = I^2Rt$
 - Applications: In Electric iron, Heater, Toaster, Electric kettle, Geyser
- **Electric Fuse:** An electric fuse is a safety device made of a wire with a low melting point.
 - It melts when excess current flows.
 - Protects electrical appliances from overload and short circuit.

CHAPTER 12: MAGNETIC EFFECT OF CURRENT

(A) MIND MAP



(B) SUMMARY

- **Magnetic Effect of Electric Current:** When electric current flows through a conductor, it produces a magnetic field around it.
- **Magnetic Field:** A magnetic field is the region around a magnet or a current-carrying conductor where its influence can be felt.
 - Magnetic Field represented by magnetic field lines.
 - They form closed loops.
 - The direction of magnetic field lines:
 - North → South.(Outside the magnet) and
 - South → North.(Inside the magnet)
 - No two field lines intersect.
- **Magnetic Field Due to Electric Current**

(a) Straight Current-Carrying Conductor

- Produces circular magnetic field lines around it.
- Direction given by Right-Hand Thumb Rule:
- Thumb → current direction
- Fingers → magnetic field direction

(b) Circular Loop

- Magnetic field lines become concentric circles near the wire.
- At the centre, field lines are nearly straight and parallel.
- Strength increases with: Increase in current, More number of turns
- **Solenoid:** A solenoid is a coil of many circular turns of insulated wire. Produces a magnetic field similar to a bar magnet. Inside the solenoid: strong and uniform field.
- **Electromagnet:** A solenoid with a soft iron core becomes an electromagnet. Strength depends on: Current, Number of turns, Nature of core
- **Force on a Current-Carrying Conductor:** A conductor carrying current in a magnetic field experiences a force.
 - Direction given by **Fleming's Left-Hand Rule:**
 - Thumb → force
 - Fore finger → magnetic field
 - Central finger → current
- **Domestic Electric Circuits:** Household circuits include:
 - Live wire (red) → carries current
 - Neutral wire (black) → returns current
 - Earth wire (green) → safety
- **Safety Devices**
 - Fuse: Made of thin wire with low melting point, Protects from overloading
 - MCB (Miniature Circuit Breaker): Automatically switches off during overload

CHAPTER 13: OUR ENVIRONMENT

(A) MIND MAP



(B) SUMMARY

- **Environment:** The environment includes all living (biotic) and non-living (abiotic) components that interact with one another.
- **Ecosystem**
An ecosystem is a functional unit where living organisms interact with each other and with the non-living environment.
 - **Biotic:** Producers, Consumers, Decomposers.
 - **Abiotic:** Air, Water, Soil, Sunlight, Temperature, Minerals.
- **Food Chain**
A food chain shows the flow of food and energy.
Example: Grass → Grasshopper → Frog → Snake → Eagle.
- **Trophic levels:** Producers, Primary consumers, Secondary consumers, Tertiary consumers.
- **Food Web**
A food web is a network of interconnected food chains. It provides stability to the ecosystem.
- **Flow of Energy**
 - The Sun is the ultimate source of energy.
 - Energy flows in one direction: Sun → Producers → Consumers → Decomposers.
 - 10% Law: Only about 10% of energy is transferred to the next trophic level.
- **Decomposers**
 - Examples: Bacteria and fungi.
 - Functions: Break down dead organisms and recycle nutrients.
- **Biodegradable and Non-biodegradable Substances**
 - Biodegradable: Vegetable waste, paper, cotton, leaves.
 - Non-biodegradable: Plastic, glass, metals, pesticides.
- **Biological Magnification**
Increase in the concentration of harmful chemicals at successive trophic levels. Top consumers accumulate the highest concentration.
- **Ozone Layer**
 - The ozone layer protects Earth from harmful UV rays.
 - Cause of depletion: CFCs.
 - Effects: Skin cancer, cataracts, damage to plants and animals.
- **Waste Management (3Rs)**
 - Reduce: Use fewer resources.
 - Reuse: Use items again.
 - Recycle: Convert waste into useful products.

SECTION A
Multiple Choice Questions (MCQ)
[Chemistry]

1. Which of the following is not a physical change?
- (A) Boiling of water to give water vapour
(B) Melting of ice to give water
(C) Dissolution of salt in water
(D) Combustion of Liquefied Petroleum Gas (LPG)

Answer: (D)

2. A colorless gas that smells like burning sulphur and causes coughing is
- (A) Hydrogen
(B) Sulphur dioxide
(C) Sulphur trioxide
(D) Nitrogen dioxide

Answer: (B)

3. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?
- (A) Displacement reaction
(B) Oxidation reaction
(C) Combination reaction
(D) Double displacement reaction

Answer: (D)

4. Which of the following is (are) an endothermic process (es)?
- (A) Dilution of sulphuric acid
(B) Freezing of water
(C) Condensation of water vapours
(D) Evaporation of water

Answer: (D)

5. Which one of the following processes involve chemical reactions?
- (A) Storing of oxygen gas under pressure in a gas cylinder
(B) Liquefaction of air
(C) Keeping petrol in a china dish in the open
(D) Heating copper wire in presence of air at high temperature

Answer: (D)

6. Which of the following indicates chemical equation
- (A) Change in size
(B) Change in mass
(C) Formation of precipitate
(D) Change in position

Answer: (C)

7. Which of the following is an oxidation reaction?
- (A) Water freezing into ice
(B) Salt dissolving in water
(C) Sugar melting in pan
(D) Iron rusting when exposed to air

Answer: (D)

8. Which of the following is a decomposition reaction
- (A) Burning of food
(B) Photosynthesis
(C) Digestion of food
(D) Rusting of iron

Answer: (B)

9. $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
Identify the substance oxidised in the above equation.

- (A) MnCl_2
(B) HCl
(C) H_2O
(D) MnO_2

Answer: (B)

10. In which reaction does a solid get separated from the solution?
- (A) Neutralization reaction
(B) Precipitation reaction
(C) Redox reaction
(D) Displacement reactions

Answer: (B)

11. The main cause of rancidity of foods is the reaction of fats and oils by
- (A) Hydrolysis
(B) Substitution
(C) Oxidation
(D) Reduction

Answer: (C)

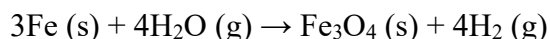
12. Which of the following completes and balances the equation



- (A) $\text{CO}_2(\text{g})$
(B) $\text{H}_2(\text{g})$
(C) $\text{N}_2(\text{g})$
(D) $\text{O}_2(\text{g})$

Answer: (A)

13. Consider the following chemical reaction:



Which statement correctly describes the physical state and role of water (H_2O) in this process?

- (A) Water is in liquid state and acts as an oxidizing agent.
(B) Water is in liquid state and acts as a reducing agent.

- (C) Water is in gaseous state (steam) and acts as an oxidizing agent.
- (D) Water is in gaseous state (steam) and acts as a reducing agent.

Answer: (C)

14. A student rubs a magnesium ribbon with sandpaper before burning it in the air. What is the fundamental purpose of this step?
- (A) To increase the surface temperature of the ribbon for rapid ignition.
 - (B) To remove a protective layer of basic magnesium carbonate from its surface.
 - (C) To convert magnesium into a highly volatile state.
 - (D) To ensure that moisture from the surroundings does not extinguish the flame.

Answer: (B)

15. A balanced chemical equation is strictly governed by which fundamental law of nature?
- (A) Law of Definite Proportions
 - (B) Law of Multiple Proportions
 - (C) Law of Conservation of Mass
 - (D) Law of Gaseous Volumes

Answer: (C)

16. To prevent structural failure and economic loss in infrastructure projects, engineering teams coat structural iron beams with paint or zinc layers. How does this intervention protect the metal?
- (A) It chemically converts the iron into a noble metal like platinum.
 - (B) It creates a physical barrier that prevents iron from interacting with oxygen and moisture.
 - (C) It absorbs environmental moisture to speed up safe internal reactions.
 - (D) It creates an alkaline medium that dissolves acidic rain before contact.

Answer: (B)

17. A group of students wants to design a cost-effective self-heating emergency food pouch. They need a chemical reaction that releases a safe, significant amount of heat energy upon activation. Which of the following pairs of reactants should they select?
- (A) Ammonium nitrate and water
 - (B) Calcium oxide and water

- (C) Sodium chloride and water
- (D) Barium hydroxide and ammonium chloride

Answer: (B)

18. Silver articles are highly prized for their brilliance, but they gradually turn black when exposed to open air for a long time. This is primarily caused by a chemical reaction with which environmental component?
- (A) Oxygen gas to form silver oxide (Ag_2O).
 - (B) Carbon dioxide gas to form silver carbonate (Ag_2CO_3).
 - (C) Hydrogen sulphide gas to form a layer of silver sulphide (Ag_2S).
 - (D) Nitrogen gas to form silver nitride (Ag_3N).

Answer: (C)

19. When hydrogen sulphide gas (H_2S) is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is formed, and sulphuric acid remains in the solution. This reaction is a classic example of a:
- (A) Combination reaction
 - (B) Displacement reaction
 - (C) Double displacement reaction
 - (D) Decomposition reaction

Answer: (C)

20. Water is removed when substance 'X' is heated, as well as its colours changes from green, then substance X is
- (A) CaSO_4
 - (B) CuSO_4
 - (C) FeSO_4
 - (D) BaSO_4

Answer: (C)

21. Which of the following is true for acids?
- (A) Bitter and change red litmus to Blue.
 - (B) Sour and change red litmus to blue.
 - (C) Sour and change blue litmus to red.
 - (D) Bitter and change blue litmus to red.

Answer: (C)

22. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
- (A) Baking powder
 - (B) Lime
 - (C) Ammonium hydroxide solution

(D) Hydrochloric acid

Answer: (D)

23. To protect tooth decay, we are advised to brush our teeth regularly. The nature of the toothpastes commonly used is

- (A) acidic
- (B) neutral
- (C) basic
- (D) corrosive

Answer: (C)

24. Which of the following statements is correct about an aqueous solution of an acid and of a base?

- (i) Higher the pH, stronger the acid
 - (ii) Higher the pH, weaker the acid
 - (iii) Lower the pH, stronger the base
 - (iv) Lower the pH, weaker the base
- (A) (i) and (iii)
 - (B) (ii) and (iii)
 - (C) (i) and (iv)
 - (D) (ii) and (iv)

Answer: (D)

25. Which one of the following can be used as an acid–base indicator by a visually impaired student?

- (A) Litmus
- (B) Turmeric
- (C) Vanilla essence
- (D) Petunia leaves

Answer: (C)

26. A student notices after eating sour candy, their teeth feel sensitive. What could be the reason for this.

- (A) The candy makes the teeth stronger
- (B) The candy increases the pH level, making the mouth more basic
- (C) The candy decreases the pH level, making the mouth more acidic.
- (D) The candy has no effect on pH level

Answer: (C)

27. A student adds water to concentrated acid instead of acid to water. What will happen ?

- (A) no reaction
- (B) explosion or splashing
- (C) cooling
- (D) neutralisation

Answer: (B)

28. Baking soda is heated during cooking. Gas released is

- (A) oxygen
- (B) nitrogen
- (C) carbon dioxide

(D) hydrogen

Answer: (C)

29. Blue colour copper sulphate turns white on heating due to loss of water, but blue colour returns due to

- (A) Heat
- (B) Hydration
- (C) Evaporation
- (D) Loss of ion

Answer: (B)

30. A person suffering from acute gastric acidity after overeating is advised to take an antacid. Which chemical property and compound combination represents the safest and most effective mechanism for relief?

- A) Strong base like Sodium hydroxide (NaOH) to rapidly react with stomach acid.
- B) Weak base like Magnesium hydroxide $[\text{Mg}(\text{OH})_2]$ to mildly neutralise excess hydrochloric acid.
- C) Strong acid like Dilute Nitric acid (HNO_3) to compete with stomach fluids.
- D) Neutral salt like Sodium chloride (NaCl) to dilute the concentration of gastric juice.

Answer: (B)

31. Four students measured the pH of four unknown solutions P, Q, R, and S and recorded the values as 2, 7, 10, and 14 respectively. Which solution contains the highest concentration of hydronium ions (H_3O^+)?

- A) Solution P
- B) Solution Q
- C) Solution R
- D) Solution S

Answer: (A)

32. A solid compound 'X' reacts vigorously with dilute hydrochloric acid to evolve a gas 'Y'. When gas 'Y' is passed through lime water, the solution turns milky. However, passing excess gas 'Y' causes the milkiness to completely disappear. Identify 'X' and 'Y'.

- A) X = Calcium oxide, Y = Oxygen
- B) X = Calcium carbonate, Y = Carbon dioxide
- C) X = Sodium chloride, Y = Hydrogen chloride
- D) X = Sodium hydroxide, Y = Hydrogen

Answer: (B)

33. Which of the following salts is formed by the combination of a weak acid and a strong base, and what will be the nature of its aqueous solution?

- A) Ammonium chloride (NH_4Cl); Acidic solution
- B) Sodium acetate (CH_3COONa); Basic solution
- C) Sodium chloride (NaCl); Neutral solution
- D) Ammonium carbonate $[(\text{NH}_4)_2\text{CO}_3]$; Amphoteric solution

Answer: (B)

34. A chemical compound 'Z' is extensively used in the textile industry for bleaching cotton and linen, as well as a disinfectant in water treatment plants to make water free of pathogens. Identify the compound 'Z' and its chemical formula.

- (A) Washing soda, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- (B) Bleaching powder, CaOCl_2
- (C) Baking soda, NaHCO_3
- (D) Plaster of Paris, $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$

Answer: (B)

35. The pH of a human mouth decreases below 5.5 after meals due to the action of bacteria on residual food particles. What physical damage does this cause, and how can it be prevented based on chemical principles?

- (A) It causes tooth decay by corroding the calcium phosphate tooth enamel; it can be prevented by using basic toothpaste.
- (B) It sharpens tooth enamel by dissolving soft plaque; no treatment is necessary.
- (C) It alters the biological taste buds permanently; it can be prevented by consuming citric fruits.
- (D) It turns the saliva into a highly volatile organic liquid; it can be prevented by avoiding water.

Answer: (A)

36. Baking powder is a common ingredient used to make cakes soft and spongy. It is a mixture of baking soda (sodium hydrogen carbonate) and a mild edible acid like tartaric acid. What is the fundamental

purpose of adding tartaric acid to this mixture?

- (A) To speed up the thermal decomposition of sodium hydrogen carbonate.
- (B) To neutralize the bitter-tasting sodium carbonate formed during heating.
- (C) To bleach the flour and give the cake a bright white appearance.
- (D) To preserve the cake and prevent bacterial growth over time.

Answer: (B)

37. When small pieces of zinc metal are added to a test tube containing a dilute solution of sodium hydroxide and heated, a gas is evolved. What is the identity of this gas, and how is it safely confirmed in a laboratory?

- (A) Oxygen gas (O_2), which rekindles a glowing wooden splinter.
- (B) Carbon dioxide gas (CO_2), which turns lime water milky.
- (C) Hydrogen gas (H_2), which burns with a characteristic 'pop' sound when a burning matchstick is brought near.
- (D) Nitrogen dioxide gas (NO_2), which is recognized by its characteristic brown fumes.

Answer: (C)

38. In the industrial 'Chlor-alkali process', the electrolysis of an aqueous solution of sodium chloride (brine) yields three highly valuable products. Which row in the options correctly maps the products formed at the anode, cathode, and within the electrolytic solution?

- A) Anode: Hydrogen; Cathode: Chlorine; Solution: Sodium carbonate
- B) Anode: Chlorine; Cathode: Hydrogen; Solution: Sodium hydroxide
- C) Anode: Oxygen; Cathode: Sodium; Solution: Hydrochloric acid
- D) Anode: Chlorine; Cathode: Oxygen; Solution: Bleaching powder

Answer: (B)

39. Which of the following is a natural source of citric acid

- (A) Spinach
- (B) Apple
- (C) Lemon

(D) Tomato

Answer: (C)

40. Which of the following is acidic in nature?

(A) Human blood

(B) Lime juice

(C) Antacid

(D) Lime water

Answer: (B)

41. The ability of metals to be drawn into thin wire is known as

(A) ductility

(B) malleability

(C) sonority

(D) conductivity

Answer: (A)

42. A metal X reacts with oxygen to form an amphoteric oxide. What could X most likely be

(A) Sodium

(B) Aluminium

(C) Magnesium

(D) Iron

Answer: (B)

43. Cinnabar is an ore of

(A) Mercury

(B) Zinc

(C) Copper

(D) Lead

Answer: (A)

44. Which of the following methods is suitable for preventing an iron frying pan from rusting?

(A) Applying grease.

(B) Applying paint.

(C) Applying a coating of zinc

(D) Applying a coat of Lead

Answer: (C)

45. Which of the following used for dissolution of gold?

(A) Hydrochloric acid

(B) Sulphuric acid

(C) Nitric acid

(D) Aqua- regia

Answer: (D)

46. An elements' positioning in the reactivity series governs its natural occurrence. Which of the following pairs of metals can coexist seamlessly in nature in their native or elemental metallic state?

(A) Sodium and Potassium

(B) Copper and Iron

(C) Gold and Platinum

(D) Magnesium and Aluminium

Answer: (C)

47. Which of the following metals do not react with cold as well as hot water?

(A) sodium

(B) calcium

(C) magnesium

(D) iron

Answer: (D)

48. Thermite is a mixture of iron (III) oxide and

(A) zinc powder

(B) sodium

(C) potassium

(D) aluminium powder

Answer: (D)

49. The highly reactive metals like Sodium, Potassium and Magnesium, etc. are extracted by the

(A) electrolysis of their molten chloride

(B) electrolysis of their molten oxides

(C) reduction by aluminium

(D) reduction by carbon

Answer: (A)

50. Which of the following non-metal is lustrous?

(A) Sulphur

(B) Oxygen

(C) nitrogen

(D) Iodine

Answer: (D)

51. Stainless steel is a very useful material for our life. In stainless steel iron is mixed with

(A) Ni and Cr

(B) Cu and Cr

(C) Ni and Cu

(D) Cu and Au

Answer: (A)

52. A non- metal which is stored in water is

(A) sulphur

(B) silicon

(C) phosphorus

(D) carbon

Answer: (C)

53. The metal that is not malleable at room temperature is

(A) copper

(B) zinc

(C) lead

(D) tin

Answer: (B)

54. To prevent accidental fires inside laboratory storage cabinets, highly reactive elements must be completely isolated from ambient air and atmospheric humidity. Which of the following fluids is safely used to submerge raw Sodium metal?

- (A) Distilled water
- (B) Concentrated alcohol
- (C) Kerosene oil
- (D) Liquid nitrogen

Answer: (C)

55. Metal oxides are generally classified by their chemical behavior when interacting with aqueous solutions. However, oxides of Aluminium (Al_2O_3) and Zinc (ZnO) show a specific dual nature. What term is used to describe such oxides?

- (A) Acidic oxides
- (B) Basic oxides
- (C) Amphoteric oxides
- (D) Neutral oxides

Answer: (C)

56. A production jeweler mixes copper with pure 24-carat gold to formulate 22-carat gold ornaments. What mechanical and structural improvement does this mixing process provide to the final jewelry piece?

- (A) Decreases the overall density to make it lightweight
- (B) Enhances structural hardness to make it resistant to bending
- (C) Sharpens the melting point to make melting easier
- (D) Significantly elevates electrical conductivity

Answer: (B)

57. In the electrolytic refining of copper the electrolyte used is

- (A) CuO
- (B) CuCl_2
- (C) acidified $\text{CuSO}_4(\text{aq})$
- (D) $\text{CuSO}_4(\text{s})$

Answer: (C)

58. An alloy used for making electrical heating elements is

- (A) Solder
- (B) Brass
- (C) Nichrome
- (D) Bronze

Answer: (C)

59. Ionic compounds conduct electricity in:

- (A) Solid state
- (B) Molten state
- (C) Solid and dry state
- (D) Solid only

Answer: (B)

60. Brass is an alloy of

- (A) Copper and Tin
- (B) Iron and Carbon
- (C) Copper and Zinc
- (D) Aluminium and Copper

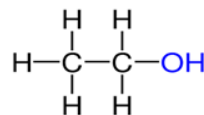
Answer: (C)

61. Which of the following metals are obtained by electrolysis of their chlorides in molten state

- (A) Mg
- (B) Ag
- (C) Zn
- (D) Cu

Answer: (A)

62. Name the below compound from its structure:



- (A) Ethane
- (B) Ethanol
- (C) Ethene
- (D) Propanol

Answer: (B)

63. Which amongst the following is not a free state of carbon?

- (A) diamond
- (B) graphite
- (C) petrol
- (D) coke

Answer: (C)

64. Covalent compounds generally have:

- (A) High melting point
- (B) Low melting and boiling points
- (C) High electrical conductivity
- (D) Hard crystalline structure

Answer: (B)

65. Carbon forms large molecules due to:

- (A) Catenation
- (B) Allotropy
- (C) Valency
- (D) Reactivity

Answer: (A)

66. Organic compounds having the same molecular formula but different structural formulae are called

- (A) Allotropes

(B) Isomers

(C) Isobars

(D) Isotopes

Answer: (B)

67. The functional group -COOH belongs to:

(A) Alcohol

(B) Aldehyde

(C) Carboxylic acid

(D) Ketone

Answer: (C)

68. Hard water reduces the effectiveness of:

(A) Detergents

(B) Soap

(C) Acids

(D) Alcohol

Answer: (B)

69. A hydrocarbon which does not belong to the same homologous series of carbon compounds is

(A) C_4H_{10}

(B) C_6H_{14}

(C) C_7H_{14}

(D) $\text{C}_{10}\text{H}_{22}$

Answer: (C)

70. Amongst C_3H_8 , C_4H_{10} , C_5H_{12} and C_5H_{10} the homologues are:

(A) C_4H_{10} and C_5H_{12} only

(B) C_3H_8 and C_4H_{10} only

(C) C_5H_{10} and C_5H_{12} only

(D) C_3H_8 , C_4H_{10} and C_5H_{12} only

Answer: (D)

71. In graphite, each carbon atom is bonded to three other carbon atoms in the same plane. What happens to the fourth valence electron?

(A) It forms an extra ionic bond with a neighbouring layer.

(B) It is completely lost to form a carbon free radical.

(C) It remains free/delocalised, allowing graphite to conduct electricity.

(D) It forms a localized triple bond between alternate carbon pairs.

Answer: (C)

72. Industrial hydrogenated vegetable ghee is manufactured from liquid vegetable oils using a nickel catalyst. This reaction is categorized as a/an:

(A) Substitution reaction

(B) Displacement reaction

(C) Addition reaction

(D) Dehydration reaction

Answer: (C)

73. An ester with a sweet, fruity fragrance is boiled with an aqueous sodium hydroxide (NaOH) solution. This specific process is widely utilised in factories to manufacture:

(A) Industrial synthetic petrol

(B) Domestic soaps

(C) Commercial vinegar

(D) Artificial polymers

Answer: (B)

74. Ordinary laundry soaps fail to clean clothes efficiently when mixed with hard municipal water because:

(A) Hard water degrades the hydrocarbon chains into gas.

(B) Calcium and magnesium ions react with soap to form an insoluble sticky scum.

(C) Soaps turn hard water highly acidic, neutralising the active ingredients.

(D) The soap molecules completely dissolve into water clusters and cannot trap dirt.

Answer: (B)

75. Pure ethanoic acid readily freezes into a solid white crystalline mass in cold winter climates. This property is the direct historical basis for calling this substance:

(A) Commercial Vinegar

(B) Glacial Acetic Acid

(C) Ethanol Solvent

(D) Saturated Soap Matrix

Answer: (B)

76. A chef notices that the exterior bases of her shiny steel pans are turning black and dusty over a gas stove. What evaluation should she make?

(A) The gas is premium and has too much fuel energy.

(B) The air inlets of the gas stove are clogged, causing wasteful incomplete combustion.

(C) The steel metal is undergoing an internal substitution reaction.

(D) This is a standard clean combustion behaviour for saturated LPG gas.

Answer: (B)

77. Methane and chlorine gases are mixed together in a clear flask. Under which specific experimental condition will a substitution reaction take place?

- (A) Storing the flask in a dark underground locker.
- (B) Exposing the flask to bright, active sunlight.
- (C) Adding high amounts of liquid hard water.
- (D) Keeping the flask in ice at exactly 0 degrees Celsius.

Answer: (B)

78. What is the official IUPAC name of the compound $\text{CH}_3\text{-CH}_2\text{-CHO}$?

- (A) Propanone
- (B) Propanol
- (C) Propanal
- (D) Propanoic acid

Answer: (C)

79. Carboxylic acids are obtained from alcohols by

- (A) pyrolysis
- (B) hydrolysis
- (C) reduction
- (D) oxidation

Answer: (D)

80. Which catalyst is used in hydrogenation of vegetable oils?

- (A) Copper
- (B) Zinc
- (C) Nickel
- (D) Iron

Answer: (C)

Direction (81 to 100): Two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is NOT the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false but R is true.

81. **Assertion (A):** Photosynthesis taking place in green plants is classified as an endothermic reaction.

Reason (R): Chlorophyll-bearing plants absorb radiant solar energy to convert carbon dioxide and water into chemical energy (glucose).

Answer: (A)

82. **Assertion (A):** Quicklime (CaO) reacts violently with water to produce

slaked lime, making it a distinctly endothermic process.

Reason (R): Chemical reactions that result in a measurable release of thermal energy into the surroundings are designated as exothermic reactions.

Answer: (D)

83. **Assertion (A):** Packed food formulations rich in lipids and oils experience a drastic deterioration in smell and taste when exposed to open atmospheric air over prolonged durations.

Reason (R): Unsaturated and saturated fatty acids undergo direct chemical oxidation upon exposure to ambient air, forming volatile, malodorous compounds through rancidity.

Answer: (A)

84. **Assertion (A):** Adding dilute hydrochloric acid to active zinc granules causes rapid effervescence, turning blue litmus paper red by the evolved gas.

Reason (R): Zinc is positioned higher than hydrogen in the electrochemical activity series, allowing it to displace hydrogen from dilute mineral acids.

Answer: (D)

85. **Assertion (A):** Respiration is considered an exothermic reaction.

Reason (R): Energy is released during respiration in the form of heat.

Answer: (A)

86. **Assertion (A):** Acids have sour taste.

Reason (R): Acids release H^+ ions.

Answer: (A)

87. **Assertion (A):** Concentrated acids are diluted by adding water to acid.

Reason (R): Dilution of concentrated acid is a highly exothermic process.

Answer: (D)

88. **Assertion (A):** Onion and clove oil can be used as olfactory indicators.

Reason (R): Their smell changes in acidic and basic medium.

Answer: (A)

89. **Assertion (A):** Bases change red litmus solution into blue litmus solution.

Reason (R): Bases give hydroxide ions in aqueous solution.

Answer: (B)

90. **Assertion (A):** Plaster of Paris should be stored in a moisture proof container.

Reason (R): Plaster of Paris is a powdery mass that absorbs water to form a hard solid mass, gypsum.

Answer: (A)

91. **Assertion (A):** Ionic compounds like Sodium Chloride (NaCl) act as highly efficient conductors of electricity when dissolved in water or maintained in a molten state, yet fail to conduct electricity in their solid crystalline state.

Reason (R): The application of heat or a solvent breaks down the strong inter-ionic forces, allowing the ions to move freely toward electrodes.

Answer: (A)

92. **Assertion (A):** Copper does not react with dilute HCl.

Reason (R): Copper is more reactive than hydrogen.

Answer: (C)

93. **Assertion (A):** Aluminium is used to make aircraft bodies.

Reason (R): Anodising makes aluminium corrosion resistant.

Answer: (B)

94. **Assertion (A):** Zinc reacts with steam to form zinc oxide and hydrogen.

Reason (R): Zinc is more reactive than iron.

Answer: (B)

95. **Assertion (A):** Galvanisation prevents iron from rusting.

Reason (R): Zinc is more reactive than iron.

Answer: (A)

96. **Assertion (A):** Carbon forms a large number of compounds.

Reason (R): Carbon has the unique ability to form bonds with other carbon atom.

Answer: (A)

97. **Assertion (A):** Diamond is a bad conductor of electricity.

Reason (R): In diamond, each carbon atom is bonded to four other carbon atoms.

Answer: (A)

98. **Assertion (A):** Ethane is a saturated hydrocarbon.

Reason (R): Ethane contains a double bond between carbon atoms.

Answer: (C)

99. **Assertion (A):** Carbon compounds burn with a yellow sooty flame.

Reason (R): Saturated carbon compounds burn with a clean flame.

Answer: (D)

100. **Assertion (A):** Ethanoic acid reacts with ethanol in presence of conc. sulphuric acid to form ester.

Reason (R): Esters have a fruity smell and are used in perfumes.

Answer: (B)

Multiple Choice Questions (MCQ)
[BIOLOGY]

1. Bile juice is stored in

- (A) liver
- (B) pancreas
- (C) gall bladder
- (D) kidney

Answer: (C)

2. Which of the following statements about autotrophs is incorrect?

- (A) They synthesise carbohydrates from carbon dioxide and water in the presence of sunlight and chlorophyll.
- (B) They store carbohydrate in the form of starch.
- (C) They convert carbon dioxide and water into carbohydrates in the absence of sunlight.
- (D) They constitute the first trophic level in food chain.

Answer: (C)

3. Alveoli are found in

- (A) lungs
- (B) heart
- (C) kidney
- (D) stomach

Answer: (A)

4. Saliva contains an enzyme called

- (A) amylase
- (B) lipase
- (C) pepsin
- (D) trypsin

Answer: (A)

5. The normal Systolic Pressure is about

- (A) 120 mm of Hg
- (B) 100 mm of Hg
- (C) 115 mm of Hg
- (D) 125 mm of Hg

Answer: (A)

6. The kidneys in human beings are apart of the system for

- (A) Nutrition
- (B) Respiration
- (C) Excretion
- (D) Transportation

Answer: (C)

7. The breakdown of pyruvate to give carbon-dioxide, water and energy take place in

- (A) Cytoplasm
- (B) Mitochondria
- (C) Nucleus
- (D) Chloroplast

Answer: (B)

8. The function of bile is to:

- (A) Digest proteins
- (B) Digest carbohydrates
- (C) Emulsify fats
- (D) Absorb water

Answer: (C)

9. The digestion of proteins begins in the:

- (A) Mouth
- (B) Stomach
- (C) Small intestine
- (D) Large intestine

Answer: (B)

10. The opening and closing of stomata is controlled by:

- (A) Guard cells
- (B) Epidermal cells
- (C) Xylem
- (D) Phloem

Answer: (A)

11. The balanced equation for photosynthesis is:

- (A) $\text{CO}_2 + \text{O}_2 \rightarrow \text{Glucose}$
- (B) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Glucose} + \text{O}_2$
- (C) $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- (D) $\text{Glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

Answer: (C)

12. Which enzyme digests proteins in the stomach?

- (A) Amylase
- (B) Pepsin
- (C) Lipase
- (D) Maltase

Answer: (B)

13. The energy released during cellular respiration is used to synthesise

- (A) Ribosome
- (B) RBC
- (C) ATP
- (D) Mitochondria.

Answer: (C)

14. The end product of anaerobic respiration in yeast is:

- (A) Lactic acid
- (B) Ethanol and carbon dioxide
- (C) Oxygen
- (D) Water

Answer: (B)

15. Which of the following is not a part of the human respiratory system?

- (A) Trachea
- (B) Lungs
- (C) Bronchi

(D) Nephron

Answer: (D)

16. The function of the lining of mucus in the nasal passage of human beings is to

- (A) increase the temperature of the inhaled air
- (B) move the air in and out
- (C) filter the air that we breathe in
- (D) absorb oxygen from the air.

Answer: (C)

17. The first step of respiration takes place in the:

- (A) Cytoplasm
- (B) Mitochondria
- (C) Nucleus
- (D) Chloroplast

Answer: (A)

18. The red colour of blood is due to:

- (A) Plasma
- (B) Platelets
- (C) Haemoglobin
- (D) WBCs

Answer: (C)

19. The most common gas liberated during aerobic respiration, anaerobic respiration and fermentation is

- (A) carbon monoxide
- (B) carbon dioxide
- (C) oxygen
- (D) water vapour

Answer: (B)

20. The pumping organ of the human circulatory system is:

- (A) Lungs
- (B) Kidney
- (C) Heart
- (D) Brain

Answer: (C)

21. Which chamber of the heart receives oxygenated blood from the lungs?

- (A) Right atrium
- (B) Right ventricle
- (C) Left atrium
- (D) Left ventricle

Answer: (C)

22. Which part of the plant mainly loses water during transpiration?

- (A) Roots
- (B) Stem
- (C) Leaves
- (D) Flowers

Answer: (C)

23. The process by which food is

transported in plants is called:

- (A) Diffusion
- (B) Osmosis
- (C) Translocation
- (D) Absorption

Answer: (C)

24. The functional unit of the kidney is:

- (A) Neuron
- (B) Nephron
- (C) Alveoli
- (D) Artery

Answer: (B)

25. Artificial kidney is used in the process called:

- (A) Transpiration
- (B) Dialysis
- (C) Respiration
- (D) Photosynthesis

Answer: (B)

26. Which of the following is an excretory product of plants?

- (A) Resin
- (B) Gum
- (C) Latex
- (D) All of these

Answer: (D)

27. Which part of the nephron reabsorbs useful substances like glucose and water?

- (A) Glomerulus
- (B) Bowman's capsule
- (C) Renal tubule
- (D) Ureter

Answer: (C)

28. Which part of the excretory system stores urine?

- (A) Kidney
- (B) Ureter
- (C) Urinary bladder
- (D) Urethra

Answer: (C)

29. Which part of the neuron receives signals?

- (A) Axon
- (B) Dendrite
- (C) Cell body
- (D) Nucleus

Answer: (B)

30. Reflex actions are controlled by:

- (A) Brain
- (B) Spinal cord
- (C) Nerves
- (D) Muscles

Answer: (B)

31. The chemical substance released at synapse is:

- (A) Hormone
- (B) Neurotransmitter
- (C) Enzyme
- (D) Protein

Answer: (B)

32. Motor neurons carry impulses from:

- (A) Receptor to brain
- (B) Brain to muscles
- (C) Brain to sensory nerves
- (D) Spinal cord to brain

Answer: (B)

33. The long part of a neuron that carries impulses away is:

- (A) Dendrite
- (B) Axon
- (C) Cell body
- (D) Nucleus

Answer: (B)

34. Folding of leaves in *Mimosa pudica* is an example of:

- (A) Tropic movement
- (B) Growth movement
- (C) Nastic movement
- (D) Phototropism

Answer: (C)

35. Which hormone regulates carbohydrate, protein and fat metabolism?

- (A) Insulin
- (B) Glucagon
- (C) Thyroxine
- (D) Adrenaline

Answer: (C)

36. Which plant hormone promotes cell division?

- (A) Cytokinin
- (B) Auxin
- (C) Ethylene
- (D) Abscissic acid

Answer: (A)

37. Which hormone is called the "emergency hormone"?

- (A) Thyroxine
- (B) Insulin
- (C) Adrenaline
- (D) Testosterone

Answer: (C)

38. Diabetes is caused due to deficiency of:

- (A) Thyroxine
- (B) Insulin
- (C) Adrenaline

(D) Estrogen

Answer: (B)

39. Which hormone is responsible for male secondary sexual characters?

- (A) Estrogen
- (B) Progesterone
- (C) Testosterone
- (D) Insulin

Answer: (C)

40. Hormones are transported through:

- (A) Nerves
- (B) Blood
- (C) Lymph only
- (D) Muscles

Answer: (B)

41. Which of the following is a plant hormone?

- (A) Insulin
- (B) Thyroxine
- (C) Oestrogen
- (D) Cytokinin

Answer: (D)

42. The gap between two neurons is called a

- (A) Axon
- (B) Synapse
- (C) Dendrite
- (D) Cell body

Answer: (B)

43. The main organ for control and co-ordination in animals

- (A) Nerve
- (B) Muscle tissue
- (C) Brain
- (D) Blood

Answer: (C)

44. Iodine is necessary for the synthesis of which hormone?

- (A) Adrenaline
- (B) Thyroxine
- (C) Auxin
- (D) Insulin

Answer: (B)

45. In a neuron, conversion of electrical signal to a chemical signal occurs at/in

- (A) Cell body.
- (B) Axonal end.
- (C) Dendrite end.
- (D) Axon

Answer: (B)

46. Electrical impulse travels in a neuron from

- (A) Dendrite→ axon→ axonal end→ cell body
- (B) Cell body→ Dendrite → axon→ axonal end
- (C) Dendrite →Cell body→ axon→ axonal end
- (D) Axonal end→ axon → Cell body → Dendrite

Answer: (C)

47. Which of the following statements is correct about receptors?

- (A) Gustatory receptor detect taste while olfactory receptors detect smell.
- (B) Both Gustatory and olfactory receptors detect smell
- (C) Auditory receptor detect smell and olfactory receptors detect taste.
- (D) Olfactory receptor detect taste and Gustatory receptors detect smell.

Answer: (A)

48. The main function of abscisic acid in plants is to

- (A) Increase the length of cells
- (B) Promote cell division
- (C) Inhibit growth
- (D) Promote of stem growth

Answer: (C)

49. The growth of pollen tubes towards ovule is due to

- (A) Hydrotropism
- (B) Chemotropism
- (C) Geotropism
- (D) Phototropism

Answer: (B)

50. Seeds in plants are formed after

- (A) Germination
- (B) Fertilisation
- (C) Pollination
- (D) Growth

Answer: (B)

51. Binary fission in Amoeba occurs in:

- (A) Any plane
- (B) Longitudinal plane
- (C) Transverse plane
- (D) Fixed plane

Answer: (A)

52. The regeneration ability is seen in:

- (A) Amoeba
- (B) Planaria
- (C) Paramecium
- (D) Euglena

Answer: (B)

53. The fertilised egg is called:

- (A) Foetus

- (B) Zygote
- (C) Embryo
- (D) Ovule

Answer: (B)

54. What provides oxygen and nutrition to the developing embryo in the female body?

- (A) Fallopian tube
- (B) Ovary
- (C) Uterus
- (D) Placenta

Answer: (D)

55. In a flower, the parts that produce male and female gametes (germ cells) are

- (A) stamen and anther
- (B) filament and stigma
- (C) anther and ovary
- (D) stamen and style

Answer: (C)

56. Which of the following is the correct sequence of events of sexual reproduction in a flower?

- (A) pollination, fertilisation, seedling, embryo
- (B) seedling, embryo, fertilisation, pollination
- (C) pollination, fertilisation, embryo, seedling
- (D) embryo, seedling, pollination, fertilization

Answer: (C)

57. In Spirogyra, asexual reproduction takes place by

- (A) breaking up of filaments into smaller bits
- (B) division of a cell into two cells
- (C) division of a cell into many cells
- (D) formation of young cells from older cells.

Answer: (A)

58. The correct sequence of reproductive stages seen in flowering plants is

- (A) gametes, zygote, embryo, seedling
- (B) zygote, gametes, embryo, seedling
- (C) seedling, embryo, zygote, gametes
- (D) gametes, embryo, zygote, seedling

Answer: (A)

59. Vegetative propagation refers to formation of new plants from

- (A) stem, roots and flowers
- (B) stem, roots and leaves
- (C) stem, flowers and fruits
- (D) stem, leaves and flowers

Answer: (B)

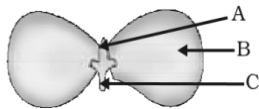
60. Factors responsible for the rapid spread of bread mould on slices of bread are
- (i) large number of spores
 - (ii) availability of moisture and nutrients in bread
 - (iii) presence of tubular branched hyphae
 - (iv) formation of round shaped sporangia
- (A) (i) and(iii)
(B) (ii) and (iv)
(C) (i) and(ii)
(D) (iii) and(iv)

Answer: (C)

61. Which of the following statements are true for flowers?
- (i) Flowers are always bisexual
 - (ii) They are the sexual reproductive organs
 - (iii) They are produced in all groups of plants
 - (iv) After fertilisation they give rise to fruits
- (A) (i) and(iv)
(B) (ii) and(iii)
(C) (i) and(iii)
(D) (ii) and (iv)

Answer: (D)

62. In Figure, the parts A, B and C are sequentially



- (A) cotyledon, plumule and radicle
(B) plumule, radical and cotyledon
(C) plumule, cotyledon and radicle
(D) radicle, cotyledon and plumule

Answer: (C)

63. In human females, an event that reflects onset of reproductive phase is
- (A) growth of body
 - (B) changes in hair pattern
 - (C) change in voice
 - (D) menstruation

Answer: (D)

64. Embryo sac is found in
- (A) endosperm
 - (B) embryo
 - (C) ovule
 - (D) seed

Answer: (C)

65. Which is NOT a Mendelian ratio?

- (A) 3:1
- (B) 1:2:1
- (C) 9:3:3:1
- (d) 2:2

Answer: (D)

66. Genetic variation is maximum in:

- (A) Asexual reproduction
- (B) Sexual reproduction
- (C) Cloning
- (D) Mitosis

Answer: (B)

67. A dominant trait is one which:

- (A) Appears only in homozygous condition
- (B) Masks the recessive trait
- (C) Disappears in F₁ generation
- (D) Never appears

Answer: (B)

68. The basic unit of heredity is:

- (A) Cell
- (B) Gene
- (C) Tissue
- (D) Chromosome

Answer: (B)

69. If a round, green seeded plant (RR yy) is crossed with wrinkled, yellow seeded pea plant (rr YY) the seeds produced in F₁ generation are:

- (A) Round and yellow
- (B) Round and green
- (C) Wrinkled and green
- (D) Wrinkled and yellow

Answer: (A)

70. Characters transmitted from parents to offspring are present in

- (A) cytoplasm
- (B) ribosome
- (C) golgi bodies
- (D) genes

Answer: (D)

71. Offspring formed as a result of sexual reproduction exhibit more Variations because

- (A) sexual reproduction is a lengthy process
- (B) genetic material comes from two parents of the same species
- (C) genetic material comes from two parents of different species
- (d) genetic material comes from many parents

Answer: (B)

72. Reproduction is essential for living

- organisms in order to
- (A) keep the individual organism alive
 - (B) fulfil their energy requirement
 - (C) maintain growth
 - (D) continue the species generation after generation

Answer: (D)

73. During adolescence, several changes occur in the human body. Mark one change associated with sexual maturation in boys

- (A) loss of milk teeth
- (B) increases in height
- (C) cracking of voice
- (d) weight gain

Answer: (C)

74. A cross between a tall plant (TT) and short pea plant(tt) resulted in progeny that were all tall plants because

- (A) tallness is the dominant trait
- (B) shortness is the dominant trait
- (C) tallness is the recessive trait
- (D) height of pea plant is not governed by gene 'T' or 't'

Answer: (A)

75. Which organisms break down dead plants and animals?

- (A) Producers
- (B) Decomposers
- (C) Consumers
- (D) Herbivores

Answer: (B)

76. The interconnected food chains form

- (A) Trophic level
- (B) Ecosystem
- (C) Food web
- (D) Biosphere

Answer: (C)

77. Increase in concentration of harmful chemicals in higher trophic levels is called:

- (A) Decomposition
- (B) Bio-magnification
- (C) Photosynthesis
- (D) Respiration

Answer: (B)

78. Which of the following best explains, why food chains are short?

- (A) Producers are few
- (B) Energy transfer efficiency is low
- (C) Carnivores cannot digest plants
- (D) Decomposers consume most organisms

Answer: (B)

79. Which waste management practice involves reuse of materials after processing?

- (A) Incineration
- (B) Recycling
- (C) Landfill
- (D) Dumping

Answer: (B)

80. A basket of vegetables contains carrot, potato, radish and tomato. Which of them represent the correct homologous structures?

- (A) Carrot and potato
- (B) Carrot and tomato
- (C) Radish and carrot
- (D) Radish and potato

Answer: (C)

81. In which trophic level autotrophs are placed?

- (A) First
- (B) Second
- (C) Third
- (D) Last

Answer: (A)

82. Which of the following constitute food chain?

- (A) Grass, Wheat and Mango
- (B) Grass, Goat and human
- (C) Grass, Cow and Elephant
- (D) Grass, Fish and Goat

Answer: (B)

83. Which of the following are Environment Friendly Practices?

- (A) Carrying cloth bags to put purchases in while shopping
- (B) Switching off unnecessary lights and fans
- (C) Walking to school instead of getting your mother to drop you on her scooter.
- (D) All of the above

Answer: (D)

84. Biotic components of an ecosystem consist of:

- (A) Producers
- (B) consumers
- (C) decomposers
- (D) All of the above

Answer: (D)

85. Depletion of ozone is mainly due to

- (A) chlorofluoro carbon
- (B) carbon monoxide
- (C) methane

(D) pesticides

Answer: (A)

86. An eco-system includes

(A) all living organisms

(B) non-living organisms.

(C) both living and non-living organisms.

(D) sometimes living organisms and sometimes non-living organisms.

Answer: (C)

87. In a food chain, the third trophic level is always occupied by:

(A) carnivores

(B) herbivores

(C) decomposers

(D) producers

Answer: (A)

88. Which one of the following is an artificial ecosystem?

(A) Ocean

(B) crop field

(C) lake

(D) forest

Answer: (B)

Direction: In the following Questions (89 to 100), the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

(A) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

(B) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

(C) Assertion is true but the Reason is false.

(D) Assertion is false but the reason is true

89. **Assertion:** When air is blown through lime water, it turns milky.

Reason: Air contains 78% nitrogen and 21% oxygen.

Answer: (B)

90. **Assertion:** Veins have thin walls to collect blood from different organs.

Reason: Blood in veins are not under pressure.

Answer: (A)

91. **Assertion:** All proteins in our food are digested in small intestine only.

Reason: The protein digesting enzymes are released into small intestine and stomach.

Answer: (D)

92. **Assertion:** Brain is a delicate organ which is protected from injury.

Reason: Only the bony box protects the brain from any shock.

Answer: (C)

93. **Assertion:** Plants do have a nervous system for control and coordination.

Reason: Plants use electro chemical means to convey information from cell to cell.

Answer: (D)

94. **Assertion:** Reflex arc works faster than thinking process of brain.

Reason: Reflex arc works in case of those animals that do not have thinking process.

Answer: (C)

95. **Assertion:** Amoeba reproduces by binary fission.

Reason: All unicellular organisms reproduce by asexual method.

Answer: (A)

96. **Assertion:** In human beings, the female plays a major role in determining the sex of the offspring.

Reason: Women have two X chromosomes.

Answer: (D)

97. **Assertion:** A bisexual flower produces ova as well as the pollen.

Reason: Ova and pollen are produced in the carpel.

Answer: (C)

98. **Assertion:** Variation is high in sexually reproducing organisms compared to asexually reproducing organisms.

Reason: Inaccuracies during DNA copying give rise to variation.

Answer: (B)

99. **Assertion:** Vegetarian food habit is more beneficial to organisms.

Reasons: Only 10% energy is available as food from one trophic level to the next.

Answer: (A)

100. **Assertion:** Decomposers act as cleaning agents of environment.

Reason: The decomposers recycle waste material in hydrosphere.

Answer: (C)

Multiple Choice Questions (MCQ)
[PHYSICS]

1. The refractive index of water is approximately:

- (A) 1.0
- (B) 1.33
- (C) 2.0
- (D) 0.5

Answer: (B)

2. A lens that converges parallel rays of light is:

- (A) Concave lens
- (B) Convex lens
- (C) Cylindrical lens
- (D) Plane lens

Answer: (B)

3. A concave lens always forms an image that is:

- (A) Real and inverted
- (B) Virtual and erect
- (C) Real and erect
- (D) None

Answer: (B)

4. The distance of image from a plane mirror is:

- (A) Greater than object distance
- (B) Less than object distance
- (C) Equal to object distance
- (D) Zero

Answer: (C)

5. The phenomenon in which left appears right and right appears left in a mirror is called:

- (A) Reflection
- (B) Lateral inversion
- (C) Refraction
- (D) Dispersion

Answer: (B)

6. Mirrors used in vehicles as rear-view mirrors are:

- (A) Plane mirrors
- (B) Concave mirrors
- (C) Convex mirrors
- (D) Cylindrical mirrors

Answer: (C)

7. If refractive index = 1.5, speed of light in material is:

- (A) 1.5×10^8 m/s
- (B) 2×10^8 m/s
- (C) 3×10^8 m/s
- (D) 2×10^7 m/s

Answer: (B)

8. The cause of refraction is:

- (A) Change in speed of light
- (B) Change in direction of light
- (C) Change in wavelength
- (D) None

Answer: (A)

9. What will be the nature of the image if the object is placed beyond C (concave mirror):

- (A) Real, diminished, inverted
- (B) Virtual, diminished, erect
- (C) Real, erect, magnified
- (D) Virtual, magnified, inverted

Answer: (A)

10. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?

- (A) A convex lens of focal length 50 cm.
- (B) A concave lens of focal length 50 cm.
- (C) A convex lens of focal length 5 cm.
- (D) A concave lens of focal length 5 cm.

Answer: (C)

11. The bending of light when it passes from one medium to another is called:

- (A) Reflection
- (B) Dispersion
- (C) Refraction
- (D) Diffraction

Answer: (C)

12. Object placed at focus of converging lens gives image:

- (A) At infinity
- (B) Virtual and erect
- (C) Real and inverted
- (D) At focal point

Answer: (A)

13. In order to obtain large images of the teeth of patients, the dentist holds the concave mirror in such a manner that the teeth are positioned:

- (A) at the focus of mirror
- (B) between pole and focus of the mirror
- (C) between focus and the centre of curvature of the mirror
- (D) at the centre of curvature of the mirror

Answer: (B)

14. A full-length image of a distant tall building can definitely be seen by using

- (A) A concave mirror.
- (B) A convex mirror.
- (C) A plane mirror

(D) Both concave as well as plane mirror

Answer: (B)

15. Which of the following materials cannot be used to make a lens?

- (A) Water
- (B) Glass
- (C) Plastic
- (D) Clay.

Answer: (D)

16. When the image is virtual, erect and of the same size as the object, then, magnification is

- (A) +1
- (B) -1
- (C) 0
- (D) +2

Answer: (A)

17. The unit of power of a lens is

- (A) Meter
- (B) Centimetre
- (C) Diopter
- (D) Millimetre

Answer: (C)

18. The laws of reflection hold good for

- (A) Plane mirror only
- (B) Concave mirror only
- (C) Convex mirror only
- (D) All mirrors irrespective of their shape.

Answer: (D)

19. Magnification produced by a rear-view mirror fitted in vehicles is

- (A) Less than one
- (B) More than
- (C) Equal to 1
- (D) Can be more or less than 1 depending on the position of the object in front of it

Answer: (A)

20. The radius of curvature of a spherical mirror is 3 cm. What is its focal length?

- (A) 1.5 cm
- (B) 3 cm
- (C) 4.5 cm
- (D) 6 cm

Answer: (A)

21. The speed of light in air is

- (A) 3×10^8 m/s
- (B) 3×10^{-8} m/s
- (C) 3×10^{18} m/s
- (D) 3×10^3 m/s

Answer: (A)

22. An object is placed in front of a concave lens. For all positions of the object, the image formed is always

- (A) Real, diminished and inverted
- (B) Virtual, diminished and erect
- (C) Real, enlarged and erect.
- (D) Virtual, enlarged and erect.

Answer: (B)

23. A light ray travels from a denser to a rarer medium. The speed of light ray

- (A) Decreases and bends towards the normal.
- (B) Increases and bends away from the normal.
- (C) Decreases and bends away from the normal.
- (D) Increases and bends towards the

Answer: (B)

24. A material medium having the lowest optical density is

- (A) Water
- (B) Air
- (C) Glass
- (D) Diamond

Answer: (B)

25. If the power of a lens is -4.0 D, then it means that the lens is a

- (A) Concave lens of focal length + 25 cm
- (B) Convex lens of focal length + 25 cm
- (C) Concave lens of focal length -25cm.
- (D) Convex lens of focal length -25cm.

Answer: (C)

26. Advance sunrise is due to:

- (A) Dispersion
- (B) Atmospheric refraction
- (C) Scattering
- (D) Reflection

Answer: (B)

27. The colour of the sun at sunrise appears red due to:

- (A) Reflection
- (B) Refraction
- (C) Scattering
- (D) Dispersion

Answer: (C)

28. A myopic person has a far point at 2 m. The power of lens required is:

- (A) -0.5 D
- (B) +0.5 D
- (C) -2 D
- (D) +2 D

Answer: (A)

29. Presbyopia occurs due to:
(A) Elongation of eyeball
(B) Weakening of ciliary muscles
(C) Damage to retina
(D) Increase in pupil size

Answer: (B)

30. Twinkling of stars is maximum when:

- (A) Stars are overhead
(B) Stars are near horizon
(C) At noon
(D) During rain

Answer: (B)

31. Which of the following parts of the eye is responsible for changing the shape of the lens to focus light onto the retina?

- (A) Pupil
(B) Iris
(C) Ciliary muscles
(D) Cornea

Answer: (C)

32. The band of the colored components of a light beam is called its

- (A) Spectrum
(B) Dispersion
(C) Reflection
(D) Refraction

Answer: (A)

33. On which part of the human eye, the image of an object is formed?

- (A) Retina
(B) Cornea
(C) Eyeball
(D) Iris

Answer: (A)

34. The least distance of distinct vision for a young adult with normal vision, is about

- (A) 25 m
(B) 2.5 m
(C) 2.5 cm
(D) 25 cm

Answer: (D)

35. The human eye can focus on objects at different distances by adjusting the focal length of the eye lens. This is due to

- (A) Accommodation
(B) Presbyopia
(C) Near sightedness
(D) Far sightedness

Answer: (A)

36. The time difference between actual sunset and the apparent sunset is about

- (A) 2 minutes
(B) 3 minutes
(C) 4 minutes
(D) 5 minutes.

Answer: (A)

37. Person suffering from cataract has

- (A) Elongated eyeball
(B) Excessive curvature of eye lens
(C) Weakened ciliary muscles
(D) Opaque eye lens

Answer: (D)

38. A normal eye can see objects clearly that are between

- (A) Our eye and infinity
(B) 25 cm and infinity
(C) 50 cm and infinity
(D) 100 cm and infinity

Answer: (B)

39. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light

- (A) Is scattered the most by smoke or fog
(B) Is scattered the least by smoke or fog
(C) Is absorbed the most by smoke or fog
(D) Moves fastest in air.

Answer: (B)

40. The focal length of the eye lens increases when eye muscles

- (A) Are relaxed and lens becomes thinner
(B) Contract and lens become thicker
(C) Are relaxed and lens becomes thicker
(D) Contract and lens become thinner

Answer: (A)

41. Two resistors of $2\ \Omega$ and $4\ \Omega$ are connected in parallel. Equivalent resistance is:

- (A) $3.13\ \Omega$
(B) $1.33\ \Omega$
(C) $2\ \Omega$
(D) $3\ \Omega$

Answer: (B)

42. A wire is stretched to double its length. Its resistance becomes:

- (A) Same
(B) Double
(C) Four times
(D) Half

Answer: (C)

43. A bulb of power 60 W operates at 220V. Current drawn is approximately:

- (A) 0.27 A
- (B) 2.7 A
- (C) 0.5 A
- (D) 1 A

Answer: (A)

44. A fuse protects a circuit by:

- (A) Increasing current
- (B) Decreasing voltage
- (C) Melting when current is high
- (D) Stopping voltage

Answer: (C)

45. In a parallel circuit, the current is:

- (A) Same everywhere
- (B) Different in each branch
- (C) Zero
- (D) Infinite

Answer: (B)

46. If resistance increases, current will:

- (A) Increase
- (B) Decrease
- (C) Remain same
- (D) Become zero

Answer: (B)

47. Nichrome wire is used in heating devices because it has:

- (A) High conductivity
- (B) High resistance
- (C) Low resistance
- (D) Low melting point

Answer: (B)

48. A wire has resistance 10 Ω . If its length is doubled, the new resistance becomes:

- (A) 5 Ω
- (B) 10 Ω
- (C) 20 Ω
- (D) 40 Ω

Answer: (C)

49. In household wiring appliances are connected in:

- (A) Series
- (B) Parallel
- (C) Both
- (D) None

Answer: (B)

50. A 220 V supply is connected to a 1100W heater. Current drawn is:

- (A) 2 A
- (B) 5 A
- (C) 10 A
- (D) 0.5 A

Answer: (B)

51. Electrical resistivity of a given metallic wire depends upon

- (A) Its length
- (B) Its thickness
- (C) Its shape
- (D) Nature of the material

Answer: (D)

52. SI unit of electric charge is:

- (A) Watt
- (B) Kilowatt
- (C) Coulomb
- (D) Ampere

Answer: (D)

53. Which of the following terms does not represent electrical power in a circuit?

- (A) I^2R
- (B) IR^2
- (C) VI
- (D) $\frac{V^2}{R}$

Answer: (B)

54. Kilowatt-hour is the unit of

- (A) Resistivity
- (B) Conductivity
- (C) Electrical energy
- (D) Electrical power

Answer: (C)

55. An electric bulb is rated 220 V and 100W. When it is operated on 110 V, the power consumed will be

- (A) 100 W
- (B) 75 W
- (C) 50 W
- (D) 25 W

Answer: (D)

56. The device used to measure the current in a circuit is

- (A) Ammeter
- (B) Voltmeter
- (C) Galvanometer
- (D) Battery

Answer: (A)

57. A piece of wire of resistance R is cut into five equal parts and then connected in parallel. If the equivalent resistance of this combination is R', then the ratio R/R' is

- (A) $\frac{1}{25}$
- (B) $\frac{1}{5}$
- (C) 5
- (D) 25

Answer: (D)

58. The conductors of resistance of 10 ohm and 12ohm are connected in series to a 6 V battery. What is the total resistance of the circuit?

- (A) 60 ohms
- (B) 18 ohms
- (C) 16 ohms
- (D) 22 ohms

Answer: (D)

59. Which device is used to measure the potential difference between two poles in an electric circuit?

- (A) Ammeter
- (B) Voltmeter
- (C) Galvanometer
- (D) Rheostat

Answer: (B)

60. The maximum resistance which can be made using four resistors, each of resistance $\frac{1}{2}$ ohm is

- (A) 2 ohms
- (B) 1 ohm
- (C) 2.5 ohms
- (D) 8 ohms

Answer: (A)

61. An electric kettle consumes 1 KW of electric power when operated at 220 V. The minimum rating of the fuse wire to be used for it is

- (A) 1 A
- (B) 2 A
- (C) 4 A
- (D) 5 A

Answer: (D)

62. Unit of electric power may be expressed as

- (A) Volt Ampere
- (B) Kilowatt-hour
- (C) Watt second
- (D) Joule second

Answer: (A)

63. An electric iron of resistance 20 ohm draws a current of 5 A. The heat developed in the iron in 30 seconds is

- (A) 15000 J
- (B) 6000 J
- (C) 1500 J
- (D) 3000 J

Answer: (A)

64. A charge of 100 C flows through a bulb in 5 minutes. How much current is flowing through the bulb?

- (A) 500 A

(B) 100 A

(C) 20 A

(D) 0.3 A

Answer: (D)

65. At the time of short circuit, the electric current in the circuit

- (A) Vary continuously
- (B) Does not change
- (C) Reduces substantially
- (D) Increases heavily

Answer: (D)

66. In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have

- (A) Higher power ratings such as geysers.
- (B) Lower power ratings such as fans
- (C) Metallic bodies and low power ratings.
- (D) Non-metallic bodies and low power ratings

Answer: (A)

67. Which option explains Fleming's left-hand rule?

- (A) When a current-carrying conductor is moved with force, it creates a magnetic field.
- (B) When a conductor is moved inside a magnetic field, the current is produced in the conductor.
- (C) When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
- (D) When a current-carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.

Answer: (D)

68. The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:

- (A) Clockwise
- (B) Anticlockwise
- (C) Towards North
- (D) Towards South

Answer: (B)

69. In all the electrical appliances, the switches are put in the

- (A) Live wire
- (B) Earth wire
- (C) Neutral wire
- (D) All of above

Answer: (A)

70. Appliances that have a metal body are generally connected to the earth wire. What is the reason to earth these wires?

- (A) To prevent the excess current
- (B) To prevent the leakage of current
- (C) To provide extra current to the appliance
- (D) To provide high resistance to the appliance

Answer: (B)

71. The strength of magnetic field inside a long current carrying straight solenoid is

- (A) More at the ends than at the centre.
- (B) Minimum in the middle
- (C) Same at all points
- (D) Found to increase from one end to the other.

Answer: (C)

72. Which of these devices work due to the magnetic effect of electric current?

- (A) LED bulb
- (B) Electric bell
- (C) Electric heater
- (D) Mobile charger

Answer: (B)

73. What is the resistance of a lamp operating at 280V with a current 0.7A?

- (A) 400 Ω
- (B) 250 Ω
- (C) 196 Ω
- (D) 150 Ω

Answer: (A)

74. Magnetic effect of current was discovered by

- (A) Oersted
- (B) Faraday
- (C) Bohr
- (D) Ampere

Answer: (A)

75. The most important safety device used for protecting the circuits from short circuiting or overloading is

- (A) Earth wire
- (B) Fuse
- (C) Stabilizer
- (D) Electric meter

Answer: (B)

76. The magnetic field lines due to a straight wire carrying a current are

- (A) Straight

- (B) Circular
- (C) Parabolic
- (D) Elliptical

Answer: (B)

77. Magnetic field due to a current through a straight conductor depends on

- (A) Current
- (B) Distance from the wire
- (C) Both a and b
- (D) Cross second sectional area of the wire

Answer: (C)

78. In a horizontal conductor, the direction of current is from east to west. Then, the direction of magnetic field to a point directly above it will be

- (A) Clockwise
- (B) Anticlockwise
- (C) Clockwise, if viewed from East
- (D) Anticlockwise, if viewed from East

Answer: (C)

79. To avoid risk of electrical shock, which phenomenon is used?

- (A) Overloading
- (B) Short circuiting
- (C) Earthing
- (D) None of these.

Answer: (C)

80. Force on a current carrying conductor in a magnetic field depends on

- (A) Direction of current
- (B) Direction of Magnetic field
- (C) Both (A) and (B)
- (D) Length of the wire.

Answer: (C)

The following questions (81 to 100) consist of two statements- Assertion (A) and Reason(R). Answer these questions, selecting the appropriate option given below:

- (A) Both A and R are true and R is the correct explanation for A
- (B) Both A and R are true but R is not the correct explanation for A
- (C) A is true but R is false.
- (D) A is false but R is true.

81. **Assertion (A):** Light does not travel in the same direction in all the media.

Reason (R): The speed of light does not change as it enters from one transparent medium to another.

Answer: (C)

82. **Assertion (A):** The height of an object is always considered positive.

Reason (R): An object is always placed above the principal axis in the upward direction.

Answer: (A)

83. **Assertion (A):** Refractive index has no units.

Reason (R): The refractive index is a ratio of two similar quantities.

Answer: (A)

84. **Assertion (A):** Light travels faster in glass than in air.

Reason (R): Glass is denser than air.

Answer: (D)

85. **Assertion (A):** Concave mirrors are used as make-up mirrors.

Reason (R): When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.

Answer: (C)

86. **Assertion (A):** White light is dispersed into its seven-colour components by a prism.

Reason (R): Different colours of light bend through different angles with respect to the incident ray as they pass through a prism.

Answer: (A)

87. **Assertion (A):** Danger signals are made of red colour.

Reason (R): Velocity of red light in air is maximum, so signals are visible even in dark.

Answer: (C)

88. **Assertion (A):** The rainbow is a natural spectrum of sunlight in the sky.

Reason (R): Rainbow is formed in the sky when the sun is overhead and water droplets are also present in air.

Answer: (C)

89. **Assertion (A):** The sky looks dark and black instead of blue in outer space.

Reason (R): No atmosphere containing air in the outer space to scatter sunlight.

Answer: (A)

90. **Assertion (A):** The phenomenon of scattering of light by the

colloidal particles gives rise to the Tyndall effect.

Reason (R): The colour of the scattered light depends on the size of the scattering particles.

Answer: (B)

91. **Assertion (A):** Tungsten metal is used for making filaments of incandescent lamps.

Reason (R): The melting point of Tungsten is very low.

Answer: (C)

92. **Assertion (A):** A cell is a device which converts chemical energy into electrical energy.

Reason (R): Cell maintains a constant potential difference between its terminals for a long time.

Answer: (B)

93. **Assertion (A):** Alloys are commonly used in electrical heating devices like electrical iron, toasters etc.

Reason (R): Alloys do not oxidize (burn) readily at high temperatures.

Answer: (A)

94. **Assertion (A):** Longer wires have greater resistance and the smaller wires have lesser resistance.

Reason (R): Resistance is inversely proportional to the length of the wire.

Answer: (C)

95. **Assertion (A):** One circuit with 15 A current rating is used for appliances such as geysers and air coolers.

Reason (R): Appliances with metallic body are connected to an earth wire with low resistance.

Answer: (B)

96. **Assertion (A):** On changing the direction of flow of current through a straight conductor, the direction of a magnetic field around the conductor is reversed.

Reason (R): The direction of magnetic field around a conductor can be given in accordance with left hand thumb rule.

Answer: (C)

97. **Assertion (A):** On freely suspending a current carrying solenoid, it comes to rest in geographical N-S direction.

Reason (R): One end of current carrying straight solenoid behaves as

a North Pole and the other end as a south Pole, just like a bar magnet.

Answer: (A)

98. **Assertion (A):** Two magnetic field lines around a current carrying straight wire do not intersect each other.

Reason (R): The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

Answer: (B)

99. **Assertion (A):** Magnetic field lines do not intersect each other.

Reason (R): Magnetic field lines are imaginary lines, the tangent to which at any point gives the direction of the field at that point.

Answer: (A)

100. **Assertion (A):** A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the magnitude of an electric current in the wire is increased.

Reason (R): Strength of a magnetic field at a point near the conductor increases on increasing the current.

Answer: (D)

SECTION B
VERY SHORT ANSWER TYPE
QUESTIONS [2 MARKS]

[CHEMISTRY]

- State two characteristics of the chemical reaction which takes place when dilute sulphuric acid is poured over zinc granules.

Answer:

If dil. H_2SO_4 is poured over Zinc granules then the following characteristics are observed

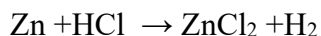
- Rise in temperature.
 - Hydrogen gas is released.
- Balance the following chemical equations:

- $\text{NH}_3 \rightarrow \text{N}_2 + \text{H}_2$
- $\text{C} + \text{CO}_2 \rightarrow \text{CO}$

Answer:

- $2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2$
- $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$

- (i) What gas is released when zinc reacts with dilute hydrochloric acid?



- Write the chemical formula of quick lime and slaked lime.

Answer:

- Hydrogen gas is released
- Quicklime (CaO); Slaked lime [$\text{Ca}(\text{OH})_2$]

- Why do gold and silver not corrode in moist air?

Answer:

Gold and silver are amongst the least reactive metals. These metals do not react with oxygen (in the air) and water (present as moisture in the air). Therefore, silver and gold do not corrode in moist air

- A light sensitive compound 'X' of silver is used in photography. On exposure to sunlight it changes to grey. (i) Identify 'X' (ii) Identify the type of chemical reaction

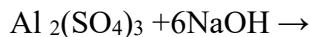
Answer:

- Silver chloride
- Decomposition reaction.

- Rewrite the following equation in a balanced form showing in it that

$\text{Al}(\text{OH})_3$ is an insoluble product $\text{Al}_2(\text{SO}_4)_3 + \text{NaOH} \rightarrow \text{Al}(\text{OH})_3 + \text{Na}_2\text{SO}_4$

Answer:



formation of insoluble product $\text{Al}(\text{OH})_3$ is indicated by an arrow pointing downwards.

- (i) Which term is used to indicate the development of unpleasant smell and taste in fat and oil containing foods due to aerial oxidation (when they are kept exposed for a considerable time)?
(ii) What are anti-oxidants? Why are they added to fat and oil containing foods?

Answer:

- Rancidity" is used to indicate the development of foul smell and taste.
- Oxidation preventing substances are called Anti-oxidants. They are added to fats and oils to prevent rancidity.

- A solution of sodium sulphate is added to barium chloride, a white solid form. Name the solid and classify the type of reaction.

Answer:

Solid formed is barium sulphate. Type of reaction is Double displacement (precipitation)

- A small amount of ferrous sulphate is heated in a hard glass tube
(i) Write the chemical equation
(ii) What type of reaction is taking place?

Answer:

- $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- Thermal decomposition reaction

- Identify the substances that are oxidised and the substances that are reduced in the following reactions:

- $4\text{Na}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{Na}_2\text{O}(\text{s})$
- $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{l})$

Answer:

- Substance oxidised is Na and the substance reduced is O_2
- Substance oxidised is H_2 and the substance reduced is CuO

- What happens when a piece of:

- Silver metal is added to a copper

sulphate solution? Also, write the balanced chemical equation if the reaction occurs.

(ii) Aluminium metal is added to dilute hydrochloric acid?

Answer:

(i) Silver metal being less reactive than copper cannot displace copper from copper sulphate solution. Therefore, no reaction occurs.

(ii) Aluminium is a reactive metal, it displaces hydrogen from dilute hydrochloric acid solution producing hydrogen gas.

12. 2g of barium hydroxide is taken in a test tube and added with 1g of ammonium chloride while mixing with the help of a glass rod. As the bottom of the test tube is touched

- (i) How does it feel and why?
(ii) Name type of reaction.

Answer:

(i) 2g of barium hydroxide when mixed with 1g of ammonium chloride, the test tube feels very cold to the touch due to absorption of heat from its surroundings

(ii) Type of reaction endothermic reaction which is a chemical reaction that absorbs heat

13. What do you mean by decomposition reaction? Give one example.

Answer:

A type of chemical reaction in which a single reactant breaks down to give simpler products is known as decomposition reaction.

e.g.: $\text{CaCO}_3(s) \rightarrow \text{CaO}(s) + \text{CO}_2(g)$

14. Fresh milk has a pH of 6. When it changes to curd, will its pH value increase or decrease? Why?

Answer:

Milk when changed to curd, its pH value will decrease, because curd contains acid so H^+ ions increase and thus, pH will decrease.

15. (i) Which gas is usually liberated when an acid reacts with an active metal?
(ii) Name the acid present in ant sting.

Answer:

Hydrogen gas is liberated when an

acid reacts with an active metal.

Formic acid (Methanoic acid)

HCOOH is present in ant sting.

16. What is an alkali? Give an example.

Answer:

A base which is soluble in water is known as alkali, for example NaOH , KOH .

17. Write one word for the following:

- (i) Water soluble base
(ii) A substance which dissociates on dissolving in water to produce hydrogen ions
(iii) A reaction between an acid with a base to form salt and water.
(iv) A substance which dissociates on dissolving in water to produce hydroxide ions.

Answer:

- (i) Alkali
(ii) Acid
(iii) Neutralisation reaction
(iv) Base

18. Why are pickles and curd not stored in copper and brass vessels?

Answer:

Sour substances like pickles, curd are acidic in nature or have in them acids. Thus, they are not kept in metal containers because when kept in brass or copper vessels they react to form toxic (poisonous) substances which may prove harmful when consumed.

19. A knife which is used to cut fruit is dipped immediately into water containing drops of blue litmus solution. The colour of the solution is changed to red. What inference can be drawn about the nature of the fruit and why?

Answer:

The fruit used is citrus fruit and its juice contains an acid, that is why the traces of acid remained in the knife which when dipped in blue litmus solution turned it to red.

20. Why does bleaching powder smell strongly of chlorine and does not dissolve completely in water?

Answer:

Bleaching powder reacts with carbon dioxide in the air to release chlorine

gas which has a strong pungent odour thus even when stored it continues to decompose giving chlorine smell. Also due to the presence of insoluble components like calcium hydroxide it does not dissolve completely in water.

21. While constructing a house a builder selects marble flooring, marble table tops for the kitchen where vinegar and juice of lemon, tamarind etc are more often used for cooking. Will you agree to this selection and why?

Answer:

No, the substance like vinegar, tamarind etc, contain acids which when accidentally fall on marble will react with the marble causing discoloration etc.

22. How would you distinguish between baking powder and washing soda by heating?

Answer:

The chemical formula of baking powder is sodium hydrogen carbonate (NaHCO_3), whereas that of washing soda is sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$). Sodium hydrogen carbonate on heating gives CO_2 gas which will turn limewater milky whereas no such gas is obtained from sodium carbonate.

23. A salt solution conducts electricity but distilled water does not.

Answer:

A salt solution conducts electricity because dissolving salt releases free moving charged particles called ions. Distilled water lacks these ions, hence, cannot conduct electricity.

24. Why is sodium kept immersed in kerosene oil?

Answer:

Sodium is a highly reactive metal reacts vigorously with oxygen and moisture in the air and may catch fire. In order to prevent sodium from reacting with oxygen, it is kept immersed in kerosene oil.

25. What are the conditions necessary for rusting?

Answer:

The conditions necessary for rusting are:

- i) presence of oxygen (air)
- ii) presence of water (moisture)

26. Define the following terms:

- (a) minerals
- (b) ores

Answer:

a) Minerals: minerals are naturally occurring compounds of a metal mixed with earthly impurities.

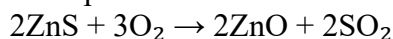
b) Ores: Ores are minerals from which metals can be extracted profitably.

27. What is roasting?

Answer:

Roasting is the process of heating sulphide ore in the presence of excess air to convert it into oxide.

Example:

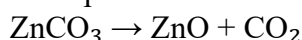


28. What is calcination?

Answer:

Calcination is the process of heating carbonate ore in the absence or limited supply of air to form oxide.

Example:



29. Name two metals which will displace hydrogen from dilute acids and two metals which will not.

Answer:

Two metals which will displace hydrogen from dilute acids are magnesium and Zinc. Two metals which will not displace hydrogen from dilute acids are silver and gold.

30. What are hydrocarbons? Name the simplest hydrocarbon.

Answer:

Compounds of carbon in which their molecules are composed of only carbon and hydrogen atoms are called hydrocarbons. The simplest hydrocarbon is methane, CH_4 .

31. Why are covalent compounds generally poor conductors of electricity?

Answer:

It is because the covalent compounds do not have positive ions or negative ions in their fused state. Thus, when electric potential is applied no ions

migrate to the opposite poles and hence no conduction of electric current takes place.

32. Define the terms:

- (a) catenation
- (b) isomerism

Answer:

a) Catenation: The property of carbon to link with other carbon atoms or the atoms of other elements with single double or triple covalent bonds so as to form a large number of compounds is called catenation.

b) Isomerism: The phenomenon due to which there exists two or more organic compounds having the same molecular formula but different structural formula and hence different physical and chemical properties is called isomerism.

33. What is meant by the term functional group? Write the names of the functional groups present in

- (a) ethanol
- (b) ethanoic acid

Answer:

A functional group in an organic compound is an atom or a group of atoms that is usually the site of chemical reactivity of an organic molecule. The functional group present in ethanol is alcohol (-OH). The functional group present in ethanoic acid is carboxylic acid (-COOH).

34. What is vinegar? Write its chemical formula and chemical name.

Answer:

5-8% solution of acetic acid in water is called vinegar. The chemical formula is CH_3COOH . The chemical name is ethanoic acid.

35. What is denatured alcohol? What is the need to denature alcohol?

Answer:

Ethanol when mixed with poisonous substances like methanol and pyridine makes it unfit for human consumption and is called denatured alcohol. Ethanol is an important industrial solvent. To prevent the misuse of ethanol produced for industrial use, it is made unfit for

drinking by making it denatured alcohol.

36. People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?

Answer:

A soap molecule has two parts namely hydrophobic and hydrophilic. With the help of these, it attaches to the grease or dirt particle and forms a cluster called micelle. These micelles remain suspended as a colloid. To remove these micelles, it is necessary to agitate clothes.

37. What is rust? State two ways to prevent rusting of iron.

Answer:

When iron is exposed to moist air for a long time acquires a coating of a brown flaky substance called rust. Rusting of iron can be prevented by painting, oiling, greasing, galvanisation, chrome plating, anodising or making alloys (any two).

38. Give the two important uses of Baking Soda.

Answer:

The uses of Baking Soda are:

i) Sodium hydrogen carbonate is also, an ingredient in antacids. Being alkaline, it neutralises excess acid in the stomach and provides relief.

ii) It is also used in soda-acid fire extinguishers.

39. What is the common name of the compound CaOCl_2 ? Give its two uses.

Answer:

The common name of the compound CaOCl_2 is Bleaching Powder. The uses of Bleaching Powder are as follows:

a) To make drinking water free from germs.

b) As an oxidising agent in many chemical industries.

40. Why do ionic compounds have high melting points?

Answer:

The ionic compounds are made up of positive and negative ions which have the strong force of attraction between opposite charged ions. So, a lot of heat energy is required to break this force of attraction or ionic bond. That is why ionic compounds have high melting points.

41. What is hydrogenation? What is its industrial application?

Answer:

The addition of hydrogen to an unsaturated compound in the presence of nickel or palladium catalyst to obtain a saturated compound is called hydrogenation. Hydrogenation is used in industry to prepare vegetable ghee from vegetable oils.

42. Why detergents are better cleansing agents than Soap? Explain.

Answer:

Detergent is preferred over soaps due to the following reasons:

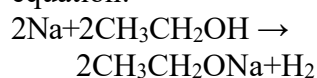
a) Detergent can be used in hard water for washing whereas soaps cannot be used in hard water as soaps form scums that stick to the fabric and make the cleaning difficult.

b) Detergent can be used in acidic solution but soaps decompose in acidic solution and forms free fatty acids.

43. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved.

Answer:

When ethanol reacts with sodium, then hydrogen gas is evolved. This reaction can be given by following equation:



44. Why is ethanol added to petrol?

Answer:

Ethanol is added to petrol because it burns completely and gives rise to only carbon dioxide and water on

burning in sufficient air. This combination reduces the emission of unburnt hydrocarbons making it eco-friendly.

45. Why is zinc applied to iron objects? What property of zinc is used here?

Answer:

Zinc coating is applied on iron objects to protect it from rusting.

Zinc when exposed to the air forms zinc oxide which is stable and adherent thus protects iron when used in galvanisation.

**VERY SHORT ANSWER TYPE
QUESTIONS [2 MARKS]
[BIOLOGY]**

46. What is nutrition? Why is it necessary for living organisms?

Answer:

Nutrition is the process of intake and utilisation of food by an organism. It is necessary for energy, growth, repair and maintenance of the body.

47. What is the difference between autotrophic and heterotrophic nutrition?

Answer:

Autotrophic nutrition: Organisms make their own food from simple substances like CO_2 and water (e.g., green plants).

Heterotrophic nutrition: Organisms depend on others for food (e.g., humans, animals).

48. Write the balanced chemical equation for photosynthesis.

Answer:

$6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$
(in presence of sunlight and chlorophyll)

49. What is the role of chlorophyll in photosynthesis?

Answer:

Chlorophyll traps sunlight and converts light energy into chemical energy required for photosynthesis.

50. What is holozoic nutrition? Give one example.

Answer:

Holozoic nutrition involves ingestion, digestion, absorption, assimilation and egestion of food. For example: human beings.

51. What is the function of saliva in digestion?

Answer:

Saliva contains salivary amylase which breaks down starch into maltose and makes food soft for swallowing.

52. How is the wall of the small intestine adapted for performing the function of absorption of food?

Answer:

The walls of the small intestine contain numerous finger like projections called villi present in the inner lining. These villi are covered with a large number of blood capillaries which helps in the quick absorption of food.

53. How is oxygen and carbon dioxide transported in human beings?

Answer:

When we breathe in, the oxygen rich air reaches the alveoli which are surrounded by thin blood vessels. The oxygen diffuses from the alveoli walls into the blood vessels which is then transported to the different parts of the body with the help of haemoglobin. Carbon dioxide produced as a waste diffuses into the blood from the different cells in the body which enters the alveoli and is removed from the lungs through the nostrils.

54. How are the lungs designed in human beings to maximise the area for exchange of gases?

Answer:

In the lungs, there are special structures called alveoli or air sacs. This provides maximum surface area for the exchange of gases. The alveoli have very thin walls which are richly supplied with blood vessels to help with the exchange of gases.

55. Give reasons for the following:

- (i) The lung alveoli are covered with blood capillaries.
- (ii) The wall of the trachea is supported by cartilage rings.

Answer:

- (i) The gaseous exchange in the alveoli occurs by the process of diffusion. The alveolar air is very rich in oxygen. The blood takes up oxygen from the alveolar air and releases carbon dioxide to the alveolar air. The blood capillaries around the alveoli helps in the process of diffusion of oxygen from higher concentration in the alveoli to the blood.

- ii) The rings of cartilage around the

trachea gives support to the trachea and also ensures that the air passage does not collapse allowing maximum amount of air to pass through the trachea.

56. Write down the functions of the two upper chambers of the heart.

Answer:

The two upper chambers of the heart are the right and left auricle or atrium. The functions are:

- (i) The right auricle receives deoxygenated blood from the body and transfers it to the right ventricle.
- (ii) The left auricle receives oxygenated blood from the lungs and transfers it to the left ventricle.

57. Write two differences between arteries and veins.

Answer:

The differences between arteries and veins are:

Arteries	Veins
(i) carry blood from the heart to the different body parts.	(i) carry blood from the different body parts to the heart.
ii) blood flows under high speed and under high pressure.	ii) blood flows with low speed and under lower pressure.

58. Which mechanism plays an important role in transportation of water in plants?

- i) During daytime
- ii) At night.

Answer:

- (i) During daytime, transpiration pull plays an important role in transportation of water in plants.
- ii) At night, root pressure plays an important role in transportation of water in plants.

59. What is the advantage of having a four chambered heart?

Answer:

Presence of four chambered heart serves two purposes. First, it ensures complete separation of oxygenated and deoxygenated blood. Second, blood is received by the upper chambers and is pumped out by the

lower chambers. This increases the efficiency of the heart and is useful in animals having high energy needs such as birds and mammals.

60. What is the functional unit of a kidney? Explain its structure.

Answer:

The functional unit of the kidney is the nephron. A nephron has a cup shaped upper end called Bowman's capsule. This contains a bundle of blood capillaries called glomerulus. The cup opens into a tubule which remains coiled, twisted, folded and has a U-turn. It opens into a collecting duct that connects to the ureter.

61. What are the two vital functions of the kidneys?

Answer:

The two vital functions of the kidneys are:

- (i) Maintaining the amount of water in the body that is osmoregulation.
- (ii) Removing nitrogenous wastes from the blood in the form of urine.

62. Why is it said that kidneys help in the process of osmoregulation? Explain.

Answer:

Osmoregulation is the process of maintenance of optimum concentration of water and salts in the body fluid. Since, reabsorption of water from the filtrate occurs in the kidney tubule which maintains the water balance and thus helps in osmoregulation.

63. How do leaves of plants help in excretion?

Answer:

Leaves of plants have tiny openings on their surface called stomata from where gaseous wastes are removed. Excess amount of water is also lost from the plant through the stomata by the process called transpiration. Some waste materials are also stored in the leaves and are removed when the old leaves fall off.

64. What happens at the synapse between two neurons?

Answer:

At the end of the axon, the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar electrical impulse in the dendrite of the next neuron. A synapse actually acts like a one-way valve because the chemical substance is present only at one side of the gap.

65. What is the role of the brain in reflex action?

Answer:

The brain has a limited role to play in reflex action. Reflex action is a quick response which does not involve the action of the brain. This action is coordinated by the spinal cord.

66. What is the function of receptors in the body

Answer:

The receptors collect information about changes in the environment around us. The receptors then pass the same information in the form of a nerve impulse to the central nervous system with the help of the nerves.

67. Plants also perform chemical coordination. Explain.

Answer:

Plants perform chemical coordination for various activities with the help of hormones. These are the chemical compounds released by stimulated cells that diffuse to various locations in plants, performing different activities.

68. Where are auxins synthesised, and what is the main function?

Answer:

Auxins are plant hormones and are synthesised at the tips of the shoots. The main function is to help the stem grow longer.

69. How does our body respond when adrenaline is secreted into the blood?

Answer:

During stress or danger, when adrenaline is secreted into the blood, there is an increase in the rate of heartbeat to supply more oxygen to the muscles. Due to this, breathing rate and sugar level increase.

70. Name the gland and one main action of the following hormones:

i) Insulin. ii) Thyroxin.

Answer:

i) Insulin- this is secreted by the pancreas and one main function is to lower the blood sugar level.

ii) Thyroxin- this is secreted by the thyroid gland and one main function is to help regulate

carbohydrate, protein and fat metabolism.

71. How do Plasmodium and Leishmania reproduce? Give one difference in their mode of reproduction.

Answer:

Plasmodium and Leishmania reproduce through fission, an asexual mode of reproduction.

Plasmodium reproduces through multiple fission, whereas Leishmania reproduces through binary fission.

72. Name an organism which reproduces by spore formation. List three conditions favourable for spores to germinate and grow.

Answer:

Rhizopus reproduces by spore formation.

Conditions favourable for spore formation are:

- i) Cool place
- ii) Moist place
- iii) Dark place.

73. Define pollination. Name the two types of pollination.

Answer:

The transfer of pollen grains from the anther to the stigma of the same or different flower is called pollination. The two types of pollination are Self-Pollination and Cross-Pollination.

74. Name two diseases each caused by STDs due to bacterial infection and viral infection.

Answer:

Bacterial infection: - Gonorrhoea and Syphilis.

Viral infection: - AIDS and Genital Warts.

75. What is DNA copying?

Answer:

DNA in the cell nucleus is the information source for making proteins, and different proteins lead to different body designs. During reproduction, a similar copy of DNA is generated, and the process is called DNA copying.

76. Give two advantages of vegetative propagation.

Answer:

- i) It is a cheaper, easier and more rapid method of propagation in plants than growing plants from their seeds.
- ii) Better quality of the plants can be maintained by this method.

77. What is fertilisation? Where does it occur in humans?

Answer:

Fertilisation is the fusion of a male gamete with a female gamete to form a zygote. In humans, it occurs in the fallopian tube (oviduct).

78. What is fertilisation in plants? What happens to the ovary after fertilisation?

Answer:

Fertilisation is the fusion of a male gamete from pollen with a female gamete in the ovule, forming a zygote. The ovary develops into a fruit, and the ovule develops into a seed.

79. Mention two sources of variation.

Answer:

- (i) Errors in DNA copying.
- (ii) Random fertilisation.

80. Who is known as the “Father of Genetics”? Name the plant on which he performed his experiments.

Answer:

Gregor Johann Mendel. He performed his experiments on the Garden Pea Plant.

81. Define the term heredity.

Answer:

The transmission of characters from one generation to another or from parents to offspring through their genes. For example, dogs give birth to puppies, whereas cats produce kittens.

82. What is DNA?

Answer:

Deoxyribonucleic Acid (DNA) is a molecule which carries the hereditary characters or traits in a coded form from one generation to the next and all the organisms.

83. “The sex of the children is determined by what they inherit from their father and not their mother.” Justify.

Answer:

It is because a child who inherits an X chromosome from the father will be a girl, and one who inherits a Y chromosome from the father will be a boy. But all children will inherit an X chromosome from their mother, regardless if they are boys or girls.

84. What do you understand by the term inherited traits and acquired traits?

Answer:

Inherited Traits	Acquired Traits
1) These are the characteristics that an individual inherits from his parents and can be passed into the next generation.	1) These are the characteristics that an individual develops during his life time and cannot be passed into the next generation.
2) These characteristics include eye colour, skin complexion, hair colour etc.	2) These characteristics include skills, knowledge, development of muscles etc.

85. Which type of reproduction is best for survival? Why?

Answer:

Sexual reproduction produces a new combination of genes in the offspring that may enable them to survive in the changing environment and help in the survival of the species.

86. If all the waste we generate is biodegradable, will this have no impact on the environment?

Answer:

Biodegradable wastes can also affect the environment. During the process of decomposition, these wastes can be led to negative impacts like smell and possibility of sparking an

epidemic, if they are dumped near a residential area.

87. Why is the use of iodised salt advisable?

Answer:

Iodine is essential for the synthesis of thyroxine hormone in the thyroid gland. The thyroxine, in turn regulates carbohydrates, proteins and fat metabolism in the body for growth. Deficiency of iodine results in goiter. Thus, use of iodised salt is advisable to prevent iodine deficiency in the body.

88. What is the function of medulla oblongata?

Answer:

Medulla oblongata controls rate of heart beat, breathing movements, expansion and contraction of blood vessels to regulate blood pressure, swallowing, coughing, sneezing, vomiting etc.

89. How is the energy released during respiration stored in the body?

Answer:

The energy released during respiration is used to make ATP (Adenosine Triphosphate) molecules from ADP (Adenosine Diphosphate) and inorganic phosphate. ATP acts as the energy currency of the cell to fuel all the endothermic reactions that take place in the cell.

90. A student has been growing plants in two pots. One pot is placed in sunlight and the other in complete darkness. After a few days, he observes that the plant in the dark bends towards one side. Why?

Answer:

The plant in the dark bends toward light due to phototropism, which is controlled by auxins. Auxins accumulate on the shaded side of the plant, promoting cell elongation and causing the plant to bend toward the light source.

91. Why do veins have valves while arteries do not?

Answer:

Veins carry blood at low pressure and often against gravity, so valves are needed to prevent backflow.

Arteries carry blood under high pressure from the heart, so valves are not required.

92. What are villi? What is their function?

Answer:

Villi are finger-like projections in the small intestine. They increase surface area for absorption of digested food.

93. A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to tell you which of the traits blood group A or O is dominant? Why or why not?

Answer:

No, this information is not sufficient to determine which of the traits blood group A or O is dominant. This is because we do not know about the blood group of all the progeny as blood group A can be genotypically AA or AO, which is incomplete to draw any such conclusion.

94. What are the advantages of cloth bags over plastic bags during shopping?

Answer:

The advantages of cloth bags are as follows:

- i) capable of carrying more things
- ii) made of biodegradable material
- iii) does not pollute the environment
- iv) can be reused

95. What are trophic levels? Give an example of a food chain and state the different trophic levels in it.

Answer:

The various levels or steps in a food chain at which the transfer of food and energy takes place are called trophic levels.

An example of a food chain:

Plants → grasshopper → frog → snake → hawk

In this example, plants are eaten by a grasshopper (First Trophic level), which is then eaten by the frog (Second Trophic level), which in turn is eaten by the snake (Third Trophic level). The snake is then

eaten by the hawk (Fourth Trophic level).

96. What are decomposers? Write the role of decomposers in the environment.

Answer:

Decomposers are microorganisms that derive their nutrition from dead remains and waste products of organisms. They play a vital role in our environment by breaking down complex organic substances into simple inorganic substances, which are made available for plants and other organisms. Hence, they act as scavengers and not only keep the environment clean but also replenish the minerals.

97. Give any two ways in which biodegradable substances would affect the environment?

Answer:

Biodegradable substances affect the environment

100. Primarily by being broken down by microorganisms, which helps recycle nutrients back into the soil to enhance fertility.

(ii) However, their decomposition can also cause negative effects, such as producing foul smells and acting as breeding grounds for disease-carrying insects.

98. What is the ozone layer? What causes ozone depletion?

Answer:

The ozone layer is a layer of ozone gas in the atmosphere that protects Earth from harmful ultraviolet radiation. Ozone depletion is mainly caused by chemicals such as chlorofluorocarbons (CFCs).

99. (a) Why is it necessary to conserve our environment?

(b) State the importance of green and blue dustbins in the safe disposal of household waste

Answer:

(a) The ecosystem provides many useful things for our survival. We get food, shelter and the air we breathe through the ecosystem. Hence, it is

necessary to conserve our environment and the ecosystem.

(b) There are two types of waste produced in our homes. These are biodegradable and non-biodegradable wastes. These wastes are dumped into different bins. Biodegradable wastes are dumped in the green bins while non-biodegradable wastes are dumped in blue bins.

100. "Is it possible that a trait is inherited but may not be expressed?" Give a suitable example to justify this statement.

Answer:

Yes, it is possible.

For example- When pure tall pea plants are crossed with pure dwarf pea plants, only tall pea plants are obtained in the F_1 generation. On selfing tall plants of the F_1 generation, both tall and dwarf plants are obtained in the F_2 generation in the ratio 3:1. The reappearance of the dwarf character shows it was present but could not express itself in the F_1 generation because of the dominant character of the tall pea plant.

**VERY SHORT ANSWER TYPE
QUESTIONS [2 MARKS]
[PHYSICS]**

101. A lens has power -2 D. Calculate its focal length and identify the type of lens.

Answer:

Given, Power(P) = $\frac{1}{f}$

or, $-2 = \frac{1}{f}$

or, $f = \frac{-1}{2}$

$\therefore f = -0.5\text{m}$.

Type of lens: Negative focal length indicates a concave lens.

102. The refractive index of a material medium is 1.33. Calculate the speed of light in the medium.

Answer:

Given, $n = 1.33$

$c = 3 \times 10^8 \text{ m/s}$

Using, $n = \frac{c}{v}$

or, $v = \frac{c}{n}$

or, $v = \frac{3 \times 10^8}{1.33}$

$\therefore v = 2.25 \times 10^8 \text{ m/s}$

103. State the laws of reflection of light.

Answer:

The laws of reflection are:

- i) The angle of incidence is equal to the angle of reflection.
- ii) At the point of incidence, the incident ray, the reflected ray and the normal lie in the same plane.

104. What is the difference between a real image and a virtual image? (Any 2 points)

Answer:

Real Image	Virtual Image
1. Light rays actually meet to form a real image.	1. Light rays do not actually meet to form a virtual image.
2. The image is generally inverted.	2. The image is generally erect.
3. Image can be obtained on the screen.	3. Image cannot be obtained on the screen.
4. The image is in front of mirror and behind the lens.	4. The image is behind the mirror and in front of the lens.

105. State the laws of refraction of light.

Answer:

The laws of refraction are:

- i) The incident ray, the refracted ray and the normal to the surface of the separation of the two media at the point of incidence, all lie in the same plane.
- ii) The ratio of the sine of angle of incidence to the sine of angle of refraction is a constant, for the light of given colour, for the given pair of media.

106. Why do we prefer a convex mirror as a rear-view mirror in vehicles? Give two reasons.

Answer:

The reasons are:

- i) A convex mirror always gives an erect, virtual, full size diminished image of distant objects.
- ii) It can cover a wider field of view. Thus, it enables the driver to view a larger area than would be possible with a plane mirror.

107. Define power of lens. Write the mathematical expression. State the SI unit of power of a lens.

Answer:

Power of a lens is defined as the reciprocal of focal length in meters.

Mathematically, $P = \frac{1}{f}$; where f is in meters.

The SI unit of a lens is called dioptre.

108. State any 2 uses of a concave mirror.

Answer:

(i) It is used as a shaving mirror. The reason being that when the face of a person is between the pole and the principal focus of a concave mirror, an erect, enlarged and virtual image is formed behind the mirror.

(ii) It is used as a reflector in the headlights of automobiles. The bulb is placed close to the principal focus of the concave mirror when a powerful parallel beam of light is placed.

109. (a) Write the mirror formula and explain the meaning of each term.

(b) Name a mirror that can give an erect and enlarged image of an object

Answer:

(a) Mirror formula: $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$.

Where f = focal length, v = image distance, u = object distance.

(b) A concave mirror produces an erect and enlarged image of an object.

110. (a) A boy standing in front of a spherical mirror finds his image having a small face, big tummy and legs of normal size. What are the shapes of three parts of the mirror?

(b) You are given kerosene, turpentine and water. In which of these does the light travel fastest?

Answer:

(a) The upper part of the mirror showing a small face must be convex. The middle part of the mirror showing a big tummy must be concave and the lower part of the mirror showing normal legs must be plane.

(b) Light travels fastest in water.

111. (a) Find the focal length of a convex mirror whose radius of curvature is 32 cm.

(b) A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal?

Answer:

(a) Given,

Radius of curvature, $R = 32$ cm

Focal length, $f = ?$

We know, $R = 2f$

$$f = \frac{R}{2} = \frac{32}{2}$$

$= 16$ cm

(b) The ray of light bends towards the normal.

112. The refractive index of diamond is 2.42. What is the meaning of this statement?

Answer:

It means that light travels 2.42 times slower in diamond than in vacuum. It also means diamond is optically very dense and bends light significantly.

113. A lens of power -4.5 D is required by a person to correct his vision. State the defect of vision he is suffering from, calculate the focal length and name the corrective lens.

Answer:

The vision defect is myopia or short-sightedness.

$$\text{Focal length} = \frac{1}{\text{power}} = \frac{100}{-4.5} \text{ cm} = -22.2 \text{ cm}$$

The person has to use a concave lens to correct the vision.

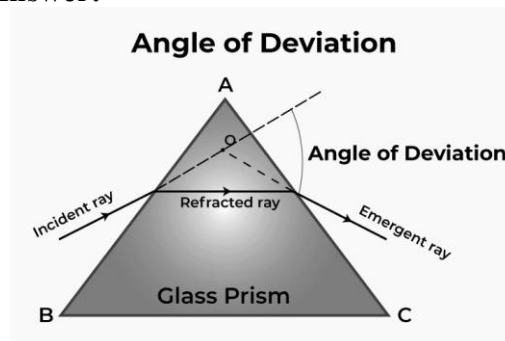
114. Why does the sun appear reddish at sunrise and sunset?

Answer:

At sunrise or sunset, sunlight travels a longer path through the atmosphere. Most blue light (shorter wavelengths) is scattered away, and only red light (longer wavelengths) reaches our eyes. Hence, the sun appears reddish at sunrise and sunset.

115. Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation.

Answer:



116. What is the cause of dispersion of white light through a prism?

Answer:

Dispersion occurs because different colours (wavelength) of light travel at different speeds in a prism. As a result, they bend by different angles, causing white light to spread into its constituent seven colours (VIBGYOR).

117. What is the Tyndall effect? Explain with an example.

Answer:

The phenomenon of scattering of a beam of light by colloidal particles is called the Tyndall effect.

For example: Tyndall effect can be observed when sunlight passes through a canopy of a dense forest.

Here, tiny water droplets in the mist scatter light.

118. (a) What is meant by dispersion of white light?
(b) Why are danger signal lights red in colour?

Answer:

(a) The splitting of white light into its component colours is called dispersion of light.

(b) Danger signal lights are red in colour because the red coloured light having longer wavelength is scattered the least by fog or smoke. Hence, it can be seen clearly from a distance.

119. White light is passed through a prism to yield a spectrum.

(a) Which colour will show

(i) maximum and (ii) minimum angle of deviation?

(b) A blue-coloured ray is passed through a glass prism. What will be the colour of the emergent ray? Justify your answer.

Answer:

(a) (i) Violet colour will show maximum angle of deviation.

(ii) Red colour will show minimum angle of deviation.

(b) The emergent ray will be blue in colour. Since blue colour ray cannot be split any further it will pass through the prism undispersed.

120. What is Presbyopia? How is the defect corrected?

Answer:

The power of accommodation of the eye usually decreases with ageing. For most people, the near point gradually recedes away. They find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses. This defect is called Presbyopia. This defect can be corrected by using convex lens of proper focal length.

121. Why are heating elements made of alloys instead of pure metals?

Answer:

Alloys are used because:

i) they have higher resistivity and hence produce more heat

ii) they have high melting point and hence don't melt easily

iii) they do not oxidize easily and hence have longer life

122. Three resistors of $2\ \Omega$, $3\ \Omega$, and $5\ \Omega$ are connected in series. Find:

(a) Total resistance

(b) Current if 10 V is applied

Answer:

(a) Total resistance:

$$R = R_1 + R_2 + R_3$$

$$\Rightarrow R = 2 + 3 + 5 = 10\ \Omega$$

(b) Current:

$$I = \frac{V}{R} = \frac{10}{10} = 1\text{ A}$$

123. Why are household appliances connected in parallel?

Answer:

They are connected in parallel due to the following reasons:

(a) Each appliance gets same voltage (220V)

(b) They can be operated independently.

(c) Failure of one does not affect others.

124. Two resistors of $4\ \Omega$ and $6\ \Omega$ are connected in parallel. Find equivalent resistance.

Answer:

$$\text{Using, } \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{6} = \frac{3+2}{12}$$

$$\Rightarrow \frac{1}{R} = \frac{5}{12}$$

$$R = \frac{12}{5} = 2.4\ \Omega$$

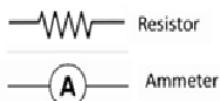
125. (i) What is meant by the statement 'The potential difference between two points is 1 volt'?

(ii) Draw the symbol of resistor and ammeter.

Answer:

(i) Potential difference of 1 volt means the amount of work done when a unit charge moves from one point to the other point in an electric field.

ii)



126. Why does the cord of an electric heater not glow while the heating element does?

Answer:

The cord of an electric heater is made of thick copper wire and has much lower resistance than its element. For the same current (I) flowing through the cord and the element, heat produced (I^2Rt) in the element is much more than that produced in the cord. Consequently, the element becomes very hot and glows whereas the cord does not become hot and as such does not glow.

127. (i) Write the function of the Voltmeter in an electric circuit.
(ii) Should the resistance of a Voltmeter be low or high? Give a reason.

Answer:

- (i) To measure potential difference across two points.
(ii) The resistance of a voltmeter should be high so that it takes a negligible current from the circuit.
128. Two wires A and B of the same material, having the same lengths and diameters 0.2 mm and 0.3 mm respectively, are connected one by one in a circuit. Which one of these two wires will offer more resistance to the flow of current in the circuit? Justify your answer.

Answer:

Wire A will offer more resistance to the flow of current in the circuit. This is because resistance is inversely proportional to the area of cross-section.

129. Define resistivity of a material. Write the mathematical formula of resistivity.

Answer:

Resistivity is defined as the resistance offered to current flow by a conductor of unit length having unit area of cross-section.

The mathematical formula of resistivity is $\rho = \frac{RA}{l}$, where ρ is the resistivity, R is the resistance, A is the area of cross-section and l is the length of the conductor.

130. Name the factors which determine the resistance of a conductor.

Answer:

The factors which determine the resistance of a conductor are

- Length of the conductor,
 - Area of cross-section of the conductor,
 - Nature of the material of the conductor, and
 - Temperature of the conductor.
131. Two wires of equal length, one of copper and the other of manganin (an alloy) have the same thickness. Which one can be used for (i) electrical transmission lines (ii) electrical heating devices? Why?

Answer:

- (i) Copper wire can be used for electrical transmission lines because copper has very low resistivity and hence it is a very good conductor of electricity.
(ii) Manganin can be used for electrical heating devices because the resistivity of manganin is about 25 times more than that of copper and hence it produces a lot of heat on passage of current through it.

132. (a) Define electric work.
(b) How much work is done in moving a charge of $2C$ across two points having a potential difference of $12 V$?

Answer:

(a) Electric work is the amount of energy transferred or used when an electric charge moves through a potential difference in an electric circuit.

- (b) Given, Charge (Q) = $2C$
Potential difference (V) = $12 V$
Work done (W) = ?
Using, $W = V \times Q$
 $= 12 \times 2$
 $= 24 J$

133. One of the major causes of fire in office buildings is short-circuiting.

State one reason, which may lead to a short-circuit. How can it be prevented?

Answer:

One possible reason for short-circuiting of an electrical circuit is either the installation of electrical wiring is damaged or appliance of high-power rating is being run on an electrical line of lower power rating, Short-circuiting can be prevented by the use of an electrical fuse of appropriate capacity.

134. What is the pattern of magnetic field lines for a current-carrying circular loop? State any two factors affecting its strength.

Answer:

A circular loop produces magnetic field lines that are circular near the wire and become parallel at the center.

The strength of the magnetic field depends on current, number of turns, and radius of the loop.

135. List two properties of magnetic field lines.

Answer:

The properties are:

- i) Magnetic field lines are closed curves.
- ii) Two magnetic field lines never intersect each other.

136. List two methods of producing magnetic fields.

Answer:

Following are the methods of producing magnetic fields:

- i) By using a permanent magnet, we can produce a magnetic field.
- ii) A current carrying straight conductor produces a magnetic field.

137. Why does a compass needle get deflected when brought near a bar magnet?

Answer:

The magnetic field of the magnet exerts force on both the poles of the compass needle. The forces experienced by the two poles are equal and opposite. These two forces form a couple and deflect the compass needle.

138. State Right-Hand Thumb Rule.

Answer:

It states that, if you hold the current carrying straight wire in the grip of your right hand in such a way that the thumb points in the direction of current, then the direction of the curl of the fingers will give the direction of the magnetic field.

139. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the drawing board gently and observes that iron filings arrange themselves in a particular pattern.

(i) What does the crowding of iron filings at the ends of the magnet indicate?

(ii) What do the lines, along which the iron filings align, represent?

Answer:

(i) Crowding of iron filings indicates that the magnetic field in that region is strong.

(ii) They represent the magnetic field lines.

140. When does an electric short circuit occur?

Answer:

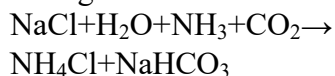
In a domestic circuit, short - circuit occurs when live and neutral wire comes in direct contact with each other. In this situation, the resistance of the circuit becomes zero and excessive current starts to flow through it.

SECTION C
SHORT ANSWER TYPE QUESTIONS
(3 marks)
[CHEMISTRY]

1. What is the chemical name of baking soda? Write down its chemical formula. How is it produced? (Give relevant chemical equation)

Answer:

The Chemical name of baking Soda is Sodium hydrogen carbonate. Its chemical formula is NaHCO_3 . It is produced by passing carbon dioxide through ammoniacal brine.



2. Explain why iron rusts more quickly in the presence of water and air. Name the compound formed during rusting and write the chemical formula.

Answer:

Rusting is faster due to the presence of moisture and oxygen. The compound formed is hydrated iron (III) oxide.

Chemical Formula: $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$.

3. Solid calcium oxide was taken in a container and water was added slowly to it.
(i) State the two observations made in the experiment
(ii) Write the name and the chemical formula of the product formed.

Answer:

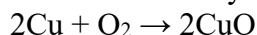
(i) Two observations made calcium oxide react vigorously. A large amount of heat is produced and the beaker becomes warm.

(ii) Product is slaked lime (or calcium hydroxide) Ca(OH)_2 .

4. What is an oxidation reaction? Give an example of oxidation reaction. Is oxidation an exothermic or endothermic reaction?

Answer:

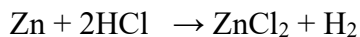
Oxidation reaction is the reaction which involves addition of oxygen and removal of hydrogen



Oxidation reaction is an endothermic reaction.

5. Zinc reacts with dilute hydrochloric acid. Write the chemical equation and name the type of reaction. Also mention the gas evolved and how would you test it.

Answer:



The type of reaction is a single displacement reaction.

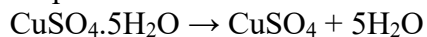
Hydrogen gas burns with a pop sound when tested by bringing a burning splinter near it.

6. Crystals of copper sulphate are heated in a test tube for sometime
(i) What is the colour of copper sulphate crystals before and after heating?
(ii) What is the source of liquid droplets seen on the upper side of the test tube during the heating process?

Answer:

(i) The colour of copper sulphate crystals is blue before heating and turns white after heating.

(ii) Water of crystallisation from hydrated copper sulphate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, on heating gives water droplets.



7. In the electrolysis of water
(i) Name the gas collected at cathode and anode respectively.
(ii) Why is the volume of one gas collected at one electrode is double of another.
(iii) Why are few drops of dil. sulphuric acid added to water prior to electrolysis?

Answer:

(i) In the electrolysis of water, hydrogen gas (H_2) is collected at the cathode (negative electrode) and Oxygen gas (O_2) at the anode (positive electrode).

(ii) The volume of hydrogen is double that of oxygen because water (H_2O) contains two parts hydrogen to one part oxygen by volume.

According to the chemical equation of electrolysis, the decomposition of water produces two molecules of

hydrogen for every one molecule of oxygen.

(iii) Pure water is a poor conductor of electricity. The addition of a few drops of dilute sulphuric acid dissociates into ions, making the water a good conductor. Dilute sulphuric acid is added to increase the electrical conductivity of pure water.

8. During the reaction of some metals with dilute hydrochloric acid following observations were made
- (i) Silver metal does not show any change.
 - (ii) The temperature of the reaction mixture rises when aluminium is added.
 - (iii) The reaction of sodium metal is found to be highly explosive.

Answer:

(i) Silver is a very less reactive metal (as it is placed below hydrogen in reactivity series). Thus, it does not react with dil. HCl.

(ii) The reaction of Al with dil. HCl is exothermic, i.e. heat is produced in the reaction and hence the temperature of the reaction mixture rises.

(iii) Sodium is a very reactive metal. It reacts vigorously with the evolution of heat too.

9. Explain giving one example, why do oxidation and reduction proceed side by side?

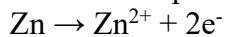
Answer:

Oxidation and reduction proceed side by side (redox reactions) because they are mutually dependent processes involving electron transfer. Oxidation is the loss of electrons, while reduction is the gain of electrons. For a substance to lose electrons (oxidation) there must be another substance available to gain them (reduction).

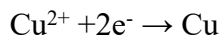
For example:

Reaction between Zinc and Copper Sulphate: When a piece of zinc (Zn) is placed in a copper sulphate solution.

Oxidation: Zinc loses two electrons to become a positive ion



Reduction: The copper ions in the solution accept these two electrons to become neutral copper

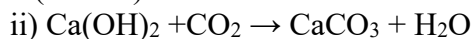
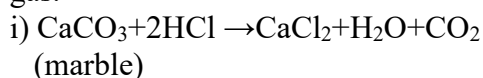


Therefore, the electrons released by the oxidation of zinc are immediately consumed by the reduction of copper ions.

10. A student dropped a few pieces of marble in dil. hydrochloric acid contained in a test tube. The evolved gas was passed through lime water. What change would be observed in lime water? Write a balanced chemical equation for both the changes observed.

Answer:

Lime water would turn milky because of the formation of calcium carbonate by evolved carbon dioxide gas.



11. Explain how an antacid works.

Answer:

The acidity produced due to excess hydrochloric acid in the stomach which causes indigestion and acute pain and irritation. Milk of Magnesia commonly called (Magnesium hydroxide) is used as an antacid. Since it is basic in nature, it reacts with excess hydrochloric acid present in the stomach and neutralises it.

12. (i) What are the main products of the chlor-alkali process?
(ii) Why is the chlor-alkali process important in industry?

Answer:

(i) Chlorine gas (Cl_2), Sodium hydroxide (NaOH), and hydrogen gas (H_2)

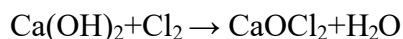
(ii) Produces key chemicals like chlorine, sodium hydroxide, and hydrogen, which are used in various industrial processes, including water purification, manufacturing of soaps and detergents.

13. Write the molecular formula of bleaching powder. How is bleaching powder prepared?

Answer:

The molecular formula of bleaching powder is CaOCl_2 .

Bleaching powder is synthesized by the action of Chlorine gas (produced from the chlor-alkaliprocess) on dry slaked lime, Ca(OH)_2 . The chemical equation is as follows:



14. (i) The pH of a sample of tomato juice is 4.6. How is this juice likely to be in taste? Give reason to justify your answer.
(ii) How do we differentiate between strong and weak acids and bases in terms of ion formation in aqueous solution?
(iii) Why do HCl , HNO_3 etc. show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character.

Answer:

(i) The tomato juice with a pH of 4.6 is considered to be an acid and therefore will taste sour.

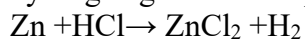
(ii) The strength of acids and bases depends on the number of H^+ ions and OH^- ions produced respectively.

(iii) HCl , HNO_3 , etc. show acidic nature because they get dissolved in the aqueous solution and produce the hydrogen ions. The hydrogen ions are responsible for the acidic nature of the compounds.

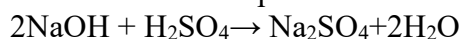
15. Illustrate three chemical properties of acids with examples

Answer:

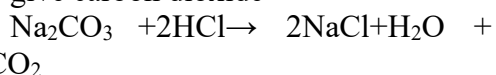
(i) They react with metals to give out hydrogen gas for example



(ii) They react with bases to form salt and water for example



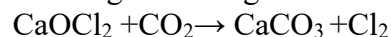
(iii) They react with carbonates to give carbon dioxide



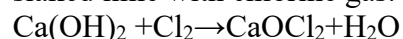
16. A yellow powder 'A' gives a pungent smell when left open. It is a good oxidising agent and is used for bleaching cotton and linen in textile industries. Identify 'A' and give its method of preparation. What is the commercial name?

Answer:

The given compound 'A' is calcium oxychloride because it is an oxidising agent and in open, it reacts with carbon dioxide to give pungent smelling chlorine gas.



It is prepared by the action of dry slaked lime with chlorine gas.



Calcium oxychloride is commercially known as bleaching powder.

17. (a) Why do metals produce hydrogen gas with acids?
(b) Why is hydrogen gas not evolved when a metal reacts with nitric acid?

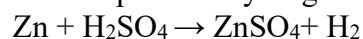
Answer:

(a) Metals displace hydrogen from acids because they are more reactive than hydrogen

Example:

Zinc + Sulphuric acid $\rightarrow$

Zinc sulphate + Hydrogen



(b) Hydrogen gas is not evolved when a metal reacts with nitric acid because nitric acid is a strong oxidizing agent it oxidizes the hydrogen produced to water and itself gets reduced to any of the nitrogen oxides.

18. Write three differences between calcination and roasting calcination.

Answer:

Roasting	Calcination
1. Ore is heated in excess of air	1. Ore is heated in the absence or limited supply of air
2. This is used for sulphide ores	2. This is used for carbonate ores
3. SO_2 is produced along with metal oxide	3. CO_2 is produced along with metal oxide

19. Differentiate between metals and non-metals on the basis of their chemical properties.

Answer:

Metals	Non-metals
1. Metals are electropositive and form cations	1. Non-metals are electronegative and form anions
2. Metals are reducing agents	2. Non-metals are oxidizing agents
3. Metals form basic or amphoteric oxides	3. Non-metals form acidic or neutral oxides

20. The galvanized article is protected from rusting even if the zinc coating is broken. Give reasons.

Answer:

Zinc is more reactive than iron and hence zinc reacts in preference to iron when they are present side by side.

If there is a scratch in the galvanized iron only zinc will be attacked by moist air and will get oxidized in preference to iron; the oxidation of iron does not take place in presence of zinc.

21. What is Aqua regia? Write its characteristics.

Answer:

Aqua regia is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of 3:1.

Aqua regia has the following characteristics:

- It is a highly corrosive fuming liquid
- It can dissolve gold and platinum even though neither of these acids can do so alone.

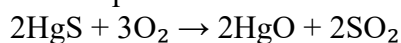
22. Write chemical equations for reactions taking place when

- Cinnabar is heated in air
- Calcium metal reacts with water

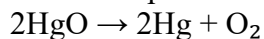
Answer:

- Cinnabar is heated in air

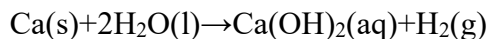
First step:



Second step:



- Calcium metal reacts with water



23. Why are Carbon and its compounds used as fuels for most applications?

Answer:

Carbon and its compounds are widely used as fuels because

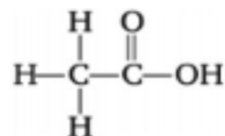
- They have high calorific values and release a large amount of heat when they are burnt in air
- They burn with a clean flame without leaving smoke (especially saturated hydrocarbons)
- They are easy to handle and the combustion can be controlled.

24. Draw the structures of the following compounds:

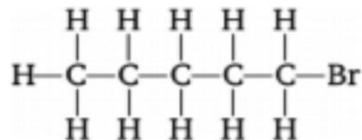
- ethanoic acid
- bromopentane
- butanone
- hexanal

Answer:

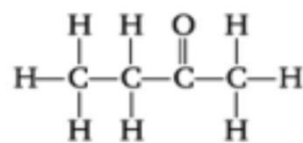
- Ethanoic acid CH_3COOH



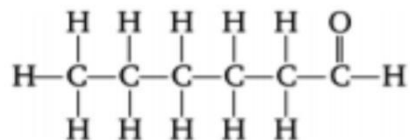
- Bromopentane $\text{C}_5\text{H}_{11}\text{Br}$



- Butanone $\text{C}_2\text{H}_5\text{COCH}_3$



- Hexanal $[\text{C}_5\text{H}_{11}\text{CHO}]$



25. a) What is a homologous series? Explain with an example.

- b) Why do we not see any gradation in the chemical properties of the homologous series of compounds?

Answer:

- a) A homologous series is the family of organic compounds having the

same functional group, similar chemical properties but the successive (adjacent) members of the series differ by a $-\text{CH}_2$ unit or 14 mass units.

For example, the alkane series has the general formula $\text{C}_n\text{H}_{2n+2}$.

The first member of the homologous series of alkane is methane, i.e., CH_4 .

The second member of the homologous series of alkane is ethane, i.e., C_2H_6 .

The successive members differ by a CH_2 group.

b) There is no gradation in the chemical properties of compounds in a homologous series because their properties are determined solely by their functional group, which remains constant.

26. How can ethanol and ethanoic acid be differentiated on the basis of the physical and chemical properties?

Answer:

Physical properties:

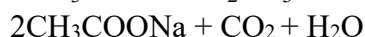
Ethanol and ethanoic acid can be differentiated on the basis of the following physical properties

i) Smell: ethanol has a pleasant smell whereas ethanoic acid has a pungent smell.

ii) Melting point: the melting point of ethanol is much lower than that of ethanoic acid. In winter ethanoic acid freezes to form glacier-like crystals while ethanol remains as a liquid.

Chemical properties:

i) Action of sodium carbonate or bicarbonate: Ethanoic acid produces brisk effervescence due to the evolution of carbon dioxide gas but ethanol does not.



ii) Action on litmus: Ethanol is a neutral compound and has no action on litmus paper. In contrast, ethanoic acid is acidic in nature and turns blue litmus red.

27. (a) Give a test that can be used to differentiate between saturated and unsaturated hydrocarbons.

(b) Which of the following hydrocarbons undergo addition reactions: C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4 ?

Answer:

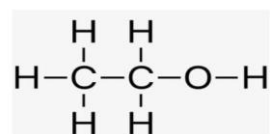
(a) Alkenes and alkynes are examples of unsaturated hydrocarbons. The bromine water test is used to distinguish between these and other saturated compounds. When an unsaturated compound is mixed with bromine water, the unsaturated hydrocarbon will decolorise bromine water; saturated hydrocarbons or alkanes on the other hand, do not decolorise bromine water.

(b) Unsaturated hydrocarbons undergo addition reactions. C_3H_6 and C_2H_2 are unsaturated hydrocarbons that undergo addition reactions.

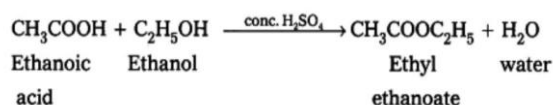
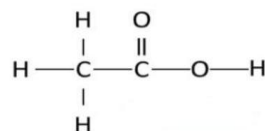
28. An organic compound A is an essential constituent of wine and beer. Oxidation of A yields an organic acid B which is present in vinegar. Name the compounds A and B and write their structural formula. What happens Write the chemical equation for the reaction, when A and B react in the presence of an acid catalyst.

Answer:

The compound A is ethanol
Structural formula of ethanol:



The compound B is ethanoic acid.
Structural formula of ethanoic acid:

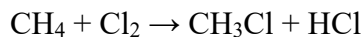


29. (a) What do you observe when methane is exposed to chlorine in the presence of sunlight? Write the relevant balanced equation.

(b) Why is ethanol added to petrol?

Answer:

(a) When methane is exposed to chlorine in the presence of sunlight a substitution reaction occurs. In this reaction one or more hydrogen atoms in methane are replaced by chlorine atoms.



(b) Ethanol is added to petrol because it burns completely and gives rise to only carbon dioxide and water on burning in sufficient air. This combination reduces the emission of unburnt hydrocarbons making it eco-friendly.

30. Explain in brief the mechanism of cleansing action of soap.

Answer:

Soaps are molecules in which the two ends have different properties, one is hydrophilic, that is it interacts with water and the other end is hydrophobic, that is it interacts with hydrocarbons. When soap is dissolved in water, its hydrophobic ends attach themselves to the dirt. Then the molecules of themselves in micelle formation and trap the dirt at the centre of the cluster. Soap in the form of micelle is therefore able to clean because of this unique orientation. The micelles stay in solution and the dirt particles are then easily rinsed away by water.

SHORT ANSWER TYPE QUESTIONS

(3 marks)

[BIOLOGY]

31. Name the glands present in the walls of the stomach. What enzyme does it produce? Give two functions of HCl produced in the stomach.

Answer:

The glands present in the walls of the stomach are the gastric glands. It produces the enzyme, Pepsin.

Two functions of HCl are:-

- (i) It creates an acidic medium which facilitates the action of the enzyme Pepsin
- (ii) It kills the germs that might have entered the stomach along with the food.

32. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Answer:

It is necessary to separate oxygenated and deoxygenated blood in mammals and birds because of the following reasons:

- (i) Mammals and birds are warm blooded animals that constantly need to maintain their body temperature.
- (ii) These organisms need a large amount of oxygen for cellular respiration to bring out more energy to maintain their body temperature.

33. What is a reflex action? Trace the sequence of events which occur when a bright light is focused on your eyes.

Answer:

Reflex action is a rapid automatic response to a stimulus.

When light is focuses in our eyes, the receptor relay impulses via sensory nerves to the central nervous system (CNS) and the CNS transmits message (in the form of impulses) to the effectors(muscles in the eye). These muscles reduce the size of the pupil and activate muscles to close the eyes.

34. Give three advantages of vegetative propagation.

Answer:

The three advantages of vegetative

propagation are:

(i) Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.

ii) It makes possible the propagation of plants such as banana, orange, rose and jasmine that have lost the capacity to produce seeds.

iii) All plants produced are genetically similar enough to the parent plant to have all its characteristics.

35. What is fission? Differentiate between binary fission and multiple fission.

Answer:

Fission is a mode of asexual reproduction in which unicellular organisms divide to create new individuals.

Binary fission is a type of fission where the organism simply split into two equal halves during cell division e.g. Amoeba.

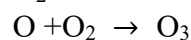
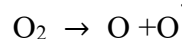
Multiple fission is a type of fission where the organism divides into many daughter cells simultaneously, e.g. Plasmodium.

36. How is ozone produced in the environment? What causes its depletion?

Answer:

The UV radiation from the sun splits apart some molecular Oxygen (O_2) into oxygen atoms (O).

The atoms then combine with molecular oxygen to form ozone



(Ozone)

Its depletion is caused by synthetic chemicals like chlorofluorocarbon (CFC) which are used in refrigerants and in fire extinguisher.

37. Explain how cells that are not in direct contact with nerves receive information?

Answer:

The cells that are not directly connected to nerves receive

information through hormones secreted by endocrine glands. The endocrine glands release hormones directly into the blood stream. These hormones travel all over the body. Not all cells respond, only cells that have the means to detect this compound using special molecules on their surfaces recognise the information and transmit it. This process is slow but it can potentially reach all the cells of the body regardless of nervous connections.

38. A person goes paragliding for the first time and experiences fear and excitement. Which hormone is released in this situation and what are its effects on the body?

Answer:

When a person goes paragliding for the first time they may feel fear, excitement or nervousness.

In such a situation the body produces adrenaline, a hormone secreted by the adrenal gland.

The effects of adrenaline are:

(i) Increased heartbeat and breathing rate to supply more oxygen to muscles

ii) Increased blood flow to muscles. The blood to the digestive system and skin is reduced and redirected to the arms and legs for action.

39. What do you mean by emulsification of fat? Why is this required?

Answer:

Large fat globules are broken down into smaller uniformly distributed fat particles by the action of bile salts present in the bile juice secreted by the liver. This process is known as emulsification of fat. The pancreatic enzyme lipase can act on the emulsified fat and convert it to fatty acid and glycerol.

40. Why is transpiration important for plants?

Answer:

Transpiration through stomata creates a transpiration pull in the underlying vascular tissue. This helps in pulling the water column and thus facilitates ascent of sap in

plants. Furthermore, transpiration is a way through which plants get rid of excess water. It also helps in temperature regulation in plants and is the major driving force in the movement of water in the xylem.

41. A signal is traveling from one neuron to another in the human body.
a) What is the junction between two neurons called?
b) How is the signal transmitted across this junction?
c) What is the role of dendrites?

Answers:

a) Synapse

b) Through chemicals called neurotransmitters

c) Dendrites receive incoming signals.

42. How is the movement of leaves of the sensitive plant touch-me-not different from the movement of shoot towards light?

Answer:

Differences between movements of leaves of touch-me-not plant and movement of shoots towards light are:

Movement of leaves of touch-me-not plant	Movement of shoots towards light
(i) This movement is independent of growth	(i) This movement is dependent on growth
(ii) stimulus is touch	(ii) stimulus is light
(iii) stimulus is touch	(iii) movement is directional

43. (i) Name the endocrine gland associated with the brain and the hormone secreted by it.
(ii) Name the endocrine gland present only in females and the hormone produced by it
(iii) Name the endocrine gland present only in males and the hormone produced by it.

Answer:

(i) The endocrine gland associated with the brain is the pituitary gland and the hormone secreted is the growth hormone

(ii) The endocrine gland present only in females are the ovaries and the hormone produced is oestrogen and progesterone

(iii) The endocrine gland present only in males are the testes and the hormone produced is Testosterone.

44. What happens when

(a) Planaria gets cut into two pieces?

(b) A mature Spirogyra filament attains considerable length?

(c) On maturation Sporangia burst?

Answer:

(a) When Planaria gets cut into two pieces each piece grows into a complete organism.

(b) A mature spirogyra on attaining considerable length breaks up into two or more small pieces and each piece then grows into a new individual.

(c) When sporangia bursts, spores are released and each one of them develops into a new individual.

45. Why is variation beneficial for the species, but not necessarily for the individual?

Answer:

Accumulation of variation in a species enables them to adapt according to the changes and the new needs. This provides survival advantage to the species. But an individual does not get any advantage due to variation that takes place on him. Thus, variation is beneficial for a species, but not necessarily for the individual.

46. What were the three steps used by Mendel in his breeding experiments?

Answer:

Mendel's experimental techniques involved three steps:

(a) Selection of "pure line" plants.

(b) Production of first generation (F1 generation) plants by cross breeding.

(c) Raising of second generation (F2 generation) plants by self fertilization of hybrids.

47. A gas 'X' is found in the upper layer of the atmosphere. It is a deadly poison, but still essential for all life forms on earth.

(a) Identify the gas and state the main factor for its depletion in the atmosphere.

(b) How is this gas formed in the upper atmosphere?

Answer:

(a) The gas 'X' is ozone (O_3). It is getting depleted mainly due to synthetic chemicals like chlorofluorocarbons (CFCs) used in refrigerants and fire extinguishers.

(b) In the upper atmosphere, ozone is formed when ultraviolet (UV) radiations split some molecules of oxygen (O_2) into free oxygen atoms (O), which then combine with molecular oxygen to form ozone (O_3).

48. An experimenter seals a green potted plant in an airtight glass bell jar along with a watch-glass containing potassium hydroxide (KOH) and places it in sunlight. Predict the effect on starch production in the leaves and explain why.

Answer:

Starch production in the plant's leaves will drop drastically or cease altogether because potassium hydroxide (KOH) actively absorbs all available carbon dioxide within the sealed bell jar. Carbon dioxide is a critical inorganic raw material necessary for the reduction phase of photosynthesis to synthesise glucose. Without carbon dioxide, the plant cannot manufacture carbohydrates, and since no excess glucose is formed, no new internal energy reserves can be stored as starch.

49. During a high-intensity sprint, a runner suddenly experiences agonizing muscle cramps. Explain the biochemical shift that occurred in their muscle cells and the product responsible for this condition.

Answer:

During sudden, rigorous physical activity, the oxygen demand of the runner's muscle cells exceeds the available supply, creating a localized lack of oxygen. To continue generating energy, the muscle cells

temporarily switch to an alternative anaerobic metabolic pathway to break down pyruvate. Instead of completing aerobic respiration in the mitochondria, the three-carbon pyruvate is converted directly into lactic acid in the cytoplasm, and its accumulation triggers muscle cramps.

50. Why are the muscular walls of the ventricles noticeably thicker and more robust than the walls of the atria in a human heart?

Answer:

The atria are the upper chambers of the heart whose primary role is to merely collect incoming blood from the body or lungs and transfer it downwards into the adjacent lower chambers.

In contrast, the ventricles are the powerful pumping chambers responsible for forcibly squeezing and pushing blood out into various external organs across long distances.

Because the ventricles must withstand and generate significantly higher pressure to drive systemic and pulmonary blood flow, they require much thicker muscular walls.

51. Contrast the underlying mechanisms driving the transport of water in the xylem during the night versus during a bright, sunny afternoon.

Answer:

At night, when stomata are largely closed and no active photosynthesis or transpiration occurs, the upward movement of water is driven primarily by “root pressure”. This is created when root cells actively pump ions from the soil, causing water to follow due to concentration differences.

On a bright, sunny afternoon, the stomata are wide open, leading to massive evaporation of water molecules from the leaf cells into the air. This rapid evaporation creates a powerful upward “transpiration pull” or suction, which supersedes root pressure and becomes the primary

force pulling water columns to the top of the plant.

52. Give three differences between aerobic and anaerobic respiration.

Answer:

The three differences between aerobic and anaerobic respiration are:

Aerobic Respiration	Anaerobic Respiration
1. Occur in the presence of oxygen	1. Occur in the absence of oxygen
2. Large amount of energy is released	2. Less energy is released
3. End products are carbon dioxide and water	3. End products are lactic acid (in muscles) or alcohol and carbon dioxide (in yeast)

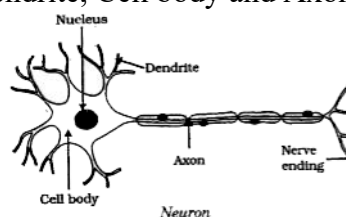
53. Describe double circulation in human beings. Why is it necessary?

Answer:

In humans and other mammals, the blood passes twice through the heart before completing a full circuit of the body. Blood is pumped from the heart to the lungs and returns to the heart from where it is distributed to the other organs in the body. This type of circulation is called double circulation.

It is necessary because humans and all mammals require a highly efficient supply of oxygen to the body as these animals have high energy needs to maintain their internal body temperature. Double circulation keeps the oxygenated blood separate from the deoxygenated blood and fulfills the requirement of oxygen in the body.

54. Draw the diagram of a neuron and label the following on it: Nucleus, Dendrite, Cell body and Axon



54. List four categories of contraceptive methods. State one advantage of adopting such preventive methods.

Answer:

Four methods of contraception used by humans are:

- (i) Mechanical barrier.
- (ii) Chemical method.
- (iii) Copper-T.
- (iv) Surgical method.

One advantage is that it helps in avoiding unwanted pregnancy.

55. List two differences in tabular form between dominant and recessive traits. What percentage of the plants in the F₂ generation were round, in Mendel's cross between round and wrinkled pea plants?

Answer:

Dominant Trait	Recessive Trait
1. When both dominant and recessive traits are inherited, the dominant trait gets expressed	1. When both dominant and recessive traits are inherited, the recessive trait does not get expressed
2. A single copy of dominant is enough to get it expressed.	2. Both the copies of a trait should be recessive to get it expressed.

75% of the plants in F₂ generation were round in Mendel's cross between round and wrinkled pea plants.

56. Why did Mendel select pea plants for conducting his experiments on inheritance?

Answer:

Mendel selected pea plant for his experiments because:

- (a) It has distinct, easily detectable contrasting characters.
- (b) It has a short life cycle.
- (c) Self fertilisation occurs but cross fertilization can also be carried out easily.

57. Give three important features of the mechanism of inheritance.

Answer:

The three important features of the mechanism of inheritance are:

- (a) Characters (traits) are controlled by genes, and each gene controls one character.
- (b) There may be two or more forms (alleles) of the gene.

(c) One form may be dominant over the other.

58. Why is damage to the ozone layer a cause for concern? Mention two steps that can be taken to limit this damage?

Answer:

Ozone depletion, allows more harmful UV radiation to reach the Earth's surface.

Consequences include higher risks of skin cancer and damage to phytoplankton and other organisms that form the base of many food chains, which can affect global ecosystems.

The steps taken to limit the damage are:

- (i) The release of CFCs and other ozone-depleting substances has been reduced and controlled.
- (ii) CFC-based refrigerants and foam-blowing agents have been replaced with environmentally safer alternatives, and better industrial practices have been adopted to limit emissions.

59. (a) What is an ecosystem? List its two main components.
(b) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain.

Answer:

(a) All the interacting organisms in an area, together with the non-living constituents of the environment, form an ecosystem.

An ecosystem includes both living (biotic) and non-living (abiotic) components.

(b) We do not clean ponds as we do in an aquarium because the waste generated in a pond is acted upon by the decomposers, whereas in an aquarium, the waste gets mixed with water and is left untreated due to the absence of decomposers.

60. How do Food chains get shortened? How does shortening of food chain affect the biosphere?

Answer:

Undesirable activities of man eliminate growth of organisms

belonging to one or more trophic levels in a food chain. Thus, the food chain gets shortened, e.g. hunting tigers for their skin, etc.

It causes imbalance in the functioning of ecosystem and biosphere. If organisms of one trophic level are eliminated, the organisms prior to that trophic level will flourish and increase in number. Also, the organisms of the subsequent trophic level will sharply decrease, thereby creating an imbalance.

61. What is the difference between self pollination and cross pollination? Why is cross pollination generally more beneficial for genetic diversity?

Answer:

Self-pollination is the transfer of pollen grains from anther to the stigma of the same flower or another flower on the same plant. Whereas, cross pollination is the transfer of pollen grains between flowers of entirely different plants of the same species.

Cross pollination creates genetic diversity because it mixes the genes of two different parent plants. This mixing creates unique offsprings with new traits, better adaptation to environmental changes, diseases and pests.

62. What are the advantages of a nervous system?

Answer:

- i) The nervous system in our body keeps us informed about the outside world through the sense organs.
- ii) It enables us to remember, to think and to reason out.
- iii) It controls and harmonises all our voluntary and involuntary activities.

63. Suggest three ways to maintain a balance between environment and development to survive.

Answer:

- (i) Judicious use of natural resources and replenishing such resources (e.g. CO₂/O₂) by growing of trees.

- (ii) Protecting the wildlife by preserving their natural habitats and banning of hunting of wild animals.

- (iii) Managing the wastes by decomposition and recycling of many such substances.

64. What is puberty? Name the hormones responsible for production of secondary sexual characters in human beings.

Answer:

The age at which the human males and females become sexually mature is called Puberty. Their reproductive parts become functional and their gonads start producing gametes at puberty.

The hormone responsible for producing secondary sexual characters in males is testosterone and in females is oestrogen.

65. In one of his experiments with pea plants, Mendel observed that when a pure tall pea plant is crossed with a pure dwarf plant, in the first generation (F₁) only tall plants appear.

- (i) What happens to the trait of dwarfness in this case?

- (ii) When the F₁ generation plants were self fertilized, he observed that in the plants of the second generation, F₂ both the tall and dwarf plants were present. Why did it happen? Explain briefly.

Answer:

- (i) In the F₁ generation, the trait of dwarfness is recessive.
- (ii) Both parents contribute equally in sexual reproduction. So each pea plant inherited genes of both tallness and dwarfness in the F₁ generation. But only the dominant trait, tallness got expressed. When F₁ plants are crossed, in the F₂ generation, there are some plants (25%) which carry only the dwarfness character and hence the same got expressed in the F₂ generation.

SHORT ANSWER TYPE QUESTIONS

(3 marks)

[PHYSICS]

66. An object 4 cm in height is placed at 15 cm in front of a concave mirror of focal length 10cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object? Calculate the height of the image.

Answer:

Given, $h_o = +4\text{cm}$, $f = -10\text{cm}$,

$u = -15\text{cm}$, $v = ?$, $h_i = ?$

Using the mirror equation.

$$\begin{aligned} \frac{1}{v} + \frac{1}{u} &= \frac{1}{f} \\ \Rightarrow \frac{1}{v} + \frac{1}{-15} &= \frac{1}{-10} \\ \Rightarrow \frac{1}{v} &= \frac{1}{-10} - \frac{1}{-15} \\ \Rightarrow \frac{1}{v} &= \frac{(-15+10)}{150} \\ \Rightarrow \frac{1}{v} &= \frac{-5}{150} \end{aligned}$$

$$\therefore v = -30\text{cm}$$

Thus, to obtain a sharp image of the object the screen should be placed in front of the mirror at a distance of 30 cm from the mirror.

Using magnification formula,

$$\Rightarrow \frac{h_i}{h_o} = \frac{-v}{u}$$

$$\text{or, } h_i = \frac{-v}{u} \times h_o$$

$$\Rightarrow h_i = - \left[\frac{-30}{-15} \right] \times 4$$

$$\text{or, } h_i = -2 \times 4 = -8\text{ cm}$$

$$\therefore h_i = -8\text{cm}$$

The image height will be 8cm.

67. (a) What is the basic cause of refraction?
(b) A coin in a glass beaker appears to rise as the beaker is slowly filled with water. Why?

Answer:

(a) The basic cause of refraction is the change in the speed of light in going from one medium to another.

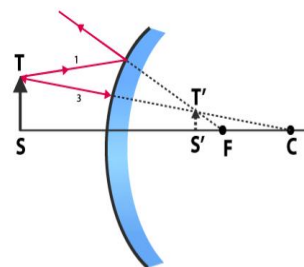
(b) It happens on account of refraction of light. A ray of light starting from the coin goes from water to air and bends away from the normal. Therefore, the bottom of the beaker on which the coin lies appears to be raised.

68. (a) If the image formed by the mirror for all positions of the object placed in front of it is always virtual and diminished, state the type of the mirror.
(b) Draw a ray diagram in support of your answer.
(c) Where are such mirrors commonly used and why?

Answer:

(a) Convex mirror

(b) Ray diagram



(c) Use of convex mirror: As rear view mirrors in vehicles because it gives a wider field of view.

69. (a) What is optical density?
(b) Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass?

Answer:

(a) The ability of a medium to refract light is known as optical density.

(b) Given, Refractive index of glass, $n = 1.50$

Using the expression,

$$n = \frac{\text{Speed of light in vacuum (c)}}{\text{speed of light in medium (v)}}$$

$$V = \frac{c}{n}$$

$$= \frac{3 \times 10^8}{1.5}$$

$$= 2 \times 10^8 \text{ m/s}$$

70. (a) Define 1 dioptre of power of a lens.
(b) A doctor has prescribed a corrective lens of power + 1.5 D. Find the focal length of the lens. Is the lens converging or diverging?

Answer:

(a) 1 dioptre is the power of a lens whose focal length is 1m.

(b) Given, Power (P) = +1.5 D

Using the expression,

$$P = \frac{1}{f}$$

$$f = \frac{1}{P}$$

$$f = \frac{1}{1.5}$$

$$f = 0.66 \text{ m}$$

The lens is a converging lens

71. Distinguish between concave and convex lenses (State any 3 points).

Answer:

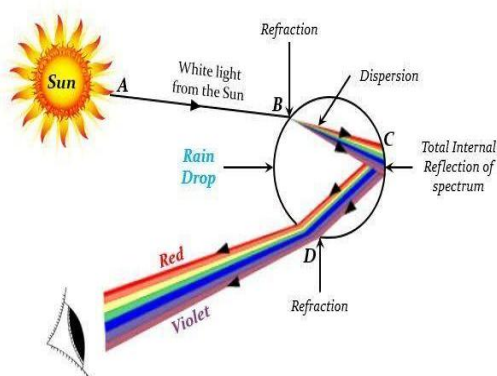
Concave lens	Convex lens
(i) It is called diverging lens	(i) It is called converging lens.
(ii) This lens is thinner in the centre than at its edges	(ii) This lens is thicker at the centre than at its edges
(iii) The principal focus is virtual	(iii) The principal focus is real.
(iv) The focal length is negative	(iv) The focal length is positive.
(v) This lens is used to correct myopia	(v) This lens can be used to correct hypermetropia.

72. What is a rainbow? With the help of a diagram, explain the formation of a rainbow.

Answer:

A rainbow is a natural spectrum appearing in the sky after a rain shower.

A rainbow is caused by dispersion of sunlight by tiny water droplets present in the atmosphere. The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop.



73. A person cannot see nearby objects clearly but can see distant objects

properly.

- Name this defect of vision.
- State one cause of this defect.
- Which type of lens is used to correct it?

Answer:

- Hypermetropia (long-sightedness).
- Eyeball too short or insufficient curvature of eye lens
- Convex (converging) lens.

74. A student observes that the Sun appears reddish during sunrise and sunset.

- Name the phenomenon responsible for this.
- Explain why the Sun appears red at that time.
- Which colour has the maximum scattering in the atmosphere?

Answer:

- Atmospheric scattering of light.
- Sunlight travels a longer distance in the atmosphere; shorter wavelengths scatter away leaving mostly red light.
- Violet/blue light.

75. (a) What is the far point and near point of the human eye with normal vision?
 (b) A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How can it be corrected?

Answer:

- The near point of the eye is the minimum distance of the object from the eye, which can be seen distinctly without strain. For a normal human eye, this distance is 25 cm.

The far point of the eye is the maximum distance to which the eye can see objects clearly. The far point of the normal eye is infinity.

- The child is suffering from myopia. This defect is corrected by using spectacles fitted with concave lenses.

76. What is meant by scattering of light? Use this phenomenon to explain why the clear sky appears blue.

Answer:

The phenomenon, in which a part of the light incident on a particle is redirected in different directions, is called the scattering of light.

The blue colour of the sky is due to the scattering of sunlight by the molecules of the atmosphere.

The light of shorter wavelength (blue) of the visible spectrum is scattered more than the light of longer wavelength by the atmospheric particles. When we look at the sky, the scattered light enters our eyes, which majorly contains blue colour and hence the sky appears blue.

77. What is atmospheric refraction? Explain the reason as to why stars appear to twinkle.

Answer:

The refraction of light caused by the earth's atmosphere due to change in the refractive indices of different layers is known as atmospheric refraction.

Stars are distant point sized sources of light. The path of the rays of light coming from the star goes on varying slightly due to the atmospheric refraction. Thus, the apparent position of the stars fluctuates and the amount of star light entering the eye flickers, giving the twinkling effect.

78. Why are electrical appliances connected in parallel in homes? Give three reasons.

Answer:

Electrical appliances are connected in parallel in homes due to the following advantages:

1. Same voltage across all appliances.
2. Independent operation.
3. If one device fails, others still work.

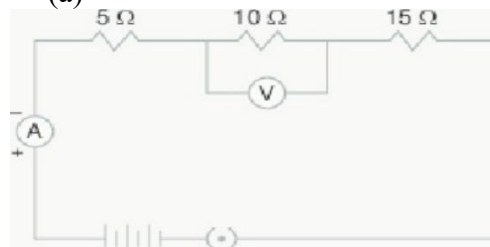
79. Three resistors of 5Ω , 10Ω and 15Ω are connected in series and the combination is connected to a battery of 30 V. An ammeter and a voltmeter are also connected in the circuit.

- (a) Draw a circuit diagram to connect all the devices in proper correct order.

- (b) What is the current flowing through the circuit?

Answer:

- (a)



- (b) Given, $V = 30 \text{ v}$

$$R_s = R_1 + R_2 + R_3 = 5 + 10 + 15 = 30 \Omega$$

$$\text{So, } I = \frac{V}{R_s} = \frac{30}{30} = 1 \text{ A}$$

80. A wire of length l and area of cross-section A was drawn into a wire of double its length by melting it. If its original resistivity and resistance were ρ and R respectively what will be its new resistivity and resistance?

Answer:

$$\text{We know, } R = \rho \frac{l}{A}$$

When wire is doubled by melting, its length would become double ($2l$) and area of cross-section would be $\frac{A}{2}$.

Thus, the new resistance is

$$R' = \frac{2\rho l}{\frac{A}{2}} = \frac{4\rho l}{A} = 4R$$

$$(\text{Since, } \rho = \rho \frac{l}{A})$$

Therefore, the new resistance of the wire is 4 times the original resistance. As resistivity of a material is the characteristic of a given material, hence it remains unchanged.

81. (a) Name and define S.I. unit of resistance.

(b) Calculate the resistance of a resistor if the current flowing through it is 200 mA when the applied potential difference is 0.8 V.

Answer:

- (a) The SI unit of resistance is ohm.

Definition: 1 Ohm is the resistance offered by conductor when the current passing through it is one

ampere and the potential difference across its ends is one volt.

(b) Given,

$$\text{Current (I)} = 200 \text{ mA} = 200 \times 10^{-3} \text{ A} \\ = 0.2 \text{ A}$$

$$\text{Potential Difference (V)} = 0.8 \text{ V}$$

By Ohm's law, $V = IR$

$$\Rightarrow R = \frac{V}{I}$$

$$\Rightarrow R = \frac{0.8}{0.2} = \frac{8}{2} = 4 \Omega$$

82. (a) State Ohm's law. Write the mathematical expression.

(b) When a 12 V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.

Answer:

(a) Ohm's law: "The potential difference, V , across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same".

The mathematical expression is

$V = IR$, where V is the potential difference, I is the current and R is the resistance of the conductor.

(b) Given,

$$\text{Potential difference (V)} = 12 \text{ V}$$

$$\text{Current (I)} = 2.5 \text{ mA} = 2.5 \times 10^{-3} \text{ A}$$

Resistance (R) = ?

$$\text{Using, } V = IR$$

$$R = \frac{V}{I}$$

$$R = \frac{12}{2.5 \times 10^{-3}}$$

$$R = 4800 \text{ ohm}$$

83. Why is Tungsten used almost exclusively for filament of electric lamps?

Answer:

Tungsten is used for making filament of electric bulbs due to the following reasons:

i) It has a high melting point.

ii) It has high resistivity

iii) It does not oxidize easily even at high temperatures.

84. Name the rule to determine the direction of a (i) magnetic field produced around a straight conductor carrying current

(ii) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it and also state the rule.

Answer:

(i) Right- Hand Thumb Rule

(ii) Fleming's Left- Hand Rule

Fleming's Left- Hand Rule states that: Stretch the forefinger, central finger and the thumb of your hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the central finger indicates the direction of current, then the thumb gives the direction of the force acting on the conductor.

85. What is the purpose of the soft iron core used in making an electromagnet? Give one use.

Answer:

The purpose of soft iron core used in making an electromagnet is that

(i) It loses all its magnetic property, i.e., magnetism immediately when the current in the solenoid is switched off

(ii) It increases the magnetic field strength of an electromagnet.

Use: It is used to magnetise steel bars.

86. What is the role of magnetism in medicine?

Answer:

In our body, small electric current travels along the nerve cells due to ions. This current produces a very weak magnetic field (about one billionth time weaker than the earth's magnetic field). Heart and brain are two main organs where the magnetic field produced is significant. The magnetic field in our body enables us to obtain the images of different body parts. This is done using a technique called Magnetic Resonance Imaging (MRI). Analysis of these images helps in medical diagnosis. Thus, magnetism has got important uses in medicine.

87. What is earthing? Why is earthing of electrical appliances necessary?

Answer:

When the body of an electrical device is connected to the earth (zero potential) by a wire, it is called earthing.

The metallic body of appliances is connected to the earth wire, which provides a low resistance conducting path for the current. Thus, it ensures that any leakage of current to the metallic body keeps its potential to that of the earth and the user may not get a severe electric shock.

88. (a) Of what substance is a fuse wire made of and why is it made?
(b) What is the capacity of an electric fuse used in lighting circuits and power circuits?

Answer:

(a) It is made of lead (75%) and tin (25%) alloy. It is made of tin-lead alloy because it has a low melting point.

(b) Lighting circuit- 5 A.

Power circuit- 15 A.

89. What is meant by solenoid? How does a current carrying solenoid behave?

Answer:

A coil of many circular turns of insulated copper wire wound on a cylindrical insulating body, such that its length is greater than its diameter is called solenoid.

When current is flowing through the solenoid, the magnetic field lines pattern resembles exactly those of a bar magnet with the fixed polarity North and South pole at its ends and it acquires the directive and attractive properties similar to bar magnet. Hence, the current carrying solenoid behaves like a bar magnet.

90. During an experiment with a concave mirror, a student finds a position where no distinct image can be obtained on a screen held in front of the mirror, but an enlarged image can be seen by looking directly inside the mirror. Identify the object's position and explain why it behaves this way.

Answer:

The object is placed between the pole ('P') and the principal focus ('F') of the concave mirror. When an object is placed between 'P' and 'F', the reflected rays diverge and never meet in front of the mirror, meaning a real image cannot be cast on a screen. Instead, the rays appear to diverge from a point behind the mirror, creating a virtual, erect, and enlarged image that can only be seen by looking into the mirror itself.

91. An astronaut standing on the surface of the Moon looks up at the sky during daytime. Explain what colour the sky will appear to them and why, contrasting this with an observer on Earth.

Answer:

The sky will appear pitch black to the astronaut on the Moon, even during the daytime.

The blue colour of Earth's sky is due to atmospheric refraction and the scattering of sunlight by gas molecules and fine particles in the atmosphere. Since the Moon has no atmosphere, there are no particles to scatter light. Without the scattering of shorter wavelengths (blue light), the sky appears dark, similar to what high-altitude passengers or astronauts experience.

92. How do ciliary muscles dynamically alter the focal length of the eye lens when you switch from looking at a distant bird in the sky to reading a text message on your mobile phone?

Answer:

When viewing distant objects, the ciliary muscles are relaxed. This causes the eye lens to become thin, which increases its focal length and allows parallel light rays from afar to focus precisely on the retina.

When shifting to a nearby object, the ciliary muscles contract. This action increases the curvature of the eye lens, making it thicker. Consequently, the focal length decreases, allowing the highly diverging rays from the nearby

phone to successfully focus on the retina.

93. A student connects too many high-power electrical appliances to a single extension socket in a domestic circuit. Explain the physical phenomenon that will occur in the circuit, its immediate hazard, and how a safety device prevents damage.

Answer:

Connecting too many appliances to a single socket causes overloading. The total current drawn from the mains drastically increases as appliances in a domestic circuit are connected in parallel.

The exceptionally high current causes excessive heating in the copper connecting wires, which can melt their insulation covers and potentially trigger a fire.

An electric fuse connected in series will safeguard the circuit. The excessive current heats the fuse wire beyond its melting point, causing it to melt and break the circuit, instantly stopping the flow of dangerous current.

94. A student notes that the absolute refractive index of kerosene is 1.44 and that of water is 1.33. Yet, when kerosene is poured into water, it floats on top. How can you explain this discrepancy between optical density and mass density?

Answer:

Optical density and mass density are two distinct concepts and do not necessarily depend on each other. Kerosene floats on water because its mass density is less than that of water.

However, a medium with a larger refractive index is considered an optically denser medium. Since the refractive index of kerosene (1.44) is higher than that of water (1.33), kerosene is optically denser than water despite being lighter in terms of mass density.

95. Explain why the physical duration of daylight on Earth is roughly 4

minutes longer than it would be if Earth had no atmosphere.

Answer:

Due to atmospheric refraction, starlight and sunlight bend towards the normal as they pass through layers of gradually increasing refractive index. This allows the Sun to be visible to us about 2 minutes before it actually crosses the horizon (advanced sunrise) and keeps it visible for about 2 minutes after it has physically set below the horizon (delayed sunset). Adding these two segments yields an extra 4 minutes of daylight.

SECTION D
LONG ANSWER TYPE QUESTIONS
(4 marks)
[CHEMISTRY]

- 1 (i) List four observations that help us to determine whether a chemical reaction has taken place.
(ii) State one basic difference between a physical change and a chemical change.

Answer:

- (i) Four observations are:
(a) Evolution of gas.
(b) Change in temperature.
(c) Change in state.
(d) Change in colour.
(ii) In physical change, no new substance is formed, whereas in a chemical change, new substance(s) is/are formed.
- 2 (i) What is the role of an oxidising agent in a reaction?
(ii) Why is a combustion reaction an oxidation reaction?
(iii) Why are food particles preferably packed in aluminium foil?

Answer:

- (i) The role of oxidising agent in a reaction is that it supplies the oxygen or removes the hydrogen in the reaction.
(ii) A combustion reaction is also an oxidation reaction because oxygen is added to the substance during burning.
(iii) Food particles are preferably packed in aluminium foil because it does not corrode in the atmosphere. A protective coating of aluminium oxide is formed on the surface of the foil and it stops any further reaction of the metal with air and water so even if it is kept for a long-time food particles do not get spoiled.
3. (i) Why do silver articles turn black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.
(ii) Name the black substance Formed and write its chemical formula.

Answer:

- (i) Metals such as silver are attacked by air, moisture, acids, gases etc. present in air and form undesirable compounds on

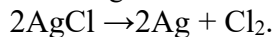
their surfaces. Silver tarnishes and gets black coating. This process is called corrosion.

(ii) The black substance is formed because silver reacts with H_2S present in air to form silver sulphide (Ag_2S). Toothpaste generally contains traces of hydrogen peroxide as one of the constituents. It reacts with black Ag_2S formed on the surface and restores whiteness.

4. (i) Why do we store silver chloride in dark coloured bottles? Explain in brief.
(ii) Write the balanced chemical equation for the following reaction and write the name of the reaction
 $\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow \text{BaSO}_4 + \text{AlCl}_3$

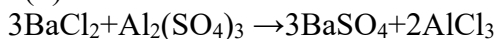
Answer:

(i) Silver chloride on exposure to sunlight may decompose as per the following reaction:



Therefore, it is stored in dark-coloured bottles.

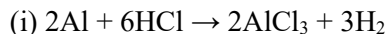
(ii)



It is a double displacement reaction.

5. Aluminium reacts with hydrochloric acid to form aluminium chloride and hydrogen gas
(i) Write the balanced chemical equation for the reaction
(ii) Identify the type of reaction
(iii) Explain why this reaction is also a redox reaction
(iv) What happens if dilute hydrochloric acid is replaced with concentrated acid

Answer:



(ii) Type of reaction: single displacement reaction, also a redox reaction

(iii) Aluminium loses electrons

(oxidation) $\text{Al} \rightarrow \text{Al}^{3+}$. Hydrogen ions gain electrons (reduction)

$\text{H}^+ \rightarrow \text{H}_2$. So, oxidation and reduction happen together.

(iv) the reaction becomes vigorous.

More hydrogen gas is released quickly. It may also produce more heat (exothermic reaction)

6. Give reasons why:

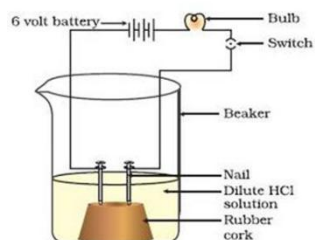
- (i) Tap water conducts electricity whereas distilled water does not.
- (ii) Dry hydrogen chloride gas does not turn blue litmus red whereas dilute hydrochloric acid does.
- (iii) During summer season a milkman usually adds a very small amount of baking soda to fresh milk.
- (iv) Ammonia is a base but does not contain hydroxyl groups.

Answer:

- (i) Tap water contains ions which conduct electricity whereas distilled water does not contain ions.
 - (ii) Dry HCl does not form ions but HCl in aqueous solution ionizes to form H^+ and Cl^- .
 - (iii) Baking soda is basic. It neutralizes lactic acid formed in milk, so milk does not turn sour quickly.
 - (iv) Ammonia dissolves in water to form OH^- . Therefore, it is basic.
7. (i) Which element is common to all acids?
- (ii) Compounds such as alcohol and glucose also contain hydrogen but are not categorised as acids. Describe an activity to prove it.

Answer:

- (i) Hydrogen is the common element present in all acids
- (ii) Experiment – Two nails are fitted on a cork and are kept in a 100 ml beaker. The nails are then connected to the two terminals of a 6-volt battery through a bulb and a switch. Now pour some dilute HCl in the beaker and the current is switched on. The same experiment is then performed with glucose solution and alcohol solution.



Observations: It will be observed that the bulb glows in the HCl solution and does not glow in the glucose solution and alcohol solution.

Result: HCl dissociates into H^+ and

Cl^- ions. These ions conduct electricity in the solution resulting in the glowing of the bulb. On the other hand, the glucose and alcohol solution does not dissociate into ions. Therefore, it does not conduct electricity.

Conclusion: From this activity, it can be concluded that all acids contain hydrogen but not all compounds containing hydrogen are acids. That is why, although alcohols and glucose contain hydrogen, they are not categorised as acids

8. Three substances are tested solid NaCl, molten NaCl and aqueous NaCl
- (i) Which of these will conduct electricity and why?
 - (ii) Why does solid NaCl not conduct electricity?
 - (iii) Compare molten and aqueous states in terms of ion movement.
 - (iv) What general conclusion can you draw about conduction in compounds?

Answer:

- (i) Molten and aqueous NaCl conduct electricity
 - (ii) In solid state ions are fixed in lattice (fixed regular arrangement of particles ions or atoms in a solid) showing no movement
 - (iii) Molten ions move freely in liquid. Aqueous ions are dissociated and mobile in solution
 - (iv) Electrical conduction requires free ions, not just presence of ions.
9. Explain the term “amphoteric oxides” and provide examples. Write the balanced chemical equation for the reaction of aluminium oxide with sodium hydroxide and hydrochloric acid.

Answer:

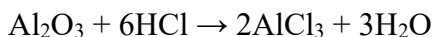
Amphoteric oxides are oxides that can exhibit both acidic and basic properties. They can react with both acids and bases to form salts and water.

Examples of Amphoteric Oxides: Aluminium oxide (Al_2O_3) and zinc oxide (ZnO).

Reaction with Acid: Amphoteric oxides react with acids to form salts

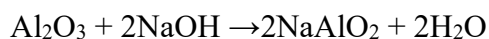
and water. For example, aluminium oxide reacts with hydrochloric acid to produce aluminum chloride and water.

Balanced Chemical Equation for Reaction with Acid:



Reaction with Base: Amphoteric oxides also react with bases to form salts and water. For instance, aluminium oxide reacts with sodium hydroxide to produce sodium aluminate and water.

Balanced Chemical Equation for Reaction with Base:

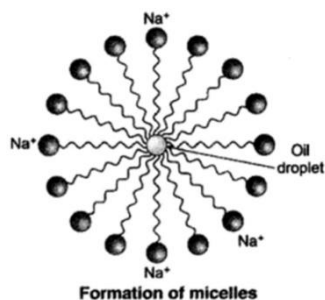


10. (a) Explain the mechanism of the cleansing action of soap.
(b) Why are detergents better cleansing agents than soaps?

Answer:

- (a) A soap molecule has two parts:
(i) Ionic part (hydrophilic)
(ii) Long hydrocarbon chain part (hydrophobic)

Most dirt is oily in nature and oil does not dissolve in water. The ionic end of soap interacts with water while the carbon chain interacts with oil. The soap molecules thus form structures called micelles where one end of the molecule is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelle thus helps in pulling out the dirt in water and we can wash our clothes clean.



- (b) Detergents can be used in hard water for washing as they do not form insoluble precipitates with calcium and magnesium ions present in hard water. Soaps form scums that stick to the fabric and makes cleaning difficult and a lot of soap is wasted. Hence, soaps are not

effective cleansing agents in hard water.

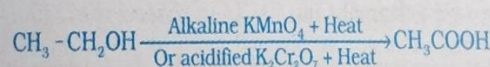
11. (a) What is saponification? Write the reaction involved in this process.
(b) Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

Answer:

- (a) Alkaline hydrolysis of an ester to give the salt of the corresponding acid and the alcohol is called saponification. It is the reverse of esterification reaction.



- (b) The reaction showing the conversion of ethanol to ethanoic acid is shown below:



A molecule of ethanol contains one oxygen atom while that of ethanoic acid contains two oxygen atoms. Since oxidation involves addition of oxygen there for conversion of ethanol to ethanoic acid is an oxidation reaction.

12. Catenation is the ability of an atom to form bonds with other atoms of the same element. Both Carbon and silicon exhibit it. Compare the ability of catenation of the two elements. Give reasons.

Answer:

Catenation is the ability of an atom to bond with other atoms of the same element. Both carbon and silicon demonstrate this property, but there are key differences in their abilities:

Reactivity: Silicon compounds tend to be more reactive compared to those of carbon.

Stability: Carbon forms very strong bonds, making its organic compounds more stable than silicon compounds.

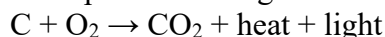
Catenation Strength: Overall, carbon exhibits better catenation due to its ability to form stable, long chains. In summary, while both elements can catenate, carbon's stronger bonds lead to greater stability in its compounds.

13. Under what conditions an oxidation reaction can be called a combustion reaction? Illustrate your answer with examples.

Answer:

When complete oxidation of fuel takes place with the release of a high amount of heat and light, it is called a combustion reaction. It is highly exothermic and generally accompanied by evolution of heat and light.

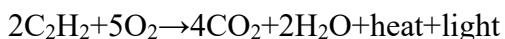
Examples – Burning of coal



Burning of the rocket fuel (liquid H_2)



Burning of acetylene used in welding torches.



14. (a) You have three unlabelled test tubes containing ethanol, ethanoic acid and soap solution. Explain the method you would use to identify the compounds in different test tubes by chemical tests using litmus paper and sodium metal.

(b) Give the reason for the formation of scum when soaps are used with hard water.

Answer:

(a) Ethanol will not be affected by blue litmus as well as red litmus paper.

Ethanoic acid will turn blue litmus red whereas red litmus will remain as it is.

Soap solution will turn red litmus blue but blue litmus will remain as it is.

Sodium metal will liberate hydrogen gas with ethanol as well as ethanoic acid.

Soap solution will not react with sodium metal.

(b) It is because soap will react with Ca^{2+} and Mg^{2+} ions present in hard water to form calcium salts of fatty acids which are insoluble and called scum.

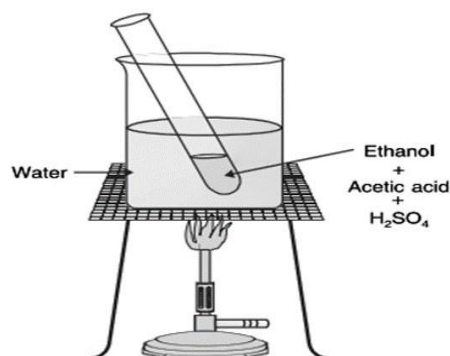
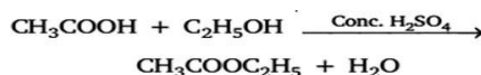
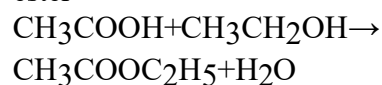
15. Esters are sweet smelling substances and are used in the making of perfumes. Suggest some activity and the reaction

involved for the preparation of an ester with neat labelled diagram?

Answer:

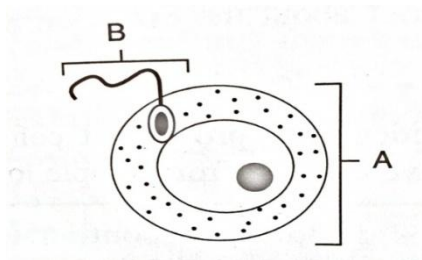
The following activity can be used for the preparation of Ester:

Let us take 10ml absolute ethanol(100%) and 10ml absolute glacial acetic acid (100%) along with few drops of sulphuric acid in a test tube. The mixture is to be warmed in a water-bath for five minutes. The mixture is poured into a beaker containing 20-50ml of water and smelling the resulting mixture. A fruity smell will be detected due to the formation of an ester



[BIOLOGY]

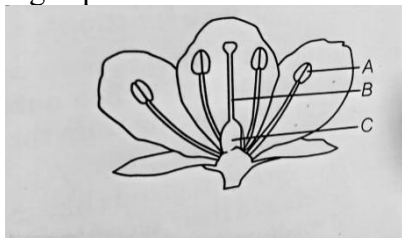
20. The diagram below represents two reproductive cells A and B. Study the same and then answer the questions that follow:



- Identify the reproductive cells A and B.
- Name the specific part of the reproductive system where the above cells are produced.
- Where in the female reproductive system do these cells unite?
- Name the main hormones by a male reproductive organ and a female reproductive organ.

Answer:

- A is Egg or Ovum and B is sperm.
 - Ovary produces egg and Testis produces sperm.
 - In the fallopian tube.
 - Testis produces testosterone hormone and ovary produces oestrogen hormone.
21. i) Name the parts A, B and C shown in the following diagram and state one function of each.
ii) What is the role of petals in an angiospermic flower?



Answer:

- A is anther. Its function is to produce pollen grains which contain the male gametes.
B is style. It connects the stigma and the ovary.
C is ovary. It contains ovules which develop into seeds while ovary forms the fruit.
 - The primary function of the petals is to attract pollinators such as bees, butterflies, birds and bats to facilitate plant reproduction.
22. A trait may be inherited, but may not be expressed. Justify the statement with the help of a suitable example.

Answer:

Let us take the following example to justify the above statement. Mendel crossed tall pea plants with dwarf pea plants.

Pure Tall plant(TT) × pure dwarf plant(tt) → TtTtTtTt (F1 – generation)

Selfing of F1, Tt × Tt → TTTtTttt (F2 – generation).

Mendel observed that F1 generation contained all tall plants with genotype Tt where 'T' represents a dominant trait and 't' represents a recessive trait.

When F1 generation underwent selfing, the trait that was unexpressed (dwarf) in F1 generation was observed in some F2 progeny. Thus, both traits, tall and dwarf were expressed in F2 generation in the phenotypic ratio of 3:1.

23. State the function of renal artery, kidney, ureter and urinary bladder

Answer:

Renal artery – Afferent arterioles of renal artery supplies blood containing body waste to glomerulus for filtration.

Kidney – produces urine

Ureter – passes the urine from kidney to urinary bladder

Urinary bladder — stores the urine until the pressure of the expanded bladder leads to the urge to pass it out through the urethra

24. (a) Name two excretory products other than oxygen and carbon dioxide in plants
(b) Why do the walls of a trachea not collapse when there is less air in it?
(c) How are the lungs designed in human beings to maximise the area for exchange of gases?

Answer:

(a) Resins, Gums.

(b) The walls of trachea do not collapse when there is less air in it as it is supported by rings of soft bones of cartilage.

(c) In the lungs, the air passage divides into smaller tubes called bronchi which forms bronchioles.

The bronchioles terminate in balloons like structures called alveoli. The alveoli present in the lungs provides maximum surface for exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.

25. What different strategies plants use for excretion?

Answer:

- i) Oxygen is eliminated mainly through stomata during the day by diffusion
- ii) They get rid of excess water by transpiration
- iii) Water products may be stored in leaves that fall off
- iv) Some waste products are stored as raisins and gums especially in old xylem
- v) Plants also excrete some waste substances into the soil around them

26. (a) How is the process of transpiration useful to plants
(b) Which mechanism plays an important role in transportation of water in plants
(i) during day time
(ii) at night

Answer:

- (a) Transpiration, the process of water evaporation from plants, is useful to plants
i) because it helps in the absorption and upward movement of water and dissolved minerals from roots to leaves, cools the plant, and provides turgidity to soft plant parts.
ii) It also aids in the distribution of water and nutrients throughout the plant and helps in regulating temperature of leaves.
(b) (i) During daytime, suction pressure created by transpiration (evaporation of water) helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves up to the top of the plant.
ii) At night, the effect of root pressure (created by the movement of water from the soil to the xylem of roots) in transport of water plays a more

significant role.

27. Why are budding, fragmentation and regeneration considered as asexual type of reproduction? With neat diagram explain the process of regeneration in Planaria.

Answer:

Reproduction by which off spring arise from a single celled organism, and inherit the genes of that parent only, and does not involve fusion of gametes is known as a sexual reproduction.

Budding, fragmentation and regeneration are considered as asexual types of reproduction because all of them involve only single parent unlike sexual reproduction and no formation of gametes.

Regeneration in Planaria:



Here the body of Planaria cut into pieces and each piece has the ability to grow into new organism. In the figure above Planaria body is cut into three pieces which regenerates into three individual cells. The cells proliferate (multiplying or increasing in number) and make large number of cells. The mass of cells formed, different cells undergo changes to become various cell types and tissues. These changes take place in an organised sequence referred to as development

28. In the following crosses write the characteristics of the progeny:

Cross		Progeny
i) RRYy	X RRYy	?
Round yellow Round yellow		
(ii) RrYy	X RrYy	?
Round yellow Round yellow		
(iii) rryy	X rryy	?
Wrinkled green wrinkled green		
(iv) RRYy	X rryy	?
Round yellow wrinkled green		

Answer:

- (i) Round yellow
 - (ii) Round yellow, round green, wrinkled yellow, wrinkled green
 - (iii) Wrinkled green.
 - (iv) Round yellow.
29. What are decomposers? What will be the consequence of their absence in an ecosystem?

Answer:

Decomposers are micro-organisms such as bacteria and fungi that obtain nutrients by breaking down the remains of dead plants and animals.

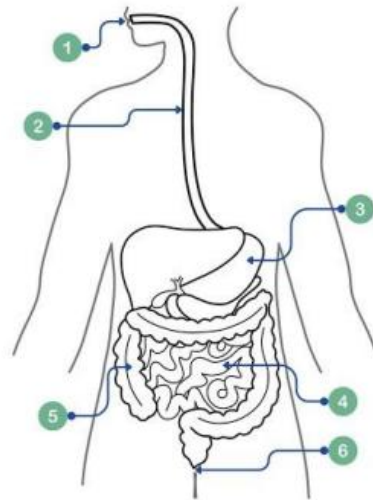
In the absence of decomposers recycling of materials will not take place which would lead to the accumulation of dead plants and animals in the environment. Additionally, the environment would be finally sapped of all its resources which are needed to maintain and sustain life.

30. Write one important function for each of the following in the human respiratory system:
- i) Rings of cartilage
 - ii) Alveoli
 - iii) Haemoglobin
 - iv) lining of mucus.

Answer:

- i) The rings of cartilage ensure that the trachea does not collapse.
- ii) Alveoli or the air sacs increase the surface area for exchange of gases in the lungs.
- iii) Haemoglobin is the respiratory pigment present in the red blood cells which take up oxygen from the air in the lungs and carries it to all the other cells in the body.
- iv) Mucus along with the fine hair are present in the nostrils which help to clean the air that enters the lungs.

31. a) Label the parts in the diagram given below

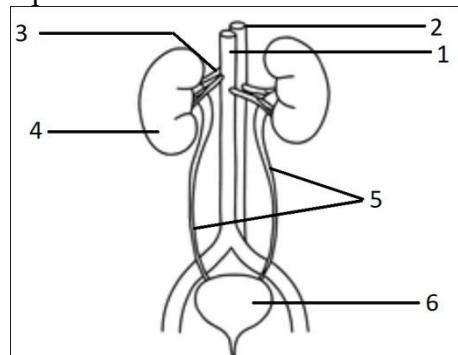


- b) Name the substance that is secreted from the liver and give its function.

Answer:

- a) 1 - mouth, 2- oesophagus, 3-stomach, 4-small intestine, 5- large intestine, 6-anus.
- b) The substance that is secreted from the liver is bile juice and the function is emulsification of fat and making the medium alkaline.

32. (a) In the given diagram name the parts from 1 to 6.



- (b) Name the two major components of normal human urine

Answer:

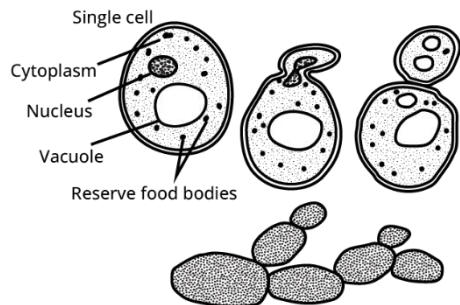
- a) 1- vena cava, 2- aorta, 3- renal vein, 4- kidney, 5- ureters, 6- urinary bladder.
- b) The two major components of normal human urine are water and nitrogenous wastes.

33. Describe budding in yeast, a fungus.

Answer:

Organisms such as yeast use asexual reproduction processes known as budding to reproduce new cells. In this process a bud develops as an outgrowth on the parent organism

due to single cell division. The bud gradually grows in size and gets detached from the parent when fully matured and develops into an adult organism, similar to the parent.



34. A blue-coloured flower plant denoted by BB is cross bred with that of white coloured flower plant denoted by bb.

(i) State the colour of flower you would expect in their F_1 generation plants.

(ii) What must be the percentage of white flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?

(iii) What must be the percentage of blue flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?

(iv) State the expected ratio of the genotypes BB and Bb in the F_2 generation.

Answer:

(i) The colour of all the flowers in the F_1 generation will be blue.

(ii) The percentage of white flower plants in F_2 generation will be 25

(iii) The percentage of blue flower plants in F_2 generation will be 75.

(iv) The ratio of genotypes BB and Bb in F_2 progeny will be 1:2.

35. (A) In a class of 40 students, a survey was conducted to find out the eating habits of the students.

It was found that 27 students are vegetarians and 13 are non-vegetarians. In terms of energy, which students are at an advantageous position (vegetarian or non-vegetarian)?

(B) Categorise the following organisms into producers, herbivores, carnivores and

decomposers. Create a three-step food chain from the given organisms. Tree, vulture, grasshopper, bacteria, rabbit, lion, eagle, deer, frog, grass, fungi.

(C) What is the significance of a food chain?

Answer:

A) Vegetarians are generally at a more advantageous position in terms of energy efficiency because they consume food directly from plants, which are primary producers in the food chain. Plants convert solar energy into food, storing the highest amount of energy.

Herbivores (and humans eating plants) consume this energy directly. When humans eat animals (who ate plants), they only receive about 10% of the energy stored by the animal, as most is lost as heat between trophic levels.

B) Producers: Tree, grass

Herbivores: Grasshopper, rabbit, deer

Carnivores: Vulture, lion, eagle, frog

Decomposers: Bacteria, fungi

A three step food chain can be:

Grass → Grasshopper → Frog

or,

Grass → Deer → Lion

C) Food chains are the pathways through which energy and nutrients flow through an ecosystem. They dictate the transfer of sunlight-derived energy from producers (plants) to various levels of consumers, and ultimately to decomposers.

LONG ANSWER TYPE QUESTIONS

(4 marks)

[PHYSICS]

36. Name the type of mirror used in the following situations:
- Headlights of a car
 - Rear view Mirror of a vehicle.
 - Solar furnace.
 - Makeup mirror.
- Support your answer with suitable reason.

Answer:

- (a) For headlights of a car, we use a concave mirror. The light source is held at the focus of the mirror. On reflection, a strong parallel beam of light emerges.
- (b) A convex mirror is used as a rear-view mirror, because its field of view is larger, and it forms virtual, erect and diminished images of objects behind.
- (c) For a solar furnace, we use a concave mirror. Light from the sun, on reflection from the mirror, is concentrated at the focus of the mirror, producing heat.
- (d) A concave mirror is used as a make-up mirror, as it can form an erect and magnified image of the face.
37. (a) What is lateral inversion?
(b) State four characteristics of an image formed by a plane mirror.
(c) Which of the two mirrors is converging: concave or convex?

Answer:

- (a) The left side of the object appears as the right side of the image and vice versa in a plane mirror. This phenomenon is called lateral inversion.
- (b) The characteristics are:
- The image formed by a plane mirror is always virtual and erect.
 - The size of the image is equal to that of the object.
 - The image formed is as far behind the mirror as the object is in front of it.
 - The image is laterally inverted.
- (c) A concave mirror is a converging

mirror.

38. Rishi went to a palmist to show his palm. The palmist used a special lens for this purpose.
- State the nature of the lens and reason for its use.
 - If the focal length of this lens is 10 cm and the lens is held at a distance of 5 cm from the palm, use lens formula to find the position and size of the image.

Answer:

(i) A palmist uses convex lens to see the magnified image of palm lines.

(ii) Given,

Focal length, $f = 10$ cm

object distance $u = -5$ cm

From lens formula,

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} = \frac{1}{10} + \frac{1}{-5}$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$

$$v = -10 \text{ cm}$$

Hence, the magnification

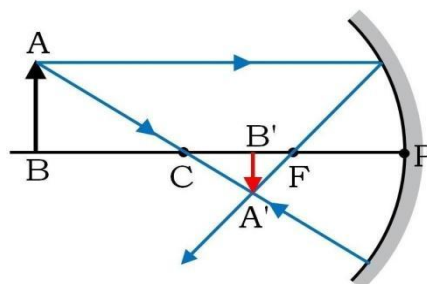
$$m = \frac{v}{u} = -\frac{10}{-5} = 2$$

Hence, the image is on the same side of the lens as the object (palm) and it is virtual, erect and magnified.

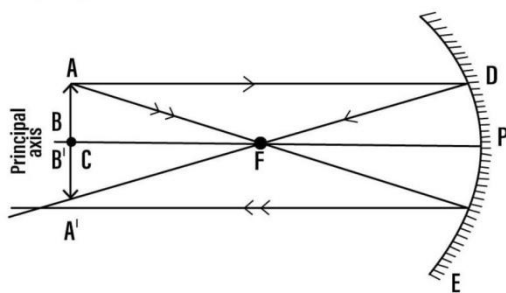
39. Draw a ray diagram to show the formation of image when the object is placed (i) beyond the centre of curvature and (ii) at the centre of curvature of a concave mirror.

Answer:

(i) Position of Object: Beyond C



(ii) Position of Object: At C



40. (a) What is meant by the power of accommodation of an eye?
 (b) A person needs a lens of power -5.5 diopters for correcting his distant vision. For correcting his near vision, he needs a lens of power $+1.5$ diopter. What is the focal length of the lens and the nature of the lens required for correcting (i) distant vision and (ii) near vision?

Answer:

(a) Power of accommodation: The ability of the eye lens to change its focal length to see objects at different distances.

(b) (i) Distant vision (Myopia) requires a concave lens.

$$f = \frac{1}{P}$$

$$f = \frac{1}{-5.5}$$

$$f = -0.1818 \text{ m} = -18.18 \text{ cm}$$

(ii) Near vision (Hypermetropia) \ requires a convex lens.

$$f = \frac{1}{P}$$

$$f = \frac{1}{+1.5}$$

$$f = +0.6667 \text{ m} = +66.67 \text{ cm}$$

41. A person suffering from cataract has blurred vision.
 a) What happens inside the eye in this condition?
 b) How does it affect vision?
 c) How is this defect corrected?
 d) Name the part of the eye involved.

Answer:

- a) The eye lens becomes cloudy or opaque.
 b) Light cannot pass clearly causing blurred vision.
 c) Surgery to remove the cloudy lens and replace it with an artificial lens.
 d) Eye lens.

42. During a science experiment, a student passes sunlight through a prism and then recombines the

colours using another prism.

- a) What does this experiment prove about sunlight?
 b) Name the scientist who performed this experiment.
 c) What is recombination of light?
 d) Write one everyday application of this phenomenon.

Answer:

- a) Sunlight is made up of seven colours.
 b) Isaac Newton.
 c) The separated colours combine again, to form white light.
 d) Rainbow formation or spectroscopy

43. State the function of the following parts of the eye:

- (i) Crystalline lens (ii) Retina (iii) Ciliary muscles (iv) pupil.

Answer:

(i) Crystalline lens- Its function is to focus the images of the objects at different distances clearly on the retina.

(ii) Retina- Its function is to receive the optical image of an object and then convert it into electrical pulses which are finally sent to the brain through the optic nerve.

(iii) Ciliary muscles- Its function is to alter the focal length of the crystalline lens, so that the image of the objects at various distances is clearly focussed on the retina.

(iv) Pupil - The pupil regulates and controls the amount of light entering the eye.

44. Explain the following:

(a) Why are the conductors of electric heating devices such as bread toasters and electric irons made of an alloy rather than a pure metal?

(b) How does the resistance of a wire vary with its cross-sectional area?

(c) Why are copper and aluminium wires usually employed for electricity transmission?

(d) What determines the rate at which energy is delivered by a current?

Answer:

- (a) Conductors of electric heating devices are made of alloys because alloys do not oxidise (burn) readily at high temperature. Also, alloys have a greater resistivity as compared to their constituent pure metals.
- (b) The resistance of a wire varies inversely as its cross-sectional area ($R \propto \frac{1}{A}$).
- (c) Copper and aluminium wires possess low resistivity and hence are generally used for electricity transmission.
- (d) Electric power determines the rate at which energy is delivered by a current.
45. Two conducting wires of the same material and of equal lengths and equal diameters are first connected in series and then in parallel in an electric circuit. What will be the ratio of the heat produced in series and parallel combination?

Answer:

Since both the wires are made of the same materials and have equal lengths and equal diameters, these have the same resistance. Let the resistance be R .

When connected in series, their equivalent resistance is

$$R_s = R + R = 2R$$

When connected in parallel, their equivalent resistance is

$$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R} = \frac{2}{R}$$

$$\Rightarrow R_p = \frac{R}{2}$$

According to Joules Law of heating,

$$H = I^2 R t$$

Heat produced in series,

$$H_s = I^2 R_s t$$

$$= I^2 \times 2R \times t$$

Heat produced in parallel, $H_p = I^2 R_p t$

$$= I^2 \times \frac{R}{2} \times t$$

Hence the required ratio is

$$\frac{H_s}{H_p} = \frac{I^2 \times 2R \times t}{I^2 \times \frac{R}{2} \times t}$$

$$\frac{H_s}{H_p} = \frac{I^2 \times 2R \times t \times 2}{I^2 \times R \times t} = \frac{4}{1}$$

$$\Rightarrow H_s : H_p = 4 : 1$$

46. (a) What is heating effect of electric current?
- (b) Name any two devices that work on the heating effect of electric current.
- (c) An electric iron of resistance 20 ohm, takes a current of 5A. Calculate the heat developed in 30s.

Answer:

- (a) When an electric current is passed through a conductor heat is produced in it. This is known as the heating effect of electric current.
- (b) The devices are electric toaster, electric oven, electric kettle, electric heater, electric iron etc. (Any two).
- (c) Given,

$$\text{Resistance (R)} = 20 \text{ ohm}$$

$$\text{Current (I)} = 5 \text{ A}$$

$$\text{Time (t)} = 30 \text{ s}$$

We know,

Heat developed,

$$H = I^2 R t$$

$$= (5)^2 \times 20 \times 30$$

$$= 25 \times 20 \times 30 = 15000 \text{ J}$$

Therefore, heat developed in 30 s is 15000J.

47. (a) What is the commercial unit of electrical energy? Represent it in terms of Joules.
- (b) Which uses more energy: a 250 W TV set in 1 hour or a 1200 W toaster in 10 minutes?

Answer:

- (a) The commercial unit of electrical energy is kilowatt-hour (kWh).

$$1 \text{ kWh} = 1000 \text{ W} \times 60 \text{ s} \times 60 \text{ s}$$

$$= 3.6 \times 10^6 \text{ J}$$

- (b) Given,

For TV set,

$$P_1 = 250 \text{ W}, \quad t_1 = 1 \text{ h} = 3600 \text{ s}$$

For toaster

$$P_2 = 1200 \text{ W}, \quad t_2 = 10 \text{ min} = 600 \text{ s}$$

Therefore,

$$\text{Energy } E_1 = P_1 \times t_1 = 250 \times 3600$$

$$= 900000 \text{ J}$$

$$\text{Energy } E_2 = P_2 \times t_2 = 1200 \times 600$$

$$= 720000 \text{ J}$$

Thus, TV set uses more energy.

48. What are magnetic field lines? Justify the following statements

- (a) Two magnetic field lines never intersect each other.
- (b) Magnetic field lines are closed curves.

Answer:

Magnetic field line is defined as the path along which the unit North pole (imaginary) tends to move in a magnetic field if free to do so.

(a) The magnetic lines of force do not intersect one another. If they do so then at the point of intersection, two tangents can be drawn at that point indicating there will be two different directions of the same magnetic field, i.e., the compass needle points in two different directions which is not possible.

(b) Magnetic field lines are closed curves. They emerge from the north pole of a bar magnet and go into its south pole. Inside the magnet they move from South Pole to North Pole.

49. (a) What is an electric fuse? How is it connected in a circuit?
 (b) What is the direction of the magnetic field at the centre of a circular coil carrying current in
 (i) anticlockwise direction and
 (ii) clockwise direction?

Answer:

(a) Electric fuse is a safety device that protects our electrical appliances in case of short circuit or overloading. It is made up of pure tin or alloy of copper and tin. It is always connected in series with live wire.

(b) Applying right hand thumb rule

(i) The magnetic field is along the axis of the coil and is acting upward.

(ii) The magnetic field is along the axis of the coil and is acting downward.

50. (a) What is overloading of an electric circuit?
 (b) State two conditions that can lead to overloading of a circuit.
 (c) How can it be prevented?

Answer:

(a) Overloading of an electrical circuit occurs when the current flowing through the circuit exceeds

the maximum capacity that the components in the circuit can handle. This excess current leads to increased heat production due to the resistance in the components, which can potentially damage them.

(b) The conditions are:

- i) Connecting multiple appliances to a single socket
- ii) Direct contact between live and neutral wire.

(c) Preventive Measures:

i) Too many electrical appliances should not be operated on a single socket.

ii) Too many high power rating electrical appliances should not be switched on at the same time.

51. (a) When does an electric short circuit occur?
 (b) An electric oven of 2 kW power rating is operated in a domestic electric circuit (220V) that has a current rating of 5A. What result do you expect? Explain.

Answer:

(a) If the insulation of the live and neutral wire gets damaged, then the two wires touch each other. This touching of the live wire and neutral wire is known as short circuit. In this situation, the resistance of a circuit decreases to a very small value. Due to this, current flowing through the wires becomes very large and heats the wires to a very high temperature, and a fire may be started.

(b) Given,

Power, $P = 2 \text{ kW} = 2000 \text{ W}$

Voltage, $V = 220 \text{ V}$

Current, $I = ?$

We know, $P = V \times I$

$$I = \frac{P}{V} = \frac{2000}{220} = 9\text{A (approx)}$$

The current drawn by this electric oven is 9A, whereas the fuse in the circuit is only 5A capacity. When a high current of 9A flows through this fuse, the fuse wire will get heated too much and will blow off cutting off the power supply in this circuit.

Sample Question Paper
(SSLC Examination 2026-27)

SCIENCE
(NCERT Textbook)

By
Meghalaya Board of School Education (MBOSE)

A. The Scheme of Examination

	Maximum Marks	Pass Marks
Theory Examination	80	24
Internal Assessment	20	6
Total	100	30

B. Scheme of Theory Examination

Section	Type of Questions	Marks for Each Question	No. of questions to be attempted/ No. of questions given	Total Marks
Section-A	Multiple choice Questions (MCQs)	1	30/30	1x30=30
Section-B	Very Short Answer Questions	2	10/14	2x10=20
Section-C	Short Answer Questions	3	6/9	3x6=18
Section-D	Long Answer Questions	4	3/5	4x3=12
80				

C. Scheme of Internal Assessment

Marks for internal assessment can be internally assessed through anyone of the following:

1. Project Work
2. Written Tests
3. Assignments (Class or Home Work)

While assessing, the weightage to different chapters may be given as provided in "D. Content Weightage in Theory Examination".

Different types of Projects Works

- Class/Interclass discussion and debates.
- Preparations of a reports, charts, posters and Diagrams based on lessons.
- Conducting Activities mentioned in the Textbook.

D. Content Weightage in Theory Examination

The chapter-wise weightage shown below is only indicative for the purpose of information of teachers while prioritising different chapters during teaching or assessment. Though the weightage in Theory Examination conducted by MBOSE would broadly follow the following pattern, there may still be some variation.

Syllabus	Marks (80)
Chapter 1: Chemical Reactions & Equations Chapter 2: Acids, Bases and Salts Chapter 3: Metals and Non-metals Chapter 4: Carbon and its Compounds	26
Chapter 5: Life Processes Chapter 6: Control and Coordination Chapter 7: How do Organisms Reproduce? Chapter 8: Heredity Chapter 13: Our Environment	28
Chapter 9: Light – Reflection and Refraction Chapter 10: The Human Eye and the Colourful World Chapter 11: Electricity Chapter 12: Magnetic Effects of Electric Current	26

Sample Question Paper
Science
(NCERT Textbook)
Class-X
Question Paper Code: XY

Time: 3 hours

Max Marks: 80 (Pass Marks: 24)

General Instructions:

1. Please check that this Question Paper contains 56 Questions.
2. Question Paper Code given above should be written on the Answer Book, in the space provided, by the Candidate.
3. 15 minutes time is given for the candidates to read the Question paper. The Question Paper will be distributed 15 minutes before the scheduled time of the examination. In these 15 minutes, the candidates should only read the instructions and questions carefully and should not write answers on the Answer Sheet.
4. The Question Paper contains 4 sections, Section A, B, C and D.
5. Section-A contains Multiple Choice Questions (MCQ). Choose the most appropriate answer from the given options. The answers to this Section must be provided in the boxes provided in the Answer Sheet. Answers provided anywhere else will not be counted for marking.
6. Section-B contains Very Short Answer Questions. Answer the questions briefly, in not more than 30 (thirty) words.
7. Section-C contains Short Answer Questions. Answer the questions in not more than 50 (fifty) words each.
8. Section-D contains Long Answer Questions. Answer the questions in not more than 70 (seventy) words each.

Section A

Multiple Choice Questions: Attempt ALL Questions. (30x1=30)

1. A chemical equation without balancing is called:
 - A. Complete Equation
 - B. Skeletal Equation
 - C. Ionic Equation
 - D. Thermo chemical Equation

2. Which of the following is not a decomposition reaction?
 - A. Burning of food
 - B. Photosynthesis
 - C. Digestion of food
 - D. Photolysis of silver chloride

3. Which of the following is a natural source of citric acid?
 - A. Spinach
 - B. Apple
 - C. Lemon
 - D. Tomato

4. A student adds water to concentrated acid instead of acid to water. What will happen?
 - A. No reaction
 - B. Explosion or splashing
 - C. Cooling
 - D. Neutralisation

5. Blue colour Copper Sulphate turns white on heating due to loss of water, but blue colour returns due to:
 - A. Heat
 - B. Hydration
 - C. Evaporation
 - D. Loss of ion

6. Among the following metals which has the lowest melting point?
 - A. Tungsten
 - B. Lead
 - C. Mercury
 - D. Potassium

7. Roasting is generally done in case of:
 - A. Carbonate Ores
 - B. Oxide Ores
 - C. Sulphide Ores
 - D. Silicate Ores

8. An alloy used for making electrical heating element is:

- A. Solder
- B. Brass
- C. Nichrome
- D. Bronze

9. Carbon forms large molecules due to:

- A. Catenation
- B. Allotropy
- C. Valency
- D. Reactivity

10. The reaction between an organic acid and alcohol forms:

- A. Salt
- B. Ester
- C. Alkane
- D. Alkene

11. The function of bile is to:

- A. Digest proteins
- B. Digest Carbohydrates
- C. Emulsify fats
- D. Absorb water

12. Which of the following is the site of cellular respiration?

- A. Nucleus
- B. Ribosome
- C. Mitochondria
- D. Chloroplast

13. Reflex Actions are controlled by:

- A. Brain
- B. Spinal Cord
- C. Nerves
- D. Muscles

14. In a flower, the parts that produce male gametes are:

- A. Ovary
- B. Filament
- C. Style
- D. Anther

15. Variation in offspring is important for:

- A. Survival of species
- B. Digestion
- C. Circulation
- D. Excretion

16. The study of heredity and variation is called:

- A. Ecology
- B. Genetics
- C. Anatomy
- D. Physiology

17. Homozygous means:

- A. Same alleles
- B. Different alleles
- C. No alleles
- D. Multiple alleles

18. Which of the two in the following set belongs to the same trophic level:

- A. Grass: Grasshopper
- B. Goat: Spider
- C. Hawk: Rat
- D. Frog: Lizard

19. Which of the following is an abiotic component of an ecosystem:

- A. Humus
- B. Bacteria
- C. Plants
- D. Fungi

20. Energy flow in an ecosystem is:

- A. Cyclic
- B. Random
- C. Unidirectional
- D. Irregular

21. What is the power of a convex lens of focal length 25cm?

- A. +2.5 D
- B. -4 D
- C. +4 D
- D. -2.5 D

22. Which mirror is used in rear-view mirrors of vehicles?

- A. Concave mirror
- B. Plain Mirror
- C. Convex Mirror
- D. Spherical Mirror

23. The twinkling of stars is due to:

- A. Reflection of light by clouds
- B. Scattering of light by dust particles
- C. Dispersion of light by water droplets
- D. Atmospheric refraction of starlight

24. The defect of the eye in which the eye ball becomes too long is:

- A. Myopia
 - B. Hypermetropia
 - C. Presbyopia
 - D. Cataract
25. Which quantity is measured in Watts?
- A. Voltage
 - B. Resistance
 - C. Power
 - D. Current
26. An electric device in which electrical energy is converted to heat energy in:
- A. Generator
 - B. Bulb
 - C. Motor
 - D. Heater
27. At the time of a short circuit, the current in the circuit:
- A. Reduces substantially
 - B. Does not change
 - C. Increases heavily
 - D. Vary continuously
28. Electric bells work on:
- A. Heating Effect
 - B. Magnetic Effect
 - C. Sound Effect
 - D. Chemical Effect
29. Which defect of vision occurs due to weakening of ciliary muscles in old age?
- A. Myopia
 - B. Hypermetropia
 - C. Astigmatism
 - D. Presbyopia
30. When the object is placed between F and 2F of a convex lens, the image formed is:
- A. At F
 - B. At 2F
 - C. Beyond 2F
 - D. Between O and F

Section B

Very Short Answer Questions (Any 10) (2x10 = 20 marks)

- 31. Give one industrial application of combination reaction
- 32. What are the rules for displacement reaction?
- 33. What do you understand by olfactory indicators?

34. Name the following:
 - a) Any metal which is preserved in kerosene
 - b) A lustrous coloured non metal
 - c) A metal which can melt when kept on the palm,
 - d) A metal, which is a poor conductor of heat.
35. Grace wrote the names of four compounds as the first members of their respective homologous series. - methanol- methanal- methanone- methanoic acid
 - (a) Which name has she written incorrectly? Justify your answer.
 - (b) What name should she have written instead?
36. What is the role of enzymes in digestion? Name an enzyme present in the saliva.
37. Define aerobic respiration. Where does it occur.
38. What is a reflex action? Give one example.
39. What is binary fission? Give one example.
40. The eyeball of a person has become slightly larger. Which kind of lens should the person wear to correct the defect in the vision caused by this change in the size of the eyeball?
41. To correct myopia, the person should wear a lens that diverges the light rays slightly before they enter the eye, ensuring they focus properly on the retina.
 - a. Which liquid fills the space behind the cornea?
 - b. Which liquid fills the space between the eye lens and the retina?
42. How does the use of a fuse wire protect electrical appliances?
43. What is meant by magnetic field? List two methods of producing magnetic field

Section C

Short answer type questions (Any 6) (3x6=18 marks)

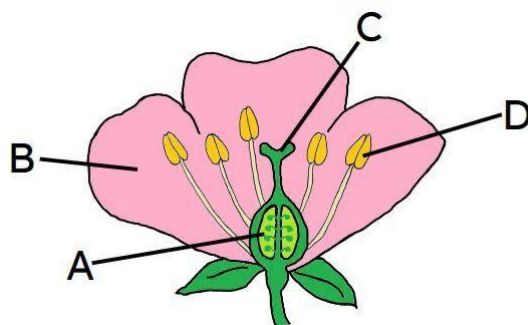
44. Give three differences between calcination and roasting?
45. What is a homologous series? Give its characteristics.
46. Why do arteries have thick and elastic walls whereas veins have valves? What is the composition of blood?
47. What is meant by trophic level in a food chain? Construct a terrestrial food chain with trophic levels. The energy flow in a food chain is always unidirectional. Why?
48. How is the sex of the child determined in human beings?
49. A convex mirror used for rear-view on an automobile has a radius of curvature of 3.00 m. If a bus is located at 5.00 m from this mirror, find the position, nature and size of the image.
50. Why is tungsten used for making bulb filaments of incandescent lamps? Name any two electric devices based on the heating effect of electric current.
51. State the rule to determine the direction of a
 - (i) magnetic field produced around a straight conductor-carrying current,
 - (ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, and
 - (iii) Name a device that uses magnetic field and current carrying conductor.

Section D

Long answer type questions (answer any 3) (3x4 marks = 12 Marks)

52. A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.
53. Study the diagram of a flower given below and answer the following questions:
- (a) Label the parts A, B, C, and D.
 - (b) Which part produces pollen grains?
 - (c) Name the female reproductive part of the flower.
 - (d) What is the function of the ovary?

Diagram (for reference):



54. Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?
55. a) Name the part that
- i. Produces urine and
 - ii. Releases urine to the outside.
- b) What is the main toxic waste kidney filters from blood?
- c) Name any two substances which are selectively reabsorbed from the tubules of a nephron.
- d) Write one function of an artificial kidney.
56. Give Reasons:
- (i) Tap water conducts electricity whereas distilled water does not
 - (ii) Dry hydrogen chloride gas does not turn blue litmus red whereas dilute hydrochloric acid does.
 - (iii) During summer season a milk man usually adds a very small amount of baking soda to fresh milk
 - (iv) Ammonia is a base but does not contain hydroxyl group.

End of Question Paper

Section -A
MULTIPLE CHOICE QUESTIONS
(MCQs) (1 MARK EACH)

In the Board Examination, there will be 14 MCQs from the English Reader and the Supplementary Reader.

A Letter to God
- G. L. Fuentes

1. Why did Lencho's field turn white?

- A. It was a cotton field
- B. It was submerged in ocean water
- C. It was covered with hailstones
- D. It was submerged in flood

Ans: C. It was covered with hailstones

2. What destroyed Lencho's fields?

- A. Heavy rainfall
- B. Hailstorm
- C. Landslide
- D. Flood

Ans: B. Hailstorm

3. "A plague of locusts would have left more than this". What does the word 'locusts' refer to?

- A. Flight of birds
- B. A host of sparrows
- C. A swarm of bees
- D. Insects which fly in big groups and destroy crops

Ans: D. Insects which fly in big groups and destroy crops

4. What is the main theme of the story "A Letter to God"?

- A. Faith and belief
- B. Poverty and struggle
- C. Nature and beauty
- D. Love and relationship

Ans: A. Faith and belief

5. How much money did Lencho ask for?

- A. A hundred pesos
- B. One thousand pesos
- C. Ten pesos
- D. Five hundred pesos

Ans: A. A hundred pesos

6. Who is the author of the lesson "A Letter to God"?

- A. Roald Dahi
- B. J. K. Rowling
- C. William Shakespeare
- D. G.L.Fuentes

Ans: D. G.L.Fuentes

7. The postmaster's attitude changes from amusement to deep concern after reading Lencho's letter. Which action best shows his concern for Lencho's unwavering faith?

- A. He explained that natural disasters could not be prevented.
- B. He ignored the letter because he could not help.
- C. He arranged money for Lencho and sent it anonymously.
- D. He advised Lencho to seek help from the local authorities.

Ans: C. He arranged money for Lencho and sent it anonymously.

8. Lencho is described as an “ox of a man” who “still knew how to write.” What does this contrast primarily reveal about his character?

- A. He combined physical strength with literacy and expressed his faith through writing.
- B. He wrote the letter simply to pass the time.
- C. He preferred writing to working in the fields.
- D. He was a scholar who farmed only for pleasure.

Ans: A. He combined physical strength with literacy and expressed his faith through writing.

9. The postmaster answered Lencho’s letter because he did not want to “shake the writer’s faith.” What does this reveal about his character?

- A. He shared Lencho’s religious beliefs.
- B. He was empathetic and respected sincere faith.
- C. He wanted to continue the joke.
- D. He feared God’s punishment.

Ans: B. He was empathetic and respected sincere faith.

10. Lencho showed “not the slightest surprise” on receiving the money. What does this reveal about him?

- A. His faith made the miracle seem certain.
- B. He already knew the money was coming.
- C. He did not understand where the money came from.
- D. He was disappointed by the amount.

Ans: A. His faith made the miracle seem certain.

11. What is ironic about Lencho’s second letter to God?

- A. God replies to his letter.
- B. Another hailstorm follows.
- C. He accuses his helpers of theft.
- D. He asks for more money than he needs.

Ans: C. He accuses his helpers of theft.

12. How does the hailstorm change the tone of the story A Letter to God?

- A. From joy to celebration.
- B. From fear to relief.
- C. From peace to confusion.
- D. From hope to despair.

Ans: D. From hope to despair.

13. What is ironic about the postmaster’s satisfaction after helping Lencho?

- A. Lencho thanks the postmaster for his kindness.
- B. Lencho does not need the money after all.
- C. He calls the people who helped him “a bunch of crooks.”
- D. The postmaster sends more money than requested.

Ans: C. He calls the people who helped him “a bunch of crooks.”

14. If the postmaster had ignored Lencho’s letter, what would most likely have happened?

- A. Lencho’s faith in God would have been shaken.
- B. Lencho would have become rich another way.
- C. The hailstorm would have been reversed.
- D. The villagers would have punished the postmaster.

Ans: A. Lencho’s faith in God would have been shaken.

15. What did Lencho believe about the post office employees?

- A. They were a bunch of crooks.
- B. They were honest workers.
- C. They were kind helpers.
- D. They were hardworking officials.

Ans: A. They were a bunch of crooks.

Fire and Ice
- Robert Frost

16. According to Robert Frost, what are the two forces that can destroy the world?

- A. Wind and water
- B. Fire and ice
- C. Earth and air
- D. Sun and moon

Ans: B. Fire and ice

17. Which emotion is symbolised by ice in the poem 'Fire and Ice'?

- A. Love
- B. Happiness
- C. Hatred and indifference
- D. Excitement

Ans: C. Hatred and indifference

18. What is the central theme of the poem "Fire and Ice"?

- A. Beauty of nature
- B. Human emotions and destruction
- C. Love and friendship
- D. Power of science

Ans: B. Human emotions and destruction

19. What does Robert Frost mean by saying that ice "would suffice"?

- A. Ice is weak
- B. Ice cannot destroy
- C. Ice alone is enough to destroy the world
- D. Ice is better than fire

Ans: C. Ice alone is enough to destroy the world

20. Which real-life situation best shows the idea of fire as used in the poem 'Fire and Ice'?

- A. Helping a neighbour
- B. Enjoying a holiday
- C. Forgiving an enemy
- D. Greed leading to corruption

Ans: D. Greed leading to corruption

21. Why does Robert Frost support those who favour fire?

- A. He has experienced the power of desire
- B. He prefers warm weather
- C. He dislikes ice
- D. He fears winter

Ans: A. He has experienced the power of desire

22. What conclusion does Robert Frost reach about hatred?

- A. It can never cause harm
- B. It is less dangerous than desire
- C. It is also capable of destroying the world
- D. It disappears with time

Ans: C. It is also capable of destroying the world

23. Which lesson from the poem 'Fire and Ice' can help maintain harmony in society?

- A. Pursue every desire without limits
- B. Ignore the feelings of others
- C. Avoid expressing emotions
- D. Control destructive emotions like hatred

Ans: D. Control destructive emotions like hatred

24. What does the poem 'Fire and Ice' suggest about human emotions?

- A. They are always beneficial
- B. They have no effect on society
- C. Uncontrolled emotions can be destructive
- D. Only positive emotions influence actions

Ans: C. Uncontrolled emotions can be destructive

25. If the poet were writing the poem today, which situation best reflects the destructive power of both "fire" and "ice"?

- A. Scientific discoveries
- B. Social media conflicts driven by hatred and greed
- C. Environmental conservation efforts
- D. Cultural festivals

Ans: B. Social media conflicts driven by hatred and greed

His First Flight **- Liam O'Flaherty**

26. In the story His First Flight, why did the young seagull hesitate to fly from the ledge?

- A. He suffers from physical injury
- B. He fears that his wings would not support flight
- C. He lacks interest in flying
- D. His parents pamper him

Ans: B. He fears that his wings would not support flight

27. While the young seagull remained in his ledge, what activity were his siblings engaged in?

- A. Learning to swim
- B. Searching for shelter
- C. Fighting for food
- D. Practising flight in the air

Ans: D. Practising flight in the air

28. What condition increased the young seagull's desperation to attempt flight?

- A. Sudden storm
- B. Prolonged hunger
- C. Darkness
- D. Extreme thirst

Ans : B. Prolonged hunger

29. What action by the mother seagull triggered the young seagull's first flight?

- A. A loud warning cry
- B. Pushing from behind
- C. Offering a piece of fish just out of reach
- D. Flying away suddenly

Ans : C. Offering a piece of fish just out of reach

30. How did the young seagull's movement change after the initial fall?

- A. Wings stopped moving
- B. Body remained stiff
- C. Movement became uncontrolled
- D. Wings spread naturally and supported flight

Ans : D. Wings spread naturally and supported flight

31. Which feeling best describes the young seagull after learning to fly?

- A. Regret
- B. Joy and confidence
- C. Fear
- D. Confusion

Ans : B. Joy and confidence

32. What does the young seagull's hesitation primarily reflect?

- A. Fear of failure despite potential
- B. Lack of ability
- C. Disobedience
- D. Physical weakness

Ans: A. Fear of failure despite potential

33. In the story "His First Flight", if the mother seagull had fed the young seagull directly on the ledge instead of tricking him, how would the narrative likely change?

- A. He would have immediately learned to fly the next day
- B. He would have left his family to join another flock
- C. His fear of flying would have remained unresolved
- D. He would have grown larger and flown automatically without fear

Ans: C. His fear of flying would have remained unresolved

34. Why did the young seagull feel the sun's heat so intensely?

- A. The weather was unusually hot that day.
- B. He had an illness that made him sensitive to heat.
- C. His empty stomach made him physically weaker and more sensitive.
- D. He was standing too close to the edge.

Ans: C. His empty stomach made him physically weaker and more sensitive.

35. What emotion best describes the young seagull's state during the twenty-four hours before his flight?

- A. Indifference
- B. Rage
- C. Total despair and helplessness
- D. Excitement

Ans: C. Total despair and helplessness

36. What was the young seagull's mother carrying when she swooped near him?

- A. A twig for a new nest
- B. A piece of fish
- C. A drop of fresh water
- D. Seaweed to make a soft bed

Ans: B. A piece of fish

37. How did the family's attitude toward the young seagull shift after he finally landed on the water?

- A. They continued to ignore him and flew away
- B. They punished him for taking so long to fly
- C. They praised him and offered him scraps of dog-fish
- D. They demanded he fly back to the ledge immediately

Ans: C. They praised him and offered him scraps of dog-fish

38. What happened to the young seagull's legs as he tried to float on the green sea?

- A. They struck the bottom of the shallow water
- B. They became completely paralyzed by the freezing temperature
- C. They sank into it, and he screamed with fright
- D. They instantly webbed out and allowed him to swim smoothly

Ans: C. They sank into it, and he screamed with fright

39. What lesson does the story convey about the relationship between fear and motivation?

- A. Fear is permanent and cannot be overcome by motivation
- B. Motivation only works when it comes from an external source
- C. Strong motivation can overpower even the most paralyzing fears
- D. Fear is a myth that disappears on its own without motivation

Ans: C. Strong motivation can overpower even the most paralyzing fears

40. In the context of the story His First Flight, what does the "green sea" symbolize?

- A. An insurmountable obstacle that brings death and danger
- B. The comfort and safety of the original ledge
- C. The vast, intimidating, yet ultimately welcoming world of new possibilities
- D. A punishment for his hesitation and lack of courage

Ans: C. The vast, intimidating, yet ultimately welcoming world of new possibilities

The Black Aeroplane - Frederick Forsyth

41. Why did the narrator of 'The Black Aeroplane' decide to fly through the storm instead of turning back?

- A. To reach home without delay
- B. Due to lack of fuel
- C. Due to unawareness of the storm
- D. Due to instructions from the control centre

Ans: A. To reach home without delay

42. What major danger did the narrator of 'The Black Aeroplane' face while flying through the storm?

- A. Engine failure
- B. Bird attack
- C. Losing direction due to failure of navigation instruments
- D. Fire in the plane

Ans: C. Losing direction due to failure of navigation instruments

43. Why did the pilot of the old Dakota immediately follow the other aeroplane after seeing it?

- A. It appeared capable of guiding him to safety.
- B. The pilot was recognised.
- C. Instructions were received to follow.
- D. Out of curiosity.

Ans: A. It appeared capable of guiding him to safety.

44. What information was given by the woman in the control centre to the narrator of 'The Black Aeroplane'?

- A. Another plane had helped
- B. There was no other aeroplane in the sky that night
- C. The storm was not strong
- D. A mistake had been made

Ans: B. There was no other aeroplane in the sky that night

45. What does the storm symbolize in 'The Black Aeroplane'?

- A. Peace
- B. Happiness
- C. Success
- D. Danger and confusion

Ans: D. Danger and confusion

46. Which statement best conveys the message of 'The Black Aeroplane'?

- A. Overconfidence can be risky and help can come unexpectedly.
- B. Flying should always be avoided.
- C. Technology is always reliable.
- D. Storms are harmless.

Ans: A. Overconfidence can be risky and help can come unexpectedly.

47. Which decision of the narrator of 'The Black Aeroplane' shows that emotions influenced his judgement?

- A. Following the runway lights
- B. Checking the fuel level
- C. Contacting the control centre
- D. Flying through the storm to reach home early

Ans: D. Flying through the storm to reach home early

48. Which action of the mysterious pilot helped the narrator of 'The Black Aeroplane' most?

- A. Giving radio instructions
- B. Flying ahead and waving to the narrator to follow him
- C. Landing beside the narrator
- D. Contacting the control centre

Ans: B. Flying ahead and waving to the narrator to follow him

49. If the narrator of 'The Black Aeroplane' had decided to turn back on seeing the storm, the story would most likely have

- A. ended at another airport
- B. become more dangerous
- C. resulted in an accident
- D. ended without the mysterious incident

Ans: D. ended without the mysterious incident

50. Which element of the story 'The Black Aeroplane' makes it different from a realistic adventure story?

- A. The accurate description of flying
- B. The airport setting
- C. The unexplained appearance of the black aeroplane
- D. The weather forecast

Ans: C. The unexplained appearance of the black aeroplane

51. According to 'The Black Aeroplane', which value is most important for a pilot when facing an unexpected emergency?

- A. Patience and presence of mind
- B. Desire for adventure
- C. Pride in one's skills
- D. Fear of failure

Ans: A. Patience and presence of mind

52. Why does the author of 'The Black Aeroplane' leave the identity of the black aeroplane unexplained?

- A. To create curiosity and encourage different interpretations
- B. Because he forgot to complete the story
- C. To prove that ghosts exist
- D. To describe aviation technology

Ans: A. To create curiosity and encourage different interpretations

53. Which situation from the story 'The Black Aeroplane' best shows that confidence should be balanced with good judgement?

- A. The narrator checks the weather before take-off
- B. The narrator lands safely at the airport
- C. The narrator flies into the storm despite recognising the danger
- D. The narrator thanks the woman at the control centre

Ans: C. The narrator flies into the storm despite recognising the danger

54. Suppose the pilot of the old Dakota had ignored the signals from the black aeroplane. What would most likely have happened?

- A. He might have remained lost inside the storm.
- B. He would have reached home more quickly.
- C. The storm would have disappeared immediately.
- D. The control centre would have guided him through the radio.

Ans: A. He might have remained lost inside the storm.

55. Which lesson from 'The Black Aeroplane' is most relevant to real life?

- A. Every mystery has a scientific explanation.
- B. Difficult situations require calm thinking, and help may come unexpectedly.
- C. Taking risks always leads to success.
- D. Technology never fails.

Ans: B. Difficult situations require calm thinking, and help may come unexpectedly.

The Ball Poem

- John Berryman

56. Why is the boy standing and staring after losing his ball?

- A. He is waiting for help
- B. He is unable to understand what has happened
- C. He is looking for another ball
- D. He wants to jump into the water

Ans: B. He is unable to understand what has happened

57. What does the ball symbolise in 'The Ball Poem'?

- A. Sports
- B. Childhood joy and possessions
- C. Wealth
- D. Friendship

Ans: B. Childhood joy and possessions

58. Why does the poet not offer the boy another ball?

- A. He has no money
- B. The boy does not want it
- C. The boy must learn about loss
- D. The shop is closed

Ans: C. The boy must learn about loss

59. What lesson does the boy learn from losing the ball?

- A. Fear
- B. Anger
- C. Hatred
- D. Responsibility and acceptance

Ans: D. Responsibility and acceptance

60. What does "Money is external" mean in 'The Ball Poem'?

- A. Money cannot replace emotional loss
- B. Money is useless
- C. Money brings happiness
- D. Money controls people

Ans: A. Money cannot replace emotional loss

61. In 'The Ball Poem', what broader truth of life does the loss of the ball represent?

- A. Success comes easily
- B. Childhood should be carefree
- C. Everyone experiences loss at some point
- D. Money solves all problems

Ans: C. Everyone experiences loss at some point

62. Which value is most strongly highlighted in 'The Ball Poem'?

- A. Acceptance of life's losses
- B. Competition
- C. Materialism
- D. Adventure

Ans: A. Acceptance of life's losses

63. In 'The Ball Poem', what does the phrase "epistemology of loss" mean?

- A. Learning through books
- B. Understanding the nature of loss through experience
- C. Studying history
- D. Gaining wealth through hard work

Ans: B. Understanding the nature of loss through experience

64. In 'The Ball Poem', the loss of the ball marks the beginning of the boy's:

- A. Academic success
- B. Athletic career
- C. Emotional maturity
- D. Financial independence

Ans: C. Emotional maturity

65. What is the poet's main purpose in describing the boy's loss in 'The Ball Poem'?

- A. To entertain readers with a story
- B. To encourage children to play carefully
- C. To criticise children's behaviour
- D. To teach an important lesson about coping with loss

Ans: D. To teach an important lesson about coping with loss

**From the Diary of Anne Frank
- Anne Frank**

66. Why did Anne decide to write a diary?

- A. She wanted to become a famous writer
- B. Her teacher told her to write one
- C. She felt she had no true friend to confide in
- D. She wanted to record history for the world

Ans : C. She felt she had no true friend to confide in

67. Why did Anne give a brief sketch of her life before starting her diary entries?

- A. She wanted to show off her writing skills
- B. She wanted to give context to her stories to "Kitty"
- C. Her father insisted she does so
- D. She wanted to record her family history for the government

Ans : B. She wanted to give context to her stories to "Kitty"

68. What does the celebration of Anne's birthday in 1942 reveal about her relationship with her grandmother?

- A. She had forgotten her grandmother
- B. She blamed her grandmother for her surgery
- C. She held deep affection and continued to miss her
- D. She only cared about her own birthday presents

Ans : C. She held deep affection and continued to miss her

69. Anne calls her teachers the "most unpredictable creatures on earth." This suggests that:

- A. Teachers often change their minds about homework
- B. It is impossible to tell who will pass or fail based on their decisions
- C. Teachers are not humans and act like animals
- D. Students can never please their teachers no matter how hard they try

Ans: B. It is impossible to tell who will pass or fail based on their decisions

70. Why was Mr. Keesing annoyed with Anne?

- A. She was weak in Math
- B. She was talkative in class
- C. She was always late to school
- D. She didn't do her homework

Ans : B. She was talkative in class

71. How did Anne justify her talkative nature in her essay?

- A. She said it was a student's right
- B. She argued it was an inherited trait from her mother
- C. She claimed it helped her think better
- D. She said she was bored in class

Ans : B. She argued it was an inherited trait from her mother

72. How does Anne describe her relationship with her father, Otto Frank?

- A. She found him to be too strict and distant from her life
- B. They had a purely professional relationship with no emotional depth
- C. She considered him the most adorable father and had a special bond with him
- D. She was closer to her father but often felt he favored her sister, Margot

Ans: C. She considered him the most adorable father and had a special bond with him

73. Anne named her diary "Kitty." What does this creative choice reveal about her approach to writing?

- A. She considered it just an ordinary book with no special meaning
- B. She was just following a trend among her classmates
- C. She treated her diary as a living, breathing confidante and an imaginary friend
- D. She wanted to hide the true identity of her diary in case it was found

Ans: C. She treated her diary as a living, breathing confidante and an imaginary friend

74. Before going into hiding, where did the Frank family originally live?

- A. Frankfurt, Germany
- B. Berlin, Germany
- C. Vienna, Austria
- D. London, United Kingdom

Ans: A. Frankfurt, Germany

75. On which birthday did Anne receive the diary that became the famous chronicle of her life?

- A. Eleventh
- B. Thirteenth
- C. Fifteenth
- D. Twelfth

Ans: B. Thirteenth

76. What does Anne's reaction to the punishment assignments reveal about her personality?

- A. She was arrogant
- B. She became discouraged
- C. She accepted the challenge with humour and creativity
- D. She ignored the task

Ans: C. She accepted the challenge with humour and creativity

77. Why did Mr. Keesing finally stop punishing Anne?

- A. Because Anne apologized
- B. Because he was transferred
- C. Because he appreciated Anne's witty and creative responses
- D. Because Anne stopped talking completely

Ans: C. Because he appreciated Anne's witty and creative responses

78. Anne Frank's diary helps readers understand that adolescents often

- A. Avoid expressing emotions
- B. Face emotional conflicts and seek someone to trust
- C. Dislike learning
- D. Prefer being alone always

Ans: B. Face emotional conflicts and seek someone to trust

79. If Anne lived in today's digital world, she would most likely express herself through—

- A. A personal blog or digital journal
- B. Business reports
- C. News bulletins
- D. Advertisements

Ans: A. A personal blog or digital journal

80. If Anne were to advise today's students about expressing emotions, what would she most likely suggest?

- A. Keep feelings hidden
- B. Find a trustworthy way to express thoughts honestly
- C. Ignore emotions
- D. Never write about personal experiences

Ans: B. Find a trustworthy way to express thoughts honestly

Amanda!
- Robin Klein

81. In the poem 'Amanda!', the repetition of the word "Amanda" refers to:

- A. A rhyme scheme
- B. The speaker looking for Amanda
- C. The speaker's frustration
- D. Alliteration

Ans: C. The speaker's frustration

82. What is Amanda doing as a mermaid in her imagination?

- A. Drifting blissfully
- B. Swimming quickly
- C. Catching fish
- D. Playing in the water

Ans: A. Drifting blissfully

83. What colour is the sea described in 'Amanda!'?

- A. Blue
- B. Black
- C. Emerald
- D. Grey

Ans: C. Emerald

84. Who is Rapunzel in the poem 'Amanda!'?

- A. Spirit
- B. A fairy tale character
- C. Witch
- D. Mermaid

Ans: B. A fairy tale character

85. Why does Amanda imagine herself as an orphan?

- A. She wants to leave her home forever
- B. She wishes to live without constant instructions
- C. She has no friends
- D. She enjoys travelling alone

Ans: B. She wishes to live without constant instructions

86. What does Amanda's daydreaming reveal about her character?

- A. She is lazy and careless
- B. She enjoys disobeying others
- C. She dislikes school
- D. She longs for freedom and peace

Ans: D. She longs for freedom and peace

87. What does the poem 'Amanda!' suggest about the way adults should treat children?

- A. They should constantly control them
- B. They should ignore their feelings
- C. They should understand their emotions and give them space
- D. They should never correct them

Ans: C. They should understand their emotions and give them space

88. Which quality can help prevent the misunderstanding shown in 'Amanda!'?

- A. Strict discipline alone
- B. Silence
- C. Competition
- D. Empathy and effective communication

Ans: D. Empathy and effective communication

89. If Amanda openly shared her feelings with her mother, what would most likely happen?

- A. Their relationship might improve through better understanding
- B. Amanda would stop imagining things completely
- C. Her mother would become stricter
- D. Amanda would leave home

Ans: A. Their relationship might improve through better understanding

90. Which modern situation best reflects Amanda's feelings in 'Amanda!'?

- A. A child being encouraged to explore new hobbies
- B. A child feeling stressed by constant monitoring and instructions
- C. A child enjoying a family vacation
- D. A child winning a school competition

Ans: B. A child feeling stressed by constant monitoring and instructions

Tea From Assam -Arup Kumar Datta

91. What was the main purpose of Rajvir's visit to Assam?

- A. To meet Pranjol's family
- B. To attend a conference
- C. To research tea farming
- D. To participate in a festival

Ans : A. To meet Pranjol's family

92. Why are tea plants pruned regularly?

- A. To control pests
- B. To improve the taste of tea
- C. To help the plants grow taller
- D. To keep them short and bushy at a convenient height for plucking

Ans : D. To keep them short and bushy at a convenient height for plucking

93. What does the phrase “a sea of tea bushes” suggest about the tea gardens
- A. The tea plants were flooded with water
 - B. The gardens were very vast and spread out
 - C. The tea bushes grew under the sea
 - D. The gardens were surrounded by lakes

Ans : B. The gardens were very vast and spread out

94. According to Rajvir, how old are the earliest records of tea drinking?
- A. About 6000 years old
 - B. About 1600 years old
 - C. About 4700 years old
 - D. About 2700 years old

Ans : C. About 4700 years old

95. What does Rajvir’s conversation with Pranjol show about him?
- A. He enjoys arguing
 - B. He likes sharing knowledge
 - C. He prefers silence
 - D. He dislikes travelling

Ans : B. He likes sharing knowledge

96. What lesson can readers learn from Rajvir’s curiosity?
- A. Curiosity helps people gain knowledge
 - B. Curiosity leads to unnecessary trouble
 - C. Curiosity wastes time
 - D. Curiosity makes travel boring

Ans : A. Curiosity helps people gain knowledge

97. What was Pranjol doing while Rajvir was eagerly looking at the scenery and discussing tea?
- A. Sleeping through the journey
 - B. Reading a detective book
 - C. Studying his school textbooks
 - D. Listening to music on headphones

Ans: B. Reading a detective book

98. How did Rajvir react to the magnificent view of the tea gardens as they entered the Dhekiabari Tea Estate?
- A. He found it monotonous and boring
 - B. He thought the tea bushes looked like golden wheat fields
 - C. He was confused by the agricultural process
 - D. He was mesmerized by the beautiful view

Ans: D. He was mesmerized by the beautiful view

99. At which railway station did Pranjol and Rajvir get off?
- A. Guwahati Junction
 - B. Dibrugarh Town
 - C. Mariani Junction
 - D. Tinsukia Junction

Ans: C. Mariani Junction

100. What was the name of the tea estate managed by Pranjol's father?
- A. Dhekiabari Tea Estate
 - B. Jia Bharali Tea Estate
 - C. Halmari Tea Estate
 - D. Monabarie Tea Estate

Ans: A. Dhekiabari Tea Estate

101. According to the Chinese legend, what was the emperor doing when tea was discovered?
- A. Making coffee
 - B. Preparing soup
 - C. Boiling water
 - D. Cooking food
- Ans: C.** Boiling water
102. In the Buddhist ascetic legend, why did the ascetic cut off his eyelids?
- A. To offer them to the gods
 - B. To avoid falling asleep during meditation
 - C. To see the future
 - D. To test his pain tolerance
- Ans: B.** To avoid falling asleep during meditation
103. How many tea plants sprang out of the ascetic's eyelids in the Buddhist legend?
- A. Ten
 - B. Five
 - C. Seven
 - D. Eight
- Ans: A.** Ten
104. How was tea treated when it was first introduced in Europe in the sixteenth century?
- A. As a refreshing morning beverage
 - B. As a luxury item reserved for royalty
 - C. An alcoholic drink for social gatherings
 - D. More as medicine than as a beverage
- Ans: D.** More as medicine than as a beverage

105. How did Rajvir come to know so many fascinating details and legends about tea?
- A. He lived in Assam before the trip
 - B. He had read extensively about it before the journey
 - C. His father worked as a tea garden manager
 - D. He was taught by Pranjol on the train
- Ans: B.** He had read extensively about it before the journey

THE TREES **- Adrienne Rich**

106. In the poem, "The Trees", where are the trees currently located?
- A. In a deep forest
 - B. In a public park
 - C. In a botanical garden
 - D. Inside the poet's house
- Ans : D.** Inside the poet's house
107. In the poem, "The Trees", what are the roots busy doing all night?
- A. Absorbing nutrients
 - B. Growing deeper into the earth
 - C. Working to free themselves from the veranda floor
 - D. Communicating with other trees
- Ans : C.** Working to free themselves from the veranda floor

108. What do the trees inside the house symbolize in the context of the poem, "The Trees"?

- A. The beauty of nature in urban spaces
- B. Women confined within domestic spheres, seeking liberation
- C. The impact of deforestation on our daily lives
- D. The growth of houseplants in modern homes

Ans: B. Women confined within domestic spheres, seeking liberation

109. Which poetic device is used in the line "The trees inside are moving out into the forest"?

- A. Personification
- B. Metaphor
- C. Simile
- D. Alliteration

Ans: A. Personification

110. What does the poet compare the moon to in the last stanza of the poem, "The Trees"?

- A. A mirror
- B. A lamp
- C. A silver coin
- D. A star

Ans: A. A mirror

111. Which of the following would be the most suitable alternate title for the poem, "The Trees"?

- A. The Silent Forest
- B. The Journey to Freedom
- C. The Lonely House
- D. The Bright Moon

Ans: B. The Journey to Freedom

112. In the poem, "The Trees", what does the poet "hardly mention" in her letters?

- A. Her own name
 - B. The departure of the trees
 - C. The weather outside
 - D. Her childhood memories
- Ans : B.** The departure of the trees

113. Why does the moon appear "broken" in the final stanza of the poem, "The Trees"?

- A. Because it is a crescent moon
- B. Because the window glass is cracked
- C. Because the poet is crying
- D. Because its light is filtered through the crown of the oak tree

Ans: D. Because its light is filtered through the crown of the oak tree

114. In the poem, "The Trees", what is the state of the forest before the trees move out?

- A. It was filled with small shrubs and weeds
- B. It was burning in a wildfire
- C. It was completely empty of trees
- D. It was a dense, dark jungle

Ans: C. It was completely empty of trees

115. Why does the poet, in the poem "The Trees", say the forest has been empty all these days?

- A. Because the trees were cut down
- B. Because the trees had been confined indoors
- C. Because there was a forest fire
- D. Because it was winter

Ans: B. Because the trees had been confined indoors

Madam Rides the Bus
- Vallikkannan

116. What gradually developed in Valli's mind?

- A. A desire to visit relatives
- B. A wish to own a toy
- C. A strong desire to ride the bus
- D. A plan to leave the village

Ans: C. A strong desire to ride the bus

117. How did Valli learn about the distance and fare of the bus journey?

- A. By reading a travel guide
- B. By secretly listening to conversations
- C. By asking her mother directly
- D. By speaking to the driver

Ans: B. By secretly listening to conversations

118. What quality of Valli is shown when she avoids buying toys and peppermints?

- A. Self-control and determination
- B. Greed
- C. Carelessness
- D. Fear of her mother

Ans: A. Self-control and determination

119. Why did Valli choose to travel in the afternoon?

- A. The bus was less crowded
- B. Her mother usually took a nap at that time
- C. The fare was cheaper
- D. She wanted to meet her friends

Ans: B. Her mother usually took a nap at that time

120. What was the fare for Valli's one-way bus journey?

- A. Thirty paise
- B. Sixty paise
- C. One rupee
- D. One rupee and twenty paise

Ans: A. Thirty paise

121. What does the conductor's behaviour towards Valli reveal?

- A. He was impatient with children
- B. He was kind, cheerful, and encouraging
- C. He wanted to make fun of her
- D. He was unwilling to help passengers

Ans: B. He was kind, cheerful, and encouraging

122. What impressed Valli the most during the journey to the town?

- A. The busy market
- B. The beautiful scenery outside the bus
- C. The large buildings
- D. The railway station

Ans: B. The beautiful scenery outside the bus

123. Why did Valli laugh when she saw the young cow running in front of the bus?

- A. The cow looked funny as it ran playfully
- B. The passengers were laughing at it
- C. The driver made a joke about it
- D. She had seen the cow before

Ans: A. The cow looked funny as it ran playfully

124. Why did Valli refuse to get off the bus in the town?

- A. She was afraid of getting lost
- B. She did not have enough money to return
- C. She had planned only a bus ride to the town and back
- D. She was feeling unwell

Ans: C. She had planned only a bus ride to the town and back.

125. What change occurs in Valli after seeing the dead cow?

- A. She becomes angry
- B. She becomes silent and thoughtful
- C. She blames the driver
- D. She laughs again

Ans: B. She becomes silent and thoughtful

126. Why does Valli keep her journey a secret from her mother?

- A. She wants to surprise her later
- B. She knows her mother would not allow her to travel alone
- C. She forgets to tell her
- D. She is angry with her mother

Ans: B. She knows her mother would not allow her to travel alone

127. Which statement best describes Valli's character at the end of the story?

- A. She remains carefree and childish
- B. She becomes more mature after her experience
- C. She regrets travelling alone
- D. She decides never to ride a bus again

Ans: B. She becomes more mature after her experience

128. What message does the story convey through Valli's experience?

- A. Children should never travel alone
- B. Experience helps people understand life better
- C. Wealth is necessary for happiness
- D. Travelling is always risky

Ans: B. Experience helps people understand life better

129. Valli's secret journey can best be described as

- A. an act of rebellion against her mother
- B. a search for adventure without responsibility
- C. a step towards self-discovery and independence
- D. an escape from village life

Ans: C. a step towards self-discovery and independence

130. Valli's bus ride symbolically represents

- A. modernisation of villages
- B. a journey from innocence towards awareness
- C. economic development
- D. public transportation problems

Ans: B. a journey from innocence towards awareness

The Tale of Custard the Dragon – Ogden Nash

131. Where did Belinda live?

- A. A big bungalow
- B. A red colour flat
- C. A little white house
- D. A yellow hut

Ans : C. A little white house

132. Which animal was nicknamed 'Ink'?

- A. The grey mouse
- B. The little black kitten
- C. The little yellow dog
- D. The dragon

Ans : B. The little black kitten

133. Why was the dragon called "cowardly"?

- A. He could not fly
- B. He was small
- C. He always cried for a safe cage
- D. He was afraid of mice

Ans : C. He always cried for a safe cage

134. What did Custard the dragon cry for?

- A. More food
- B. A nice safe cage
- C. Freedom to fly away
- D. Weapons to fight the pirate

Ans : B. A nice safe cage

135. The pets used to tease Custard for being a coward, but they all get terrified when the pirate shows up. What does this tell us about bravery?

- A. People who brag about being brave are always the strongest.
- B. Real bravery is only shown when there is real danger, not by teasing others.
- C. Teasing people is a good way to make them brave.
- D. Everyone enjoys a dangerous situation.

Ans: B. Real bravery is only shown when there is real danger, not by teasing others

136. What specific detail about the pirate's weapons shows that he is completely ready to fight?

- A. He has a wooden leg.
- B. He has a black beard.
- C. He is carrying a shield on his back
- D. He is holding pistols in both hands and a cutlass (sword) in his teeth.

Ans: D. He is holding pistols in both hands and a cutlass (sword) in his teeth.

137. What did the pirate do to prepare himself for the fight?

- A. Gulped some liquor
- B. Had some breath
- C. Shouted a war cry
- D. Made up his mind

Ans. A. Gulped some liquor

138. Why does the poet describe the pirate as "meaning no good" right from the start?

- A. To make us feel terrified and realize the characters are in real danger.
- B. To make us feel sorry for him because he has a wooden leg.
- C. To show that the pirate is just looking for a friend.
- D. To make us laugh at his funny clothes.

Ans: A. To make us feel terrified and realize the characters are in real danger.

139. What does the poet compare Custard's loud snorting to, showing how powerful he is?

- A. A roaring lion
- B. A loud engine
- C. A thunderstorm
- D. A crackling campfire

Ans: B. A loud engine

140. Which of these can be concluded about Ink, Blink and Mustard after reading 'The Tale of Custard the Dragon'?

- A. They were boastful creatures
- B. They were courageous warriors
- C. They were obedient towards Belinda
- D. They were kidnappers sent by the pirate

Ans: A. They were boastful creatures

The Sermon at Benares

[Source: Values and Voices: A College Reader by Betty Renshaw]

141. About how many years ago was Gautam Buddha born?

- A. 500
- B. 600
- C. 1500
- D. 2600

Ans: D. 2600

142. The four sights that changed Siddhartha's life did NOT include

- A. A king
- B. A sick man
- C. A funeral procession
- D. An old man

Ans: A. A king

143. Why did Siddhartha leave his royal life?

- A. To become a king
- B. To search for the truth about human suffering
- C. To travel around the world
- D. To fight in battles

Ans: B. To search for the truth about human suffering

144. Why did people think Kisa Gotami had lost her senses?

- A. She refused to speak
- B. She wandered with her dead child asking for medicine
- C. She left her home forever
- D. She blamed everyone for her sorrow

Ans: B. She wandered with her dead child asking for medicine

145. What was the special condition attached to the mustard seeds?

- A. They must be fresh
- B. They must be from a rich house
- C. They must be from a house untouched by death
- D. They must be offered with prayer

Ans: C. They must be from a house untouched by death

146. The Buddha's method of teaching Kisa Gotami was mainly based on

- A. Punishment
- B. Practical experience and self-realisation
- C. Strict rules
- D. Reward and appreciation

Ans: B. Practical experience and self-realisation

147. Why does the Buddha choose not to directly tell Kisa Gotami that death is universal?

- A. He wants to avoid speaking to her
- B. He expects someone else to help her
- C. He is unsure of the answer
- D. He wants her to discover the truth through her own experience

Ans: D. He wants her to discover the truth through her own experience.

148. Which statement best explains why Kisa Gotami's search for mustard seeds changes her perspective?

- A. She finds many kind people
- B. She realises that every family has experienced death
- C. She becomes tired of walking
- D. She receives help from wealthy families

Ans: B. She realises that every family has experienced death

149. What transformation best describes Kisa Gotami at the end of the story?

- A. From blind grief to spiritual understanding
- B. From sorrow to revenge
- C. From faith to doubt
- D. From poverty to wealth

Ans: A. From blind grief to spiritual understanding

150. According to the Buddha, life is afflicted by

- A. Wealth and success
- B. Pleasure and comfort
- C. Fame and honour
- D. Death and suffering

Ans: D. Death and suffering

151. What natural image does the Buddha use to explain human mortality?

- A. Flowing river
- B. Burning lamp
- C. Ripe fruits
- D. Setting sun

Ans: C. Ripe fruits

152. According to the Buddha, what happens to those who cling to grief?

- A. They gain wisdom
- B. They remain in sorrow
- C. They become famous
- D. They find peace quickly

Ans: B. They remain in sorrow

153. What does the word "mortals" in the Buddha's sermon mean?

- A. All human beings
- B. Monks
- C. Kings
- D. The poor

Ans: A. All human beings

154. If Kisa Gotami had found a house untouched by death, what would have happened to the Buddha's lesson?

- A. It would have become stronger
- B. It would have lost its intended meaning
- C. It would have remained unchanged
- D. It would have proved that miracles are possible

Ans: B. It would have lost its intended meaning

155. Which quality is most essential for accepting the Buddha's teaching in 'The Sermon at Benares'?

- A. Courage to face reality with wisdom
- B. Physical strength
- C. Wealth and influence
- D. Blind faith

Ans: A. Courage to face reality with wisdom

FOR ANNE GREGORY
- Adrienne Rich

156. Who wrote the poem 'For Anne Gregory'?

- A. John Berryman
- B. William Butler Yeats
- C. Robert Frost
- D. Walt Whitman

Ans: B. William Butler Yeats

157. What feature of Anne Gregory attracts young men?

- A. Her voice
- B. Her kindness
- C. Her yellow hair
- D. Her smile

Ans: C. Her yellow hair

158. What does Anne Gregory suggest she can do?

- A. Cut her hair
- B. Dye her hair
- C. Hide her hair
- D. Tie her hair

Ans: B. Dye her hair

159. According to the poem 'For Anne Gregory', who can truly love someone for themselves?

- A. Friends
- B. Family
- C. God
- D. Strangers

Ans: C. God

160. What does the poem 'For Anne Gregory' suggest about most people?

- A. They are attracted mainly by outward beauty
- B. They value inner beauty more than appearance
- C. They dislike beautiful people
- D. They never judge others

Ans: A. They are attracted mainly by outward beauty

161. What does Anne Gregory wish to know?

- A. Whether she should become a singer
- B. Whether she should change her name
- C. Whether she should travel abroad
- D. Whether anyone would love her for herself alone

Ans: D. Whether anyone would love her for herself alone

162. Why does the speaker mention Anne Gregory's yellow hair in the poem?

- A. To praise her fashion sense
- B. To criticise people with coloured hair
- C. To illustrate how physical beauty attracts attention
- D. To show that hair colour determines personality

Ans: C. To illustrate how physical beauty attracts attention.

163. Anne Gregory's yellow hair is presented as a symbol of:

- A. External beauty
- B. Intelligence
- C. Wealth
- D. Courage

Ans: A. External beauty

164. What message does the poem 'For Anne Gregory' ultimately convey?

- A. Beauty guarantees true love
- B. Outer appearance is more important than character
- C. Hair colour determines a person's personality
- D. True love values inner qualities rather than physical appearance

Ans: D. True love values inner qualities rather than physical appearance

165. If Anne Gregory changed her hair colour but people still admired only her appearance, what would the speaker most likely conclude?

- A. Changing one's appearance always changes people's opinions
- B. People often continue to judge others by their outward appearance
- C. Hair colour is more important than character
- D. Anne Gregory should never change her hair

Ans: B. People often continue to judge others by their outward appearance

The Proposal - Anton Chekov

166. Why does Lomov visit Chubukov's house?

- A. To propose marriage
- B. To discuss farming
- C. To borrow money
- D. To attend a party

Ans: A. To propose marriage

167. What type of play is 'The Proposal'?

- A. Comedy
- B. Tragedy
- C. Farce
- D. Historical drama

Ans: C. Farce

168. What is the name of the disputed land in 'The Proposal'?

- A. Green Field
- B. Oxen Meadows
- C. Cherry Garden
- D. Oak Farm

Ans: B. Oxen Meadows

169. Lomov's constant complaints about his health suggest that he is:

- A. Brave
- B. Overly anxious about his health
- C. Careless
- D. Dishonest

Ans: B. Overly anxious about his health

170. What quality do Lomov and Natalya share?

- A. Patience
- B. Kindness
- C. Stubbornness
- D. Silence

Ans : C. Stubbornness

171. What does the ending of 'The Proposal' suggest?

- A. The characters have learned from their mistakes
- B. They will continue arguing even after marriage
- C. They will never speak again
- D. They will cancel the marriage

Ans: B. They will continue arguing even after marriage

172. Which health problem does Lomov repeatedly complain of throughout the play?

- A. Fever
- B. Headache
- C. Blindness
- D. Heart palpitations

Ans: D. Heart palpitations

173. Why does Lomov want to marry?

- A. For a peaceful life
- B. For money
- C. For adventure
- D. For travel

Ans: A. For a peaceful life

174. What do Lomov and Natalya first argue about?

- A. Dogs
- B. Money
- C. Land ownership
- D. Marriage

Ans: C. Land ownership

175. Who reveals Lomov's proposal to Natalya?

- A. Natalya
- B. Chubukov
- C. A servant
- D. A neighbour

Ans: B. Chubukov

176. Why do Lomov and Natalya quarrel over their dogs?

- A. Because each believes their own dog is superior
- B. To decide which dog should be sold
- C. Because both dogs are missing
- D. Because they want to exchange their dogs

Ans: A. Because each believes their own dog is superior

177. Which action by Lomov and Natalya best shows that pride can create unnecessary conflicts?

- A. They greet each other politely
- B. They decide not to meet again
- C. They agree to settle the dispute peacefully
- D. They continue arguing instead of discussing the marriage

Ans: D. They continue arguing instead of discussing the marriage

178. What would have been the most effective way for Lomov and Natalya to avoid their unnecessary quarrels?

- A. Continue arguing until someone wins
- B. End the marriage proposal immediately
- C. Listen to each other patiently and resolve the disagreement calmly
- D. Ignore each other's opinions completely

Ans: C. Listen to each other patiently and resolve the disagreement calmly

179. How does Natalya react when she hears about Lomov's proposal?

- A. She refuses him immediately
- B. She cries
- C. She ignores the proposal
- D. She wants Lomov to return at once

Ans: D. She wants Lomov to return at once

180. If Lomov and Natalya had listened patiently to each other during their disagreements, what would most likely have happened?

- A. Their arguments would have ended more quickly
- B. They would have become enemies forever
- C. Chubukov would have cancelled the proposal
- D. The dispute over the dogs would have become more serious

Ans: A. Their arguments would have ended more quickly

Supplementary Reader:

A Triumph of Surgery - James Herriot

181. Why did Dr. Herriot decide to take Tricki away from Mrs. Pumphrey's house?

- A. Tricki had a contagious disease
- B. He believed a change in routine and controlled care was necessary
- C. Mrs. Pumphrey wanted to sell Tricki
- D. Tricki needed an operation at the hospital

Ans: B. He believed a change in routine and controlled care was necessary

182. Which quality of Dr. Herriot is best reflected in the story 'A Triumph of Surgery'?

- A. Greed for money
- B. Fear of difficult cases
- C. Patience and practical wisdom
- D. Strictness towards all pet owners

Ans: C. Patience and practical wisdom

183. Why did Mrs. Pumphrey think Tricki's recovery was a "triumph of surgery"?

- A. She believed Dr. Herriot had performed a difficult operation
- B. She knew Tricki had recovered without any treatment
- C. She had watched the entire treatment herself
- D. She believed only expensive medicines could cure Tricki

Ans: A. She believed Dr. Herriot had performed a difficult operation

184. What was the real “triumph of surgery” in the story?
- A. Tricki underwent a complex operation
 - B. Dr. Herriot prescribed powerful medicines
 - C. Mrs. Pumphrey learned veterinary skills
 - D. Tricki recovered through proper care, diet, and exercise

Ans: D. Tricki recovered through proper care, diet, and exercise

185. Which of the following best reflects the lesson on real-life pet care conveyed in the story ‘A Triumph of Surgery’?

- A. Pets do not need exercise
- B. Excessive pampering can harm pets
- C. Medicine is always necessary for sick pets
- D. Feeding more treats is the key to love

Ans: B. Excessive pampering can harm pets

THE THIEF’S STORY

- Ruskin Bond

186. Why did the thief approach Anil?

- A. To rob him immediately
- B. To ask for money
- C. To gain his trust and rob later
- D. To become his friend

Ans: C. To gain his trust and rob later

187. Why did Hari Singh hesitate to board the train?

- A. He was scared of police
- B. He felt guilty
- C. He had no ticket
- D. He was tired

Ans: B. He felt guilty

188. Hari said Anil was the most trusting person he ever met. How did this trust make Hari feel?

- A. It made him feel bad and made it harder for him to steal
- B. It made him happy because stealing would be easy.
- C. It made him think Anil was foolish.
- D. It made him want to steal even more money.

Ans: A. It made him feel bad and made it harder for him to steal

189. Hari tied the money to his pyjamas and hurried to the station. What does this hurry represent in the story?

- A. His fear of missing the last train of the night.
- B. The sudden rush of excitement and anxiety that comes right after committing a crime.
- C. His desire to get to the station before it started raining.
- D. His plan to count the money safely at the railway station.

Ans: B. The sudden rush of excitement and anxiety that comes right after committing a crime.

190. At the end of the story, Hari decides to become an educated and respectable man. What truly caused this change in him?

- A. The fear of getting caught by the police the next time he stole.
- B. The fact that he was tired of living a life on the run.
- C. The realization that six hundred rupees is not a lot of money.
- D. Anil's unconditional faith and the promise to teach him how to write.

Ans: D. Anil's unconditional faith and the promise to teach him how to write.

A QUESTION OF TRUST
- Victor Canning

191. How did Horace Danby get the money to buy the books he loved?

- A. By making locks
- B. By working in a library
- C. By stealing from rich people's safes
- D. By selling paintings

Ans : C. By stealing from rich people's safes

192. Why didn't Horace Danby wear gloves while opening the safe for the lady in red?

- A. Because he forgot them in his bag
- B. Because he wanted to work faster
- C. Because he trusted the woman and was in a hurry to please her
- D. Because he thought the safe was already broken

Ans : C. Because he trusted the woman and was in a hurry to please her

193. What physical ailment did Horace Danby suffer from, which made him sneeze?

- A. Asthma
- B. Hay fever
- C. Arthritis
- D. Chronic bronchitis

Ans: B. Hay fever

194. Who did the young lady in red claim to be when Horace encountered her in the drawing room?

- A. The wife of the owner of the house
- B. The caretaker's daughter
- C. A visiting friend of the family
- D. A wealthy neighbour

Ans: A. The wife of the owner of the house

195. What was the ultimate consequence of Horace's trust in the lady in red?

- A. He was sent to prison because his fingerprints were found on the safe
- B. He escaped with the jewels but gave up stealing forever
- C. The lady in red gave him a share of the stolen jewels
- D. He became a locksmith assistant in the prison

Ans: A. He was sent to prison because his fingerprints were found on the safe

Footprints Without Feet
- H. G. Wells

196. Who followed the muddy footprints?

- A. The landlord
- B. Two girls
- C. Mr. and Mrs. Hall
- D. Two boys

Ans: D. Two boys

197. The shop of the theatrical company was situated at:

- A. Griffin Lane
- B. London Lane
- C. Drury Lane
- D. Iping Lane

Ans: C. Drury Lane

198. Instead of working honestly, Griffin used his invisibility to steal from innocent people. What does this tell us about him?

- A. He is a good person who just needed a little help.
- B. He does not care about hurting others as long as he gets what he wants.
- C. He is just playing a harmless joke on his neighbors.
- D. He wants to share his money with the poor.

Ans: B. He does not care about hurting others as long as he gets what he wants.

199. Which option best describes Mrs. Hall from 'Footprints Without Feet'?

- A. Hospitable but firm
- B. Scared and superstitious
- C. Accommodating but curious
- D. Opportunistic and insensitive

Ans. A. Hospitable but firm

200. What happened to Mr. Jaffers, the constable, when he tried to arrest the invisible man?

- A. He successfully tied Griffin up with a rope.
- B. He was knocked unconscious by Griffin and couldn't stop him.
- C. He decided to help Griffin escape from the angry crowd.
- D. He ran away immediately because he was too scared to fight.

Ans: B. He was knocked unconscious by Griffin and couldn't stop him.

The Necklace - Guy de Maupassant

201. What does Matilda's reaction to the invitation reveal?

- A. She is humble
- B. She is content
- C. She cares about appearance
- D. She hates parties

Ans: C. She cares about appearance

202. What does Monsieur Loisel's decision to give Matilda his savings reveal about him?

- A. He was careless with money
- B. He cared more about Matilda's happiness than his own wishes
- C. He believed expensive clothes were unnecessary
- D. He wanted to impress others

Ans: B. He cared more about Matilda's happiness than his own wishes

203. Why did Matilda and her husband hide the truth from Madame Forestier?

- A. They feared admitting the loss and facing the consequences
- B. They planned to keep the necklace
- C. They believed someone would return it
- D. They forgot to inform her

Ans: A. They feared admitting the loss and facing the consequences

204. Which action by Matilda and her husband led to years of hardship?
- A. Accepting the invitation to the party
 - B. Borrowing the necklace
 - C. Replacing the necklace without informing Madame Forestier of the loss
 - D. Buying a new dress for the party

Ans: C. Replacing the necklace without informing Madame Forestier of the loss

205. What lesson does the story 'The Necklace' teach?
- A. Friends are not trustworthy
 - B. Money is everything
 - C. Parties are useless
 - D. Honesty and contentment are important

Ans: D. Honesty and contentment are important

Bholi
- K. A. Abbas

206. Who helped Bholi gain confidence?
- A. Her father
 - B. Her sisters
 - C. The villagers
 - D. Her teacher

Ans: D. Her teacher.

207. What does Bholi's eagerness to attend school later in the story show?
- A. She wanted to leave her home.
 - B. She realised the value of education.
 - C. She wanted to become famous.
 - D. She wished to avoid household work.

Ans: B. She realised the value of education.

208. Why did Bholi refuse to marry Bishamber?
- A. He was poor
 - B. He was old
 - C. He demanded dowry
 - D. He lived far away

Ans: C. He demanded dowry.

209. Which quality of Bholi is best reflected when she rejects the marriage proposal?
- A. Pride
 - B. Courage and self-respect
 - C. Jealousy
 - D. Carelessness

Ans: B. Courage and self-respect.

210. What does Bholi's transformation by the end of the story mainly show?
- A. Education gives confidence and self-respect.
 - B. Wealth brings happiness.
 - C. Marriage is the only goal in life.
 - D. Beauty is more important than character.

Ans: A. Education gives confidence and self-respect.

Grammar

**In the Board Examination Q. No 15-20
(6 MCQs) will be on Grammar
(Tenses, Modals, Determiners, Subject-
verb Concord and Reported Speech)**

TENSES

211. Seema _____ to school every day.

- A. go
- B. went
- C. going
- D. goes

Ans: D. goes

212. I _____ this movie twice this week.

- A. saw
- B. have seen
- C. seeing
- D. see

Ans: B. have seen

**213. The boy _____ for the
examination all week.**

- A. has studied
- B. has been studying
- C. studies
- D. was studying

Ans: B. has been studying

**214. They _____ football at 5 p.m.
yesterday.**

- A. play
- B. played
- C. were playing
- D. have played

Ans: C. were playing

**215. By the time we arrived, she _____
her homework.**

- A. had finished
- B. finished
- C. has finished
- D. finishes

Ans: A. had finished

**216. By next month, he _____ at this
company for ten years.**

- A. work
- B. will work
- C. will have worked
- D. will have been working

Ans: D. will have been working

217. Listen! The baby _____ loudly.

- A. cries
- B. cried
- C. is crying
- D. has cried

Ans: C. is crying

218. We _____ the museum yesterday.

- A. explore
- B. explored
- C. have explored
- D. are exploring

Ans: B. explored

**219. She _____ her grandparents next
Sunday.**

- A. visits
- B. visited
- C. will visit
- D. visiting

Ans: C. will visit

**220. At this time tomorrow, they _____
to Delhi.**

- A. will be travelling
- B. travel
- C. travelled
- D. have travelled

Ans: A. will be travelling

**221. By next month, we _____ the
project.**

- A. complete
- B. completed
- C. will have completed
- D. have completed

Ans: C. will have completed

222. She _____ for the competition for several weeks before she fell ill.

- A. practised
- B. was practising
- C. has been practising
- D. had been practising

Ans: D. had been practising

223. The children have been waiting for the bus since morning.

- A. Present Perfect
- B. Present Perfect Continuous
- C. Present Continuous
- D. Past Perfect Continuous

Ans: B. Present Perfect Continuous

224. By the end of this month, she will have completed the course.

- A. Simple Future
- B. Future Continuous
- C. Future Perfect
- D. Future Perfect Continuous

Ans: C. Future Perfect

225. He was cooking dinner in the kitchen.

- A. Past Continuous
- B. Simple Past
- C. Present Continuous
- D. Past Perfect

Ans: A. Past Continuous

MODALS

226. She _____ play the piano very well.

- A. should
- B. must
- C. might
- D. can

Ans: D. can

227. You _____ submit your assignment by tomorrow; it is compulsory.

- A. may
- B. must
- C. can
- D. could

Ans: B. must

228. I _____ visit my grandparents if I have time.

- A. will
- B. must
- C. might
- D. shall

Ans: C. might

229. _____ I borrow your pen for a moment?

- A. May
- B. Must
- C. Shall
- D. Should

Ans: A. May

230. You _____ take some rest; you look tired.

- A. must
- B. can
- C. should
- D. might

Ans: C. should

231. How _____ you speak to your teacher like that?

- A. may
- B. can
- C. should
- D. dare

Ans: D. dare

232. We ____ wear helmets while riding a motorcycle.

- A. can
- B. must
- C. might
- D. could

Ans: B. must

233. ____ you help me carry these bags, please?

- A. Could
- B. Can
- C. Shall
- D. Must

Ans: A. Could

234. It is cloudy. It ____ rain later in the evening.

- A. should
- B. can
- C. might
- D. ought to

Ans: C. might

235. You ____ eat too much junk food if you want to stay healthy.

- A. need not
- B. cannot
- C. may not
- D. should not

Ans: D. should not

236. She ____ solve difficult Maths problems when she was in Class VIII.

- A. can
- B. could
- C. must
- D. shall

Ans: B. could

237. You ____ leave early today if you have finished your work.

- A. may
- B. must
- C. ought to
- D. should

Ans: A. may

238. We ____ meet our grandparents during the summer vacation.

- A. will
- B. must
- C. need
- D. ought to

Ans: A. will

239. You ____ apologise for your mistake; it is the right thing to do.

- A. will
- B. can
- C. might
- D. ought to

Ans: D. ought to

240. You ____ carry an umbrella today; the weather forecast says it will be sunny.

- A. must not
- B. need not
- C. should
- D. may

Ans: B. need not

DETERMINERS

241. ____ boy standing near the gate is my brother.

- A. A
- B. The
- C. Some
- D. Any

Ans: B. The

242. She did not have ____ money to pay the bill.

- A. some
- B. many
- C. few
- D. any

Ans: D. any

243. ____ students were absent yesterday.

- A. Each
- B. Either
- C. Many
- D. Much

Ans: C. Many

244. She spent ____ hour reviewing the documents carefully.

- A. a
- B. an
- C. the
- D. some

Ans: B. an

245. He bought ____ books from the store.

- A. every
- B. much
- C. a little
- D. a few

Ans: D. a few

246. He gave me ____ advice about my career.

- A. many
- B. a few
- C. some
- D. few

Ans: C. some

247. There isn't ____ time left before the examination begins.

- A. many
- B. much
- C. few
- D. several

Ans: B. much

248. I have visited this museum ____ times before.

- A. several
- B. much
- C. every
- D. little

Ans: A. several

249. There is ____ sugar left in the jar.

- A. many
- B. few
- C. little
- D. several

Ans: C. little

250. ____ student in the class received a certificate.

- A. Every
- B. Several
- C. Few
- D. Much

Ans: A. Every

251. ____ students attended the extra class because of the heavy rain.

- A. Few
- B. Much
- C. Every
- D. Any

Ans: A. Few

252. I was grateful for ____ friends who stood by me during difficult times.

- A. few
- B. a few
- C. the few
- D. several

Ans: C. the few

253. There isn't ____ water left in the bottle.

- A. some
- B. any
- C. many
- D. each

Ans: B. any

254. The teacher spoke to ____ student individually.

- A. each
- B. many
- C. much
- D. little

Ans: A. each

255. ____ team played well in the football final match.

- A. Several
- B. Little
- C. Much
- D. Neither

Ans: D. Neither

SUBJECT-VERB CONCORD

256. Everybody ____ excited about the trip.

- A. is
- B. are
- C. were
- D. have

Ans: A. is

257. Each of the students ____ a notebook.

- A. have
- B. has
- C. are
- D. is

Ans: B. has

258. Neither Ramesh nor his friends ____ coming to the party.

- A. is
- B. are
- C. was
- D. has been

Ans: B. are

259. The jury ____ divided in their opinions.

- A. has
- B. have
- C. is
- D. are

Ans: D. are

260. Many a man ____ lost his way in the forest.

- A. were
- B. is
- C. has
- D. have

Ans: C. has

261. The police ____ investigating the case.

- A. is
- B. are
- C. was
- D. were

Ans: B. are

262. Ten kilometres ____ a long distance to walk every day.

- A. are
- B. is
- C. were
- D. have

Ans: B. is

263. The quality of the apples ____ excellent.

- A. are
- B. were
- C. have
- D. is

Ans: D. is

264. A number of students ____ absent today.

- A. is
- B. was
- C. are
- D. has

Ans: C. are

265. The number of students in the class ____ increasing every year.

- A. is
- B. are
- C. have
- D. were

Ans: A. is

266. The furniture in this room ____ very expensive.

- A. are
- B. were
- C. is
- D. have

Ans: C. is

267. My spectacles ____ on the table.

- A. is
- B. was
- C. has
- D. are

Ans: D. are

268. The United States ____ a developed country.

- A. is
- B. are
- C. were
- D. have

Ans: A. is

269. The rich ____ often expected to help the poor.

- A. is
- B. are
- C. has
- D. was

Ans: B. are

270. The cattle ____ grazing in the field.

- A. is
- B. has
- C. are
- D. was

Ans: C. are

REPORTED SPEECH

(Direct to Indirect Speech)

271. Mother said, "I met him yesterday."

- A. Mother said that she met him yesterday.
- B. Mother said that she had met him yesterday.
- C. Mother said that she has met him yesterday.
- D. Mother said that she had met him the previous day.

Ans: D. Mother said that she had met him the previous day.

272. He said to me, "Where do you live?"

- A. He asked me where I lived.
- B. He asked me where did I live.
- C. He asked me where do I live.
- D. He asked me where I live.

Ans: A. He asked me where I lived.

273. The teacher said to the students, "Work hard."

- A. The teacher said to the students work hard.
- B. The teacher advised the students to work hard.
- C. The teacher ordered the students work hard.
- D. The teacher told the students work hard.

Ans: B. The teacher advised the students to work hard.

274. Father said to me, "Do not waste time."

- A. Father advised me not to waste time.
- B. Father told me not waste time.
- C. Father advised me to not waste time.
- D. Father said to me not to waste time.

Ans: A. Father advised me not to waste time.

275. He said, "How beautiful the garden is!"

- A. He said the garden was beautiful.
- B. He exclaimed the garden is beautiful.
- C. He told the garden was beautiful.
- D. He exclaimed with joy that the garden was very beautiful.

Ans: D. He exclaimed with joy that the garden was very beautiful.

276. The teacher said, "Honesty is the best policy."

- A. The teacher said honesty was the best policy.
- B. The teacher said honesty has been the best policy.
- C. The teacher said that honesty is the best policy.
- D. The teacher told that honesty is the best policy.

Ans: C. The teacher said that honesty is the best policy.

277. She said, "I am learning French."

- A. She said that she is learning French.
- B. She said that she was learning French.
- C. She said that she had learnt French.
- D. She said that she has been learning French.

Ans: B. She said that she was learning French.

278. Anita said, “I lost my keys last night.”

- A. Anita said that she lost her keys last night.
- B. Anita said that she had lost her keys the previous night.
- C. Anita said that she has lost her keys the previous night.
- D. Anita said that she had lost her keys last night.

Ans: B. Anita said that she had lost her keys the previous night.

279. She said to me, “Do you understand this lesson?”

- A. She asked me if I understood that lesson.
- B. She asked me that I understood that lesson.
- C. She asked me whether did I understand that lesson.
- D. She asked me if I understand this lesson.

Ans: A. She asked me if I understood that lesson.

280. The teacher said to the student, “When did you submit the form?”

- A. The teacher asked the student when he submitted the form.
- B. The teacher asked the student when had he submitted the form.
- C. The teacher asked the student when he had submitted the form.
- D. The teacher asked the student when did he submit the form.

Ans: C. The teacher asked the student when he had submitted the form.

281. The principal said to the students, “Maintain discipline.”

- A. The principal told the students maintain discipline.
- B. The principal ordered the students to maintain discipline.
- C. The principal said that the students should maintain discipline.
- D. The principal requested the students maintaining discipline.

Ans: B. The principal ordered the students to maintain discipline.

282. The guard said to us, “Do not enter this gate.”

- A. The guard warned us not to enter that gate.
- B. The guard said to us not enter that gate.
- C. The guard ordered us do not enter that gate.
- D. The guard requested us not entering that gate.

Ans: A. The guard warned us not to enter that gate.

283. He said to his friends, “Let us leave early.”

- A. He ordered his friends to leave early.
- B. He requested his friends to leave early.
- C. He suggested to his friends that they should leave early.
- D. He told his friends that they left early.

Ans: C. He suggested to his friends that they should leave early.

284. The old man said, “May God bless you!”

- A. The old man said that God blessed me.
- B. The old man prayed that God might bless me.
- C. The old man wished me good luck.
- D. The old man said that God will bless me.

Ans: B. The old man prayed that God might bless me.

285. The boy said, “Hurrah! We won the match.”

- A. The boy said that they won the match.
- B. The boy exclaimed with joy that they had won the match.
- C. The boy exclaimed that they won the match.
- D. The boy said with joy that they have won the match.

Ans: B. The boy exclaimed with joy that they had won the match.

(Indirect to Direct Speech)

286. The stranger asked me if I could drive a car.

- A. The stranger said to me, “Can you drive a car?”
- B. The stranger said to me, “Could I drive a car?”
- C. The stranger said to me, “Will you drive a car?”
- D. The stranger said to me, “Do you drive a car?”

Ans: A. The stranger said to me, “Can you drive a car?”

287. She advised him to consult a doctor immediately.

- A. She said to him, “Consulted a doctor immediately.”
- B. She said to him, “Consult a doctor immediately.”
- C. She said to him, “You consult a doctor immediately.”
- D. She said to him, “To consult a doctor immediately.”

Ans: B. She said to him, “Consult a doctor immediately.”

288. Jenny exclaimed with joy that she had passed the test.

- A. Jenny said, “How I passed the test!”
- B. Jenny said, “I passed the test.”
- C. Jenny said, “I have passed the test.”
- D. Jenny said, “Hurrah! I have passed the test!”

Ans: D. Jenny said, “Hurrah! I have passed the test!”

289. She asked the boys why they were making so much noise.

- A. She said to the boys, “Why had you been making so much noise?”
- B. She said to the boys, “Why are you making so much noise?”
- C. She said, “Why you are making so much noise?”
- D. She said, “Why did you making so much noise?”

Ans: B. She said to the boys, “Why are you making so much noise?”

290. He asked me who would represent the team.

- A. He said to me, "Who would represent the team?"
- B. He said to me, "Who will represent this team?"
- C. He said to me, "Who represents the team?"
- D. He said to me, "Who did represent the team?"

Ans: A. He said to me, "Who will represent the team?"

291. The man told her that he was waiting there for her brother.

- A. The man said to her, "I am waiting there for your brother."
- B. The man said to her, "I waited here for your brother."
- C. The man said to her, "I am waiting here for your brother."
- D. The man said to her, "I was waiting there for your brother."

Ans: C. The man said to her, "I am waiting here for your brother."

292. She said that she was tired that day.

- A. She said, "I am tired today."
- B. She said, "I was tired today."
- C. She said, "I am tired that day."
- D. She said, "I have been tired today."

Ans: A. She said, "I am tired today."

293. He told me that he had lost his wallet the previous day.

- A. He said to me, "I had lost my wallet yesterday."
- B. He said to me, "I lose my wallet yesterday."
- C. He said to me, "I have lost my wallet the previous day."
- D. He said to me, "I lost my wallet yesterday."

Ans: D. He said to me, "I lost my wallet yesterday."

294. She asked me if I liked music.

- A. She said to me, "Did you like music?"
- B. She said to me, "Do you like music?"
- C. She said to me, "Will you like music?"
- D. She said to me, "Have you liked music?"

Ans: B. She said to me, "Do you like music?"

295. She asked where I was going.

- A. She said to me, "Where were you going?"
- B. She said to me, "Where do you go?"
- C. She said to me, "Where are you going?"
- D. She said to me, "Where have you gone?"

Ans: C. She said to me, "Where are you going?"

296. The teacher told the students to sit quietly.

- A. The teacher said to the students, "Sit quietly."
- B. The teacher said to the students, "You sit quietly."
- C. The teacher said to the students, "To sit quietly."
- D. The teacher said to the students, "Sitting quietly."

Ans: A. The teacher said to the students, "Sit quietly."

297. She requested him to close the window.

- A. She said to him, "Close the window."
- B. She said to him, "Please close the window."
- C. She said to him, "You close the window."
- D. She said to him, "To close the window."

Ans: B. She said to him, "Please close the window."

298. He suggested that they should try again.

- A. He said to them, "Try again."
- B. He said to them, "You should try again."
- C. He said to them, "Let us try again."
- D. He said to them, "Please try again."

Ans: C. He said to them, "Let us try again."

299. The old man prayed that God might help him.

- A. The old man said, "God helps me!"
- B. The old man said, "May God help me!"
- C. The old man said, "God will help me!"
- D. The old man said, "Please help me, God!"

Ans: B. The old man said, "May God help me!"

300. He exclaimed with sorrow that he had lost his watch.

- A. He said, "I lost my watch!"
- B. He said, "I had lost my watch!"
- C. He said, "What a watch I lost!"
- D. He said, "Alas! I have lost my watch!"

Ans: D. He said, "Alas! I have lost my watch!"

Reading Comprehension

In the Board Examination

Q.No.21-30(10 MCQs) will be based on the passage given

COMPREHENSION PASSAGE

Nature plays a vital role in maintaining balance on Earth. Forests, rivers, mountains, and oceans provide resources that support life for humans, animals, and plants. Trees produce oxygen, absorb carbon dioxide, and help regulate the climate. They also prevent soil erosion and provide shelter and food for many living creatures. Because of these benefits, forests are often called the “lungs of the Earth.”

However, in recent years, human activities have caused serious damage to the natural environment. Large areas of forests are being cut down for agriculture, construction, and industrial development. This process, known as deforestation, leads to the loss of wildlife habitats and reduces biodiversity. Many animals lose their homes and may even face extinction when forests disappear.

Pollution is another major threat to nature. Air pollution from vehicles and factories harms both the environment and human health. Water pollution caused by waste and chemicals affects rivers and oceans, making the water unsafe for aquatic life. Plastic waste is also becoming a serious problem because it takes many years to decompose and often harms animals that accidentally consume it.

Despite these challenges, people around the world are becoming more aware of the need to protect the environment. Governments and organizations are encouraging tree planting, recycling, and the use of renewable energy sources such as solar and wind power. Individuals can also contribute by reducing waste,

conserving water, and protecting natural habitats.

In conclusion, protecting nature is a shared responsibility. If people take small but meaningful actions to care for the environment, future generations will be able to enjoy a healthy and balanced planet.

MCQs (SOLVED)

1. What is the main topic of the passage?

- A. The importance of protecting nature
- B. The development of cities
- C. The benefits of factories
- D. The history of forests

Ans: A

2. Forests are called the “lungs of the Earth” because they:

- A. Produce oxygen and absorb carbon dioxide
- B. Contain many animals
- C. Are very large
- D. Have tall trees

Ans: A

3. What is deforestation?

- A. Planting new trees
- B. Cutting down large areas of forests
- C. Protecting wildlife
- D. Cleaning rivers

Ans: B

4. One result of deforestation is

- A. Increased biodiversity
- B. Loss of wildlife habitats
- C. Cleaner air
- D. More rainfall

Ans: B

5. Air pollution mainly comes from

- A. Rivers and lakes
- B. Vehicles and factories
- C. Trees and plants
- D. Animals

Ans: B

6. Water pollution affects

- A. Only humans
- B. Only plants
- C. Aquatic life in rivers and oceans
- D. Only forests

Ans: C

7. Why is plastic waste a serious problem?

- A. It disappears quickly
- B. It improves soil quality
- C. It takes many years to decompose
- D. It increases oxygen

Ans: C

8. Which of the following is a renewable energy source mentioned in the passage?

- A. Coal
- B. Oil
- C. Solar power
- D. Gasoline

Ans: C

9. Individuals can help protect nature by

- A. Increasing waste
- B. Conserving water and recycling
- C. Cutting more trees
- D. Ignoring pollution

Ans: B

10. The passage concludes that protecting nature is

- A. The government's job only
- B. Impossible
- C. A shared responsibility
- D. Not important

Ans: C

Section – B

ANALYTICAL PASSAGE

This Section will contain one Question on Reading Comprehension through Case Based Factual Passage (with visual input statistical data, chart, etc) At the end of the passage there will be 10 questions. Each question carries one mark. Read the passage and the statistical data care-fully before answering.

1. A recent survey was conducted among 500 students of four senior secondary schools to understand how teenagers spend their free time after school. The survey divided activities into five categories: sports, reading, social media, television, and creative hobbies such as painting, music, and photography.

The findings revealed that 40% of the students spent most of their free time on social media. Sports was the second most preferred activity, chosen by 25% of the students. Reading attracted 15% of the students, while television accounted for 10%. The remaining 10% preferred creative hobbies.

The survey also showed a difference between students living in urban and rural areas. Urban students spent more time on social media and television, whereas rural students participated more in sports and creative hobbies. Researchers observed that students who regularly engaged in sports or creative hobbies generally reported lower stress levels and better concentration in studies.

Another important finding was related to academic performance. Students who spent more than four hours daily on social media showed a decline in their grades over a six-month period. On the other hand, students who balanced recreational activities with study schedules performed better academically and emotionally.

Teachers involved in the survey suggested that schools should encourage students to participate in physical and creative activities. They believed that such activities help students develop discipline, teamwork, confidence, and problem-solving skills.

Chart Showing Students' Preferred Activities

Activity	Percentage of Students
Social Media	40%
Sports	25%
Reading	15%
Television	10%
Creative Hobbies	10%

Questions with Answers

1. What was the main purpose of the survey?

Ans: The main purpose of the survey was to understand how teenagers spend their free time after school.

2. Which activity was the most preferred among students?

Ans: Social media was the most preferred activity among students.

3. What percentage of students preferred sports?

Ans: 25% of the students preferred sports.

4. Which two activities were chosen by the smallest number of students?

Ans: Television and creative hobbies were chosen by the smallest number of students.

5. How did the interests of urban students differ from those of rural students?

Ans: Urban students spent more time on social media and television, whereas rural students participated more in sports and creative hobbies.

6. Which group of students reported lower stress levels?

Ans: Students who regularly engaged in sports or creative hobbies reported lower stress levels.

7. What happened to students who spent more than four hours daily on social media?

Ans: Students who spent more than four hours daily on social media showed a decline in their grades.

8. Which students performed better academically and emotionally?

Ans: Students who balanced recreational activities with study schedules performed better academically and emotionally.

9. Name any two qualities developed through physical and creative activities.

Ans: Two qualities developed through physical and creative activities are discipline and teamwork.

10. What conclusion can be drawn from the passage?

Ans: The passage concludes that balanced participation in physical and creative activities is beneficial for students' academic performance, emotional well-being, and overall development.

Section – C
LETTER WRITING

1. You are Ruchi / Rohan, a student of Class X. Many students spend excessive time on mobile phones and social media which affects their studies and health. Write a letter to the Editor of a newspaper expressing your concern and suggesting ways in which students can use technology responsibly.

Answer:

Shillong
12th March, 2026

To
The Editor
The Shillong Times
Shillong

Subject: Excessive use of mobile phones
among students

Sir/Madam,

I wish to draw attention to the increasing dependence of students on mobile phones and social media. A large number of students spend excessive time online, which is adversely affecting their academic performance, concentration, and physical as well as mental health. Prolonged screen time often leads to reduced outdoor activity, poor sleep patterns, and a decline in interpersonal communication skills.

It is essential for parents and teachers to guide students towards responsible use of technology. Schools should organise awareness programmes and encourage disciplined digital habits. Setting time limits, promoting educational use of devices, and engaging students in sports and creative activities can help maintain a healthy balance.

I sincerely hope that this issue will be addressed so that students can use technology wisely and develop healthier lifestyles.

Yours faithfully,
Rohan Gupta

2. You are Maria D'Souza/ Robert D'Cruz, a resident of Police Bazaar, Shillong. The drains in your locality are often blocked, leading to foul smell and health hazards. Write a letter to the Municipal Commissioner, complaining about the poor sanitation and requesting immediate action.

Answer:

Police Bazaar
Shillong – 793001

1st March, 2026

To
The Municipal Commissioner
Shillong Municipal Board
Shillong

Subject: Complaint regarding poor
sanitation

Sir/Madam,

I wish to draw your attention to the poor sanitation conditions in Police Bazaar. The drains in the area are frequently clogged, and garbage often remains uncollected for several days. This results in a foul smell and creates an unhygienic environment, posing serious health risks to residents and visitors alike. The situation worsens during rainy days when overflowing drains spread waste across the streets.

Immediate steps must be taken to clean the drains and ensure regular and timely garbage collection. The municipal authorities should increase monitoring

and deploy sufficient staff to manage waste effectively. Public awareness about proper disposal of garbage should also be promoted to prevent further deterioration of the area.

I sincerely hope the concerned authorities will take prompt action to improve sanitation and ensure a cleaner and healthier environment for all.

Yours faithfully,
Maria D'Souza

3. You are Aiban/ Aimeka Lyngdoh, a resident of Laitumkhrah, Shillong. Many street lights in your locality have not been working for the past two weeks, causing inconvenience and safety issues at night. Write a letter to the Area Manager, MePDCL, Shillong, requesting immediate repair of the street lights.

Answer:
Laitumkhrah
Shillong – 793003

10th February, 2026

To
The Area Manager
MePDCL
Shillong – 793001

Subject: Complaint regarding non-functional street lights

Sir/Madam,

I wish to draw your attention to the issue of non-functional street lights in Laitumkhrah. A large number of street lights in our locality have not been working for the past two weeks, causing serious inconvenience to residents. The streets remain poorly lit at night, making it difficult for people to move around safely. Students returning home in the evening and elderly residents face particular difficulty due to the darkness.

The absence of proper lighting has also increased the chances of accidents and encouraged anti-social activities in the area. This situation poses a threat to the safety and security of the residents.

I request the concerned authorities to take immediate steps to repair the faulty street lights and restore proper illumination. Regular inspection and maintenance should also be ensured to prevent recurrence of such issues.

I hope that prompt action will be taken to resolve this problem at the earliest.

Yours faithfully,
Aiban Lyngdoh

ARTICLE WRITING

1. In today's age of stress and anxiety, the children need to understand the importance of sleep, meditation and yoga over social networking and the use of the cell phone. Write an article, in about 120-150 words, on 'Concentration and Composure, the Need of the Hour'. You are Kyfer / Jessica

Answer:

Concentration and Composure, the Need of the Hour

By Jessica

Modern life is fast-paced and stressful, especially for children. Excessive use of mobile phones and social networking has disturbed their daily routine. Many children stay awake late at night using gadgets, which affect their sleep and reduce their concentration and alertness during the day. Lack of proper sleep can also lead to health problems such as anxiety, obesity, and depression.

It is important for children to understand the value of a balanced lifestyle. Adequate sleep helps in restoring energy and improving focus. Along with this, yoga

and meditation play a vital role in reducing stress and enhancing mental peace. These practices help children remain calm, composed, and attentive in their studies.

Parents and teachers must encourage children to limit screen time and adopt healthy habits. Developing concentration and composure is essential for a healthy and successful life.

2. Video games, Internet, cell phones and other high-tech gear are just part of growing up in a digital world. But parents are concerned about the amount of time their children spend with these and worry that it might be distracting to them and cramping their academic and social development. Write an article, in about 120-150 words, for your school magazine describing both the benefits and drawbacks of using these high-tech devices. You are Aman / Akshita.

Answer:

High Tech Devices – A Boon or Bane

By Aman

In today's digital world, high-tech devices like mobile phones, the internet, and video games have become an essential part of life. They offer many benefits such as easy access to information, online learning, and better communication. Students can enhance their knowledge and stay updated with the latest developments through these technologies.

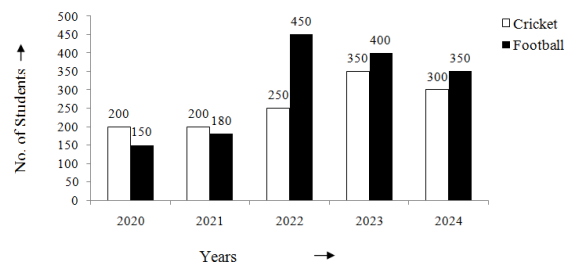
However, excessive use of such devices can have negative effects. Spending long hours on screens may lead to poor eyesight, disturbed sleep, and reduced physical activity. It also distracts students from their studies and limits real-life social interactions. Overdependence on technology can affect both academic performance and personal development.

Therefore, it is important to use these devices wisely and in moderation. With proper guidance from parents and teachers, students can benefit from technology without harming their health or studies.

ANALYTICAL PARAGRAPH

1. The given bar graph shows the preferences of children in a school in playing different games over a period of five years. Write an analytical paragraph about the given information in about 100 to 120 words.

Trends in Student Preferences: Cricket vs. Football (2020–2024)

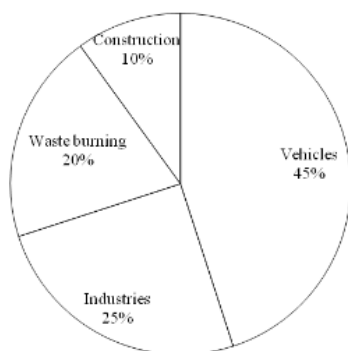


Ans: The provided bar graph illustrates the shifting preferences of school children for Cricket and Football over a five-year period from 2020 to 2024. Initially, Cricket was the more popular choice, with 200 students opting for it in both 2020 and 2021, while Football followed closely, growing from 150 to 180 students. A significant shift occurred in 2022, when interest in Football surged dramatically to its peak of 450 students, more than doubling its initial figures and comfortably overtaking Cricket (250). Although Cricket saw a steady rise to its own peak of 350 in 2023, Football remained the preferred sport with 400 students. By 2024, both sports experienced a slight decline, with Football

(350) maintaining a narrow lead over Cricket (300). Overall, the data reveals that while Cricket showed gradual growth, Football emerged as the more dominant sport from 2022 onwards despite a final-year dip.

2. Metropolitan cities in India are facing major problems due to the poor quality of air. The following pie chart shows the major causes of air pollution in these cities. Study the data and write an analytical paragraph in 120 – 150 words.

Causes of Air Pollution in Metropolitan Cities in India



Ans: The pie chart highlights the major causes of air pollution in metropolitan cities of India. Vehicles emerge as the largest contributor, accounting for 45% of total air pollution. The rapid increase in the number of private cars alongside inadequate public transport systems has intensified vehicular emissions in urban areas. Industries form the second major source at 25%, releasing harmful gases and particulate matter into the atmosphere. Waste burning contributes 20%, reflecting poor waste management practices and the open burning of garbage. Construction activities add another 10%, as dust and debris from building sites pollute the air. Overall, the data indicates that

transportation and industrial activities are the primary drivers of deteriorating air quality in India's metropolitan cities.

Section – D

Short Answer type questions: (2 marks each)

1. What did Lencho ask from God and why?

Ans: Lencho asked God for one hundred pesos in order to sow his field again and to live until the new crop came, as the hailstorm had completely destroyed his crops.

2. Why was the destruction of the crop a serious problem for Lencho's family?

Ans: The destruction of the crop was a serious problem for Lencho's family because it was their only source of livelihood. With the entire harvest ruined, they had no corn to sustain themselves and feared going hungry until the next harvest.

3. Why did Lencho call the post office employees crooks?

Ans: Lencho called the post office employees a bunch of crooks because he believed they had stolen 30 pesos from the money God had sent him. He had asked God for 100 pesos but received only 70. Since he firmly believed that God would never send him less than the amount requested, he blamed the post office employees for the missing money.

4. How do the symbols of fire and ice help the poet convey the central idea of the poem?

Ans: Fire symbolises desire, greed, and uncontrolled passion, while ice symbolises hatred and indifference.

Through these symbols, the poet shows that both emotions are equally capable of causing destruction and can ultimately lead to the end of the world.

5. Why does Robert Frost believe that fire can destroy the world?

Ans: Robert Frost believes that fire, which symbolises intense desire, can lead to greed, conflict, and chaos. Such uncontrolled emotions may drive people towards destructive actions, ultimately leading to the end of the world.

6. The poem 'Fire and Ice' warns against destructive emotions. Suggest any two ways by which people can control desire and hatred in everyday life.

Ans: People can control desire by practising contentment and self-discipline. Hatred can be controlled by developing empathy, forgiveness, and respect for others' feelings and opinions. These qualities help promote peace and harmony in society.

7. Why did the young seagull not jump off the ledge with his brothers and sister?

Ans: The young seagull did not jump because he was deeply afraid. When he ran to the edge and looked down at the vast, deep sea below, he panicked. He felt completely certain that his wings were too weak to support him and that he would fall and drown.

8. How did the parents train the young seagull's brothers and sister in the art of flight?

Ans: The parents trained the young seagull's brothers and sister by teaching them how to fly skillfully. They helped them learn to skim the waves and dive for fish.

9. What does the young seagull's successful flight teach us about facing our own fears?

Ans: The story teaches us that fear is often just a trick played by our own minds. The young seagull believed he could not fly, but his body was always capable of it. Similarly, we often hesitate to try new things out of fear, but once we take the first step, we realize we are more capable than we thought.

10. Was the pilot's decision to follow the unknown aeroplane justified? Give a reason.

Ans: Yes, the decision was justified because the pilot had lost his way and had no other safe option. Following the unknown aeroplane helped him navigate through the storm and reach safety successfully.

11. Why did the narrator want to meet the pilot of the black aeroplane?

Ans. The narrator wanted to meet the pilot of the black aeroplane because he wanted to thank its pilot. He had saved the narrator's life by guiding him out of the storm clouds. The narrator was able to land safely at an airport because of him.

12. What is the message that the narrator wants to give to the readers through the lesson 'The Black Aeroplane'?

Ans. The narrator wants to convey the message that we should never lose hope, even in the most hopeless situation. He himself was in a desperate situation when he lost contact with Paris control and all his instruments had stopped working. It was the mysterious pilot who guided him safely through the storm and gave him hope and confidence to survive.

13. Why is the ball so important to the boy in 'The Ball Poem'?

Ans: The ball is so important to the boy because it symbolises his childhood memories, experiences, and emotional attachment. Its loss is painful because it is not merely a toy but a cherished possession associated with a part of his life.

14. What does the poet teach us about dealing with loss through the boy's experience in 'The Ball Poem'?

Ans: The poet teaches us that loss is a natural part of life and must be accepted with courage and maturity. The boy's experience of losing his ball helps him learn an important life lesson and become emotionally stronger.

15. How might the boy's attitude towards his belongings change after losing the ball?

Ans: After losing the ball, the boy is likely to become more mature and thoughtful about his belongings. He may value them more deeply and understand that material possessions can be lost, making him emotionally stronger and more responsible.

16. Why was writing in a diary a strange experience for Anne Frank?

Ans: Writing in a diary was strange for Anne because she had never written a diary before. Moreover, she felt that, later on, neither she nor anyone else would be interested in the musings of a thirteen-year-old schoolgirl.

17. Why does Anne feel she is alone in the world despite having friends and family?

Ans: Anne has loving parents, a sister, and thirty "friends", but she lacks a true confidant. She can talk about ordinary things to the people around her but she cannot share her deepest feelings with any of them. This makes her feel lonely and isolated.

18. How does Anne's description of her relationship with her grandmother reveal her emotional sensibility?

Ans: Anne deeply loved her grandmother, stating that "no one knows how often I think of her and still love her". Her grief during her grandmother's illness and the intentional act of lighting a candle for her during Anne's own birthday celebration show her profound empathy, loyalty, and emotional maturity.

19. Why does the speaker say, "Don't bite your nails, Amanda!"?

Ans: The speaker says this to correct Amanda's habits and teach her proper behaviour. It shows the adults' concern for discipline, though their constant instructions make Amanda feel restricted.

20. How does Amanda use her imagination to cope with the constant instructions she receives?

Ans: Amanda escapes into her imaginary world whenever she is constantly instructed. By imagining herself as a mermaid, an orphan, and Rapunzel, she finds temporary peace, freedom, and relief from the pressure she experiences in real life.

21. Why does Amanda say that she will never let down her bright hair?

Ans: Amanda says this while imagining herself as Rapunzel living alone in a peaceful tower. She does not want anyone to enter her tower because she longs for freedom and wishes to escape from constant instructions and interference.

22. How does the description of the tea gardens in the chapter “Tea from Assam” reflect the beauty and richness of the region?

Ans: The writer describes the tea gardens as a “sea of tea bushes” stretching endlessly against the backdrop of wooded hills, showing their vast beauty. The neatly arranged rows and peaceful surroundings highlight both the scenic charm and natural richness of Assam as a tea-producing region.

23. Why was Rajvir excited during the train journey?

Ans: Rajvir was excited during the train journey because it was his first visit to Assam, the state with the largest concentration of tea plantations in the world. He had read a lot about tea and was eager to see the vast tea gardens with his own eyes.

24. Why did Pranjol’s father say that Rajvir had done his "homework" before coming?

Ans: Pranjol’s father said that Rajvir had done his "homework" because Rajvir correctly identified the "second-flush" or sprouting period when he saw a tractor carrying freshly plucked tea leaves. His knowledge about the second flush of tea, its season, and its high-quality yield

surprised and impressed Mr. Barua, Pranjol's father.

25. Why are the trees moving out into the forest?

Ans: The trees are moving out into the forest because they want to return to their natural habitat. Their movement symbolizes the desire for freedom and liberation from confinement.

26. In the poem, The Trees, how does the comparison with newly discharged patients help the readers understand the trees' condition?

Ans: The comparison with newly discharged patients helps readers understand that the trees are slowly adjusting to freedom after being confined indoors for a long time. Just as patients take careful, uncertain steps while recovering, the trees also move gradually towards the forest, suggesting both renewal and the struggle to regain their natural place.

27. How does the poem, “The Trees”, encourage readers to develop sensitivity towards nature?

Ans: The poem reminds readers that nature has its own rightful place and should not be confined or exploited. It encourages respect, care, and harmony with the environment.

28. What information did Valli gather about the bus journey?

Ans: Valli learned that the town was six miles from her village. She also found out that the bus journey took about forty-five minutes and that the fare was thirty paise for a one-way trip.

29. How does Valli manage to save money for her bus journey?

Ans: Valli saves sixty paise by carefully controlling her small expenses. She resists buying peppermints and toys and even gives up riding the merry-go-round at the village fair.

30. Why did the conductor call Valli ‘Madam’?

Ans: The conductor called Valli “Madam” playfully because she behaved confidently and insisted that she was not a child. He appreciated her self-confidence and treated her with friendly respect.

31. What was the appearance of the dragon?

Ans: Custard the dragon had big sharp teeth, spikes on his head, and scales underneath his body and spikes on top. His mouth was like a fireplace, his nose like a chimney, and his toes were sharp like daggers.

32. How is the behavior of the other pets funny when the pirate enters the house?

Ans: It is funny because the other pets (Ink, Blink, and Mustard) always bragged about how brave they were, but they ran away in fear when a real pirate arrived. Only Custard, who was called a coward, stayed back and fought.

33. How did the characters react after the pirate’s death regarding their bravery?

Ans: After the pirate’s death, Mustard claimed he would have been twice as brave if he had not been nervous. Ink and Blink boasted that they would have been three times as brave as Custard. Custard humbly agreed and said that they were indeed braver than him.

34. What task did the Buddha give to Kisa Gotami?

Ans: The Buddha asked Kisa Gotami to bring a handful of mustard seed from a house where no one had ever died. This was to help her understand the truth about death.

35. What did Kisa Gotami learn from the people she met during her search for mustard seeds?

Ans: Kisa Gotami learned that every family had experienced the death of a loved one. This helped her understand that sorrow and death are common to all human beings.

36. How does the Buddha’s approach to helping Kisa Gotami reflect compassion and wisdom?

Ans: Instead of directly advising her, the Buddha guided Kisa Gotami to discover the truth herself. This compassionate and wise approach helped her realise that death is a universal reality and enabled her to accept her loss.

37. Why does the poet think young men love Anne Gregory?

Ans: The poet believes that young men love Anne Gregory for her outward beauty, especially her golden hair. Their love is based more on appearance than on her inner qualities.

38. The young woman’s hair is yellow coloured. She is ready to change her hair colour to another colour. Why would she want to do so?

Ans. The young woman is willing to do so because she wants to be loved for her nature and her inner self rather than for her appearance. Furthermore, she wishes to be loved for her inner beauty rather than her yellow hair color.

39. What are Anne's views on external beauty?

Ans. Anne Gregory does not value external beauty and wishes to be loved for who she is. She claims that her beautiful hair, which attracts so many men, can be changed and coloured in various ways. This demonstrates Anne's belief that external beauty is unimportant and changeable.

40. What do Lomov and Natalya quarrel about first?

Ans: Lomov and Natalya first quarrel about the ownership of Oxen Meadows. Each of them claims that the land belongs to their family.

41. What health condition does Lomov have?

Ans: Lomov suffers from heart palpitations and nervousness. He constantly complains about these problems, which make him anxious and weak in stressful situations.

42. How is the title of the play "The Proposal" both ironic and suitable?

Ans: The title is suitable because the play centers on Lomov visiting his neighbor to ask for Natalya's hand in marriage. It is ironic because the characters spend the entire time fighting over petty issues like land and dogs instead of being romantic.

Supplementary Reader

43. Why did Dr. Herriot refuse to give Tricki any food for the first two days at the surgery?

Ans: Dr. Herriot did not give Tricki any food for the first two days because he wanted his digestive system to recover from the effects of overfeeding. This

helped Tricki regain his health without the need for medicines.

44. How did the other dogs at the surgery influence Tricki's recovery?

Ans: The other dogs were active and playful, which encouraged Tricki to move around and join them. This increased his physical activity and helped him regain his strength and vitality.

45. How did Mrs. Pumphrey show her concern for Tricki while he was at the surgery?

Ans: Mrs. Pumphrey showed her concern by calling Dr. Herriot frequently to enquire about Tricki's health. She also sent eggs, wine, and brandy, believing they would help him regain his strength.

46. What makes the thief feel guilty after stealing Anil's money?

Ans: The thief feels guilty because Anil had trusted him completely and treated him with kindness. This makes him realise that stealing from such a person is wrong.

47. What made Hari Singh go back to Anil's house?

Ans. Hari Singh decided to go back to Anil's house because he realised the importance of the education he was receiving from Anil. He knew that learning to read and write and being a literate person would open doors to many opportunities. He was sure that he would then be able to earn more than a few hundred rupees he had in hand at that time.

48. How was Hari Singh's 'appealing smile' at the end different from his similar smiles on earlier occasions?

Ans. Hari Singh's 'appealing smile' at the end is different from his similar smiles on earlier occasions. Earlier, his smiles were fake and artificial. They were full of flattery that aimed to fulfill his goal. But in the end, his smile was real; it was natural and appealing.

49. How did Horace Danby plan his robberies, and why was he considered an unusual thief?

Ans: Horace Danby carefully planned every robbery and avoided using violence. He stole only once a year to support his passion for buying rare books. This made him different from ordinary thieves.

50. Why did Horace Danby believe the young lady he met at Shotover Grange?

Ans: Horace Danby believed the young lady who pretended to be the owner's wife because she behaved confidently and spoke naturally. She cleverly deceived him into opening the safe, after making him believe she had forgotten the combination to the safe.

51. What is the irony at the end of the story "A Question of Trust"?

Ans: The irony lies in the phrase "honour among thieves." Horace, a professional thief, was outsmarted and betrayed by another thief. He is now in prison for a crime he technically committed, but for which he gained nothing.

52. How was Griffin a lawless man?

Ans: Griffin was lawless because he committed many anti-social deeds without guilt. He set fire to his landlord's house, stole food and clothes from a London store, robbed a theatrical shop, attacked a

shopkeeper, and burgled a clergyman's house to pay his bills.

53. According to the text, what specific change in Griffin's financial situation made the villagers suspect he was involved in the burglary?

Ans : Griffin had recently admitted to the villagers that he had no money, but right after the burglary, he suddenly had enough cash to pay his expenses. This sudden change made them suspicious.

54. What exactly did Mrs. Hall do that made Griffin lose his temper and decide to reveal his secret?

Ans: Griffin lost his temper because Mrs. Hall questioned him about the strange events happening in his room and demanded an explanation. He became furious at being questioned.

55. Why was Matilda unhappy with her life?

Ans: Matilda was unhappy because she desired a life of wealth and luxury. She felt dissatisfied with her simple middle-class lifestyle.

56. How did the necklace change the life of the Loisels?

Ans: The Loisels' life changed after replacing the lost necklace with a new one, as the couple had to repay all the money that they had borrowed to buy the new necklace. They had to live life in hardship because of the situation brought up by the incident. They sent away the maid and changed their lodgings. Mrs Loisel had to do all the household chores to survive then.

57. How does "The Necklace" teaches a moral lesson on the importance of contentment?

Ans. The story "The Necklace" teaches a powerful moral lesson on the importance of finding contentment in what one already has. Matilda's desire for social status and material possessions led to her own downfall and a decade of hardship. Had Matilda simply been grateful and content with all that she had, she could have avoided a lot of pain.

58. Why was Bholi considered a backward child?

Ans. Bholi was considered a backward child because people believed that the fall from a cot when she was ten months old had affected her brain. Later, she developed a stammer, and the pockmarks left by smallpox added to this impression. As a result, everyone regarded her as a backward child.

59. What kind of mother was Ramal's wife?

Ans. Ramlal's wife (Bholi's mother) was a traditional housewife who believed that daughters should not be educated as it would be difficult to find grooms for them. She neglected Bholi as she was ugly and speech-impaired, and wanted to get rid of her by marrying her off to just anyone.

60. Why are Bholi's first day of school and her wedding day considered major turning points in her life?

Ans: The first day of school marked the beginning of her self-discovery and education, replacing her fear with confidence. Her wedding day was the ultimate test where she applied her education—she found the courage to speak out against a social evil and stand up for her own rights.

Long Answer type Questions (5 marks each)

1. How did Lencho's hope for rain turn into despair?

Ans: While Lencho was having dinner, it began to rain. He went outside to enjoy the rain. He compared the raindrops to new coins, believing that the rain would bring prosperity. He saw his field of ripe corn covered with a curtain of rain.

However, suddenly strong winds began to blow and large hailstones started to fall. For an hour, hailstones continued to fall heavily. The field soon looked white, as if it had been covered with salt. The corn crop was completely destroyed. When the storm passed, Lencho stood in the middle of the field and realized that all his hard work had been wasted. He sadly told his sons that they would go hungry that year and that there was no one who could help them.

2. How does the ironic ending of 'A Letter to God' highlight the central message of the story?

Ans: The ending of 'A Letter to God' is ironic because Lencho accuses the very people who helped him of stealing his money. After the hailstorm destroys his crops, he writes to God asking for one hundred pesos. Moved by his unwavering faith, the postmaster, along with his employees and friends, collects seventy pesos and sends the money anonymously. However, when Lencho receives only seventy pesos, he is convinced that God could never have sent him less than the amount he had requested. Instead of appreciating the kindness shown to him, he assumes that the post office employees have stolen the remaining thirty pesos and calls them "a bunch of crooks."

This irony highlights the contrast between reality and Lencho's perception.

While his faith in God remains absolute, he fails to recognise the generosity of the people who helped him. Through this ironic ending, the author conveys that genuine kindness often comes through ordinary people and should be recognised and appreciated. The story also suggests that unquestioning faith, when accompanied by mistaken assumptions, can lead a person to misjudge the good intentions of others.

3. How does the poem 'Fire and Ice' show that extreme human behaviour can lead to the end of the world?

Ans: In the poem 'Fire and Ice', Robert Frost effectively shows how extreme human behaviour can lead to the destruction of the world. He uses the powerful symbols of fire and ice to represent two dangerous human emotions. Fire symbolises uncontrolled desire, passion, and greed. When these emotions grow beyond limits, they make people selfish and aggressive, leading to conflict, violence, and destruction.

On the other hand, ice represents hatred, cruelty, indifference, and emotional coldness. These negative feelings destroy love, compassion, and mutual understanding among people, gradually breaking down relationships and society.

The poet suggests that both desire and hatred are equally destructive and can ultimately lead to the end of the world. Through these symbols, he warns that if such extreme emotions are left unchecked, they can destroy both individuals and society.

4. How does the young seagull's first flight show that fear can be overcome through courage, confidence, and self-belief?

Ans: In the beginning of the story, the young seagull is afraid to fly because he fears that his wings will not support him. Even though his parents, brothers, and sister encourage him to fly, he remains on the ledge while the others learn to soar in the sky. His fear prevents him from trusting his own abilities.

When the seagull becomes extremely hungry, his mother cleverly tempts him with a piece of fish. In his eagerness to get the food, he jumps off the ledge. At first, he feels as though he is falling, but soon his wings spread automatically and begin to support him. He discovers that he can fly with ease. His fear disappears and is replaced by joy and confidence. The story teaches that fear is often only a mental barrier. Confidence comes through experience and action rather than by waiting for fear to disappear. Once we believe in ourselves and take the first step, we often realize that we are far more capable than we imagined. The story inspires readers to face challenges courageously and develop self-confidence through practice and determination.

5. How did the seagull's family help him learn to fly, and do you consider their seemingly harsh behavior to be ultimately caring and justified?

Ans: The seagull's family helped him learn to fly by refusing to encourage his fear. While his brothers and sister learned to fly successfully, he stayed behind because he was afraid. His parents first tried to persuade him, but when he still refused, they stopped feeding him and left him alone on the

ledge. Seeing his hunger, his mother tempted him with a piece of fish but held it just out of his reach. Driven by hunger, the young seagull jumped toward the food. As he fell, he instinctively spread his wings and discovered that he could fly. His family then flew around him, encouraged him with joyful cries, and welcomed him proudly.

Although their behavior seemed harsh, it was ultimately caring and justified. They understood that he had the ability to fly but lacked confidence. Their tough approach forced him to overcome his fear, helping him gain self-belief, independence, and an essential life skill.

6. How does 'The Black Aeroplane' show that hope, courage, and presence of mind, along with unexpected help, can save a person in a crisis? Support your answer with reference to the pilot's experience.

Ans: The story 'The Black Aeroplane' shows that hope, courage, and presence of mind, along with unexpected help, can save a person in a life-threatening situation. The pilot of the Dakota aircraft gets caught in a severe storm while flying from France to England. The sky turns dark, visibility drops to zero, and all instruments stop working, leaving him completely lost. Despite the danger, he shows courage by continuing to fly and does not lose hope. He also uses his presence of mind to stay calm and keep control of the aircraft.

At the height of the crisis, a mysterious black aeroplane appears and silently guides him through the storm. Trusting it, the pilot follows its direction and is safely led out of danger. After landing, he learns that no other aircraft was seen in the sky, which adds a sense of mystery. Thus, the story highlights that inner strength and unexpected help can together save a person in extreme danger.

7. Describe the appearance of the strange black aeroplane in the most hopeless situation. How did the pilot of the black aeroplane help the narrator to come out of the storm clouds and land safely?

Answer: The narrator was really in deep trouble. The huge mountains of black clouds were around him. The old Dakota aeroplane was jumping and twisting in the air. His compass was dead. The other instruments were dead too. Nothing worked for him. Even his efforts to contact Paris control failed. The radio was dead too. In such a hopeless situation, the sudden appearance of a mysterious black aeroplane was like God's sent help for him. There were no lights on the wings of that black aeroplane. The narrator could see the pilot's face. He was saying "Follow me". The narrator was totally lost. He thought that the pilot was trying to help him. So he followed the black aeroplane like an obedient child. He was frightened as he had fuel enough to last for five or ten minutes. Suddenly, he came out of the clouds. He saw two long straight lines of lights in front of him. It was a runway. "An airport!" he cried. He was out of danger and could land safely. He turned to look for his rescuer in the black aeroplane, but the sky was empty.

8. Explain how "The Ball Poem" presents learning through experience rather than instruction.

Ans: "The Ball Poem" shows that real learning comes through personal experience rather than direct instruction. When the boy loses his ball, he feels deep sorrow and helplessness because the ball represents his memories and attachment. The poet does not try to remove his pain or offer easy consolation. Instead, he allows the boy to face the reality of the loss.

Through this experience, the boy learns that loss is an unavoidable part of life and

that material things, once lost, cannot always be replaced emotionally. He also begins to understand the importance of accepting responsibility and dealing with disappointment. The poem reflects the process of growing up, as maturity often develops through such painful experiences. Thus, the poet emphasizes that true understanding and emotional growth come from facing life's realities rather than being taught through advice alone.

9. "Paper has more patience than people." Explain this statement in the light of Anne Frank's decision to write a diary.

Ans: Anne Frank believed that paper is more patient than people because it is a silent, non-judgmental listener. Unlike human beings, who may get bored, impatient, or offer unwanted advice and criticism, a diary allows one to express their innermost thoughts without fear of being misunderstood or mocked. Anne had a loving family and many friends, but she lacked a true confidant with whom she could share her deepest secrets and vulnerabilities. She felt that people often listen only superficially, whereas paper "waits" for the writer to pour their heart out completely. By naming her diary "Kitty," she personified it, turning an ordinary object into a loyal friend. This decision highlights her emotional maturity and her need for a safe space to express her frustrations and joys during a period of intense loneliness.

10. How does Anne Frank's diary become more than just a notebook, and what does her experience teach young people about self-awareness, emotional well-being, and the importance of expressing their thoughts and feelings?

Ans: Anne Frank's diary became much more than an ordinary notebook because it was her trusted companion. She named it "Kitty" and shared her deepest thoughts, fears, dreams, and emotions with it. Since

she found it difficult to confide in others, writing in her diary helped her understand herself better and cope with loneliness.

The diary gave Anne emotional support during challenging times. It encouraged her to reflect on her experiences, express her feelings honestly, and develop confidence and inner strength. Through this habit, she became more self-aware and emotionally resilient.

Anne's experience teaches young people that expressing emotions in a healthy way is important for mental and emotional well-being. Writing a journal, talking to trusted family members or friends, or engaging in creative activities can help reduce stress and improve self-understanding. It also highlights the value of honest communication and self-reflection in personal growth. Anne's diary reminds us that understanding our emotions and expressing them constructively helps us face challenges with courage, hope, and resilience.

11. How does the poem 'Amanda!' highlight the importance of understanding a child's emotions and need for freedom?

Ans: In 'Amanda!', the poet highlights the importance of understanding a child's emotions and need for freedom. Amanda is constantly instructed and corrected by her mother about her behaviour, posture, and habits. These repeated instructions make her feel restricted, misunderstood, and deprived of personal freedom. To escape this pressure, she retreats into an imaginary world where she imagines herself as a mermaid, an orphan, and Rapunzel. Each fantasy symbolises her longing for peace, independence, and freedom from constant control. Through Amanda's imagination, the poet shows that children have their own feelings, dreams, and emotional needs. The poem

suggests that while parents should guide and discipline their children, they should also be patient, empathetic, and respect their individuality. Such a balance between discipline and understanding helps children develop confidence, emotional security, and a healthy relationship with their parents. Thus, the poem emphasises that children need both guidance and emotional support to grow into confident and responsible individuals.

12. Describe how Rajvir's curiosity and eagerness to learn more about tea benefit the readers of the story "Tea from Assam".

Ans: Rajvir's curiosity and eagerness to learn help the readers understand the history and facts about tea easily. Since he is visiting Assam for the first time, his excitement makes the journey interesting. Before his trip, he did a lot of research. Through him, readers learn about the famous stories of how tea was discovered. This includes the Chinese story of the emperor and the Indian story of the monk Bodhidharma.

Rajvir shares historical facts about tea, saying that tea was first drunk in China as far back as 2700 BC. It came to Europe only in the sixteenth century and that it was drunk more as medicine than as a beverage.

Rajvir also shares important facts about tea farming. For example, he mentions that the best tea is collected during the second harvest season between May and July. His smart questions make Pranjol's father share even more information about the tea garden. By asking questions like a curious student, Rajvir acts like a guide for the readers. He turns a simple travel

story into an exciting and easy lesson about tea.

13. How does the chapter "Tea from Assam" blend factual information with folklore to engage the reader?

Ans: The chapter "Tea from Assam" blends factual information with folklore in an engaging way. On one hand, it provides factual details about tea cultivation, such as the vast tea gardens described as a "sea of tea bushes," the neatly maintained rows of plants, and the process of pruning that helps produce high-quality tea leaves. It also highlights Assam's importance as one of the largest tea-producing regions in the world, giving the reader useful knowledge about tea production.

On the other hand, the chapter includes folklore that adds charm and curiosity to the narrative. The Chinese legend explains the discovery of tea when leaves accidentally fell into boiling water and created a refreshing drink. Along with this, the Indian legend describes how the Buddhist ascetic, Bodhidharma, cut off his eyelids to avoid sleep during meditation, and from the eyelids that fell to the ground, tea plants are said to have grown.

By combining factual information with these legends, the author makes the chapter both informative and interesting. The facts educate the reader about tea cultivation, while the legends add cultural richness and make the narrative more engaging and memorable.

14. How does Adrienne Rich use the image of trees leaving the house to convey her message about the relationship between humans and nature? Explain with reference to the poem.

Ans: In the poem, “*The Trees*”, Adrienne Rich uses the powerful image of trees leaving the house and returning to the forest to highlight the importance of restoring nature to its rightful place. The trees symbolize the natural world that has been confined and controlled by human beings. Their movement out of the house suggests nature's strong desire to break free from artificial boundaries and regain its freedom. The poet describes the roots disengaging themselves from the cracks in the veranda floor, the leaves straining toward the glass, and the branches shuffling under the roof. This shows that nature has the strength and determination to overcome obstacles.

As the trees return, the empty forest becomes alive again, symbolizing ecological balance and renewal. Through this imagery, the poet reminds readers that human progress should not come at the cost of the environment. The poem creates awareness about environmental conservation and urges people to respect nature's independence. It conveys that humans and nature can coexist only when the natural world is allowed to flourish in its own space.

15. How does the author present Valli as a determined and independent child? Support your answer with examples from the story.

Ans: Valli is presented as a determined and independent eight-year-old girl. She develops a strong desire to ride the bus to the nearby town and

patiently gathers all the necessary information by listening carefully to the conversations of others. She saves sixty paise by avoiding unnecessary expenses such as buying toys, peppermints, and visiting the village fair. She plans her journey wisely by choosing the afternoon when her mother is asleep. During the journey, she behaves confidently and politely, refusing unnecessary help and insisting that she is capable of managing on her own. She also sticks to her plan of remaining on the bus and returning without getting off in the town. Through these actions, the author portrays Valli as a confident, responsible, and independent child whose determination helps her fulfil her dream.

16. How does Valli's bus journey reflect her growth from curiosity to emotional maturity? Support your answer with incidents from the story.

Ans: Valli's bus journey shows her growth from simple curiosity to emotional maturity. At first, her fascination with the bus develops into a strong desire to visit the town. She carefully gathers information about the distance and fare and saves money by giving up small pleasures, showing determination and responsibility. During the journey, she is full of excitement. She enjoys the scenery and laughs joyfully at the sight of a running cow, revealing her innocence. However, on the return journey, she sees the same cow lying dead on the roadside. This sight makes her silent and thoughtful, as she realises that life can change suddenly. Thus, the journey becomes a meaningful experience that deepens her understanding of life and marks her emotional growth. The story shows that real experiences teach valuable lessons and help a person grow wiser and more mature.

17. How does the poem highlight the difference between true bravery and false boasting?

Ans: The poem highlights the difference between true bravery and false boasting through the behavior of Belinda's other pets and Custard. Belinda, Ink, Blink, and Mustard constantly boast about their courage and laugh at Custard, calling him a coward. Their bravery exists only in words.

However, when the pirate suddenly enters, their claims prove false. All of them become frightened and run away to save themselves. In contrast, Custard, who is always considered a coward, shows real courage. He faces the pirate fearlessly, attacks him, and ultimately kills him. Thus, the poem clearly shows that true bravery is proved through actions in times of danger, while false boasting is empty and meaningless. Custard, though mocked, turns out to be the only truly brave character.

18. Describe how Siddhartha became the Buddha and what he taught in his first sermon.

Ans: Siddhartha was born into a royal family, but he was deeply disturbed after seeing a sick man, an old man, a funeral procession, and a monk begging for alms. These sights made him realise that life is full of suffering and that death is inevitable. Although he lived in great luxury, he left his palace and family in search of the truth. He wandered for seven years seeking knowledge and understanding. Finally, he meditated under a peepal tree and, after seven days of deep meditation, attained enlightenment. From then on, he came to be known as the Buddha.

The Buddha delivered his first sermon at Benares. He taught that life is full of suffering caused by desire and attachment. He explained that death is natural and inevitable, and that sorrow

and grief arise because people fail to understand this universal truth. The wise accept death calmly and free themselves from attachment. His teachings encourage people to live with wisdom, compassion, understanding, and inner peace.

19. How does Kisa Gotami's journey from grief to acceptance in 'The Sermon at Benares' show the importance of experience in learning life's truths?

Ans: Kisa Gotami's journey from grief to acceptance shows that true understanding often comes through personal experience rather than mere advice. After the death of her only son, she was overwhelmed with sorrow and refused to accept his death. The Buddha asked her to bring a handful of mustard seeds from a house where no one had ever died. As she went from house to house, she discovered that every family had experienced the loss of a loved one. This made her realise that death is a universal and unavoidable part of life. Her own experience helped her understand the Buddha's teaching more deeply than words alone could. She accepted the truth with wisdom, let go of her grief, and attained inner peace. Thus, her journey highlights the importance of experience in learning life's greatest truths.

20. What is the theme of the poem 'For Anne Gregory'?

Ans. The central theme of the poem 'For Anne Gregory' is that true beauty lies in a person's inner qualities rather than physical appearance. The poem questions society's tendency to judge people, especially women, by their outward looks. Anne Gregory believes that men admire her only because of her beautiful yellow hair and thinks that if she dyes it black, brown, or red, they will no longer find her attractive. However, the poet rejects this idea and suggests that physical beauty is temporary and should not be the basis of love or admiration. He believes that a person's character and inner qualities are

far more valuable than outward appearance. Through the poem, W. B. Yeats criticises society's obsession with external beauty and reminds us that inner beauty is lasting and deserves greater appreciation.

21. Why does Lomov decide to marry Natalya despite not being in love with her, and what does this reveal about the marriage norms of his society?

Ans: Lomov decides to marry Natalya purely out of practical and calculated reasons rather than love because he believes he has reached a critical turning point in his life. At thirty-five years old, he feels intense pressure to settle down and lead a quiet, regular life, especially given his constant health anxieties and heart palpitations. He views Natalya not as a romantic partner, but as a suitable match who fulfills all his practical criteria, noting that she is an excellent housekeeper, well-educated, and decent-looking. Furthermore, their families own adjoining estates, making the marriage a perfect economic opportunity to merge their lands and increase their collective wealth.

This transactional approach to marriage reveals that 19th-century Russian upper-class society viewed matrimony as a business merger rather than an emotional union. Wealth, property, and social status were prioritized far above mutual affection or compatibility. There was immense social pressure to marry by a certain age to avoid social stigma and secure financial stability. Because these alliances were built entirely on material gains rather than love, relationships lacked genuine understanding and respect. This underlying greed is exactly why Lomov and Natalya repeatedly descend into vicious, immature shouting matches over trivial matters like land ownership and hunting dogs, proving that their

society valued pride and possessions over human connection.

22. In the play "The Proposal" by Anton Chekhov, marriage is presented more as a matter of social status and economic gain than love or understanding. How does the behaviour of Lomov and Natalya during their proposal meeting reflect this attitude? What does the play suggest about human nature and relationships?

Ans: In "The Proposal", Anton Chekhov presents marriage as a social and economic arrangement rather than a bond based on love. This is clearly reflected in the behaviour of Lomov and Natalya during their meeting.

Lomov comes to propose to Natalya, but instead of expressing affection, he becomes nervous and starts arguing over trivial issues like the ownership of Oxen Meadows. Natalya, instead of focusing on the proposal, strongly insists that the land belongs to her family. Their conversation quickly turns into a heated argument, showing how material possessions dominate their thinking.

Even when the proposal is revealed, both of them continue to argue, and their personal conflict over shadows the purpose of the visit. It is only through the intervention of Chubukov that they finally agree to marry, but even then, they immediately start quarrelling again over petty issues like their dogs.

The play highlights the absurdity of human behaviour, showing how pride, greed, and ego can overpower reason and emotion. It satirically suggests that in such a society, marriage decisions are influenced more by property and social standing than by love or compatibility.

Extract Based Questions
(4 marks each)

Read the following extracts carefully and answer the questions that follow: (1x4)

1. It was during the meal that, just as Lencho had predicted, big drops of rain began to fall. In the north east huge mountains of clouds could be seen approaching. The air was fresh and sweet. The man went out for no other reason than to have the pleasure of feeling the rain on his body.

(a) When did the big drops of rain begin to fall?

Ans: It was during the meal that, just as Lencho had predicted, big drops of rain began to fall.

(b) What could be seen approaching in the north-east?

Ans: In the north-east sky, huge mountains of clouds could be seen approaching.

(c) What did Lencho predict?

Ans: Lencho predicted that it would rain that day.

(d) Why did Lencho go out?

Ans: Lencho went out for no other reason than to have the pleasure of feeling the rain on his body.

2. "So, in order not to shake the writer's faith in God, the postmaster came up with an idea: answer the letter. But when he opened it, it was evident that to answer it he needed something more than goodwill, ink and paper. But he stuck to his resolution: he asked for money from his employees..."

(a) Why did the postmaster decide to answer the letter?

Ans: The postmaster decided to answer the letter to ensure that the writer's deep faith in God was not shaken.

(b) What three things were not enough to answer the letter once the postmaster opened it?

Ans: The three things which were not enough to answer the letter were goodwill, ink, and paper.

(c) What was the postmaster's "resolution" mentioned in the text?

Ans: The postmaster's "resolution" mentioned in the text was his decision to answer the letter.

(d) From whom did the postmaster ask for money to fulfil his resolution?

Ans: To fulfil his resolution, the postmaster decided to ask for money from his employees as well as his friends, and he also gave a part of his own salary.

3. "From what I've tasted of desire I hold with those who favour fire."

(a) Which emotion does "fire" symbolise?

Ans: Fire symbolises desire, passion, and greed.

(b) Whose opinion does the poet agree with?

Ans: The poet agrees with those who believe that the world will end in fire.

(c) What experience does the poet refer to in these lines?

Ans: The poet refers to his personal experience and understanding of human desire.

(d) What is the main idea expressed in these lines?

Ans: The lines emphasise that desire is a powerful force capable of causing destruction.

4. "And all the morning the whole family had walked about on the big plateau midway down the opposite cliff taunting him with his cowardice."

(a) Where had the young seagull's family gathered?

Ans: The young seagull's family had gathered on the big plateau midway down the opposite cliff.

(b) How did the family spend their morning?

Ans: They spent the whole morning walking about on the plateau.

(c) What did the family do to the young seagull?

Ans: The family taunted and mocked the young seagull for his cowardice.

(d) Why was the young seagull being taunted by his family?

Ans: The young seagull was being taunted because he was afraid to fly, whereas his brothers and sister had already learned to fly.

5. "Maddened by hunger, he dived at the fish. With a loud scream, he fell outwards and downwards into space. Then a monstrous terror seized him and his heart stood still. But his wings spread outwards. The wind rushed against his breast feathers, then under his stomach and against his wings."

(a) Why did the young seagull dive towards the fish?

Ans: The young seagull dived towards the fish because he was extremely hungry and wanted to eat it.

(b) What happened when he jumped off the ledge?

Ans: When the young seagull jumped off the ledge, he began to fall but instinctively spread his wings.

(c) How did the wind help the young seagull?

Ans: The wind supported his wings and enabled him to fly.

(d) What is the main idea of this extract?

Ans: The main idea is that the young seagull overcomes his fear and discovers his ability to fly.

6. Inside the clouds, everything was suddenly black. It was impossible to see anything outside the aeroplane.

The old aeroplane jumped and twisted in the air. I looked at the compass. I couldn't believe my eyes: the compass was turning round and round and round. It was dead. It would not work! The other instruments were suddenly dead, too. I tried the radio.

"Paris Control? Paris Control? Can you hear me?" There was no answer. The radio was dead too. I had no radio, no compass, and I could not see where I was.

I was lost in the storm.

(a) Why was the narrator unable to see where he was going?

Ans: The narrator was unable to see where he was going because he was inside thick storm clouds where everything was completely black and dark.

(b) What happened to the narrator's instruments like the compass and the radio?

Ans: They stopped working completely and became "dead" due to the severe storm.

(c) Who did the narrator try to call for help when he got lost?

Ans: He tried to call "Paris Control" on his radio.

(d) How did the old aeroplane behave inside the storm clouds?

Ans: The aeroplane jumped and twisted violently in the air because of the strong wind.

7. Suddenly, I came out of the clouds and saw two long straight lines of lights in front of me. It was a runway! An airport! I was safe! turned to look for my friend in the black aeroplane, but the sky was empty. There was nothing there. The black aeroplane was gone. could not see it anywhere.

(a) Why does the narrator call the pilot of the black aeroplane his "friend"?

Ans: The unknown pilot had just guided him safely out of the terrifying storm, so the narrator naturally felt a deep sense of gratitude and connection toward him.

(b) What did the "two long straight lines of lights" mean for the narrator?

Ans: They meant he had found an airport runway, bringing him sudden relief, hope, and safety after a near-death experience.

(c) Why was the narrator shocked when he looked back at the sky?

Ans: He was shocked because the black aeroplane that just helped him had suddenly vanished completely, leaving the sky entirely empty.

(d) What mystery does the ending of this extract create in the reader's mind?

Ans: It makes the reader wonder whether the black aeroplane was real, a ghost, or just a figment of the narrator's imagination.

8. "What is the boy now, who has lost his ball,
What, what is he to do?"

(a) What has the boy lost?

Ans: The boy has lost his ball.

(b) What does the repetition of "what" show?

Ans: The repetition of "what" shows the boy's confusion, shock, and helplessness after losing his ball.

(c) What emotion is the boy experiencing?

Ans: The boy is experiencing deep grief and sorrow.

(d) What theme is introduced here?

Ans: The theme of loss and helplessness is introduced here.

9. "Our entire class is quaking in its boots. The reason, of course, is the forthcoming meeting in which the teachers decide who'll move up to the next form and who'll be kept back."

(a) Why was the class "quaking in its boots"?

Ans: The class was quaking in its boots because they were nervous about the year-end results.

(b) What process was followed to decide the exam results?

Ans: The teachers' meeting would decide who would move up to the next form and who would be kept back.

(c) Does Anne Frank share in the nervousness of her classmates?

Ans: No, unlike most of her classmates, Anne was not worried.

(d) Which word in the extract means the same as 'shaking'?

Ans: The word 'quaking' means the same as 'shaking'.

10. "To enhance the image of this long-awaited friend in my imagination, I don't want to jot down the facts in this diary the way most people would do, but I want the diary to be my friend, and I'm going to call this friend 'Kitty'."

(a) Who is the "long-awaited friend" referred to in these lines?

Ans: The long awaited friend referred to here is the diary, which Anne Frank later named 'Kitty'.

(b) How does Anne's diary differ from the way most people write diaries?

Ans: Anne's diary is different because she treats it as a true friend rather than just listing facts.

(c) What name does Anne give to her diary?

Ans: 'Kitty' is the name given by Anne to her diary.

(d) Find a word in the extract that means 'to write down quickly'.

Ans: The word 'jot down' has the same meaning as 'to write down quickly'.

11. "(There is a languid, emerald sea,
Where the sole inhabitant is me—
A mermaid, drifting blissfully)"

(a) What do the brackets signify?

Ans: The brackets signify Amanda's inner thoughts and imagination.

(b) Who is a mermaid?

Ans: A mermaid is a mythical sea creature with the upper body of a human and the tail of a fish.

(c) What would Amanda do as a mermaid?

Ans: As a mermaid, Amanda would drift blissfully in the calm sea and enjoy a peaceful, carefree life.

(d) What does the phrase "sole inhabitant" suggest?

Ans: It suggests that Amanda is completely alone in her imaginary world, free from any interference or restrictions.

12. "This is the second-flush or sprouting period, isn't it, Mr. Barua?" Rajvir asked. "It lasts from May to July and yields the best tea." "You seem to have done your homework before coming," Pranjol's father said in surprise.

(a) Who is Mr. Barua?

Ans: Mr. Barua is Pranjol's father and the manager of Dhekiabari Tea Estate.

(b) What is the duration of the second-flush period?

Ans: The second-flush period is from May to July.

(c) Why was Mr. Barua surprised?

Ans: Mr. Barua was surprised because Rajvir, a young visitor, had so much knowledge about tea harvesting.

(d) What is significant about the "second-flush" tea?

Ans: It is known to yield the best quality tea.

13. "Tea came to Europe only in the sixteenth century and was drunk more as medicine than as a beverage." Rajvir added, "The words 'chai' and 'chini' are from Chinese. Tea was first drunk in China."

(a) When did tea come to Europe?

Ans: Tea came to Europe in the sixteenth century.

(b) For what purpose was tea first used in Europe?

Ans: Tea was first used as medicine rather than as a beverage.

(c) From which language do the words "chai" and "chini" come?

Ans: These words come from the Chinese language.

(d) Find a word from the extract that means 'a drink'.

Ans: The word from the extract that means 'a drink' is 'beverage'.

14. " My head is full of whispers
which tomorrow will be silent.
Listen. The glass is breaking.
The trees are stumbling forward..."

(a) What is the poet's head full of?

Ans: The poet's head is full of **whispers**.

(b) What sound indicates that the trees are escaping?

Ans: The sound of breaking glass indicates that the trees are escaping from the house.

(c) In which direction are the trees moving?

Ans: The trees are stumbling forward towards the forest.

(d) When will the whispers become silent?

Ans: The whispers will become silent the next morning.

15. "Never mind," she said, "I can get on by myself. You don't have to help me."

(a) Who is speaking these words?

Ans: These words are spoken by Valli, the eight-year-old girl who is travelling alone on the bus for the first time.

(b) To whom are these words addressed?

Ans: These words are addressed to the bus conductor, who offers to help Valli get onto the bus.

(c) Which quality of the speaker is reflected in these words?

Ans: These words reflect Valli's confidence and independence.

(d) Why does the listener smile after hearing this reply?

Ans: The bus conductor smiles because he is amused by Valli's confidence and grown-up behaviour.

16. "The memory of the dead cow haunted her, dampening her enthusiasm. She no longer wanted to look out the window"

(a) What had happened to the cow?

Ans: The cow had been hit by a fast-moving vehicle and was lying dead by the roadside.

(b) Why did the memory haunt Valli?

Ans: The memory haunted Valli because she had seen earlier the same cow running playfully in front of the bus.

(c) How did this incident change her mood?

Ans: Valli's excitement disappeared, and she became quiet and thoughtful.

(d) What deeper realisation does this incident suggest?

Ans: It suggests that Valli begins to understand the reality that life can suddenly change.

17. Pistol in his left hand, pistol in his right, And he held in his teeth a cutlass bright,
His beard was black, one leg was wood;
It was clear that the pirate meant no good.

(a) What kind of person does the pirate seem to be based on his appearance?

Ans: His terrifying look and heavy weapons show that he is a dangerous criminal who has come to attack or harm the household.

(b) Why do you think the pirate was carrying weapons in both his hands and his teeth?

Ans: He wanted to look as frightening as possible and be fully prepared to fight anyone who tried to stop him.

(c) How does the description show that the pirate is an experienced fighter?

Ans: Details like his wooden leg and the sword held in his teeth suggest he has survived many violent battles in the past.

(d) "It was clear that the pirate meant no good." What makes his bad intentions so obvious?

Ans: The fact that he broke in heavily armed with pistols and a sharp blade immediately gives away his violent plans.

18. "As all earthen vessels made by the potter end in being broken, so is the life of mortals. Both young and adult, both those who are fools and those who are wise, all fall into the power of death; all are subject to death."

(a) What does the Buddha compare human life to in the extract?

Ans: The Buddha compares human life to earthen vessels made by a potter.

(b) According to the extract, who is subject to death?

Ans: Everyone is subject to death, whether young or old, wise or foolish.

(c) What is the fate of all earthen vessels made by the potter, according to the extract?

Ans: All earthen vessels eventually break.

(d) What universal truth about life does the Buddha convey through this extract?

Ans: The Buddha conveys that death is inevitable and that all human beings are subject to it.

19. "So the world is afflicted with death and decay, therefore the wise do not grieve, knowing the terms of the world."

(a) Who spoke these words and to whom?

Ans: These words were spoken by the Buddha to Kisa Gotami.

(b) What does "afflicted" mean?

Ans: The word "afflicted" means suffering or deeply affected by something painful.

(c) What are "the terms of the world"?

Ans: It refers to the universal truth that birth and death are unavoidable.

(d) How can this teaching help someone today?

Ans: This teaching can help someone today by encouraging them to accept loss calmly and understand that death is a natural part of life.

20. "Never shall a young man, Thrown into despair By those great honey-coloured Ramparts at your ear."

(a) What do the words, "honey-coloured Ramparts" refer to?

Ans: It refers to Anne Gregory's beautiful golden hair.

(b) Who is being addressed in these lines?

Ans: Anne Gregory is being addressed in these lines.

(c) What does this description suggest about Anne Gregory?

Ans: It suggests that Anne Gregory's golden hair is highly attractive and draws the attention of young men.

(d) What theme is introduced in this extract?

Ans: The extract introduces the theme of outer beauty and its influence on love.

21. "My heart's palpitating awfully. My foot's gone to sleep. There's something that keeps pulling in my side"

(a) Who speaks these words and to whom?

Ans: Ivan Vassilevitch Lomov speaks these words to Natalya Stepanovna.

(b) What symptoms does the speaker mention in the extract?

Ans: Lomov mentions heart palpitations, numbness in his foot, and a pulling pain in his side.

(c) Why does the speaker complain about his health at this moment?

Ans: Lomov complains about his health because he becomes highly agitated during the argument, and the stress of the quarrel worsens his weak condition.

(d) What does this extract reveal about the speaker's character?

Ans: This extract shows that Lomov is nervous, anxious, and overly conscious about his health, especially under stress.

22. ." But, please, Stephen Stepanovitch, how can they be yours? Do be a reasonable man ! My aunt's grandmother gave the Meadows for the temporary and free use of your grandfather's peasants. The peasants used the land for forty years and got accustomed to it as if it was their own, when it happened that

(a) What is the main reason behind the misunderstanding about the ownership of the Meadows?

Ans: The misunderstanding arose because Natalya's ancestors had allowed Lomov's grandfather's peasants to use the

Meadows temporarily, but they later began to regard them as their own.

(b) Why does the speaker ask Stephen Stepanovitch to "be a reasonable man"?

Ans: Natalya asks Stephen Stepanovitch to be reasonable because she believes the Meadows rightfully belong to her family.

(c) How does this extract show that a small favour in the past created a major problem for the next generation?

Ans: A temporary favour of allowing the peasants to use the Meadows eventually led to a bitter dispute between Natalya and Lomov.

(d) What does the peasants getting "accustomed to it as if it was their own" tell us about human nature?

Ans: It shows that when people use something for a very long time without any rules, they naturally develop a false sense of ownership over it.

Supplementary Reader

23. "It was a temptation to keep Tricki on as a permanent guest, but I knew Mrs Pumphrey was suffering and after a fortnight, felt compelled to phone and tell her that the little dog had recovered and was awaiting collection."

(a) Why was it a temptation for Dr. Herriot to keep Tricki on as a permanent guest?

Ans: It was a temptation because Mrs. Pumphrey kept sending eggs, wine, and brandy for Tricki, which Dr. Herriot and his partners enjoyed.

(b) Why did Dr. Herriot not keep him as a permanent guest?

Ans: Dr. Herriot did not keep him as a permanent guest because he knew Mrs. Pumphrey was suffering with worry over her dog and it would be unfair to keep Tricki away from her any longer.

(c) What does the phrase “felt compelled” suggest about Dr. Herriot?

Ans: It suggests that Dr. Herriot felt morally bound to inform Mrs. Pumphrey that Tricki had recovered.

(d) What does the word “awaiting” mean in the extract?

Ans: The word “awaiting” means waiting for or ready for collection.

24. . "He took me to his room over the Jumna Sweet Shop and told me I could sleep on the balcony. But the meal I cooked that night must have been terrible because Anil gave it to a stray dog and told me to be off. But I just hung around, smiling in my most appealing way, and he couldn't help laughing."

(a) What do Anil's actions tell us about his nature?

Ans: They show that Anil is an extremely kind, patient, and forgiving person who doesn't get angry easily.

(b) Why did the narrator smile in his "most appealing way"?

Ans: He did it to charm Anil, win his sympathy, and prevent himself from being kicked out of the house.

(c) Why didn't Anil throw the narrator out after realizing he couldn't cook?

Ans: Anil felt pity for the homeless boy and chose compassion over his own convenience.

(d) What would have happened to the narrator if he had left when told to "be off"?

Ans: He would have remained a homeless, uneducated thief without any chance to reform his life.

25. *"For two days he kept his promise to the kind young lady. On the morning of the third day, however, he thought of the books he wanted and he knew he would have to look for another safe. But he never got the chance to begin his plan."*

(a) What promise had Horace made to the lady?

Ans: Horace had promised the lady that he would not commit any more burglaries if she let him go.

(b) Why did his resolve to keep the promise weaken on the third day?

Ans: His desire to collect rare and expensive books made him feel that he needed money again, which weakened his resolve.

(c) What happened before he could plan another robbery?

Ans: He was arrested by the police in connection with the burglary at Shotover Grange.

(d) Why was he arrested if he hadn't taken the jewels?

Ans: He was arrested because his fingerprints were found on the safe and throughout the room, proving his involvement in the burglary.

26. "The arrival of a stranger at an inn in winter was in any case an unusual event. A stranger of such uncommon appearance set all tongues wagging. Mrs. Hall made every effort to be friendly. But Griffin had no desire to talk, and told her, 'My reason for coming to Iping is a desire for solitude. I do not wish to be disturbed in my work.'"

(a) Who is the 'stranger' referred to here?

Ans: The stranger is Griffin, the invisible scientist.

(b) Why was the stranger's appearance considered 'uncommon'?

Ans: Griffin wore bandages around his forehead, dark glasses, a false nose, and a large hat that hid his face.

(c) Why did the stranger come to Iping?

Ans: He came to Iping to be alone and to avoid being disturbed in his work.

(d) What phrase in the extract means 'everyone started talking'?

Ans: 'Set all tongues wagging.'

27. One morning, a clergyman and his wife were awakened by noises coming from their study. As they quietly went downstairs, they heard the sound of money being taken from the clergyman's desk. When the clergyman suddenly opened the door, he was astonished to find that the room was empty."

(a) Why did the "empty room" make the theft much more terrifying for the couple than a normal robbery?

Ans: A normal robbery has a visible thief you can defend against, but an empty room meant they were dealing with an invisible, unknown threat they could not see or fight.

(b) What does the couple's decision to creep "quietly downstairs" instead of shouting tell us about their initial assumption?

Ans: It shows they assumed they were dealing with a normal, physical human thief whom they wanted to catch by surprise.

(c) Since Griffin had a brilliant scientific mind, what does his choice to commit a petty house burglary reveal about his character?

Ans: It reveals that despite his high intelligence, he lacked moral values and preferred using his genius for cheap, easy crimes rather than honest work.

(d) How does the opened desk drawer prove that this "invisible force" was still bound by normal human physical limits?

Ans: It proves the thief could not walk through solid objects or make money disappear by magic; he still had to physically open the desk drawer to take the cash.

28. He was silent, stupefied, in dismay, at the sight of his wife weeping. He stammered, "What is the matter? What is the matter?" By a violent effort, she had controlled her vexation and responded in a calm voice, wiping her moist cheeks, "Nothing. Only I have no dress and consequently I cannot go to this affair. Give your card to some colleague whose wife is better fitted out than I." He was grieved, but answered, "Let us see, Matilda. How much would a suitable costume cost, something that would serve for other occasions, something very simple?" She reflected for some seconds thinking of a sum that she could ask for without refusal and a frightened exclamation from the economical clerk.

(a) Why does Matilda suggest giving the invitation card to a colleague instead?

Ans: She uses reverse psychology to make her husband feel guilty about their financial condition so that he will offer to buy her a new dress.

(b). What does the husband's reaction to his wife's crying tell us about him?

Ans: It shows that he is a genuinely caring, selfless, and loving husband who values his wife's happiness over his own comfort.

(c) Why does Matilda think carefully for a few seconds before naming a price for the dress?

Ans: She is calculating the highest amount of money she can ask for without shocking him into refusing her request.

(d) Why does the text describe the husband as an "economical clerk" at the end?

Ans: It highlights their tight budget, showing that even a simple dress is a huge financial sacrifice for a middle-class man like him.

29. She was not convinced. 'No', she replied, "there is nothing more humiliating than to have a shabby air in the midst of rich women."
Then her husband cried out, "How stupid we are! Go and find your friend Madame Forestier and ask her to lend you her jewels."
She uttered a cry of joy. 'It is true!' she said. "I had not thought of that."

(a) What does Matilda's fear of looking "shabby" among rich women tell us about her character?

Ans: It shows that she is deeply insecure and cares too much about social status, appearances, and what wealthy people think of her.

(b) Why does the husband call himself and Matilda "stupid"?

Ans: He realizes they were stressing out over a problem that had a very simple, cost-free solution right in front of them.

(c) Why does Matilda call Madame Forestier her "friend" only when she needs to borrow jewellery?

Ans: It highlights her materialistic nature, showing that she values the relationship more because of Madame Forestier's wealthy background and expensive belongings.

(d) How does Matilda's sudden "cry of joy" shift the mood of the scene?

Ans: It instantly changes the mood from tense, gloomy, and dramatic to one of sudden excitement and hope.

30. "Bholi felt as if suddenly all the bells in the village temple were ringing and the

trees in front of the school-house had blossomed into big red flowers."

(a) Why did Bholi feel as if the temple bells were ringing and the trees were dancing with joy?

Ans: Bholi felt this way because she was very happy and hopeful after meeting her teacher, who spoke kindly to her and encouraged her to learn.

(b) What had just happened that made Bholi feel so happy?

Ans: Bholi's teacher had treated her with kindness and assured her that she would learn to speak properly, which filled Bholi with hope and confidence.

(c) What does this line tell us about Bholi's feelings at that moment?

Ans: These lines show that Bholi felt joyful, hopeful, and encouraged because her teacher's kind words made her believe in herself.

(d) Find a word from the extract that means the same as 'developed'

Ans: Blossomed.

31. Bholi turned violently on the old woman, "Yes, Aunt, you are right. You all thought I was a dumb-driven cow. That's why you wanted to hand me over to this heartless creature. But now the dumb cow, the stammering fool, is speaking. Do you want to hear more?"

(a) Why does Bholi use the phrase "dumb-driven cow" to describe her past self?

Ans: Because society always treated her as a helpless creature who had no voice or opinion of her own.

(b) What does Bholi's "violent" turn on the old woman tell us about her emotional state?

Ans: It shows that she had reached her limit and was completely done tolerating societal insults and humiliation.

(c) Who is the "heartless creature" being referred to in this extract?

Ans: Bishamber Nath, the greedy groom.

(d) How does Bholi's ability to speak clearly now challenge the society's perception of her?

Ans: It proves that she is no longer a helpless fool, but an educated, self-reliant individual who can fight back.

Unsolved Questions for Practice.

A Letter to God

- G. L. Fuentes

Short Answer Questions :

1. The destruction of Lencho's crops left him with no source of income. What does his decision to write to God reveal about his way of dealing with problems?
2. Why did Lencho suspect the post office employees instead of doubting God?
3. What does the story suggest about the power of faith and human kindness?

Long Answer Question : (5 marks)

1. What qualities are reflected in the characters of the post office employees?

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. "But in the hearts of all who lived in that solitary house in the middle of the valley, there was a single hope: help from God. Don't be upset, even though this seems like a total loss. Remember, no one dies of hunger."

- (a) Who is the speaker of the above line?
- (b) Which 'hope' is the speaker talking about?
- (c) What 'loss' is being talked about in the above lines?
- (d) What does the word 'solitary' mean?

2. "Lencho was an ox of a man, working like an animal in the fields, but still he knew how to write. The following Sunday, at daybreak, he began to write a letter which he himself would carry to town and place in the mail. It was nothing less than a letter to God."

- (a) When did Lencho start to write the letter?
- (b) Whom was the letter addressed to ?
- (c) Where did he decide to carry the letter?
- (d) What does 'an ox of a man' mean ?

Fire and Ice

- Robert Frost

-

Short Answer Questions :

1. Which human emotion does Robert Frost personally relate to, and why?
2. Which emotion, fire or ice, do you think is more dangerous in today's world? Give a reason for your answer.
3. Give one real-life example where hatred or coldness causes harm.

Long Answer Question :

1. How does Robert Frost use symbolism in the poem "Fire and Ice"?

Extract-Based Questions:

1. "Some say the world will end in fire,
Some say in ice."

- (a) What are the two ways the world may end according to the extract?
- (b) What does fire symbolise here?
- (c) What does ice symbolise here?
- (d) What is the main idea conveyed in these lines?

2. "From what I've tasted of desire
I hold with those who favour
fire."

- (a) What does the word "tasted"
suggest about the poet's
experience?
(b) Why does the poet agree with
those who favour fire?
(c) Mention one real-life situation
that reflects the idea of "fire" in
this extract.
(d) What life skill or value is
highlighted through this extract?

HIS FIRST FLIGHT
- *Liam O'Flaherty*

SHORT ANSWER QUESTIONS

1. How did the seagull's parents try to make him fly?
2. What did the young seagull do when he saw his mother carrying a piece of fish?
3. What happened when the young seagull finally jumped off the ledge?
4. How did the young seagull react when he landed on the sea?

LONG ANSWER QUESTIONS

1. "Fear and hunger are powerful motivators." Discuss this statement with reference to the young seagull's experience.
2. Towards the end, how was the young seagull different from what he was at the beginning of the lesson?

EXTRACT-BASED QUESTIONS
**Read the following extract carefully
and answer the questions that follow:**

1. *"They were beckoning to him, calling shrilly. He dropped his legs to stand on the green sea. His legs sank into it."*
 - a. Who were 'They'?
 - b. Who was 'him'?
 - c. Why were they beckoning to him?
 - d. What happened when he dropped his legs into the sea?
2. *"Then his father flew over him screaming. He saw his two brothers and his sister flying around him, curveting and banking and soaring and diving."*
 - a. Who was 'He'?
 - b. What does 'curveting' mean?
 - c. What does 'banking' mean in the context of the extract?
 - d. What did 'He' forget?

The Black Aeroplane
- **Frederick Forsyth**

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 - d. What did 'He' forget?

The Ball Poem **- John Berryman**

SHORT ANSWER QUESTIONS

1. Why does the poet call money "external"?
2. How does the loss of the ball mark the boy's first step towards maturity?
3. According to 'The Ball Poem', what role does loss play in shaping human emotions?

4. What does the ball symbolize in 'The Ball Poem'?

5. If the poet had immediately bought the boy another ball, how would the message of 'The Ball Poem' change?

LONG ANSWER QUESTIONS

1. Analyse how the poet uses the loss of a simple object to convey a universal truth about human life in 'The Ball Poem'.

EXTRACT-BASED QUESTIONS

Read the following extract carefully and answer the questions that follow:

1. "I saw it go
Merrily bouncing, down the street, and then
Merrily over—there it is in the water!"
 - (a) What does the word "it" refer to?
 - (b) Why is the word "merrily" repeated?
 - (c) What contrast is highlighted in these lines?
 - (d) What does the water symbolise in the poem?
2. "No use to say—'O there are other balls':
An ultimate shaking grief fixes the boy"
 - (a) Why is it "no use" to console the boy?
 - (b) What does "ultimate shaking grief" suggest?
 - (c) How does the boy react to the loss?
 - (d) What stage of emotional development is shown?

3. "People will take
Balls, balls will be lost always, little
boy."

- (a) Who are referred to as "people" here?
(b) What truth about life is conveyed in
these lines?
(c) Why does the poet address the boy
directly?
(d) What life lesson is suggested through
this extract?

**FROM THE DIARY OF ANNE
FRANK
- Anne Frank**

**SHORT ANSWER TYPE
QUESTIONS**

1. Why was the entire class "quaking in
its boots"?
2. How did Anne justify her talkative
nature in her first essay?
3. How did Anne finally change Mr.
Keesing's attitude towards her?

LONG ANSWER QUESTIONS

1. Anne Frank had loving family
members and a number of friends, yet
she said that she was completely alone
in the world. Elaborate the reasons
with reference to the narration in her
diary.
2. What do you think of Anne Frank's
talent of writing essays as evident in
the ones she wrote as punishment for
being talkative?

EXTRACT-BASED QUESTIONS

**Read the following extracts carefully
and answer the questions that follow:**

1. *"Paper has more patience than people.
I thought of this saying on one of those
days when I was feeling a little
depressed and was sitting at home with
my chin in my hands, bored and
listless, wondering whether to stay in
or go out."*

- a. What has more patience than
people, according to the writer?
- b. How was the writer feeling on
that day?
- c. Where was the writer sitting?
- d. What was the writer wondering
about doing?

2. *"I finished my poem, and it was
beautiful! It was about a mother duck
and a father swan with three baby
ducklings who were bitten to death by
the father because they quacked too
much."*

- a. What did the writer finish
writing?
- c. How many baby ducklings were
there?
- c. Why did the father kill the
ducklings?
- d. What humorous message was
Anne trying to convey through
the poem?

Amanda!
- Robin Kleen

SHORT ANSWER TYPE QUESTIONS

1. What does the poem tell us about Amanda's state of mind?
2. Why does Amanda want to be a mermaid?
3. Why does Amanda enjoy imagining herself as an orphan roaming the streets?
4. Does Amanda really want to be an orphan, or does she simply long for the freedom she believes an orphan has? Give reasons to support your answer.

LONG ANSWER QUESTIONS

1. How does constant nagging affect Amanda in the poem 'Amanda!'?
2. Explain the significance of freedom in Amanda's imaginative world.

EXTRACT-BASED QUESTIONS

Read the following extracts carefully and answer the questions that follow:

1. "Did you finish your homework, Amanda?

Did you tidy your room, Amanda?

I thought I told you to clean your shoes, Amanda!"

- (a) Who do you think is speaking to Amanda?
- (b) Which task is Amanda reminded to do?
- (c) What does the repetition of "Amanda" indicate?
- (d) Is Amanda paying attention to the speaker?

2. (I am an orphan, roaming the street.
I pattern soft dust with my hushed, bare feet.
The silence is golden, the freedom is sweet.)

- (a) Who is 'I' in this extract?
- (b) What does Amanda imagine herself to be?
- (c) What does the expression "the silence is golden" mean?
- (d) What does the speaker do with her hushed, bare feet?

3. Don't eat that chocolate, Amanda!
Remember your acne, Amanda!
Will you please look at me when I'm speaking to you,
Amanda!

- (a) Who do you think is speaking in this extract?
- (b) What is Amanda being warned about?
- (c) What does the speaker want Amanda to do while speaking to her?
- (d) How does the speaker try to discipline Amanda in this extract?

TEA FROM ASSAM
-Arup Kumar Datta

Short Answer Questions

1. What does the Chinese legend reveal about the discovery of tea?
2. What did Rajvir find interesting about the tea plantation?
3. What makes the journey to Assam enjoyable for Rajvir?
4. How does the author show that Assam is an important place for tea production in the world? Mention two points from the chapter.

Long Answer Questions

1. "You've done your homework before coming, I see." In what ways does Rajvir's character demonstrate the importance of curiosity and self-learning during a journey?

Extract-Based Questions

Read the following extracts carefully and answer the questions that follow:

1. Then the soft paddy fields gave way to tea bushes. It was a magnificent view. Against the backdrop of densely wooded hills a sea of tea bushes stretch as far as the eye could see. Dwarfing the tiny tea plants were tall sturdy shade-trees.
 - a. What change did Rajvir notice outside the train?
 - b. What plants were seen in large numbers?
 - c. What trees were seen above the tea bushes?
 - d. What does the phrase "as far as the eye could see" suggest?
2. "We have an Indian legend too. Bodhidharma, an ancient Buddhist ascetic, cut off his eyelids because he felt sleepy during meditations. Ten tea plants grew out of the eyelids. The leaves of these plants when put in hot water and drunk banished sleep."
 - a. Who was Bodhidharma?
 - b. Why did he cut off his eyelids?
 - c. What property of tea is highlighted in this legend?
 - d. What grew out of the discarded eyelids?

THE TREES - Adrienne Rich

SHORT ANSWER QUESTIONS

1. How does the poet describe the "empty" forest?
2. What is the poet doing while the trees are leaving the house?
3. What does the poet, Adrienne Rich, try to convey by saying 'My head is full of whispers'?

LONG ANSWER QUESTIONS

1. The poem, "The Trees", apparently is about nature but on a deeper level, Adrienne Rich expresses concern about constrictions in the society, of women in particular, and she champions liberation. Elaborate with reference to the poem.

EXTRACT-BASED QUESTIONS

Read the following extracts carefully and answer the questions that follow:

1. 'I sit inside, doors open to the veranda writing long letters
in which I scarcely mention the departure
of the forest from the house...'
 - a. Where is the speaker sitting in the poem?
 - b. What is the speaker doing while sitting inside the house?
 - c. What important event does the speaker scarcely mention in the letters?
 - d. From where is the forest departing according to the lines?

2. " All night the roots work to disengage themselves from the cracks in the veranda floor. The leaves strain toward the glass small twigs stiff with exertion..."
- What part of the trees work to free themselves from the floor?
 - Where are the cracks located?
 - What are the leaves straining toward?
 - Which word suggests the physical effort of the twigs?

**Madam Rides the Bus
- Vallikkannan**

SHORT ANSWER QUESTIONS

- How did the conductor react when Valli boarded the bus alone?
- What did Valli observe when the bus reached the town?
- Why does Valli refuse to get down at the town bus stand?

LONG ANSWER QUESTIONS

- Describe Valli's preparation and planning for her bus journey.
- How did the incident of the dead cow change Valli's mood and understanding?
- "Valli strongly desires independence, yet her innocence remains visible throughout the journey." Discuss this statement with reference to the story.

EXTRACT-BASED QUESTIONS

Read the following extracts carefully and answer the questions that follow:

1. "Over many days and months, Valli listened carefully to the conversations between her neighbours and people who regularly used the bus"

- Why did Valli listen carefully to these conversations?
- What information did she learn from these conversations?
- What does this behaviour reveal about Valli?
- Find a word from the extract which means 'talks between people'.

2. "Her first journey—what careful, painstaking, elaborate plans she had to make for it! She had thriftily saved whatever stray coins came her way, resisting every temptation to buy peppermints, toys, balloons and the like ..."

- Why did Valli have to make elaborate plans for her journey?
- What temptations did Valli resist while saving money?
- What quality of Valli is revealed through her careful saving?
- What does the word 'thriftily' mean in the extract?

3. “‘Oh,’ said Valli, I was just agreeing with what you said about things happening without our knowledge.”

- (a) In what situation does Valli make this remark?
- (b) What idea about life is being discussed in this conversation?
- (c) Why is this statement ironic in the context of the story?
- (d) Find a word from the extract that means ‘awareness’.

The Tale of Custard the Dragon – Ogden Nash

SHORT ANSWER QUESTIONS

- 1. What lesson can be learnt from Custard’s character in dealing with peer pressure and criticism ?
- 2. Based on the poem ‘The Tale of Custard the Dragon’, what is the value of inner strength over outward bravado?
- 3. Custard humbly accepts that other animals are braver than him. What does it reveal about Custard’s character?

Long Answer Question

- 1. In the context of “The Tale of Custard the Dragon”, how does the poem challenge the idea of making fun of someone based on their personality, preferences, or choices in life?
- 2. Discuss whether it is justified to ridicule others for being different.

EXTRACT-BASED QUESTIONS

Read the following extract carefully and answer the questions that follow:

1. “Custard the dragon had big sharp teeth, And spikes on top of him and scales underneath, Mouth like a fireplace, chimney for a nose, And realio, trulio, daggers on his toes. “

- a. Who was Custard?
- b. What kind of teeth did the dragon have?
- c. Which poetic device is used in “Mouth like a fireplace”?
- d. What is the nose compared to?

2. “Belinda giggled till she shook the house, And Blink said Week!, which is giggling for a mouse, Ink and Mustard rudely asked his age, When Custard cried for a nice safe cage.”

- a. Why did Belinda giggle?
- b. Why were Ink and Mustard rude to the dragon?
- c. Why did Ink and Mustard rudely ask his age?
- d. What happened when Belinda giggled?

The Sermon at Benares

SHORT ANSWER QUESTIONS

- 1. What were the four sights that changed Siddhartha’s life?
- 2. Why do you think the Buddha did not directly tell Kisa Gotami that her son was dead and could not return to life?
- 3. If someone loses a loved one and refuses to accept the loss, how can the Buddha’s teachings help that person?

Long Answer Question

1. Narrate the story of Kisa Gotami and explain the lesson she learned.
2. How does Kisa Gotami's experience in 'The Sermon at Benares' illustrate the idea that attachment is the root cause of suffering?
3. How do the experiences of Kisa Gotami in 'The Sermon at Benares' and Valli in 'Madam Rides the Bus' show that real learning comes through personal experience? Explain with examples from both texts.
4. Both Kisa Gotami in 'The Sermon at Benares' and the boy in 'The Ball Poem' experience the pain of loss. Compare their experiences and explain what they learn about accepting loss.

EXTRACT-BASED QUESTIONS

Read the following extract carefully and answer the questions that follow:

1. "He wandered for seven years and finally sat down under a peepal tree, where he vowed to stay until enlightenment came. Enlightenment came after seven days, ..."

- (a) Who is 'he' referred to here?
- (b) Under which tree did he meditate?
- (c) What does "enlightenment" mean here?
- (d) What does his vow show about his character?

2. "The Buddha answered, 'I want a handful of mustard-seed.' And when the girl in her joy promised to procure it, the Buddha added, 'The mustard-seed must be taken from a house where no one has lost a child, husband, parent or friend.'"

- (a) Why did Kisa Gotami feel joyful on hearing Buddha's first request?
- (b) What special condition did the Buddha add to his request?
- (c) What was the real purpose behind the Buddha's condition?
- (d) What does this incident reveal about the Buddha's method of teaching?

3. "Kisa Gotami became weary and hopeless, and sat down at the wayside watching the lights of the city, as they flickered up and were extinguished again. And she thought to herself, 'How selfish am I in my grief! Death is common to all...'"

- (a) Why did Kisa Gotami become weary and hopeless?
- (b) What do the 'flickering lights' symbolize?
- (c) What realization came to Kisa Gotami as she sat by the roadside?
- (d) How did this realization change her attitude towards her son's death?

For Anne Gregory
– William Butler Yeats

SHORT ANSWER QUESTIONS

1. Why does the poet think outer beauty influences love?
2. Why does Anne Gregory want to change her hair colour?
3. What idea about true love is presented in the poem?

Long Answer Question

1. Discuss how the poem 'For Anne Gregory' highlights the difference between outer beauty and inner beauty.

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. “But I can get a hair-dye And set such colour there, Brown, or black, or carrot,”

- a. Who is the speaker in these lines?
- b. What does the speaker say she can do?
- c. Why does she want to change her hair colour?
- d. What idea about beauty is conveyed in this extract?

2. “I heard an old religious man
But yester night declare
That he had found a text to prove”

- a. Who is the speaker referring to in these lines?
- b. What did the old religious man claim to have found?
- c. What does the word “text” refer to here?
- d. What idea about love is conveyed through this statement?

The Proposal - Anton Chekov

SHORT ANSWER QUESTIONS

- 1. Why does Lomov consider Natalya a suitable bride?
- 2. What leads to the argument between Lomov and Natalya about their dogs?
- 3. How does Chubukov react during the argument about the dogs?

Long Answer Question

- 1. Describe the character of Ivan Vassilevitch Lomov.

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. “There’s a large meadow between your birch woods and the Burnt Marsh.”

- (a) Who says this line?
- (b) To whom is it said?
- (c) What are they discussing?
- (d) Find a word in the extract that means ‘grassland’.

2. “She’s willing! Well? Kiss and be damned to you!”

- (a) Who says these words?
- (b) Who is willing, and for what?
- (c) Why does Chubukov say this in such an impatient tone?
- (d) What does this moment reveal about the ending of the play?

Supplementary Reader

A Triumph of Surgery - James Herriot

SHORT ANSWER QUESTIONS

- 1. Why was giving extra food to Tricki unwise?
- 2. What does Mr. Herriot’s decision to hospitalise Tricki reveal about his understanding of the dog’s condition?
- 3. What makes the episode of the eggs, wine, and brandy humorous in ‘A Triumph of Surgery’?
- 4. Do you think Tricki loved Mrs. Pumphrey despite his stay at the surgery? Justify.
- 5. Why is Mrs. Pumphrey’s remark, “This is a triumph of surgery,” ironic?

6. What does Tricki's transformation at the end of the story show?

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. "Now! I really mean this. If you don't cut his food right down and give him more exercise he is going to be really ill. You must harden your heart and keep him on a very strict diet."

- (a) Who is the speaker and to whom was it said?
- (b) Why did the speaker sound severe?
- (c) Why was the advice given?
- (d) What is the antonym of 'harden'?

2. "Tricki would eat nothing. Refused even his favourite dishes, and besides he had bouts of vomiting."

- (a) What symptoms of illness did Tricki show?
- (b) Why was this situation worrying for Mrs Pumphrey?
- (c) What was the main cause of Tricki's illness?
- (d) What decision did Mr Herriot take after seeing Tricki's condition?

3. "Poor old lad", I said. "You haven't a kick in you but I think I know a cure for you."

- (a) Who is the speaker and to whom was it said?
- (b) Why does the speaker say "poor old lad"?
- (c) What cure did the speaker have in mind?
- (d) What is the meaning of 'a kick' in the extract?

4. "He became an accepted member of the gang, an unlikely, silky little object among the shaggy crew, ..."

- (a) Who is referred to as 'he' in this extract?
- (b) Who were the 'gang' mentioned here?
- (c) Why is Tricki called an 'unlikely' member?
- (d) How did being with the other dogs help Tricki?

THE THIEF'S STORY
- Ruskin Bond

SHORT ANSWER QUESTIONS

1. Hari Singh noticed that greedy people show fear and poor people show acceptance when they lose money. What does this show about him?
2. Anil knew Hari Singh had stolen the money because the notes were wet from the rain, but he did not say anything. Why did Anil stay silent?
3. Why was Hari Singh more thankful for the promise of education than for the money he stole every day?

EXTRACT-BASED QUESTIONS

Read the extracts carefully and answer the questions that follow:

1. "I awoke late next morning to find that Anil had already made the tea. He stretched out his hand towards me. There was a fifty-rupee note between his fingers."

- a. Who woke up late in the morning?
- b. What had Anil already done by that time?
- c. What does Anil promise Hari from that day onward?
- d. What does this extract suggest about Anil's attitude towards the thief?

2. "When I was on the road, I began to run. I had the notes at my waist, held by the string of my pyjamas."

- Who stole the money?
- How did the thief carry the money?
- At what time did the incident take place?
- From whom did the thief steal the money?

A QUESTION OF TRUST **- Victor Canning**

SHORT ANSWER QUESTIONS

- How did Horace Danby know all the details about the Shotover Grange?
- "Society must be protected from men like you." Comment on the irony of the sentence in the context of the story "A Question of Trust".
- Why did Horace Danby open the safe without wearing gloves?

EXTRACT-BASED QUESTIONS

Read the extracts carefully and answer the questions that follow:

- "The police arrested him for the jewel robbery at Shotover Grange. His fingerprints, for he had opened the safe without gloves, were all over the room, and no one believed him when he said that the wife of the owner of the house had asked him to open the safe for her."
 - Why were Horace's fingerprints all over the room?
 - What did Horace tell the police about the broken safe?
 - Why did "no one" believe his story?
 - Who was the actual owner of the house?

- "Horace is now the assistant librarian in the prison. He often thinks of the charming, clever young lady who was in the same profession as he was, and who tricked him. He gets very angry when anyone talks about 'honour among thieves'."

- What is Horace's current job?
- How does Horace now feel about the lady?
- Why does the mention of "honour among thieves" make him angry?
- What is the "profession" mentioned in the extract?

Footprints Without Feet **- H. G. Wells**

SHORT ANSWER QUESTIONS

- Why was Mrs Hall hysterical and fell down the stairs?
- Why did Griffin enter a big London store?
- Who was Griffin? Why did he become a homeless wanderer?
- How did Griffin try to become visible?

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

- "The two boys started in surprise at the fresh muddy imprints of a pair of bare feet. What was a barefooted man doing on the steps of a house in the middle of London? And where was the man? ... They gazed, fascinated, until the muddy impressions grew fainter and fainter, and at last disappeared altogether."
 - Who are 'they' in the above extract?
 - Why were the boys surprised?
 - Whose footprints were these?
 - Find a word in the extract that means 'attracted'.

2. "Suddenly Mrs. Hall almost fell down the stairs in hysterics. 'You! ... You, Mrs. Hall, are a fool! ... You don't know who or what I am,' he shouted. 'Very well—I'll show you.' Instantly he threw off bandages, whiskers, spectacles, and even nose. It took him only a minute to do this. The people in the bar found themselves staring at a headless man!"

- (a) Who is 'he' in this extract?
- (b) Why did the people stare at a 'headless man'?
- (c) What do 'hysterics' mean?
- (d) How did Griffin show his identity?

3. At that moment, Mr Jaffers arrived to arrest him. Although the constable bravely tried to carry out his duty, he found himself struggling with a man he could not see... This dramatic scene marks the first public revelation of Griffin's invisibility. It also shows how his extraordinary scientific achievement, instead of benefiting society, has become a source of fear, disorder, and isolation."

- (a) Why was Mr. Jaffers' professional training and bravery ineffective against Griffin?
- (b) How did Griffin's behavior during the fight shift his status from a "secretive guest" to a dangerous criminal?
- (c) How did Griffin's brilliant "scientific achievement" ironically lead to his own "isolation"?
- (d) In your own words, what is the main lesson this extract teaches us about scientific discoveries?

The Necklace

- Guy de Maupassant

SHORT ANSWER QUESTIONS

- 1. Why did Mr. Loisel sacrifice his savings?
- 2. How did Matilda's life change after losing the necklace?
- 3. What role does pride play in the story?

4. What message does the story give?

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. "She danced with enthusiasm, intoxicated with pleasure."

- a. Where was Matilda?
- b. Why was she happy?
- c. What does this show about her?
- d. Give the synonym of 'intoxicated'.

2. MmeLoisel now knew the horrible life of necessity."

- a. Why did the Loiseles become poor?
- b. How did her life change?
- c. What does this suggest?
- d. Give the antonym of 'horrible'?

3. "In a shop of the Palais-Royal, they found a chaplet of diamonds which seemed to them exactly like the one they had lost."

- a. Who are 'they' in the above line?
- b. How did the chaplet appear to them?
- c. Why might they have been interested in buying the chaplet?
- d. What was the value of the chaplet?

Bholi

- K. A. Abbas

SHORT ANSWER QUESTIONS

- 1. Why did Bholi's parents send her to school?
- 2. How did education transform Bholi's personality?
- 3. What message does the story convey?

Extract-Based Questions :

Read the following extract carefully and answer the questions that follow:

1. "Pitaji! Take back your money. I am not going to marry this man."
 - a. Who speaks these words?
 - b. Why does the speaker refuse the marriage?
 - c. What do these lines show about the speaker's personality?
 - d. How does this moment change the story?
2. "The teacher's voice was so soft and soothing! In all her life she had never been called like that. It touched her heart."
 - a. Who is she referred to in the above line?
 - b. Why did the teacher's voice touch her heart?
 - c. How had she been treated by others before?
 - d. Find a word in the passage which means the same as 'calming'.

GRAMMAR

MULTIPLE CHOICE QUESTIONS (MCQs)

TENSES

1. **My brother _____ in the garden every morning.**
 - A. works
 - B. work
 - C. worked
 - D. working
2. **She _____ for the competitive exam since January.**
 - A. studies
 - B. has studied
 - C. has been studying
 - D. studied
3. **She _____ her homework when the power went out.**
 - A. did
 - B. was doing
 - C. has done
 - D. does
4. **We _____ a new project next month.**
 - A. will have started
 - B. start
 - C. started
 - D. will start
5. **The children _____ breakfast at 8 a.m. every day.**
 - A. eat
 - B. eats
 - C. ate
 - D. eating

6. I _____ for two hours before you called me.

- A. studied
- B. have studied
- C. had been studying
- D. was studying

7. The dog _____ under the table right now.

- A. sleeps
- B. is sleeping
- C. slept
- D. has slept

8. I _____ three emails since I arrived at the office.

- A. have written
- B. wrote
- C. write
- D. am writing

9. He _____ to the gym three times this week.

- A. goes
- B. went
- C. has gone
- D. is going

10. By the time we arrived, the train _____.

- A. had left
- B. left
- C. has left
- D. is leaving

11. The students _____ for the test right now.

- A. study
- B. are studying
- C. studied
- D. have studied

12. While she _____ the road, a bus knocked her down.

- A. has crossed
- B. crosses
- C. was crossing
- D. is crossing

13. By next week, I _____ all my reports.

- A. finishes
- B. will finish
- C. finish
- D. will have finished

14. My father _____ for two hours when the guests arrived.

- A. cooked
- B. had been cooking
- C. was cooking
- D. has cooked

15. They _____ to Italy last summer.

- A. travelled
- B. have travelled
- C. travel
- D. are travelling

16. I _____ French for six months now.

- A. have learned
- B. have been learning
- C. learned
- D. am learning

17. Tomorrow, the manager _____ the meeting at 10 a.m.

- A. held
- B. holds
- C. will hold
- D. will have held

18. By the end of this year, she _____ at the company for eight years.

- A. will have worked
- B. will work
- C. works
- D. will have been working

19. The baby _____ all morning.

- A. is crying
- B. cries
- C. has been crying
- D. cried

20. He _____ his keys somewhere in the house last night.

- A. has lost
- B. lost
- C. is losing
- D. loses

21. The train _____ before we reached the station.

- A. had left
- B. has left
- C. left
- D. is leaving

22. We _____ on a new software update tomorrow at this time.

- A. work
- B. works
- C. will work
- D. will be working

23. By this time next week, I _____ my exams.

- A. will finish
- B. finish
- C. will have finished
- D. finishes

24. I _____ many valuable lessons from this experience.

- A. have learned
- B. have been learning
- C. learned
- D. am learning

25. Father _____ to the market yesterday.

- A. go
- B. goes
- C. gone
- D. went

26. The teacher _____ the test papers today.

- A. has corrected
- B. corrected
- C. is correcting
- D. corrects

27. I have been studying for three hours.

- A. Present Perfect Continuous
- B. Present Continuous
- C. Present Perfect
- D. Past Perfect

28. They will have completed the project by next Monday.

- A. Future Continuous
- B. Future Perfect
- C. Simple Future
- D. Present Perfect

29. She is reading a book in the library.

- A. Present Perfect
- B. Simple Past
- C. Simple Future
- D. Present Continuous

30. He played football yesterday evening.

- A. Present Continuous
- B. Simple Present
- C. Simple Past
- D. Future Continuous

MODALS

1. ____ I open the window? It's very hot in this room.

- A. Can
- B. Should
- C. May
- D. Must

2. You ____ always tell the truth; it is the right thing to do.

- A. can
- B. should
- C. may
- D. might

3. She ____ solve difficult problems quickly.

- A. can
- B. must
- C. might
- D. shall

4. How ____ you enter the room without knocking?

- A. should
- B. may
- C. can
- D. dare

5. I ____ help you with your homework after school if I finish my work early.

- A. may
- B. must
- C. can
- D. should

6. You ____ drink plenty of water during the summer.

- A. might
- B. should
- C. must
- D. can

7. They ____ visit us tomorrow, but I am not sure.

- A. can
- B. must
- C. should
- D. might

8. Students ____ not bring mobile phones into the exam hall.

- A. may
- B. must
- C. might
- D. could

9. You ____ not panic about the test results; everything is fine.

- A. need
- B. must
- C. should
- D. may

10. You ____ complete your project today; the deadline is strict.

- A. may
- B. could
- C. might
- D. have to

11. When she was young, she ____ play the violin beautifully.

- A. can
- B. could
- C. shall
- D. might

12. I ____ join you at the park later if it doesn't rain.

- A. may
- B. must
- C. shall
- D. will

13. You ____ arrive on time for the meeting; it is mandatory.

- A. could
- B. might
- C. must
- D. should

14. ____ we take a short break before continuing the class?

- A. Shall
- B. Must
- C. Can
- D. Might

15. When I was a child, my grandfather ____ always tell us interesting stories before bedtime.

- A. must
- B. can
- C. would
- D. might

16. You ____ switch off the lights before leaving the room.

- A. can
- B. must
- C. might
- D. could

17. ____ you please pass me the salt?

- A. Must
- B. Shall
- C. Could
- D. Need

18. We ____ reach the station on time if we leave now.

- A. can
- B. ought to
- C. may
- D. should

19. You ____ not park your car here; it is a 'No Parking' zone.

- A. need
- B. must
- C. may
- D. could

20. She ____ be in the library because her bag is there.

- A. can
- B. should
- C. must
- D. might

21. ____ I carry these books for you?

- A. Shall
- B. Must
- C. Need
- D. Might

22. You ____ apologise to your parents for your rude behaviour.

- A. might
- B. may
- C. can
- D. ought to

23. We ____ finish the project today, or we will miss the deadline.

- A. can
- B. may
- C. have to
- D. could

24. He ____ speak four languages fluently.

- A. should
- B. can
- C. might
- D. ought to

25. You ____ use a calculator during the examination.

- A. must not
- B. can
- C. may
- D. should

26. If you leave now, you ____ still catch the last bus.

- A. should
- B. need
- C. must
- D. may

27. You ____ disturb the patients in the hospital.

- A. should not
- B. may
- C. can
- D. ought to

28. We ____ invite our neighbours to the festival next week.

- A. need
- B. must
- C. shall
- D. ought to

29. Even after many attempts, he ____ lift the heavy box alone.

- A. needn't
- B. mustn't
- C. shouldn't
- D. couldn't

30. ____ you mind closing the door before you leave?

- A. Can
- B. Would
- C. Must
- D. Shall

DETERMINERS

1. We have ____ time left; we must hurry.

- A. a little
- B. little
- C. few
- D. several

2. She answered ____ question confidently.

- A. every
- B. much
- C. little
- D. several

3. There were hardly ____ students in the hall after the programme ended.

- A. much
- B. every
- C. any
- D. several

4. ____ road will take you to the station.

- A. Each
- B. Both
- C. Either
- D. Several

5. He has invested ____ money in the project.

- A. many
- B. much
- C. few
- D. several

6. ____ books on the table belong to me.

- A. This
- B. That
- C. These
- D. Each

7. ____ student was able to answer the question correctly.

- A. No
- B. Both
- C. Many
- D. Several

8. She bought ____ umbrella because it was raining.

- A. a
- B. an
- C. the
- D. some

9. We still have ____ time to complete the work.

- A. few
- B. several
- C. little
- D. a little

10. I have visited ____ countries in Europe.

- A. much
- B. many
- C. little
- D. a little

11. ____ dress do you like?

- A. Which
- B. Either
- C. Both
- D. Neither

12. She can speak ____ English and Hindi fluently.

- A. either
- B. neither
- C. both
- D. each

13. I want ____ apples from the basket.

- A. a few
- B. a little
- C. much
- D. each

14. ____ bag is lying on the floor?

- A. Either
- B. Some
- C. Which
- D. Whose

15. She gave me ____ useful advice.

- A. few
- B. a few
- C. some
- D. several

16. ____ students have not yet submitted their assignments.

- A. Every
- B. Much
- C. Some
- D. Each

17. She bought ____ notebook after losing the first one.

- A. every
- B. another
- C. few
- D. much

18. ____ student was absent on the day of the examination.

- A. No
- B. Every
- C. Several
- D. Much

19. There is ____ food for everyone at the party.

- A. little
- B. enough
- C. few
- D. every

20. She needs ____ practice before the competition.

- A. several
- B. each
- C. either
- D. more

21. ____ book on the table is mine.

- A. Much
- B. That
- C. Those
- D. These

22. We do not have ____ time left before the train leaves.

- A. several
- B. much
- C. every
- D. each

23. There is ____ sugar in this tea than in mine.

- A. every
- B. those
- C. more
- D. few

24. ____ teacher encouraged us to participate in the competition.

- A. Our
- B. Several
- C. Much
- D. Few

25. She bought ____ dress after returning the first one.

- A. other
- B. every
- C. another
- D. several

26. ____ answer do you think is correct?

- A. Several
- B. Which
- C. Few
- D. What

27. ____ hope he had was lost after the final defeat.

- A. Little
- B. Much
- C. The little
- D. Every

28. He stood on the ____ step of the staircase and looked down.

- A. much
- B. several
- C. little
- D. first

29. I invited ____ friends to my birthday party.

- A. three
- B. much
- C. every
- D. little

30. ____ information provided by the witness was useful.

- A. Many
- B. Few
- C. All
- D. Several

SUBJECT-VERB CONCORD

1. One of the players ____ selected for the state team.

- A. are
- B. is
- C. were
- D. have

2. Every student ____ responsible for his own work.

- A. is
- B. are
- C. have
- D. were

3. The sum of these figures ____ correct.

- A. are
- B. were
- C. is
- D. have

4. Some of the milk ____ spilled on the floor.

- A. is
- B. are
- C. were
- D. have

5. Either the teacher or the principal ____ giving the speech.

- A. has
- B. are
- C. were
- D. is

6. Neither the manager nor the employees ____ available today.

- A. is
- B. are
- C. was
- D. were

7. The Times of India ____ published in several cities.

- A. are
- B. were
- C. have
- D. is

8. Each boy and each girl ____ given a certificate.

- A. are
- B. were
- C. was
- D. have

9. More than one student ____ absent today.

- A. have
- B. is
- C. are
- D. were

10. A lot of visitors ____ waiting outside the museum.

- A. are
- B. is
- C. was
- D. has

11. The scissors ____ on the table.

- A. have
- B. was
- C. is
- D. are

12. Two and two ____ four.

- A. make
- B. makes
- C. has made
- D. making

13. He is one of the students who ____ always punctual.

- A. is
- B. was
- C. are
- D. has

14. All the mangoes in the basket ____ ripe.

- A. are
- B. is
- C. were
- D. have

15. Half of the cake ____ still left on the table.

- A. are
- B. is
- C. have
- D. were

16. The captain, along with his teammates, ____ ready for the match.

- A. are
- B. is
- C. were
- D. have

17. Neither of the proposals ____ acceptable.

- A. are
- B. have
- C. were
- D. is

18. The bouquet of roses ____ beautiful.

- A. is
- B. are
- C. were
- D. have

19. More than fifty percent of the work ____ completed.

- A. are
- B. have
- C. is
- D. were

20. Not only the students but also the principal ____ present at the meeting.

- A. were
- B. are
- C. have
- D. is

21. The introduction to these books ____ very informative.

- A. are
- B. is
- C. have
- D. were

22. The pair of shoes ____ under the bed.

- A. are
- B. were
- C. is
- D. have

23. The captain, as well as the players, ____ confident of winning.

- A. is
- B. are
- C. were
- D. have

24. The majority of the audience ____ clapping loudly.

- A. is
- B. are
- C. has
- D. was

25. The poet and philosopher ____ invited as the chief guest.

- A. are
- B. were
- C. have
- D. was

26. The poet and the philosopher ____ invited to the programme.

- A. were
- B. was
- C. has
- D. is

27. There ____ a pen and two pencils on the desk.

- A. are
- B. were
- C. is
- D. have

28. The Arabian Nights ____ a famous collection of stories.

- A. are
- B. is
- C. have
- D. were

29. Much of the information ____ useful.

- A. are
- B. were
- C. have
- D. is

30. The wages of the workers ____ very high.

- A. is
- B. has
- C. are
- D. was

REPORTED SPEECH

1. He said, "I have finished my homework."

A. He said that he had finished his homework.

B. He said that he finished his homework.

C. He said that he has finished his homework.

D. He said that he was finishing his homework.

2. She said, "I will call you tonight."

A. She said that she would call me that night.

B. She said that she will call me tonight.

C. She said that she would call you that night.

D. She said that she will call you tonight.

3. They said, "We are waiting for the bus."

A. They said that they were waiting for the bus.

B. They said that we were waiting for the bus.

C. They said that they are waiting for the bus.

D. They said that they had waited for the bus.

4. The teacher said, "The sun rises in the east."

A. The teacher said that the sun rises in the east.

B. The teacher said that the sun rose in the east.

C. The teacher said that the sun had risen in the east.

D. The teacher said that the sun is rising in the east.

5. My friend said to me, “Do you know the answer?”

- A. My friend asked me if I knew the answer.
- B. My friend asked me that I knew the answer.
- C. My friend asked me whether do I know the answer.
- D. My friend asked me do I know the answer.

6. She said to her child, “Why are you crying?”

- A. She asked the child why he was crying.
- B. She asked the child why was he crying.
- C. She asked the child that why he was crying.
- D. She asked the child why he is crying.

7. He said to me, “Open the window.”

- A. He told me to open the window.
- B. He told me open the window.
- C. He said that I open the window.
- D. He requested me open the window.

8. The old woman said to me, “Please wait for me.”

- A. The old woman requested me to wait for her.
- B. The old woman requested that I wait for her.
- C. The old woman told me wait for her.
- D. The old woman said me to wait for her.

9. She said, “What an amazing story!”

- A. She exclaimed with admiration that it was an amazing story.
- B. She said that it was an amazing story.
- C. She exclaimed that it is an amazing story.
- D. She said what an amazing story it was.

10. We said, “Let us start early.”

- A. We suggested that we should start early.
- B. We told us start early.
- C. We ordered that we start early.
- D. We requested to start early.

11. Mohan said, “If I get time, I will help you.”

- A. Mohan said that if he got time, he would help me.
- B. Mohan said if he gets time he will help me.
- C. Mohan said that if he gets time, he would help me.
- D. Mohan said that if he got time, he will help me.

12. She said, “I must finish this work today.”

- A. She said that she had to finish that work that day.
- B. She said that she would finish that work that day.
- C. She said that she has to finish that work today.
- D. She said that she had finished that work.

13. Rita said, “These flowers are very beautiful.”

- A. Rita said that those flowers were very beautiful.
- B. Rita said that these flowers were very beautiful.
- C. Rita said that those flowers are very beautiful.
- D. Rita said that these flowers are very beautiful.

14. He said, "I was cooking dinner."

- A. He said that he had been cooking dinner.
- B. He said that he was cooking dinner.
- C. He said that he cooks dinner.
- D. He said that he had cooked dinner.

15. The coach said to me, "Be careful."

- A. The coach advised me to be careful.
- B. The coach said to me to be careful.
- C. The coach told that I be careful.
- D. The coach said that I was careful.

16. He said that he played football.

- A. He said, "I play football."
- B. He said, "I had played football."
- C. He said, "I have played football."
- D. He said, "I am playing football."

17. She said that she would visit me the next day.

- A. She said, "I will visit you tomorrow."
- B. She said, "I would visit you tomorrow."
- C. She said, "I visit you tomorrow."
- D. She said, "I will visit me tomorrow."

18. They asked me if I was ready.

- A. They said to me, "Are you ready?"
- B. They said to me, "You are ready?"
- C. They said to me, "Were you ready?"
- D. They said to me, "Ready?"

19. He asked where I lived.

- A. He said, "Where do you live?"
- B. He said, "Where did you live?"
- C. He said, "Where you live?"
- D. He said, "Where are you live?"

20. She told me to sit down.

- A. She said, "Sit down."
- B. She said, "Sits down."
- C. She said, "You sit down."
- D. She said, "Sat down."

21. She requested him to help her.

- A. She said to him, "Please help me."
- B. She said, "Help me."
- C. She said, "You help me."
- D. She said, "Helps me."

22. He exclaimed with sorrow that he had failed.

- A. He said, "Alas! I have failed."
- B. He said, "I failed."
- C. He said, "Oh! I fail."
- D. He said, "I fail."

23. She wished that I might succeed.

- A. She said, "May you succeed!"
- B. She said, "You may succeed."
- C. She said, "Succeed."
- D. She said, "You succeed."

24. They suggested that we should start early.

- A. They said, "Let us start early."
- B. They said, "We start early."
- C. They said, "Start early."
- D. They said, "Started early."

25. She said that she was feeling ill that day.

- A. She said, "I am feeling ill today."
- B. She said, "I feel ill today."
- C. She said, "I was feeling ill today."
- D. She said, "I have felt ill today."

26. He said that he would be travelling the next week.

- A. He said, "I will be travelling next week."
- B. He said, "I am travelling next week."
- C. He said, "I travel next week."
- D. He said, "I would travel next week."

27. They said that they could not attend the meeting.

- A. They said, "We cannot attend the meeting."
- B. They said, "We could not attend the meeting."
- C. They said, "We do not attend the meeting."
- D. They said, "We will not attend the meeting."

28. He said that it was very cold that night.

- A. He said, "It is very cold tonight."
- B. He said, "It was very cold tonight."
- C. He said, "It is very cold that night."
- D. He said, "It was very cold this night."

29. She told me that she had lost her keys.

- A. She said, "I have lost my keys."
- B. She said, "I had lost my keys."
- C. She said, "I lose my keys."
- D. She said, "I lost her keys."

30. He ordered the boys to leave the room.

- A. He said to the boys, "Leave the room."
- B. He said, "Leave the room."
- C. He said, "You leave the room."
- D. He said, "Left the room."

COMPREHENSION PASSAGES UNSOLVED QUESTION

Technology has transformed nearly every aspect of modern life, including the way people learn. In the past, education relied heavily on textbooks, blackboards, and face-to-face instruction. Today, digital tools such as computers, tablets, and online platforms have become an essential part of the educational experience.

One of the most significant advantages of technology in education is access to information. Students can now explore vast amounts of knowledge through the internet. Online libraries, educational videos, and digital courses provide resources that were once difficult to obtain. This accessibility allows learners from different parts of the world to study topics that interest them.

Technology also supports personalized learning. Traditional classrooms often follow a single teaching pace that may not suit every student. However, digital learning platforms can adapt to individual learning speeds. Students who need more time can review materials repeatedly, while those who learn quickly can move ahead to more advanced topics.

Another benefit is improved communication and collaboration. Students and teachers can interact through emails, discussion forums, and video conferences. This allows learning to continue even when participants are not physically present in the same location. Group projects can also be conducted online, allowing students from different countries to work together.

Despite these benefits, technology also presents certain challenges. Excessive reliance on digital devices can lead to distractions and reduced attention spans. Some students may spend more time on social media or games than on educational tasks. Additionally, not all students have equal access to technology, creating a digital divide between those who have reliable internet and those who do not.

Therefore, while technology has great potential to enhance education, it must be used responsibly and thoughtfully. Teachers, parents, and students must work together to ensure that technology serves as a tool for learning rather than a source of distraction.

MCQs (UNSOLVED)

1. What is the passage mainly about?

- A. The disadvantages of schools
- B. The influence of technology on education
- C. The history of computers
- D. The importance of textbooks

2. In the past, education mainly relied on:

- A. Smartphones
- B. Virtual classrooms
- C. Textbooks and blackboards
- D. Social media

3. Technology helps students access:

- A. Limited knowledge
- B. Vast amounts of information
- C. Only school notes
- D. Only printed books

4. Personalized learning means:

- A. Students learn at the same speed
- B. Learning adapted to individual needs
- C. Teachers stop teaching
- D. Students study alone

5. Technology improves communication through:

- A. Letters only
- B. Emails and video conferences
- C. Television only
- D. Newspapers

6. One challenge mentioned is:

- A. Lack of teachers
- B. Too many books
- C. Digital distractions
- D. Lack of classrooms

7. The “digital divide” refers to:

- A. Differences in internet access
- B. Differences in languages
- C. Differences in school uniforms
- D. Differences in exam patterns

8. Online collaboration allows students to:

- A. Avoid studying
- B. Work with people from different countries
- C. Skip classes
- D. Reduce communication

9. According to the passage, technology should be used:

- A. Completely avoided
- B. Only by teachers
- C. Responsibly
- D. Only at home

10. The author’s attitude toward technology is:

- A. Completely negative
- B. Completely positive
- C. Balanced and cautious
- D. Indifferent

ANALYTICAL PASSAGE UNSOLVED QUESTION

1. The graph represents the percentage distribution of a family’s monthly expenditure across various categories. Food accounts for the largest share at 30%, indicating that basic needs consume a significant portion of income. Rent follows closely at 25%, reflecting the high cost of housing in urban areas.

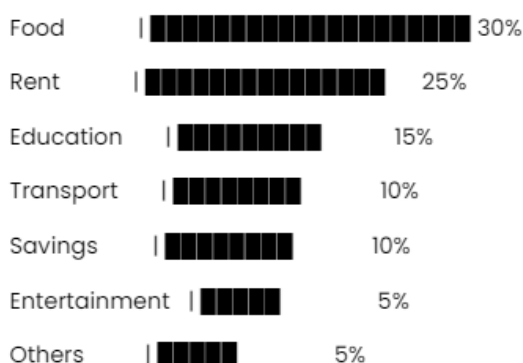
Education takes up 15% of the budget, showing the family’s priority towards academic development. Transport and savings each account for 10%, suggesting a balance between daily commuting needs and future financial security.

Entertainment and other expenses are limited to 5% each, indicating controlled discretionary spending. This pattern reflects a cautious financial approach, where essential needs are prioritised over luxury.

Overall, the graph highlights the importance of budgeting and financial

planning in maintaining a stable household economy, especially in the face of rising living costs.

Monthly Expenditure of a Family (in %)



1. What does the above graph represent?
2. Which category accounts for the highest expenditure?
3. What percentage of income is spent on rent and food combined?
4. How much is allocated to savings, and what does it indicate?
5. Why do you think entertainment expenses are low?
6. Identify two essential and two non-essential expenses from the graph.
7. What does the spending pattern suggest about the family's priorities?
8. If the total monthly income is ₹40,000, calculate the amount spent on education.
9. What economic challenge is hinted at in the passage?
10. What does the graph highlight overall?

LETTER WRITING UNSOLVED QUESTIONS

1. You are Rumi / Rahul, a resident of 105 Green Park, Guwahati. You have noticed that traffic rules are frequently ignored near Montfort School, causing traffic jams and posing a danger to students and pedestrians. Write a letter, in about 120–150 words, to the Deputy Commissioner of Police (Traffic), Guwahati, complaining about the situation and suggesting measures to regulate traffic and ensure safety near the school.

2. You are Ridalin / Sanhiwot. The household water supply in your locality is muddy and unfit for drinking. Despite several complaints to the civic authorities, the problem still remains unresolved. Write a letter, in about 120–150 words, to the Editor of a local daily newspaper, expressing your concern about the issue, suggesting possible solutions, and drawing the attention of the concerned authorities to the matter.

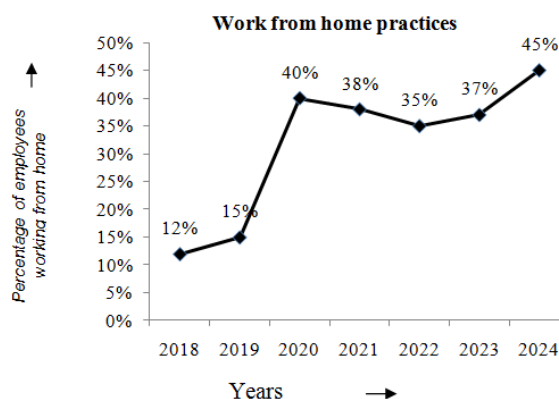
3. You are Tia / Melvin, a student of Modern Public School, Delhi. You have observed that many students are becoming increasingly dependent on Artificial Intelligence (AI) tools for completing assignments and homework, which may affect their creativity and learning ability. Write a letter, in about 120–150 words, to the Editor of The Times of India, expressing your concern and suggesting ways to encourage independent thinking and the responsible use of technology among students.

ARTICLE WRITING UNSOLVED QUESTIONS

1. Metropolitan cities are becoming concrete jungles. There are no playgrounds left for children. Write an article, in about 120-150 words, on the “Role of Playground in a Child's Development”. You are Dame / Ashira.
2. You are Kapil / Radha of Town School Tura. Every town you visit, you come across a deposit of garbage in its outskirts. It creates an unhealthy scene and is a serious threat to the environment. As a responsible citizen you feel that some concrete steps should be taken to check this problem. Write an article, in about 120-150 words, for your School Magazine on "Need for Garbage Management”.
3. Trees are cut to widen roads or to develop new townships. It is fatal for the environment as a tree takes years to grow. You are in favour of growing more trees and banning the cutting of trees. Write an article, in about 120-150 words for your school magazine on the need to plant more trees and prevent deforestation. You are Annanya / Anil.

ANALYTICAL PARAGRAPH UNSOLVED QUESTIONS

1. The line graph below shows the growth of work-from-home practices in various sectors from 2018 to 2024. Study the line graph carefully and write an analytical paragraph in about 100–120 words highlighting the key trends, comparisons, and overall changes shown in the data.



2. The table below provides data on the number of speakers (in millions) and the percentage of the total population for six major languages spoken in India, based on a recent census report. Write an **analytical paragraph** in about 120–150 words summarizing the information.

Speakers of Six Major Indian Languages

Language	Number of speakers (in millions)	Percentage of Total Population
Hindi	528	43.6%
Bengali	97	8.0%
Marathi	83	6.8%
Telugu	81	6.7%
Tamil	69	5.7%
Gujarati	55	4.5%

**CM IMPACT Guidebook for Students
(With Important Questions and Answers)**

**Health & Physical Education
Class X
2026**

**Published by
Education Department**

**An Initiative under
Chief Minister's Initiative to Maximize Pass Achievement and Classroom Triumph (CM IMPACT)**

Section- A (1 mark) MCQ:

1. _____ cannot change, you cannot hurry it up or slow it down.

- A. Intellectual Age
- B. Chronological Age
- C. Cellular Age
- D. Philosophical Age

Ans. B

2. Which of the following is not an aspect of maturity?

- A. Physical
- B. Emotional
- C. Intellectual
- D. Calculative.

Ans. D

3. The ability to get along with people is _____.

- A. Emotional maturity
- B. Physical maturity
- C. Social maturity
- D. Philosophical maturity

Ans. C

4. The maturity that helps in maintaining an equilibrium in the present as well as future life is _____.

- A. Philosophical Maturity
- B. Intellectual Maturity
- C. All- round Maturity
- D. Social Maturity

Ans. C

5. Having a mission in life is part of what maturity?

- A. Intellectual Maturity
- B. Social Maturity
- C. Philosophical Maturity
- D. Emotional Maturity

Ans. C

6. As you become a teenager, your dependence on parents _____

- A. Increases
- B. Decreases
- C. Doesn't change
- D. Cannot tell

Ans. B

7. Marriages in our country are generally arranged by

- A. Grandparents
- B. Parents.
- C. Friends
- D. Relatives

Ans. B

8. The most intimate relationship of a married couple is

- A. Sex satisfaction
- B. Domestic Chores
- C. Formal
- D. Casual

Ans. A

9. All parts of the body grow at

- A. The same rate
- B. Different rates
- C. Equal rate
- D. Speed rate.

Ans. B

10. Which of the following is not a benefit of living in a joint family?

- A. Abundant privacy
- B. Help in upbringing children
- C. Support in events of crisis
- D. Advice on personal issues

Ans. A

11. Which of the following is not a requisite for a successful marriage?

- A. Loving and being loved
- B. Cooperation.

C. Compatibility.

D. Competitiveness

Ans. D

12. Growth in human beings mean much more than growing

- A. Shorter and stronger.
- B. Taller and stronger.
- C. Weaker and shorter.
- D. Stronger and weaker.

Ans: B

13. Human development does not include

- A. Physical growth
- B. Intellectual advancement
- C. Social maturity
- D. Chronological maturity

Ans: D

14. Striking changes takes place in the body during

- A. Adolescence
- B. Adulthood
- C. Birth
- D. Childhood

Ans: A

15. Knowledge of our body structure and its functioning is essential for maintaining

_____.

- A. Good academics
- B. Good wealth
- C. Good health
- D. Good relations

Ans: C

16. Complete growth of your body is

- A. Social maturity
- B. Intellectual maturity
- C. Physical maturity
- D. Chronological maturity.

Ans: C

17. Intellectually, the adolescent shows great progress in developing the ability to think

- A. Smart
- B. Active
- C. Logically
- D. Brilliant

Ans: C

18. Every human being has a_____ in life.

- A. Philosophy
- B. Emotional
- C. Physical
- D. Social

Ans: A

19. Maturity means the ability to

- A. Earn money.
- B. Handle responsibilities and experiences.
- C. Become physically strong.
- D. Grow older quickly.

Ans: B

20. Chronological maturity is based on

- A. Intelligence.
- B. Emotional control.
- C. Number of years lived.
- D. Social interaction.

Ans: C

21. Which of the following is an example of chronological maturity?

- A. Learning to control anger
- B. Celebrating birthdays
- C. Making career decisions
- D. Helping others

Ans: B

22. Physical maturity mainly refers to

- A. Thinking ability
- B. Emotional control
- C. Body growth and development
- D. Social adjustment

Ans: C

23. Intellectual maturity helps a person to

- A. Become physically strong
- B. Control emotions only
- C. Think and make wise decisions
- D. Increase age

Ans: C

24. Philosophical maturity is related to

- A. Body growth
- B. Emotions only
- C. Values and life goals
- D. Age

Ans: C

25. It is expected of the newly wed couple that they should give_____ to the family of each other.

- A. Due respect
- B. Dowry
- C. Gifts
- D. House.

Ans: A

26. Two persons who marry cannot have exactly the same_____ .

- A. Traits
- B. Character
- C. Behaviour
- D. Religion

Ans: A

27. _____means to adapt and respect the likes and dislikes of each other.

- A. Compatibility
- B. Sincerity
- C. Adaptability
- D. Morality

Ans: C

28. A successful marriage is necessarily a_____ marriage

- A. Devastating
- B. Broken
- C. Happy
- D. Curse

Ans: C

29. If the husband and wife share some common interest, it helps to_____them together.

- A. Connect
- B. Disconnect
- C. Separate
- D. Bind

Ans: D

30. Sharing household work reflects

- A. Laziness
- B. Cooperation
- C. Independence
- D. Weakness

Ans: B

31. Germs contain certain chemical substances called

- A. Antigens
- B. Antibodies
- C. Leucocytes
- D. Phagocytes

Ans. A

32. Each block comprises of about

- A. 10 villages
- B. 100 villages
- C. 1000 villages
- D. 5000 villages

Ans. B

33. The Revised National Tuberculosis Control Programme aims to eradicate tuberculosis from the country by the year

- A. 2025
- B. 2035
- C. 2045
- D. 2055

Ans. A

34. Which is a non-communicable disease?

- A. Diabetes
- B. Measles
- C. Diphtheria

D. Cholera

Ans. A

35. BCG Vaccination is being offered to all below the age of

- A. All ages
- B. 50 years
- C. 20 years
- D. 40 years

Ans. C

36. BCG Vaccination was discovered by

- A. Paul Ehrlich
- B. Alexander Fleming
- C. Salman A Waksman
- D. Calmette and Guerin

Ans. D

37. BCG vaccine protects from

- A. Tuberculosis
- B. Leprosy
- C. Cholera
- D. Malaria

Ans. A

38. The tablet used for treating leprosy patients:

- A. Sulfone
- B. Bromides
- C. Paracetamol

D. Amphetamines

Ans. A

39. The National Vector Borne Disease Control Programme do not cover

- A. Malaria
- B. Filariasis
- C. Cancer
- D. Dengue

Ans. C

40. Trachoma affects which part of the body?

- A. Eyes.
- B. Ears.
- C. Lungs.
- D. Legs.

Ans. A

41. The first country in the world to launch Family Planning as an official programme is

- A. USA
- B. India
- C. Russia
- D. China

Ans. B

42. A Sub Centre normally looks after a population of about

- A. 10,000
- B. 1,000

C. 1,00,000

D. 5,00,000

Ans. A

43. World AIDS Day is observed on which day?

- A. 1st January
- B. 1st December
- C. 1st November
- D. 1st October

Ans. B

44. The percentage of our population living in rural

- A. 50 per cent
- B. 60 per cent
- C. 80 per cent
- D. 95 per cent

Ans. C

45. In Health Services of Government, PHC stands for_____

- A. Physical Health Centre
- B. Physical Healing Centre
- C. Primary Health Centre
- D. Primary Healing Centre

Ans. C

46. The PHC is the largest agency to serve the public health needs in

- A. Rural areas

- B. Urban areas
- C. Residential areas
- D. Commercial areas

Ans. A

47. Trachoma is found particularly in the age group of

- A. 0-1 years
- B. 0-10 years
- C. 10-20 years
- D. 60-70 years

Ans. B

48. The National Population Policy 2000, has a long-term objective of stabilising the country's population by

- A. 2035 CE
- B. 2040 CE
- C. 2045 CE
- D. 2055 CE

Ans. C

49. _____ attack the germs and neutralise them.

- A. Antibodies
- B. Antigens
- C. Antibiotics
- D. Vaccines

Ans: A

50. If a person cannot fight diseases easily, it is called

- A. Immunity
- B. Disease
- C. Susceptibility
- D. Passive immunity

Ans: C

51. _____ is the ability of our body to fight against diseases.

- A. Immunity
- B. Disease
- C. Susceptibility
- D. Allergic reaction

Ans: A

52. Examples of allergic reactions can be

- A. Diarrhoea, hiccups
- B. Constipation, toothache
- C. Skin rashes
- D. Anaemia

Ans. C

53. Which of the following conditions is **not** an allergic reaction?

- A. Asthma
- B. Migraine
- C. Eczema
- D. Anaemia

Answer: D

54. Mission Indradhanush was launched on

- A. 25 Dec 2014
- B. 25 Dec 2015
- C. 24 Dec 2015
- D. 24 Dec 2014

Ans. A

55. Universal Immunization Programme (UIP) was launched in the year

- A. 1983
- B. 1984
- C. 1985
- D. 1986

Ans. C

56. Intensified Mission Indradhanush (IMI) was launched on

- A. Oct 2015
- B. Oct 2016
- C. Oct 2017
- D. Oct 2018

Ans. C

57. Mission Indradhanush depicts the

- A. 4 seasons in a year
- B. 12 numbers in a dozen
- C. 2 numbers in a pair

D. 7 colours of the rainbow

Ans. D

58. The Central Council of Health was set up by a presidential order on

- A. 8 August 1952
- B. 7 August 1953
- C. 9 August 1952
- D. 9 August 1953

Ans. C

59. The Central Council was set up under Article_____ of the Constitution of India

- A. 260
- B. 261
- C. 262
- D. 263

Ans. D

60. The Department of AIDS Control was merged with the Department of Health and Family Welfare

- A. August 7, 2014
- B. August 7, 2015
- C. August 9, 2014
- D. August 9, 2015

Ans. A

61. The Department of Health Research (DHR) was formally launched on

- A. 5th October 2007
- B. 5th October 2008
- C. 5th December 2007
- D. 5th January 2008

Ans. A

62. It was in _____ that an integrated comprehensive scheme of establishing PHCs in the community development block was heralded.

- A. 1955
- B. 1954
- C. 1953
- D. 1952

Ans. D

63. Pradhan Mantri National Dialysis Programme provided relief to patients at the end-stages of _____ related diseases.

- A. Liver
- B. Heart
- C. Pancreas
- D. Kidney

Ans. D

64. The Ministry of Health and Family Welfare consists of

- A. 1 department
- B. 2 departments
- C. 3 departments
- D. 4 departments

Ans. B

65. The Directorate General of Health services comprises _____ main units

- A. One
- B. Two
- C. Three
- D. Four

Ans. C

66. The Government of India launched the Family Planning Programme as a national Programme in

- A. 1951
- B. 1952
- C. 1953
- D. 1954

Ans. B

67. In order to fight malaria, a nationwide MCP was launched in the year

- A. 1950
- B. 1952
- C. 1953
- D. 1954

Ans. C

68. The achievements of the MCP were so encouraging that in _____ it was switched over to an Eradication Programme

- A. 1958

- B. 1968
- C. 1955
- D. 1966

Ans. A

69. National Leprosy Control Programme was initiated in the year

- A. 1955
- B. 1945
- C. 1935
- D. 1925

Ans. A

70. The National Trachoma Control Programme was launched in

- A. March 1953
- B. March 1963
- C. April 1953
- D. April 1963

Ans. B

71. The Applied Nutrition Programme was launched in the year

- A. 1963
- B. 1964
- C. 1965
- D. 1966

Ans. A

72. The National AIDS Control Programme was launched in India in

- A. December 1999
- B. September 1989
- C. October 1979
- D. December 2001

Ans. A

73. The National Programme for Control of Blindness was originally launched to fight:

- A. Cataract
- B. Trachoma
- C. Glaucoma
- D. Night blindness

Ans. B

74. The National Vector Borne Disease Control Programme aims to control:

- A. Tuberculosis and leprosy
- B. Malaria, filariasis and dengue
- C. AIDS and cancer
- D. Trachoma and blindness

Ans. B

75. The National Leprosy Eradication Programme was renamed from the earlier:

- A. National Leprosy Control Programme
- B. National Blindness Control Programme
- C. National Nutrition Programme
- D. National AIDS Control Programme

Ans. A

76. A PHC covers a population of about:

- A. 10,000-30,000
- B. 30,000-60,000
- C. 60,000-1,00,000
- D. 2,00,000-3,00,000

Ans. C

77. PHC provide services for

- A. Only children
- B. Only old people
- C. Only pregnant women
- D. The whole community

Ans. D

78. PHC provides emergency treatment for

- A. Major illness
- B. Only non communicable disease
- C. Major surgeries
- D. Minor ailments

Ans. D

79. Maternal and child welfare services are meant for

- A. Mothers and children
- B. Only babies
- C. Only adolescent
- D. Only old people

Ans. A

80. Big cities are managed by

- A. PHC
- B. Municipal corporation
- C. Municipal committee
- D. Bank

Ans. B

81. Towns are managed by

- A. PHC
- B. Municipal corporation
- C. Municipal committee
- D. Bank

Ans. C

82. Which of the following is **not** a false health related belief?

- A. Raw milk is best quality milk
- B. Rinsing mouth after eating food
- C. Wine helps in forming blood
- D. Alcoholic beverages can cure cold

Ans. B

83. We should always consult a qualified medical practitioner for our

- A. Educational needs
- B. Medical needs
- C. Spiritual needs

D. Social needs

Ans. B

84. Which of the following is a cultural practice that promotes health?

- A. Greeting friends with folded hands
- B. Not eating milk and yogurt together
- C. Drinking raw milk
- D. Drinking alcoholic beverages to cure cold

Ans. A

85. Which of the following is not a criterion for a wise consumer?

- A. Select consumer articles intelligently
- B. Consider family budget
- C. Practice self-medication
- D. Make use of consumer laws

Ans. C

86. The government has enacted_____ to protect the consumers from cheats

- A. Jurisdiction
- B. Execution
- C. Legislation
- D. Communication

Ans.C

87. Early concepts of medicine and surgery were set out in the

A. Atharvaveda

B. Rigveda

C. Yajurveda

D. Ayurveda

Ans. A

88. Which of the following is not recommended by Ayurvedic practitioners?

- A. Early rising
- B. Cleaning of bowels
- C. Cleaning of teeth
- D. Taking medicine daily

Ans. D

89. Who was regarded as the God of medicine?

- A. Chanakya
- B. Ritucharya
- C. Dinacharya
- D. Dhanvantari

Ans. D

90. Which system is based upon three substances present in the body, i.e, vayu, pitta and kapha?

- A. Unani system
- B. Allopathy
- C. Ayurvedic system
- D. Naturopathy

Ans. C

91. The Unani system of medicine was introduced in India around the twelfth century CE by

- A. British rulers
- B. Muslim rulers
- C. French rulers
- D. Portuguese rulers

Ans. B

92. Siddha system of medicine is mainly practiced in

- A. Tamil Nadu
- B. Maharashtra
- C. Bihar
- D. Madhya Pradesh

Ans. A

93. The classical books of Siddha system are written in which language?

- A. Telugu
- B. Tamil
- C. Kannada
- D. Malayalam

Ans. B

94. A system of medicine based on natural philosophy:

- A. Homeopathy
- B. Allopathy

C. Naturopathy

D. Ayurvedic

Ans. C

95. Which of the following is not the main line of treatment in Naturopathy?

- A. Hydrotherapy
- B. Oil Bath
- C. Enema
- D. Fasting

Ans. B

96. A system of medicine based on the concept of 'similars', i.e. likes are cured by likes' is

- A. Homeopathy
- B. Allopathy
- C. Ayurvedic system
- D. Siddha system

Ans. A

97. Homeopathy was discovered by

- A. Dr. Samuel Hahnemann
- B. Charaka Samhita
- C. Susruta Samhita
- D. Paul Erhlich

Ans. A

98. Which is the most prevalent system of medicine all over the world?

- A. Naturopathy

- B. Homeopathy
- C. Allopathy
- D. Ayurvedic system

Ans. C

99. There is no other system in medicine which has so many specializations as in

- A. Homeopathy
- B. Allopathy
- C. Naturopathy
- D. Unani system

Ans. B

100. Considering the development of medicine and surgery, innumerable career opportunities are available in

- A. Homeopathy
- B. Naturopathy
- C. Siddha system
- D. Allopathy

Ans. D

101. A false ray of hope, like a mirage, leads people to the money-making trap of

- A. Vaid
- B. Hakims
- C. Quacks
- D. Allopathy doctors

Ans. C

102. Many quacks practice medicine under the garb of

- A. Registered Medical Practitioners
- B. Unregistered Medical Practitioners
- C. Local Medical Practitioners
- D. Indigenous Medical Practitioners

Ans. A

103. _____ may be defined as the practice of the art of healing by the people who are not qualified to practice them.

- A. Curative quackery
- B. Healing quackery
- C. Corrective quackery
- D. Medical quackery

Ans. D

104. The branch of medicine in which treatment of diseases is done by the operation of the diseased tissue is

- A. Medicine
- B. Surgery
- C. Physiotherapy
- D. Chemotherapy

Ans. B

105. The science of healing diseases by the administration of internal and external remedies is

- A. Medicine
- B. Surgery

C. Physiotherapy

D. Chemotherapy

Ans. A

106. Penicillin was discovered by

A. Marie Curie

B. Alexander Fleming

C. Antonie van Leeuwenhoek

D. Edward Jenner

Ans. B

107. Streptomycin was discovered by

A. Marie Curie

B. Alexander Fleming

C. Selman Waksman

D. Edward Jenner

Ans. C

108. What are the commonly abused substances throughout the world?

A. Alcohol and cocaine

B. Tobacco and alcohol

C. Tobacco and cocaine

D. Alcohol, tobacco and cocaine

Ans. B

109. Which of the following symptoms need immediate medical attention?

A. Chest pain

B. Coughing

C. Sneezing

D. Common cold

Ans. A

110. Name the drugs which are used only in medical research

A. Hallucinogens

B. Narcotics

C. Depressants

D. Stimulants

Ans. A

111. All substances with abuse potential can produce mental changes in human such as

A. Fever

B. Stomach pain

C. Common cold

D. Depression

Ans. D

112. Codeine is an example of

A. Narcotics

B. Depressants

C. Stimulants

D. Hallucinogens

Ans. A

113. Novocaine is an example of

A. Narcotics

B. Depressants

- C. Stimulants
- D. Hallucinogens

Ans. A

114. Morphine is an example of

- A. Narcotics
- B. Depressants
- C. Stimulants
- D. Hallucinogens

Ans. A

115. Which drugs are used by physicians and dentists to relieve pain or prevent pain?

- A. Depressants
- B. Narcotics
- C. Stimulants
- D. Hallucinogens

Ans. B

116. Which is an important component of commonly available cough syrups?

- A. Novocaine
- B. Morphine
- C. Codeine
- D. Heroin

Ans. C

117. Name the drug which is used by dentists for local anesthesia.

- A. Novocaine

- B. Morphine
- C. Codeine
- D. Bromides

Ans. A

118. Which drug is used to smother unbearable and severe pain?

- A. Novocaine
- B. Codeine
- C. Morphine
- D. Bromide

Ans. C

119. Drugs that give a soothing feeling and reduce anxiety and tension

- A. Narcotics
- B. Depressants
- C. Stimulants
- D. Hallucinogens

Ans. B

120. Bromides is an example of

- A. Narcotics
- B. Depressants
- C. Stimulants
- D. Hallucinogens

Ans. B

121. Drugs that are present in many patent sedative or sleeping pills:

- A. Morphine
- B. Codeine
- C. Novocaine
- D. Barbiturates

Ans. D

122. Alcohol is an example of

- A. Narcotics
- B. Depressants
- C. Stimulants
- D. Hallucinogens

Ans. B

123. The alcohol used for drinking is

- A. Ethyl alcohol
- B. Methyl alcohol
- C. Isopropyl alcohol
- D. Methanol alcohol

Ans. A

124. Name the alcohol which is deadly poisonous and causes blindness and even death

- A. Ethanol
- B. Methyl alcohol
- C. Isopropyl alcohol
- D. Ethyl alcohol

Ans. B

125. Which of the following is used as a solvent and cleaning agent?

- A. Ethanol alcohol
- B. Methyl alcohol
- C. Isopropyl alcohol
- D. Ethyl alcohol

Ans. C

126. As medical science progressed the need for more and more drugs was felt. This gave birth to the era of

- A. Herbal Drugs
- B. Synthetic drugs
- C. Mechanical drugs
- D. Natural drugs

Ans. B

127. During _____ a person sees images that do not exist.

- A. Illness
- B. Hallucination
- C. Surgery
- D. Medication

Ans. B

128. Hallucinogen drugs affect one's

- A. Sensory and auditory perception
- B. Visual and auditory perception
- C. Mental and visual perception
- D. Auditory perception

Ans. C

129. _____ is obtained from a nicotine rich leaves of a plant, which is grown in many parts of the world

- A. Sugarcane
- B. Rice
- C. Tobacco
- D. Cocaine

Ans. C

130. Nicotine and other chemicals enter the body through the

- A. Skin
- B. Stomach
- C. Ears
- D. Throat

Ans. D

131. Smoking is also associated with

- A. Cancer of the lips and larynx
- B. Illusions
- C. Coma
- D. Unconsciousness

Ans. A

132. Which of the following is a fermented organic liquid, obtained by the natural fermentation of malts and sugars?

- A. Alcohol

B. Tobacco

C. Medicine

D. Cigarette

Ans. A

133. Alcohol when taken in small quantities, causes

- A. Bloating of stomach
- B. Muscular relaxation
- C. Itchy skin
- D. Sneezing

Ans. B

135. The pioneering work in the field of the synthetic drugs was done by

- A. Alexander Fleming
- B. Paul Ehrlich
- C. Selman A. Waksman
- D. Samuel Hahnemann

Ans. B

136. Chemotherapy is the treatment of disease by

- A. Massaging
- B. Administering chemicals
- C. Using hot or cold water
- D. Using UV Rays

Ans. B

137. In case of an illness, you should go to a

- A. Laboratory
- B. Uninformed quack
- C. Qualified physician
- D. Informed quack

Ans. C

138. Non-prescription drugs are generally used in case of minor ailments such as

- A. Headache
- B. Cholera
- C. Dysentery
- D. Cancer

Ans. A

139. The leftover drugs can be

- A. Used for next time
- B. Given to relatives for use
- C. Donated to charitable dispensaries
- D. None of the above

Ans. C

140. Sale of drugs is governed by the

- A. Medicine Control Act
- B. Health Control Act
- C. Drugs Control Act
- D. Pharmacy Control Act

Ans. C

141. Using left over medicine from earlier illness is

- A. Harmless
- B. Dangerous
- C. Good
- D. Beneficial

Ans. B

142. Which of the following is a characteristic of stimulants?

- A. Produce Excitement
- B. Feeling lazy
- C. Leads to coma
- D. Increase the desire for sleep

Ans. A

143. Some stimulants such as_____ are used medically to combat depression.

- A. Amphetamines
- B. Thalidomide
- C. Bromide
- D. Barbiturates

Ans. A

144. Alcoholism generally leads to addiction because of its effects as a

- A. Depressant
- B. Stimulant

C. Hallucinogen

D. Narcotic

Ans. A

145. Our choice of buying goods are often influenced by attractive advertisement using the words such as

A. Miracle cure

B. Quick relief

C. Energy in a pill

D. All of the above

Ans. D

146. In the market a consumer needs to know how to choose products

A. Spontaneously

B. Intelligently

C. Quickly

D. After seeing advertisement

Ans. B

147. Avoid self medication, consult qualified

A. Teacher

B. Lawyer

C. Doctor

D. Headman

Ans. C

148. Charaka Samhita deals with which of the following?

A. Medical Aspect

B. Surgery

C. Control of drugs

D. Dietary control

Ans. A

149. Drugs can be classified into _____ categories.

A. One

B. Two

C. Three

D. Four

Ans: D

150. The headquarter of W.H.O. is in

A. Rome

B. Geneva

C. Canada

D. India

Ans. B

151. The agency that promotes the development of basic soil and water resources of countries

A. WHO

B. UNICEF

C. FAO

D. CARE

Ans. C

152. The International Health Regulations (IHR), are binding on

A. 96 Countries

B. 16 Countries

C. 116 Countries

D. 196 Countries

Ans. D

153. The WHO provides _____ health guidance with regards to international travel to medical professionals, travellers and member states.

A. Guess - based

B. Evidence-based

C. Profit-based

D. Deficit - based

Ans. B

154. The regional office of WHO for South East Asia in

A. New Delhi

B. Rome

C. Kolkata

D. Mumbai

Ans A

155. _____ sets standards for the quality control of vaccines

A. WHO

B. UNICEF

C. CARE

D. FAO

Ans. A

156. World Health Day is celebrated on

A. 1st April

B. 7th April

C. 7th May

D. 1st December

Ans. B

157. The agency that promotes medical research and exchange of scientific information is

A. FAO

B. CARE

C. WHO

D. IHR

Ans. C

158. _____ assists in the control of diseases which are responsible for mortality among mother and children

- A. UNICEF
- B. FAO
- C. IMF
- D. World Bank

Ans. A

159. The main aim of the UNICEF is to provide humanitarian and development assistance to

- A. Children alone
- B. Mothers alone
- C. Children and mothers
- D. Farmers

Ans. C

160. One of the objectives of FAO is to improve production and distribution of all food and agricultural products from

- A. Farms, forests, fisheries
- B. Industries, dry land, urban spaces
- C. Deserts, barren land, mountains
- D. Cities, factories, terrestrial environment

Ans. A

161. _____ is providing technical assistance in such fields as nutrition and food management:

- A. UNICEF
- B. WHO
- C. FAO

- D. CARE

Ans. C

162. The International Health Regulations are intended to detect, reduce or eliminate the source from which infection spreads and to improve sanitation in

- A. Airports, border check posts and ports
- B. Airports, railway stations and ports
- C. Airports, border check posts and railway stations
- D. Airports, border check posts and public transport

Ans. A

163. A period during which persons who might spread an infectious disease are kept isolated is called

- A. Quarantine
- B. Treatment
- C. Hospitalisation
- D. Rehabilitation

Ans. A

164. CARE was created to mobilize relief supplies to

- A. War-torn Asia
- B. War-torn Europe
- C. War-torn Africa

D. War-torn America

Ans. B

165. CARE has now grown into one of the world's largest

- A. Governmental agency
- B. International voluntary relief agency
- C. Health Business
- D. None of the above

Ans. B

166. Which of the following is not a specialized agency of the United Nations?

- A. FAO
- B. CARE
- C. WHO
- D. UNICEF

Ans. B

167. The full form of IHR is

- A. International Hygiene Regulations
- B. International Health Regulations
- C. Indian Hygiene Regulations
- D. Indian Health Regulations

Ans. B

168. At the request of the member countries the WHO assists them in planning out

A. Health programmes

B. Rural programmes

C. Education programmes

D. Drinking water projects

Ans. A

169. Mosquitoes can cross the border and spread_____

- A. Cancer
- B. Diabetes
- C. Sun Stroke
- D. Malaria

Ans. D

170. Immunization is one of the key focus area of_____

- A. IHR
- B. UNICEF
- C. FAO
- D. CARE

Ans: B

171. CARE has been working in India since

- A. 1948
- B. 1960
- C. 1946

D. 1938

Ans. C

172. Ships suspected of carrying infection are kept_____ on its arrival at a port.

A. Isolated

B. Together

C. In a community

D. In a church

Ans: A

173. CARE was formally established in India in the year

A. 1947

B. 1948

C. 1949

D. 1950

Ans D

174. The most important measure for prevention of certain diseases is production of_____

A. Drugs

B. Food

C. Antibodies

D. Vaccines

Ans: D

175. The WHO collaborates with member countries in disease_____ programme

A. Control

B. Eradication

C. Evaluation

D. Diagnostic

Ans: B

176. Genital herpes is caused by

A. Trichomonas Vaginalis Parasite

B. Human Papilloma Virus

C. Treponema Pallidum

D. Herpes Simplex Virus

Ans. D

177. Non-specific urethritis can be treated with

A. Antibiotics

B. Shampoo

C. Antiviral drugs

D. Glycerine

Ans. A

178. Syphilis is caused by a

A. Lice

B. Worm

C. Bacteria

D. Virus

Ans. C

179. The most common STI is

A. Chlamydia

B. Non-specific urethritis

C. Trichomoniasis

D. Pubic lice

Ans. A

180. Human papilloma virus causes

A. Genital warts

B. Genital herpes

C. Syphilis

D. Gonorrhoea

Ans. A

181. Treating warts using liquid nitrogen is called_____

A. Chemotherapy

B. Cryotherapy

C. Physiotherapy

D. Hydrotherapy

Ans. B

182. Trichomoniasis can be treated with

A. Antiviral

B. Antifungal

C. Antibiotics

D. Acyclovir

Ans. C

183. What is teenage pregnancy?

A. Pregnancy after 30 years

B. Pregnancy between 13-19 years

C. Pregnancy in old age

D. Pregnancy after marriage only

Answer: B

184. Which is a symptom of pregnancy?

A. Fever

B. Missed period

C. Cold

D. Toothache

Answer: B

185. What causes STIs?

A. Books

B. Germs (bacteria, viruses, parasites)

C. Water

D. Air only

Ans. B

186. Which of the following helps prevent STIs?

- A. Risky behaviour
- B. Awareness and protection
- C. Ignoring problems
- D. Sharing needles

Answer: B

187. What does HIV stand for?

- A. Human Infection Virus
- B. Human Immunity Virus
- C. Human Immunodeficiency Virus
- D. Health Immune Virus

Answer: C

188. HIV mainly attacks which part of the body?

- A. Digestive system
- B. Immune system
- C. Nervous system
- D. Respiratory system

Answer: B

189. Which of the following is NOT a way in which HIV spreads?

- A. Unprotected sex
- B. Sharing needles
- C. Mosquito bite

D. Infected blood transfusion

Ans. C

190. AIDS stands for:

- A. Active Immune Deficiency System
- B. Acquired Immunodeficiency Syndrome
- C. Auto Immune Defense System
- D. Acute Infectious Disease Syndrome

Answer: B

191. Universal precautions are used in:

- A. Schools
- B. Hospitals
- C. Markets
- D. Homes

Answer: B

192. Treatment for HIV/AIDS is called:

- A. Antibiotics
- B. Antiretroviral
- C. Vaccine
- D. Syrup

Answer: B

193. Teenage pregnancy is more likely in individuals with:

- A. Strong family support

- B. High self-esteem
- C. High-risk behaviours
- D. Good education

Answer. C

194. Which of the following is a social effect of teenage pregnancy?

- A. Increased income
- B. Isolation and guilt
- C. Better job opportunities
- D. Improved health

Ans. B

195. Infants born to teenage mothers may face

- A. High weight
- B. No complications
- C. Developmental delays
- D. Strong immunity

Answer. C

196. Chlamydia can be treated with

- A. Antibiotics
- B. Painkillers
- C. Vaccines
- D. Vitamins

Answer: A

197. Genital warts are caused by

- A. HIV
- B. Human Papilloma Virus (HPV)
- C. Bacteria
- D. Parasite

Answer. B

198. Gonorrhoea is caused by

- A. Virus
- B. Bacteria
- C. Fungus
- D. Parasite

Answer. B

199. Section 377 of the Indian Penal Code was overturned by the Supreme Court in:

- A. 2016
- B. 2017
- C. 2018
- D. 2019

Answer. C

200. Some people with HIV may remain without symptoms for about:

- A. 2 years

B. 5 years

C. 10 years

D. 15 years or more

Answer. D

Section-B (2 marks) Very short answer questions:

1. Define growth.

Ans: Growth refers to the physical, measurable, increase in body size, height, weight and organ size, generally growing and gaining maturity.

2. What is adolescence?

Ans: Adolescence is the period of transition from childhood to adulthood.

3. How to maintain good health?

Ans: Knowledge of our body structure and its functioning is essential for maintaining good health.

4. When does one gain physical maturity?

Ans: One gains physical maturity when one has obtained his full height, weight and strength.

5. In what respect emotional maturity helps you?

Ans: Emotional maturity helps us to have an attractive and charming personality.

6. Why do you need to develop social maturity as you grow up?

Ans: As we grow up we need more and more people of various kinds in our life and we need different things from them.

7. Why is social maturity a very difficult area of growth?

Ans: Social maturity is a very difficult area of growth because it is neither predictable nor regular and it is not the same all the time.

8. Why do adolescents need the help from their parents?

Ans: Adolescents need the help from their parents for advice and guidance.

9. Why compatibility an important requisite in marriage

Ans: Two persons who marry cannot have the same traits, individual differences can always be there. The couple must accept and live with their differences.

10. Why is common interest important in married life?

Ans: Common interest is important in marriage life because it helps to bind them together. For example, similar habits, musical, cultural, and professional taste help in strengthening the marriage life.

11. Growth is controlled by many factors. Name them.

Ans. Growth is controlled by genes, endocrine secretions, food, exercise, rest, relaxation and sleep.

12. Define maturity.

Ans. Maturity is indicative of one's readiness to share adult experiences, privileges and responsibilities.

13. What are antibodies?

Ans: Antigens make the body produce other substances called antibodies, which protect us from diseases. These antibodies attack the germs and neutralize them.

14. What are vaccines?

Ans: Advances in medicine have made it possible to manufacture protective substances in the form of vaccines which were injected into the body, which will afford protection against subsequent attacks.

15. Define non-communicable disease.

Ans: The non-communicable diseases are not transmitted from person to person.

16. What is an allergic reaction?

Ans: In some cases of passive immunisation, certain violent reactions like asthma, migraine

(headache), eczema and skin rashes may occur in the individual. This is known as an allergic reaction.

17. Give a few examples of allergic reactions.

Ans: Asthma, migraine(headache), eczema and skin rashes.

18. What is the aim of Mission Indradhanush?

Ans. It aims at achieving full immunisation coverage against childhood diseases for all children.

19. What is the aim of the PMSSY?

Ans: Aims at balancing the availability of healthcare available in different parts of the country with quality medical education facilities in deserving areas.

20. What are the intentions of the programme MAA?

Ans: This programme intends to encourage and support breastfeeding among new mothers.

21. What is the natural increase in population?

Ans: When the gap between the birth rate and the death rate becomes wider, the population grows rapidly. This phenomenon is called the natural increase in population.

22. What is the main function of the white blood cells?

Ans: The main function of the white blood cells in the blood is to help defend the body against a sudden attack of germs.

23. Who is susceptible to diseases?

Ans: A person who is in poor health, undernourished, in fatigue and with severe physical and mental strain is susceptible to diseases.

24. What is anaphylaxis?

Ans: In some cases of passive immunization, there will not be any violent reaction for the first dose but the individual is rendered intolerant to a second dose. This condition is known as anaphylaxis

25. What are toxoids?

Ans: Certain germs like diphtheria and tetanus produce poisons which when made harmless are used for producing immunity. These are toxoids.

26. Who are the primary focus groups of the IMI programme?

Ans: The primary focus groups of the Intensified Mission Indradhanush (IMI) programme are the children up to 2 years of age and pregnant women who have missed out routine immunization.

27. Name the two tablets which are distributed for the benefits of pregnant and lactating mothers.

Ans: The two tablets which are distributed for the benefit of pregnant and lactating mothers are Iron and Folic Acid tablets.

28. What are the two main objectives of the National Leprosy Control Programme?

Ans: The two main objectives of the National Leprosy Control Programme are the early case detection and the treatment given at the home of the leprosy patients with sulfone tablets.

29. Who were the founders of the ayurvedic system of medicine?

Ans. Susruta and Charaka were the founders of the ayurvedic system of medicine.

30. The Unani system of medicine is based upon four humours present in the body. Name them.

Ans. Unani is based upon four humours present in the body i.e, sauda, safra, balgam and khoon.

31. What is a drug?

Ans. A drug is a chemical or non- infectious biological substance which alters the body and its functions.

32. What are the two important reasons for using drugs without doctor's advice?

Ans. Two important reasons for using drugs without a doctor's advice are lack of resources and lack of attitude.

33. How do we know when to consult a doctor?

Ans. Severity, persistence and repetition of symptoms should be used as criteria for consulting a doctor.

34. What is drug abuse?

Ans. Drug abuse is defined as self-administration of drugs in excessive or inappropriate doses. It is the use of drugs or substances in a way that is harmful to an individual's health, relationships or overall well being.

35. What is alcohol?

Ans. Alcohol is a fermented organic liquid, obtained by the natural fermentation of malts and sugars.

36. In which part did Charaka Samhita and Susruta Samhita deal with?

Ans. Charaka Samhita deals with the medical aspect and Susruta Samhita deals with surgery.

37. Name the different sources of drugs.

Ans. The different sources of drugs are plants, animals, minerals and some drugs are synthesised in laboratories.

38. Classify drugs with abuse potential into four categories.

Ans. The four categories of drugs are narcotics, depressants, stimulants and hallucinogens

39. What are the health effects of tobacco?

Ans. Tobacco can cause cancer of the lips and larynx, chronic bronchitis, lung cancer and peptic ulcer

40. What is quarantine?

Ans. Quarantine is the period during which persons who might spread an infectious disease (especially travellers) are kept isolated.

41. What is the main objective of the WHO?

Ans. The main objective of the WHO is the attainment of the highest possible level of health by all people.

42. What is the Chief Objective of the International Health Organization?

Ans: The Chief Objective of the International Health Organization is prevention of the spread of communicable disease from one country to another.

43. What does FAO promote?

Ans: FAO promotes the development of basic soil and water resources of countries.

44. What is teenage pregnancy?

Ans. Teenage Pregnancy, also known as adolescent pregnancy is one that takes place from puberty to the age of 19 years.

45. What is an STI?

Ans. A sexually transmitted infection (STI) is an illness caused by an infectious pathogen which spreads from one person to another by means of sexual contact, including vaginal intercourse, oral sex and anal sex.

46. What is the goal of physical education?

Ans. The goal of physical education is to ensure that all students acquire the knowledge, skills and attitudes to lead healthy and active lives.

47. What is puberty?

Ans. Puberty is the period during which adolescents reach sexual maturity and become capable of reproduction.

48. What is AIDS?

Ans. AIDS (Acquired Immunodeficiency Syndrome) is the final stage of HIV infection where the body becomes very weak to fight diseases.

49. What are universal precautions?

Ans. Safety steps like wearing gloves and washing hands to avoid infection.

50. How can early syphilis be treated?

Ans. Early syphilis can be treated with antibiotics given as tablets or injections.

51. A girl becomes pregnant and wants to continue her studies. What advice will you give to her?

(Competency based question)

Section-C (3 marks) Short answer questions:

1. What does philosophical maturity include?

Ans: Philosophical maturity includes

- (i) long-term values
- (ii) goal worth striving for
- (iii) making true friends
- (iv) having a dedication
- (v) mission in life

2. What are the benefits of a Joint family?

Ans: The certain benefit derived from a joint family is as follows

- (i) economic help
- (ii) refuge in events of crisis
- (iii) help in up- bringing the children
- (iv) seeking advice and guidance on personal issues

3. Why is chronological maturity important?

Ans. Chronological maturity is important in some respects e.g. getting the right to vote, inheriting property, obtaining a driving license, getting married, opening a savings account in the post office or a bank.

4. In which way intellectual growth varies from person to person?

Ans. Intellectual growth varies from person to person because each individual is different from one another, it also depends on the situations in which one lives. It continues as long as one wants to grow and keeps alert.

5. Mention any three qualities in the choice of a bride-to-be.

Ans. Any three qualities in the choice of a bride-to-be are

- a) She has good health and follows healthy habits.
- b) She is well educated.

c)She has interests similar to those of the boy.

6. what is a PHC?

Ans: The PHC is an institution for both health and welfare of the people in the area of a Community Development Block. It is the smallest agency adapted to serve the public health needs of rural areas, covering a population of about 60,000 to 1,00,000. The PHC is the locus from where health activities radiate to the remotest villages in the area through sub-centres.

7. What is immunity? What are the two types of immunity?

Ans: Immunity is that condition existing in our body which protects our body against diseases. The two broad categories are:

- a) Natural or inborn and
- b) Acquired.

8. What happens when disease-causing germs enter the body?

Ans: When disease-producing germs enter the body, the body sets up its own defence. Antibodies are produced in the body to kill these germs and the dead germs are swallowed by the white blood cells.

9. How does the infection get localised?

Ans: The leucocytes change their shape, leave the blood vessels and go into the tissues (they are then called phagocytes). They then engulf the invading germs and block their spread to other organs of the body. The infection is thus sealed off.

10. What is a disease?

Ans: The word 'disease' means an illness that affects people or animals, especially one that is caused by infection. Whenever the body or any of its parts do not function properly and the person suffers, as a result, we call it a disease.

11. Define communicable disease.

Ans: Communicable diseases are the diseases, which are caused by germs, worms or other parties. Usually these are infectious and spread from a person suffering from the disease to the healthy ones.

12. Give some examples of passive immunity.

Ans: Some examples of passive immunity:

- i. A mother supplies antibodies to her foetus
- ii. Inoculation of blood containing immune bodies (Antibodies) as in tetanus, diphtheria
- iii. When an individual is given a serum from the people convalescing (recovering) from a disease to make the disease less severe
- iv. Inoculation of serum taken from animals which were artificially immunised.

13. What is the aim of the DHR?

Ans: The DHR aims to make modern health technologies accessible to the people through research and innovations related to diagnosis, treatment methods and vaccines for prevention.

14. What are the main symptoms of Tuberculosis?

Ans: the main symptoms of Tuberculosis are fever and weakness, loss of weight and appetite, pain in the chest, chronic cough which lasts for weeks and occasional blood in the sputum.

15. What are the three pronged strategies of the National Vector Borne Disease Programme?

Ans. To achieve this objective, a three-pronged strategy has been undertaken, ie, (a) Government's efforts (b) people's participation and (c) research on vector borne diseases.

16. What is distributed in a midday meals programme under the Nutrition Programme?

Ans: CSM (Corn-soy-milk) and butter oil or salad oil are invariably used to meet the nutritional needs of primary school children. In

some places, Balahar is also used and in other places even locally available food is prepared and distributed to the children.

17. Write any 3 reasons why rural living conditions affect health.

- Ans:- i) Unsafe drinking water.
ii) Kaccha and ill-ventilated houses.
iii) Poor drainage.
iv) No latrine. (any three)

18. What is consumer education?

Ans. The term 'consumer education' refers to that area of 'Health Education' which is concerned with providing the knowledge to help people to make the right decision in the selection of drugs, medicines, foods and other products and services of day-to-day use.

19. Write any three false health-related beliefs.

Ans. The three false health-related beliefs are as follows:

- (a) Milk and yoghurt should not be eaten together.
- (b) Alcohol beverages are stimulants.
- (c) Wine helps in forming blood.

20. Write any three cultural practices that promote health.

- Ans.
- (a) Washing hands before and after eating.
 - (b) Rinsing mouth after taking food.
 - (c) Drinking boiled milk.

21. Why drugs have to be handled with great care?

Ans. Drugs are capable of doing a great deal of good, but if used indiscriminately, they are capable of doing great harm too. The harm can be temporary and minor or a kind of permanent disability, or even death in some cases.

22. What things should be kept in mind while using non-prescription drugs?

Ans. In case of non-prescription drugs, one should follow the directions on the label carefully, and if symptoms of the ailment persist, a physician should be consulted immediately.

23. What are the ill effects of nicotine?

Ans. Nicotine causes dizziness and headache and may affect blood circulation, respiration and digestion. Heavy smoking increases the rate of heartbeat and causes palpitations. Smoking is also associated with cancer of the lips and larynx, chronic bronchitis, lung cancer and peptic ulcer.

24. What are the aims of the Department of Health Research?

Ans. The DHR aims to make modern health technologies accessible to the people through research and innovations related to diagnosis, treatment methods and vaccines for prevention. It is also the responsibility of the DHR to introduce these innovations into the public health system.

25. Name the three units of the Directorate General of Health Services.

Ans. The Directorate comprises of three main units, which are,
a) medical care and hospital,
b) public health and
c) general administration.

26. Define medicine and surgery.

Ans. Medicine is the science of healing diseases by the administration of internal and external remedies. Surgery is that branch of medicine in which treatment of diseases is done by the removal or operation of the diseased tissue.

27. What are the daily routines recommended by ayurvedic practitioners?

Ans: The daily routine recommended by ayurvedic practitioners is based on health principles like early rising, cleaning of bowels, cleaning of teeth, physical exercises, taking baths and pranayamas, etc.

28. Who are quacks? How are quacks classified?

Ans. Quacks are people with no special training or license.

Quacks can be classified into

- a) An uninformed quack
- b) A deluded quack

29. Name three specialised agencies of the United Nations.

Ans. The specialised agencies of the UN are

- a) World Health Organisation (WHO)
- b) Food and Agricultural Organisation (FAO)
- c) United Nations Children's Fund (UNICEF)

30. What preceded the formation of WHO?

Ans. From 1851 onwards, there were attempts at coming to an agreement on communicable diseases control at the international level. A series of conferences took place in Europe and America to discuss sanitary control of international traffic. These attempts preceded the formation of the WHO.

31. What are the three objectives of FAO?

Ans. The three objectives of FAO are

- a) To raise levels of nutrition and standards of living.
- b) To improve production and distribution of all food and agriculture products from farms, forests, and fisheries.
- c) To better the economic conditions of rural people.

32. What are the main aspects of the International Health Regulations?

Ans. The main aspects of the International Health Regulations relate to the prevention of the spread of communicable diseases, immunisation, and international health certificates for travellers who go abroad.

33. What do the International Health Regulations intend to do?

Ans: The regulations are intended to detect, reduce or eliminate the source from which infection spreads and to improve sanitation in border checkposts, ports and airports.

34. Mention the different projects of CARE in India?

Ans: CARE is working on different projects in India, such as the Madhya Pradesh Nutrition Project, Briddhi in West Bengal and Axshya in Madhya Pradesh, Chhattisgarh and Jharkhand.

35. Outline any three career opportunities available in both medicine and paramedical fields.

Ans.

- i. The prevention of illness.
- ii. Working with people in hospitals and communities.
- iii. Working in a laboratory.

36. Define medical quackery?

Ans. Medical quackery may be defined as the practice of the art of healing by people who are not qualified to practise them, application of worthless methods, whether by unqualified practitioners or by those who are qualified by education and training, and the distribution of drugs and devices which are worthless for the purposes for which they are offered.

37. List any three criteria of a wise consumer.

Ans. The three criteria of a wise consumer are as follows:

1. Before buying food, clothing, medicine and other articles, check them properly.
2. While buying foodstuff, see what is needed in the family.
3. Buy nutritious food which is cheap and locally available.

38. Name the systems of medicine that are practiced in our country.

Ans. The systems of medicine practiced in our country are Ayurvedic system, Unani system, Siddha system, Naturopathy, Homeopathy and Allopathy.

39. Write down the three reasons that make people turn to quacks.

Ans: The three reasons that make people turn to quacks are:

- People who do not know the difference between a qualified doctor and a quack
- Those who are mentally disturbed and who even when told by doctors that they have no problems, yet continue to show anxiety about their health.
- Those people who are in the final stage of diseases like cancer.

40. Distinguish between prescription drugs and non-prescription drugs.

Ans. Non-prescription drugs are generally used in case of minor ailments such as headache, common cold and pain.

Prescription drugs are drugs prescribed by a doctor, where the directions given by them should be carefully followed.

41. What are the treatments for genital herpes?

Ans. The treatment of genital herpes is as follows:

- a) Cooling the area with ice or cold water or bathing in a salt bath.

b) Using a topical anaesthetic like Lidocaine gel or applying petroleum jelly can be soothing.
c) Treatment with an antiviral drug like acyclovir reduces the severity and duration of symptoms.

42. What are the signs and symptoms of syphilis?

Ans. The first sign of syphilis is a raised lump or lesion usually found on or near the genitals or anus, which may then form a painless sore. This may be followed by a general feeling of being unwell with symptoms such as fever, headache and tiredness. White patches may be noticed on the tongue or on the roof of the mouth.

43. What is meant by the term 'cofactors' for the disease progression of an HIV patient? Give examples.

Ans. Factors that give an impetus to the acceleration of the infection are termed as cofactors for disease progression. Example genetic factors, age, gender, route of infection, smoking, nutrition and other infectious diseases.

44. Mention a few ways through which HIV is not transmitted.

Ans. HIV is not transmitted through-

- a) Casual, everyday contact
- b) Shaking hands, hugging, kissing
- c) Coughs, sneezes
- d) Swimming pools, toilet seats
- e) Sharing eating utensils, water fountains
- f) Mosquitoes, other insects or animals.

45. Write any three main routes of HIV transmission.

Ans. Three main routes of HIV transmission are-

- a) Unprotected penetrative sex with someone who is infected.
- b) Injection or transfusion of contaminated blood or blood products, donations of

semen, skin grafts or organ transplants taken from someone who is infected.

c) From a mother who is infected to her baby.

46. What are cofactors in HIV progression?

Ans. Cofactors are conditions or habits that make HIV progress faster.

Examples:

- Poor nutrition
- Other infections
- Weak health

47. Describe the main routes of HIV transmission.

Ans. HIV spreads in three main ways:

1. Unsafe sexual contact
2. Through infected blood
 - Sharing needles
 - Unsafe blood transfusion
3. From mother to child
 - During pregnancy, birth, or breastfeeding

48. What is the aim of the Applied Nutrition Programme?

Ans: The aim is to promote the production of foodstuffs like fish, poultry, milk, vegetables, fruits, etc., and to encourage their consumption among children, pregnant women and nursing mothers as they need them more.

49. Why should we not avoid leprosy patients?

(Competency based question)

Section-D (5 marks) Long answer questions

1. What do you mean by social maturity?

Ans: Social maturity is the ability to get along with people as we grow up from childhood to adolescence and eventually to adulthood. We need people in our lives to help us in certain things. Social maturity is gradually learned as we learn to live in a world full of people. Our success, popularity and happiness to a great extent depend upon how we get along with people around us. Social maturity is a very difficult area of growth

2. What is philosophical maturity ?

Ans: Every human being has a philosophy of life which includes long-term value goals worth striving for, making true friends and having a dedication and mission in life. Our philosophy of life depends upon the customs and values of people in our family, religion and community. The people whom we love and admire also help in building the philosophy of our life. Having a philosophy of life may aid a successful career or marriage

3. List five things you can do to make family life free from tension.

Ans: The five things we can do to make our family life free from tension are:

- (i) Have a polite manner
- (ii) Be well groom
- (iii) Be truthful and honest
- (iv) Behave in a responsible way
- (v) Be regular in school and do well in your studies.

4. In what manner can we judge that a person has obtained intellectual maturity?

Ans. It is difficult to measure intellectual maturity, but it can be thought of in the following manner

- Intellectual maturity means that you can handle and understand the language of words, figures and signs or symbols in accordance with your culture.
- An intellectually mature person makes his own decisions and does not wait for advice or prompting from others. The more independently he takes decisions, the more mature intellectually he is supposed to grow.
- You can be considered intellectually mature if you can look at your problems impartially, objectively and from the right perspective
- If you make a mistake and accept it, you are more mature than those who shift the responsibility onto others
- If you make hasty judgments, you are like the child who makes quick moves without weighing the pros and cons. Hasty judgments are always risky.

5. Write a note on emotional maturity?

Ans. You often lose your temper and feel extremely annoyed when things don't happen the way you desire. This may be due to lack of emotional maturity. Children who do not get easily disturbed and upset, may be able to make rational decisions and tend to grow emotionally mature.

An emotionally mature person will restrain himself and will not be easily disturbed by his immediate impulse.

There are some feelings which you accept and keep to yourself. There are some feelings which you express and share with others. Such a control on one's emotions is not learnt in a day or two. You slowly learn to have more and more control on yourself. Emotional maturity helps you to have an attractive and charming personality. It makes you a socially acceptable person.

6. Explain any five requisites which are essential for making married life happy.

Ans. The five requisites which are essential for making married life happy are:

i) Loving and being loved:

A husband and wife should have a loving attitude towards each other. If the couple develops hostility and indifference towards one another, their marriage is likely to fail.

ii) Emotional interdependence:

A husband and wife have an emotional bond of interdependence which gives them a sense of reliance on each other.

This makes the marriage satisfying to everybody in the family.

iii) Compatibility:

Two persons who marry cannot have exactly the same traits. Individual differences can always be there; the couple must accept and live with their differences.

iv) Common interests:

If the husband and wife share some common interests, it helps to bind them together. Similar reading habits, musical, cultural and professional tastes help in strengthening the marriage ties.

v) Cooperation:

A good home is a cooperative set-up for all the members of the family. Women, too, are earning members of the family now. Hence, the domestic chores need to be shared between the husband and the wife.

7. What are the goals of Mission Indradhanush?

Ans. The goals of Mission Indradhanush are as follows:

i. The Mission was launched with the focus on interventions to expand full coverage in India

from 65% in 2014 to 90% children in the next five years.

ii. The Government aims to do this through catchy campaigns.

iii. It was decided that painstaking planning, public mobilization efforts and intensive training for health workers would be conducted primarily in high-risk areas identified by the polio eradication programme and areas with low routine immunization coverage

iv. In the first phase (April to July 2015) 201 high focus districts across the country were targeted.

8. State any five main functions of the state health department.

Ans. Five main functions of the state health department are:

- To set up hospitals, dispensaries, health centres, clinics, etc.
- To take measures for the control of communicable diseases
- To implement other national health programmes in the state.
- To enforce minimum standards with regard to food and drugs as laid down by the Central or State Acts.
- To collect and publish vital statistics of the state and its important health administration units.

9. What are the specific functions of the Directorate General of Health Services?

Ans. The specific functions and activities include:

- International health relations and quarantine.
- Control of drug standards.
- Maintaining medical stores and depots.
- Post-graduate training.
- Medical education
- Central Government Health Scheme.

- Medical research
- National health programmes
- Health intelligence
- Maintain a national medical library
- Health education.

10. Name some of the major achievements of the Directorate General of Health Services.

Ans. Some of the major achievements of the Directorate include:

- The eradication of smallpox, guinea worm polio
- The elimination of Leprosy and Yaws
- Control of diseases such as cholera and malaria.
- The combining of AYUSH (Department of Ayurvedic, Yoga and Naturopathy, Unani, Siddha and Homoeopathy) with the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) in 6 districts in the country.
- Launch of National Program for Palliative Care (NPPC)

11. Which areas concerning health are addressed by the National Health Programme?

Ans. The National Health Programmes address five broad areas concerning national health. They are:

- Reproductive, Maternal, Neonatal, Child and Adolescent Health.
- Nutrition.
- Communicable Diseases
- Non-communicable Diseases.
- Health System Strengthening

12. Explain any two Nutrition Programmes.

Ans. Any two Nutrition Programmes are as follows:

- Midday meals programme CSM (Corn-soy-milk) and butter oil or salad oil are invariably used to meet the nutritional needs of primary school children. In some places, Balahar is also used, and in other places even locally available food is prepared and distributed to the children.
- Special nutrition programme. The beneficiaries include pre-school children, pregnant and lactating mothers in the city slums and tribal areas. In the city slums, invariably bread and milk are supplied, whereas in tribal areas locally available foods such as mixtures of cereals and pulses and Balahar, etc, are distributed.

13. Mention any five aims of the National AIDS Control Programme?

Ans. The five aims of the National AIDS Control Programme are as follows

- Reduce the blood-borne transmission of HIV
- To less than 1 per cent of total transmission.
- Enable people to protect themselves from getting infected.
- Improve services for care of living with HIV/AIDS
- Promote AIDS education in schools, colleges, universities and in the community.
- Enable people to manage the HIV/AIDS problem themselves with their family and community support

14. Explain briefly any five functions of the PHC

Ans. The five functions of the Primary Health Centre are as follows

- **Medical Care**

The PHC provides basic medical care and emergency treatment for minor illnesses and injuries. These services are mainly offered to ambulatory patients on an outpatient basis.

- **Control of Communicable Diseases**

The health staff maintains surveillance over the occurrence and spread of communicable diseases in the community, with particular attention to diseases such as malaria. They also undertake preventive and control measures to reduce disease transmission.

- **Maternal and Child Welfare Services and Family Planning**

Maternal and Child Welfare (MCW) services provide comprehensive care for mothers and children to promote their health and well-being. These services include antenatal care, postnatal care, immunization, growth monitoring, nutrition support, and family planning services to ensure healthy pregnancies and child development.

- **Environmental Sanitation**

Environmental sanitation includes ensuring a safe supply of drinking water, proper sanitation facilities, and the safe disposal of household and industrial waste. These measures help prevent the spread of diseases and promote a healthy living environment.

- **School Health and Nutrition Education**

School health services focus on promoting the physical, emotional, intellectual, and social development of children. These services include health promotion, nutrition education, disease prevention, early detection of health problems, timely treatment, regular health check-ups, immunization, and fostering a healthy school environment.

15. Distinguish between natural acquired immunity and artificial acquired immunity.

Ans: An immunity is called natural acquired immunity when a previous attack of the disease gives a certain amount of immunity from another attack of the same disease.

It is called artificial acquired immunity when it is due to the inoculation of certain material containing antigens. It gives protection against future exposure to that particular disease for a certain period.

16. What is herd immunity? Explain how it helps to protect a community.

Ans: It is herd immunity when a group of people or a community as a whole are immune to a particular disease. This happens when more than 70 per cent of the people composing the community are immunised against a disease. The other 30 per cent, although susceptible, enjoy freedom from that disease by virtue of their belonging to that group. It is, therefore, more important than individual immunity

17. Differentiate between active and passive immunity.

Ans: Acquired immunity may be active or passive. It is called active when it has been brought about by:

- Having had the disease, that is, by a prior infection; for example, an attack of chickenpox or mumps.
- Slight infections from repeated exposure to a disease.
- As a result of inoculation or vaccination with killed or inactivated (made harmless)
- Germs are their byproducts (toxins)

It is called passive immunity when antibodies produced in some other person or animal of the same or another species are introduced into the body to fight the disease. In this case, immunity

lasts only for a short duration. This is helpful when antibodies are not present in the body. For example, a mother supplies antibodies to her fetus.

18. Explain the goal of Mission Indradhanush.

Ans: GOALS OF MISSION
INDRADHANUSH

- The mission was launched with the focus on interventions to expand full coverage in India from 65 per cent in 2014 to at least 90 per cent of children in the next five years
- The government aimed to do this through special catchy campaigns.
- It was decided that painstaking planning, public mobilisation efforts and intensive training for health workers would be conducted primarily in high-risk areas identified by the polio eradication programme and areas with low routine immunisation coverage.
- In the first phase (April to July 2015), 201 high-focus districts across the country were targeted.

19. What is the impact of Mission Indradhanush on children?

Ans: IMPACT OF MISSION
INDRADHANUSH

A total of 528 districts have been covered under Mission Indradhanush during the various phases. In October 2017, the Government of India launched Intensified Mission Indradhanush (IMI) in select districts and urban areas of the country with an aim to achieve the target of more than 90 per cent coverage in immunisation. The primary focus groups of the IMI programme are the children up to 2 years of age and pregnant women who have missed out on routine immunisation. However, should there be

any request of vaccination of any child up to 5 years, it would be provided during IMI rounds.

20. Describe the role of the Ministry of Health and Family Welfare.

Ans: The Union Minister gives advice on health and allied matters, coordinates health and family planning programmes and policies, supplies information and equipment and provides financial and other assistance towards health measures. Thus, it mainly guides, assists and coordinates.

21. List the 5 broad areas concerning national health.

Ans: Various health programmes are run by the Government of India. All these programmes address five broad areas concerning national health. These are:

1. Reproductive, Maternal, Neonatal, Child and Adolescent Health
2. Nutrition
3. Communicable Diseases
4. Non-communicable Diseases
5. Health System Strengthening

22. Write about the newly launched health programmes under Mission Indradhanush.

Ans: Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) This programme aims at balancing the availability of healthcare available in different parts of the country with quality medical education facilities in deserving areas
Pradhan Mantri National Dialysis Programme: This programme aims to bring dialysis services in district hospitals and provide relief to patients at the end stages of kidney-related diseases.
MAA (Mothers' Absolute Affection) Programme for Infant and Young Child Feeding: This programme intends to encourage and support breastfeeding among new mothers. It will focus on awareness drives and reinforce lactation support services. Revised National Tuberculosis

Control Programme: This programme is working towards eradicating tuberculosis from the country by 2025, five years before the global target for the same. The programme has outlined four pillars on the basis of which it will achieve its aim- " Detect-Treat-Prevent-Build" (DTPB)

23. How can you help in the National Vector-Borne Disease Programme?

Ans: We can help in the following ways:

1. Do not allow any area to develop as a breeding place for mosquitoes
2. Do not allow water to stagnate in any place
3. Observe one dry day every week when all stored water should be emptied
4. Keep the overhead tank properly covered so that mosquitoes do not breed therein
5. Report any fever cases to the health worker so that he can take the blood sample and arrange for laboratory examination of the same.

24. What are the symptoms of tuberculosis?

Ans: The symptoms of tuberculosis are:

1. Fever and weakness
2. Loss of weight and appetite
3. Pain in the chest
4. Chronic cough lasting for weeks
5. Occasional blood in the sputum

25. What healthy habits should you follow to prevent diseases like tuberculosis?

Ans: 1. Keep your house and the surroundings clean and your rooms well ventilated.
2. Take regular exercise and participate in games
3. Take a nutritious diet and keep yourself fit and healthy.
4. You must cultivate the habit of covering your mouth with a piece of cloth or a handkerchief whenever you sneeze or cough
5. Indiscriminate spitting is a very bad habit and must be avoided.

26. What do you understand about the Indigenous system of medicine in India?

Ans: So far, we have tried to know about the general structure of the health services that are present at various levels in our country. You must be aware that sometimes your parents, grandparents or neighbours prefer to visit a vaid, a hakim or a homoeopath. In our country, indigenous systems of medicine serve the large population of our country. With the advent of the modern system of medicine known as allopathy, we have neglected our own system for some time, and as a result, its systematic study has been neglected. This resulted in practicing deterioration of these systems of standards, medicine. Many quacks started practicing these systems of medicine, thus further eroding people's faith in these systems. Our Government has realised the importance of these indigenous systems hospitals and colleges for and has opened dispensaries training students as v aids, hakims, or homoeopaths. The Government of India has constituted statutory bodies like (a) Central Council of Indian Medicine and (b) Central Council for Research in Indian Medicine and Homoeopathy for all recognised systems of medicine. The main functions of these bodies are to maintain standards and promote research in these systems.

27. Why do people go to quacks?

Ans: People who turn to quacks are:

- People who do not know the difference between qualified medical practitioners and quacks.
- Those who are mentally disturbed and who are even told by qualified professional practitioners that they do not have any problem, continue to show anxiety about their health.
- Those individuals with terminal stages of diseases like cancer who would rather accept misconceptions and lift truths

from quacks than the truth from a qualified physician.

28. Who is a deluded quack?

Ans. A deluded quack may have some education, including some medical training. However, he/she may have little or no knowledge of the conditions and illnesses of research, and little information about the difficulties that may be associated with a person's illness. This type of quack uses scientific-sounding jargon to impress his/her customers.

29. Give any five characteristics of a Quack.

Ans: The five characteristics of a Quack are as follows:

- Claims 'secret' or 'exclusive' formula or machine can cure disease.
- Claims cure-all preparations as having the blessings of saints and sages.
- Uses psychological suggestions to use their worthless remedies
- Guarantees a quick cure within a specified time limited usually on a contract basis
- Advertises or uses case history and testimonials to promote a cure.

30. List any five dangers of self- medication.

Ans. Five dangers of self-medication are:

- Similar symptoms may arise for a variety of diseases, both fatal and non-fatal. Without knowing the cause of the disease, it is dangerous to treat it on our own.
- Reaction to various drugs differs from individual to individual, and for the same medicine, prescribed for another person for the same disease may not suit us, even if the symptoms are similar.

- Some individuals are allergic to certain drugs.
- A number of medicines have side effects: that is, they may relieve the symptom but may cause other problems.
- Using leftover medicine from an earlier illness is also dangerous.

31. Write down the general criteria of a wise consumer. (Any five points)

Ans: The general criteria of a wise consumer are as follows:

- Before buying food, clothing, medicine and other articles, check them properly.
- While buying foodstuff, see what is needed in the family.
- Buy nutritious food which is cheap and locally available.
- Keep medicines safely and do not buy food exposed to dust and flies.
- Do not get influenced by advertisements.
- Avoid self-medication; consult a qualified doctor.
- Always read the information on the label of the product you buy so that there is no misconception.
- Inform the concerned authorities, such as food inspectors, drug inspectors, and health and sanitary inspectors in your locality, about the malpractices of shopkeepers.
- Participate in government health programmes and educate others about these programmes.
- Distinguish between frauds, cheats and qualified personnel.

32. State some false health-related beliefs (any five).

Ans: Some false health-related beliefs are:

1. Milk and yoghurt should not be eaten together.
2. Alcoholic beverages are stimulants.
3. Alcoholic beverages can cure a cold
4. Wine helps in forming blood
5. Brown eggs are more nutritious than white eggs.
6. Fish is a brain-developing food
7. Home-ground flour is more nutritious than mill-ground flour.
8. Raw milk is the best quality milk.
9. Oranges should not be taken on cold days or at night during winter.
10. Eating foods like eggs, jaggery (gur) and groundnuts during summer is harmful to health.
11. Canned vegetables are always less nutritious than fresh and cooked vegetables.
12. Obesity is inherited
13. Care given to a baby tooth is not important because they are soon replaced by permanent teeth.
14. Cooking food in aluminium utensils causes cancer.
15. Boils are caused by "bad blood" in the human body.
16. Tuberculosis is inherited.
17. Sickness, accidents and bad luck are punishments for being bad.
18. Diabetes is caused only by eating too much sugar and sweets.
19. A woman never gets pregnant as long as she breastfeeds her child
20. A daily bowel movement is essential for good health.
21. Running water is always safe for drinking.
22. Eating mangoes before it rains causes boils and diarrhoea.

33. Describe the cultural practices that promote health. (Any five) - 5 Marks

Ans: The cultural practices that help to promote health are the following:

1. Washing hands before and after eating

2. Rinsing the mouth after taking food.
3. Souring of kneaded flour before making food
4. Drinking boiled milk.
5. Greeting friends with folded hands instead of shaking hands.
6. Using earthen pots or utensils to serve food in community feasts and discarding them after use.
7. Not allowing visitors to handle the newborn baby immediately when they visit the child.
8. Keeping a separate dress to wear while working.

34. Explain the main systems of medicine in India (any two)

Ans: The main systems of medicine in India are:

(i) Ayurvedic System: According to this system, diseases are caused by faulty food, disturbance of the mind and unhygienic habits. It is based on three substances present in the body, i.e., vayu, pitta and kapha. To cure the disease, it aims to remove toxins from the body and to maintain internal equilibrium. The daily routine recommended by this system is based on health principles like early rising, taking a bath, cleaning of bowels, cleaning of teeth, physical exercise and pranayamas. All these health principles are described in Ayurveda under the chapters of Dinacharya and Ritucharya.

(ii) Unani System: This system of medicine was introduced in India by the Muslim rulers around the twelfth century CE. The original books of this system are in Arabic and Persian languages. This system is also based on four humours present in the body, sauda, safra, balgam and khoun. To diagnose the disease, this system first examines the pulse. They use herbs and minerals as medicines in this system.

(iii) Siddha System: The Siddha system of medicine is mainly practised in Tamil Nadu and some parts of Kerala. The basic principles of this system are similar to Ayurveda. The classical books of this system are written in the Tamil language.

(iv) Homoeopathy: Homoeopathy is a unique system of medicine developed in the 19th century by Dr Samuel Hahnemann. It is based on the law of similars called "Similia similibus curentur, which means "likes are cured by likes. For example, a substance that produces symptoms in a healthy person can, in highly diluted form, treat similar symptoms in a sick person. This seems to be paradoxical, but it was proved by doctors during the past few centuries. In this system, the doses of medicine are so small that they do not produce any side effects.

(v) Allopathy: This is the most popular system all over the world. It is a system of treating disease through drugs after diagnosis of the ailment through complete investigation. There is no system of medicine which has as many specializations as Allopathy. They focus on detection of diseases, treatment, control, prevention and immunization. Career opportunities in this system are many, which includes:

- The care of the ill and injured
- The prevention of illness
- Working with people in hospitals and the community

vi) Naturopathy: This system is based on natural philosophy. Hydrotherapy, enema, fasting, consuming green vegetables and massages, etc., are the main lines of treatment in this system.

35. Describe briefly the different categories of drugs. (Any two)

Ans: The different categories of drugs are described below:

(a). Narcotics: These drugs make a person feel sleepy and produce a numbing effect on consciousness. They reduce body activity and make a person feel relaxed. They are used only by doctors and dentists to relieve severe pain. Some examples of narcotics are:

- Codeine commonly available in cough syrups.
- Novocaine is used by dentists for local anaesthesia before filling or extracting teeth.
- Morphine is used to reduce unbearable and severe pain.

If narcotics are used without consulting a doctor, they may lead to addiction and even death.

(b). Depressants: These drugs affect the central nervous system, reduce functional body activity and produce muscular relaxation. To reduce worry and tension for patient depressants are prescribed to make them calm and comfortable. But without a doctor's prescription, it may lead to artificial sleep, then to coma and finally to death.

For example, bromides are depressants and should not be used without consulting a doctor because they can be irritating and poisonous. Barbiturates are another category of depressants. Many patent sedatives or sleeping pills contain these drugs. Therefore, the indiscriminate use of such pills is extremely dangerous

(c). Stimulants: Stimulants increase the activity of the central nervous system. They make a person feel excited and prevent sleep. A person may also not feel hungry. The effect of these drugs lasts only for a short time, which makes the person want to take more of them, leading to addiction. For example, amphetamines are sometimes used by doctors to fight tension in psychiatric cases.

(d). Hallucinogens: From the name itself, we can understand how it affects the person who uses it. These drugs result in illusions and hallucinations. An illusion is the distorted image of an object seen, where the abuser cannot differentiate between fact and fantasy. During hallucination, a person sees images that do not actually exist. These drugs affect a person's mental and visual perception and may lead them

to commit antisocial behaviours such as stealing, violence and may also result in fatal accidents.

36. Explain any five main functions of the WHO

Ans. The main functions of the WHO are:

- It plans and coordinates health activities on a global basis.
- The WHO promotes research and exchange of scientific information and this is very useful for all countries.
- The WHO provides evidence-based health guidance with regard to international travel to medical professionals, travellers and member states.
- The WHO keeps communicable diseases under constant watch, collects data and sends out information on health matters.
- The most important measures for the prevention of certain diseases are the production of vaccines. It is for this reason that the World Health Organization set standards for the quality control of the vaccines.

37. Explain the main aims of the UNICEF

Ans. The main aims of the UNICEF are:

- The main aim of UNICEF is to provide humanitarian and development assistance to children and mothers. It has an effective partnership with government and non-government organizations, through which it works towards bringing practical solutions to the women and children who are at risk.
- UNICEF is committed to ensure that all children and mothers are able to access the knowledge of how to prevent HIV infection and also to provide adequate treatment, care and support to the ones with the infection.

- UNICEF works towards ensuring the children worldwide get proper vaccines. Therefore, immunisation is one of the key focus areas of UNICEF
- UNICEF assists in the control of diseases which are responsible for mortality among mothers and children, such as vitamin deficiencies, anaemia, trachoma, etc.
- A large part of UNICEF assistance is in the form of equipment and supplies. Depending on the type of projects, UNICEF may provide equipment and drugs for child health services. UNICEF also provides technical services for food conservation.

38. What are the five areas of life skills that have been broadly classified by WHO?

Ans. The five skills are

- Self- awareness and empathy
- Communication and interpersonal relationship
- Decision making and problem solving
- Creative thinking and critical thinking
- Coping with emotional and with stress

39. Mention any five capabilities a skilled person would have.

Ans. Five capabilities a skilled person would have are:

- Self-awareness: Being aware of one's character, strengths, weaknesses, desires, likes and dislikes.
- Strong interpersonal relationships: Understand what builds and breaks relationships, relate positively with people, and maintain and end relationships in a constructive manner.
- Decision - making skills: Be able to consider all options available and likely

consequences of each action before making a choice.

- Critical-thinking skills: Be able to analyse information and experience in an objective manner, question and reason independently.
- Coping with stress: Be able to recognise the source and the effects of stress and take remedial measures.

40. Write any five potential behaviour patterns of teenage girls becoming pregnant.

Ans. Five potential behaviour patterns for teenage girls becoming pregnant are

- i) Early dating behavior
- ii) Lack of support group or few friends
- iii) Unhealthy environment at home
- iv) Stress and depression
- v) Financial constraints

41. Mention any five symptoms of STIs?

Ans. The following are the symptoms of STIs

- Bleeding after sex or between period
- Pain during sex
- Pelvic or lower abdominal pain
- An unusual discharge from the vagina, penis or anus
- Infection in the rectum or throat

42. What are the three key things that can be done to prevent transmission of HIV?

Ans: Three key things that can be done to prevent transmission of HIV are as follows-

- First among these is promoting widespread awareness of HIV and how it can be spread. Media campaigns and education in schools are among the best ways to do this.
- Another essential part of a prevention programme is HIV counselling and testing. People living with HIV are less

likely to transmit the virus to others if they know they are infected and if they have received counselling about safer behaviour.

- The third key factor is providing antiretroviral treatment. This treatment enables people living with HIV to enjoy longer, healthier lives and such it acts as an incentive for HIV testing.

43. Why is sport inclusive?

Ans.

i) Sport is inclusive and stands for human values such as respect for the opponent, abiding by the rules of the game, teamwork and fair play.

ii) Sport promotes the values of social integration by inculcating the spirit of respect for diversity.

iii) Many sports events organized on national and international platforms give a boost to the economy as a lot of money is invested in and earned through these events.

iv) The United Nations states, "Sport is a powerful tool to strengthen social ties and networks and to promote ideals of peace, fraternity, solidarity, non - violence, tolerance and justice.

v) Many sports offer such situations in which the participants are challenged to explore decisions and apply strategies to win a sport.

44. Beliefs and superstitions are an integral part of all cultures in the world. Why?

(Competency based question)

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REAL NUMBERS

Important points/Summary

1. **Prime Number:** A number which has exactly two factors i. e. 1 and the number itself is called a prime number. 2 is the smallest prime number.
2. **Composite number:** A number which is not prime is called a composite number. A composite number has more than two factors. The smallest composite number is 4.
3. **Co-primes:** Two numbers p and q are called co-primes if their HCF is unity i. e.
 $HCF(p, q) = 1$.
4. **Rational number:** A number which is in the form $\frac{p}{q}$, where p, q are positive integers and $q \neq 0$ is called a rational number. e.g. 2, -3, $\frac{1}{2}$, $\frac{3}{4}$, .. are all rational numbers
5. **Irrational number:** A number which is not a rational is called an irrational number.
E. g. $\sqrt[3]{2}$, $\sqrt{3}$, π , ... are all irrational numbers.
6. **Fundamental theorem of Arithmetic:** - Every composite number can be expressed (factorized) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur.
7. **For any two positive integers a and b then**
 - i. **HCF (a, b) X LCM (a, b) = a X b (product of two numbers)**
 - ii. **$HCF(a, b) = \frac{\text{product of two numbers}}{LCM(a, b)}$**
 - iii. **$LCM(a, b) = \frac{\text{product of two numbers}}{HCF(a, b)}$**
 - iv. **One number = $\frac{HCF \times LCM}{\text{another number}}$**
 - v. **Other number = $\frac{HCF \times LCM}{\text{one number}}$**

Section-A

Multiples Choice Questions (MCQ) - 1 Mark

1. The exponent of 2 in the prime factorisation of 144 is:
(A) 5 (B) 4 (C) 3 (D) 2

Ans: (B)
2. The product of a non-zero rational number and an irrational number is:
(A) An irrational number
(B) a rational number (C) one
(D) zero
Ans: (A)
3. The sum or difference of a rational number and an irrational number is:
(A) A rational number
(B) An irrational number
(C) One
(D) Zero

Ans.(B)

4. For any two positive integers a and b, $HCF(a, b) \times LCM(a, b)$ is equal to:
(A) $a + b$ (B) $a - b$ (C) $a \times b$ (D) a/b
Ans.(C)

5. Every composite number can be expressed as a product of:
(A) Co-primes (B) primes
(C) twin primes (D) none of these
Ans. (B)

(MBOSE Suppl.)

6. Every composite number has:
(A) At least two factors
(B) at least three factors
(C) Only one factor
(D) None of these

Ans:(B)

7. The decimal expansion of a rational number is always:

- (A) Non-terminating
- (B) non-terminating and non- repeating
- (C) terminating or non- terminating repeated
- (D) none of these

Ans. (C)

8. The HCF of p and q which are relatively primes is:

- (A) 1 (B) p (C) q (D) $p \times q$

Ans. (A)

9. The LCM of p and q which are relatively primes is:

- (A) 1 (B) p (C) q (D) $p \times q$

Ans. (D)

10. The prime factorization of 96 is

- (A) $2^5 \times 3^2$ (B) $2^4 \times 3$ (C) $2^5 \times 3$ (D) 2^6

Ans (C)

11. Product of two co-prime numbers is 117. Their then LCM is

- (A) 13 (B) 39 (C) 117 (D) 9

Ans=(C)117

12. . HCF of two different numbers is 24, which one of the following can be their LCM.

- (A) 12 (B) 18 (C) 36 (D) 48

Ans (D) 48

13. A number which cannot be expressed in the form $\frac{a}{b}$, where 'a' and 'b' are both integers and $b \neq 0$ is called a/an:

- (A) Rational number
- (B) Irrational number
- (C) Composite number
- (D) Prime number

Ans. (B)

14. The LCM of 6 and 20 is

- (A) 40 (B) 60 (C) 80 (D) 100

Ans (B)

15. If n is any natural numbers then 6^n always ends with

- (A) 1 (B) 0 (C) 3 (D) 6

Ans. (D) 6

16. A natural number which has exactly two factors i. e., 1 and the number itself is called a:

- (A) Rational number (B) whole number
- (C) composite number (D) prime number

Ans. (D)

17. A natural number which is not prime and has more than two factors is called a/an:

- (A) Composite number (B) whole number
- (C) Odd natural number (D) prime number

Ans. (A)

18. For some even integer q, every odd integer is of the form:

- (A) q (B) $q + 2$ (C) $2q$ (D) $q - 1$

Ans. (D)

19. HCF of the smallest composite number and smallest prime number is:

- (A) 1 (B) 2 (C) 4 (D) 8

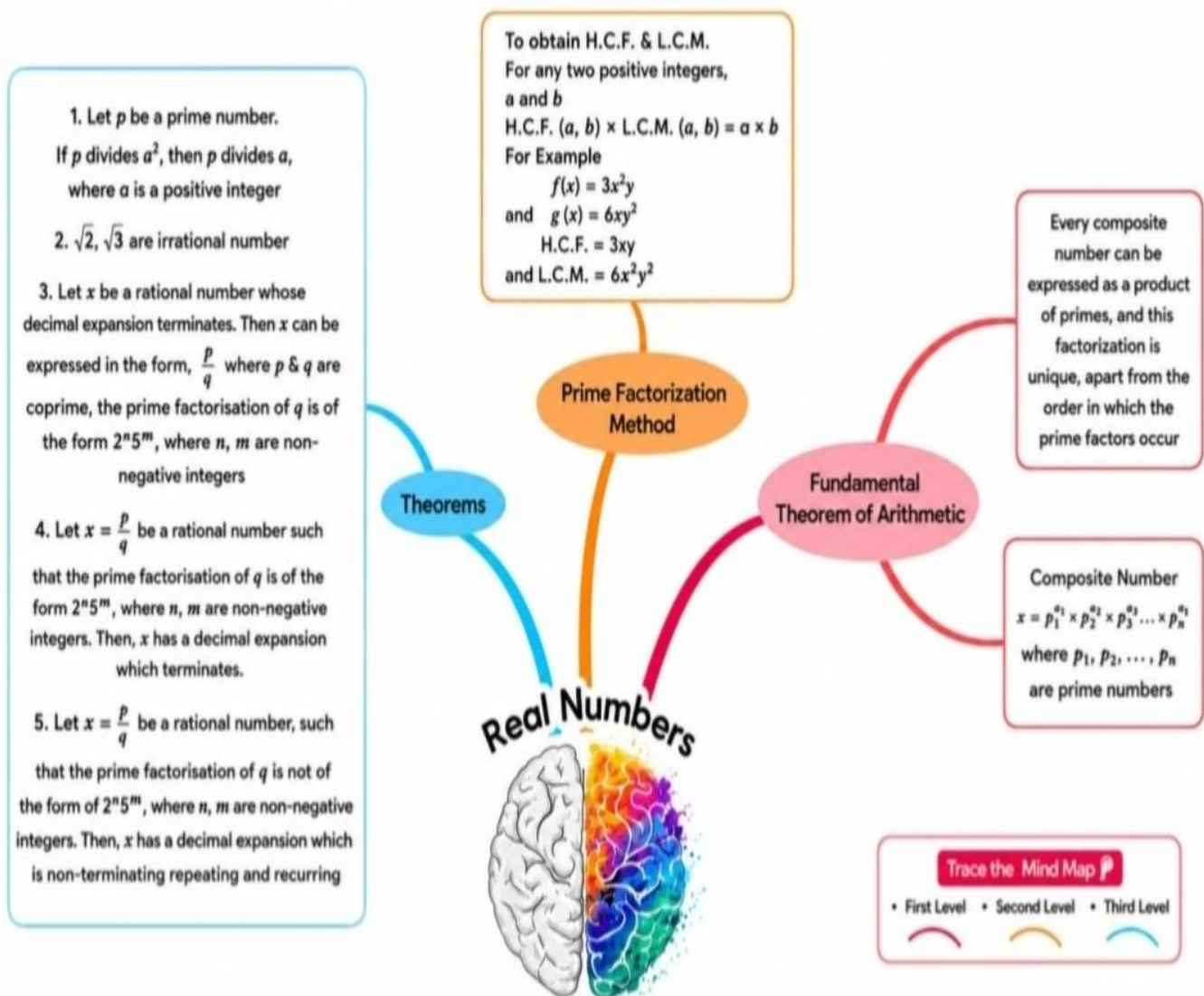
Ans. (B)

20. . If LCM of P and 18 is 36 and HCF of P and 18 is 2. Then the value of P will be

- (A) 2 (B) 3 (C) 1 (D) 4

Ans= (D) 4

REAL NUMBER MIND MAP



POLYNOMIALS

IMPORTANT POINTS/SUMMARY:-

1. **Polynomial:** An algebraic expression of the form ,
 $P(x) = a_n x^n + \dots + a_1 x_1 + a_0$, $a_n \neq 0$ is called a polynomial in x whose degree is n .
2. **Degree of the polynomial:** The highest power of the variable x in a polynomial $p(x)$ is called its degree.
3. A Polynomial of degree 1 is called a linear polynomial.
4. A polynomial of degree 2 is called a quadratic polynomial.
5. A polynomial of degree 3 is called a cubic polynomial.
6. A polynomial of degree 4 is called a bi-quadratic polynomial.
7. **Constant polynomial:** a polynomial of degree 0 is called a constant polynomial.
8. **Zero of the polynomial:** A Real number ' k ' is called the zero of the polynomial $P(x)$ if $P(k) = 0$.
9. A linear polynomial has **at most one zero**.
10. A quadratic polynomial has **at most two zeroes**.
11. A cubic polynomial has **at most three zeroes**.
12. A bi-quadratic polynomial has **at most four zeroes**.
13. If any graph representing the polynomial $P(x)$ cuts the x -axis at one point then it has one zero; if it cuts the x -axis at two points then it has two zeroes and if it cuts the x -axis at three points then it has three zeroes.
14. The zero of a linear polynomial $P(x) = ax + b$, $a \neq 0$ is $-\frac{b}{a} = -\frac{\text{constant term}}{\text{co-efficient of } x}$
15. **Relationship between zeroes and co-efficient of quadratic polynomial**
 Let α and β be the two zeroes of a quadratic polynomial $P(x) = ax^2 + bx + c$, $a \neq 0$
16. **Sum of the zeroes** $= \alpha + \beta = -\frac{b}{a}$
 $= -\frac{\text{co-efficient of } x}{\text{co-efficient of } x^2}$
17. **Product of the zeroes** $= \alpha \beta = \frac{c}{a}$
 $= \frac{\text{constant term}}{\text{co-efficient of } x^2}$

Sl. No.	Pair of Lines	$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$	Compare the ratios	Graphical Representation	Algebraic Interpretation
1	$x - 2y = 0$ $3x + 4y - 20 = 0$	$\frac{1}{3}$	$\frac{-2}{4}$	$\frac{0}{-20}$	$a_1/a_2 \neq b_1/b_2$	Intersecting lines	Exactly one solution (unique)
2	$2x + 3y - 9 = 0$ $4x + 6y - 18 = 0$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{-9}{-18}$	$a_1/a_2 = b_1/b_2 = c_1/c_2$	Coincident lines	Infinitely many solutions
3	$x + 2y - 4 = 0$ $2x + 4y - 12 = 0$	$\frac{1}{2}$	$\frac{2}{4}$	$\frac{-4}{-12}$	$a_1/a_2 = b_1/b_2 \neq c_1/c_2$	Parallel lines	No solutions

21. A quadratic polynomial in variable x is of the form $ax^2 + bx + c$ where a , b and c are real numbers and
 (A) $a=0$ (B) $a \neq 0$
 (C) a and b are both 0 (D) none of these.

Ans. (B)

22. A polynomial of degree 3 is called a:

- (A) Linear polynomial
 (B) Quadratic polynomial
 (C) Cubic polynomial
 (D) Biquadratic polynomial

Ans. (C)

23. A quadratic polynomial can have at most:

- (A) 1 zero (B) 2 zeroes
 (C) 3 zeroes (D) 4 zeroes

Ans. (B) (MBOSE 2025)

24. The degree of a constant polynomial is:

- (A) 2 (B) 1 (C) -1 (D) 0

Ans. (D) (MBOSE 2025 Suppl)

25. The degree of a zero polynomial is:

- (A) Always zero (B) never zero
 (C) Negative (D) undefined

Ans. (D)

26. if 3 is a zero of the polynomial $p(x) = 4x^2 + kx + 12$,
 then the value of k is:

- (A) 16 (B) -16 (C) 48 (D) -48

Ans. (B)

27. Sum of zeroes of the polynomial $p(x) = x^2 - 3x + 2$ is:

- (A) 2 (B) 3 (C) -2 (D) -3

Ans. (B)

28. Product of zeroes of the polynomial $p(x) = x^2 - 3$ is:

- (A) -3 (B) 3 (C) $\sqrt{3}$ (D) $-\sqrt{3}$

Ans. (A)

29. The number of zeroes of a polynomial of degree n is: (MBOSE 2025 Suppl)

- (A) Equal to n (B) greater than n
 (C) less than n (D) less than or equal to n

Ans. (D) less than or equal to n

30. If the graph of $y = p(x)$, where $p(x)$ is a polynomial, does not intersect the x -axis then the number of zeros is:

- (A) 1 (B) 2 (C) 3 (D) No Zeros

Ans. (D)

31. If the graph of $y = p(x)$ where $p(x)$ is a polynomial, intersects the x -axis at one point only then the number of zeros is

- (A) 1 (B) 2 (C) 3 (D) 4

Ans. (A)

32. The number of zeroes of a polynomial $p(x)$ is the number of points where the graph of $y=p(x)$ cuts the:

- (A) y -axis (B) x -axis

- (C) origin (D) none of these

Ans. (B)

33. The zero of a linear polynomial $P(x) = ax + b$, where a , b are real numbers, is:

- (A) $-a/b$ (B) $-b/a$ (C) $-(ab)$ (D) a/b

Ans. (B) $-b/a$

34. For any polynomial $p(x)$, if $p(a) = 0$, then 'a' is called: (MBOSE 2025)

- (A) Constant of the polynomial

- (B) Zero of the polynomial

- (C) Degree of the polynomial
 (D) Coefficient of the polynomial
 Ans.(B) zero of the polynomial

35. Value of k for which $x=2$ is a solution of the equation $5x^2-4x+(2+k)=0$
 (A) 10 (B) -10 (C) 14 (D) -14

Ans (D)

36. A bi-quadratic polynomial is a polynomial of degree:
 (A) 1 (B) 2 (C) 3 (D) 4

Ans. (D) 4

37. . If the product of zeroes of $ax^2 - 6x - 6$ is 4 then a is :

- (A) $\frac{-3}{2}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{-2}{3}$

Ans (A)

38. Which of the following is a polynomial?

- (A) $x^2 + \frac{-1}{x^2}$ (B) $\sqrt{x} + 2$
 (C) $x^2 + 3x$ (D) $x^{-3} + 1$

Ans (C)

39. The zeroes of a quadratic polynomial $3x^2 - x - 4$ are:

- (A) 1, - 4/3 (B) - 1, 3/4
 (C) - 1, 4/3 (D) -1, - 4/3

Ans. (C)

40. The zeroes of a quadratic polynomial $x^2 - 15$ are:

- (A) $\sqrt{15}, \sqrt{15}$ (B) $\sqrt{15}, -\sqrt{15}$
 (C) $3\sqrt{5}, -3\sqrt{5}$ (D) $5\sqrt{3}, -5\sqrt{3}$

Ans. (B)

41. The quadratic polynomial with 2 as sum and - 8 as product of its zeroes is:

- (A) $x^2 - 2x - 8$ (B) $x^2 + 2x - 8$
 (C) $x^2 - 2x + 8$ (D) $x^2 + 2x + 8$

Ans. (A)

42. The quadratic polynomial with 0 and $-1/7$ as its two zeroes is:

- (A) $7x^2 + x$ (B) $x^2 - 7x$
 (C) $x^2 + 7x$ (D) $7x^2 - x$

Ans. (A)

43. If the graph of $y = x^2 - 2x - 35$ cuts the x-axis at (7, 0) and (- 5, 0) then the zeroes of the polynomial $x^2 - 2x - 35$ are:

- (A) 7, - 5 (B) 0, - 5 (C) 0, 7 (D) 0, 0

Ans. (A)

44. A Polynomial of degree 1 is called:

- (A) bi-quadratic (B) cubic
 (C) quadratic (D) linear

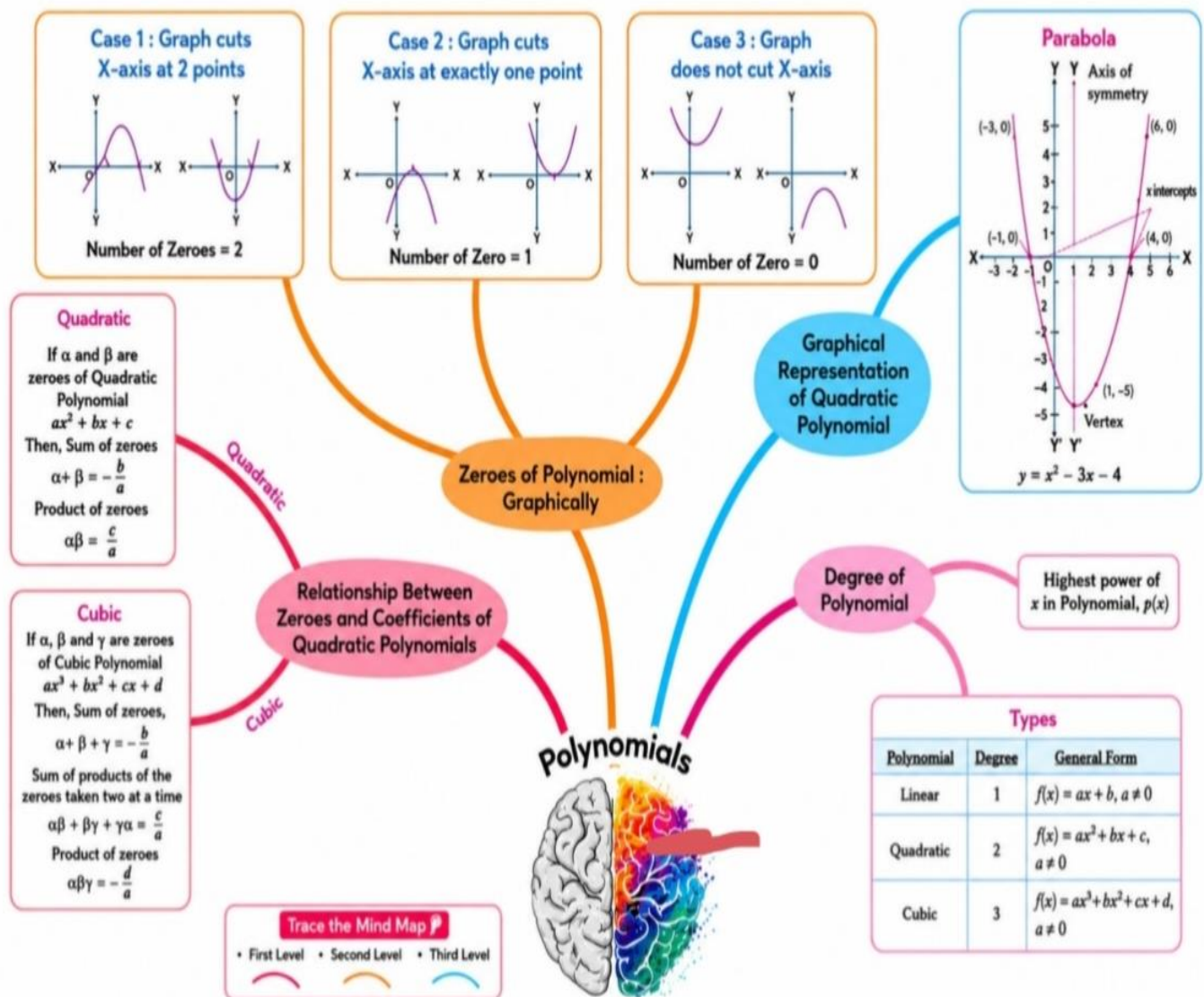
Ans. (D)

45. If the graph of a polynomial lies above or below the X - axis without touching or intersecting it then the number of its zeroes is

- (A) 0 (B) 1 (C) 2 (D) 3

Ans. (A)

POLYNOMIAL MIND MAP



Pair of Linear Equations in two variables

Important points/summary:

- i. A pair of linear equation in two variables x and y is of the form :

$$a_1 x + b_1 x + c_1 = 0 \dots\dots\dots (1)$$

$$a_2 x + b_2 x + c_2 = 0 \dots\dots\dots (2),$$

where $a_1, a_2, b_1, b_2, c_1, c_2$ are real numbers and

$$a_1^2 + b_1^2 \neq 0 ; a_2^2 + b_2^2 \neq 0$$

- ii. The graphs represented by a pair of linear equations

$$a_1 x + b_1 x + c_1 = 0 \dots\dots\dots (1)$$

$$a_2 x + b_2 x + c_2 = 0 \dots\dots\dots (2)$$

are straight line graphs and three cases arise:

Case 1: if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, the pair of equations has **unique solution** and the graphs representing the system of equations are **intersecting lines**. The system of equation is **consistent** (dependent).

Case 2: if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, the pair of equations has **infinitely many solutions** and the graphs representing the system of equations are **coincident lines**. The system of equations is **dependent** (consistent).

Case 3: if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, the pair of equations has **no solution** and the graphs representing the system of equations are **parallel lines**. The system of equations is **inconsistent**.

46. If the graphs of two lines pass through the same points, then the system of equations representing these lines is:

- (A) Consistent
(B) inconsistent
(C) Consistent and dependent
(D) Not dependent

Ans. (C) consistent and dependent

47. The pair of equations $x = 3$ and $y = 5$ has:

- (A) No solution (B) one solution
(C) two solutions (D) infinitely many solutions

Ans. (B)

48. If the ten's and unit's digit of a two digit number are p and q respectively, then the number will be –

- (A) pq (B) $10p - q$
(C) $10p + q$ (D) $10q + p$

Ans: (C)

49. The system of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if:

- (A) $a_1/a_2 \neq b_1/b_2$ (B) $a_1/a_2 = b_1/b_2 \neq c_1/c_2$
(C) $a_1/a_2 = b_1/b_2 = c_1/c_2$ (D) none of these

Ans. (A) (MBOSE 2025 Suppl)

50. The system of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has no solution if:

- (A) $a_1/a_2 \neq b_1/b_2$ (B) $a_1/a_2 = b_1/b_2 \neq c_1/c_2$
(C) $a_1/a_2 = b_1/b_2 = c_1/c_2$ (D) none of these

Ans. (B)

51. The pair of equations $x = a$ and $y = b$ graphically represents lines which are:

- (A) Parallel
(B) coincident
(C) Intersecting at (a, b)
(D) Intersecting at (b, a)

Ans. (C)

52. The system of equations $-3x + 4y = 5$ and

$$\frac{9}{2}x - 6y + \frac{15}{2} = 0 \text{ has:}$$

- (A) Unique solution (B) infinite solutions
(C) No solutions (D) none of these

Ans. (B)

53. If $x = a$ and $y = b$ is the solution of the equations $x - y = 2$ and $x + y = 4$, then the values of a and b are respectively:

- (A) 3 and 5 (B) 3 and 1
(C) 5 and 3 (D) -1 and -3

Ans. (B) 3 and 1

54. If $(4, k)$ is a solution of the equation $3x + 2y - 22 = 0$ then the value of k is:

- (A) - 4 (B) - 5 (C) 4 (D) 5

Ans. (D)

55. If the sum of zeroes of the polynomial $p(x) = 2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$ then k is equal to:

- (A) $\sqrt{2}$ (B) 2 (C) $2\sqrt{2}$ (D) $1/2$

Ans. (B) 2

56. A linear equation in two variables has infinitely many solutions which can be represented on –

- (A) a circle (B) a triangle
(C) a number line (D) the Cartesian plane

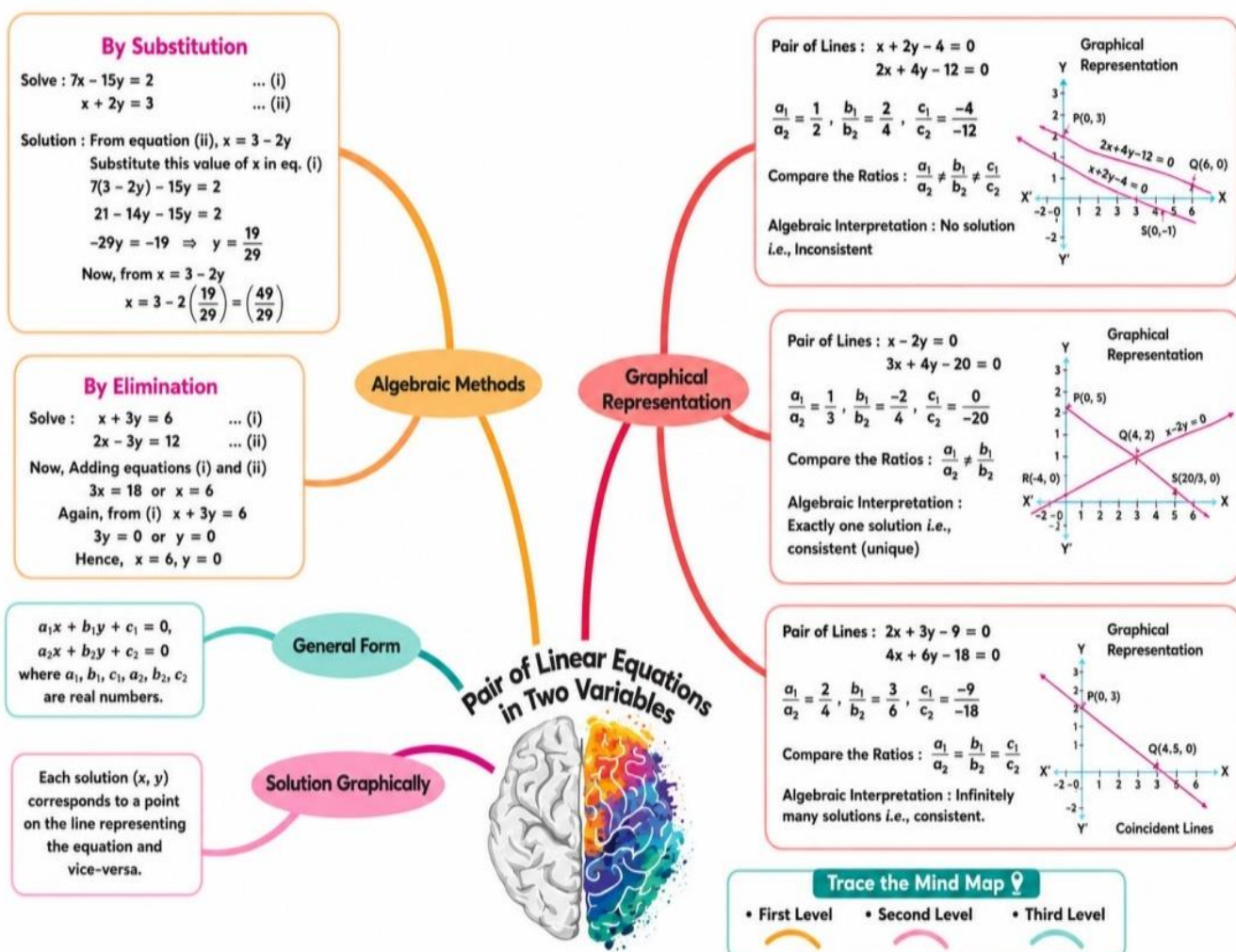
Ans: (D)

57. If the line $y = mx - 3$ passes through the point $(5, 3)$, then the value of m is –

- (A) $\frac{5}{6}$ (B) $\frac{6}{5}$
(B) 5 (D) 6

Ans: (B)

LINEAR EQUATIONS IN TWO VARIABLES MIND MAP



QUADRATIC EQUATIONS

Important points/summary:

1. The standard form of a quadratic equation in the variable x is of the form :
 $ax^2 + bx + c = 0$, where a, b, c are real numbers and $a \neq 0$.
2. A quadratic equation $ax^2 + bx + c = 0$, has **at most two roots**
3. The solution of the quadratic equation $ax^2 + bx + c = 0$ is given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, which is known as the quadratic formula.
4. $D = b^2 - 4ac$, is called the **Discriminant** of the quadratic equation $ax^2 + bx + c = 0$, where a, b, c are real numbers and $a \neq 0$.
5. In $D = b^2 - 4ac$, three cases arise:
 If $D > 0$, $ax^2 + bx + c = 0$ has real and unequal/distinct roots
 If $D = 0$, $ax^2 + bx + c = 0$ has real and equal roots
 If $D < 0$, $ax^2 + bx + c = 0$ has no real roots

58. Which of the following is a quadratic equation?

- (A) $x^2 - 2x = (-2)(3 - x)$
 (B) $x^2 + 3\sqrt{x} + 2 = 5$
 (C) $(x - 2)(x + 1) = (x - 1)(x + 3)$
 (D) $(x + 2)^3 = 2x(x^2 - 1)$

Ans. (A)

59. If the roots of the equation $ax^2 + bx + c = 0$ are equal, then b equals to:

- (A) $\sqrt{2ac}$ (B) $\pm\sqrt{4ac}$
 (C) $-\sqrt{2ac}$ (D) $-\sqrt{4ac}$

Ans. (B)

60. If $x = 3$ is a solution of the quadratic equation $3x^2 + (k - 1)x + 9 = 0$, then k equals to:

- (A) 11 (B) -11 (C) 13 (D) -13

Ans.(B)

61. The roots of the equation $ax^2 + bx + c = 0$ are not-real if:

- (A) $b^2 - 4ac = 0$ (B) $b^2 - 4ac > 0$
 (C) $b^2 - 4ac < 0$ (D) $b = 0$

Ans. (C) (MBOSE 2025 Suppl)

62. If $x = 1$ is the common root of $ax^2 + bx + 2 = 0$ and $x^2 + x + b = 0$, then a equals:

- (A) 1 (B) 0 (C) 3 (D) 4

Ans.(B)

63. If the polynomial $ax^2 + bx + c$ is a perfect square, then

- (A) $b^2 = 4ac$ (B) $b = -4ac$
 (C) $a^2 = 4bc$ (D) $a^2 = -4bc$

Ans: (A)

64. The roots of the quadratic equation $100x^2 - 20x + 1 = 0$ are:

- (A) 10, 10 (B) -10, 10
 (C) 1/10, 1/10 (D) 1/10, -1/10

Ans. (C)

65. $ax^2 + bx + c = 0, a > 0, b = 0, c > 0$ has

- (A) One real roots
 (B) no real roots
 (C) two equal roots

(D) two distinct real roots

Ans: (B)

(A) a, a

(B) $-a^2, a^2$

(C) $-a, -a$

(D) $a, -a$

Ans: (D)

66. If the roots of a quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relation is true?

(A) $a = b^2/c$ (B) $b^2 = ac$

(C) $ac = b^2/4$ (D) $c = b^2/a$

Ans. (C)

67. The Discriminant of the quadratic equation $x^2 + 8x + 16 = 0$ is:

(A) 3 (B) 2 (C) 1 (D) 0

Ans. (D)

68. The solutions of $(x - 3)(x + 6) = 0$ are:

(A) -3, 6 (B) 3, -6 (C) -3, -6 (D) 3, 6

Ans. (B)

69. If $b^2 - 4ac > 0$, then the quadratic equation $ax^2 + bx + c = 0$ has:

(A) Real and equal roots

(B) Real and unequal roots

(C) No real roots (D) none of the above

Ans. (B)

70. If $b^2 - 4ac = 0$, then the roots of the quadratic equation $ax^2 + bx + c = 0$ are:

(A) $-b/2a, -b/2a$ (B) $-b/2a, b/2a$

(C) $2b/a, -2b/a$ (D) $a/2b, -a/2b$

Ans. (A)

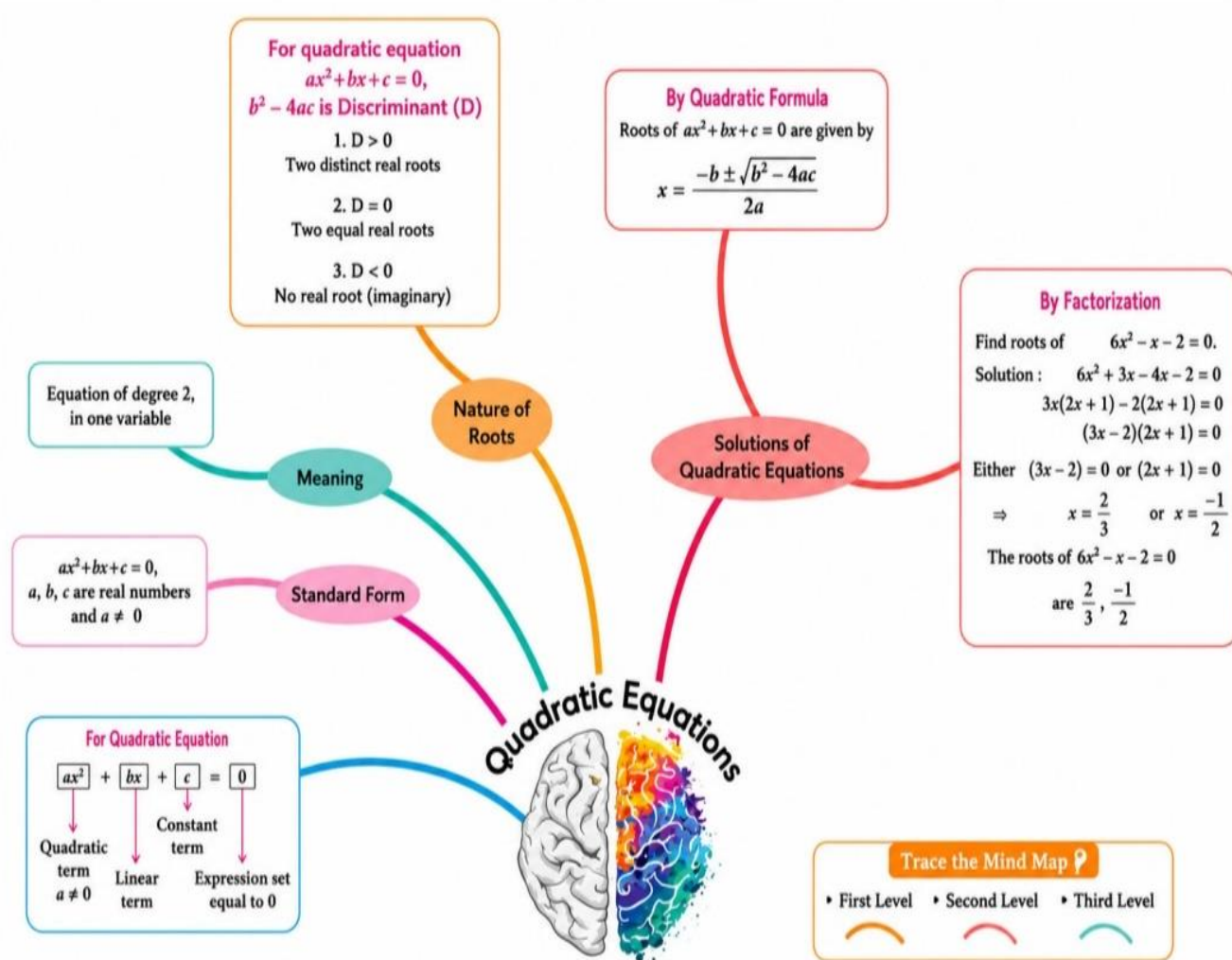
71. If $2x^2 - 2kx + 1 = 0$ has real and equal roots, then the value of k is:

(A) ± 1 (B) 2 (C) ± 2 (D) 1

Ans. (C)

72. The roots of the quadratic equation $\frac{x}{a} = \frac{a}{x}$, x , $a \neq 0$, are –

QUADRATIC EQUATION MIND MAP



ARITHMETIC PROGRESSION

Important points/summary

- a. The sequences or set of terms arranged according to some definite law, whose general term can be expressed as a formula are called **progressions**.
- b. **A.P:** A sequence is called an Arithmetic Progression if the difference of any of its terms and the preceding term is always the same.
That is, $t_{n+1} - t_n = \text{constant}$, which is called the common difference of the A.P.
- c. Common difference, $d = t_{n+1} - t_n$, where $n = 1, 2, 3, \dots$
Like, $d = t_2 - t_1 = t_3 - t_2 = t_4 - t_3$
- d. **nth term of an AP:**
 $a_n = a_1 + (n - 1)d$
or, $t_n = a + (n - 1)d$
- e. **sum of n terms of an AP:**
 $S_n = \frac{n}{2} \{2a + (n - 1)d\}$
or, $S_n = \frac{n}{2} \{a + l\}$

73. In an AP, if $d = 2$ and fourth term, $a_4 = 13$ then a is:

(A) 6 (B) 7 (C) 20 (D) 28

Ans. (B) 7

74. In an AP, if $a = 2$, $d = 0$, $n = 1000$ then a_n is:

(A) 2 (B) 10 (C) 1000 (D) 2000

Ans. (A)

75. In an AP: 3, 1, -1, -3, ... the first term 'a' and common difference 'd' are respectively:

(A) 3, 2 (B) 1, -2 (C) 2, 3 (D) 3, -2

Ans. (D)

76. Which of the following is an AP?

(A) 2, 4, 8, 16, ...

(B) -1.2, -3.2, -5.2, -7.2, ...

(C) 1, 3, 9, 27, ...

(D) 0.2, 0.22, 0.222, 0.2222, ...

Ans. (B)

77. The first three terms of an AP when the first term, $a = 10$ and common difference, $d = 10$ are:

(A) 10, 20, 30 (B) 0, 10, 100

(C) 10, -10, -20 (D) 10, 5, 0

Ans. (A)

78. If common difference of an AP is 5, then

$a_{16} - a_{15}$ is:

(A) 1 (B) 31 (C) 5 (D) 15

Ans. (C)

79. Which of the following is not an AP?

(A) 4, 10, 16, 22, ...

(B) 1, -1, -3, -5, ...

(C) 0, -4, -8, -12, ...

(D) 1, 3, 9, 27, ...

Ans. (D)

80. The missing term in the box of the AP: 2, □, 26, ... Is:

(A) 6 (B) 12 (C) 13 (D) 14

Ans. (D)

81. The 4th term of the AP $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \dots$ is –
 (A) $\frac{4}{3}$ (B) $\frac{11}{3}$
 (C) $\frac{13}{3}$ (D) $\frac{12}{3}$
 Ans. (C)

82. If $k, 2k - 1, k + 4$ are three consecutive terms of an AP, then the value of k is:
 (A) -2 (B) 3 (C) -3 (D) 6
 Ans. (B)

83. If $2n + 3$ is the n th term of an AP, then the common difference is:
 (A) 2 (B) 4 (C) 5 (D) 6
 Ans. (A)

84. The first three terms of an AP if $a_n = 2n + 5$ are:
 (A) $1, 2, 3$ (B) $7, 10, 13$
 (C) $7, 9, 11$ (D) $11, 13, 17$
 Ans. (C)

85. The number of odd numbers between 0 and 50 is –
 (A) 24 (B) 25
 (B) 23 (D) 26
 Ans. (B)

86. The sum of first n terms of an AP, whose first term ' a ' and last term ' l ' is:
 (A) $n/2 (a + 2l)$ (B) $n/2 (a + l)$
 (C) $(a + l)$ (D) $n/2$
 Ans. (B)

87. The next term of the series $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$ is –
 (A) $\sqrt{48}$ (B) $\sqrt{54}$
 (C) $\sqrt{50}$ (D) $\sqrt{60}$
 Ans. (C)

88. In an A.P: $a, a + d, a + 2d, a + 3d, \dots$, its general term a_n equals to:
 (A) $a + n d$ (B) $\{a + (n - 1)d\}$
 (C) $(a + n)/2$ (D) $\{n (a + n)d\}$
 Ans. (B)

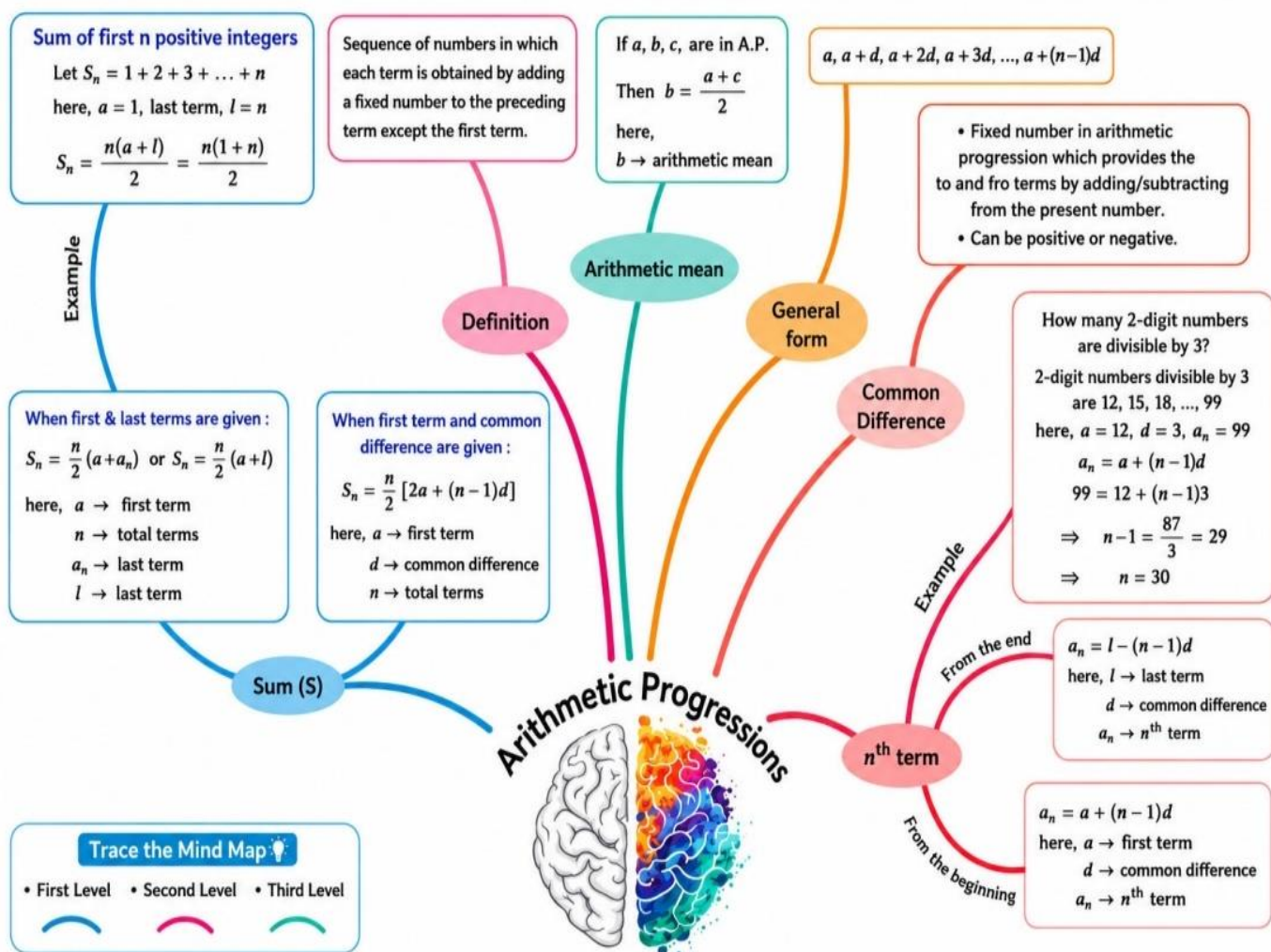
89. The list of numbers $-10, -6, -2, 2, \dots$ is –
 (A) An AP with $d = -16$
 (B) an AP with $d = 4$
 (C) An AP with $d = -4$
 (D) not an AP
 Ans. (B)

90. In an AP, the difference between t_{n+1} and t_n is called the:
 (A) First term (B) last term
 (C) Common difference (D) next term
 Ans. (C)

91. If $a = -2, d = 5$ then the value of t_{10} is equal to:
 (A) 23 (B) 33 (C) 43 (D) 53
 Ans. (C)

92. The common difference of the AP: $0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, \dots$ is:
 (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 0
 Ans. (A)

ARITHMETIC PROGRESSION MIND MAP



TRIANGLES

Important points/summary:

1. **Triangle:** A Triangle is a plane figure bounded by three line segments. It has three sides, three vertices and three angles.
2. **Scalene triangle:** A triangle in which no two of its sides are equal is called a scalene triangle.
3. **Isosceles triangle:** A triangle in which two of its sides are equal is called an isosceles triangle.
4. **Similar figures:** Two geometric figures having the same shape but different sizes are said to be similar figures.
5. **Congruent figures:** Two geometric figures having the same shape but same sizes are said to be congruent figures.
6. **Similar triangles:** Two triangles are said to be similar if
 - i. Their corresponding angles are equal and
 - ii. their corresponding sides are proportional
7. **Equilateral triangle:** An equilateral triangle is a triangle in which all the three sides are equal.
8. **Mid- point theorem:** The straight line joining the middle points of two sides of a triangle is parallel to the third side.
9. **AAA Similarity:** If in two triangles, corresponding angles are equal then the triangles are similar.
10. **AA Similarity:** If in two angles of one triangle are respectively equal to two angles of another triangle then the two triangles are similar.
11. **SSS Similarity:** If the corresponding sides of two triangles are proportional then they are similar.
12. **SAS Similarity:** If in two triangles, one pair of corresponding sides is proportional and the included angle is equal then the two triangles are similar.
13. In an **equilateral triangle** having side 'a' units, then
 - i. **Altitude** = $\frac{\sqrt{3}}{2} a$ units
 - ii. **Area** = $\frac{\sqrt{3}}{4} a^2$ sq. units

93. All geometrical congruent figures are:

- (A) Not similar (B) similar
(C) Unequal (D) none of the above

Ans. (B)

94. The ratio of any two corresponding sides in two equiangular triangles is always:

- (A) The same (B) different
(C) Similar (D) None of the above

Ans. (A)

95. If two angles of one triangle are respectively equal to two angles of another triangles then the two triangles are similar. This is referred to as the:

- (A) AA Similarity Criterion for two triangles
- (B) SAS Similarity Criterion for two triangles
- (C) AAA Similarity Criterion for two triangles
- (D) SSS Similarity Criterion for two triangles

Ans. (A)

96. If $\triangle ABC$ and $\triangle DEF$ are two triangles in which $\frac{AB}{DE} = \frac{BC}{DF}$ then the two triangles are similar if:

- (A) $\angle A = \angle F$ (B) $\angle B = \angle D$
- (C) $\angle A = \angle D$ (D) $\angle B = \angle E$

Ans. (B)

97. The area of an equilateral triangle of side 'a' is

- (A) $3a^2$ (B) $\frac{2\sqrt{3}}{a}$
- (C) $\frac{\sqrt{3}}{4}a$ (D) $\frac{\sqrt{3}}{4}a^2$

Ans. (D) (MBOSE 2025)

98. The length of the altitude of an equilateral triangle of side 2 cm is:

- (A) 3 (B) $\sqrt{3}$ (C) $\sqrt{3}/2$ (D) $2\sqrt{3}$

Ans. (B) (MBOSE 2025 Suppl)

99. In a $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

Which of the following is true

- (A) $\triangle ABC \sim \triangle DEF$ by SSS Criterion
- (B) $\triangle ABC \sim \triangle DEF$ by SAS Criterion
- (C) $\triangle ABC \sim \triangle DEF$ by AA Criterion
- (D) $\triangle ABC$ is not similar to $\triangle DEF$

Ans. (A) $\triangle ABC \sim \triangle DEF$ by SSS Criterion

100. In a triangle, if the perpendicular from the vertex to the base bisects the base. The triangle is:

- (A) Scalene (B) isosceles
- (C) Obtuse –angled (D) right- angled

Ans. (B)

101. Given $\triangle ABC \sim \triangle PQR$, $\angle A = 30^\circ$ and $\angle Q = 90^\circ$, then the value of $\angle R + \angle B$ is

- (A) 120°
- (B) 150°
- (C) 180°
- (D) 90°

Ans. (C)

102. In a triangle, the line segment joining from one vertex to the mid-point of the opposite side is called its:

- (A) Median (B) perpendicular
- (C) Hypotenuse (D) angle bisector

Ans. (A) (MBOSE 2025 Suppl)

103. In the $\triangle ABC$ with $XY \parallel BC$, if $AX = 3$ cm, $XB = 5$ cm, $AY = 6$ cm, then AC is equal to:

- (A) 10 cm (B) 13 cm
- (C) 14cm (D) 16 cm

Ans. (D) 16 cm

104. If $\triangle ABC \sim \triangle DEF$, such that $2AB = DE$ and $BC = 8$ cm, then EF equals:

- (A) 4cm (B) 8 cm
- (C) 12 cm (D) 16 cm

Ans. (D) 16 cm

105. The perimeter of an equilateral triangle with side 9 cm is: (MBOSE 2025 suppl.

- (A) 9 cm (B) 18 cm
- (C) 27 cm (D) 36 cm

Ans. (C)

TRIANGLES MIND MAP

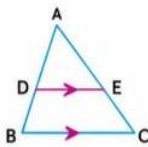
Summary

In $\triangle ABC$, let $DE \parallel BC$. Then,

(i) $\frac{AD}{DB} = \frac{AE}{EC}$

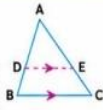
(ii) $\frac{AB}{DB} = \frac{AC}{EC}$

(iii) $\frac{AD}{AB} = \frac{AE}{AC}$



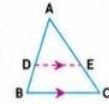
1. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, If, $DE \parallel BC$ the other two sides are divided in the same ratio.

then, $\frac{AD}{DB} = \frac{AE}{EC}$



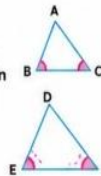
2. If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

If $\frac{AD}{DB} = \frac{AE}{EC}$
then, $DE \parallel BC$



Theorems

3. If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar. (AAA criterion)

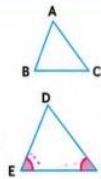


If $\angle A = \angle D$, $\angle B = \angle E$,
 $\angle C = \angle F$

then, $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

hence, $\triangle ABC \sim \triangle DEF$

4. If in two triangles, sides of one triangle are proportional to (i.e., in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar. (SSS criterion)

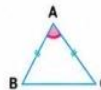


If $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

then, $\angle A = \angle D$, $\angle B = \angle E$,
 $\angle C = \angle F$

hence, $\triangle ABC \sim \triangle DEF$

5. If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar. (SAS criterion)



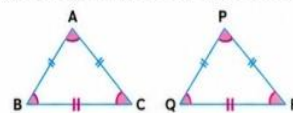
If $\frac{AB}{PQ} = \frac{AC}{PR}$ & $\angle A = \angle P$
then, $\triangle ABC \sim \triangle PQR$

Triangles



Similarity

- (i) Corresponding angles are equal
- (ii) Corresponding sides are in the same ratio



$\triangle ABC \sim \triangle PQR$

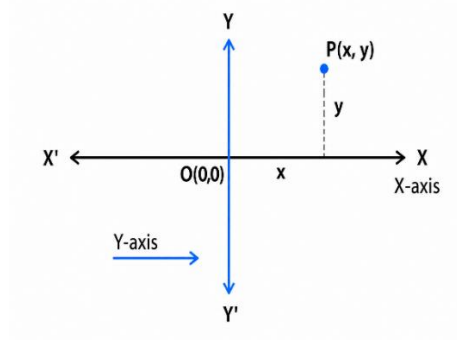
Trace the Mind Map

- First Level
- Second Level
- Third Level



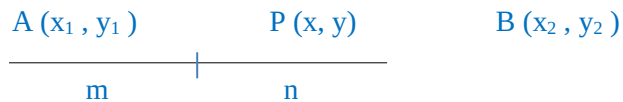
COORDINATE GEOMETRY

Important points/summary:



XOX' and YOY' are two mutually perpendicular axes intersecting each other at a point O, called the Origin, whose coordinates are O (0,0).

1. **Abcissa:** in the ordered pair (x, y), x is called the abscissa or x-coordinate.
2. **Ordinate:** in the ordered pair (x, y), y is called the ordinate or y-coordinate.
3. **Collinearity** of three points: three points are collinear if the sum of any two distances is equal to the third distance.
4. The coordinates of **any point on the X-Axis** are **(x,0)** (as $y = 0$)
5. The coordinates of **any point on the Y-Axis** are **(0,y)** (as $x = 0$)
6. **Distance formula:** the distance between the two points A (x_1, y_1) and B (x_2, y_2) is given by
$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
7. The distance of any point P (x, y) from the origin O (0, 0) is given by **OP** = $\sqrt{x^2 + y^2}$
8. **Section formula:**



The coordinates of the point P (x, y) which **divides internally** the line segment joining the points A (x_1, y_1) and B (x_2, y_2) in the ratio $m : n$ are given by

$$(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$

9. Mid- point formula:

Let M (x, y) be the mid point of the line segment joining the points A (x_1, y_1) and B (x_2, y_2) in the ratio 1 : 1 are given by

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

10. **Centroid:** the point of concurrency of the three medians of a triangle is called the centroid of a triangle.

106. The perimeter of a circle is called its:

- (A) Area (B) Diameter
(C) Radius (D) Circumference

Ans. (D) circumference

107. The coordinates of a point on X-axis is of the form:

- (A) (x, y) (B) (x, 0)
(C) (y, 0) (D) (0, y)

Ans. (B)

108. The distance of any point P (x, y) from

Origin is: (MBOSE 2025)

- (A) $\sqrt{x^2 - y^2}$ (B) $\sqrt{y^2 - x^2}$
(C) $\sqrt{x^2 + y^2}$ (D) $\sqrt{x^3 + y^3}$

Ans. (C)

109. In which quadrant does the point (-3, 5) lie?

- (A) first quadrant (B) second quadrant
(C) third quadrant (D) fourth quadrant

Ans. (B)

110. The distance of the point P (3, 4) from the

origin is: (MBOSE 2025 Suppl)

- (A) 4 unit (B) 3 units
(C) 5 units (D) 7 units

Ans. (C)

111. The coordinates of the midpoint of the line segment joining the points A (- 2, 8) and B (- 6, - 4) is:

- (A) (4, 2) (B) (- 4, 2)
(C) (4, - 2) (D) (- 4, - 2)

Ans. (B)

112. The coordinates of the midpoint of the line segment joining the points A (a, b) and B (0, 0) is:

- (A) (a + b/2, a) (B) (a + b, b)

- (C) (a/2, b/2) (D) (a, b)

Ans. (C)

113. The coordinates of a point on X –axis are of the form:

- (A) (0, x) (B) (x, 0)
(C) (0, y) (D) (y, 0)

Ans. (B)

114. The mid-point of the line segment joining the points P (- 4, 5) and Q(4, 6) lies on:

- (A) Origin (B) x - axis
(C) y- axis (D) neither x-axis or y-axis

Ans. (C)

115. The perimeter of a triangle with vertices (0,4), (0, 0) and (3, 0) is:

- (A) 12 units (B) 14 units
(C) 16 units (D) 8 units

Ans. (A)

116. The point (3, - 4) lies in the:

- (A) first quadrant (B) second quadrant
(C) third quadrant (D) fourth quadrant

Ans. (D)

117. The coordinates of the point P (x, y) which divides the line segment joining the points A(x₁, y₁) and B(x₂, y₂) in the ratio m:n is:

- (A) $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$
(B) $\left(\frac{mx_2 - nx_1}{m+n}, \frac{my_2 - ny_1}{m+n}\right)$
(C) $\left(\frac{mx_2 + nx_1}{m-n}, \frac{my_2 + ny_1}{m-n}\right)$
(D) $\left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right)$

Ans. (C)

118. The coordinates of a mid- point of the line segment AB with end points A (x₁, y₁) and B (x₂, y₂) is:

- (A) $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$ (B) $\left(\frac{x_1 + x_2}{3}, \frac{y_1 + y_2}{3}\right)$
(C) $\left(\frac{x_1 + x_2}{4}, \frac{y_1 + y_2}{4}\right)$ (D) $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Ans. (D)

119. The perpendicular distance of a point from Y- axis called:
(A) Ordinate (B) abscissa
(C) altitude (D) none of the above
Ans. (B)

120. The ordinates of all points on a horizontal line are:
(A) Parallel (B) perpendicular
(C) Equal (D) coincident
Ans. (C)

121. The abscissa of any point on the Y – axis is:
(A) 1 (B) – 1 (C) 0 (D) 2
Ans. (C)

122. If P $(4, \frac{a}{2})$ is the mid- point of the line segment joining the points A (- 6, 5) and B (- 2, 3) then ‘a’ equals:
(A) - 6 (B) – 8 (C) – 12 (D) 12
Ans. (B)

123. The distance between the points A (4, k) and B (1, 0) is 5 units then k equals:
(A) 4 (B) – 4 (C) 0 (D) ± 4
Ans. (D)

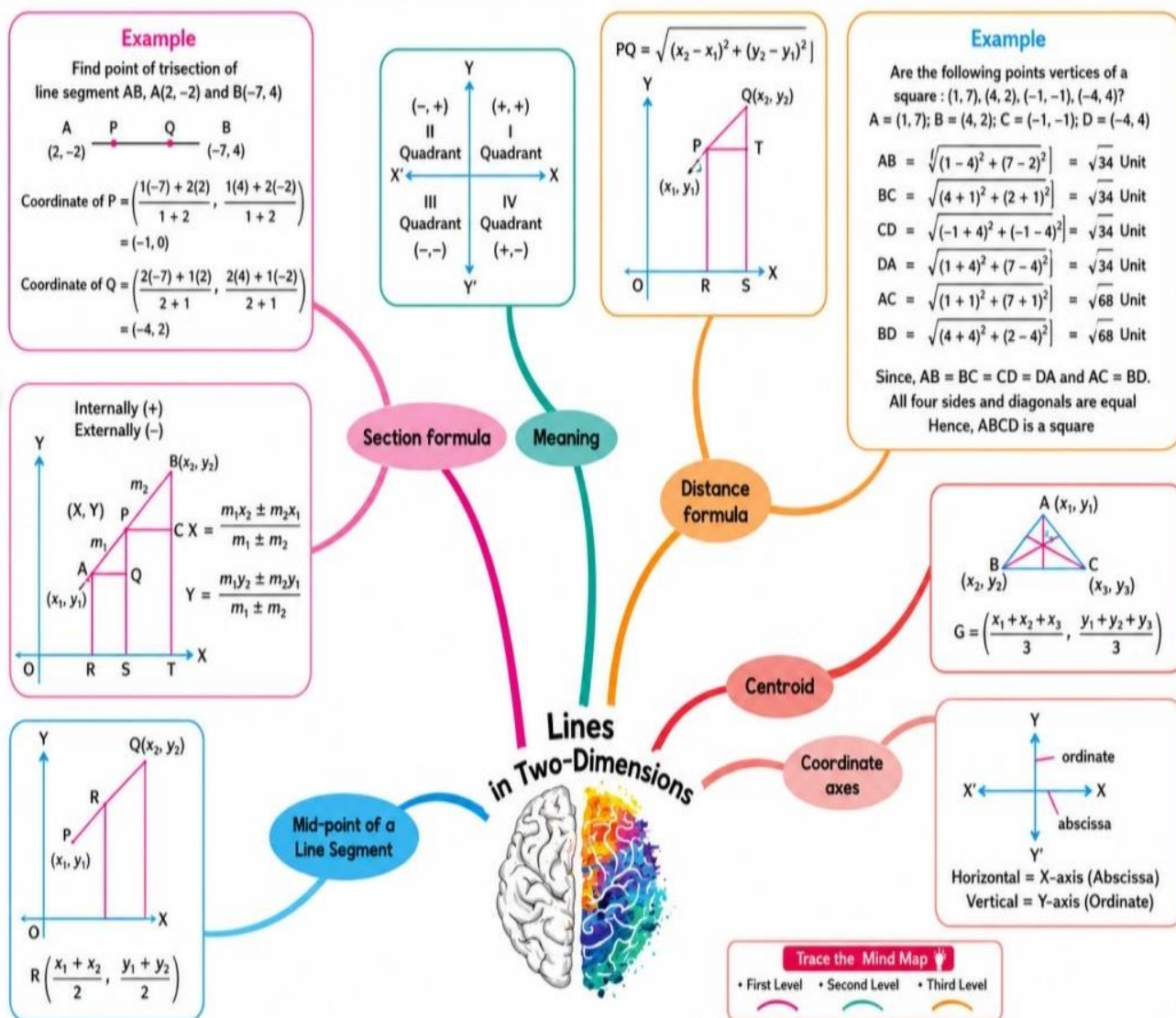
124. The distance between the points P (0, 5) and Q (- 5, 0) is:
(A) 5 units (B) $5\sqrt{2}$ units (C) $2\sqrt{5}$ units
(D) $\sqrt{10}$ units
Ans. (B)

125. If the end points of a diameter of a circle are (1, 2) and (3, 4) then the coordinates of the Centre are:
(A) (2, 4) (B) (2, 3)
(C) (1, 2) (D) (4, 6)
Ans. (B)

126. Centroid of a triangle is the point of concurrency of its three:
(A) Angle bisectors (B) medians
(C) Altitudes (D) perpendicular bisectors
Ans. (B)

127. The ordinates of all points on a horizontal line are:
(A) Parallel (B) perpendicular
(C) equal (D) coincident
Ans. (C)

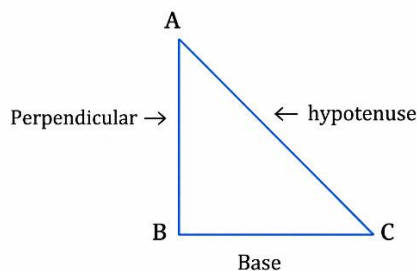
CO-ORDINATE GEOMETRY MIND MAP



Introduction to Trigonometry

Important points/summary:

Trigonometry is a branch of Mathematics which deals with the measurements of sides and angles of a triangle and their relationships.



Consider a right $\triangle ABC$ right angled at B and let $\theta < 90^\circ$ at C be an acute angle then the six trigonometric ratios are defined as :

$$1. \quad \sin \theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{P}{H} \quad \left(\sin \theta = \frac{1}{\text{cosec} \theta} \right) \quad (\text{reciprocals})$$

$$2. \quad \cos \theta = \frac{\text{base}}{\text{Hypotenuse}} = \frac{B}{H} \quad \left(\cos \theta = \frac{1}{\text{sec} \theta} \right)$$

$$3. \quad \tan \theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{P}{B} \quad \left(\tan \theta = \frac{1}{\cot \theta} \right)$$

$$4. \quad \cot \theta = \frac{\text{Base}}{\text{perpendicular}} = \frac{B}{P} \quad \left(\cot \theta = \frac{1}{\tan \theta} \right)$$

$$5. \quad \sec \theta = \frac{\text{Hypotenuse}}{\text{Base}} = \frac{H}{B} \quad \left(\sec \theta = \frac{1}{\cos \theta} \right)$$

$$6. \quad \text{cosec} \theta = \frac{\text{Hypotenuse}}{\text{Perpendicular}} = \frac{H}{P} \quad \left(\text{cosec} \theta = \frac{1}{\sin \theta} \right)$$

$$7. \quad \text{Relation between Sin } \theta, \cos \theta \text{ and } \tan \theta: \quad \tan \theta = \frac{\sin \theta}{\cos \theta}; \quad \cot \theta = \frac{\cos \theta}{\sin \theta}$$

8. Relation between Sin θ , cos θ and cot θ is

9. Some Identities/formulae:

a. $\sin^2 \theta + \cos^2 \theta = 1$

b. $1 + \tan^2 \theta = \sec^2 \theta$

c. $1 + \cot^2 \theta = \text{cosec}^2 \theta$

Table showing trigonometric ratios of some angles:

Ratios ↓	Some specific Angles ↓				
	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Undefined
cot	Undefined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Undefined
cosec	undefined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

128. The value of $1 + \tan^2 45^\circ$ is:

- (A) -1 (B) 0 (C) 1 (D) 2

Ans. (D)

129. If $\cos \theta = 1$, then the value of θ is:

- (A) 0° (B) 30° (C) 60° (D) 90°

Ans. (A)

130. The value of $3 \cot^2 A - 3 \operatorname{cosec}^2 A$ is equal to:

(MBOSE 2025 Suppl)

- (A) -3 (B) 0 (C) 3 (D) $3/2$

Ans. (A)

131. In $\triangle ABC$ right angle at B, if $AC = 13\text{cm}$, $BC = 5\text{ cm}$ and $AB = 12\text{ cm}$ then $\sin A$ is equal to:

- (A) $13/5$ (B) $5/13$ (C) $12/13$ (D) $13/12$

Ans. (B)

132. The value of $9 \sec^2 \theta - 9 \tan^2 \theta$ is:

- (A) 0 (B) 1 (C) 9 (D) 10

Ans. (C)

133. The value of $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$ is equal to:

- (A) $\cos 60^\circ$ (B) $\sin 60^\circ$
(C) $\tan 60^\circ$ (D) $\sin 30^\circ$

Ans. (C)

134. $\sin 2A = 2 \sin A$ is true when A equals to:

- (A) 0° (B) 30° (C) 45° (D) 60°

Ans. (A) (MBOSE 2025 Suppl)

135. If θ is an acute angle of a right-angled triangle, then which of the following equations is not true?

- (A) $\sin \theta \cot \theta = \cos \theta$ (B) $\cos \theta \tan \theta = \sin \theta$
(C) $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$ (D) $\tan^2 \theta - \sec^2 \theta = 1$

Ans. (D) $\tan^2 \theta - \sec^2 \theta = 1$

136. The value of $\sec 60^\circ$ is:

- (A) $\sqrt{3}/2$ (B) $1/2$ (C) 2 (D) 1

Ans. (C)

137. The relation between $\sin \theta$, $\cos \theta$ and $\tan \theta$ is:

- (A) $\cos \theta / \sin \theta = \tan \theta$
(B) $\sin \theta / \cos \theta = \tan \theta$
(C) $\tan \theta / \sin \theta = \cos \theta$

(D) $\tan \theta / \cos \theta = \sin \theta$

Ans. (B)

138. The relation between $\sin \theta$, $\cos \theta$ and $\cot \theta$ is:

- (A) $\cos \theta / \sin \theta = \cot \theta$ (B) $\sin \theta / \cos \theta = \tan \theta$
(C) $\tan \theta / \sin \theta = \cos \theta$ (D) $\tan \theta / \cos \theta = \sin \theta$

Ans. (A)

139. If $\theta = 30^\circ$ then the value of $\cos^2 \theta - \sin^2 \theta$ is:

- (A) 1 (B) $1/2$ (C) $-1/2$ (D) -1

Ans. (B) (MBOSE 2025)

140. The reciprocal of $\cos \theta$ is:

- (A) $\tan \theta$ (B) $\sec \theta$ (C) $\operatorname{cosec} \theta$ (D) $\sin \theta$

Ans. (B)

141. $\tan^2 \theta + 1$ is equal to:

- (A) $\cot^2 \theta$ (B) $\sec^2 \theta$
(C) $\operatorname{cosec}^2 \theta$ (D) $\cos^2 \theta$

Ans. (B)

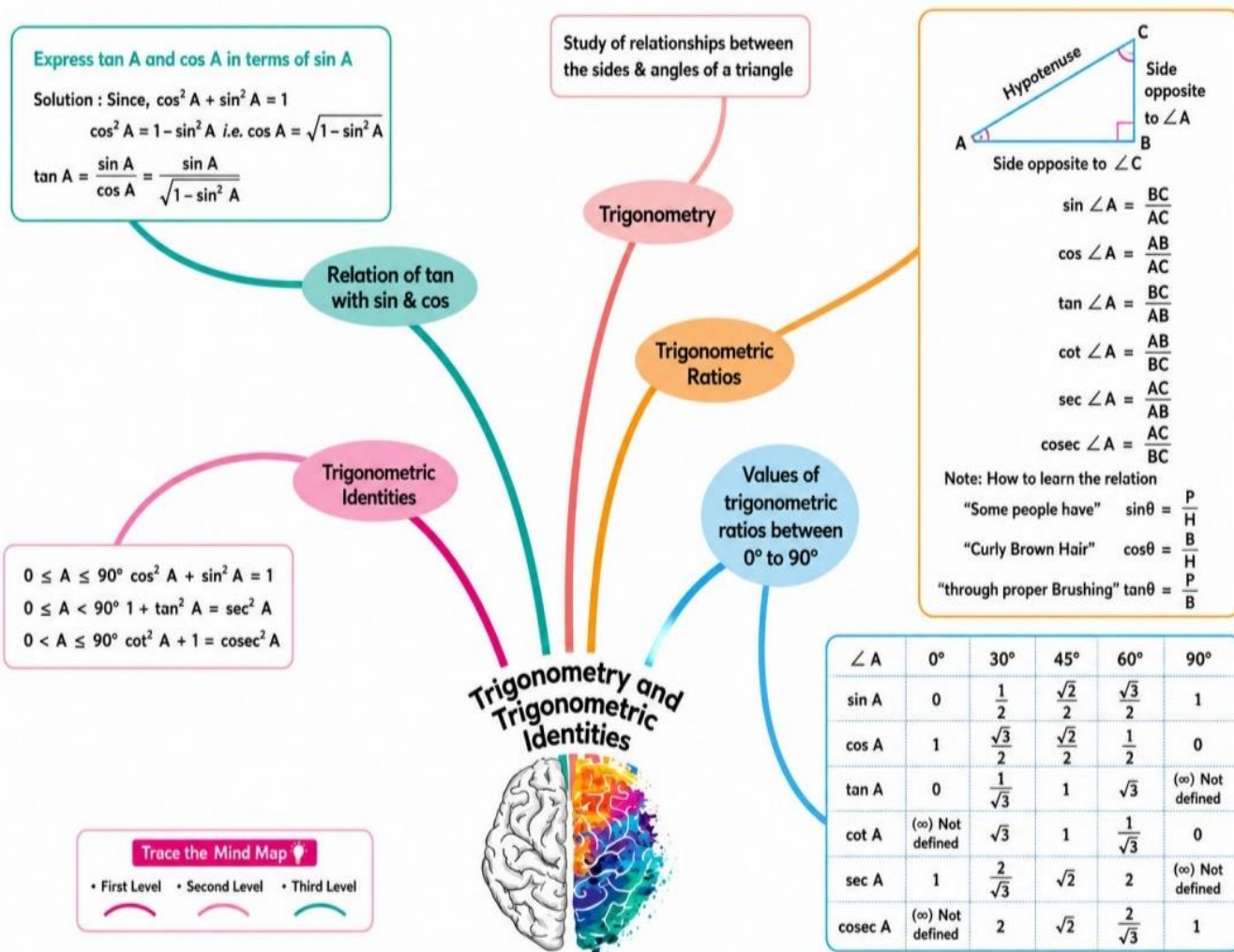
142. $1 - \sin^2 \theta$ is equal to:

- (A) $\cot^2 \theta$ (B) $\sec^2 \theta$
(C) $\operatorname{cosec}^2 \theta$ (D) $\cos^2 \theta$

Ans. (D)

INTRODUCTION TO TRIGONOMETRY

MIND MAP



Some Applications in the Trigonometric Ratios

Important points/ summary

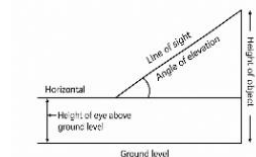
Definitions

1. Line of Sight

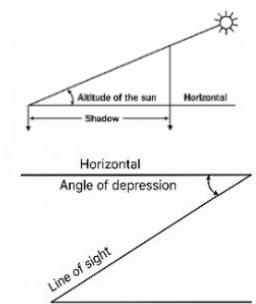
The line drawn from the eye of an observer to a point in the object where the person is viewing is called the line of sight.

2. Angle of Elevation

If you look upwards at an object, say the top of a tree, the angle formed between the horizontal and your line of sight is called angle of elevation.



Note: Sun's altitude or Sun's elevation is nothing but angle of elevation.



3. Angle of Depression

If you look downwards at an object, the angle formed between the horizontal and your line of sight is called angle of depression.

Note: Both the angle of elevation and depression are measured from the horizontal.

Note: To solve the sum of height & distance, diagram is mandatory.

143. The angle formed between the line of sight and the horizontal when you look towards the height of a tower is

- (A) Angle of elevation
- (B) Angle of depression
- (C) Corresponding angles
- (D) Alt. int. angles

Ans: (A) Angle of elevation

144. The angle formed between the line of sight and the horizontal line when you look from the top of a high rise building towards a car on a street is

- (A) Angle of elevation
- (B) Angle of depression
- (C) Alt. int. angles
- (D) Straight angles

Ans: (B) Angle of depression

145. A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60°

with the wall, then the height of the wall is

- (A) $15\sqrt{3}$ m
- (B) $15\sqrt{3}/2$ m
- (C) $15 \text{ m}/2$
- (D) 15 m

Ans: (C) $15/2$ m

146. If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the Sun at that time is

- (A) 30°
- (B) 60°
- (C) 45°
- (D) 75°

Ans: (B) 60°

147. The ratio of the length of a rod and its shadow is $1:\sqrt{3}$. The angle elevation of the rod is

- (A) 30°
- (B) 45°
- (C) 60°
- (D) 90°

Ans: (A) 30°

148. The _____ of an object is the angle formed by the line of sight with the horizontal when the object is below the horizontal level.

(a) line of sight

- (b) angle of elevation
- (c) angle of depression
- (d) none of these

Ans: (c) angle of depression

149. A pole is being broken by the wind at the point of trisection of the pole, then the top strikes the ground at an angle of

- (A) 30°
- (B) 60°
- (C) 90°
- (D) 45°

Ans: (A) 30°

150. The shadow of a tower is equal to its height at 10:45 a.m. The sun's altitude is

- (A) 30°
- (B) 45°
- (C) 60°
- (D) 90°

Ans: (D) 45°

151. If a pole of height 20 m makes an angle of elevation 45° with the ground, then the distance between the point on the ground and the foot of the pole is

- (A) 10 m
- (B) 15 m
- (C) 20 m
- (D) 40 m

Ans: (C) 20 m

152. From the top of a cliff 25 m high, the angle of elevation of a tower is found to be equal to the angle of depression of the foot of the tower. The height of the tower is

- (A) 25 m
- (B) 50 m
- (C) 75 m
- (D) 100 m

Ans: (B) 50 m

153. If the angle of elevation of the top of a tower from two points distant a and b from the base in the same straight line with it are complementary, then the height of the tower is

- (A) ab
- (B) $\sqrt{ab}$
- (C) a/b
- (D) $\sqrt{(a/b)}$

Ans: (B) $\sqrt{ab}$

154. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, the Sun's elevation is

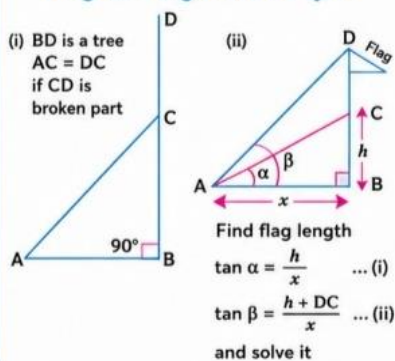
- (A) 60°
- (B) 75°
- (C) 30°
- (D) 90°

Ans: (A) 60°

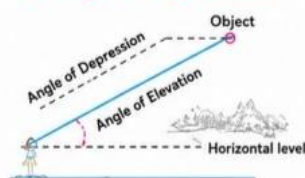
SOME APPLICATIONS IN THE TRIGONOMETRIC RATIOS

MIND MAP

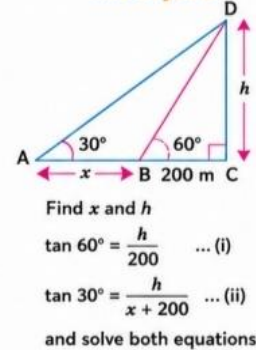
Height / Length of an object



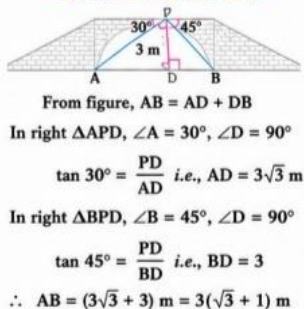
Angle of Elevation is equal to Angle of Depression



Distance between two objects



To determine width AB

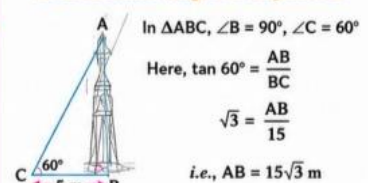


Heights and Distances



Examples Height

To determine height of object AB



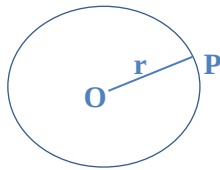
Trace the Mind Map

- First Level
- Second Level
- Third Level

Circles

Important points/summary

1. **Circle:** A circle is a collection of all points in a plane which is equidistant from a fixed point in the plane. The fixed point is called the Centre of a circle and the constant distance is called its radius. O is the Centre of a circle and $OP = r$, is its radius



2. The **perimeter/length/path** of a circle is called its **circumference**.
3. A **chord** passing through the Centre of a circle is called its **diameter**. Or, the **longest chord** of a circle is called its **diameter**.
4. **Tangent:** A line which intersects the circle at **one point only** is called a **tangent line**.
5. The point which the tangent intersects the circle is called the **point of contact**.
6. A line which intersects the circle in **two distinct points** is called **secant of the circle**.
7. There can be **only two tangents** from a **point outside the circle**.
8. One and only **one tangent** can be drawn through a **point lying on the circle**.
9. The **lengths of tangents** drawn from an **external point** to a circle are **equal**.
10. A **tangent to a circle is perpendicular to the radius** through the point of contact.

155. If tangents PA and PB from a point P to a circle with Centre O are inclined to each other at an angle of 80° then $\angle POA$ is equal to:

- (A) 50° (B) 60° (C) 70° (D) 80°

Ans. (A)

156. From a point Q, the length of the tangent to a circle is 4 cm and the distance of Q from the Centre is 5 cm, then the radius of a circle is:

- (A) 1 cm (B) 5 cm (C) 3 cm (D) 4 cm

Ans. (C)

157. The tangents drawn at the end points of a diameter of a circle are:

- (A) Equal (B) parallel
(C) Perpendicular (D) intersecting

Ans. (B) (MBOSE 2025 Suppl)

158. The distance between two parallel tangents of a circle of radius 8 cm is:

- (A) 8 cm (B) 12 cm
(C) 14 cm (D) 16 cm

Ans. (D) (MBOSE 2025)

159. A part of the circle whose end points are end point of a diameter is called a:

- (A) Circumference (B) segment
(C) Semicircle (D) perimeter

Ans. (C) (MBOSE 2025)

160. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the Centre O at a point Q so that $OQ = 12$ cm, then length PQ is:

- (A) 12 cm (B) 13 cm
(C) 8.5 cm (D) $\sqrt{119}$ cm

Ans. (D) $\sqrt{119}$ cm

161. A line which intersects a circle at two distinct points is called:

- (A) Tangent (B) secant
(C) Diameter (D) chord of a circle

Ans. (B) Secant

162. If the angle between two tangents drawn from a point P to a circle of radius r and centre O is 90° , the OP is equal to

- (A) 2r (B) $r/2$
(C) $\sqrt{2} r$ (D) $\sqrt{2} / r$

Ans: (C) $\sqrt{2} r$

163. If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to

- (A) $\sqrt{3}/2$ cm (B) 3 cm
(C) $3\sqrt{3}$ cm (D) 6 cm

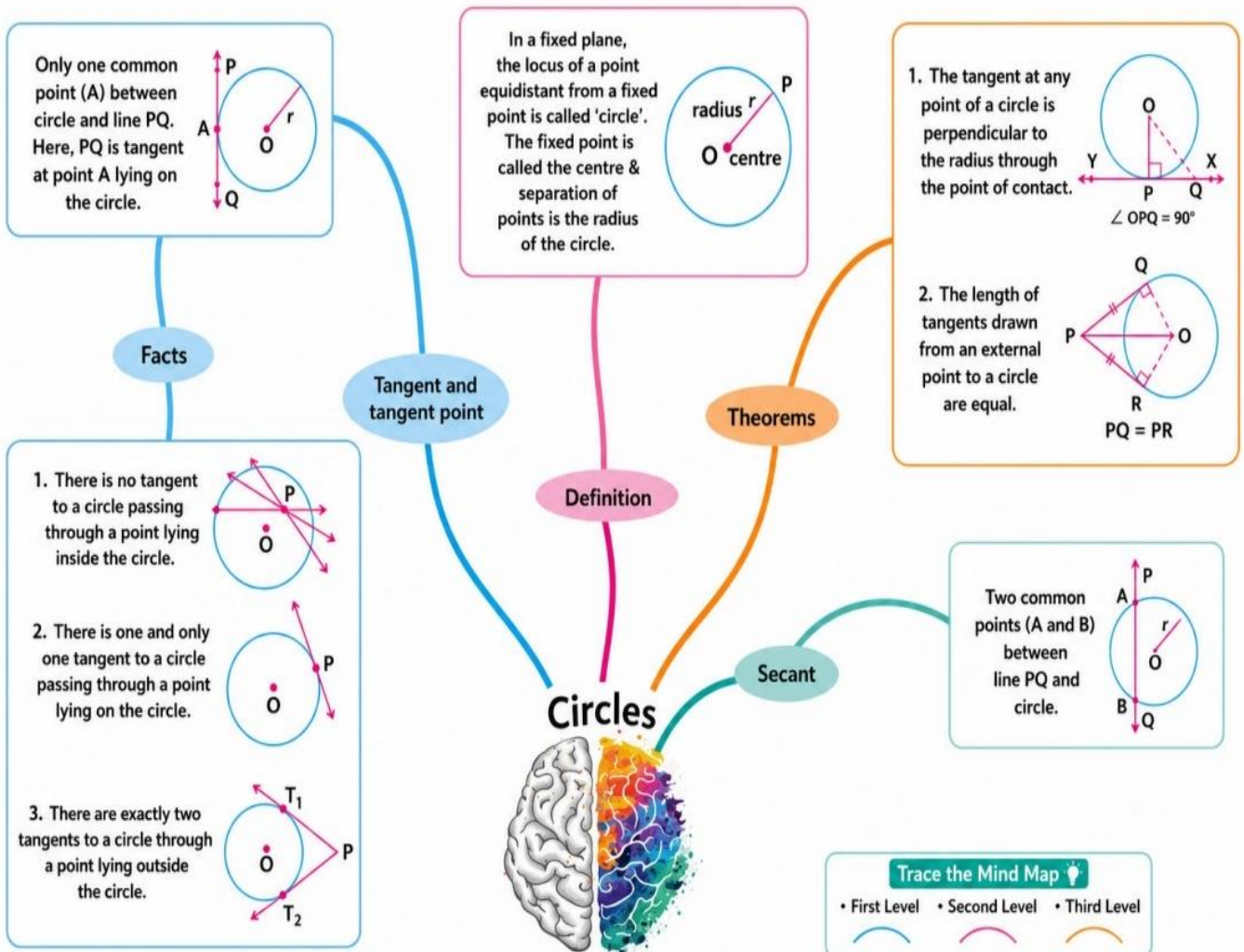
Ans: (C) $3\sqrt{3}$ cm

164. Two circles touch each other externally at P. AB is a common tangent to the circles touching them at A and B. The value of $\angle APB$ is

- (A) 30° (B) 45°
(C) 60° (D) 90°

Ans: (D) 90°

CIRCLES MIND MAP

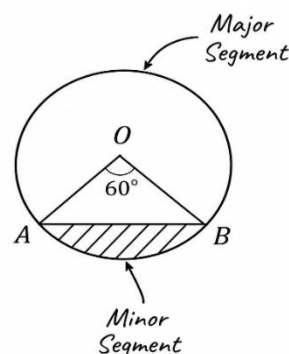
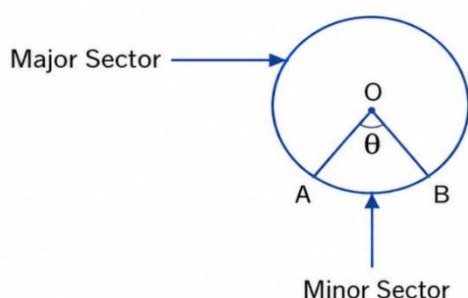


AREA RELATED TO CIRCLES

Important points/summary:

1. $\pi = \frac{c}{d} \left(\frac{\text{circumference}}{\text{diameter}} \right)$
2. $c = \pi d = 2\pi r$ (As $d = 2r$)
3. Area of a circle $= \pi r^2$
4. Area of a semicircle $= \frac{1}{2} \pi r^2$
5. Area of a ring $= \pi (R^2 - r^2)$
6. Angle described by a minute hand in 1 hour (60 minutes) $= 360^\circ$

(that is, Angle described by a minute hand in 1 minute $= 6^\circ$)



7. The portion of a circular region enclosed by two radii and the corresponding arc is called the **sector of the circle**.
8. The portion of a circular region enclosed between a chord and the corresponding arc is called the **segment of the circle**.

9. Area of the sector $= \frac{\pi r^2 \theta}{360}$

(θ is the sector angle)

Area of the segment $= r^2 \left(-\frac{\pi \theta}{360} - \frac{1}{2} \sin \theta \right)$ [when $\theta > 90^\circ$ use , $\sin(180^\circ - \theta) = \sin \theta$]

10. Length of an arc of a circle $= \frac{\pi r \theta}{180}$

11. Area of the major segment $= \pi r^2 - \text{area of minor segment}$

12. Perimeter of a sector $= 2r + \frac{\pi r \theta}{180}$

165. The portion (or part) of a circular region enclosed between a chord and the corresponding arc is called a/an:

- (A) Arc of the circle (B) Perimeter of a circle
(C) Sector of a circle (D) segment of a circle.

Ans. (D)

166. The portion (or part) of the circular region enclosed by two radii and the corresponding arc is called the/a/n:

- (A) Arc of the circle
(B) Perimeter of a circle
(C) Sector of a circle
(D) Segment of a circle

Ans. (C)

(MBOSE 2025 Suppl)

167. If r is the radius of a circle and θ is the angle subtended by an arc of length l , then area of the sector of a circle is:

- (A) $\frac{1}{2} l r$ (B) $2\pi r l$
(C) $\frac{2}{3} r l$ (D) $\frac{1}{2} l r \theta$

Ans. (A)

168. The Area of a circle is $49\pi \text{ cm}^2$. Its circumference is:

- (A) $7\pi \text{ cm}$ (B) $14\pi \text{ cm}$
(C) $21\pi \text{ cm}$ (D) $28\pi \text{ cm}$

Ans. (B)

169. In a circle of radius 21cm, an arc subtends an angle of 60° at the centre. The length of an arc is: (take $\pi = 22/7$)

- (A) 22 cm (B) 44 cm
(C) 132 cm (D) 231 cm

Ans. (A) (MBOSE 2025 Suppl)

170. The angle made by the minute hand of a clock at its centre in 15 minutes duration is:

- (A) 60° (B) 80° (C) 90° (D) 180°

Ans. (C)

171. If the area and circumference of a circle are numerically equal, then its diameter is:

- (A) 2 units (B) 3 units
(C) 4 units (D) 6 units

Ans. (C) (MBOSE 2025)

172. If the circumference of a circle increases from 2π to 4π , then its area is:

- (A) Four times (B) tripled
(C) doubled (D) halved

Ans. (A)

173. The total surface area of a hemispherical object of radius r is:

- (A) πr^2 (B) $2\pi r^2$
(C) $3\pi r^2$ (D) $4\pi r^2$

Ans. (C) (MBOSE 2025)

174. The length of a diagonal of a cube of side 'a' is:

- (A) $a\sqrt{3}$ (B) $3\sqrt{a}$ (C) $\sqrt{3}a$ (D) $a/\sqrt{3}$

Ans. (C)

175. The area of square is the same as the area of circle. Their perimeters are in the ratio of:

- (A) 1:1 (B) $2:\pi$ (C) $\pi:2$ (D) $2:\sqrt{\pi}$

Ans. (D)

176. The perimeter of a circle is equal to that of a square, then the ratio of their areas is

- (A) 22 : 7 (B) 14 : 11
(C) 1 : 22 (D) 11 : 14

Ans: (B) 14 : 11

177. A garden roller has circumference of 4 m. the number of revolutions it makes in moving 40 m is:

- (A) 8 (B) 10 (C) 12 (D) 16

Ans. (B)

178. The angle described by a minute hand in half an hour is:

- (A) 60° (B) 120° (C) 180° (D) 360°

Ans. (C)

179. The circumference of a circle of diameter D units is:

- (A) πD (B) $2\pi D$ (C) $4\pi/2$ (D) $\pi D/2$

Ans. (A) πD

180. If 'r' and 'h' represent the radius of the base and height of a right circular cone respectively then its curved surface area is:

- (A) $\pi r h$ (B) $\pi r^2 h$
 (C) $\pi r (\sqrt{r^2 + h^2})$ (D) $\pi r h^2$
 Ans. (C)

181. The area of a sector whose perimeter is four times its radius 'r' units is:

- (A) $r^2/4$ (B) $2r^2$ (C) r^2 (D) $r^2/2$
 Ans. (C)

182. Distance covered by a wheel in one revolution is equal to:

- (A) Diameter of a wheel (B) radius of a wheel
 (C) Circumference of a wheel (D) None of these
 Ans. (C)

183. The circumference of a bicycle wheel that makes 5000 revolutions in moving 11 km is:

- (Take $\pi = 22/7$)
 (A) 500 cm (B) 250 cm
 (C) 220 cm (D) 150 cm
 Ans. (C)

184. The area of a circle when area and circumference are numerically equal is:

- (A) 2π (B) 4π (C) 6π (D) 8π
 Ans. (B)

185. When area and circumference are numerically equal then the radius of the circle is equal to:

- (A) 1 unit (B) 2 units
 (C) 3 units (D) 4 units
 Ans. (B)

186. The difference between circumference and diameter of a circle is 90 cm, then the radius of a circle is:

- (A) 24.5 cm (B) 23 cm
 (C) 22.5 cm (D) 21 cm
 Ans. (D)

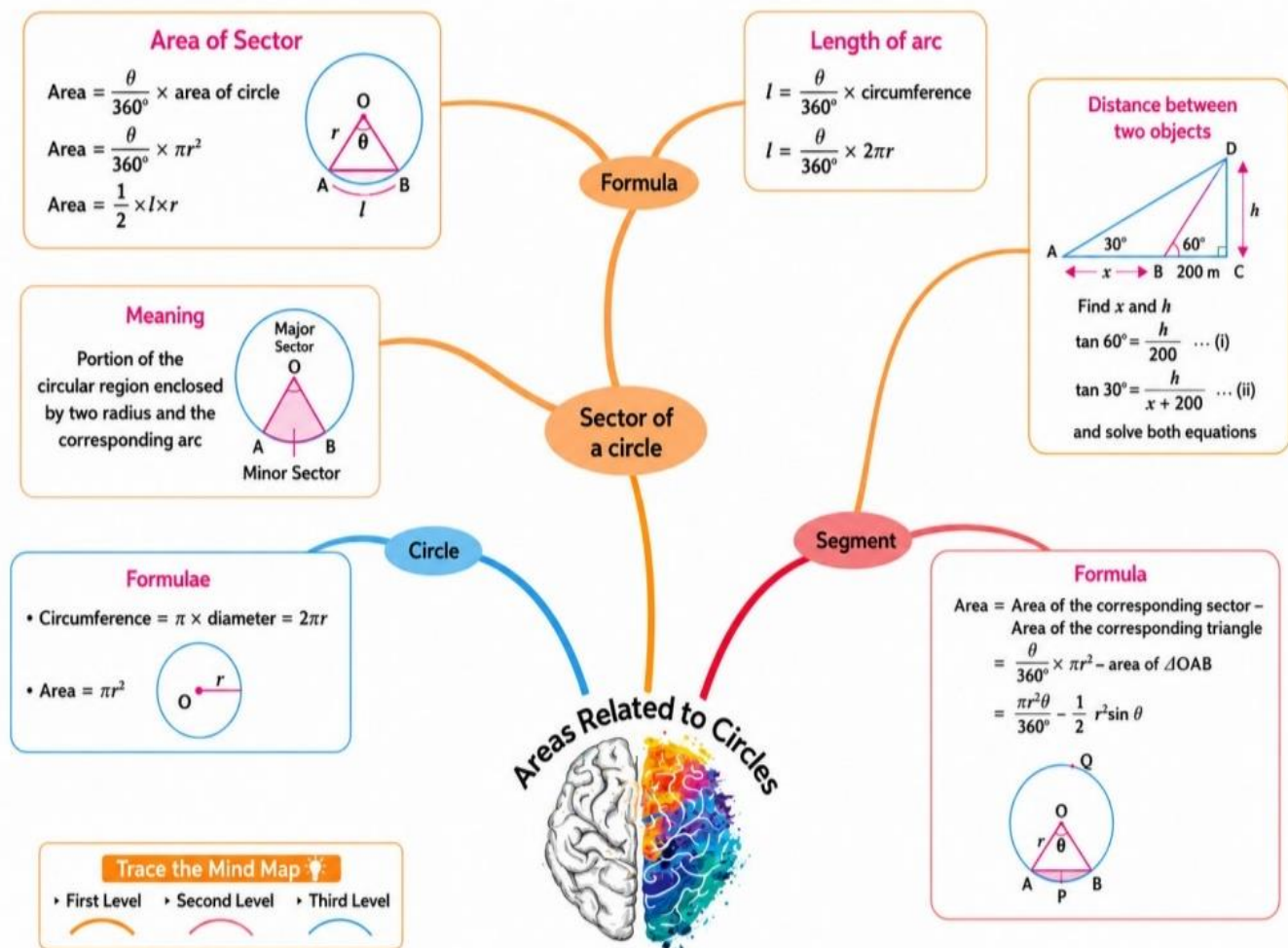
187. If the radius of a circle is 7 cm, then its circumference is equal to

- (A) 22 cm (B) 44 cm
 (C) 77 cm (D) 88 cm
 Ans: 44 cm

188. If the diameter of the circle is 7 cm, then its area is equal to

- (A) $7/2 \text{ cm}^2$ (B) $77/2 \text{ cm}^2$
 (C) $154/2 \text{ cm}^2$ (D) $308/3 \text{ cm}^2$
 Ans: (B) $77/2$

AREAS RELATED TO CIRCLES MIND MAP



SURFACE AREA AND VOLUMES

Important points/summary:

CUBOID: If l , b , h represents length, breadth and height of a cuboid, then

- i. Total Surface Area = $2(lb + bh + hl)$ sq. units.
- ii. Lateral Surface Area = $2(l + b)h$ sq. units
= Area of four walls of a room
- iii. Volume = $(l \times b \times h)$ cu. Units

CUBE: If ' a ' represents side of a cube, then

- iv. Total Surface Area = $6a^2$ sq. units.
- v. Lateral Surface Area = $4a^2$ sq. units
- vi. Volume = a^3 cu. Units

RIGHT CIRCULAR CYLINDER: If ' r ' and ' h ' be the radius and height of the right circular cylinder then

- vii. Area of each circular base = πr^2 sq. units
- viii. Curved Surface Area = $2\pi rh$ sq. units
- ix. Total Surface Area = $2\pi r(h + r)$ sq. units.

Volume = $\pi r^2 h$ cu. Units

CONE: If ' r ', ' h ' and ' l ' represent the radius, height and slant height of the cone then

- i. Area of each circular base = πr^2 sq. units
- ii. Curved Surface Area = πrl sq. units
- iii. Total Surface Area = $\pi r(l + r)$ sq. units.
- iv. $l = \sqrt{r^2 + h^2}$ units
- v. Volume = $\frac{1}{3}\pi r^2 h$ cu. Units

SPHERE: If ' r ' is the radius of the sphere then

- vi. Curved Surface Area = $4\pi r^2$ sq. units
- vii. Volume = $\frac{4}{3}\pi r^3$ cu. Units

HEMISPHERE: If ' r ' is the radius of the hemisphere then

- viii. Curved Surface Area = $2\pi r^2$ sq. units
- ix. Total Surface Area = $3\pi r^2$ sq. units.
- x. Volume = $\frac{2}{3}\pi r^3$ cu. Units

SPHERICAL SHELL: Let ' R ' and ' r ' be the outer and inner radii of the spherical shell then

- xi. Outer Surface Area = $4\pi R^2$ sq. units
- xii. Inner Surface Area = $4\pi r^2$ sq. units
- xiii. Volume = $\frac{4}{3}\pi (R^3 - r^3)$ cu. Units

Note: $1 \text{ cm}^3 = 1 \text{ ml}$
 $1 \text{ litre} = 1000 \text{ ml}$
 $= 1000 \text{ cm}^3$

189. The total surface area of a hemisphere with radius ' R ' is:

- (A) πR^2 (B) $2\pi R^2$ (C) $3\pi R^2$ (D) $4\pi R^2$

Ans. (C)

190. The volume of a sphere of radius R is:

- (A) $\frac{2}{3}\pi R^3$ (B) $\frac{4}{3}\pi R^3$
(C) $3\pi R^3$ (D) $4\pi R^3$

Ans. (B)

191. During the conversion of a solid from one shape to another, the volume of the new shape will:

- (A) Increase (B) decrease
(C) Remain unaltered (D) Depends on the shape

Ans. (C)

192. If the radius of a sphere becomes 3 times, then its volume will become:

- (A) 3 times (B) 6 times (C) 9 times (D) 27 times

Ans. (D)

193. The surface areas of two spheres are in the ratio 16:9. The ratio of their volume is:

- (A) 64:27 (B) 16:9 (C) 4:3 (D) $16^3:9^3$

Ans. (A) (MBOSE 2025 Suppl)

194. If the length of each side of a cube is 4 m, then diagonal of the cube is

- (A) $3\sqrt{3}$ m (B) $4\sqrt{3}$ m (C) $5\sqrt{3}$ m (D) $6\sqrt{3}$ m

Ans. (B) $4\sqrt{3}$ m

195. The radius of a hemisphere is 7 m. The total surface area of the hemisphere is

- (A) 264 m^2 (B) 624 m^2 (C) 462 m^2 (D) 642 m^2

Ans. (C) 462 m^2

196. The volume of a cube of an edge of 4 cm is:

- (A) 16 cm^3 (B) 64 cm^3 (C) 128 cm^3
(D) 256 cm^3

Ans. (B) (MBOSE 2025 Suppl)

197. Eight metallic spheres each of radius 2 mm are melted and recast into a single sphere.

Then the radius of the new sphere is:

- (A) 4 mm (B) 4.5 mm (C) 5.5 mm (D) 6 mm

Ans. (A)

198. The total surface area of a cube of length 'a' units is:

- (A) $3a^2$ sq. units (B) $4a^2$ sq. units
(C) $6a^2$ sq. units (D) $8a^2$ sq. units

Ans. (C)

199. The total surface area of a right circular cylinder of radius 'r' and height 'h' is:

- (A) $2\pi r(r+h)$ (B) $2\pi r h$

- (C) $2\pi r(r-h)$ (D) $3\pi r(r+h)$

Ans. (A)

200. If the curved surface area of a cone is 308 cm^2 and its slant height is 14 cm, then radius of the base is: (MBOSE 2025)

- (A) 14 cm (B) 7 cm (C) 21 cm (D) 28 cm

Ans. (B)

201. If the radius of a sphere is doubled then the ratio of the volumes of the first sphere to the new sphere is: (MBOSE 2025)

- (A) 1:2 (B) 1:4 (C) 1:6 (D) 1:8

Ans. (D)

202. Let 'r' and 'h' be the radius and height respectively of a right circular cylinder, then its curved surface area is:

- (A) $2\pi r(r+h)$ (B) $2\pi r h^2$
(C) $2\pi r h$ (D) $2\pi r(r-h)$

Ans. (C)

203. Let 'r' and 'h' be the radius and height respectively of a cone, then its volume is equal to:

- (A) $\pi r^2 h$ (B) πr^2
(C) $\frac{1}{3} \pi r^2 h$ (D) $\frac{2}{3} \pi r h$

Ans. (C)

204. What is the maximum length of a pencil that can be placed in a rectangular box of dimensions $10 \text{ cm} \times 6 \text{ cm} \times 5 \text{ cm}$?

- (A) $\sqrt{161}$ cm (B) $\sqrt{173}$ cm
(C) $\sqrt{191}$ cm (D) $\sqrt{201}$ cm

Ans. (A) $\sqrt{161}$ cm

205. The radius (in cm) of the largest right circular cone that can be cut out from a cube of side 4.2 cm is

- (A) 2.1 cm (B) 4.2 cm (C) 8.4 cm (D) 1.05 cm
Ans. (A) 2.1 cm

206. Vertical cross-section of a right circular cylinder is always a

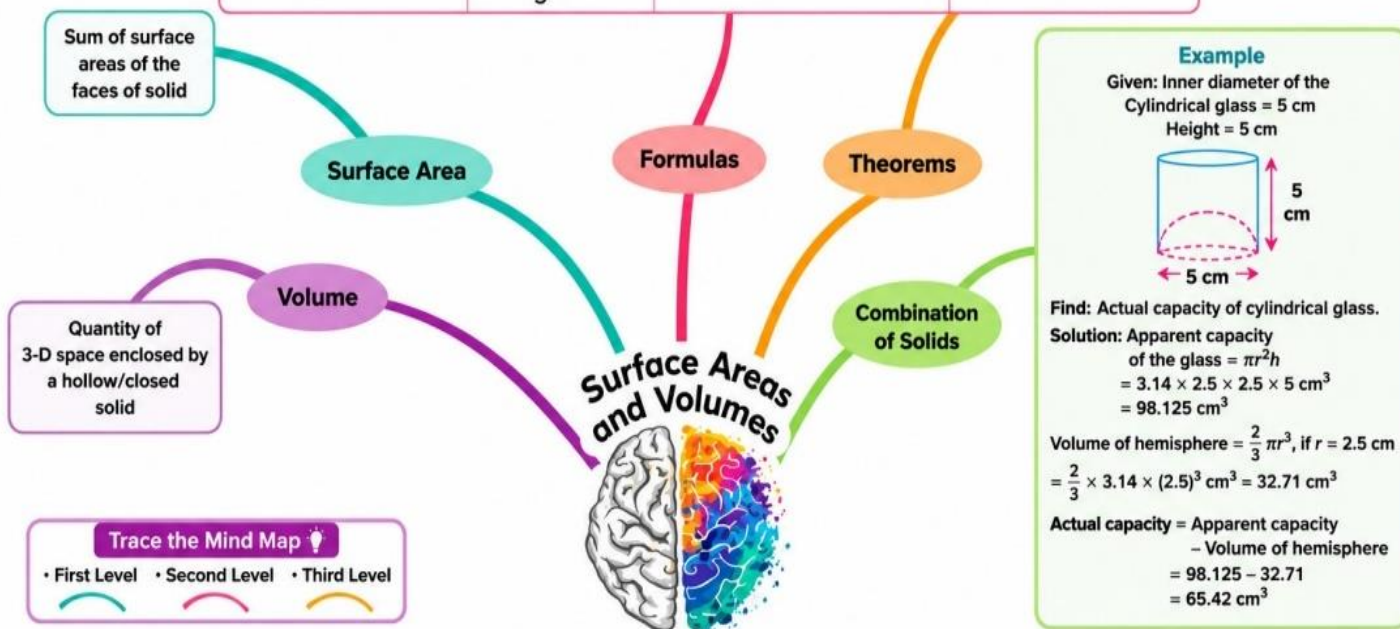
- (A) square (B) rhombus
(C) rectangle (D) trapezium

Ans. (C) rectangle

SURFACE AREAS AND VOLUMES

MIND MAP

Name of solid	Volume	Total surface Area	Lateral surface Area
Cube	$V = a^3$	$TSA = 6a^2$	$LSA = 4a^2$
Cuboid	$V = l \times b \times h$	$TSA = 2(lb + bh + hl)$	$LSA = 2h(l + b)$
Cylinder	$V = \pi r^2 h$	$TSA = 2\pi r(h + r)$	$CSA = 2\pi rh$
Hollow cylinder ($R > r$)	$V = \pi(R^2 - r^2)h$	$TSA = 2\pi(R + r)(h + R - r)$	$2\pi(R + r)h$
Cone	$V = \frac{1}{3}\pi r^2 h$	$TSA = \pi r(l + r)$	$CSA = \pi rl$
Sphere	$V = \frac{4}{3}\pi r^3$	$TSA = 4\pi r^2$	$CSA = 4\pi r^2$
Hemisphere	$V = \frac{2}{3}\pi r^3$	$TSA = 3\pi r^2$	$CSA = 2\pi r^2$



STATISTICS

Important points/summary:

1. **MEAN OF GROUPED DATA:** Let $x_1, x_2, x_3, \dots, x_n$ be n observations whose frequencies are $f_1, f_2, f_3, \dots, f_n$ respectively i. e. x_1 occurs f_1 times, x_2 occurs f_2 times and so on, then the mean $\bar{x}$ (average) of the data is given by $\bar{x} = \frac{f_1 x_1 + f_2 x_2 + \dots + f_n x_n}{f_1 + f_2 + \dots + f_n} = \frac{\sum f_i x_i}{\sum f_i} = \frac{\sum f_i x_i}{n}$ ($i = 1, 2, 3, \dots, n$)
2. **Class mark** of a class interval is defined as **class mark** = $\frac{\text{upper Limit} + \text{Lower Limit}}{2}$
3. **Mode of grouped data:** The item which occurs more frequently in a data is called its mode.
4. **Modal class:** in a grouped frequency distribution, the class which has the **maximum frequency** is called **Modal class**.
5. The data which have only **one mode** is called **unimodal**, if it contains **two modes**, it is called **bimodal**, if it contains **three modes**, it is called **trimodal**. In general, if it contains **more than one mode**, it is called **multimodal**.
6. **Median of grouped data:** **Median** is the **value of the middlemost item** when the data are arranged in ascending or descending order of magnitude.
7. **Median class:** the class which corresponds to $\frac{n}{2}$ the observation is called the median class.
8. **Median of ungrouped data:** Let the total number of items in the data be n , then
 - i. If n is odd,

Median = value of $(\frac{n+1}{2})$ th item
 - ii. If n is even,

Median = $\frac{1}{2}$ [value of $\frac{n}{2}$ th item + value of $(\frac{n}{2} + 1)$ th item]
9. The empirical relationship between mean, mode and median is given by **3 Median = Mode + 2 Mean**
10. **Cumulative frequency** of a particular value of the variable (or class) is the sum total of all the frequencies up to that value (or the class).
11. **Ogive or cumulative frequency curve:** The graphical representation of a cumulative frequency distribution is called an Ogive or cumulative frequency curve.

IMPORTANT FORMULAE:

i. **Mean** = $\frac{\sum f_i x_i}{\sum f_i}$, (Direct method)

where x_i = class marks and f_i = frequencies

ii. **Mean** = $a + \frac{\sum f_i d_i}{\sum f_i}$,
(Assumed mean method)

where $d_i = x_i - a$, a = assumed mean

iii. **Mean** = $a + h \frac{\sum f_i u_i}{\sum f_i}$,
(Step deviation method)

where $u_i = \frac{x_i - a}{h}$, h = class size

- iv. **Mode** = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$,
Where l = lower limit of the modal class
h = class size
 f_1 = frequency of modal class
 f_0 = frequency of the class preceding the modal class
 f_2 = frequency of the class succeeding the modal class
- v. **Median** = $l + \frac{\frac{n}{2} - c}{f} \times h$,
Where l = lower limit of the median class
f = frequency of median class
 $\frac{n}{2}$ = half of the cumulative frequency
c = cumulative frequency preceding the median class

207. The empirical relationship between mean, mode and median in asymmetrical distribution is:

- (A) Mode = 3 Median – 2 Mean
 (B) Mode = 3 Median + 2 Mean
 (C) Mode = 2 Median – 3 Mean
 (D) Mode = Median – 2 Mean

Ans. (A) (MBOSE 2025 Suppl)

208. Mode is:

- (A) Least frequent value
 (B) Middle most value
 (C) Most frequent value
 (D) None of the above

Ans. (C)

209. The cumulative frequency table is useful in determining the:

- (A) Mean (B) Median
 (C) Mode (D) All of the above

Ans. (B)

210. The difference between the highest and lowest values of the observations is called

- (A) Frequency
 (B) Range
 (C) Mean
 (D) Class interval

Ans: (B) Range

211. Which of the following is not a measure of central tendency?

- (A) Mean
 (B) Mode
 (C) Median
 (D) Standard deviation

Ans: (D) Standard deviation

212. The sum of the values of all the observations divided by the total number of observations is called:

- (A) Mean (B) mode
 (C) median (D) Frequency

Ans. (A)

213. In a frequency distribution, the class having the maximum frequency is called:

- (A) Class mark (B) class size
 (C) Median class (D) modal class

Ans. (D) (MBOSE 2025)

214. The wickets taken by a bowler in 10 cricket matches are as follows: 2, 6, 4, 5, 0, 2, 1, 3, 2, 3

Then the mode of the data is:

- (A) 3 (B) 2 (C) 4 (D) 5

Ans. (B)

215. In the formula of mode, f_1 stands for

- (A) Lowest frequency
 (B) Frequency of the class succeeding the modal class
 (C) Frequency of the class preceding the

modal class

(D) Frequency of the modal class

Ans: (D) Frequency of the modal class

216. The middlemost observation of every data arranged in order is called:

- (A) Mode (B) Median
(C) Mean (D) Deviation

Ans. (B)

217. The mean of first 10 natural numbers is:

- (A) 5.5 (B) 5 (C) 6 (D) 10

Ans. (A)

218. The difference between the minimum and maximum values of the data is called:

- (A) Class limits (B) class interval
(C) Class size (D) range of data

Ans. (D) (MBOSE 2025 Suppl)

219. The value of $\frac{1}{2}$ (Lower Limit + Upper Limit) of any class interval is called:

- (A) Class size (B) class limits
(C) class mark (D) class interval

Ans. (C) (MBOSE 2025)

220. The median class is

- (A) Class with highest frequency
(B) Class containing median
(C) Class whose cumulative frequency just

exceeds $N/2$

(D) First class

Ans: (C) Class whose cumulative frequency just exceeds $N/2$

221. If l = lower limit of the median class,

$N/2$ = half of the cumulative frequency

c = cumulative frequency of the preceding class,

h = height of each class, f = frequency of the

median class. Then the formula for finding median is median equals:

- (A) $l + (N/2 - c)h/f$ (B) $l - (N/2 - c)h/f$
(C) $l + (N/2 + c)h/f$ (D) $l + (N/2)h/f$

Ans. (C)

222. The median of the following data:

6, 8, 15, 16, 9, 22, 21, 25, 18 is:

- (A) 21 (B) 18 (C) 16 (D) 9

Ans. (C)

223. Mode is

- (A) Average value
(B) Most frequent value
(C) Middle value
(D) Difference of values

Ans. (B) Most frequent value

224. Which of the following is not the measure of central tendency?

- (A) Mean (B) mode
(C) median (D) Standard deviation

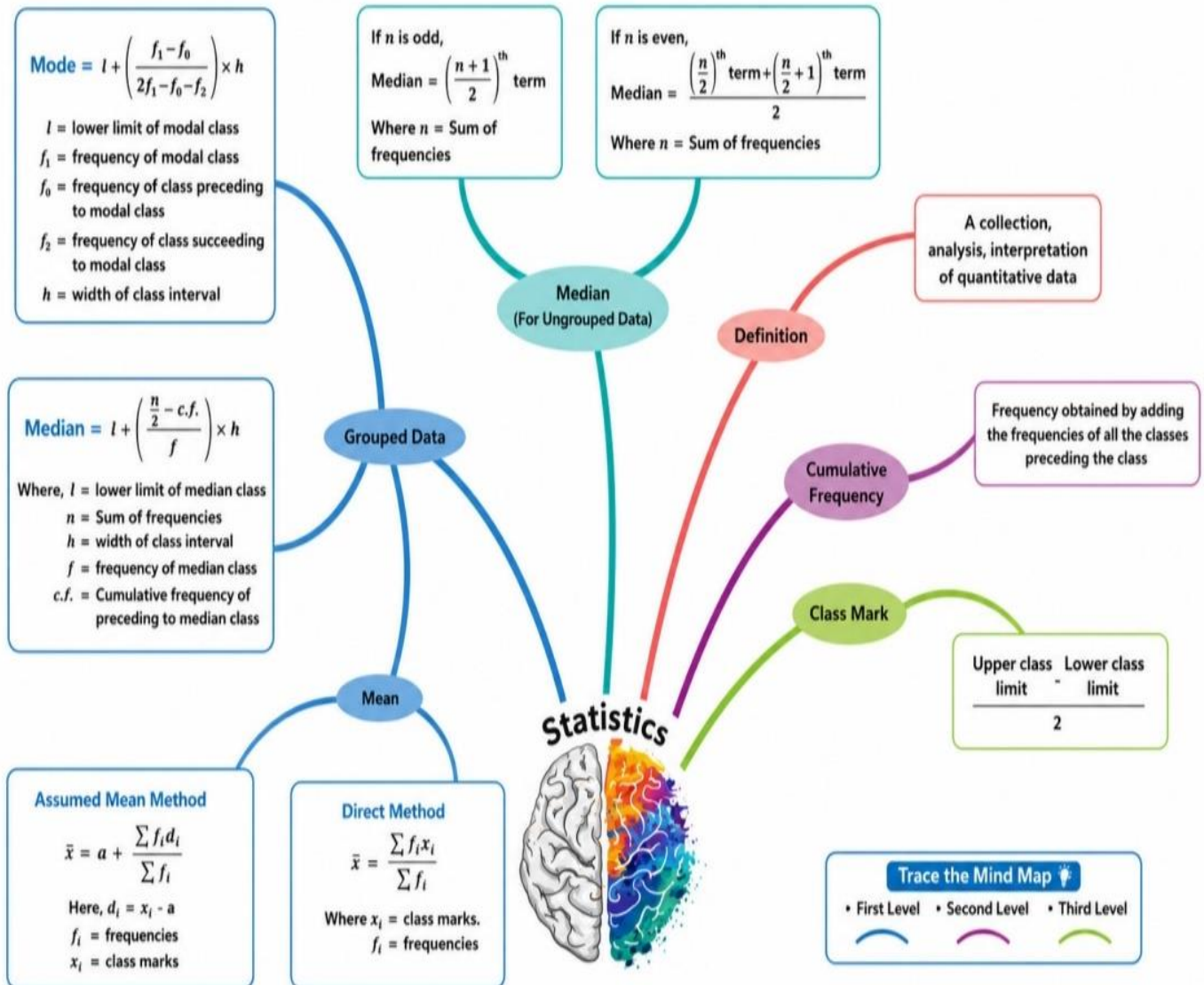
Ans. (D)

225. The formula for finding mean by direct method is equal to:

- (A) $\sum f_i x_i / \sum f_i$ (B) $\sum f_i x_i / f_i$
(C) $\sum x_i / \sum f_i$ (D) $\sum f_i x_i$

Ans. (A)

STATISTICS MIND MAP



PROBABILITY

Important points / Summary:

1. **OUTCOMES:** The observations of any experiment are called its outcomes.
2. **Sample space:** The set of all possible outcomes of an experiment is called a sample space.
e.g. {1, 2, 3, 4, 5, 6} is the sample space for an unbiased die.
3. **RANDOM EXPERIMENT:** An experiment whose outcomes cannot be predicted in advance is called a random experiment.
4. **EVENT:** The possible outcomes of a trial are called Events.
5. **Probability:** The theoretical probability of an event 'E', written as P(E) is defined as

$$P(E) = \frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes}}$$

6. The probability that the event E will not happen, denoted by E' is given by

$$P(E') = \frac{\text{Number of unfavourable outcomes to E}}{\text{Number of all possible outcomes}}$$

7. Sum of both P(E) and P(E') is always unity. i. e. $P(E) + P(E') = 1$
 $\Rightarrow P(E') = 1 - P(E)$
8. The probability of a sure event (or certain event) is 1
i.e. if $P(E) = 1$, E is a sure event
9. The probability of an impossible event is 0
i.e. if $P(E) = 0$, E is an impossible event

226. A die is thrown once. The probability of getting a number less than 3 is:

(A) 1/2 (B) 1/3 (C) 1/4 (D) 1/6

Ans. (B) (MBOSE 2025)

227. A die is thrown once. The probability of getting a prime number is:

(A) 1/2 (B) 1/3 (C) 2/3 (D) 1/6

Ans. (A) 1/2

228. The probability of a sure Event is:

(A) 0 (B) 1/2 (C) 1 (D) non-existent

Ans. (C) (MBOSE 2025 Suppl)

229. The probability of an impossible Event is:

(A) 0 (B) 1/2 (C) 1 (D) non-existent

Ans. (A)

230. If $P(E) = 0.05$, then $P(E')$ equals:

(A) 0.05 (B) 0.5 (C) 0.9 (D) 0.95

Ans. (D)

231. A jar contains 6 red, 5 black, and 3 green marbles of equal size. The probability that a randomly drawn marble would be green in colour is:

(A) 5/14 (B) 11/14 (C) 3/14 (D) 1/3

Ans. (C)

232. If the probability of a player winning a game is 0.79, then the probability of his losing the same game is:

(A) 1.79 (B) 0.31

(C) 0.21% (D) 0.21

Ans. (D) 0.21

233. A die is thrown once, then the probability of getting an even prime number is:

(A) 1/6 (B) 1/2 (C) 1/3 (D) 2/3

Ans. (A) (MBOSE 2025 Suppl)

234. A letter is selected at random from the letters of the words 'MATHEMATICS' then the probability of getting the letter M is:

(A) 2/11 (B) 6/11 (C) 4/11 (D) 5/11

Ans. (A)

235. In a musical chair game, the person playing the music has been advised to stop playing the music at any time within 2 minutes after the play starts. Then the probability that the

music will stop within one and half minutes after starting the game is:

- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{3}{4}$ (D) $\frac{1}{3}$

Ans. (C)

236. If two coins are tossed at the same time, the probability of getting tail on the top face of both the coins is

- (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
(C) $\frac{1}{4}$ (D) 1

Ans: (C) $\frac{1}{4}$

237. The probability that a number selected at random from the numbers 3, 4, 5, 6, 7, 8, 9 is a multiple of 4 is:

- (A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{5}{7}$ (D) $\frac{6}{7}$

Ans. (B) (MBOSE 2025 Suppl)

238. Which of the following numbers best expresses the probability of a man dying before completing 180 years of age?

- (A) 0.5 (B) 0.6
(C) 0.2 (D) 1

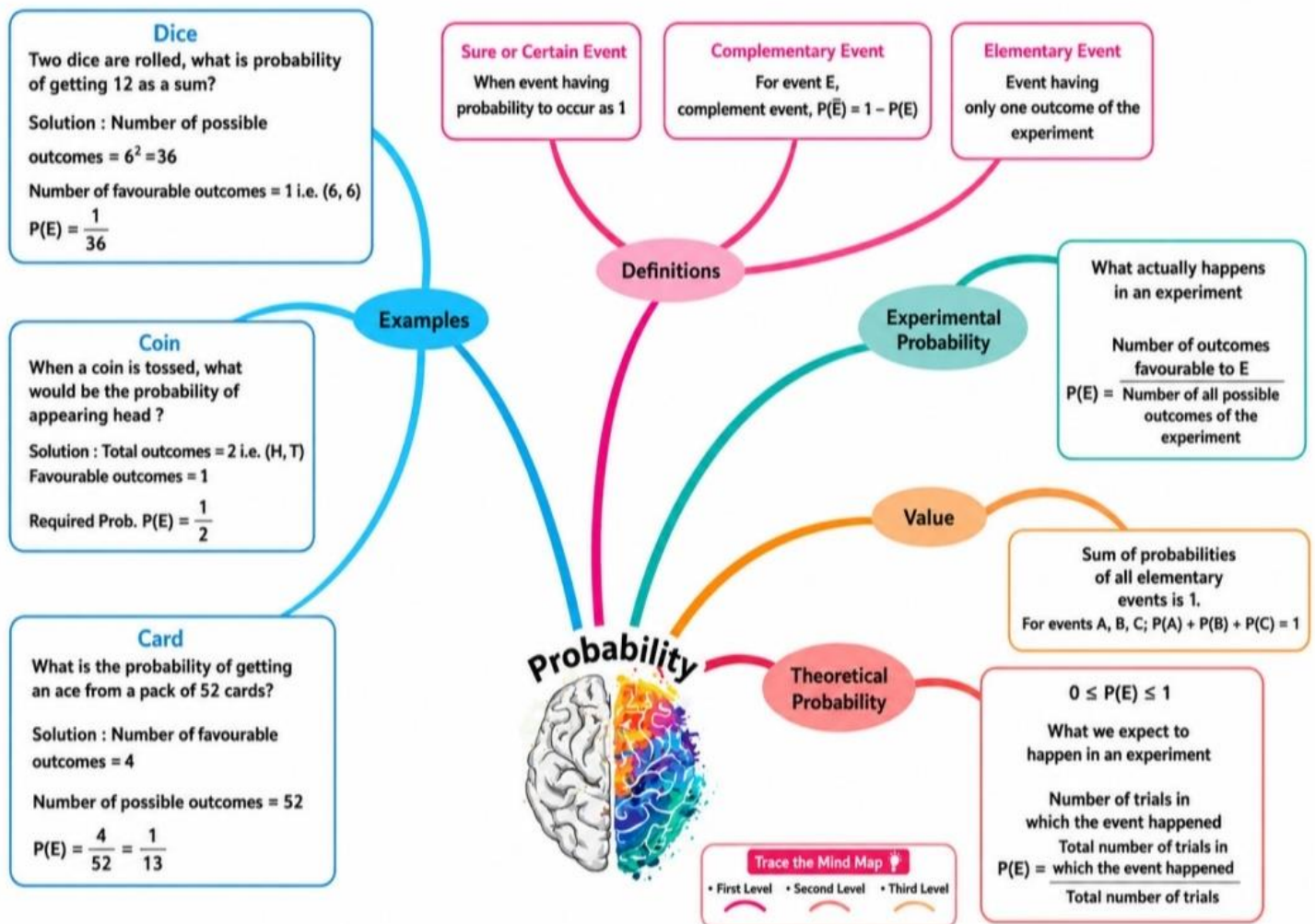
Ans: (D) 1

239. A card is drawn at random from a well shuffled deck of 52 playing cards. What is the probability of getting a card of club or a queen?

- (A) $\frac{1}{13}$ (B) $\frac{4}{13}$
(C) $\frac{2}{13}$ (D) $\frac{1}{52}$

Ans. (B) $\frac{4}{13}$

PROBABILITY MIND MAP



Section-B

Very Short Answer Questions (2 Marks)

1. Express 3825 as a product of its prime factors

$$\begin{array}{r|l}
 3 & 3825 \\
 \hline
 3 & 1275 \\
 \hline
 5 & 425 \\
 \hline
 5 & 85 \\
 \hline
 & 17
 \end{array}$$

$$\therefore 3825 = 3^2 \times 5^2 \times 17$$

2. Find the least Number which is exactly divisible by 18, 24 and 36.

$$\begin{array}{r|l}
 2|18 \\
 \hline
 3|9 \\
 \hline
 3
 \end{array}
 \quad
 \begin{array}{r|l}
 2|24 \\
 \hline
 2|12 \\
 \hline
 2|6 \\
 \hline
 3
 \end{array}
 \quad
 \begin{array}{r|l}
 2|36 \\
 \hline
 2|18 \\
 \hline
 3|9 \\
 \hline
 3
 \end{array}$$

$$18 = 2 \times 3^2$$

$$24 = 2^3 \times 3$$

$$36 = 2^2 \times 3^2$$

$$\therefore \text{L C M} = 2^3 \times 3^2 = 72$$

$$\therefore \text{The required number} = 72$$

3. Find the LCM of the smallest two digit number and the smallest composite number.

Ans The smallest two digit number = 10

The smallest composite number = 4

$$\therefore 10 = 2 \times 5$$

$$4 = 2^2$$

$$\therefore \text{LCM}(10, 4) = 2 \times 2 \times 5$$

$$= 20$$

4. Find the HCF and LCM of 510 and 92 by applying the fundamental theorem of Arithmetic

$$\begin{array}{r|l}
 2|510 \\
 \hline
 3|255 \\
 \hline
 5|85 \\
 \hline
 17
 \end{array}
 \quad
 \begin{array}{r|l}
 2|92 \\
 \hline
 2|46 \\
 \hline
 23
 \end{array}$$

$$510 = 2 \times 3 \times 5 \times 17$$

$$92 = 2^2 \times 23$$

$$\therefore \text{H C F} = 2$$

$$\text{L C M} = \frac{\text{Product of two numbers}}{\text{HCF}}$$

$$= \frac{510 \times 92}{2}$$

$$= 23460$$

5. Given that $\text{HCF}(306, 657) = 9$, find the LCM (306, 657). (MBOSE 2025)

We know,

$\text{HCF} \times \text{LCM} = \text{Product of two numbers}$

$$\Rightarrow 9 \times \text{L C M} = 306 \times 657$$

$$\Rightarrow \text{L C M} = \frac{306 \times 657}{9}$$

$$\Rightarrow \text{LCM} = 34 \times 657 = 22338$$

6. Prove that $7\sqrt{5}$ is irrational.

Ans Let us assume, to the contrary, that $7\sqrt{5}$ is rational

$\therefore 7\sqrt{5} = \frac{a}{b}$, where a and b are integers and $b \neq 0$

$$\Rightarrow 7\sqrt{5} b = a$$

$$\Rightarrow \sqrt{5} = \frac{a}{7b}$$

But $\frac{a}{7b}$ is rational and so $\sqrt{5}$ is rational

But this contradicts the fact that $\sqrt{5}$ is irrational

Hence, $7\sqrt{5}$ is irrational

Hence Proved. (MBOSE 2025)

7. Find the HCF and LCM of 21 and 315 by prime factorisation method.

$$\begin{array}{r} 3 \overline{)21} \quad 3 \overline{)315} \\ |7 \quad 3 \overline{)105} \\ \quad 5 \overline{)35} \\ \quad |7 \end{array}$$

$$21 = 3 \times 7$$

$$315 = 3^2 \times 5 \times 7$$

$$\text{H C F} = 3 \times 7 = 21$$

$$\therefore \text{L C M} = 3^2 \times 5 \times 7 = 315$$

8. Check whether 6^n can end with the digit 0 for any natural number n .

Ans. If 6^n ends with the digit zero, then it should be divisible by 10

So, the prime factorization of 6^n must contain the primes 2 and 5. This is not possible as the only primes in the factorisation of 6^n are 2 and 3. Thus, there is no value of n in natural numbers for which 6^n ends with the digit zero.

9. Find the HCF and LCM of 12, 15 and 21 by applying the prime factorisation method.

Soln:-

$$\begin{array}{r} 2 \overline{)12} \quad 3 \overline{)15} \quad 3 \overline{)21} \\ \underline{2 \overline{)6}} \quad |5 \quad |7 \\ |3 \end{array}$$

$$12 = 2^2 \times 3$$

$$15 = 3 \times 5$$

$$21 = 3 \times 7$$

$$\therefore \text{H C F} = 3$$

$$\text{And } \text{LCM} = 2^2 \times 3 \times 5 \times 7 = 420$$

10. Four bells ring at intervals of 4, 7, 12, and 14 seconds respectively. If they begin ringing together at 12 o'clock, when will they next ring together?

Soln :-

$$\text{LCM of 4, 7, 12, and 14} = 84$$

$\therefore$ The bell will ring together after 84 seconds or 1min 24seconds or at 12:01:24secs

11. Write the smallest number which is divisible by both 306 and 657.

Soln:- Here, to find the required smallest number, we will find the LCM of 306 and 657.

$$\text{So, } 306 = 2 \times 3^2 \times 17$$

$$657 = 3^2 \times 73$$

$$\therefore \text{LCM} = 2 \times 3^2 \times 17 \times 73 = 22338$$

Hence, the required smallest number is 22338. (Ans)

12. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start from the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

Soln: To find the time after which they meet again at the starting point, we have to find the LCM of 18 and 12 minutes.

We have,

$$18 = 2 \times 3^2$$

$$12 = 2^2 \times 3$$

$$\therefore \text{LCM} = 2^2 \times 3^2$$

$$= 4 \times 9 = 36$$

Hence, they will meet again at the starting point after 36 minutes. (Ans)

13. Show that $5 - \sqrt{3}$ is an irrational number.

Soln:- Let us assume that $5 - \sqrt{3}$ is a rational number.

Now, $5 - \sqrt{3} = \frac{p}{q}$, where p & q are integers, having no common factor except 1 and $q \neq 0$.

$$\Rightarrow 5 - \frac{p}{q} = \sqrt{3}$$

$$\Rightarrow \sqrt{3} = \frac{5q-p}{q}$$

Since $\frac{5q-p}{q}$ is rational number as p & q are integers.

$\therefore \sqrt{3}$ is also a rational number which is a contradiction.

Thus, our assumption is wrong.

Hence, $5 - \sqrt{3}$ is an irrational number.
(Ans)

14. Is the following pair of linear equations consistent? Justify your answer.
 $2ax + by = a$, $4ax + 2by = 2a$; $a, b \neq 0$.

Soln: Yes.

$$\text{Here, } \frac{a_1}{a_2} = \frac{2a}{4a} = \frac{1}{2}$$

$$\frac{b_1}{b_2} = \frac{b}{2b} = \frac{1}{2}$$

$$\frac{c_1}{c_2} = \frac{-a}{-2a} = \frac{1}{2}$$

$$\text{Since, } \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$\therefore$ The given system of linear equations is consistent

15. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident

$$5x - 4y + 8 = 0$$

$$7x + 6y - 9 = 0$$

Soln:- We have,

$$5x - 4y + 8 = 0 \text{ -----(i)}$$

$$7x + 6y - 9 = 0 \text{ -----(ii)}$$

$$\text{Here, } a_1 = 5, b_1 = -4, c_1 = 8$$

$$a_2 = 7, b_2 = 6, c_2 = -9$$

$$\text{So, } \frac{a_1}{a_2} = \frac{5}{7} \text{ and } \frac{b_1}{b_2} = \frac{-4}{6} = \frac{-2}{3}$$

$$\text{Since, } \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$\therefore$ Equations (i) and (ii) represent intersecting lines. (Ans)

16. The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them

Soln:- Let the supplementary angles be x and y ($x > y$).

Now, we are given that

$$x + y = 180^\circ \text{ ----- (i)}$$

$$\& \quad x - y = 18^\circ$$

$$\Rightarrow x - 18^\circ = y \text{ ----- (ii)}$$

Substituting $y = x - 18^\circ$ in equation (i), we have

$$x + y = 180^\circ$$

$$\Rightarrow x + x - 18^\circ = 180^\circ$$

$$\Rightarrow 2x = 180^\circ + 18^\circ$$

$$\Rightarrow 2x = 198^\circ$$

$$\Rightarrow x = \frac{198^\circ}{2}$$

$$\Rightarrow x = 99^\circ$$

Then, from equation (ii), we have

$$y = x - 18^\circ$$

$$\Rightarrow y = 99^\circ - 18^\circ$$

$$\Rightarrow y = 81^\circ$$

Hence, the required angles are 99° and 81° .

17. Check whether the system of linear equations $5x - 4y + 8 = 0$, $7x + 6y - 9 = 0$ intersect at a point or not.

Soln:-

Here,

$$a_1 = 5, b_1 = -4, c_1 = 8$$

$$a_2 = 7, b_2 = 6, c_2 = -9$$

$$\frac{a_1}{a_2} = \frac{5}{7}$$

$$\frac{b_1}{b_2} = \frac{-4}{6} = \frac{-2}{3}$$

$$\frac{c_1}{c_2} = \frac{-8}{9}$$

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$\therefore$ The given system of linear equations intersects at a point.

18. Find out whether the lines representing a pair of linear equations $2x - 3y - 8 = 0$, $4x - 6y - 9 = 0$ has a unique solution or not.

Soln:-

Here,

$$a_1 = 2, b_1 = -3, c_1 = -8$$

$$a_2 = 4, b_2 = -6, c_2 = -9$$

$$\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$$

$$\frac{b_1}{b_2} = \frac{-3}{-6} = \frac{1}{2}$$

$$\frac{c_1}{c_2} = \frac{-8}{-9} = \frac{8}{9}$$

$$\text{Here, } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$\therefore$ The given system of linear equations does not have a unique solution.

19. Determine whether the following system of linear equations is consistent or inconsistent.

$$2x - 3y = 8$$

$$4x - 6y = -5$$

Soln:- Here,

$$a_1 = 2, b_1 = -3, c_1 = -8$$

$$a_2 = 4, b_2 = -6, c_2 = 5$$

$$\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$$

$$\frac{b_1}{b_2} = \frac{-3}{-6} = \frac{1}{2}$$

$$\frac{c_1}{c_2} = \frac{-8}{5}$$

$$\text{Here, } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

∴ The given system of linear equations is inconsistent.

20. Check whether the following system of linear equations $9x + 3y + 12 = 0$, $18x + 6y + 24 = 0$ represent co-incident lines or not.

Soln:-:- Here,

$$a_1 = 9, b_1 = 3, c_1 = 12$$

$$a_2 = 18, b_2 = 6, c_2 = 24$$

$$\frac{a_1}{a_2} = \frac{9}{18} = \frac{1}{2}$$

$$\frac{b_1}{b_2} = \frac{3}{6} = \frac{1}{2}$$

$$\frac{c_1}{c_2} = \frac{12}{24} = \frac{1}{2}$$

$$\text{Here, } \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

∴ The given system of linear equations represents co-incident lines.

21. Sum of the two numbers is 35 and their difference is 13. Find the numbers.

Soln:-Let the two numbers be x and y , where $x > y$.

Now, According to the question, we have

$$x + y = 35 \longrightarrow \text{(i)}$$

$$x - y = 13 \longrightarrow \text{(ii)}$$

Adding equations (i) & (ii), we get

$$2x = 48$$

$$\Rightarrow x = \frac{48}{2}$$

$$\Rightarrow x = 24$$

Substituting $x = 24$ in equation (i), we get

$$24 + y = 35$$

$$\Rightarrow y = 35 - 24$$

$$\Rightarrow y = 11$$

Hence, the required numbers are 24 and 11.

22. Solve the system of linear equations $x + y = 14$, $x - y = 4$ by substitution method.

$$\text{Soln :- } x + y = 14 \text{ -----(i)}$$

$$x - y = 4 \text{ -----(ii)}$$

$$\Rightarrow x = 4 + y \text{(iii)}$$

Substituting the value of x in eqn (i), we get

$$x + y = 14$$

$$\Rightarrow 4 + y + y = 14 \text{ (from (iii))}$$

$$\Rightarrow 4 + 2y = 14$$

$$\Rightarrow 2y = 14 - 4$$

$$\Rightarrow 2y = 10$$

$$\Rightarrow y = \frac{10}{2}$$

$$\Rightarrow y = 5$$

Putting $y = 5$ in eqn (i), we get

$$x + y = 14$$

$$\Rightarrow x + 5 = 14$$

$$\Rightarrow x = 14 - 5$$

$$\Rightarrow x = 9$$

$$\therefore x = 9 \text{ and } y = 5$$

23. Total number of legs in a herd of goats and hens is 40. Represent this situation in the form of a linear equation in two variables.

Soln.: Let the number of goats and hens be x and y respectively.

Since, Number of legs of 1 goat = 4

∴ Number of legs of x goats = $4x$

Since, Number of legs of 1 hen = 2

∴ Number of legs of y hens = $2y$

Now, according to the question, we have

$$4x + 2y = 40$$

$$\Rightarrow 2x + y = 20 \text{ (Dividing both sides by 2)}$$

Which is the required linear equation in two variables.

24. The difference between two numbers is 26 and one number is three times the other. Find them.

Soln: Let the two number be x and y ($x > y$)

$\therefore$ According to the question,

$$x - y = 26 \quad \text{-----(i)}$$

$$x = 3y \quad \text{-----(ii)}$$

Putting $x = 3y$ in eqn (i), we get

$$x - y = 26$$

$$\Rightarrow 3y - y = 26$$

$$\Rightarrow 2y = 26$$

$$\Rightarrow y = \frac{26^{13}}{2_1}$$

$$\Rightarrow y = 13$$

Putting $y = 13$ in eqn (ii), we get

$$x = 3y$$

$$\Rightarrow x = 3 \times 13$$

$$\Rightarrow x = 39$$

$\therefore$ The two numbers are 39 and 13

25. The cost of a note book is thrice the cost of a pen. Write this situation as a linear equation in two variables.

Soln:- Let the cost of one notebook and one pen be Rs x and Rs y .

Now, by the question, we have

$$x = 3y$$

$$\Rightarrow x - 3y = 0$$

Which is the required linear equation in two variables.

26. From a pair of linear equations in the given problem: (MBOSE 2025)

The coach of a cricket team buys 7 bats and 6 balls for ₹ 3800. Later, she buys 3 bats and 5 balls for ₹ 1750.

Soln:-Let the cost of each bat be ₹ x and the cost of ball be ₹ y

$\therefore$ The cost of 7 bats is ₹ $7x$ and the cost of 6 balls is ₹ $6y$ and their total cost is ₹ 3800

$$\therefore 7x + 6y = 3800$$

Again, the cost of 3 bats is ₹ $3x$ and the cost of 5 balls is ₹ $5y$ and their cost is ₹ 1750

$$\therefore 3x + 5y = 1750$$

27. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots.

Soln: Given quadratic equation is –
 $x^2 + k(2x + k - 1) + 2 = 0$

$$\Rightarrow x^2 + 2kx + (k^2 - k + 2) = 0$$

Here, $a = 1$, $b = 2k$ and $c = (k^2 - k + 2)$

For equal roots, we have \ Discriminant = 0

$$\Rightarrow b^2 - 4ac = 0$$

$$\Rightarrow (2k)^2 - 4 \times 1 \times (k^2 - k + 2) = 0$$

$$\Rightarrow 4k^2 - 4k^2 + 4k - 8 = 0$$

$$\Rightarrow 4k - 8 = 0$$

$$\Rightarrow 4k = 8$$

$$\Rightarrow k = \frac{8}{4}$$

$$\Rightarrow k = 2$$

Hence, the required value of k is 2.

28. If $x = \frac{2}{3}$ and $x = -3$ are roots of the quadratic equation $ax^2 + 7x + b = 0$, find the values of a and b .

Soln:-Let us assume the quadratic equation be

$$ax^2 + bx + c = 0$$

Now, Sum of the roots = $-\frac{b}{a}$

$$\Rightarrow \frac{2}{3} + (-3) = -\frac{b}{a}$$

$$\Rightarrow \frac{2-9}{3} = -\frac{b}{a}$$

$$\Rightarrow \frac{-7}{3} = -\frac{b}{a}$$

$$\Rightarrow a = \frac{(-7) \times 3}{(-7)}$$

$$\Rightarrow a = 3$$

And, Product of the roots = $\frac{c}{a}$

$$\Rightarrow \frac{2}{3} \times (-3) = \frac{b}{a}$$

$$\Rightarrow -2 = \frac{b}{a}$$

$$\Rightarrow -2a = b$$

$$\Rightarrow -2 \times 3 = b$$

$$\Rightarrow -6 = b$$

$$\Rightarrow b = -6$$

Hence, $a = 3$ and $b = -6$.

29. Find the roots of the quadratic equation $4x^2 + 4\sqrt{3}x + 3 = 0$ by applying the quadratic formula.

Soln: We have, $4x^2 + 4\sqrt{3}x + 3 = 0$

Here, $a = 4$, $b = 4\sqrt{3}$ and $c = 3$

$$\therefore \text{Discriminant}, D = b^2 - 4ac$$

$$= (4\sqrt{3})^2 - 4 \times 4 \times 3$$

$$= 48 - 48$$

$$= 0$$

Since, $D = 0$, roots exist and are equal.

Thus, using quadratic formula, we have

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-4\sqrt{3} \pm 0}{2 \times 4} = \frac{-4\sqrt{3}}{8} = \frac{-\sqrt{3}}{2}$$

Hence, the roots of the given equation are

$$\frac{-\sqrt{3}}{2} \text{ and } \frac{-\sqrt{3}}{2}.$$

30. Find the discriminant and nature of roots of the quadratic equation $2x^2 - 3x - 2 = 0$.

Soln:- Here,

$$a = 2, b = -3, c = -2$$

$$\therefore \text{Discriminant} = b^2 - 4ac$$

$$= (-3)^2 - 4 \times 2 \times (-2)$$

$$= 9 + 16$$

$$= 25 > 0$$

Thus, the nature of roots are real and unequal

31. Solve the quadratic equation $2x^2 = 9x$.

Soln:- $2x^2 = 9x$

$$\Rightarrow 2x^2 - 9x = 0$$

$$\Rightarrow x(2x - 9) = 0$$

$\therefore$ Either, or,

$$x = 0 \quad 2x - 9 = 0$$

$$\Rightarrow 2x = 9$$

$$\Rightarrow x = \frac{9}{2}$$

$$\therefore x = 0, \frac{9}{2}$$

32. Check whether $(x + 4)(x - 4) = x(x + 2) + 8$ is a quadratic equation or not.

Soln:- $(x + 4)(x - 4) = x(x + 2) + 8$

$$\Rightarrow (x)^2 - (4)^2 = x^2 + 2x + 8$$

$$\Rightarrow x^2 - 16 - x^2 - 2x - 8 = 0$$

$$\Rightarrow -2x - 24 = 0$$

It is not in the form $ax^2 + bx + c = 0$

$\therefore$ The given equation is not a quadratic equation

33. Find the roots of the quadratic equation $2x^2 + x - 6 = 0$ by factorization.

Soln:- $2x^2 + x - 6 = 0$

$$\Rightarrow 2x^2 + 4x - 3x - 6 = 0$$

$$\Rightarrow 2x(x + 2) - 3(x + 2) = 0$$

$$\Rightarrow (x + 2)(2x - 3) = 0$$

$\therefore$ Either, or,

$$x + 2 = 0 \quad 2x - 3 = 0$$

$$\Rightarrow x = -2 \quad \Rightarrow 2x = 3$$

$$\Rightarrow x = \frac{3}{2}$$

Hence the roots are $-2, \frac{3}{2}$

34. Represent the given situations in the form of a quadratic equation.

The area of a rectangular plot is 528m^2 .

The length of the plot (in metres) is one more than twice its breadth.

Soln:- Let the length (in metres) of the plot be x and the breadth (in metres) of the plot be y

$$\therefore \text{Area of the plot} = (xy)\text{m}^2$$

$$\therefore xy = 528 \dots\dots\dots(i)$$

$$\text{Also, } x = 1 + 2y \dots\dots\dots(ii)$$

Using (ii) in (i), we get

$$(1 + 2y)y = 528$$

$$\Rightarrow 2y^2 + y - 528 = 0, \text{ is a quadratic equation}$$

35. Find the nature of the quadratic equation $x^2 + 7x + 10 = 0$.

Soln:-The quadratic equation is $x^2 + 7x + 10 = 0$

Here,

$$a = 1, b = 7, c = 10$$

$$\therefore \text{Discriminant } (D) = b^2 - 4ac$$

$$= (7)^2 - 4 \times 1 \times 10$$

$$= 49 - 40$$

$$= 9$$

$$\therefore D > 0$$

$\therefore$ The given equation has two real and distinct roots

36. The cost of a note book is thrice the cost of a pen. Write this situation as a linear equation in two variables.

Soln:- Let the cost of one notebook and one pen be Rs x and Rs y .

Now, by the question, we have

$$x = 3y$$

$$\Rightarrow x - 3y = 0$$

37. Which is the required linear equation in two variables. The coach of a cricket team buys 3 bats and 2 balls for ₹ 5700. Later he buys 2 bats and 3 balls for ₹ 4050. Find the cost of one bat?

Soln:- Let ₹ x and ₹ y be the cost of each bat and each ball respectively

$\therefore$ By question,

$$3x + 2y = 5700 \text{ -----(i) } \times 3$$

$$\text{Also, } 2x + 3y = 4050 \text{ (ii) } \times 2$$

Multiplying (i) by 2 and (ii) by 3 we get

$$9x + 6y = 17100$$

$$4x + 6y = 8100$$

$$\text{Subtracting, } 5x = 9000$$

$$\Rightarrow x = 9000/5$$

$$\Rightarrow x = 1800$$

Thus, cost of one bat = ₹ 1800

38. Find two consecutive positive numbers whose square have the sum 85.

Soln:-Let the two consecutive positive numbers be x and $x + 1$

$\therefore$ According to the question,

$$x^2 + (x + 1)^2 = 85$$

$$\Rightarrow x^2 + x^2 + 2x + 1 = 85$$

$$\Rightarrow 2x^2 + 2x + 1 - 85 = 0$$

$$\Rightarrow 2x^2 + 2x - 84 = 0$$

$$\Rightarrow 2(x^2 + x - 42) = 0$$

$$\Rightarrow x^2 + x - 42 = 0$$

$$\Rightarrow x^2 + 7x - 6x - 42 = 0$$

$$\Rightarrow x(x + 7) - 6(x + 7) = 0$$

$$\Rightarrow (x + 7)(x - 6) = 0$$

$\therefore$ Either, or,

$$x + 7 = 0$$

$$x - 6 = 0$$

$$\Rightarrow x = -7$$

$$\Rightarrow x = 6$$

(Rejected)

$\therefore$ The two positive numbers are 6 and 7

39. In the adjoining figure, $DE \parallel BC$. Find EC where $AD = 1.5\text{cm}$, $DB = 3\text{cm}$ and $AE = 1\text{cm}$.

(MBOSE 2025 Suppl)

Ans $\therefore DE \parallel BC$

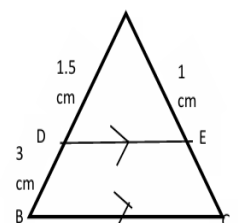
$\therefore$ By Basic Proportionality Theorem,

$$\frac{AD}{DB} = \frac{AE}{EC}$$

$$\Rightarrow \frac{1.5}{3} = \frac{1\text{cm}}{EC}$$

$$\Rightarrow EC = \frac{3}{1.5} = \frac{3^1 \times 10^2}{15_1}$$

$$\Rightarrow EC = 2\text{cm}$$



40. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{2}{3}$ and $AE = 7.2\text{cm}$, find AC .

Soln:- $\because DE \parallel BC$

$\therefore$ By Basic Proportionality Theorem,

$$\frac{AD}{DB} = \frac{AE}{EC}$$

$$\Rightarrow \frac{2}{3} = \frac{7.2\text{ cm}}{EC}$$

$$\Rightarrow EC = \frac{3 \times 7.2}{2} \text{ cm}$$

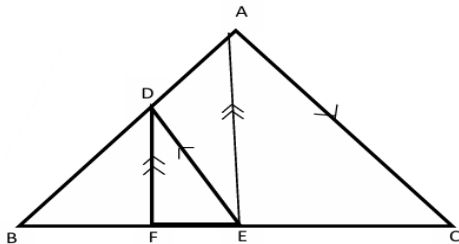
$$\Rightarrow EC = 10.8 \text{ cm}$$

$$\therefore AC = AE + EC$$

$$= 7.2 \text{ cm} + 10.8 \text{ cm}$$

$$= 18 \text{ cm}$$

41. In the adjoining figure, $DE \parallel AC$ and $DE \parallel AE$. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.



Soln:- In $\triangle ABC$,

$$DE \parallel AC$$

$\therefore$ By Basic Proportionality Theorem

$$\frac{BD}{DA} = \frac{BE}{EC} \quad \text{-----(i)}$$

Again, in $\triangle ABE$,

$$DF \parallel AC$$

$\therefore$ By Basic Proportionality Theorem

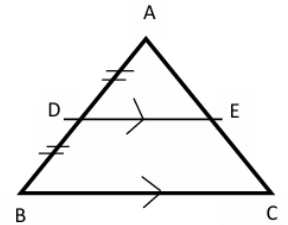
$$\frac{BD}{DA} = \frac{BF}{FE} \quad \text{-----(ii)}$$

$\therefore$ From eqn (i) and (ii), we get

$$\frac{BF}{FE} = \frac{BE}{EC} \text{ Hence Proved}$$

42. Prove that the line drawn from the mid-point of one side of a triangle parallel to another side bisects the third side.

Soln:- $\triangle ABC$, in which D is the mid-point of AB and $DE \parallel BC$



To Prove:- $AE = EC$

Proof: In $\triangle ABC$,

$$\because DE \parallel BC$$

$\therefore$ By Basic Proportionality Theorem

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \text{-----(i)}$$

$\because D$ is the mid-point of AB

$$\therefore AD = DB \quad \text{-----(ii)}$$

$\therefore$ From eqn (i) and (ii), we get

$$\frac{AD^1}{AD_1} = \frac{AE}{EC}$$

$$\Rightarrow 1 = \frac{AE}{EC}$$

$$\Rightarrow AE = EC$$

$$\Rightarrow DE \text{ bisects } AC$$

Hence Proved

43. S and T are points on side PR and QR of $\triangle PQR$ such that $\angle P = \angle RTS$. Show that $\triangle RPQ \sim \triangle RST$.

Soln:-

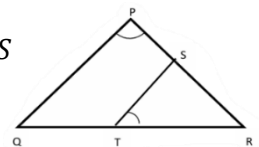
In $\triangle RPQ$ and $\triangle RTS$

$$\angle P = \angle RTS \text{ (Given)}$$

$$\angle PRQ = \angle SRT \text{ (Common angle)}$$

$$\therefore \triangle RPQ \sim \triangle RTS \text{ [AA Similarity]}$$

Hence Showed



44. In the adjoining figure, $\triangle OAB \sim \triangle OCD$. When $AB = 8\text{cm}$, $BO = 6.4\text{cm}$, $OC = 3.5\text{cm}$ and $CD = 5\text{cm}$, find OA and DO .

Soln:- $\because \Delta OAB \sim \Delta OCD$

$$\therefore \frac{AB}{CD} = \frac{OA}{OC} = \frac{OB}{OD}$$

$$\Rightarrow \frac{8}{5} = \frac{OA}{3.5 \text{ cm}} = \frac{6.4 \text{ cm}}{OD}$$

Taking, $\frac{8}{5} = \frac{OA}{3.5 \text{ cm}}$

$$\Rightarrow 5 \times OA = 8 \times 3.5 \text{ cm}$$

$$\Rightarrow OA = \frac{8 \times 3.5^{0.7} \text{ cm}}{5_1}$$

$$\Rightarrow OA = 5.6 \text{ cm}$$

Taking, $\frac{8}{5} = \frac{6.4 \text{ cm}}{OD}$

$$\Rightarrow 8 \times OD = 5 \times 6.4 \text{ cm}$$

$$\Rightarrow OD = \frac{5 \times 6.4^{0.8} \text{ cm}}{8_1}$$

$$\Rightarrow OD = 4 \text{ cm}$$

45. In the adjoining figure, $\angle APQ = \angle B$. Prove that $\Delta APQ \sim \Delta ABC$. If $AP = 3.8 \text{ cm}$, $AQ = 3.6 \text{ cm}$, $BQ = 2.1 \text{ cm}$ and $BC = 4.2 \text{ cm}$ find PQ .

Soln:- In ΔABC and ΔAPQ ,

$$\angle APQ = \angle B \quad (\text{Given})$$

$$\angle A = \angle A \quad (\text{Common angle})$$

$$\therefore \Delta ABC \sim \Delta APQ \quad (\text{AA Similarity})$$

$$\therefore \frac{AP}{AB} = \frac{PQ}{BC}$$

$$\Rightarrow \frac{3.8}{3.6 + 2.1} = \frac{PQ}{4.2}$$

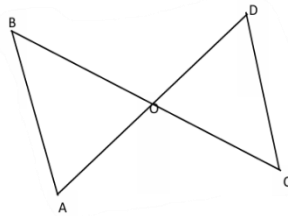
$$\Rightarrow \frac{3.8}{5.7} = \frac{PQ}{4.2}$$

$$\Rightarrow 5.7 \times PQ = 3.8 \times 4.2 \text{ cm}$$

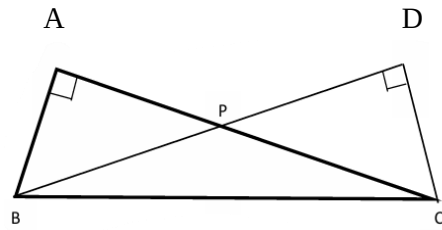
$$\Rightarrow PQ = \frac{3.8^{0.2} \times 4.2^{1.4}}{5.7^{0.30.1}} \text{ cm}$$

$$\Rightarrow PQ = 2.8 \text{ cm}$$

46. Two Δ s BAC and BDC , right angled at A and D respectively are drawn on the same base BC and on the same side of BC. If AC and DB intersect at P, prove that $AP \times PC = DP \times PB$.



Soln:-



In Δ s PAB and PDC

$$\angle A = \angle D \quad (\text{Each } 90^\circ)$$

$$\angle APB = \angle DPC \quad (\text{Vertically opposite angles})$$

$$\therefore \Delta PAB \sim \Delta PDC \quad (\text{AA Similarity})$$

$$\therefore \frac{AP}{DP} = \frac{PB}{PC}$$

$$\Rightarrow AP \times PC = DP \times PB$$

Hence Proved

47. X and Y are points on side PQ and PR of a ΔPQR . If $PX = 2 \text{ cm}$, $XQ = 4 \text{ cm}$ and $XY \parallel QR$, prove that $3XY = QR$.

Soln:- In ΔPXY and ΔPQR

$$\angle P = \angle P \quad (\text{Common angle})$$

$$\angle Q = \angle PXY \quad (\because XY \parallel QR)$$

$$\therefore \Delta PXY \sim \Delta PQR \quad (\text{AA Similarity})$$

$$\therefore \frac{PX}{PQ} = \frac{XY}{QR}$$

$$\Rightarrow \frac{PX}{PX + XQ} = \frac{XY}{QR}$$

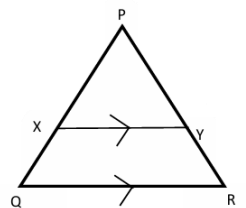
$$\Rightarrow \frac{2}{2 + 4} = \frac{XY}{QR}$$

$$\Rightarrow \frac{2}{6} = \frac{XY}{QR}$$

$$\Rightarrow \frac{1}{3} = \frac{XY}{QR}$$

$$\Rightarrow 3XY = QR$$

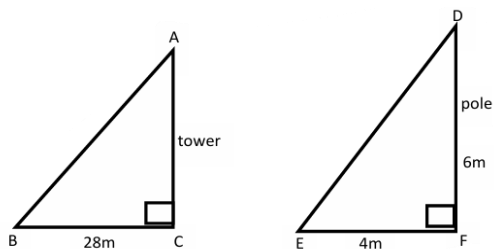
Hence Proved



48. A vertical tower of length 6m casts a shadow 4cm long on the ground and at the same time a tower casts a shadow 28m long. Find the height of the tower.

Soln:-

Let AC be the height of the tower and BC = 28 m be the length of its shadow.



Let DF = 6 m be height of the pole and EF = 4 m be the length of its shadow.

In $\triangle ABC$ and $\triangle DEF$,

$\angle B = \angle E$ (same inclination at the same time)

$\angle C = \angle F$ (each 90°)

$\therefore \triangle ABC \sim \triangle DEF$ (AA Similarity)

$$\therefore \frac{AC}{DF} = \frac{BC}{EF}$$

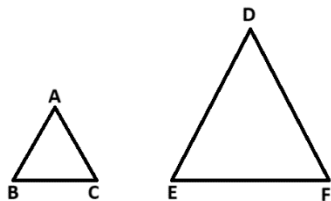
$$\Rightarrow \frac{AC}{6\text{ m}} = \frac{28}{4}$$

$$\Rightarrow AC = \frac{28 \times 6\text{ m}}{4}$$

$$\Rightarrow AC = 42\text{ m}$$

$\therefore$ The height of the tower is 42 m

49. If $\triangle ABC \sim \triangle DEF$ such that $2AB = DE$ and $BC = 8\text{ cm}$. Then find the length of EF .



Soln: Since $\triangle ABC \sim \triangle DEF$ (Given)

$$\therefore \frac{AB}{DE} = \frac{BC}{EF}$$

$$\Rightarrow \frac{AB}{2AB} = \frac{8}{EF} \quad (\because DE = 2AB)$$

$$\Rightarrow \frac{1}{2} = \frac{8}{EF}$$

$$\Rightarrow 1 \times EF = 8 \times 2$$

$$\Rightarrow EF = 16\text{ cm. (Ans)}$$

50. In the adjoining figure, $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ & $EC = x - 1$, find the value of x .

Soln: In $\triangle ABC$,
 $\because DE \parallel BC$

Using Basic Proportionality Theorem, we have

$$\frac{AD}{DB} = \frac{AE}{EC}$$

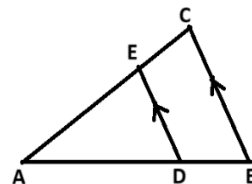
$$\Rightarrow \frac{x}{x-2} = \frac{x+2}{x-1}$$

$$\Rightarrow x(x-1) = (x-2)(x+2)$$

$$\Rightarrow x^2 - x = x^2 - 4$$

$$\Rightarrow -x = -4$$

$$\Rightarrow x = 4 \text{ (Ans)}$$



51. In the adjoining figure, $\frac{AO}{OC} = \frac{BO}{OD} = \frac{1}{2}$ and $AB = 5\text{ cm}$. Find the value of DC .

Soln: In $\triangle AOB$ and $\triangle COD$,

$$\frac{AO}{OC} = \frac{BO}{OD} \text{ (Given)}$$

$$\angle AOB = \angle COD \text{ (Vertically opposite angles)}$$

So, by SAS Similarity Criterion, we have

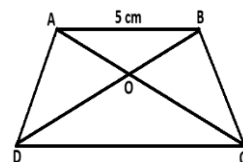
$$\triangle AOB \sim \triangle COD$$

$$\Rightarrow \frac{AO}{OC} = \frac{BO}{OD} = \frac{AB}{DC}$$

$$\Rightarrow \frac{1}{2} = \frac{5}{DC} \quad (\because AB = 5\text{ cm})$$

$$\Rightarrow 1 \times DC = 2 \times 5$$

$$\Rightarrow DC = 10\text{ cm. (Ans)}$$



52. In $\triangle ABC$, right angled at B, $AB = 24\text{ cm}$, $BC = 7\text{ cm}$, find $\sin A$.

Soln:- By Pythagoras Theorem in $\triangle ABC$, we get

$$AC^2 = AB^2 + BC^2$$

$$\Rightarrow AC^2 = (24\text{ cm})^2 + (7\text{ cm})^2$$

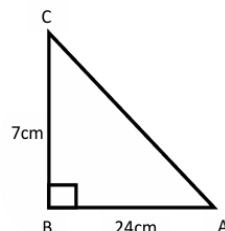
$$\Rightarrow AC^2 = 576\text{ cm}^2 + 49\text{ cm}^2$$

$$\Rightarrow AC^2 = 625\text{ cm}^2$$

$$\Rightarrow AC^2 = \sqrt{625\text{ cm}^2}$$

$$\Rightarrow AC^2 = 25\text{ cm}$$

$$\therefore \sin A = \frac{BC}{AC} = \frac{7}{25}$$



53. Find the value of $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

Soln:- $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

$$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2}$$

$$= \frac{3}{4} + \frac{1}{4}$$

$$= \frac{3+1}{4}$$

$$= \frac{4}{4}$$

$$= 1$$

54. Prove that $2\cos^2 30^\circ - 1 = \cos 60^\circ$

$$\text{Soln:- L H S} = 2\cos^2 30^\circ - 1$$

$$= 2 \times \left(\frac{\sqrt{3}}{2}\right)^2 - 1$$

$$= 2 \times \frac{3}{4} - 1$$

$$= \frac{3}{2} - 1$$

$$= \frac{3-2}{2}$$

$$= \frac{1}{2}$$

$$= \cos 60^\circ$$

$$= \text{R H S}$$

Hence Proved

55. If $A = 60^\circ, B = 30^\circ$, verify that
 $\cos(A+B) = \cos A \cos B - \sin A \sin B$

$$\text{Soln:- L H S} = \cos(A+B)$$

$$= \cos(60^\circ + 30^\circ)$$

$$= \cos 90^\circ$$

$$= 0$$

$$\text{R H S} = \cos A \cos B - \sin A \sin B$$

$$= \cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$$

$$= \frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2}$$

$$= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4}$$

$$= \frac{\sqrt{3}-\sqrt{3}}{4}$$

$$= \frac{0}{4}$$

$$= 0$$

$$\therefore \text{L H S} = \text{R H S}$$

Hence Verified. (MBOSE 2025 Suppl)

56. Prove that $(1 - \sin^2 \theta) \sec^2 \theta = 1$

$$\text{Soln:- L H S} = (1 - \sin^2 \theta) \sec^2 \theta$$

$$= \cos^2 \theta \times \sec^2 \theta$$

$$= \cancel{\cos^2 \theta} \times \frac{1}{\cancel{\cos^2 \theta}}$$

$$= 1$$

$$= \text{R H S}$$

Hence Proved

57. Prove that $(\sec^2 A - 1)(\operatorname{cosec}^2 A - 1) = 1$

$$\text{Ans L H S} = (\sec^2 A - 1)(\operatorname{cosec}^2 A - 1)$$

$$= \tan^2 A \times \cot^2 A$$

$$= \cancel{\tan^2 A} \times \frac{1}{\cancel{\tan^2 A}}$$

$$= 1$$

$$= \text{R H S}$$

Hence Proved

58. If $\sin A = \frac{3}{4}$, calculate $\tan A$

Soln:- Let ABC be a right Δ , right angled at C

$$\sin A = \frac{BC}{BA} = \frac{3}{4}$$

$\therefore BC = 3k$ and $BA = 4k$, where k is a positive number

$\therefore$ By using Pythagoras Theorem, we get

$$AB^2 = BC^2 + AC^2$$

$$\Rightarrow (4k)^2 = (3k)^2 + AC^2$$

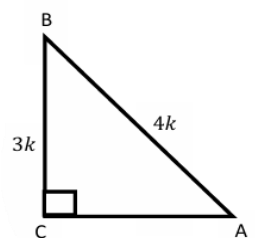
$$\Rightarrow 16k^2 = 9k^2 + AC^2$$

$$\Rightarrow 16k^2 - 9k^2 = AC^2$$

$$\Rightarrow 7k^2 = AC^2$$

$$\Rightarrow \sqrt{7k^2} = AC$$

$$\Rightarrow \sqrt{7} k = AC$$



$$\begin{aligned}\therefore \tan A &= \frac{BC}{AC} \\ &= \frac{3k}{\sqrt{7}k} \\ &= \frac{3}{\sqrt{7}}\end{aligned}$$

59. Find the value of $\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ}$

Soln:-
$$\begin{aligned}\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ} \\ &= \frac{1-1^2}{1+1^2} \\ &= \frac{1-1}{1+1} \\ &= \frac{0}{2} \\ &= 0\end{aligned}$$

60. Prove that $\frac{1}{1+\tan^2 \theta} + \frac{1}{1+\cot^2 \theta} = 1$

Soln:- L H S
$$\begin{aligned}&= \frac{1}{1+\tan^2 \theta} + \frac{1}{1+\cot^2 \theta} \\ &= \frac{1}{\sec^2 \theta} + \frac{1}{\operatorname{cosec}^2 \theta} [\because 1 + \tan^2 \theta = \sec^2 \theta \text{ and } 1 + \cot^2 \theta = \operatorname{cosec}^2 \theta] \\ &= \cos^2 \theta + \sin^2 \theta \\ &= 1 \\ &= \text{R H S} \\ &\text{Hence Proved}\end{aligned}$$

61. Express $\frac{1+\tan^2 A}{1+\cot^2 A}$ in terms of $\tan A$

Soln:-
$$\begin{aligned}\frac{1+\tan^2 A}{1+\cot^2 A} &\quad (\text{MBOSE 2025}) \\ &= \frac{\sec^2 A}{\operatorname{cosec}^2 A} \\ &= \frac{\frac{1}{\cos^2 A}}{\frac{1}{\sin^2 A}} \\ &= \frac{1}{\cos^2 A} \times \frac{\sin^2 A}{1} \\ &= \frac{\sin^2 A}{\cos^2 A} \\ &= \tan^2 A\end{aligned}$$

62. If $\sin \theta - \cos \theta = 0$, then find the value of $\sin^4 \theta + \cos^4 \theta$.

Soln:- Given: $\sin \theta - \cos \theta = 0$

$$\begin{aligned}\Rightarrow \sin \theta &= \cos \theta \\ \Rightarrow \frac{\sin \theta}{\cos \theta} &= 1 \text{ (Dividing both side by } \cos \theta) \\ \Rightarrow \tan \theta &= 1 \\ \Rightarrow \tan \theta &= \tan 45^\circ \\ \Rightarrow \theta &= 45^\circ\end{aligned}$$

Now,
$$\begin{aligned}\sin^4 \theta + \cos^4 \theta &= \sin^4 45^\circ + \cos^4 45^\circ \\ &= \left(\frac{1}{\sqrt{2}}\right)^4 + \left(\frac{1}{\sqrt{2}}\right)^4 \\ &= \frac{1}{4} + \frac{1}{4} \\ &= \frac{1+1}{4} \\ &= \frac{2}{4} \\ &= \frac{1}{2} \text{ (Ans)}\end{aligned}$$

63. Prove that $\frac{1-\sin \theta}{1+\sin \theta} = (\sec \theta - \tan \theta)^2$.

Soln:-
$$\begin{aligned}LHS &= \frac{1-\sin \theta}{1+\sin \theta} \\ &= \frac{1-\sin \theta}{1+\sin \theta} \times \frac{1-\sin \theta}{1-\sin \theta} \\ &= \frac{(1-\sin \theta)^2}{1-\sin^2 \theta} \\ &= \frac{(1-\sin \theta)^2}{\cos^2 \theta} \\ &= \left(\frac{1-\sin \theta}{\cos \theta}\right)^2 \\ &= \left(\frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta}\right)^2 \\ &= (\sec \theta - \tan \theta)^2 \\ &= RHS \text{ (Proved)}\end{aligned}$$

64. Prove that $\frac{\sin 60^\circ + \cos 30^\circ}{1 + \sin 30^\circ + \cos 60^\circ} = \frac{\sqrt{3}}{2}$.

Soln:-
$$\begin{aligned}LHS &= \frac{\sin 60^\circ + \cos 30^\circ}{1 + \sin 30^\circ + \cos 60^\circ} \\ &= \frac{\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}}{1 + \frac{1}{2} + \frac{1}{2}} \\ &= \frac{\frac{2\sqrt{3}}{2}}{\frac{2+1+1}{2}} \\ &= \frac{2\sqrt{3}}{2+1+1} \\ &= \frac{2\sqrt{3}}{4} \\ &= \frac{2\sqrt{3}}{2} \times \frac{2}{4} \\ &= \frac{\sqrt{3}}{2} \\ &= RHS \text{ (Proved)}\end{aligned}$$

65. A die is thrown once. What is the probability of getting a number less than 3?

Soln:- Total number of possible outcomes

$$= 6 \{ie\ 1, 2, 3, 4, 5, 6\}$$

Number of favourable outcomes less than 3

$$= 2 \{i.e 1, 2\}$$

$$\begin{aligned}\therefore P(\text{less than } 3) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{2}{6} \\ &= \frac{1}{3}\end{aligned}$$

66. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the drawn ball is not red.

$$\text{Soln:- Total number of possible outcomes} = 8 \quad (3 + 5)$$

Number of favourable outcomes of not red = 5

$$\begin{aligned}\therefore P(\text{not red}) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{5}{8}\end{aligned}$$

67. A box contains 20 cards number 1 to 20. A card is drawn at random from the box. Find the probability that the number on the drawn card is a prime number.

$$\text{Soln:- Total number of possible outcomes} = 20$$

Prime numbers are 2, 3, 5, 7, 11, 13, 17, 19

$\therefore$ Number of favourable outcomes of a prime number = 8

$$\begin{aligned}\therefore P(\text{prime number}) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{8}{20} \\ &= \frac{2}{5}\end{aligned}$$

68. A bag contains lemon flavoured candies only. Maline takes out one candy without looking into the bag. What is the probability that she takes out an orange flavoured candy.

$$\text{Soln:- Let the number of lemon flavoured candies be } x$$

$$\therefore \text{Total number of favourable outcomes} = x$$

$$\text{Number of orange flavoured candies} = 0$$

$$\begin{aligned}\therefore P(\text{orange flavoured candies}) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{0}{x} \\ &= 0\end{aligned}$$

69. A box contains balls numbered 3 to 50. A ball is drawn at random from the box. Find the probability that the drawn ball has a number which is a perfect square.

$$\text{Soln:- Total number of possible outcomes} = 50 - 3 + 1 = 48$$

The perfect squares are 4, 9, 16, 25, 36, 49

$$\therefore \text{Number of favourable} = 6$$

$$\begin{aligned}\therefore P(\text{perfect square}) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{6}{48} \\ &= \frac{1}{8} \quad (\text{MBOSE 2025})\end{aligned}$$

70. One card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting a king of red colour.

$$\text{Soln:- Total number of possible outcomes} = 52$$

Number of favourable outcomes of a king of red colour = 2

$$\begin{aligned}\therefore P(\text{king of red colour}) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{2}{52} \\ &= \frac{1}{26}\end{aligned}$$

71. A game of chance consists of spinning an arrow which comes to rest pointing to one of the number 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. What is the probability that it will point greater than 2.

$$\begin{aligned}\text{Soln:- Total number of possible outcomes} \\ \{i.e 1, 2, 3, 4, 5, 6, 7, 8\} &= 8\end{aligned}$$

Number of favourable outcomes $\{i.e 3, 4, 5, 6, 7, 8\} = 6$

$$\begin{aligned}\therefore P(\text{number greater than } 2) &= \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}} \\ &= \frac{6}{8} \\ &= \frac{3}{4}\end{aligned}$$

72. Five cards-the ten, jack, queen, king and ace of diamonds are well-shuffled with then face downwards. One card is drawn at random. What is the probability that the card drawn is a queen.

$$= \frac{36-11}{36}$$

$$= \frac{25}{36}$$

Soln:- Total number of possible outcomes = 5

Number of favourable outcomes = 1

$$\therefore P(\text{a queen}) = \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}}$$

$$= \frac{1}{5}$$

73. A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that she will buy it.

Soln:- Total number of ball pens = 144

$\therefore$ Total number of possible outcomes = 144

Number of defective ball pens = 20

$\therefore$ Number of good ball pens = $144 - 20 = 124$

$\therefore$ Number of favourable outcome of good ball pens = 124

$$\therefore P(\text{buy it}) = \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}}$$

$$= \frac{\cancel{124} \cancel{52}^{31}}{\cancel{144} \cancel{236}^{36}}$$

$$= \frac{31}{36}$$

74. A die is thrown twice. What is the probability that 5 will not come up either time.

Soln:-Total number of possible outcomes = $6 \times 6 = 36$

Number of possible outcomes when 5 will come up either time

{ie (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (1,5), (2,5), (3,5), (4,5), (6,5)} = 11

$$\therefore P(5 \text{ will come up either time}) = \frac{\text{number of favourable outcomes}}{\text{total number of possible outcomes}}$$

$$= \frac{11}{36}$$

$$\therefore P(5 \text{ will not come up either time}) = 1 - \frac{11}{36}$$

75. A card is drawn from a pack of 52 cards. Find the probability that the card drawn is a queen.

Soln:-Total number of favourable outcomes =

Total number of queens in a pack of 52 cards = 4

Total number of possible outcomes = Total number of cards in the pack = 52

$$\therefore P(\text{queen}) = \frac{\text{Total number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

$$= 4 / 52$$

$$= 1/13$$

76. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

Soln:-Total number of pens 12 defective +

132 good ones = 144

Total number of possible outcomes = 144

Number of favourable outcomes of a good pen = 132

$\therefore$ Probability that a pen taken out is good one

$$= \frac{\text{No. of favourable outcomes}}{\text{Total no. of possible outcomes}}$$

$$= \frac{132}{144}$$

$$= \frac{11}{12} \text{ (Ans)}$$

77. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen.

Soln:-Total number of possible outcomes

= 52

Number of red cards and queens = $26 + 2$
= 28

No. of favourable outcomes of neither a red card nor a queen = $52 - 28 = 24$

$\therefore$ P(getting neither a red card nor a queen)

$$= \frac{\text{No. of favourable outcomes}}{\text{Total no. of possible outcomes}}$$

$$= \frac{24}{52}$$

$$= \frac{6}{13} \text{ (Ans)}$$

Section – C
Short Answer Question (3 Marks)

1. Find a quadratic polynomial whose sum and product of zeroes are $\frac{1}{4}$ and -1 respectively.

Soln.: Given: Sum of the zeroes = $\frac{1}{4}$
Product of the zeroes = -1
 $\therefore$ A quadratic polynomial is -
 $x^2 - (\text{sum of the zeroes})x + \text{Product of the zeroes}$
 $= x^2 - \frac{1}{4}x + (-1)$
 $= \frac{4x^2 - x - 4}{4}$
 $= \frac{1}{4}(4x^2 - x - 4)$
 $\Rightarrow 4x^2 - x - 4$, where $\frac{1}{4}$ is a constant.
Hence, the required quadratic polynomial is $4x^2 - x - 4$.

2. Find the zeroes of the quadratic polynomial $10x^2 + 3x - 1$ and verify the relationship between the zeroes and the coefficients.

Soln.: Let $p(x) = 10x^2 + 3x - 1$
 $= 10x^2 + (5 - 2)x - 1$
 $= 10x^2 + 5x - 2x - 1$
 $= 5x(2x + 1) - 1(2x + 1)$
 $= (2x + 1)(5x - 1)$

If $p(x) = 0$

Then, $(2x + 1)(5x - 1) = 0$

Now, either, $2x + 1 = 0$ or, $5x - 1 = 0$

$$\Rightarrow x = \frac{-1}{2} \quad \text{or,} \quad x = \frac{1}{5}$$

$\therefore$ The zeroes of $p(x)$ are $\frac{-1}{2}$ and $\frac{1}{5}$

Verification:

$$\begin{aligned} \text{Sum of the zeroes} &= \frac{-1}{2} + \frac{1}{5} \\ &= \frac{-5+2}{10} \\ &= \frac{-3}{10} \\ &= \frac{-(\text{coefficient of } x)}{\text{coefficient of } x^2} \end{aligned}$$

$$\begin{aligned} \text{Product of the zeroes} &= \frac{-1}{2} \times \frac{1}{5} \\ &= \frac{-1}{10} \\ &= \frac{\text{constant term}}{\text{coefficient of } x^2} \end{aligned}$$

Hence, verified.

3. Find a quadratic polynomial whose zeroes are $\frac{2}{\sqrt{3}}$ and $\frac{-4}{\sqrt{3}}$.

Soln.: Sum of the zeroes = $\frac{2}{\sqrt{3}} + \left(\frac{-4}{\sqrt{3}}\right) = \frac{2-4}{\sqrt{3}} = \frac{-2}{\sqrt{3}}$
Product of the zeroes = $\frac{2}{\sqrt{3}} \times \left(\frac{-4}{\sqrt{3}}\right) = \frac{-8}{3}$
 $\therefore$ A quadratic polynomial is -
 $x^2 - (\text{sum of the zeroes})x + \text{Product of the zeroes}$
 $= x^2 - \left(\frac{-2}{\sqrt{3}}\right)x + \left(\frac{-8}{3}\right)$
 $= x^2 + \frac{2}{\sqrt{3}}x - \frac{8}{3}$
 $= \frac{3\sqrt{3}x^2 + 6x - 8\sqrt{3}}{3\sqrt{3}}$
 $= \frac{1}{3\sqrt{3}}(3\sqrt{3}x^2 + 6x - 8\sqrt{3})$
 $\Rightarrow 3\sqrt{3}x^2 + 6x - 8\sqrt{3}$, where $\frac{1}{3\sqrt{3}}$ is a constant.
Hence, the required quadratic polynomial is $3\sqrt{3}x^2 + 6x - 8\sqrt{3}$.

4. One zero of the quadratic polynomial $2x^2 - 8x - m$ is $\frac{5}{2}$. Find the other zero and the value of m .

Soln.: Given, one of the zeroes is $\frac{5}{2}$.

Let the other zero be y .

Now,

$$\text{Sum of the zeroes} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\Rightarrow \frac{5}{2} + y = \frac{-(-8)}{2}$$

$$\Rightarrow y = \frac{8}{2} - \frac{5}{2}$$

$$\Rightarrow y = \frac{8-5}{2}$$

$$\Rightarrow y = \frac{3}{2}$$

Also,

$$\text{Product of the zeroes} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\Rightarrow \frac{5}{2} \times y = \frac{-m}{2}$$

$$\Rightarrow \frac{5}{2} \times \frac{3}{2} = \frac{-m}{2}$$

$$\Rightarrow \frac{15}{4} = \frac{-m}{2}$$

$$\Rightarrow m = \frac{-15 \times 2}{4}$$

$$\Rightarrow m = \frac{-15}{2}$$

Hence, the other zero is $\frac{3}{2}$ and $m = \frac{-15}{2}$.

5. If α and β are zeroes of the polynomial $p(x) = ax^2 + bx + c$, then evaluate $(\alpha - \beta)^2$.

Soln.: Since, α and β are zeroes of the polynomial,

$$p(x) = ax^2 + bx + c$$

$$\therefore \text{Sum of the zeroes} = \frac{-b}{a}$$

$$\Rightarrow \alpha + \beta = \frac{-b}{a}$$

$$\text{And, Product of the zeroes} = \frac{c}{a}$$

$$\Rightarrow \alpha\beta = \frac{c}{a}$$

Now,

$$\begin{aligned} (\alpha - \beta)^2 &= (\alpha + \beta)^2 - 4\alpha\beta \\ &= \left(\frac{-b}{a}\right)^2 - 4 \cdot \frac{c}{a} \\ &= \frac{b^2}{a^2} - \frac{4c}{a} \\ &= \frac{b^2 - 4ac}{a^2} \quad (\text{Ans}) \end{aligned}$$

6. Find the value of 'p' if the quadratic polynomial $p(x) = x^2 + 8x + p$ has zeroes whose difference is 4.

Soln.: Let α and β be the zeroes of

$$p(x) = x^2 + 8x + p$$

$$\therefore \alpha + \beta = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\Rightarrow \alpha + \beta = \frac{-8}{1}$$

$$\Rightarrow \alpha + \beta = -8 \quad \text{-----(i)}$$

And,

$$\alpha\beta = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\Rightarrow \alpha\beta = \frac{p}{1}$$

$$\Rightarrow \alpha\beta = p \quad \text{-----(ii)}$$

Also, By the question, we have

$$\alpha - \beta = 4 \quad \text{-----(iii)}$$

Adding equations (i) and (iii), we have

$$\alpha + \beta + \alpha - \beta = -8 + 4$$

$$\Rightarrow 2\alpha = -4$$

$$\Rightarrow \alpha = -2$$

Putting $\alpha = -2$ in eqn. (iii), we have

$$\alpha - \beta = 4$$

$$\Rightarrow -2 - \beta = 4$$

$$\Rightarrow -\beta = 4 + 2$$

$$\Rightarrow -\beta = 6$$

$$\Rightarrow \beta = -6$$

Putting the values of α and β in eqn. (ii), we get

$$\alpha\beta = p$$

$$\Rightarrow (-2)(-6) = p$$

$$\Rightarrow p = 12$$

Hence, $p = 12$. (MBOSE 2025 Suppl)

7. If the zeroes of the quadratic polynomial $p(x) = 3x^2 + (2k - 1)x - 5$ are equal in magnitude but opposite in sign then find the value of k .

Soln.: Given polynomial is-

$$p(x) = 3x^2 + (2k - 1)x - 5$$

Let the zeroes be y and $-y$.

$$\therefore \text{Sum of the zeroes} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$\Rightarrow y + (-y) = \frac{-(2k-1)}{3}$$

$$\Rightarrow y - y = \frac{-2k+1}{3}$$

$$\Rightarrow 0 = \frac{-2k+1}{3}$$

$$\Rightarrow 0 \times 3 = -2k + 1$$

$$\Rightarrow 0 = -2k + 1$$

$$\Rightarrow 2k = 1$$

$$\Rightarrow k = \frac{1}{2} \quad (\text{Ans})$$

8. If one zero of the polynomial $(a^2 + 9)x^2 + 15x + 6a$ is reciprocal of the other, find the value of a .

Soln.: Given polynomial is $(a^2 + 9)x^2 + 15x + 6a$

Let the other zero be y

$$\therefore \text{One zero} = \frac{1}{y}$$

Now,

$$\text{Product of the zeroes} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\Rightarrow y \times \frac{1}{y} = \frac{6a}{a^2+9}$$

$$\Rightarrow 1 = \frac{6a}{a^2+9}$$

$$\Rightarrow a^2 + 9 = 6a$$

$$\Rightarrow a^2 - 6a + 9 = 0$$

$$\Rightarrow a^2 - (3 + 3)a + 9 = 0$$

$$\Rightarrow a^2 - 3a - 3a + 9 = 0$$

$$\Rightarrow a(a - 3) - 3(a - 3) = 0$$

$$\Rightarrow (a - 3)(a - 3) = 0$$

Either, $a - 3 = 0$ or, $a - 3 = 0$

$$\Rightarrow a = 3 \text{ or, } a = 3$$

Hence, the value of a is 3. (Ans)

9. Find the sum and product of the zeroes of the quadratic polynomials:

$$(i) \ x^2 - 8 \quad (ii) \ x^2 - (c - ab)x - abc$$

Soln.:(i) Given polynomial is: $x^2 - 8$

$$\therefore \text{Sum of the zeroes} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2}$$

$$= \frac{0}{1}$$

$$= 0$$

$$\begin{aligned}\text{And, Product of the zeroes} &= \frac{\text{Constant term}}{\text{Coefficient of } x^2} \\ &= \frac{-8}{1} \\ &= -8\end{aligned}$$

(ii) Given polynomial is: $x^2 - (c - ab)x - abc$

$$\begin{aligned}\therefore \text{Sum of the zeroes} &= \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2} \\ &= \frac{-\{-(c-ab)\}}{1} \\ &= c - ab\end{aligned}$$

$$\begin{aligned}\text{And, Product of the zeroes} &= \frac{\text{Constant term}}{\text{Coefficient of } x^2} \\ &= \frac{-abc}{1} \\ &= -abc \quad (\text{Ans})\end{aligned}$$

10. Find the value of k such that the quadratic polynomial $x^2 - (k + 6)x + 2(2k + 1)$ has sum of the zeroes as half of their product.
(MBOSE 2025)

Soln.: We have $p(x) = x^2 - (k + 6)x + 2(2k + 1)$

Let α and β be the zeroes of $p(x)$

Then,

$$\begin{aligned}\alpha + \beta &= \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2} \\ &= \frac{-\{-(k+6)\}}{1} \\ &= k + 6\end{aligned}$$

And,

$$\begin{aligned}\alpha\beta &= \frac{\text{Constant term}}{\text{Coefficient of } x^2} \\ &= \frac{2(2k+1)}{1} \\ &= 4k + 2\end{aligned}$$

But, According to the question, we have

$$\begin{aligned}\alpha + \beta &= \frac{1}{2}(\alpha\beta) \\ \Rightarrow k + 6 &= \frac{1}{2}(4k + 2) \\ \Rightarrow 2k + 12 &= 4k + 2 \\ \Rightarrow 4k - 2k &= 12 - 2 \\ \Rightarrow 2k &= 10 \\ \Rightarrow k &= 5\end{aligned}$$

11. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 + x - 2$, then find a polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$.

Soln:- Given, α and β are the zeroes of the polynomial $f(x) = x^2 + x - 2$

$$\begin{aligned}\alpha + \beta &= -(\text{coefficient of } x) / (\text{coefficient of } x^2) \\ &= -1 / 1 \\ &= -1\end{aligned}$$

$$\alpha\beta = \text{constant term} / \text{coefficient of } x^2$$

$$\begin{aligned}&= -2 / 1 \\ &= -2\end{aligned}$$

$$\text{Now, Sum} = 2\alpha + 1 + 2\beta + 1$$

$$= 2(\alpha + \beta) + 2$$

$$= 2(-1) + 2$$

$$= -2 + 2$$

$$= 0$$

$$\text{Product} = (2\alpha + 1)(2\beta + 1)$$

$$= 2\alpha(2\beta + 1) + 1(2\beta + 1)$$

$$= 4\alpha\beta + 2\alpha + 2\beta + 1$$

$$= 4 \times (-2) + 2 \times (-1) + 1$$

$$= -8 - 2 + 1$$

$$= -9$$

$\therefore$ The required quadratic polynomial

$$= x^2 - (\text{Sum})x + \text{Product}$$

$$= x^2 - 0x + (-9)$$

$$= x^2 - 9$$

12. Find the least positive value of k for which $x^2 + kx + 16 = 0$ has real roots.

Ans: Given quadratic equation is $x^2 + kx + 16$.

Here, $a = 1$, $b = k$, $c = 16$

Now, $D = b^2 - 4ac$

$$= k^2 - 4 \times 1 \times 16$$

$$= k^2 - 64$$

Roots of the given equation are real if $D \geq 0$

$$\Rightarrow k^2 - 64 \geq 0$$

$$\Rightarrow k^2 \geq 64$$

$$\Rightarrow k \geq 8 \text{ or } k \leq -8$$

$\Rightarrow$ The least positive value of k is 8.

13. Find the value of p for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

Soln:- The quadratic equation is $px^2 - 14x + 8 = 0$

Here, $a = p$, $b = -14$, $c = 8$

Let α and β be the two roots.

Now,

$$\alpha + \beta = \frac{-b}{a} = \frac{-(-14)}{p} = \frac{14}{p} \quad \dots\dots\dots(i)$$

Also,

$$\alpha\beta = \frac{c}{a} = \frac{8}{p} \quad \dots\dots\dots(ii)$$

$$\text{By question, } \alpha = 6\beta \quad \dots\dots\dots(iii)$$

Putting in equation (i),

$$6\beta + \beta = \frac{14}{p}$$

$$\Rightarrow 7\beta = \frac{14}{p}$$

$$\Rightarrow \beta = \frac{14}{7p}$$

$$\Rightarrow \beta = \frac{2}{p} \quad \dots\dots\dots\text{(iv)}$$

Now,

$$\alpha\beta = \frac{8}{p} \quad (\text{from ii})$$

$$\Rightarrow 6\beta \times \beta = \frac{8}{p} \quad (\text{using eqn iii})$$

$$\Rightarrow 6\beta^2 = \frac{8}{p}$$

$$\Rightarrow 6 \times \frac{(2)^2}{(p)^2} = \frac{8}{p}$$

$$\Rightarrow 6 \times \frac{4}{p^2} = \frac{8}{p}$$

$$\Rightarrow 8p^2 = 24p$$

$$\Rightarrow 8p^2 - 24p = 0$$

$$\Rightarrow 8p(p - 3) = 0$$

Either, $8p = 0$ Or, $p - 3 = 0$

$$\Rightarrow p = 0 \quad \Rightarrow p = 3$$

(not possible)

Thus, $p = 3$

14. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers.

Solution:

Let the three consecutive natural numbers be: x , $x+1$, $x+2$

Ans:

Let the three consecutive natural numbers be x , $x+1$ and $x+2$.

According to the question:

$$(x+1)^2 - [(x+2)^2 - x^2] = 60$$

$$\Rightarrow x^2 + 2x + 1 = x^2 + 4x + 4 - x^2 + 60$$

$$\Rightarrow x^2 + 2x + 1 = 4x + 64$$

$$\Rightarrow x^2 + 2x + 1 - 4x - 64 = 0$$

$$\Rightarrow x^2 - 2x - 63 = 0$$

$$\Rightarrow x^2 - 9x + 7x - 63 = 0$$

$$\Rightarrow x(x - 9) + 7(x - 9) = 0$$

$$\Rightarrow (x - 9)(x + 7) = 0$$

Either, $x = 9$ or $x = -7$ (Not possible)

$\therefore x = 9$

$\therefore$ The three consecutive natural numbers are 9, 10, 11.

15. The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three times the age of his son. Find their present ages. (MBOSE 2025)

Soln.: Let the present age of the son be x years

Then, the age of the man = $2x^2$ years

$\therefore$ 8 years hence, the age of the son = $(x + 8)$ years

& 8 years hence, the age of the man = $(2x^2 + 8)$ years

Now, According to the question, we have

$$\Rightarrow (2x^2 + 8) = 3(x + 8) + 4$$

$$\Rightarrow 2x^2 + 8 = 3x + 24 + 4$$

$$\Rightarrow 2x^2 + 8 = 3x + 28$$

$$\Rightarrow 2x^2 - 3x + 8 - 28 = 0$$

$$\Rightarrow 2x^2 - 3x - 20 = 0$$

$$\Rightarrow 2x^2 - (8 - 5)x - 20 = 0$$

$$\Rightarrow 2x^2 - 8x + 5x - 20 = 0$$

$$\Rightarrow 2x(x - 4) + 5(x - 4) = 0$$

$$\Rightarrow (x - 4)(2x + 5) = 0$$

$$\text{Either, } x - 4 = 0 \quad \text{or, } 2x + 5 = 0$$

$$\Rightarrow x = -4 \quad \text{or, } x = \frac{-5}{2}$$

(Rejected as age cannot be negative)

Hence, son's present age = 4 years.

& man's present age = $2 \times 4^2 = 2 \times 16$
= 32 years.

16. Find the value of 'k' for which $2x^2 + kx + 3 = 0$ have equal roots.

Soln.: Comparing $2x^2 + kx + 3 = 0$ with $ax^2 + bx + c = 0$, we have

$a = 2$, $b = k$, and $c = 3$

We know, for equal roots,

Discriminant, $D = 0$

$$\Rightarrow b^2 - 4ac = 0$$

$$\Rightarrow k^2 - 4 \times 2 \times 3 = 0$$

$$\Rightarrow k^2 - 24 = 0$$

$$\Rightarrow k^2 = 24$$

$$\Rightarrow k = \pm\sqrt{24}$$

$$\Rightarrow k = \pm\sqrt{2 \times 2 \times 6}$$

$$\Rightarrow k = \pm\sqrt{2^2 \times 6}$$

$$\Rightarrow k = \pm 2\sqrt{6}$$

$\therefore k = 2\sqrt{6}, -2\sqrt{6}$. (Ans)

17. Is the following situation possible? If so, determine their present ages. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages (in years) was 48.

Ans Let the age of one of two friends be x .

Then the age of the other friend = $(20 - x)$

[$\because$ the sum of the ages of two friends is 20 years]

4 yr ago, age of one of two friends = $(x - 4)$

And age of the other friend = $(20 - x - 4) = (16 - x)$

According to the question,

$$(x - 4)(16 - x) = 48$$

$$\Rightarrow 16x - x^2 - 64 + 4x = 48$$

$$\Rightarrow x^2 - 20x + 112 = 0$$

On comparing with $ax^2 + bx + c = 0$, we get

$$a = 1, b = -20, \text{ and } c = 112$$

Now, discriminant, $D = b^2 - 4ac$

$$= (-20)^2 - 4 \times 1 \times 112$$

$$= 400 - 448$$

$$= -48 < 0$$

Which implies that the real roots are not possible as this condition represents imaginary roots. So, the solution does not exist and hence given situation is not possible.

18. The product of two consecutive positive integers is 240. Find the integers.

Soln.: Let the two consecutive positive integers be x and $(x + 1)$.

According to the question, we have

Product of two consecutive positive integers = 240

$$\Rightarrow x(x + 1) = 240$$

$$\Rightarrow x^2 + x = 240$$

$$\Rightarrow x^2 + x - 240 = 0$$

$$\Rightarrow x^2 + (16 - 15)x - 240 = 0$$

$$\Rightarrow x^2 + 16x - 15x - 240 = 0$$

$$\Rightarrow x(x + 16) - 15(x + 16) = 0$$

$$\Rightarrow (x + 16)(x - 15) = 0$$

$$\text{Either, } x + 16 = 0 \text{ or, } x - 15 = 0$$

$$\Rightarrow x = -16 \quad \text{or, } x = 15$$

Since x is a natural number,

$\therefore x = -16$ is rejected

Hence, the two consecutive positive integers are

$$x = 15 \text{ \& } x + 1 = 15 + 1 = 16.$$

19. Find the positive value of k for which $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will have real roots.

Soln.: Since, the equation $x^2 + kx + 64 = 0$ has real roots.

$\therefore$ Discriminant ≥ 0

$$\Rightarrow b^2 - 4ac \geq 0$$

$$\Rightarrow k^2 - 4 \times 1 \times 64 \geq 0$$

$$\Rightarrow k^2 - 256 \geq 0$$

$$\Rightarrow k^2 \geq 256$$

$$\Rightarrow k \geq \pm\sqrt{256}$$

$$\Rightarrow k \geq \pm 16$$

$$\Rightarrow k \geq 16 \text{ or, } k \leq -16 \quad \text{-----(i)}$$

Also,

Since, the equation $x^2 - 8x + k = 0$ has real roots.

$\therefore$ Discriminant ≥ 0

$$\Rightarrow b^2 - 4ac \geq 0$$

$$\Rightarrow (-8)^2 - 4 \times 1 \times k \geq 0$$

$$\Rightarrow 64 - 4k \geq 0$$

$$\Rightarrow 64 \geq 4k$$

$$\Rightarrow 4k \leq 64$$

$$\Rightarrow k \leq \frac{64}{4}$$

$$\Rightarrow k \leq 16 \quad \text{-----(ii)}$$

From equations (i) and (ii), we have

$$k = 16. \text{ (Ans)}$$

20. Find two numbers whose sum is 27 and the product is 182.

Soln.: Let the first number be x and the second number be $(27 - x)$.

According to the question, we have

$$\text{Product of two numbers} = 182$$

$$\Rightarrow x(27 - x) = 182$$

$$\Rightarrow 27x - x^2 = 182$$

$$\Rightarrow x^2 - 27x + 182 = 0$$

$$\Rightarrow x^2 - (14 + 13)x + 182 = 0$$

$$\Rightarrow x^2 - 14x - 13x + 182 = 0$$

$$\Rightarrow x(x - 14) - 13(x - 14) = 0$$

$$\Rightarrow (x - 14)(x - 13) = 0$$

$$\text{Either, } x - 14 = 0 \text{ or, } x - 13 = 0$$

$$\Rightarrow x = 14 \quad \text{or, } x = 13$$

$\therefore$ First number is equal to 13 or 14.

And, Second number = $27 - x = 27 - 13 = 14$.

Or, Second number = $27 - x = 27 - 14 = 13$.

Hence, the two numbers are 13 and 14.

21. The sum of two numbers is 16. The sum of their reciprocals is $\frac{1}{3}$. Find the numbers.

Soln.: Let one number be x (MBOSE 2025suppl)

And the other number = $16 - x$

According to the question, we have

$$\begin{aligned} \Rightarrow \frac{1}{x} + \frac{1}{16-x} &= \frac{1}{3} \\ \Rightarrow \frac{16-x+x}{x(16-x)} &= \frac{1}{3} \\ \Rightarrow \frac{16}{16x-x^2} &= \frac{1}{3} \\ \Rightarrow 16x - x^2 &= 48 \\ \Rightarrow x^2 - 16x + 48 &= 0 \\ \Rightarrow x^2 - (12+4)x + 48 &= 0 \\ \Rightarrow x^2 - 12x - 4x + 48 &= 0 \\ \Rightarrow x(x-12) - 4(x-12) &= 0 \\ \Rightarrow (x-12)(x-4) &= 0 \end{aligned}$$

Either, $x - 12 = 0$ or, $x - 4 = 0$

$$\Rightarrow x = 12 \quad \text{or,} \quad x = 4$$

$\therefore$ The numbers are 4 and 12.

22. The sum of a number and its reciprocal is $\frac{17}{4}$. Find the number.

Soln.: Let the number be x .

According to the question, we have

$$\begin{aligned} x + \frac{1}{x} &= \frac{17}{4} \\ \Rightarrow \frac{x^2+1}{x} &= \frac{17}{4} \\ \Rightarrow 4x^2 + 4 &= 17x \\ \Rightarrow 4x^2 - 17x + 4 &= 0 \\ \Rightarrow 4x^2 - (16+1)x + 4 &= 0 \\ \Rightarrow 4x^2 - 16x - x + 4 &= 0 \\ \Rightarrow 4x(x-4) - 1(x-4) &= 0 \\ \Rightarrow (x-4)(4x-1) &= 0 \end{aligned}$$

Either, $x - 4 = 0$ or, $4x - 1 = 0$

$$\Rightarrow x = 4 \quad \text{or,} \quad x = \frac{1}{4} \text{ (Rejected as it is a fraction)}$$

$\therefore$ The required number is 4. (Ans)

23. A train travels 360 km at a uniform speed. If the speed had been 5 km/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Soln.: Let the uniform speed of the train be x km/hr

Distance travelled by the train = 360 km

$$\begin{aligned} \therefore \text{Time taken to cover 360 km} &= \frac{\text{Distance}}{\text{Speed}} \\ &= \frac{360}{x} \text{ hours} \end{aligned}$$

If the speed had been 5 km/hr more
i.e., $(x+5)$ km/hr, then

$\therefore$ New time taken to cover 360 km

$$\begin{aligned} &= \frac{\text{Distance}}{\text{New Speed}} \\ &= \frac{360}{x+5} \text{ hours} \end{aligned}$$

Now, According to the question, we have

$$\begin{aligned} \frac{360}{x} - \frac{360}{x+5} &= 1 \\ \Rightarrow \frac{360(x+5) - 360x}{x(x+5)} &= 1 \\ \Rightarrow \frac{360x + 1800 - 360x}{x^2 + 5x} &= 1 \\ \Rightarrow 1800 &= x^2 + 5x \\ \Rightarrow x^2 + 5x - 1800 &= 0 \\ \Rightarrow x^2 + (45-40)x - 1800 &= 0 \\ \Rightarrow x^2 + 45x - 40x - 1800 &= 0 \\ \Rightarrow x(x+45) - 40(x+45) &= 0 \\ \Rightarrow (x+45)(x-40) &= 0 \end{aligned}$$

Either, $x + 45 = 0$ or, $x - 40 = 0$

$$\Rightarrow x = -45 \quad \text{or,} \quad x = 40$$

($x = -45$ is rejected because speed of train cannot be negative)

$\therefore x = 40$

Hence, the required speed of the train is 40 km/hr. (Ans)

24. Find the roots of the quadratic equation

$$\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0 \text{ by factorisation.}$$

Soln. $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

$$\begin{aligned} \Rightarrow \sqrt{2}x^2 + (5+2)x + 5\sqrt{2} &= 0 \\ \Rightarrow \sqrt{2}x^2 + 5x + 2x + 5\sqrt{2} &= 0 \\ \Rightarrow x(\sqrt{2}x + 5) + \sqrt{2}(\sqrt{2}x + 5) &= 0 \\ \Rightarrow (\sqrt{2}x + 5)(x + \sqrt{2}) &= 0 \end{aligned}$$

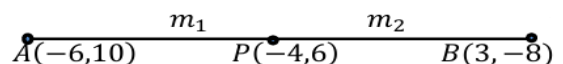
Either, $\sqrt{2}x + 5 = 0$ or, $x + \sqrt{2} = 0$

$$\Rightarrow x = \frac{-5}{\sqrt{2}} \quad \text{or,} \quad x = -\sqrt{2}$$

Hence, the roots are $\frac{-5}{\sqrt{2}}$ and $-\sqrt{2}$ (Ans)

25. In which ratio does the point $(-4,6)$ divide the line segment joining the points $A(-6,10)$ and $B(3,-8)$.

Soln.:



Let $P(-4,6)$ divide AB internally in the ratio

$m_1 : m_2$

Using the Section Formula, we get

$$\begin{aligned} (x, y) &= \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2} \right) \\ \Rightarrow (-4, 6) &= \left(\frac{m_1 \times 3 + m_2(-6)}{m_1 + m_2}, \frac{m_1(-8) + m_2 \times 10}{m_1 + m_2} \right) \end{aligned}$$

$$\Rightarrow (-4, 6) = \left(\frac{3m_1 - 6m_2}{m_1 + m_2}, \frac{-8m_1 + 10m_2}{m_1 + m_2} \right)$$

So, $-4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$ and $6 = \frac{-8m_1 + 10m_2}{m_1 + m_2}$

Now, $-4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$

$$\Rightarrow -4m_1 - 4m_2 = 3m_1 - 6m_2$$

$$\Rightarrow 3m_1 + 4m_1 = 6m_2 - 4m_2$$

$$\Rightarrow 7m_1 = 2m_2$$

$$\Rightarrow \frac{m_1}{m_2} = \frac{2}{7}$$

$$\Rightarrow m_1 : m_2 = 2 : 7$$

Hence, the required ratio is 2 : 7. (Ans)

26. If the points $A(6,1)$, $B(8,2)$, $C(9,4)$ and $D(P,3)$ are the vertices of a parallelogram taken in order, find the value of P .

Soln.: Given, points $A(6,1)$, $B(8,2)$, $C(9,4)$ and $D(P,3)$ are the vertices of a parallelogram $ABCD$. Since, the diagonals AC and BD of a parallelogram $ABCD$ bisect each other at a point M .
 $\therefore$ Mid-point M of AC and mid-point M of BD are same point.
 So, Coordinates of mid-point of AC =
 Coordinates of the mid-point of BD

$$\Rightarrow \left(\frac{6+9}{2}, \frac{1+4}{2} \right) = \left(\frac{8+P}{2}, \frac{2+3}{2} \right)$$

$$\Rightarrow \left(\frac{15}{2}, \frac{5}{2} \right) = \left(\frac{8+P}{2}, \frac{5}{2} \right)$$

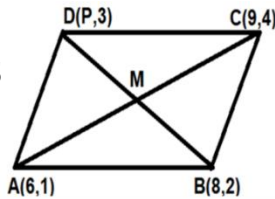
So, $\frac{15}{2} = \frac{8+P}{2}$

$$\Rightarrow 2(8+P) = 2 \times 15$$

$$\Rightarrow 8+P = \frac{30}{2}$$

$$\Rightarrow 8+P = 15$$

$$\Rightarrow P = 15 - 8$$

$$\Rightarrow P = 7. \text{ (Ans)}$$


27. Find a relation between x and y such that the point (x,y) is equidistant from the points $(7,1)$ and $(3,5)$.

Soln.: Let $P(x,y)$ be equidistant from the points $A(7,1)$ and $B(3,5)$.
 $AP = BP$
 $\Rightarrow AP^2 = BP^2$ (Squaring both sides)
 $\Rightarrow (x-7)^2 + (y-1)^2 = (x-3)^2 + (y-5)^2$
 $\Rightarrow x^2 - 2 \cdot x \cdot 7 + 7^2 + y^2 - 2 \cdot y \cdot 1 + 1^2 = x^2 - 2 \cdot x \cdot 3 + 3^2 + y^2 - 2 \cdot y \cdot 5 + 5^2$

$$\Rightarrow x^2 - 14x + 49 + y^2 - 2y + 1 = x^2 - 6x + 9 + y^2 - 10y + 25$$

$$\Rightarrow x^2 - 14x + y^2 - 2y + 50 = x^2 - 6x + y^2 - 10y + 34$$

$$\Rightarrow x^2 - x^2 + y^2 - y^2 - 14x + 6x - 2y + 10y = 34 - 50$$

$$\Rightarrow -8x + 8y = -16$$

$$\Rightarrow -8(x - y) = -16$$

$$\Rightarrow x - y = \frac{-16}{-8}$$

$$\Rightarrow x - y = 2$$

which is the required equation. (MBOSE 2025)

28. Find a point on the y -axis which is equidistant from the points $(2,3)$ and $(-4,1)$

Soln.: We know that a point on the y -axis is of the form $(0,y)$.

So, let the point $P(0,y)$ be equidistant from $A(2,3)$ and $B(-4,1)$.

$$\therefore PA = PB$$

$$\Rightarrow PA^2 = PB^2 \text{ (Squaring both sides)}$$

$$\Rightarrow (2-0)^2 + (3-y)^2 = (-4-0)^2 + (1-y)^2$$

$$\Rightarrow 2^2 + 3^2 - 6y + y^2 = 16 + 1 - 2y + y^2$$

$$\Rightarrow 13 - 6y + y^2 - y^2 = 17 - 2y$$

$$\Rightarrow -6y + 2y = 17 - 13$$

$$\Rightarrow -4y = 4$$

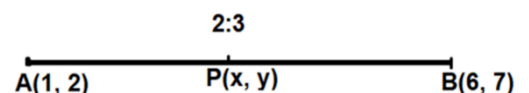
$$\Rightarrow y = \frac{4}{-4}$$

$$\Rightarrow y = -1$$

Hence, the required point on the y -axis is $(0,-1)$. (Ans)

29. If A and B are $(1,2)$ and $(6,7)$, respectively, find the coordinates of P such that $AP = \frac{2}{5}AB$ and P lies on the line segment AB .

Soln.:



Given, $AP = \frac{2}{5}AB$

$$\Rightarrow \frac{AP}{AB} = \frac{2}{5}$$

$$\Rightarrow \frac{AP+PB}{AB} = \frac{2+3}{5}$$

$$\Rightarrow 1 + \frac{PB}{AP} = 1 + \frac{3}{2}$$

$$\Rightarrow \frac{PB}{AP} = \frac{3}{2}$$

$$\Rightarrow \frac{AP}{PB} = \frac{2}{3}$$

Let $P(x, y)$ be the point which divides the line segment joining the points $A(1, 2)$ and $B(6, 7)$ in the ratio 2:3

$\therefore$ BY Section Formula, we get

$$\begin{aligned}(x, y) &= \left(\frac{2 \times 6 + 3 \times 1}{2 + 3}, \frac{2 \times 7 + 3 \times 2}{2 + 3} \right) \\ &= \left(\frac{12+3}{5}, \frac{14+6}{5} \right) \\ &= \left(\frac{15}{5}, \frac{20}{5} \right) \\ &= (3, 4)\end{aligned}$$

Hence, the required coordinates of the point P are $(3, 4)$. (Ans)

30. Check whether the points $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of an isosceles triangle.

Soln.: Let $A(3, 0)$, $B(6, 4)$ and $C(-1, 3)$ be the given points.

Then, Using Distance Formula, we get

$$\begin{aligned}AB &= \sqrt{(6-3)^2 + (4-0)^2} \\ &= \sqrt{3^2 + 4^2} \\ &= \sqrt{9 + 16} \\ &= \sqrt{25} \\ &= 5 \text{ units} \\ BC &= \sqrt{(-1-6)^2 + (3-4)^2} \\ &= \sqrt{(-7)^2 + (-1)^2} \\ &= \sqrt{49 + 1} \\ &= \sqrt{50} \\ &= 5\sqrt{2} \text{ units} \\ CA &= \sqrt{(-1-3)^2 + (3-0)^2} \\ &= \sqrt{(-4)^2 + 3^2} \\ &= \sqrt{16 + 9} \\ &= \sqrt{25} \\ &= 5 \text{ units}\end{aligned}$$

Since, $AB = CA$

$\therefore \triangle ABC$ is an isosceles triangle. (Ans)

31. Find the values of a for which the distance between the points $P(a, -1)$ and $Q(5, 3)$ is 5 units.

Soln.: According to the question, we have

$$\begin{aligned}PQ &= 5 \\ \Rightarrow PQ^2 &= 5^2 \text{ (Squaring both sides)} \\ \Rightarrow (5-a)^2 + (3+1)^2 &= 25 \\ \Rightarrow 5^2 - 2.5.a + a^2 + 4^2 &= 25 \\ \Rightarrow 25 - 10a + a^2 + 16 &= 25 \\ \Rightarrow 25 - 25 - 10a + a^2 + 16 &= 0 \\ \Rightarrow a^2 - 10a + 16 &= 0 \\ \Rightarrow a^2 - (8+2)a + 16 &= 0 \\ \Rightarrow a^2 - 8a - 2a + 16 &= 0\end{aligned}$$

$$\Rightarrow a(a-8) - 2(a-8) = 0$$

$$\Rightarrow (a-8)(a-2) = 0$$

Either, $a-8=0$ or, $a-2=0$

$$\Rightarrow a=8 \quad \text{or, } a=2$$

$\therefore a=2$ or 8. (Ans)

32. Find the coordinate of a point A , where AB is the diameter of a circle whose centre is $(2, -1)$ and B is $(5, 7)$.

Soln.: Suppose, AB be the diameter of a circle having its centre at $C(2, -1)$ and Coordinates of end-point B is $(5, 7)$.

Let the coordinates of A be (x, y) .

Since, AB is the diameter.

$\therefore C$ is the mid-point of AB .

Using Mid-Point Formula,

The coordinates of C are $\left(\frac{x+5}{2}, \frac{y+7}{2} \right)$

But, it is given that the coordinates of C are $(2, -1)$

$$\therefore \frac{x+5}{2} = 2$$

$$\Rightarrow x+5=4$$

$$\Rightarrow x=4-5$$

$$\Rightarrow x=-1$$

And,

$$\frac{y+7}{2} = -1$$

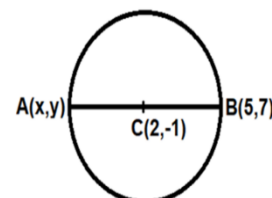
$$\Rightarrow y+7=-2$$

$$\Rightarrow y=-2-7$$

$$\Rightarrow y=-9$$

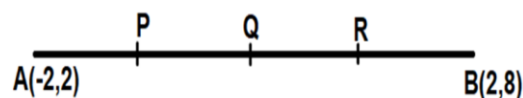
Hence, the required coordinate of

A is $(-1, -9)$. (Ans)



33. Find the coordinates of the points which divide the line segment joining $A(-2, 2)$ and $B(2, 8)$ into four equal parts.

Soln.: Let P, Q and R be the points that divide the line segment joining $A(-2, 2)$ and $B(2, 8)$ into four equal parts.



Since, Q divides the line segment AB into two equal parts i.e., Q is the mid-point of AB .

$\therefore$ Coordinates of $Q = \left(\frac{-2+2}{2}, \frac{2+8}{2} \right)$

$$= \left(\frac{0}{2}, \frac{10}{2}\right)$$

$$= (0, 5)$$

Now, P divides the line segment AQ into two equal parts i.e., P is the mid-point of AQ .

$$\therefore \text{Coordinates of } P = \left(\frac{-2+0}{2}, \frac{2+5}{2}\right)$$

$$= \left(\frac{-2}{2}, \frac{7}{2}\right)$$

$$= \left(-1, \frac{7}{2}\right)$$

Again, R divides the line segment QB into two equal parts i.e., R is the mid-point of QB .

$$\therefore \text{Coordinates of } R = \left(\frac{0+2}{2}, \frac{5+8}{2}\right)$$

$$= \left(\frac{2}{2}, \frac{13}{2}\right)$$

$$= \left(1, \frac{13}{2}\right)$$

Hence, the required coordinates of the points that divide the line segment AB into four equal parts are $P(0, 5)$,

$$Q\left(-1, \frac{7}{2}\right) \text{ and } R\left(1, \frac{13}{2}\right). \text{ (Ans)}$$

34. Find the coordinates of the point which divides the line segment joining the points $(4, -3)$ and $(8, 5)$ in the ratio $3:1$ internally.

Soln.: Let the coordinates of the point be $P(x, y)$.

$$\text{Here, } x_1 = 4, y_1 = -3$$

$$x_2 = 8, y_2 = 5$$

$$m_1 = 3, m_2 = 1$$

$\therefore$ By Section Formula, we have

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2} = \frac{3 \times 8 + 1 \times 4}{3 + 1} = \frac{24 + 4}{4}$$

$$= \frac{28}{4} = 7$$

And,

$$y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} = \frac{3 \times 5 + 1 \times (-3)}{3 + 1}$$

$$= \frac{15 - 3}{4} = \frac{12}{4} = 3$$

Hence, the required coordinates of the point are

$$P(7, 3). \text{ (Ans)}$$

Find a point on the x-axis which is equidistant from the points $(2, -5)$ and $(-2, 9)$.

Solution: Let the point on the x-axis be $P(x, 0)$. Let $A(2, -5)$ and $B(-2, 9)$ be the two points.

According to the question: $PA = PB$

$$\Rightarrow \sqrt{[(2-x)^2 + (-5-0)^2]} = \sqrt{[(-2-x)^2 + (9-0)^2]}$$

$$\Rightarrow \sqrt{[x^2 - 4x + 4 + 25]} = \sqrt{[x^2 + 4x + 4 + 81]}$$

$$\Rightarrow x^2 - 4x + 29 = x^2 + 4x + 85$$

$$\Rightarrow -8x = 56 \Rightarrow x = -7$$

$\therefore$ Required point on the x-axis is $P(-7, 0)$

35. Find the ratio in which the line segment joining $A(1, -5)$ and $B(-4, 5)$ is divided by the x-axis. Also, find the coordinates of the point of division.

Solution:

Let the x-axis divide the segment in the ratio $k:1$ at point $M(x, 0)$.

Using section formula:

$$(x, y) = \left(\frac{k(-4) + 1(1)}{k+1}, \frac{k(-5) + 1(5)}{k+1}\right)$$

Setting $y = 0$:

$$(5k - 5)/(k + 1) = 0 \rightarrow k = 1$$

$$\text{Substitute } k = 1 \text{ into } x: x = (-4 + 1)/2 = -3/2$$

Therefore, the ratio is $1:1$ and point of division is $(-3/2, 0)$.

36. From a point Q , the length of the tangent to a circle is 24 cm and the distance of Q from the Centre is 25 cm . Find the diameter of the circle. (MBOSE 2025)

Soln.: Let the length of the tangent be $PQ = 24\text{ cm}$ and $OQ = 25\text{ cm}$.

Radius OP is joined.

We know that a tangent at any point of a circle is Perpendicular to the radius through the point of Contact.

$$\therefore OP \perp PQ = 90^\circ$$

Now, in rt. ΔOPQ ,

By Pythagoras theorem, we have

$$OQ^2 = OP^2 + PQ^2$$

$$\Rightarrow (25)^2 = OP^2 + (24)^2$$

$$\Rightarrow 625 = OP^2 + 576$$

$$\Rightarrow OP^2 = 625 - 576$$

$$\Rightarrow OP^2 = 49$$

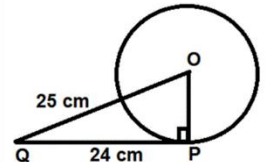
$$\Rightarrow OP = \sqrt{49}$$

$$\Rightarrow OP = 7\text{ cm}$$

Hence, the required diameter of the circle $= 2 \times \text{radius}$

$$= 2 \times 7$$

$$= 14\text{ cm}. \text{ (Ans)}$$



37. The length of a tangent from a point A at a distance 5 cm from the centre of the circle is 4 cm . Find the radius of the circle.

Soln.: Let O be the centre of the circle and P be the point of contact.

Tangent, $AP = 4\text{ cm}$ and $OA = 5\text{ cm}$.

Radius, OP is joined.

Since, the tangent at any point of a circle is Perpendicular to the radius through the point of

Contact.

$$\therefore OP \perp AP \Rightarrow \angle OPA = 90^\circ$$

Now, in rt. ΔOPA ,

By Pythagoras theorem, we have

$$OA^2 = OP^2 + AP^2$$

$$\Rightarrow (5)^2 = OP^2 + (4)^2$$

$$\Rightarrow 25 = OP^2 + 16$$

$$\Rightarrow OP^2 = 25 - 16$$

$$\Rightarrow OP^2 = 9$$

$$\Rightarrow OP = \sqrt{9}$$

$$\Rightarrow OP = 3 \text{ cm}$$

Hence, the radius of the circle is 3 cm. (Ans)

38. In the given figure, if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 130^\circ$, then find $\angle PTQ$.

Soln.: Given: $\angle POQ = 130^\circ$.

We know that a tangent at any point of a circle is Perpendicular to the radius through the point of Contact **(MBOSE 2025 Suppl)**

$$\therefore OP \perp PT \text{ and } OQ \perp QT$$

$$\Rightarrow \angle OPT = 90^\circ \text{ and } \angle OQT = 90^\circ \text{ -----(i)}$$

Now, in a quadrilateral $OPTQ$,

Since, the sum of the four angles of a quadrilateral is 360°

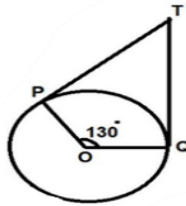
$$\therefore \angle POQ + \angle OPT + \angle PTQ + \angle OQT = 360^\circ$$

$$\Rightarrow 130^\circ + 90^\circ + \angle PTQ + 90^\circ = 360^\circ$$

$$\Rightarrow 310^\circ + \angle PTQ = 360^\circ$$

$$\Rightarrow \angle PTQ = 360^\circ - 310^\circ$$

$$\Rightarrow \angle PTQ = 50^\circ \text{ (Ans)}$$



39. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Soln.: Let PQ be the diameter of a given circle With centre O and two tangents AB and CD are drawn to the circle at points P and Q respectively. **(MBOSE 2025 Suppl)**

Now, since the tangent at any point of a circle is Perpendicular to the radius through the point of Contact.

$$OP \perp AB \text{ and } OQ \perp CD$$

$$PQ \perp AB \text{ and } PQ \perp CD$$

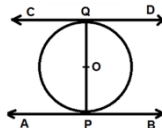
$$\Rightarrow \angle APQ = 90^\circ \text{ and }$$

$$\angle PQD = 90^\circ$$

$$\Rightarrow \angle APQ = \angle PQD$$

Since, these are a pair of alternate angles.

$\therefore AB \parallel CD$. Hence, Proved.



40. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

Soln.: Let O be the common centre of two concentric circles and let

PQ be a chord

of larger circles touching the smaller circles at M .

OM is joined.

So, $OM = 3 \text{ cm}$ and $OP = 5 \text{ cm}$

Since, OM is the radius of the smaller circle

And PQ is the tangent to this circle at M .

$$\therefore OM \perp PQ$$

We know that the perpendicular drawn from the centre of a circle to any chord of the circle, bisects the chord.

i.e., OM bisects PQ

$$\therefore PM = MQ$$

$$\Rightarrow PQ = \frac{1}{2} PQ$$

$$2PM = PQ \text{ -----(i)}$$

Now, in rt. ΔPMO ,

By Pythagoras Theorem, we have

$$OP^2 = OM^2 + PM^2$$

$$\Rightarrow (5)^2 = (3)^2 + PM^2$$

$$\Rightarrow 25 = 9 + PM^2$$

$$\Rightarrow PM^2 = 25 - 9$$

$$\Rightarrow PM^2 = 16$$

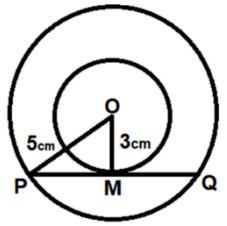
$$\Rightarrow PM = \sqrt{16}$$

$$\Rightarrow PM = 4 \text{ cm.}$$

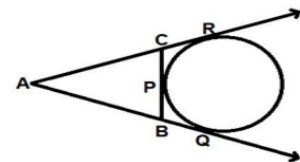
$\therefore$ From eqn. (i), we have

$$PQ = 2PM = 2 \times 4 = 8 \text{ cm}$$

Hence, the length of the chord of the larger circle which touches the smaller circle is 8 cm. (Ans)



41. A circle touches the side BC of ΔABC , at P and touches AB and AC produces at Q and R respectively. Prove that $AQ = \frac{1}{2}(\text{Perimeter of } \Delta ABC)$.



Soln.: Since the lengths of the tangents drawn from an external point to a circle are equal.

$$\therefore BP = BQ \text{ (Tangents from B) -----(i)}$$

$$CP = CR \text{ (Tangents from C) -----(ii)}$$

$$\& AQ = AR \text{ (Tangents from A) -----(iii)}$$

Now,

$$\text{Perimeter of } \triangle ABC = AB + BC + AC$$

$$\begin{aligned} &= AB + (BP + PC) + AC \\ &= AB + BQ + CR + AC \text{ [from (i)&(ii)]} \\ &= (AB + BQ) + (AC + CR) \\ &= AQ + AR \\ &= AQ + AQ \text{ [from (iii)]} \\ &= 2AQ \\ \therefore AQ &= \frac{1}{2}(\text{perimeter of } \triangle ABC) \end{aligned}$$

Hence, Proved.

42. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

Soln.: Let PA and PB be two tangents drawn from an external point P to a circle with centre O.

To Prove: $\angle AOB + \angle APB = 180^\circ$

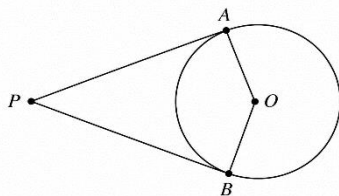
Proof: Since, tangent at any point of a circle is Perpendicular to the radius through the point of contact.

$$\therefore OA \perp AP \Rightarrow \angle OAP = 90^\circ \text{ ----- (i)}$$

$$\& OB \perp BP \Rightarrow \angle OBP = 90^\circ \text{ ----- (ii)}$$

Now,

Since, the sum of the four angles of a quadrilateral is 360°



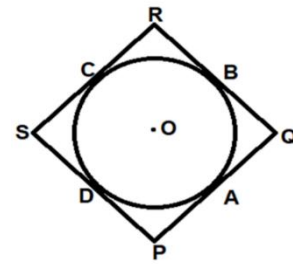
$$\begin{aligned} \therefore \angle AOB + \angle OAP + \angle APB + \angle OBP &= 360^\circ \\ \Rightarrow \angle AOB + 90^\circ + \angle APB + 90^\circ &= 360^\circ \text{ [from (i)&(ii)]} \\ \angle AOB + \angle APB + 180^\circ &= 360^\circ \\ \Rightarrow \angle AOB + \angle APB &= 360^\circ - 180^\circ \\ \Rightarrow \angle AOB + \angle APB &= 180^\circ \end{aligned}$$

Hence, Proved.

43. Prove that a parallelogram circumscribing a circle is a rhombus. (MBOSE 2025)

Soln.: Let PQRS be a parallelogram such that its sides touch a circle with centre O.

We know, that the lengths of tangent drawn from an external point to a circle are equal.



Therefore, we have
 $PA =$

PD (Tangents from P)----- (i)

$QA = QB$ (Tangents from Q)----- (ii)

$RC = RB$ (Tangents from R)----- (iii)

$\& SC = SD$ (Tangents from S)----- (iv)

Now, adding (i), (ii), (iii) & (iv), we get

$$PA + QA + RC + SC = PD + QD + RB + SD$$

$$\Rightarrow (PA + QA) + (RC + SC) = (PD + SD) + (QB + RB)$$

$$\Rightarrow PQ + RS = PS + QR$$

$$\Rightarrow PQ + PQ = QR + QR$$

$$\Rightarrow [\text{since, PQRS is a parallelogram, } PQ = RS \& QR = PS]$$

$$\Rightarrow 2PQ = 2QR$$

$$\Rightarrow PQ = QR$$

$$\therefore PQ = QR = RS = PS$$

Hence, PQRS is a rhombus. (Proved)

44. In the figure, if $PM = 15\text{cm}$, $RL = 12\text{cm}$ and $QN = 7\text{cm}$, then find the perimeter of the triangle PQR.

Soln.: Given: $PM = 15\text{cm}$, $RL = 12\text{cm}$ and $QN =$

7cm

We know, that the lengths of two tangents

Drawn from an external point to a circle are equal.

$$\therefore PM = PN = 15\text{cm}$$

$$QN = QL = 7\text{cm}$$

$$RL = RM = 12\text{cm}$$

Now,

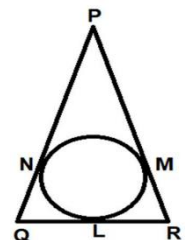
$$\text{Perimeter of } \triangle PQR = PQ + QR + RP$$

$$= (PN + QN) + (QL + RL) + (RM + MP)$$

$$= (15 + 7) + (7 + 12) + (12 + 15)$$

$$= 22 + 19 + 27$$

$$= 68\text{cm (Ans)}$$



45. In the figure, if $AB = AC$, prove that $BE = EC$.

Soln.: Given: $AB = AC$

To Prove: $BE = EC$

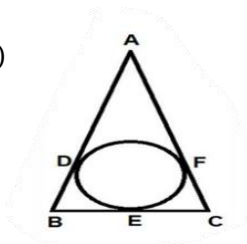
Since, the lengths of two tangents drawn from

an external point to a circle are equal.

- $\therefore AD = AF$ (Tangents from A)-----(i)
 $BD = BE$ (Tangents from B)-----(ii)
 $CE = CF$ (Tangents from C)-----(iii)

Now,

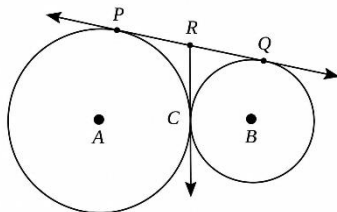
$$\begin{aligned}
 &AB = AC \text{ (given)} \\
 \Rightarrow &AD + BD = AF + CF \\
 \Rightarrow &AF + BD = AF + CF \text{ [From (i)]} \\
 \Rightarrow &AF - AF + BD = CF \\
 \Rightarrow &BD = CF \\
 \Rightarrow &BE = EC \text{ [From (ii)&(iii)]} \\
 \text{Hence, } &BE = EC. \text{ Proved.}
 \end{aligned}$$



46. In the figure, two circles touch each other at C.
 Prove that the common tangent to the circle at C, bisects the common tangent at point P and Q.

Solution:

We know that the lengths of tangents drawn from an



external point to a circle are equal.

- $PR = RC$ (tangent at R) ----- (i)
 $RQ = RC$ (tangent at R) ----- (ii)
 From equation (i) and (ii), we get
 $PR = RQ$

Thus, R is the midpoint of PQ
 Hence, RC bisects the tangent PQ.
 Hence Proved.

47. In the given figure, $AB = BC = 10$ cm. If $AC = 7$ cm, then find the length of BP.

Solution:

Let $BP = x$ cm

Given $AB = BC = 10$ cm.

$$\Rightarrow AP = AB - BP$$

$$\Rightarrow AP = (10 - x) \text{ cm}$$

Now, $AP = AR$ (Tangents drawn from an external point are equal)

$$\Rightarrow (10 - x) \text{ cm} = AR \quad \dots(1)$$

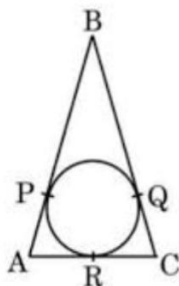
Also, $AC = 7$ cm

$$\Rightarrow AR + RC = 7 \text{ cm}$$

$$\Rightarrow RC = 7 \text{ cm} - AR$$

$$\Rightarrow RC = 7 \text{ cm} - (10 - x) \text{ cm} \quad (\text{using eq. (1)})$$

$$\Rightarrow RC = (x - 3) \text{ cm}$$



Also, $QC = RC$ (Tangents drawn from an external point are equal)

$$\Rightarrow (x - 3) \text{ cm} = QC$$

Also, $BC = 10$ cm

$\Rightarrow BQ + QC = 10$ cm [BQ= BP = x cm, (Tangents drawn from an external point are equal)]

$$\Rightarrow x \text{ cm} + (x - 3) \text{ cm} = 10 \text{ cm}$$

$$\Rightarrow 2x \text{ cm} - 3 \text{ cm} = 10 \text{ cm}$$

$$\Rightarrow 2x = 10 \text{ cm} + 3 \text{ cm}$$

$$\Rightarrow 2x = 13 \text{ cm}$$

$$\Rightarrow x = 13/2$$

$$x = 6.5 \text{ cm}$$

Therefore BP = 6.5 cm

48. The area of a square is same as the area of a circle. What is the ratio of their perimeters?

Soln.: Let, a be the side of a square
 & r be the radius of a circle

Given that, $\text{Area of a square} = \text{Area of a circle}$

$$\Rightarrow a^2 = \pi r^2$$

$$\Rightarrow a = \sqrt{\pi r^2}$$

$$\Rightarrow a = r\sqrt{\pi}$$

Now,

Required ratio of their perimeters = $\frac{\text{Perimeter of a square}}{\text{Perimeter of a circle}}$

$$= \frac{4a}{2\pi r}$$

$$= \frac{4(r\sqrt{\pi})}{2\pi r}$$

$$= \frac{2\sqrt{\pi}}{\pi}$$

$$= \frac{2}{\sqrt{\pi}}$$

$$= 2 : \sqrt{\pi} \text{ (Ans)}$$

49. Find the area of the sector of a circle of radius 8 cm and the angle at the centre 30°

Soln.: Given: Radius, $r = 8$ cm

& Central angle, $\theta = 30^\circ$

Now,

Area of sector of a circle = $\frac{\theta}{360^\circ} (\pi r^2)$

$$= \frac{30^\circ}{360^\circ} \left\{ \frac{22}{7} \times (8)^2 \right\}$$

$$= \frac{1}{12} \times \frac{22}{7} \times 8 \times 8$$

$$= \frac{352}{21} \text{ cm}^2$$

$$= 16.76 \text{ cm}^2 \text{ (Ans)}$$

50. A chord of a circle of radius 14 cm subtends an angle 60° at the centre. Find the area of the major sector.

Soln.: Given: Radius, $r = 14\text{ cm}$
& Central angle (minor sector) $= 60^\circ$
 $\therefore$ Central angle for major sector, $\theta = 360^\circ - 60^\circ = 300^\circ$

Now,

$$\begin{aligned}\text{Area of the major sector} &= \frac{\theta}{360^\circ} (\pi r^2) \\ &= \frac{300^\circ}{360^\circ} \left\{ \frac{22}{7} \times (14)^2 \right\} \\ &= \frac{5}{6} \times \frac{22}{7} \times 14 \times 14 \\ &= 154\text{ cm}^2 \text{ (Ans)}\end{aligned}$$

(MBOSE 2025 suppl)

51. Find the angle subtended at the centre of a circle of radius 5 cm by an arc of length $\frac{5\pi}{3}\text{ cm}$.

Soln.: Given: Radius, $r = 5\text{ cm}$
Let the Central angle be θ .

We Know,

$$\begin{aligned}\text{Length of an arc} &= \frac{\theta}{360^\circ} (2\pi r) \\ \Rightarrow \frac{5\pi}{3} &= \frac{\theta}{360^\circ} (2 \times \pi \times 5) \\ \Rightarrow \frac{5}{3} &= \frac{\theta}{360^\circ} \times 10 \\ \Rightarrow \frac{5}{3} &= \frac{\theta}{36} \\ \Rightarrow \theta &= \frac{5 \times 36}{3} \\ \Rightarrow \theta &= 60^\circ \text{ (Ans)}\end{aligned}$$

52. An arc of length $20\pi\text{ cm}$ subtends an angle 144° at the centre. Find the radius of the circle.

Soln.: Given: Central angle, $\theta = 144^\circ$
& Length of an arc, $l = 20\pi\text{ cm}$
Let, r be the radius of the circle.

Now,

$$\begin{aligned}\text{Length of an arc} &= \frac{\theta}{360^\circ} (2\pi r) \\ \Rightarrow 20\pi &= \frac{144^\circ}{360^\circ} (2\pi r) \\ \Rightarrow 20 &= \frac{144}{360} (2r) \\ \Rightarrow r &= \frac{20 \times 360}{144 \times 2} \\ \Rightarrow r &= 25\text{ cm} \text{ (Ans)}\end{aligned}$$

53. The minute hand of a clock is 7 cm long. Find the area swept by the minute hand between 9 AM to $9:05\text{ AM}$.

Soln.: Given: Radius, $r = 7\text{ cm}$
We know, $60\text{ minutes} = 360^\circ$

$$\begin{aligned}\Rightarrow 1\text{ minute} &= \frac{360^\circ}{60} \\ \Rightarrow 5\text{ minutes} &= \frac{360}{60} \times 5 \\ \Rightarrow &= 30^\circ\end{aligned}$$

$\Rightarrow$ Central angle, $\theta = 30^\circ$

Now,

Area swept by the minute hand = Area of the minor sector

$$\begin{aligned}&= \frac{\theta}{360^\circ} (\pi r^2) \\ &= \frac{30}{360} \left\{ \frac{22}{7} \times (7)^2 \right\} \\ &= \frac{1}{12} \left(\frac{22}{7} \times 7 \times 7 \right) \\ &= \frac{77}{6}\text{ cm}^2 \\ &= 12.83\text{ cm}^2 \text{ (Ans)}\end{aligned}$$

54. Find the area of a quadrant of a circle whose circumference is 22 cm .

Soln.: Let, r be the radius of a circle.

Given, Circumference of a circle $= 22\text{ cm}$

$$\begin{aligned}\Rightarrow 2\pi r &= 22 \\ \Rightarrow 2 \times \frac{22}{7} \times r &= 22 \\ \Rightarrow r &= \frac{22 \times 7}{2 \times 22} \\ \Rightarrow r &= \frac{7}{2}\text{ cm}\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of a quadrant of a circle} &= \frac{1}{4} \pi r^2 \\ &= \frac{1}{4} \times \frac{22}{7} \times \left(\frac{7}{2} \right)^2 \\ &= \frac{1}{4} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \\ &= \frac{77}{8}\text{ cm}^2 \\ &= 9.63\text{ cm}^2\end{aligned}$$

(Ans)

55. An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle of radius 45 cm , find the area between the two consecutive ribs of the umbrella.

Soln.: Given: Radius, $r = 45\text{ cm}$
Since, there are 8 ribs in the umbrella
 $\therefore$ Central angle, $\theta = \frac{360}{8} = 45^\circ$

Now,

Area between two consecutive ribs =

Area of the minor sector

$$\begin{aligned}&= \frac{\theta}{360^\circ} (\pi r^2) \\ &= \frac{45}{360} \left\{ \frac{22}{7} \times (45)^2 \right\} \\ &= \frac{1}{8} \left(\frac{22}{7} \times 45 \times 45 \right) \\ &= \frac{44550}{56}\end{aligned}$$

$$= 795.5 \text{ cm}^2$$

Hence, the area between the two consecutive ribs is 795.5 cm^2 . (Ans)

56. A car has two wipers which do not overlap. Each wiper has a length 25 cm sweeping through an angle of 115° . Find the total area cleaned at each sweep of the blades.

Soln.: Given: Radius, $r = 25 \text{ cm}$
& Central angle, $\theta = 115^\circ$

Now,

Area swept by each blade =

Area of the sector

$$\begin{aligned} &= \frac{\theta}{360^\circ} (\pi r^2) \\ &= \frac{115}{360} \left\{ \frac{22}{7} \times (25)^2 \right\} \\ &= \frac{115}{360} \left(\frac{22}{7} \times 25 \times 25 \right) \\ &= \frac{1581250}{2520} \\ &= 627.48 \text{ cm}^2 \end{aligned}$$

Hence, total area cleaned at each sweep by 2 blades
 $= 2 \times 627.48$
 $= 1254.96 \text{ cm}^2$ (Ans)

57. To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km . Find the area of the sea over which the ships are warned. (use $\pi = 3.14$)

Soln.: Given: Radius, $r = 16.5 \text{ km}$
& Central angle, $\theta = 80^\circ$

Now,

$$\begin{aligned} \text{Area of the sector} &= \frac{\theta}{360^\circ} (\pi r^2) \\ &= \frac{80}{360} \{3.14 \times (16.5)^2\} \\ &= \frac{80}{360} (3.14 \times 16.5 \times 16.5) \\ &= \frac{1709.73}{9} \\ &= 189.97 \text{ km}^2 \end{aligned}$$

Hence, the area of the sea over which the ships are warned is 189.97 km^2 . (Ans)

58. A ceiling fan has three wings. Find the length of the arc described between two consecutive wings, where the length of each wing is 0.98 m .

Now, area of each sector = $(1/3) \times$ area of circle formed by the wings of fan

$$= (1/3) \times \pi \times r^2, \text{ where } r = 0.98 \text{ m}$$

$$= (1/3) \times (22/7) \times (0.98 \text{ m})^2$$

$$= (1/3) \times (22/7) \times 0.98 \text{ m} \times 0.98 \text{ m} \dots(i)$$

Also, area of each sector = $(1/2) \times l \times r$

$$= (1/2) \times l \times 0.98 \text{ m} \dots(ii)$$

$\therefore$ From eq (i) and (ii), we get

$$(1/2) \times l \times 0.98 \text{ m} = (1/3) \times (22/7) \times 0.98 \text{ m} \times 0.98 \text{ m}$$

$$\Rightarrow l = (2 \times 22 \times 0.98 \text{ m} \times 0.98 \text{ m}) / (3 \times 7 \times 0.98 \text{ m})$$

$$\Rightarrow l = (2 \times 22 \times 0.98) / (3 \times 7)$$

$$\Rightarrow l = 2.05 \text{ m (approx.)}$$

Therefore the length of the arc described = 2.05 cm

59. Find the difference of the area of a sector of angle 120° and its corresponding major sector of a circle of radius 21 cm .

Ans: radius (r) = 21 cm

sector angle (θ) = 120°

The difference of the areas of minor sector and the corresponding major sector

= area of major sector - area of the minor sector

= πr^2 - area of the minor sector -- area of the major sector = $\pi r^2 - 2 \times$ area of the minor sector

$$= \frac{22}{7} \times 21 \times 21 - \frac{2 \times \pi r^2 \theta}{360^\circ}$$

$$= 1386 - 2 \times \frac{22}{7} \times 21 \times 21 \times \frac{120^\circ}{360^\circ}$$

$$= 1386 - 924$$

$$= 462 \text{ cm}^2$$

60. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table below. Find the mode of the data: (MBOSE 2025)

Let l be the length of the arc described.

No. of cars	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	14	13	12	20	11	15	8

Soln.: Since the maximum frequency is 20 and the class corresponding to this frequency is 40 – 50.

So, the modal class is 40 – 50.

Therefore, lower limit (l) of the modal class = 40

Class size (h) = 10

Frequency (f_1) of the modal class = 20

Frequency (f_0) of the class preceding the modal class = 12

Frequency (f_2) of the class succeeding the modal class = 11

Now, Using the formula, we have

$$\begin{aligned}
 \text{Mode} &= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h \\
 &= 40 + \left(\frac{20 - 12}{2 \times 20 - 12 - 11} \right) \times 10 \\
 &= 40 + \left(\frac{8}{40 - 23} \right) \times 10 \\
 &= 40 + \frac{80}{17} \\
 &= 40 + 4.7 \\
 &= 44.7 \text{ cars (Ans)}
 \end{aligned}$$

61. The mileage (Km per litre) of 50 cars of the same model was tested by a manufacturer and details are tabulated as given below:

Mileage (Km per litre)	10 – 12	12 – 14	14 – 16	16 – 18
Number of cars	7	12	18	13

Find the mean mileage.

Soln.:

Mileage (Km per litre)	Class Mark (x_i)	Number of cars (f_i)	$f_i x_i$
10 – 12	11	7	77
12 – 14	13	12	156
14 – 16	15	18	270
16 – 18	17	13	221
		$\sum f_i = 50$	$\sum f_i x_i = 724$

Now, Using the formula, we have

$$\begin{aligned}
 \text{Mean, } \bar{x} &= \frac{\sum f_i x_i}{\sum f_i} \\
 &= \frac{724}{50}
 \end{aligned}$$

$$= 14.48$$

Hence, mean mileage is 14.48 Km per litre. (Ans)

62. The maximum bowling speeds in Km per hour, of 33 players at a cricket coaching centre are given as follows:

Speed (Km per hour)	85 – 100	100 – 115	115 – 130	130 – 145
Number of players	11	9	8	5

Calculate the median bowling speed.

Soln.:

Speed (Km per hour)	Number of players	Cumulative Frequency
85 – 100	11	11
100 – 115	9	11 + 9 = 20
115 – 130	8	20 + 8 = 28
130 – 145	5	28 + 5 = 33

Here, $n = 33$

Now, $\frac{n}{2} = \frac{33}{2} = 16.5$ which lies in the class 100 – 115.

So, the median class is 100 – 115

Here, l = lower limit of the median class = 100

n = Number of observation = 33

cf = Cumulative frequency of the class preceding the median class = 11

f = Frequency of the median class = 9

h = Class size = 15

Now, Using the formula, we have

$$\begin{aligned}
 \text{Median} &= l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h \\
 &= 100 + \left(\frac{16.5 - 11}{9} \right) \times 15 \\
 &= 100 + \left(\frac{5.5}{9} \right) \times 15 \\
 &= 100 + \frac{82.5}{9} \\
 &= 100 + 9.17 \\
 &= 109.17
 \end{aligned}$$

Hence, median bowling speed is 109.17 Km per hour. (Ans)

63. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality.

Monthly Consumption (in units)	Number of consumers
65 – 85	4
85 – 105	5
105 – 125	13
125 – 145	20
145 – 165	14
165 – 185	8
185 – 205	4

Based on the above information, answer the following questions:

- Find the median class of the data.
- Find the class mark of the median class.

Soln.:

Monthly Consumption (in units)	Number of consumers	Cumulative Frequency (cf)
65 – 85	4	4
85 – 105	5	4 + 5 = 9
105 – 125	13	9 + 13 = 22
125 – 145	20	22 + 20 = 42
145 – 165	14	42 + 14 = 56
165 – 185	8	56 + 8 = 64
185 – 205	4	64 + 4 = 68
Total	$N = 68$	

Here, $n = 68$

$\Rightarrow \frac{n}{2} = \frac{68}{2} = 34$ which is just greater than the cumulative frequency 22 and lies in the class 125 – 145.

- So, the median class of the given data is 125 – 145.
- The class mark of the median class 125 – 145 is

$$= \frac{\text{lower class limit} + \text{upper class limit}}{2}$$

$$= \frac{125 + 145}{2}$$

$$= \frac{270}{2}$$

$$= 135. \text{ (Ans)}$$

64. For the following distribution:

Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency	10	15	12	20	9

Find the sum of lower limit of the median class and the lower limit of the modal class.

Soln.:

Class	Frequency	Cumulative Frequency (cf)
0 – 5	10	10
5 – 10	15	10 + 15 = 25
10 – 15	12	25 + 12 = 37
15 – 20	20	37 + 20 = 57
20 – 25	9	57 + 9 = 66

Here, $n = 66$

$\Rightarrow \frac{n}{2} = \frac{66}{2} = 33$, which lies in the class interval 10 – 15.

So, Median class is 10 – 15

So, lower limit of the median class is 10

Also, the highest frequency is 20, which lies in the class interval 15 – 20.

So, Modal Class is 15 – 20

So, lower limit of the modal class is 15

Hence, required sum = 10 + 15 = 25.

(Ans)

65. Find the mean of the following data:

x_i	13	15	17	19	21	23
f_i	8	2	3	4	5	6

Soln.:

x_i	f_i	$f_i x_i$
13	8	104
15	2	30
17	3	51
19	4	76
21	5	105
23	6	138
	$\sum f_i = 28$	$\sum f_i x_i = 504$

Now, Using the formula, we have

$$\text{Mean, } \bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{504}{28} = 18. \text{ (Ans)}$$

66. For the following distribution:

Marks	Number of students
Below 10	3
Below 20	12
Below 30	27
Below 40	57
Below 50	75
Below 60	80

Find the modal class.

Soln.:

Marks	Number of students	Cumulative Frequency (cf)
Below 10	3	3
10 – 20	(12 – 3) = 9	12
20 – 30	(27 – 12) = 15	27
30 – 40	(57 – 27) = 30	57
40 – 50	(75 – 57) = 18	75
50 – 60	(80 – 75) = 5	80

So, we see that the highest frequency is 30, which lies in the class interval 30 – 40.

∴ The modal class is 30 – 40. (Ans)

67. What is the difference of median and mean, if the difference of mode and median is 24?

Soln.: Given:

$$Mode - Median = 24$$

$$\Rightarrow Mode = 24 + Median \text{-----(i)}$$

Now, Relation among mean, median and mode is –

$$Mode = 3Median - 2Mean \text{-----(ii)}$$

From equation (i) and (ii), we get

$$3Median - 2Mean = 24 + Median$$

$$3Median - Median - 2Mean = 24$$

$$\Rightarrow 2Median - 2Mean = 24$$

$$\Rightarrow 2(Median - Mean) = 24$$

$$\Rightarrow Median - Mean = \frac{24}{2}$$

$$\Rightarrow Median - Mean = 12.$$

(Ans)

68. Find the mode, if

l = Lower limit of the modal class = 1500

h = Class size = 500

f_1 = Frequency of the modal class = 40

f_0 = Frequency of the class preceding the modal class = 24

f_2 = Frequency of the class succeeding the modal class = 33

Soln.: Using the formula, we have

$$\begin{aligned} Mode &= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h \\ &= 1500 + \left(\frac{40 - 24}{2 \times 40 - 24 - 33} \right) \times 500 \\ &= 1500 + \left(\frac{16}{80 - 57} \right) \times 500 \\ &= 1500 + \left(\frac{16}{23} \right) \times 500 \\ &= 1500 + \frac{8000}{23} \\ &= 1500 + 347.83 \\ &= 1847.83 \text{ (Ans)} \end{aligned}$$

69. Find the median, if

l = lower limit of the median class = 3000

n = number of observation = 400

cf = cumulative frequency of the class preceding the median class = 130

f = frequency of the median class = 86

h = class size = 500

(MBOSE 2025 suppl)

Soln.: Using the formula, we have

$$\begin{aligned} Median &= l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h \\ &= 3000 + \left(\frac{\frac{400}{2} - 130}{86} \right) \times 500 \\ &= 3000 + \left(\frac{200 - 130}{86} \right) \times 500 \\ &= 3000 + \left(\frac{70}{86} \right) \times 500 \\ &= 3000 + \frac{35000}{86} \\ &= 3000 + 406.98 \\ &= 3406.98 \text{ (Ans)} \end{aligned}$$

70. If the median of the following distribution is 58 and the sum of all the frequencies is 140, find the values of x and y :

Class Interval	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85	85 - 95
Frequency	8	10	x	25	40	y	15	7

Solution:

Given: Median = 58 and $\sum f_i = 140$

Also, sum of all frequencies = 140

$$\text{So, } 8 + 10 + x + 25 + 40 + y + 15 + 7 = 140$$

$$\begin{aligned} \Rightarrow x + y + 105 &= 140 \\ \Rightarrow x + y &= 140 - 105 \\ x + y &= 35 \quad \text{--- (1)} \end{aligned}$$

Now, the cumulative frequency table is as follows:

Class Interval	Frequency	Cumulative Frequency (cf)
15–25	8	8
25–35	10	$8 + 10 = 18$
35–45	x	$18 + x$
45–55	25	$18 + x + 25 = 43 + x$
55–65	40	$43 + 40 = 83 + x$
65–75	y	$83 + x + y$
75–85	15	$83 + x + y + 15 = 98 + x + y$
85–95	7	$98 + x + y + 7 = 105 + x + y$
Total	$x + x + y + 105$	

Here, $n = 140 \Rightarrow n/2 = 140/2 = 70$.

Given, median = 58, which lies in the class 55 - 65

So, the median class is 55 - 65

Here,

l = lower limit of median class = 55

h = class size = 10

f = frequency of median class = 40

cf = cumulative frequency of class preceding the median class

$$= 43 + x$$

$$\text{Median} = l + \{(n/2 - cf)/f\} \times h$$

$$\Rightarrow 58 = 55 + \{(70 - (43 + x))/40\} \times 10$$

$$\Rightarrow 58 - 55 = (70 - 43 - x)/40 \times 10$$

$$\begin{aligned} \Rightarrow 3 &= (27 - x)/4 \\ \Rightarrow 12 &= 27 - x \\ \Rightarrow x &= 27 - 12 \\ \Rightarrow x &= 15 \end{aligned}$$

Putting the value of x in eqⁿ (1), we get

$$\begin{aligned} y &= 35 - x \\ &= 35 - 15 \\ &= 20 \end{aligned}$$

$$\therefore x = 15$$

$$y = 20$$

71. Find the missing frequency 'x' from the following data:

Class Interval	Class Mark (x_i)	Frequency (f_i)	$f_i x_i$
0–20	10	5	50
20–40	30	8	240
40–60	50	x	50x
60–80	70	12	840
80–100	90	7	630
100–120	110	8	880
Total		$40 + x$	$2640 + 50x$

Solution:

We know that:

$$\text{Mean} = \Sigma(f_i x_i) / \Sigma f_i$$

$$\Rightarrow 62.8 = (2640 + 50x) / (40 + x)$$

Multiply both sides by $(40 + x)$:

$$\Rightarrow 62.8(40 + x) = 2640 + 50x$$

$$\Rightarrow 2512 + 62.8x = 2640 + 50x$$

$$\Rightarrow 62.8x - 50x = 2640 - 2512$$

$$\Rightarrow 12.8x = 128$$

$$\Rightarrow x = 128 / 12.8$$

$$\Rightarrow x = 10$$

Section- D

Long Answer Questions (5 Marks)

1. The first term of an A.P is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference. Write the first three terms of the AP. (MBOSE 2025)

Ans.

Let a_1 be the first term of an AP

Let a_n be the last term of an AP

Let S_n be the sum of the n^{th} term of an AP

Let n be the number of terms of an AP

Let d be the common difference of an AP

Here, $a_1=5$, $a_n=45$, $S_n=400$

Given, $S_n=400$

$$\Rightarrow \frac{n}{2} (a_1 + a_n) = 400$$

$$\Rightarrow \frac{n}{2} (5+45) = 400$$

$$\Rightarrow 50n = 400 \times 2$$

$$\Rightarrow n = \frac{400 \times 2}{50}$$

$$n = 16$$

Hence, there are 16 numbers of terms in the given AP.

But, $a_n = 45$

$$\Rightarrow a_1 + (n-1)d = 45$$

$$\Rightarrow 5 + (16-1)d = 45$$

$$\Rightarrow 15d = 45-5$$

$$\Rightarrow 15d = 40$$

$$d = \frac{40}{15} = \frac{8}{3}$$

Hence, the common difference of an AP is $\frac{8}{3}$

The first three terms of the series are: $(a, a + d, a + 2d)$ Or, $a_1, a_1 + d, a_2 + d)$

$5, 5 + 8/3 = 15 + 8/3 = 23/3, 5 + 23/3 = 38/3$ i.e. $5, 23/3, 38/3$.

2. For what value of n , are the n^{th} terms of two APs 63, 65, 67, ... and 3, 10, 17, ... equal?

Solution:

For 1st A.P

$$a=63, a_2=65$$

$\therefore$ Common difference, $d=a_2-a$

$$=65-63$$

$$=2$$

By Term Formula

$$a_n = a + (n-1)d$$

$$a_n = 63 + (n-1) \times 2$$

$$a_n = 63 + 2n - 2$$

$$a_n = 61 + 2n$$

For 2nd A.P

$$a=3, a_2=10$$

$\therefore$ Common difference, $d=a_2-a$

$$=10-3$$

$$=7$$

By Term Formula

$$a_n = a + (n-1)d$$

$$a_n = 3 + (n-1) \times 7$$

$$a_n = 3 + 7n - 7$$

$$a_n = 7n - 4$$

Since, their n^{th} terms of both the A.P s are equal.

$$\therefore 61 + 2n = 7n - 4$$

$$\Rightarrow 2n - 7n = -4 - 61$$

$$\Rightarrow -5n = -65$$

$$\Rightarrow n = \frac{-65}{-5}$$

$$\Rightarrow n = 13$$

3. The sum of 4^{th} and 8^{th} terms of an A.P is 24 and the sum of 6^{th} and 10^{th} terms is 44. Find the first three terms of the AP.

Solution:

Let the 1st term be a and the common difference be d .

According to the question,

$$a_4 + a_8 = 24$$

$$\Rightarrow a + (4-1)d + a + (8-1)d = 24$$

$$\Rightarrow a + (4-1)d + a + (8-1)d = 24$$

$$\Rightarrow a + 3d + a + 7d = 24$$

$$\Rightarrow 2a + 10d = 24$$

$$\Rightarrow 2(a + 5d) = 24$$

$$\Rightarrow a + 5d = \frac{24}{2}$$

$$\Rightarrow a + 5d = 12 \dots (i)$$

Also, $a_6 + a_{10} = 44$

$$\Rightarrow a + (6-1)d + a + (10-1)d = 44$$

$$\Rightarrow a + 5d + a + 9d = 44$$

$$\Rightarrow 2a + 14d = 44$$

$$\Rightarrow 2(a + 7d) = 44$$

$$\Rightarrow (a + 7d) = \frac{44}{2}$$

$$\Rightarrow a + 7d = 22 \dots (ii)$$

Subtracting (i) from (ii),

$$a + 7d - (a + 5d) = 22 - 12$$

$$\Rightarrow a + 7d - a - 5d = 10$$

$$\Rightarrow 2d = 10$$

$$\Rightarrow d = \frac{10}{2}$$

$$\Rightarrow d = 5$$

Putting the value of d in equation (i),

$$a + 5(5) = 12$$

$$\Rightarrow a + 25 = 12$$

$$\Rightarrow a = 12 - 25$$

$$\Rightarrow a = -13$$

Now

$$a_2 = a + d = -13 + 5 = -8$$

$$a_3 = a + 2d = -13 + 2(5) = -13 + 10 = -3$$

$\therefore$ The first three terms of the A.P. are $-13, -8, -3$.

4. Find the sum of the first 51 terms of an AP whose second and third terms are 14 and 18 respectively. (MBOSE 2025 Suppl)

Solution: Let a_1, a_2, a_3 be the first, second and the third terms of an AP.

Let 'd' be the common difference of an AP.

Here $a_2 = 14$ and $a_3 = 18, n = 51$

Now, $a_2 = 14$

$$\Rightarrow a_1 + d = 14 \dots \dots \dots (i)$$

and, $a_3 = 18$

$$\Rightarrow a_2 + d = 18$$

$$\Rightarrow a_1 + 2d = 18 \dots \dots \dots (ii)$$

Subtracting equation (i) from equation (ii) we get

$$d = 4$$

Putting $d = 4$ in equation (i) we get

$$a_1 + 4 = 14$$

$$\Rightarrow a_1 = 14 - 4$$

$$\Rightarrow a_1 = 10$$

Using the formula

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$S_{51} = \frac{n}{2} \{a_1 + a_1 + (n-1)d\},$$

$$\text{where } a_n = a + (n-1)d$$

$$= \frac{51}{2} \{2 \times 10 + (51-1) \times 4\}$$

$$= \frac{51}{2} \{20 + 200\}$$

$$= \frac{51}{2} \times 220$$

$$= 5610$$

Hence the sum of the first 51 term of an AP is 5610

5. If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms. (MBOSE 2026)

Solution:

Let a_1 be the first term of an AP

Let d be the common difference of an AP

Given, $S_7 = 49$

$$\Rightarrow \frac{7}{2} (a_1 + a_7) = 49 \quad [\because S_n = \frac{n}{2} (a_1 + a_n)]$$

$$\Rightarrow a_1 + a_1 + 6d = \frac{49 \times 2}{7}$$

$$\Rightarrow 2a_1 + 6d = 14$$

$$\Rightarrow a_1 + 3d = 7 \dots \dots \dots (i) \text{ (by dividing each term by 2)}$$

And, $S_{17} = 289$

$$\frac{17}{2} (a_1 + a_{17}) = 289 \quad [\because S_n = \frac{n}{2} (a_1 + a_n)]$$

$$\Rightarrow a_1 + a_1 + 16d = \frac{289 \times 2}{17}$$

$\Rightarrow 2a_1 + 16d = 34$
 $\Rightarrow a_1 + 8d = 17 \dots\dots\dots (ii)$ [By dividing each term by 2]
 Subtracting equation (i) from equation (ii) we get

$$5d = 10$$

$\Rightarrow d = \frac{10}{5}$
 $\Rightarrow d = 2$

Putting $d = 2$ in equation (i) we get

$$a_1 + 3 \times 2 = 7$$

$\Rightarrow a_1 = 7 - 6$
 $\Rightarrow a_1 = 1$

Using the formula

$$\begin{aligned}
 S_n &= \frac{n}{2} (a_1 + a_n) \\
 &= \frac{n}{2} \{2a_1 + (n-1)d\} \\
 &= \frac{n}{2} \{2 \times 1 + (n-1) \times 2\} \\
 &= \frac{n}{2} \{2 + 2(n-1)\} \\
 &= \frac{2n}{2} (1 + n-1) \\
 &= n \times n \\
 S_n &= n^2
 \end{aligned}$$

Hence, sum of first n terms is n^2

6. How many three- digit numbers are divisible by 7?

Solution: The first three-digit number divisible by 7 is 105

And the last three-digit number divisible by 7 is 994

Therefore, the AP is 105, 112, ... 994

Here, First term, $a_1 = 105$,
second term, $a_2 = 112$

Common difference, $d = 7$

Let n be the number terms of the given AP
Now,

$a_n = 994$
 $\Rightarrow a_1 + (n-1)d = 994$
 $\Rightarrow 105 + (n-1) \times 7 = 994$
 $\Rightarrow (n-1) \times 7 = 994 - 105$
 $\Rightarrow (n-1) \times 7 = 889$

$\Rightarrow n - 1 = \frac{889}{7}$
 $\Rightarrow n - 1 = 127$
 $\Rightarrow n = 127 + 1$
 $\Rightarrow n = 128$

Hence there are 128 three-digit numbers which are divisible by 7.

7. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in seventh year. Assuming that the production increases uniformly by fixed number every year.

Find:

- The production in the first year
- The production in the 10th year
- The total production in the first seven years.

Solution: (i) Since the production increases uniformly by a fixed number every year, the number of TV sets manufactured in 1st, 2nd, 3rd, ... years will form an AP

Let us denote the number of TV sets manufactured in the n^{th} year by a_n

$$\text{Then, } a_3 = 600$$

$$\text{Or, } a + 2d = 600 \dots\dots\dots (1)$$

$$\text{And } a_7 = 700$$

$$\Rightarrow a + 6d = 700 \dots\dots (2) \text{ (Where } a \text{ is the first term)}$$

Subtracting equation 1 from equation 2 we get

$$4d = 100$$

$\Rightarrow d = \frac{100}{4}$
 $\Rightarrow d = 25$

Putting $d = 25$ in equation 1 we get

$$a + 2 \times 25 = 600$$

$$a = 600 - 50$$

$$a = 550$$

$\therefore$ The production of TV sets in the first year is 550.

(ii) Now, $a_n = a + 9d$

$$a_{10} = 550 + 9 \times 25$$

$$= 550 + 225$$

$$= 775$$

∴ Production of TV sets in the 10th year is 775.

(iii) Also,

$$\begin{aligned} \Rightarrow S_7 &= \frac{7}{2} \{2 \times 550 + (7-1) \times 25\} \\ & \quad [\because S_n = \frac{n}{2} (2a_1 + (n-1)d)] \\ &= \frac{7}{2} (1100 + 150) \\ &= \frac{7}{2} \times 1250 \\ &= 7 \times 625 \\ &= 4375. \end{aligned}$$

Therefore, the total production of TV sets in the first 7 years is 4375.

8. Find the 20th term from the last term of the A.P.:

3, 8, 13, ..., 253

Solution:

The given A.P. is 3, 8, 13, ..., 253.

Writing the given A.P. in reverse order:

253, ..., 13, 8, 3

Here,

First term, $a = 253$

Common difference, $d = 8 - 13 = -5$

Using the nth term formula:

$$a_n = a + (n-1)d$$

$$\begin{aligned} \Rightarrow a_{20} &= 253 + (20-1)(-5) \\ \Rightarrow a_{20} &= 253 - 19 \times 5 \\ \Rightarrow a_{20} &= 253 - 95 \\ \Rightarrow a_{20} &= 158 \end{aligned}$$

∴ The 20th term from the last is 158.

9. How many multiple of 4 lies between 10 and 250?

Solution: First multiple of 4 between 10 and 250 is 12

The last multiple of 4 between 10 and 250 is 248

Therefore the AP is 12, 16, 20, 24, ... 248

Here $a_1 = 12$, common difference, $d = 4$

And, $a_n = 248$, where n is the number of terms of the above AP

$$a_n = 248$$

$$\begin{aligned} \Rightarrow a_1 + (n-1)d &= 248 \\ \Rightarrow 12 + (n-1)4 &= 248 \\ \Rightarrow (n-1)4 &= 248 - 12 \\ \Rightarrow n-1 &= \frac{236}{4} \\ \Rightarrow n-1 &= 59 \\ \Rightarrow n &= 59 + 1 \\ \Rightarrow n &= 60 \end{aligned}$$

Thus, there are 60 multiples of 4 between 10 and 250.

10. Find the sum of the odd numbers, between 0 and 50.

Solution: First odd numbers between 0 and 50 is 1 and the last odd number between 0 and 50 is 49.

Therefore the AP is 1, 3, 5, ... 49

Here $a_1 = 1$, $d = 3 - 1 = 2$

Let n be the number of terms of the AP

$$a_n = 49$$

$$\begin{aligned} \Rightarrow a_1 + (n-1)d &= 49 \\ \Rightarrow 1 + (n-1)2 &= 49 \\ \Rightarrow (n-1) \times 2 &= 49 - 1 \\ \Rightarrow (n-1) \times 2 &= 48 \\ \Rightarrow n-1 &= \frac{48}{2} \\ \Rightarrow n-1 &= 24 \\ \Rightarrow n &= 24 + 1 \\ \Rightarrow n &= 25 \end{aligned}$$

Using the formula

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$S_{25} = \frac{25}{2} (1 + 49)$$

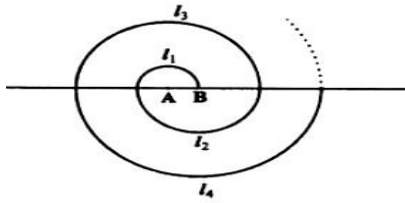
$$= \frac{25}{2} \times 50$$

$$= 25 \times 25$$

$$= 625$$

Therefore, the sum of the odd numbers between 0 and 50 is 625.

11. A spiral is made up of successive semi-circles, with centres alternately at A and B, starting with A, of radii 0.5 cm, 1.5 cm, 2.0 cm,.... as shown in the figure. What is the total length of such spiral made up of thirteen consecutive semi-circles? (Take $\pi = \frac{22}{7}$)



Solution: circumference of 1st semi-circles = 0.5π cm
circumference of 2nd semi-circles = π cm
circumference of 3rd semi-circles = 1.5π cm
circumference of 4th semi-circles = 2π cm

Thus, the AP is $0.5\pi, \pi, 1.5\pi, 2\pi, \dots$

$$\text{Here } a_1 = 0.5\pi, \quad d = \pi - 0.5\pi \\ = 0.5\pi$$

$$\text{and, } n = 13$$

Using the formula

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$\text{Or, } S_n = \frac{n}{2} (a_1 + a_1 + (n-1)d)$$

$$S_{13} = \frac{13}{2} [(2 \times 0.5\pi + (13-1) \times 0.5\pi)]$$

$$S_{13} = \frac{13}{2} (\pi + 12 \times 0.5\pi)$$

$$= \frac{13}{2} (\pi + 6\pi)$$

$$= \frac{13}{2} \times 7\pi$$

$$= \frac{13}{2} \times 7 \times \frac{22}{7} \quad (\because \pi = \frac{22}{7})$$

$$= 13 \times 11$$

$$= 143 \text{ cm}$$

Therefore, the total length of such spiral made up of thirteen consecutive semi-circles is 143 cm.

12. 200 toys are stacked in the following manner. 20 toys in the bottom row, 19 in the next row, 18 in the row next to it and so on. In how many rows are the 200 toys placed and how many toys are in the top row?



Solution:

Number of toys in the first row, $a_1 = 20$

Number of toys in the second row, $a_2 = 19$

Number of toys in the third row, $a_3 = 18$

$\therefore$ The sequence becomes 20, 19, 18,....

$$\text{Now, } a_3 - a_2 = 18 - 19 = -1$$

$$a_2 - a_1 = 19 - 20 = -1$$

$$\therefore a_3 - a_2 = a_2 - a_1 = -1$$

Since the difference between any two successive terms is the same everywhere, therefore the given sequence is an AP.

Thus the AP is 20, 19, 18,....

Here $a_1 = 20$, common difference, $d = -1$

Let n be the number of rows

$$\therefore S_n = 200$$

$$\Rightarrow \frac{n}{2} (2a_1 + (n-1)d) = 200$$

$$\Rightarrow n \{2 \times 20 + (n-1)(-1)\} = 200 \times 2$$

$$\Rightarrow n(40 - n + 1) = 400$$

$$\Rightarrow n(41 - n) = 400$$

$$\Rightarrow 41n - n^2 = 400$$

$$\text{Or, } n^2 - 41n + 400 = 0$$

$$\Rightarrow n^2 - 25n - 16n + 400 = 0$$

$$\Rightarrow n(n-25) - 16(n-25) = 0$$

$$\Rightarrow (n-25)(n-16) = 0$$

$$\text{Either, } n - 25 = 0$$

$$n = 25$$

$$\text{or, } n - 16 = 0$$

$$n = 16$$

$$\therefore n = 16 \text{ or } 25$$

$$\text{When } n = 16$$

$$a_{16} = a_1 + 15d$$

$$= 20 + 15 \times (-1)$$

$$= 20 - 15$$

$$a_{16} = 5$$

$$\text{And when, } n = 25$$

$$a_{25} = a_1 + 24d$$

$$= 20 + 24 \times (-1)$$

$$= 20 - 24$$

= -4 (is rejected as the number of an AP cannot be negative)

Therefore, there are 16 number of rows arranged for 200 toys.

And, there are 5 toys in the top row which is in the 16th row.

13. A sum of Rs 1000 is invested at 8% simple interest per year. Calculate the interest at the end of each year. Do these interests form an AP? If so, find the interest at the end of 30 years making use of this fact.

Solution: We know that the formula to calculate simple interest is given by:

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

So, the interest at the end of the first year = Rs.

$$\frac{1000 \times 8 \times 1}{100} = \text{Rs. } 80$$

The interest at the end of second year = Rs.

$$\frac{1000 \times 8 \times 2}{100} = \text{Rs. } 160$$

The interest at the end of third year = Rs.

$$\frac{1000 \times 8 \times 3}{100} = \text{Rs. } 240$$

Similarly, we can obtain the interest at the end of the 4th year, 5th year, and so on.

So, The interest in rupees at the end of the 1st, 2nd, 3rd, ... years respectively are: 80, 160, 240.....

Here $a_1 = 80$, $a_2 = 160$, $a_3 = 240$

Now, $a_3 - a_2 = 240 - 160 = 80$

$$a_2 - a_1 = 160 - 80 = 80$$

Since, the difference between the consecutive terms in the list is 80. Therefore, the given list of numbers is an AP.

Hence, first term $a_1 = 80$ and common difference, $d = 80$

Therefore, $a_{30} = a_1 + 29d$

$$\begin{aligned} \Rightarrow a_{30} &= 80 + 29 \times 80 \\ &= 80 + 2320 \\ &= 2400 \end{aligned}$$

So, the interest at the end of 30 years will be Rs. 2400.

14. The Production of TV in a factory increases uniformly by a fixed number every year. It produced 8000 set in 6th year and 11300 in 9th year. Find the production in 6 years.

Solution: Number of TV produced in 6th year = 8000

$$\Rightarrow a_6 = 8000$$

$$\Rightarrow a + 5d = 8000 \dots (i)$$

Also, number of TV produced in 9th year = 11300

$$\Rightarrow a_9 = 11300$$

$$\Rightarrow a + 8d = 11300 \dots (ii)$$

Subtracting (i) from (ii), we get

$$3d = 3300$$

$$d = 1100$$

Putting $d = 1100$ in equation (i), we get

$$a + 5 \times 1100 = 8000$$

$$\Rightarrow a + 5500 = 8000$$

$$\Rightarrow a = \frac{8000 - 5500}{1}$$

$$\Rightarrow a = 2500$$

$\therefore$ Production in 6 years is

$$S_6 = (6/2)[2500 + 8000]$$

$$= 3 \times 10500$$

$$= 31500$$

$\therefore$ The production of TV sets in 6 years are **31500**.

15. An A.P. consist of 50 terms of which 3rd term is 12 and the last term is 106. Find its 29th term.

Solution: Let 'a' be the first term and 'd' be the common difference

$\therefore$ By the given conditions

$$a_3 = 12$$

$$a_{50} = 106$$

$$\Rightarrow a + 2d = 12 \text{ --- (i)}$$

And,

$$\Rightarrow a + 49d = 106 \text{ --- (ii)}$$

Substituting (ii) from (i) we get

$$-47d = -94$$

$$\Rightarrow d = \frac{-94}{-47}$$

$$\Rightarrow d = 2$$

Putting $d = 2$ in equation (i) we get

$$a + 2 \times 2 = 12$$

$$\Rightarrow a + 4 = 12$$

$$\Rightarrow a = 12 - 4$$

$$\Rightarrow a = 8$$

$$\therefore a_{29} = a + 28d$$

$$= 8 + 28 \times 2$$

$$= 8 + 56$$

$$a_{29} = 64$$

$\therefore$ The 29th term of an A.P. is 64.

16. The sum of all terms of the A.P having ten terms except for the first term, is 99, and except for the sixth term, is 89. Find the 8th term of the A.P, if the sum of the first and fifth term is equal to 10.

Solution: Let $a_1, a_2, a_3, \dots$ be the term terms of an A.P

By given condition,

$$a_2 + a_3 + a_4 + \dots + a_{10} = 99 \text{ --- (i)}$$

and,

$$a_1 + a_2 + a_3 + \dots + a_5 + a_7 + \dots + a_{10} = 89 \text{ --- (ii)}$$

Subtracting (ii) from (i) we get

$$-a_1 + a_6 = 10$$

Or,

$$a_6 - a_1 = 10$$

$$a_1 + 5d - a_1 = 10 \quad [\because a_6 = a_1 + 5d]$$

$$5d = 10$$

$$\Rightarrow d = \frac{10}{5}$$

$$\Rightarrow d = 2$$

Again by question,

$$a_1 + a_5 = 10$$

$$a_1 + a_1 + 4d = 10$$

$$\Rightarrow 2a_1 + 4 \times 2 = 10$$

$$\Rightarrow 2a_1 = 10 - 8$$

$$\Rightarrow a_1 = \frac{2}{2}$$

$$\Rightarrow a_1 = 1$$

$\Rightarrow$

$$\begin{aligned} \therefore a_8 &= a + 7d \\ &= 1 + 7 \times 2 \\ &= 1 + 14 \\ &= 15 \end{aligned}$$

$\therefore$ 8th term of an A.P is 15.

17. A girl of height 90cm is walking away from the base of a lamp-post at a speed of 1.2m/sec. if the lamp is 3.6 m above the ground; find the length of her shadow after 4 seconds.

Solution:

Let AB denote the lamp-post and CD the girl after walking for 4 seconds away from the lamp-post.

Let DE = xcm be the shadow of the girl.

$$BD = 1.2\text{m} \times 4 =$$

$$4.8\text{m} (\because$$

distance = speed $\times$ time)

$\triangle ABE$ and $\triangle CDE$

$\angle B = \angle D$ (90° each)

$\angle E = \angle E$

(common angles)

$\therefore \triangle ABC \sim \triangle CDE$

[AA similarity]

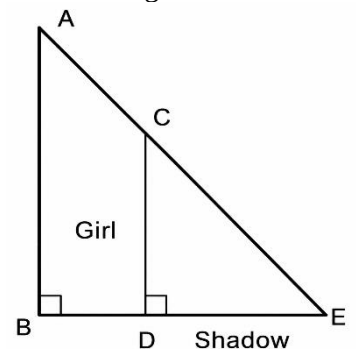
$$\frac{DE}{BE} = \frac{CD}{AB} \text{ [corresponding sides]}$$

$$\text{or, } \frac{x}{x+4.8} = \frac{0.9}{3.6} \quad [90\text{cm} = \frac{90}{100}\text{m} = 0.9\text{m}]$$

$$\text{or, } \frac{x}{x+4.8} = \frac{9}{36}$$

$$\text{or, } \frac{x}{x+4.8} = \frac{1}{4}$$

$$\text{or, } 4x = x + 4.8$$



$$\text{or, } 4x - x = 4.8$$

$$\text{or, } 3x = 4.8$$

$$\text{or, } x = \frac{4.8}{3} \quad \text{B}$$

$$\therefore x = 1.6\text{m}$$

So, the shadow of the girl after walking four seconds is 1.6m

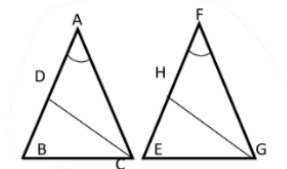
18. CD and GH are respectively the bisector of $\angle ACB$ and $\angle EGH$ such that D and H lie on side AB and FE of $\triangle ABC$ and $\triangle EFG$ respectively. If $\triangle ABC \sim \triangle FEG$, Show that
(i) $\frac{CD}{GH} = \frac{AC}{FG}$ (ii) $\triangle DCB \sim \triangle HGE$

Given: $\triangle ABC \sim \triangle FEG$, CD and GH are bisectors of $\angle ACB$ and $\angle EGF$ respectively.

To Prove: (i) $\frac{CD}{GH} = \frac{AC}{FG}$

(ii) $\triangle DCB \sim \triangle HGE$

Proof: (i) In $\triangle ACD$ and $\triangle FGH$



$$\angle A = \angle F [\because \triangle ABC \sim \triangle FEG]$$

$$\angle ACD = \angle FGH \quad [\text{CD bisects } \angle ACB \text{ and GH bisects } \angle EGF]$$

$$\therefore \angle ACD \sim \angle FGH \quad [\text{AA similarity}]$$

$$\Rightarrow \frac{CD}{GH} = \frac{AC}{FG} \quad [\text{Corresponding sides of similar } \Delta]$$

Proof: (ii) In $\triangle DCB$ and $\triangle HGE$

$$\angle B = \angle E [\because \triangle ABC \sim \triangle FGH]$$

$$\angle DCB = \angle HGE \quad [\text{CD and GH are bisectors of } \angle ACB \text{ and } \angle EGF]$$

$$\therefore \triangle DCB \sim \triangle HGE \quad [\text{AA similarity}] \text{ Proved.}$$

19. In fig. $DE \parallel OQ$ and $DF \parallel OR$. Show that $EF \parallel QR$.

Solution: $DE \parallel OQ$ and $DF \parallel OR$

To show: $EF \parallel QR$

Proof: In $\triangle POQ$, $DE \parallel OQ$

By basic proportionality theorem.

$$\therefore \frac{PE}{EQ} = \frac{PD}{DO} \quad (1)$$

In $\triangle POR$, $DF \parallel OR$

$$\therefore \frac{PD}{DO} = \frac{PF}{FR} \quad (2)$$

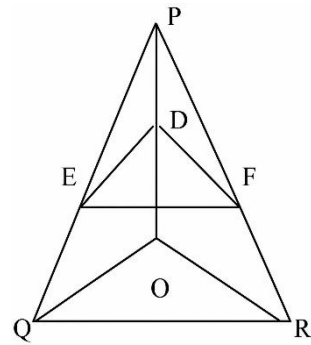
From equation (1) and

$$\frac{PE}{EQ} = \frac{PF}{FR}$$

Now, in $\triangle PQR$, we have E and F are points on PQ and PR respectively such that

$$\frac{PE}{EQ} = \frac{PF}{FR}$$

By converse of proportionality theorem
 $\therefore EF \parallel QR$. Showed.



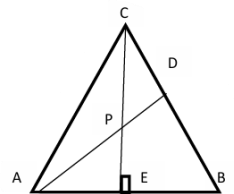
20. In fig. altitudes AD and CE of $\triangle ABC$ intersect each other at the point P show that:
(i) $\triangle AEP \sim \triangle CDP$ (ii) $\triangle ABD \sim \triangle CBE$ (iii) $\triangle AEP \sim \triangle ADB$

Given: $\triangle ABC$ in which, altitudes AD and CE intersect each other at the point P.

To Prove: (i) $\triangle AEP \sim \triangle CDP$

(ii) $\triangle ABD \sim \triangle CBE$

(iii) $\triangle AEP \sim \triangle ADB$



Proof: (i) In $\triangle AEP$ and $\triangle CDP$

$$\angle AEP = \angle CDP \quad [90^\circ \text{ each}]$$

$$\angle APE = \angle CPD \quad [\text{Vertically opposite angles}]$$

$$\therefore \triangle AEP \sim \triangle CDP \quad [\text{AA similarity}]$$

Proof: (ii) In $\triangle ABD$ and $\triangle CBE$

$$\angle ABD = \angle CBE \quad [\text{Common angles}]$$

$$\angle ADB = \angle CEB \quad [90^\circ \text{ each}]$$

$$\therefore \triangle ABD \sim \triangle CBE \quad [\text{AA similarity}]$$

Proof: (iii) In $\triangle AEP$ and $\triangle ADB$

$$\angle PAE = \angle DAB \quad [\text{Common angles}]$$

$$\angle AEP = \angle ADB \quad [90^\circ \text{ each}]$$

$$\therefore \triangle AEP \sim \triangle ADB \quad [\text{AA similarity}]$$

21. In fig. ABC and AMP are two right triangles, right angle at B and M respectively. Prove that

$$(i) \triangle ABC \sim \triangle AMP \quad (ii) \frac{CA}{PA} = \frac{BC}{MP}$$

Given: ABC and AMP are two right triangles,
right angled at B and M respectively i.e.,
 $\angle ABC = \angle AMP = 90^\circ$

To Prove: (i) $\triangle ABC \sim \triangle AMP$

$$(iii) \quad \frac{CA}{PA} = \frac{BC}{MP}$$

Proof: (i) In $\triangle ABC$ and $\triangle AMP$

$$\angle CAB = \angle MAP$$

[Common angles]

$$\angle ABC = \angle AMP [90^\circ]$$

each]

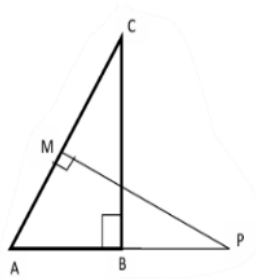
$$\therefore \triangle ABC \sim \triangle AMP \text{ [AA Similarity]}$$

Proof: (ii) Since $\triangle ABC \sim \triangle AMP$ [Proved above]

If two triangles are similar, the ratio of their corresponding sides is proportional.

$$\therefore \frac{CA}{PA} = \frac{BC}{MP} = \frac{AB}{AM}$$

$$\Rightarrow \frac{CA}{PA} = \frac{BC}{MP} \text{ Proved}$$



22. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.

Given: In triangles ABC and PQR, AD and PM are median such that

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$$

To prove: $\triangle ABC \sim \triangle PQR$

Proof: Since $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$

[Given]

$\therefore$ D and M are the mid points of BC and QR respectively.

$$\therefore \frac{BC}{PQ} = \frac{2BD}{2QM} = \frac{BD}{QM}$$

In $\triangle ABD \sim \triangle PQM$

$$\therefore \frac{AB}{PQ} = \frac{AD}{PM} = \frac{BD}{QM}$$

$\triangle ABD \sim \triangle PQM$ [SSS similarity]

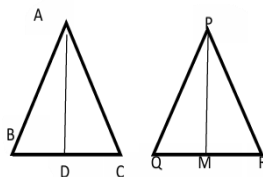
$\angle B = \angle Q$ [Corresponding angles]

Now, in $\triangle ABC$ and $\triangle PQR$

$$\frac{AB}{PQ} = \frac{BC}{QR}$$

$\angle B = \angle Q$ [Proved above]

Hence, $\triangle ABC \sim \triangle PQR$ [Similarity] Proved.



23. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show That ABCD is a trapezium.

Solution: A quadrilateral ABCD whose diagonals AC and BD intersect each other at O such that $\frac{AO}{BO} = \frac{CO}{DO}$.

To prove: Quadrilateral ABCD is a trapezium.

Construction: Draw $EO \parallel BA$, meeting AD at E.

Proof: In $\triangle ABD$, $EO \parallel BA$

By basic proportionality theorem

$$\frac{DE}{EA} = \frac{DO}{OB} \quad (i)$$

$$\text{But, } \frac{AO}{BO} = \frac{CO}{DO} \text{ [Given]}$$

$$\Rightarrow \frac{DO}{BO} = \frac{CO}{AO} \quad (ii)$$

From equation (i) and (ii)

$$\frac{DE}{EA} = \frac{CO}{OA}$$

$$\Rightarrow EO \parallel DC \quad [\text{by converse of B.P.T}]$$

But $EO \parallel BA$ [by construction]

$\therefore DC \parallel AB$

Hence, ABCD is a trapezium. Proved.

(MBOSE 2025)

24. In fig. A, B and C are points on OP, OR and OR respectively such that $AB \parallel PQ$ and $AC \parallel PR$. Show that $BC \parallel QR$.

Given: A, B, C are points on OP, OQ and OR respectively such that $AB \parallel PQ$ and $AC \parallel PR$

To prove: $BC \parallel QR$

Proof: In $\triangle OPQ$, $AB \parallel PQ$

By basic proportionality theorem

$$\frac{OA}{AP} = \frac{OB}{BQ} \quad (i)$$

Similarly, in $\triangle OPR$, $AC \parallel PR$

$$\frac{AO}{AP} = \frac{OC}{CR} \quad (ii)$$

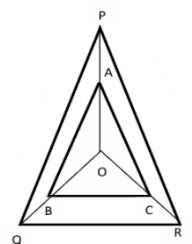
Combining equation (i) and (ii)

$$\frac{OB}{BQ} = \frac{OC}{CR}$$

By converse of basic proportionality theorem.

Line BC divides the $\triangle OQR$ in the same ratio

$\therefore BC \parallel QR$ Proved.



25. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$

Given: A parallelogram ABCD, E is the point on the side AD produced and BE intersects CD at F.

To prove: $\triangle ABE \sim \triangle CFB$

Proof: In Parallelogram ABCD

Opposite angles of a parallelogram are equal.

$$\angle A = \angle C \quad (i)$$

Opposite sides of a parallelogram are parallel i.e., $AD \parallel BC$

But AE is AD extended

$\therefore AE \parallel BC$ and BE is the transversal

$\therefore \angle AEB = \angle CBF$ (ii) [Alternate interior angles]

In $\triangle ABE$ and $\triangle CFB$

$$\angle A = \angle C \quad [\text{from eqn (i)}]$$

$$\angle AEB = \angle CBF \quad [\text{from eqn (ii)}]$$

$$\therefore \triangle ABC \sim \triangle CFB \quad [\text{AA similarity}].$$

Proved.

26. If AD and PM are medians of triangle ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$, prove $\frac{AB}{PQ} = \frac{AD}{PM}$ (MBOSE 2025 Suppl)

Solution:

Given: AD and PM are medians of $\triangle ABC$ and $\triangle PQR$ respectively.
Also, given $\triangle ABC \sim \triangle PQR$

$$\text{To prove: } \frac{AB}{PQ} = \frac{AD}{PM}$$

Proof: $\because \triangle ABC \sim \triangle PQR$

$$\Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} \quad (i)$$

[sides are proportional]

$\because$ AD is the median of $\triangle ABC$

$\Rightarrow$ D is the midpoint of BC

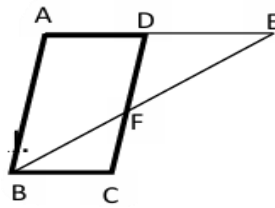
$$\Rightarrow BD = CD$$

Similarly, $QM = MR$ [$\because$ M is the midpoint of QR]

From equation (i) we have

$$\frac{AB}{PQ} = \frac{BC}{QR}$$

$$\Rightarrow \frac{AB}{PQ} = \frac{2BD}{2QM}$$



$$\Rightarrow \frac{AB}{PQ} = \frac{BD}{QM} \quad (ii)$$

Now in $\triangle ABD$ and $\triangle PQM$

$$\angle B = \angle Q \quad [\because \triangle ABC \sim \triangle PQR]$$

$$\frac{AB}{PQ} = \frac{BD}{QM} \quad [\text{Using (ii)}]$$

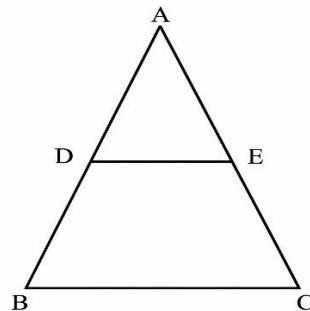
$\Rightarrow \triangle ABD \sim \triangle PQM$ (SAS similarity)

$$\Rightarrow \frac{AB}{PQ} = \frac{AD}{PM} \quad [\text{Sides are proportional}]$$

$$\text{Hence, } \frac{AB}{PQ} = \frac{AD}{PM} \text{ proved.}$$

27. Prove that the line joining the mid-point of two sides of a triangle is parallel to the third side and equal to half of it.

Solution: Let 'D' and 'E' be the mid-point of the sides 'AB' and 'AC' respectively of a triangle 'ABC'. (MBOSE 2026 Suppl)



Given:-

D is the mid-point of AB.

$$\therefore AD = DB$$

$$\Rightarrow AD/DB = 1 \quad \dots(i)$$

Also,

E is the mid-point of AC.

$$\therefore AE = EC$$

$$\Rightarrow AE/EC = 1 \quad \dots(ii)$$

From (i) and (ii),

$$AD/DB = AE/EC$$

Therefore, by the Converse of Basic Proportionality Theorem,

$$DE \parallel BC$$

Now, since $DE \parallel BC$,

$$\triangle ADE \sim \triangle ABC$$

(By AA similarity)

Therefore,

$$DE/BC = AD/AB$$

But,

$$AD = DB$$

$$\Rightarrow AB = AD + DB$$

$$= AD + AD$$

$$= 2AD$$

Therefore,

$$AD/AB = AD/2AD$$

$$= 1/2$$

$$\text{Hence, } DE/BC = 1/2$$

$$\Rightarrow DE = BC/2$$

Hence, the line joining the mid-points of two sides of a triangle is parallel to the third side and equal to half of it.

28. PQR is an isosceles triangle with $PQ = PR$ and 'S' is the midpoint of 'PR' such that $QR^2 = PR \times RS$.

Show that: $QS = QR$

.Solution: Given, $\triangle PQR$ is an isosceles triangle with $PQ = PR$ S is the mid-point of PR such that $QR^2 = PR \times RS$

To show that: $QS = QR$

Construction: QS is joined

Proof: $\because$ S is the mid-point of 'PR'

$$\therefore PS = SR \text{ --- (i)}$$

$$\text{Given, } QR^2 = PR \times RS$$

$$\Rightarrow QR \times QR = PR \times RS$$

$$\Rightarrow \frac{QR}{RS} = \frac{PR}{QR} \text{ --- (ii)}$$

In $\triangle QRP$ and $\triangle SRQ$

$$\Rightarrow \frac{QR}{RS} = \frac{PR}{QR} \text{ (from (ii) above)}$$

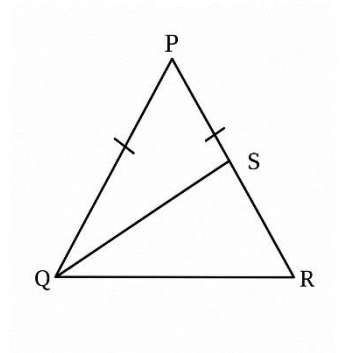
$$\angle R = \angle R \text{ (common angle)}$$

$\therefore \triangle QRP \sim \triangle SRQ$ (By SAS similarity)

$$\Rightarrow \frac{QR}{RS} = \frac{PR}{QR} = \frac{QP}{SQ} \text{ (Sides are proportional)}$$

From the last two ratios, we get

$$\begin{aligned} \Rightarrow \frac{PR}{QR} &= \frac{QP}{SQ} \\ \Rightarrow \frac{PR}{QR} &= \frac{PR}{SQ} \quad [\because PQ = PR] \\ \Rightarrow \frac{PR}{PR} &= \frac{QR}{SQ} \\ \Rightarrow 1 &= \frac{QR}{SQ} \\ \Rightarrow QS &= QR. \end{aligned}$$



29. In $\triangle ABC$, 'DE' is parallel to line 'BC', with 'D' on 'AB' and 'E' on 'AC'. If $\frac{AD}{DB} = \frac{2}{3}$, find $\frac{BC}{DE}$

Solution: Given $\triangle ABC$, $DE \parallel BC$

$$\text{And } \frac{AD}{DB} = \frac{2}{3}$$

$$\text{or } \frac{DB}{AD} = \frac{3}{2}$$

To find: $\frac{BC}{DE}$

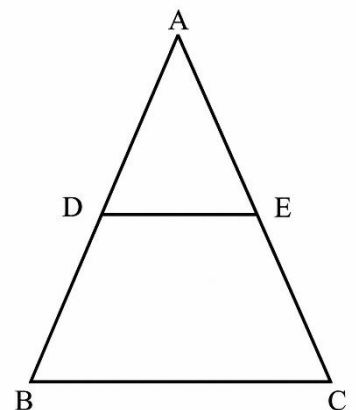
Procedure: In $\triangle ABC$, $DE \parallel BC$

$$\therefore \frac{AD}{DB} = \frac{AE}{EC}$$

$$\text{Or, } \frac{BD}{AD} = \frac{EC}{AE}$$

$$\Rightarrow \frac{BD}{AD} + 1 = \frac{EC}{AE} + 1$$

$$\Rightarrow \frac{BD + AD}{AD} = \frac{EC + AE}{AE}$$



$$\Rightarrow \frac{AB}{AD} = \frac{AC}{AE} \quad \text{--- (i)}$$

Now, in $\triangle ABC$ and $\triangle ADE$ we have

$$\frac{AB}{AD} = \frac{AC}{AE} \quad (\text{from (i) above})$$

$$\angle BAC = \angle DAE \quad (\text{Common } \angle s)$$

$$\therefore \triangle ABC \sim \triangle ADE \quad (\text{SAS})$$

$$\Rightarrow \frac{BC}{DE} = \frac{AB}{AD} \quad (\text{Side are proportional})$$

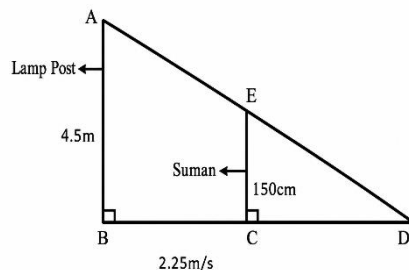
$$\Rightarrow \frac{BC}{DE} = \frac{AD + BD}{AD}$$

$$\begin{aligned} \Rightarrow \frac{BC}{DE} &= \frac{AD}{AD} + \frac{BD}{AD} \\ \Rightarrow \frac{BC}{DE} &= 1 + \frac{3}{2} \\ \Rightarrow \frac{BC}{DE} &= \frac{5}{2} \end{aligned}$$

30. Suman is going away from the lamp post at a speed of 2.25 m/sec. If the height of Suman is 150 cm and lamp post is 4.5 m above the ground, then find the length of the shadow after 5 second.

Solution: Let 'AB' be the lamp post and 'CE' be the position of Suman after walking for 5 seconds.

Let 'CD' be the shadow of Suman of length x metres.



AB = Lamp post

CE = Height of Suman = 1.5 m

BC = Distance travelled in 5 s

CD = Shadow

Now, in $\triangle ABD$ and $\triangle ECD$,

$$\angle B = \angle C \quad (\text{each } 90^\circ)$$

$$\angle D = \angle D \quad (\text{common})$$

$$\therefore \triangle ABD \sim \triangle ECD \quad (\text{By AA similarity})$$

$$AB/EC = BD/CD = AD/ED$$

(sides are proportional)

Taking the first two ratios,

$$AB/EC = BD/CD$$

$$4.5 \text{ m} / 150 \text{ cm} = (BC + CD)/CD$$

$$4.5 \text{ m} / 1.5 \text{ m} = (2.25 \times 5 + x)/x$$

$$[\because 150 \text{ cm} = 1.5 \text{ m}]$$

$$[\text{Also, Speed} \times \text{Time} = BC]$$

$$\Rightarrow 3 = (11.25 + x)/x$$

$$\Rightarrow 3x = 11.25 + x$$

$$\Rightarrow 3x - x = 11.25$$

$$\Rightarrow 2x = 11.25$$

$$\Rightarrow x = 5.625 \text{ m}$$

$\therefore$ The length of the shadow after 5 seconds is 5.625 m.

31. The angle of elevation of the top of the tower from a point on the ground, which is 30m away from the foot of the tower, is 30° . Find the height of the tower. (use $\sqrt{3} = 1.732$)

Solution:

Let AB = xm be the height of the tower

BC = 30m be a distance of the point C from the foot of the tower

And the angle of elevation is 30°

To find: x

Now, in right $\triangle ABC$,

$$\tan 30^\circ = \frac{AB}{BC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{x}{30}$$

$$\Rightarrow x = \frac{30}{\sqrt{3}}$$

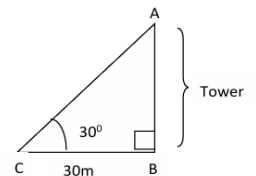
$$\Rightarrow x = \frac{30\sqrt{3}}{3\sqrt{3}}$$

$$\Rightarrow x = 10\sqrt{3} \text{ m}$$

$$\Rightarrow x = 10 \times 1.732$$

$$\Rightarrow x = 17.32 \text{ m}$$

Hence the height of the tower is 17.32m



32. A kite is flying at a height of 60m above the ground. The string attached to the kite is temporarily to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string. (use $\sqrt{3} = 1.732$)

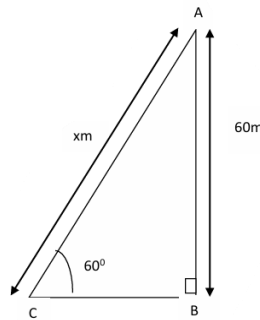
Solution:

Let the height of the kite above the ground (AB) = 60m

Let the length of the string (AC) = x m
 $\angle ABC = 60^\circ$

In right $\triangle ABC$,
 $\frac{AB}{AC} = \sin 60^\circ$
 $\Rightarrow \frac{60}{x} = \frac{\sqrt{3}}{2}$
 $\Rightarrow \sqrt{3}x = 120$
 $\Rightarrow x = \frac{120}{\sqrt{3}}$
 $\Rightarrow x = \frac{120\sqrt{3}}{\sqrt{3} \times \sqrt{3}}$
 $\Rightarrow x = \frac{120\sqrt{3}}{3}$
 $\Rightarrow x = 40 \times 1.732$
 $\Rightarrow x = 69.28m$

$\therefore$ The length of the string = 69.28m



Now, height of the tree = AB
 $= AC + BC$
 $= B'C + BC$
 $= \frac{16}{\sqrt{3}} + \frac{8}{\sqrt{3}}$
 $= \frac{16+8}{\sqrt{3}}$
 $= \frac{24}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$
 $= \frac{24\sqrt{3}}{3}$
 $= 8\sqrt{3}m$

AB = 8 × 32m
 AB = 13. n

Hence, the height of the tree is 13.856m

33. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree. (use $\sqrt{3} = 1.732$)
 (MBOSE 2025 Suppl)

Solution:

Let AB be the height of the tree before it was broken,

And AB' be the broken part of the tree after the storm which makes an angle of 30°

with the ground

And BB' = 8m be the distance of the top and foot of the tree.

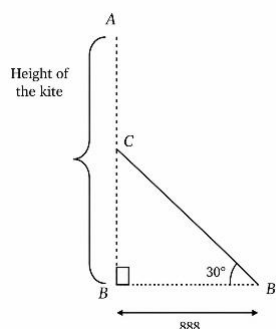
Now,

In right $\triangle B'BC$,

$\Rightarrow \tan 30^\circ = \frac{BC}{B'C}$
 $\Rightarrow \frac{1}{\sqrt{3}} = \frac{BC}{8}$
 $\Rightarrow BC = \frac{8}{\sqrt{3}} \dots\dots (i)$

And, $\cos 30^\circ = \frac{B'B}{B'C}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{8}{B'C}$
 $\Rightarrow B'C = \frac{16}{\sqrt{3}} \dots\dots (ii)$



34. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 50m high, find the height of the building. (MBOSE 2026)

Solution: Let AB be the height of the building

And CD = 50m be the height of the tower

The angle of elevation of the top of the building to the foot of the tower is 30°

And the angle of elevation of the top of the tower to the foot of the building is 60°

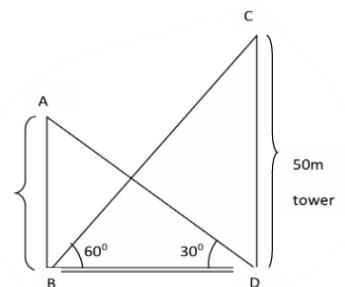
Now,

In right $\triangle CDB$,

$\tan 60^\circ = \frac{CD}{BD}$
 $\Rightarrow \sqrt{3} = \frac{50}{BD}$
 $\Rightarrow BD = \frac{50}{\sqrt{3}} \dots\dots (i)$

Also, right $\triangle ABD$

$\tan 30^\circ = \frac{AB}{BD}$
 $\Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{\frac{50}{\sqrt{3}}}$
 $\Rightarrow AB = \frac{50}{\sqrt{3}} \times \frac{1}{\sqrt{3}}$
 $= \frac{50}{3}$
 $= 16.67m$



Hence the height of the building is 16.67m.

35. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20m high building are 45° and 60° respectively. Find the height of the tower. (MBOSE 2025)

Solution: Let AC be the height of the transmission tower and BC = 20m be the height of the building.

The angle of elevation from a point D on the ground to the top and the bottom of the tower are 60° and 45° respectively.

Now, In right $\triangle BCD$

$$\tan 45^\circ = \frac{BC}{BD}$$

$$\Rightarrow 1 = \frac{20}{BD}$$

$$\Rightarrow BD = 20 \text{ m} \dots\dots\dots(i)$$

Also, in the right $\triangle ABD$

$$\tan 60^\circ = \frac{AB}{BD}$$

$$\Rightarrow \sqrt{3} = \frac{AC+BC}{20}$$

[From (i)]

$$\Rightarrow 20\sqrt{3} = AC+20$$

$$\Rightarrow AC = 20\sqrt{3} - 20$$

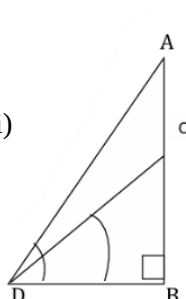
$$\Rightarrow AC = 20(\sqrt{3} - 1)$$

$$\Rightarrow AC = 20(1.732 - 1) \text{ (taking } \sqrt{3} = 1.732)$$

$$\Rightarrow AC = 20 \times 0.732$$

$$\Rightarrow AC = 14.64 \text{m}$$

Height of the transmission tower is 14.64m.



36. Two poles of equal heights are standing opposite to each other on either side of the road, which is 80m wide, from a point between them on the road, the angle of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles. (use $\sqrt{3} = 1.732$)

Solution: Let AB and CD be the poles of equal height h m.

Let E be the point between the poles.

Let distance between the two poles: BC=80m

Where BE = x m and EC = $(80 - x)$ m

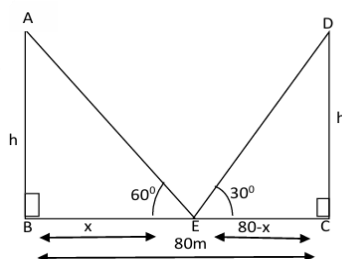
Let $\angle AEB = 60^\circ$ be the angle of elevation of pole AB from the point E on the road.

Let $\angle CED = 30^\circ$ be the angle of elevation of pole CD from point E on the ground.

Now, In right $\triangle ABC$

$$\tan 60^\circ = \frac{AB}{BC}$$

$$\Rightarrow \sqrt{3} = \frac{h}{x}$$



$$\Rightarrow h = x\sqrt{3} \dots\dots\dots(i)$$

and, right $\triangle CED$

$$\tan 30^\circ = \frac{CD}{EC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{80-x}$$

$$\Rightarrow h\sqrt{3} = 80 - x$$

$$\Rightarrow x\sqrt{3} \times \sqrt{3} = 80 - x \text{ (from (i))}$$

$$\Rightarrow 3x = 80 - x$$

$$\Rightarrow 3x + x = 80$$

$$\Rightarrow 4x = 80$$

$$\Rightarrow x = \frac{80}{4}$$

$$\Rightarrow x = 20 \text{m}$$

Putting $x = 20$ m in equation (i) we get

$$h = 20\sqrt{3}$$

$$\Rightarrow h = 20 \times 1.732$$

$$\Rightarrow h = 34.64$$

$$\text{And } 80 - x = 80 - 20$$

$$= 60 \text{m}$$

Hence the height of the equal poles is 34.64m

Distance of point E from the pole AB is 20m

And, distance of point E from the pole CD 60m

37. The shadow of a tower standing on a level ground is found to be 40m longer when the sun's altitude is 30° than when it is 60° . Find the height of the tower. (MBOSE 2026 Suppl)

Solution: Let AB be the tower and BC is the length of the shadow

When the sun's altitude is 60°

Let DB be the length of the shadow when the sun's altitude is 30°

Now, Let AB be h m and BC be x m

According to question

DB is 40m longer than BC

$$\text{So, } DB = (40 + x)$$

Now, in right $\triangle ABC$

$$\tan 60^\circ = \frac{AB}{BC}$$

$$\Rightarrow \sqrt{3} = \frac{h}{x}$$

$$\Rightarrow h = \sqrt{3}x \quad (i)$$

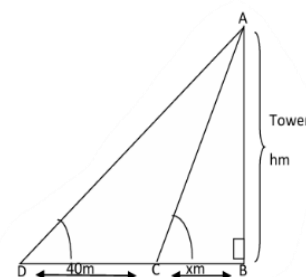
Now, in right $\triangle ABD$

$$\tan 30^\circ = \frac{AB}{BD}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x+40}$$

$$\Rightarrow 1 = \frac{\sqrt{3}x}{x+40} \quad \{\text{using (i)}\}$$

$$\Rightarrow x+40 = 3x \quad \{\sqrt{3} \times \sqrt{3} = 3\}$$



$$\Rightarrow 3x - x = 40$$

$$\Rightarrow 2x = 40$$

$$\Rightarrow x = \frac{40}{2} = 20$$

Putting $x = 20$ in equation (i) we get

$$\Rightarrow h = 20\sqrt{3}$$

$$\Rightarrow h = 20 \times 1.732$$

$$\Rightarrow h = 34.64\text{m}$$

Hence, height of the tower is 34.64m.

38. From a window 15m high above the ground, in a street the angle elevation and depression of the top and foot of another house on opposite side of the street one 30° and 45° respectively. Show that the height of the opposite house is 23.66m

(use $\sqrt{3} = 1.732$)

Solution: Let the height of opposite house $AB = h$ m

Let the height of another house $DC = 15$ m

Let the distance between two houses $BC = x$ m

$\therefore BC = EB = x$ m
 $DC = EB = 15$ m

$AE = AB - EB = (h - 15)$ m

$\angle ADE = 30^\circ$

$\angle EDB = \angle DBC = 45^\circ$

In right $\triangle DCB$,

$$\frac{DC}{BC} = \tan 45^\circ$$

$$\Rightarrow \frac{15}{x} = 1$$

$$\Rightarrow x = 15 \quad (\text{i})$$

Again, in right $\triangle AED$

$$\frac{AE}{ED} = \tan 30^\circ$$

$$\Rightarrow \frac{h-15}{15} = \frac{1}{\sqrt{3}} \quad \{\text{Using equation (i)}\}$$

$$\Rightarrow h - 15 = \frac{15}{\sqrt{3}}$$

$$\Rightarrow h - 15 = \frac{15}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$\Rightarrow h - 15 = \frac{15 \times 1.732}{3}$$

$$\Rightarrow h - 15 = 8.66$$

$$\Rightarrow h = 8.66 + 15$$

$$\Rightarrow h = 23.66$$

$\therefore$ Height of opposite house = AB
 $= 23.66\text{m}$

39. A straight highway leads to the foot of a tower of height 50m. From the top of the tower, the angles of depression of two cars standing on the highway are 30° and 60° respectively.

What is the distance between two cars and how far is each car from the tower?

Solution: Let the height of tower, $AB = 50$ m

Let the distance of 1st position of car from the tower, $BC = x$ m

Let the distance of 2nd position of car from the tower, $DB = y$ m

$\therefore$ Distance, between two cars:

$$CD = BC - BD = (x - y)\text{m}$$

$$\angle PAC = \angle ACB = 30^\circ$$

$$\angle PAD = \angle ADB = 60^\circ$$

In right $\triangle ABC$

$$\frac{AB}{BC} = \tan 30^\circ$$

$$\frac{50}{x} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow x = 50\sqrt{3}$$

$$\Rightarrow x = 50 \times 1.732$$

$$\Rightarrow x = 86.60$$

Again, In right $\triangle ABD$,

$$\frac{AB}{BD} = \tan 60^\circ$$

$$\Rightarrow \frac{50}{y} = \sqrt{3}$$

$$\Rightarrow \sqrt{3}y = 50$$

$$\Rightarrow y = \frac{50}{\sqrt{3}}$$

$$\Rightarrow y = \frac{50}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

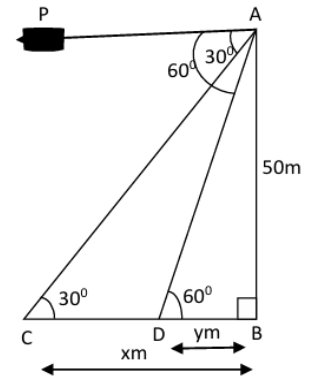
$$\Rightarrow y = \frac{50 \times 1.732}{3}$$

$$\Rightarrow y = \frac{86.60}{3} = 28.87$$

$\therefore$ Distance between the cars $= x - y$
 $= 86.60 - 28.87$
 $= 57.73\text{m}$

Hence, Distance from the tower of 1st car, $x = 86.60\text{m}$

Distance from the tower of the 2nd car, $y = 28.87\text{m}$



40. A 1.5m Tall boy is standing at some distance from a 30m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building. ($\sqrt{3} = 1.73$)

Solution: Let $AB = GF = EC = 1.5$ m be the height of the boy

Let $CD = 30$ m be the height of the building

$$\begin{aligned}\therefore DE &= CD - EC \\ &= 30\text{m} - 1.5\text{m} \\ &= 28.5\text{m}\end{aligned}$$

$$\angle DAE = 30^\circ$$

$$\angle DGE = 60^\circ$$

$$AG = AE - GE$$

In right $\triangle DEA$

$$\frac{DE}{AE} = \tan 30^\circ \left(\tan 30^\circ = \frac{1}{\sqrt{3}} \right)$$

$$\Rightarrow \frac{DE}{AE} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \frac{28.5}{AE} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow AE = 28.5 \times \sqrt{3} \quad (i)$$

Again, In right $\triangle DEG$

$$\frac{DE}{GE} = \tan 60^\circ$$

$$\Rightarrow \frac{DE}{GE} = \sqrt{3} \quad (\tan 60^\circ = \sqrt{3})$$

$$\Rightarrow \frac{28.5}{GE} = \sqrt{3}$$

$$\Rightarrow GE = \frac{28.5}{\sqrt{3}}$$

$$\Rightarrow GE = \frac{28.5 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{28.5 \times \sqrt{3}}{3} \quad (ii)$$

$$\text{Now, } AG = 28.5 \times \sqrt{3} - \frac{28.5 \times \sqrt{3}}{3}$$

$$= 28.5\sqrt{3} \left(1 - \frac{1}{3} \right)$$

$$= 28.5\sqrt{3} \left(\frac{3-1}{3} \right)$$

$$= \frac{28.5 \times 1.732 \times 2}{3} \text{ m}$$

$$= \frac{98.61}{3} \text{ m}$$

$$= 32.87 \text{ m}$$

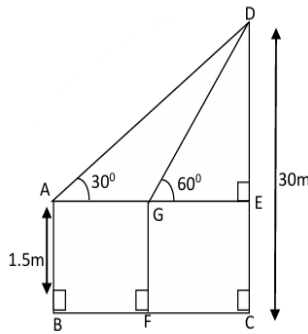
$\therefore$ The required distance he walked towards the building is 32.87m

41. There is a small island in the middle of 100 m wide river and a tall tree stands on the island. P and Q are two points directly opposite to each other, and in the line with the tree. If the angle of elevation of the top of the tree from P and Q are respectively 30° and 45° . Find the height of the tree.

Solution: Let AB be the height of the tree.

Here, PQ = 100 m

Let QB = x, then PB = (100 - x)



$$\angle APB = 30^\circ, \angle AQB = 45^\circ$$

In rt $\triangle AQB$

$$AB / QB = \tan 45^\circ$$

$$\Rightarrow AB / x = 1$$

$$\Rightarrow AB = x$$

In rt. $\triangle APB$

$$AB / PB = \tan 30^\circ$$

$$\Rightarrow x / (100 - x) = 1/\sqrt{3}$$

$$\Rightarrow \sqrt{3}x = 100 - x$$

$$\Rightarrow x(\sqrt{3} + 1) = 100$$

$$\Rightarrow x = 100 / (\sqrt{3} + 1)$$

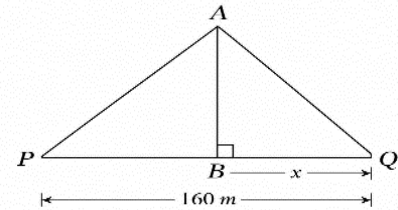
$$\Rightarrow x = 100(\sqrt{3} - 1) / ((\sqrt{3} + 1)(\sqrt{3} - 1))$$

$$\Rightarrow x = 100(\sqrt{3} - 1) / (3 - 1)$$

$$\Rightarrow x = 100(\sqrt{3} - 1) / 2$$

$$\Rightarrow x = 50(\sqrt{3} - 1)$$

$\therefore$ Height of the tree = $50(\sqrt{3} - 1)$ m



42. From a lighthouse the angle of depression of two ships on the opposite sides of the lighthouse were observed to be 30° and 45° . If the lighthouse is 90 m high and the line joining the two ships passes through the foot of the lighthouse, find the distance between the two ships.

Solution: Let AB be the height of the lighthouse and C and D be the two ships.

Here, AB = 90 m

In rt $\triangle ABD$

$$AB / BD = \tan 45^\circ$$

$\therefore$

$$\Rightarrow 90 / BD = 1$$

$$\Rightarrow BD = 90 \text{ m}$$

In rt $\triangle ABC$

$$AB / BC = \tan 30^\circ$$

$$\Rightarrow 90 / BC = 1/\sqrt{3}$$

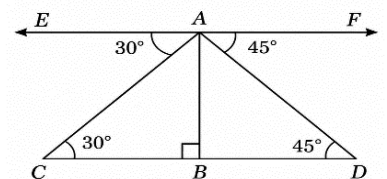
$$\Rightarrow BC = 90\sqrt{3}$$

Distance between ships = CD

$$= BC + BD$$

$$= 90\sqrt{3} + 90$$

$$= 90(\sqrt{3} + 1) \text{ m}$$



43. The angle of elevation of the top of a tower from two points, distant

a and b from the base and in the same straight line with it are complementary. Prove that the height of the tower is $\sqrt{ab}$.

Solution:

Let **AB** be the tower.

Let

$AB = h$ m

B be the foot of the tower.

Let C and D be two points on the same straight line through B such that

$BC = a$

$BD = b$

Let $\angle ACB = \theta$

Then, $\angle ADB = (90^\circ - \theta)$

In $\triangle ABC$,

$$\begin{aligned}\tan \theta &= AB/BC \\ &= h/a \quad \dots(i)\end{aligned}$$

In $\triangle ABD$,

$$\begin{aligned}\tan (90^\circ - \theta) &= AB/BD \\ &= h/b \quad \dots(ii)\end{aligned}$$

But,

$$\begin{aligned}\tan (90^\circ - \theta) &= \cot \theta \\ \therefore \cot \theta &= h/b\end{aligned}$$

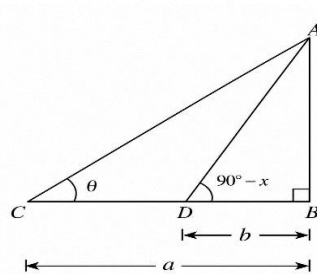
Multiplying (i) and (ii),

$$\begin{aligned}\tan \theta \times \cot \theta &= (h/a) \times (h/b) \\ 1 &= h^2/ab \\ h^2 &= ab\end{aligned}$$

Taking square root,

$$h = \sqrt{ab}$$

Hence, the height of the tower is $\sqrt{ab}$.



as the base of the tower and on the same side of it are θ and ϕ , where $\tan \theta = 3/4$ and $\tan \phi = 1/3$. Find the distance between two cars.

Solution: Let AB be the tower and C and D be the positions of the two cars.

Here, $AB = 96$ m

In rt $\triangle ABC$

$$AB / BC = \tan \theta$$

$$\Rightarrow 96 / BC = 3/4$$

$$\Rightarrow BC = 128 \text{ m}$$

In right $\triangle ABD$

$$AB / BD = \tan \phi$$

$$\Rightarrow 96 / BD = 1/3$$

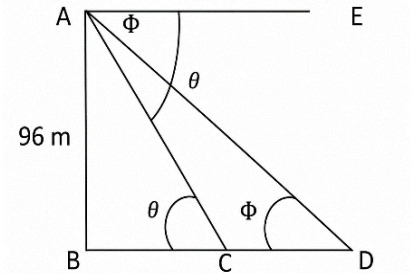
$$\Rightarrow BD = 288 \text{ m}$$

Distance between the cars = CD

$$= BD - BC$$

$$= 288 - 128$$

$$= 160 \text{ m}$$



45. The top of a broken tree has its top end touching the ground at a distance 15 m from the bottom, the angle made by broken part with the ground is 30° . Find the length of the broken part and the height of the tree before breaking.

Solution: Let 'AB' be the tree, broken at point 'D'

Let $AD = CD = y$ m be the broken part of the tree

Then, $BD = x$ m

and $\angle BCD = 30^\circ$

Then the height of the tree before breaking = $(x+y)$ metres

In right $\triangle BDC$,

we have

$$\frac{BD}{BC} = \tan 30^\circ$$

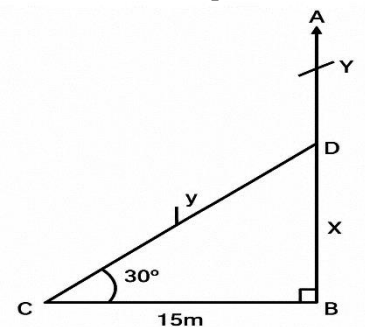
$$\frac{x}{15} = \frac{1}{\sqrt{3}}$$

$$x = \frac{15}{\sqrt{3}} \text{ m} \quad \dots(i)$$

$$\text{And, } \frac{BC}{CD} = \cos 30^\circ$$

$$\frac{15}{y} = \frac{\sqrt{3}}{2}$$

$$y = \frac{30}{\sqrt{3}} \quad \dots(ii)$$



44. From the top of a tower 96 m high, the angle of depression of two cars on a road at the same level

$$\begin{aligned}
 \therefore x+y &= \frac{15}{\sqrt{3}} + \frac{30}{\sqrt{3}} \text{ (using (i) and (ii))} \\
 &= \frac{15+30}{\sqrt{3}} \\
 &= \frac{45}{\sqrt{3}} \\
 &= \frac{45\sqrt{3}}{3} \\
 &\approx 15 \times 1.732 \\
 &= 25.98 \text{ m}
 \end{aligned}$$

$\therefore$ Height of the tree before breaking is 25.98 m.

$$\begin{aligned}
 \therefore \text{Height of the broken part:} &= y \\
 &= \frac{30}{\sqrt{3}} \\
 &= \frac{30\sqrt{3}}{3} \\
 &= 10\sqrt{3} \\
 &\approx 10 \times 1.732 \\
 &= 17.32 \text{ m}
 \end{aligned}$$

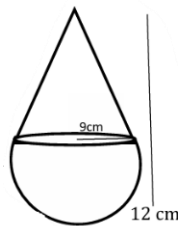
46. A Toy is in the form of a cone mounted on a hemisphere. The diameter of the base of a cone is 18cm and its height is 12cm. calculated the total surface area of a toy. (take $\pi = 3.14$)

Solution:

$$\begin{aligned}
 \text{Radius of the hemisphere, } r &= \frac{18}{2} \\
 &= 9 \text{ cm}
 \end{aligned}$$

Curved surface area of the hemisphere = $2\pi r^2$

$$\begin{aligned}
 &= 2 \times 3.14 \times 9 \times 9 \\
 &= 508.68 \text{ cm}^2
 \end{aligned}$$



Radius of the cone, $r = 9 \text{ cm}$
Height of the cone, $h = 12 \text{ cm}$

$$\begin{aligned}
 \text{Slant height of the cone, } l &= \sqrt{r^2 + h^2} \\
 &= \sqrt{9^2 + 12^2} \\
 &= \sqrt{81 + 144} \\
 &= \sqrt{225} \\
 &= 15 \\
 \therefore l &= 15 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{Curved surface area of the cone} &= \pi rl \\
 &= 3.14 \times 9 \times 15 \\
 &= 423.90 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{The total surface area of the toy} &= \text{curved surface area of the cone} + \text{curved surface area of the hemisphere} \\
 &= 508.68 + 423.90 \\
 &= 932.58 \text{ cm}^2
 \end{aligned}$$

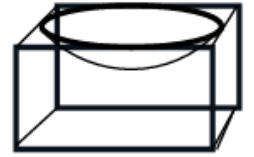
47. A hemisphere depression is cut out from one face of a cubical wooden block such that the diameter of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

olution:

Edge of the cube = l

$\therefore$ Radius of the

hemisphere, $r = \frac{l}{2}$



Now,

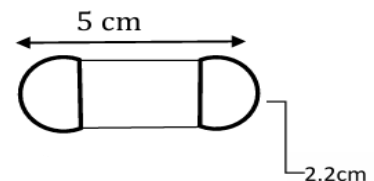
Surface area of the remaining solid
= TSA of the cube – area of the top of the hemispherical part + CSA of the hemisphere

$$\begin{aligned}
 &= 6l^2 - \frac{\pi l^2}{4} + \frac{2\pi l^2}{4} \\
 &= \frac{24l^2 - \pi l^2 + 2\pi l^2}{4} \\
 &= \frac{24l^2 + \pi l^2}{4} \\
 &= \frac{l^2(24 + \pi)}{4}
 \end{aligned}$$

$\because$ Area of a circle = πr^2 and, CSA of hemisphere = $2\pi r^2$

Hence, Surface area of the remaining solid is $\frac{l^2}{4}(24 + \pi)$

48. A Gulab Jamun, contain sugar syrup up to 30% of its volume. Find approximately how much syrup would be found in 45 Gulab Jamun shaped like a cylinder with two hemispherical ends, with length 5cm and diameter 2.8cm. Solution:



$$\text{Radius of the Gulab Jamun, } r = \frac{2.8}{2} = 1.4 \text{ cm}$$

$$\begin{aligned}
 \text{Height of the cylindrical portion, } h &= 5 - (2 \times 1.4) \\
 &= 2.2 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{Volume of the cylindrical portion} &= \pi r^2 h \\
 &= \frac{22}{7} \times 1.4 \times 1.4 \times 2.2 \text{ cm}^3 \\
 &= 13.552 \text{ cm}^3
 \end{aligned}$$

$$\text{Volume of two hemispherical ends} = 2 \times \frac{2}{3} \pi r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times 1.4 \times 1.4 \times 1.4$$

$$\begin{aligned}
 &= \frac{34.496}{3} \\
 &= 11.50 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{Total volume of Gulab Jamun} &= (13.552 + 11.50) \text{ cm}^3 \\
 &= 25.052 \text{ cm}^3
 \end{aligned}$$

Amount of sugar syrup in one Gulab Jamun =
30% of 25.052 = 7.52 cm²

∴ Amount of sugar syrup in 45 Gulab Jamun =
= 45 × 7.52 cm²
= 338.20 cm²
= 338 cm³ (approx)

49. A pen stand made of wood is in the shaped of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15cm by 10cm by 3.5 cm. The radius of each of the depression is 0.5cm and depth is 1.4cm. find the volume of wood in the entire stand. (use $\pi = \frac{22}{7}$)

Solution:



Volume of
pen stand (cuboid) = $15 \times 10 \times 3.5$
= 525 cm³

Radius of conical depression, $r = 0.5 = \frac{1}{2}$ cm

Height of conical depression, $h = 1.4$ cm

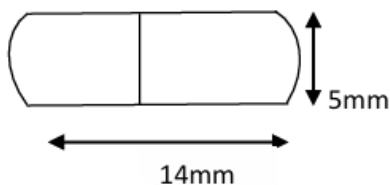
$$\begin{aligned}\text{Volume of conical depression} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \times \frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} \times 1.4 \\ &= \frac{2.2}{6} \\ &= \frac{11}{30} \text{ cm}^3\end{aligned}$$

∴ Volume of 4 conical depression = $4 \times \frac{11}{30} \times \text{cm}^3$
= $\frac{22}{15}$ cm³ or 1.47

∴ Volume of cuboid in the stand = Volume of
pen stand – volume of 4 conical
depression = 525 - 1.47
= 523.53 cm³

50. A medicine capsule is in the shaped of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14mm and the diameter of the capsule is 5mm. find its surface area.

Solution:



Total length of capsule = 14mm

Diameter of capsule = 5 mm

Then, radius of each hemispherical end, $r = \frac{5}{2}$ mm

∴ Surface area of the two hemispherical
ends, $A_1 = 2 \times 2 \pi r^2$

$$\begin{aligned}&= 4 \times \frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \text{ mm}^2 \\ &= \frac{550}{7} \text{ mm}^2\end{aligned}$$

Again, length of the cylindrical portion of the
capsule, h = Total length of capsule – 2 ×
hemispherical ends.

$$\begin{aligned}&= 14 \text{ mm} - 2 \times \frac{5}{2} \text{ mm} \\ &= 9 \text{ mm}\end{aligned}$$

∴ Surface area of the cylindrical portion, $A_2 =$
 $2\pi rh$

$$\begin{aligned}&= 2 \times \frac{22}{7} \times \frac{5}{2} \times 9 \text{ mm}^2 \\ &= \frac{990}{7} \text{ mm}^2\end{aligned}$$

Hence, the required total surface area of the
medicine capsule = $A_1 + A_2$

$$\begin{aligned}&= \frac{550}{7} + \frac{990}{7} \text{ mm}^2 \\ &= \frac{1540}{7} \text{ mm}^2 \\ &= 220 \text{ mm}^2\end{aligned}$$

51. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure 12.11. If the height of the cylinder is 10cm and its base is of radius 3.5cm, find the total surface area of the article.

Solution:

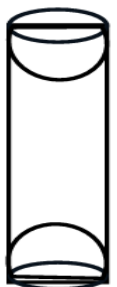
Radius of the cylinder, $r = 3.5$ cm

Height of the cylinder, $h = 10$ cm

$$\begin{aligned}\text{CSA of the cylinder} &= 2\pi rh \\ &= 2 \times \frac{22}{7} \times 3.5 \times 10 \text{ cm}^2 \\ &= 220 \text{ cm}^2\end{aligned}$$

CSA of the scooped hemisphere =
 $2\pi r^2$

$$= 2 \times \frac{22}{7} \times 3.5 \times 3.5 \text{ cm}^2$$



$$= 77 \text{ cm}^2$$

∴ Required surface area of the article

= CSA of cylinder + 2(CSA of one scooped hemisphere)

$$= 220 \text{ cm}^2 + 2 \times 77 \text{ cm}^2$$

$$= 220 \text{ cm}^2 + 154 \text{ cm}^2$$

$$= 374 \text{ cm}^2$$

52. From a solid cylinder whose height is 2.4cm and diameter 1.4cm, a conical cavity of the same height and same diameter is hallowed out. Find the total surface area of the remaining solid the nearest cm^2 . ($\pi = 22/7$)

Solution: Radius of the base of the cylinder,

$$r = \frac{1.4}{2} = 0.7 \text{ cm} \quad (\text{MBOSE 2025})$$

Height of the cylinder, $h = 2.4 \text{ cm}$

CSA of the cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 0.7 \times 2.4 \text{ cm}^2$$

$$= 10.56 \text{ cm}^2$$

Slant height of the cone, $l = \sqrt{r^2 + h^2}$

$$= \sqrt{0.7^2 + 2.4^2}$$

$$= \sqrt{0.49 + 5.76}$$

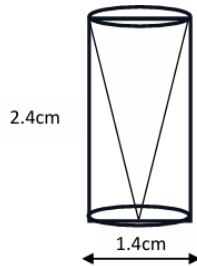
$$= \sqrt{6.25}$$

$$= 2.5 \text{ cm}$$

CSA of the cone = πrl

$$= \frac{22}{7} \times 0.7 \times 2.5$$

$$= 5.5 \text{ cm}^2$$



Area of the base of a cone = πr^2

$$= \frac{22}{7} \times 0.7 \times 0.7 \text{ cm}^2$$

$$= 1.54 \text{ cm}^2$$

TSA of the remaining solid = $(10.56 + 5.5 + 1.54)$

$$= 17.6 \text{ cm}^2$$

$$= 18 \text{ cm}^2 \text{ (to the nearest cm}^2\text{)}$$

53. Two cubes each of volume 64 cm^3 are joined end to end. Find the surface of the resulting cuboid. (MBOSE 2026)

Solution:

Volume of a cube = 64 cm^3

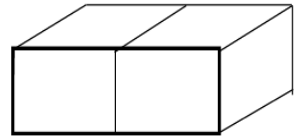
Let the edge of a cube be $x \text{ cm}$

∴ the volume of the cube = $x^3 \text{ cm}^3$

$$\Rightarrow x^3 = 64$$

$$\Rightarrow x^3 = 4^3$$

$$\Rightarrow x = 4$$



When two cubes are joined together,

Length of the new cuboid, $l = 2x$

$$= 2 \times 4$$

$$= 8 \text{ cm}$$

Width of the new cuboid, $b = x \text{ cm} = 4 \text{ cm}$

Height of the new cuboid, $h = x \text{ cm} = 4 \text{ cm}$

∴ Surface area of the resulting cuboid = $2(lb + bh + lh)$

$$= 2(8 \times 4 + 4 \times 4 + 8 \times 4)$$

$$= 2(32 + 16 + 32)$$

$$= 2 \times 80$$

$$= 160 \text{ cm}^2$$

54. Rachel an engineering, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminum sheet. The diameter of the model is 30cm and its length is 12cm. if each one has height of 2cm, find the volume of air contained in the model that Rachel made (assume the outer and inner dimensions of the model to be nearly the same).

Solution:

Radius of the cone = Radius of the cylinder = r

Hence, $r = \frac{1}{2} \times \text{diameter}$

$$= \frac{1}{2} \times 30 \text{ cm}$$

$$= \frac{3}{2} \text{ cm}$$

Total height of the model = 12cm

Height of the cone, $h_2 = 2 \text{ cm}$

∴ Height of the cylinder, $h_1 = 12 - 4$

$$= 8 \text{ cm}$$

Hence, volume of the model = 2 × volume of cone + Volume of cylinder

$$= 2 \times \frac{1}{3} \pi r^2 h_2 + \pi r^2 h_1$$

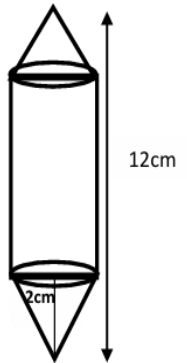
$$= \frac{\pi r^2}{3} (2h_2 + 3h_1)$$

$$= \frac{22 \times 3 \times 3}{7 \times 3 \times 2 \times 2} (2 \times 2 + 3 \times 8)$$

$$= \frac{22 \times 33}{7 \times 2 \times 2} (4 + 24)$$

$$= \frac{11 \times 3}{7 \times 2} \times 28$$

$$= 66 \text{ cm}^3$$



∴ The volume of air contained in the model is 66 cm^3 .

55. A vessel is in the form of an inverted cone. Its height is 8cm and the radius of its top, which is open, is 5cm. It is filled with water up to the brim when lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one-fourth of the water flow out. Find the number of lead shots dropped in the vessel.

Solution:

Radius of conical vessel, $R = 5 \text{ cm}$

Height of conical vessel, $h = 8 \text{ cm}$

Radius of each lead shots, $r = 0.5 \text{ cm}$
 $= \frac{1}{2} \text{ cm}$

Let the number of lead shots be 'n'.
 Therefore,

Volume of n lead shots $= \frac{1}{4}$ volume of conical vessel

$$\Rightarrow n \times \frac{4}{3} \times \pi r^3 = \frac{1}{4} \times \frac{1}{3} \times \pi R^2 h$$

$$\Rightarrow n = \frac{3 \times \pi \times h \times R^2}{4 \times 4 \times 3 \times \pi \times r^3}$$

$$\Rightarrow n = \frac{5 \times 5 \times 8}{4 \times 4 \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}}$$

$$\Rightarrow n = 100$$

∴ The number of lead shots dropped in the vessel is 100.

56. A circus tent is in the form of a right circular cylinder and right circular cone above it. The diameter and the height of the cylindrical part of the tent are 126 m and 5 m respectively. The total height of the tent is 21 m. Find the total surface area of the tent.

Solution: Diameter of the base of the cylindrical portion and conical portion = 126 m

∴ Radius of the base (r) = $21 \times 126 \text{ m} = 63 \text{ m}$

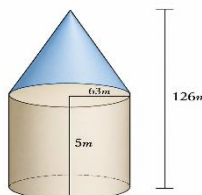
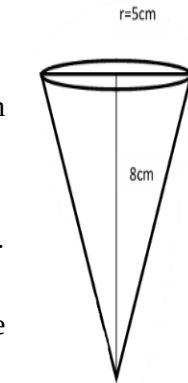
Height of the cylinder (h_1) = 5 m

And,

Total height of the tent (H) = 21 m

∴ Height of the cone (h_2) = $H - h_1$
 $= 21 - 5$
 $= 16 \text{ m}$

∴ Slant height of the cone (l) = $(\sqrt{h_2^2 + r^2})$
 $= (\sqrt{16^2 + 63^2})$



$$= 256 + 3969$$

$$= 4225$$

$$= 65 \text{ m}$$

∴ TSA of the tent = CSA of the cylinder + CSA of the cone

$$= 2\pi r h_1 + \pi r l$$

$$= \pi r (2h_1 + l)$$

$$= 722 \times 63 \times (2 \times 5 + 65) \text{ m}^2$$

$$= 22 \times 9 \times 75 \text{ m}^2$$

$$= 14850 \text{ m}^2$$

57. A toy is in the form of a cone mounted on a hemisphere of diameter 7 cm. The total height of the toy is 14.5 cm. Find the volume and the total surface area of the toy.

Solution:

Diameter of the cone and diameter of hemisphere = 7 cm

∴ Radius of the cone and hemisphere (r) = $7/2 \text{ cm}$

Total height of the toy (H) = 14.5 cm

∴ Height of the cone (h) = $H - r$

$$= 14.5 - r$$

$$= 14.5 - 7/2$$

$$= 14.5 - 3.5$$

$$= 11 \text{ cm}$$

∴ Slant height of the cone (l) = $\sqrt{r^2 + h^2}$
 $= \sqrt{(11)^2 + (7/2)^2}$
 $= \sqrt{(121 + 49/4)}$
 $= \sqrt{(533/4)}$
 $= (23.08/2) \text{ cm}$

∴ Volume of the toy = Volume of the cone +

Volume of the hemisphere = $(1/3)\pi r^2 h + (2/3)\pi r^3$

$$= (1/3)\pi r^2 (h + 2r)$$

$$= (1/3) \times (22/7) \times (7/2)$$

$$\times (7/2) \times (11 + 2 \times 7/2) \text{ cm}^3$$

$$= (77/6) \times 18 \text{ cm}^3$$

$$= 77 \times 3$$

$$= 231 \text{ cm}^3$$

And,

TSA of the toy = CSA of the cone + CSA of hemisphere = $\pi r l + 2\pi r^2$

$$= \pi r (l + 2r)$$

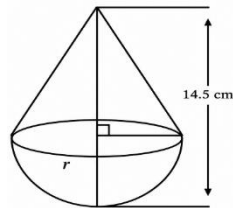
$$= (22/7) \times (7/2) \times [(23.08/2) + 2 \times 7/2] \text{ cm}^2$$

$$= 11 \times [(23.08 + 14)/2]$$

$$= (11 \times 37.08)/2 \text{ cm}^2$$

$$= 407.88/2 \text{ cm}^2$$

$$= 203.94 \text{ cm}^2$$



Sample Question Paper-I
(SSLC Examination 2026-27)

Mathematics
(New Course – NCERT Textbook)

by
Meghalaya Board of School Education (MBOSE)

A. The Scheme of Examination

	Maximum Marks	Pass Marks
Theory Examination	80	24
Internal Assessment	20	6
Total	100	30

B. Scheme of Theory Examination

Section	Type of Questions	Marks for Each Question	No. of questions to be attempted/ no. of questions given	Total Marks
Section-A	MCQs	1	30/30	1x30=30
Section-B	Very Short Answer Questions	2	6/9	2x6=12
Section-C	Short Answer Questions	3	6/9	3x6=18
Section-D	Long Answer Questions	5	4/7	5x4=20
Total Marks				80

C. Scheme of Internal Assessment

The Internal Assessment can be done through anyone of the following:

1. Project Work
2. Written Tests
3. Assignments (Class work or Home Work)

D. Content Weightage in Theory Examination

The chapter-wise weightage shown below is only indicative for the purpose of information of teachers while prioritising different chapters during teaching or assessment. Though the weightage in Theory Examination conducted by MBOSE would broadly follow the following pattern, there may still be some variation.

Subject	Chapter	Marks
Algebra	• Real Numbers • Polynomials • Pairs of Linear Equations in Two Variables • Quadratic Equations • Arithmetic Progression	27
Coordinate Geometry	• Coordinate Geometry	05
Trigonometry	• Introduction to Trigonometry • Some Applications of Trigonometry	09
Geometry and Mensuration	• Triangles • Circles • Arrears related to Circles • Surface Areas and Volumes	29
Statistics & Probability	• Statistics • Probability	10
Total		80

Sample Question Paper

Mathematics
Class-X

Question Paper Code: XY

Time: 3 hours

Max Marks: 80 (Pass Marks: 24)

General Instructions:

1. Please check that this Question Paper contains 55 Questions.
2. Question Paper Code given above should be written on the Answer Book, in the space provided, by the Candidate.
3. 15 minutes time is given for the candidates to read the Question paper. The Question Paper will be distributed 15 minutes before the scheduled time of the examination. In these 15 minutes, the candidates should only read the instructions and questions carefully and should not write answers on the Answer Sheet.
4. The Question Paper contains 4 sections, Section A, B, C and D.
5. Section-A contains Multiple Choice Questions (MCQ). Choose the most appropriate answer from the given options. The answers to this Section must be provided in the boxes provided in the Answer Sheet. Answers provided anywhere else will not be counted for marking.
6. Section-B contains Very Short Answer Questions. Answer the questions briefly, in minimum 3 steps.
7. Section-C contains Short Answer Questions. Answer the questions in minimum 5 steps.
8. Section-D contains Long Answer Questions. Answer the questions in minimum 8 steps.
9. Use of calculators/ mobile phone/ any electronic device is NOT ALLOWED.

Section- A

Multiple Choice Questions: Attempt **ALL** Questions. (30 X 1 = 30 marks)

1. The product of a non-zero rational number and an irrational number is :
(A) An irrational number
(B) a rational number
(C) one
(D) zero
2. If the product of two numbers is 540 and their LCM is 30, then their HCF is:
(A) 15 (B) 16 (C) 18 (D) 24
3. Which of the following is a quadratic polynomial?
(A) $x + 7$ (B) $x^2 - 2$
(C) $x^3 + 4x + 9$ (D) $x^4 + 3x^3 + 2x + 7$
4. A polynomial of degree 3 is called a:
(A) Linear polynomial
(B) quadratic polynomial
(C) cubic polynomial
(D) biquadratic polynomial
5. The pair of equations $x = a$ and $y = b$ graphically represents lines which are:
(A) parallel
(B) coincident
(C) intersecting at (a, b)
(D) intersecting at (b, a)
6. The system of equations $-3x + 4y = 5$ and $\frac{9}{2}x - 6y + \frac{15}{2} = 0$ has :
(A) Unique solution
(B) infinite many solutions
(C) no solutions
(D) none of these
7. The sum of the roots of the equation $x^2 - 6x + 5 = 0$ is:
(A) 5 (B) - 5 (C) 6 (D) -6
8. The product of the roots of the equation $x^2 - 6x + 5 = 0$ is:
(A) 5 (B) - 5 (C) 6 (D) -6
9. The 9th term of an AP: 3, 8, 13, 18, ... is:
(A) 43 (B) 23 (C) 93 (D) 113
10. The first three terms of an AP when the first term, $a = 4$ and common difference, $d = 6$ are:
(A) 4, - 2, - 8 (B) 4, 10, 16
(C) 10, 16, 22 (D) -10, -16, -22
11. All geometrical congruent figures are:
(A) Not similar (B) similar
(C) unequal (D) none of the above
12. The ratio of any two corresponding sides in two equiangular triangles is always:
(A) Complementary (B) different
(C) equal (D) none of the above
13. If two angles of one triangle are respectively equal to two angles of another triangle then the two Triangles are similar. This is referred to as the:
(A) AA Similarity Criterion for two triangles
(B) SAS Similarity Criterion for two triangles
(C) AAA Similarity Criterion for two triangles
(D) SSS Similarity Criterion for two triangles
14. The distance of a point P (3, 4) from origin is:
(A) 1 unit (B) 3 units (C) 5 units (D) 7 units

15. The midpoint of the line segment joining the points A (- 2, 8) and B (- 6, - 4) is:

- (A) (4, 2) (B) (- 4, 2) (C) (4, - 2) (D) (- 4, - 2)

16. The value of $1 + \tan^2 45^\circ$ is:

- (A) 0 (B) - 1 (C) 1 (D) 2

17. If $\cos \theta = 1$ then the value of θ is:

- (A) 0° (B) 30° (C) 60° (D) 90°

18. How many tangents can be drawn parallel to the secant of a circle?

- (A) One (B) two
(C) three (D) infinitely many

19. If a tangent PQ at a point P of a circle of radius 5cm meets a line through the Centre O such that OQ = 12 cm then the length PQ is :

- (A) 12cm (B) 13 cm (C) 8.5cm (D) $\sqrt{119}$ cm

20. If a tangent PA and PB from a point P to a circle with Centre O are inclined to each other at an angle of 80° , then $\angle POA$ is equal to:

- (A) 50° (B) 60°
(C) 70° (D) 80°

21. The angle made by the minute hand of a clock at its Centre in 15 minutes duration is:

- (A) 60° (B) 80° (C) 90° (D) 180°

22. If the circumference of a circle increases from 2π to 4π then its area is:

- (A) four times (B) tripled
(C) doubled (D) halved

23. The total surface area of a hemisphere of radius R units is:

- (A) πR^2 sq. units (B) $2\pi R^2$ sq. units
(C) $3\pi R^2$ sq. units (D) $4\pi R^2$ sq. units

24. During conversion of a solid from one shape to another, the volume of the new shape will:

- (A) Increase (B) decreases
(C) remain unaltered (D) be doubled

25. If the surface area of a sphere is 616 cm^2 its diameter is:

- (A) 7 cm (B) 14 cm (C) 28 cm (D) 56 cm

26. The middle most observation of every data arranged in order is called:

- (A) Median (B) mode
(C) mean (D) deviation

27. A numerical data is said to be multimodal if it has:

- (A) Single mode (B) two modes
(C) three modes (D) more than three modes

28. Which of the following cannot be the probability of an event?

- (A) $2/3$ (B) - 1.5 (C) 15 % (D) 0.7

29. A Child has a die whose six faces marked with letters A, B, C, D, E, A. When the die is thrown once then the probability of getting A is:

- (A) 2 (B) $1/6$ (C) $1/3$ (D) $2/3$

30. The probability that it will rain today is 0.87, then the probability that it will not rain today is:

- (A) 0.13 (B) 1.87 (C) $87/100$ (D) 1.03

Section – B

Very Short Answer Questions: Answer **any 6 (six)**.

(2x6=12 marks)

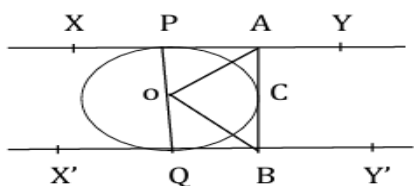
31. Express 5005 as a product of its prime factors.
32. Solve the following system of linear equations:
 $2x + 3y = 5$ and $3x - 4y = -1$
33. Find the length and breadth of a rectangular mango grove whose length is twice its breadth and its area is 800 m^2 ?
34. Prove that $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$
35. If $\cot \theta = 7/8$, evaluate $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$
36. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$.

37. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.
38. Prove that $3 + 2\sqrt{5}$ is an irrational number. It is given that $\sqrt{5}$ is an irrational number.
39. Show that the number $7 \times 11 \times 13 + 13$ is a composite number.

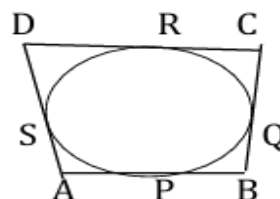
Section – C

Short Answer Questions: Answer **any 6 (six)**. (3x6=18 marks)

40. Find the ratio in which the line segment joining the points A (1, -5) and B (-4, 5) is divided by the x-axis.
41. Find the coordinates of a point A, where AB is the diameter of a circle whose Centre is (2, -3) and B is (1, 4).
42. Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360 years. Find their present ages?
43. In the given figure, XY and X'Y' are two parallel tangents to a circle with Centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



44. A Quadrilateral ABCD is drawn to circumscribe a circle as shown in the adjoining figure. Prove that $AB + CD = AD + BC$



45. In a circle of radius 21 cm, an arc subtends an angle of 60° at the Centre. Find:
 - (i) The length of the arc; and
 - (ii) area of the sector formed by the arc. (use $\pi = 22/7$)
46. The following table shows the ages of the patients admitted in a hospital during the year. Based on the information, find median of the given data.

Ages (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

47. Based on the information given in Question no. 46, find mean of the given data.
48. If α and β are zeroes of the polynomial $P(x) = 3x^2 - 2x - 6$, then find the value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

Section – D

Long Answer Questions: Answer **any 4(four)** (4x5=20 marks)

49. A Tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the Cylindrical part are 2.1 m and 4 m respectively; and the slant height of the top is 2.8 m. Find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of ₹500 per meter. (Use $\pi = 22/7$)
50. If α and β are zeroes of the polynomial $p(x) = ax^2 + bx + c$, then evaluate $(\alpha - \beta)^2$.
51. If the 5th and 12th term of an AP are 30 and 65 respectively, then find the sum of its first 20 terms?
52. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, and then prove that the other two sides are divided in the same ratio.
53. In the give figure PA, QB ad RC are each perpendicular to AC, such that PA =x, QB = z, RC = y, AB= a, and BC = b. prove that $1/x + 1/y = 1/z$.
54. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal?
55. The mileage (Km per litre) of 50 cars of the same model was tested by a manufacturer and details are tabulated as given below:

Mileage (Km per litre)	10-12	12-14	14-16	16-18
Number of cars	7	12	18	13

Find the mean mileage.

*** End of the Question Paper ***

SAMPLE QUESTION PAPER - II

Question Paper Code: XY

Time: 3 hours

Max Marks: 80 (Pass Marks: 24)

General Instructions:

- (i) Please check that this Question Paper contains 55 questions.
- (ii) 15 minutes time is given for the candidates to read the Question Paper. The Question Paper will be distributed 15 minutes before the scheduled time of the examination. In these 15 minutes, the candidates should only read the instructions and questions carefully and should not write answers on the Answer Sheet.
- (iii) The Question Paper contains 4 Sections, Sections A, B, C and D.
- (iv) Section—A contains Multiple Choice Questions (MCQ). Choose the most appropriate answer from the given options. The answers to this Section must be provided in the boxes provided in the Answer Sheet. Answers given anywhere else will not be counted for marking.
- (v) Section—B contains Very Short Answer-type Questions. Answer the questions briefly, in minimum 3 steps.
- (vi) Section—C contains Short Answer-type Questions. Answer the questions in minimum 5 steps.
- (vii) Section—D contains Long Answer-type Questions. Answer the questions in minimum 8 steps.
- (viii) Use of calculators/mobile phone/any electronic device is NOT ALLOWED.

SECTION - A

Multiple Choice Questions (Attempt all questions)

(1 X 30=30)

1. The prime factorization of 96 is
 - (A) $2^5 \times 3^2$
 - (B) $2^4 \times 3$
 - (C) $2^5 \times 3$
 - (D) 2^6
2. The highest exponent of the variable in a polynomial is called the.
 - (A) Degree of the polynomial
 - (B) Maximum value of the polynomial
 - (C) Number of terms in the polynomial
 - (D) None of these.
3. Which of the following polynomial is a linear polynomial.
 - (A) $4x+2$
 - (B) $2y^2 - 3y + 4$
 - (C) $7u^6 - \frac{3}{2}u^6 + 4u^2 - 8$
 - (D) None of these
4. 14. A quadratic polynomial whose sum and product of the zeroes are -3 and 2 is
 - (A) $x^2 - 3x + 2$
 - (B) $x^2 - 3x - 2$
 - (C) $-x^2 - 3x - 2$
 - (D) $x^2 + 3x + 2$.
5. A linear equation in two variables has
 - (A) unique solution
 - (B) two solution
 - (C) No solution
 - (D) infinitely many solutions
6. The equation $2x + y = 7$ has –
 - (A) Two solutions
 - (B) infinitely many solutions
 - (C) No solution
 - (D) a unique solution
7. Any equation of the form $p(x) = 0$, where $p(x)$ is a polynomial of degree 2 is a –
 - (A) Biquadratic equation
 - (B) cubic equation
 - (C) Quadratic equation
 - (D) linear equation
8. The quantity $b^2 - 4ac$ for a quadratic equation $ax^2 + bx + c = 0$ is called its –
 - (A) Zeroes
 - (B) reciprocal
 - (C) discriminant
 - (D) coefficient
9. If the polynomial $ax^2 + bx + c$ is a perfect square, then
 - (A) $b^2 = 4ac$
 - (B) $b = -4ac$
 - (C) $a^2 = 4bc$
 - (D) $a^2 = -4bc$
10. The first three terms of an AP, whose first term is 10 and the common difference is 10 are –
 - (A) 10, 20, 30
 - (B) 10, 20, -30
 - (C) 10, -20, 30
 - (D) 10, -20, -30
11. A Mathematics Text Book for Class- X is in the shape of a
 - (A) Rectangle
 - (B) Square
 - (C) Rhombus
 - (D) Parallelogram

12. If $\triangle ABC \sim \triangle DEF$ and $\angle A = 47^\circ$ and $\angle B = 83^\circ$, then $\angle D$ is:
- (A) 50° (B) 47°
(C) 80° (D) 83°
13. The measure of each angle of an equilateral triangle is
- (A) 30° (B) 45°
(C) 60° (D) 90°
14. The coordinates of the midpoint of the line segment joining the points A(- 2, 8) and B(- 6, - 4) is:
- (A) (4, 2) (B) (- 4, 2)
(C) (4, - 2) (D) (- 4, - 2)
15. The coordinates of a point on X –axis are of the form:
- (A) (0, x) (B) (x, 0)
(C) (0, y) (D) (y, 0)
16. The value of $3 \cot^2 A - 3 \operatorname{Cosec}^2 A$ is equal to:
- (A) - 3 (B) 0
(C) 3 (D) 1
17. The value of $\sec 60^\circ$ is:
- (A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{2}$
(C) 2 (D) 1
18. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is
- (A) 7 cm (B) 12 cm
(C) 15 cm (D) 10 cm
19. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° , the $\angle POA$ is equal to
- (A) 50° (B) 60°
(C) 70° (D) 80°
20. A line which intersects the circle exactly at one point is called
- (A) Tangent
(B) Secant
(C) Chord
(D) Diameter
21. The angle described by a minute hand in 1 hour is
- (A) 60° (B) 120°
(C) 180° (D) 360°
22. The distance covered by a wheel in one revolution is equal to
- (A) Diameter of a wheel
(B) radius of a wheel
(C) Circumference of a wheel
(D) None of these
23. The volume of a cuboid if the length = 3 m, breadth = 4 m and height = 5 m is
- (A) 30 m^3 (B) 40 m^3
(C) 50 m^3 (D) 60 m^3
24. The total surface area of a right circular cylinder having radius of base 7 cm and height 3 cm is
- (A) 220 cm^2 (B) 440 cm^2
(C) 660 cm^2 (D) 880 cm^2
25. During conversion of a solid from one shape to another, the volume of the new shape will
- (A) increase
(B) decrease
(C) remain unaltered
(D) be doubled
26. Tallies are usually marked in a bunch of
- (A) 3 (B) 5
(C) 4 (D) 6
27. Mode is
- (A) Least frequent value
(B) Most frequent value
(C) Middle most value
(D) None of these
28. If two coins are tossed at the same time, the probability of getting tail on the top face of both the coins is

- (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{1}{4}$ (D) 1
29. Which of the following cannot be the probability of an event?
 (A) $\frac{2}{3}$ (B) -1.5
- (C) 15% (D) 0.7
30. If $P(E) = 0.05$, then $P(\bar{E})$ equals
 (A) -0.05
 (B) 0.5
 (C) 0.9
 (D) 0.95

SECTION - B

Very Short Answer Type questions (Answer any Six)

(2 x 6 = 12)

31. Find the HCF and LCM of 12, 15 and 21 by prime factorization method.
32. Represent the given situation in the form of a pair of linear equations in two variables.
 The sum of the digits of a two digit-number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits.
33. A natural number, when increased by 12 equals 160 times its reciprocal. Find the number.
34. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{2}{3}$ and $AE = 7.2\text{cm}$, find AC .
35. If $A = 60^\circ$, $B = 30^\circ$, verify that $\cos(A + B) = \cos A \cos B - \sin A \sin B$.
36. A card is drawn from a pack of 52 cards. Find the probability that the card drawn is a queen.
37. Show that $2\sqrt{2}$ is irrational.
38. Prove that $(\sec^2 A - 1)(\operatorname{cosec}^2 A - 1) = 1$
39. Write the discriminant of the quadratic equation $(x + 5)^2 = 2(5x - 3)$

SECTION - C

Short Answer Type questions (Answer any Six)

(3 x 6 = 18)

40. Find a quadratic polynomial whose zeroes are $-\frac{11}{6}$ and $\frac{1}{2}$.
41. Find two numbers whose sum is 27 and product is 182.
42. If (a, b) is the mid-point of the line segment joining the points $A(10, -6)$ and $B(k, 4)$ lies on a line $-2b = 18$. Find the value of k .
43. In what ratio is the line segment joining the points $(-2, -3)$ and $(3, 7)$ divided by the y -axis. Also, find the coordinates of the point of division.
44. A circle touches the side BC of $\triangle ABC$ at P and touches AB and AC produced at Q and R respectively. Prove that $AB = \frac{1}{2}(\text{Perimeter of } \triangle ABC)$
45. Prove that a parallelogram circumscribing a circle is a rhombus.
46. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes
47. Find the mode of the following data:

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency	11	13	19	15	11

48. Find the median, if

l = lower limit of the median class = 125

n = number of observations = 68

cf = cumulative frequency of the class preceding

the median class = 22

f = frequency of the median class = 20

h = class size = 20

Section - D

Long Answer Type questions (Answer any Four)

(5 × 4 = 20)

49. An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

50. Prove that If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points then the other two sides are divided in the same ratio.

51. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle of 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree. (Use $\sqrt{3} = 1.732$)

52. A Gulab Jamun contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 Gulab Jamuns,

each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm.

53. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show That ABCD is a trapezium.

54. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find Rohan's present age.

55. Consider the following distribution of daily wages of 50 workers of a factory.

Daily wages (in ₹)	500–520	520–540	540–560	560–580	580–600
Number of workers	12	14	8	6	10

Find the mean daily wages of the workers of the factory.

*** End of the Question Paper ***

