RRB Group D Official Paper (Held On: 24 Dec, 2025 Shift 1) (Previous Year Paper)

RRB Group D • 2025 • 100 questions • 90 minutes • Answer key and solutions

Take this paper as a timed mock test

Practise under exam conditions, then review your answers after you submit.

yourmocktest.com/pyq/rrb-group-d/rrb-group-d-official-paper-held-on-24-dec-2025-shift-1-previ…

Scan the QR code or click the link to open it.

GENERAL SCIENCE

Q1. Which of the following features are displayed by all cells under a microscope?

(a) Only plasma membrane and nucleus
(b) Only nucleus and cytoplasm
(c) Plasma membrane, nucleus and cytoplasm
(d) Only plasma membrane and cytoplasm

Q2. Which of the following help in maintaining the supply of nutrients to the growing plants in the forest?

(a) Secondary consumers
(b) Decomposers
(c) Tertiary consumers
(d) Primary consumers

Q3. Which type of bond is present between carbon atoms in saturated hydrocarbons?

(a) Triple bond
(b) Both double and triple bonds
(c) Double bond
(d) Single bond

Q4. Which of the following best describes the relation between a cell's shape and its role?

(a) Cell shape is random.
(b) All cells have the same function.
(c) All cells are round regardless of function.
(d) Cell shape supports its specific function.

Q5. In a house, electricity is supplied at 220 V. If the maximum power consumption of the house is 11 kW, what should the rating of the main fuse be?

(a) 20 A
(b) 30 A
(c) 50 A
(d) 100 A

Q6. What are the noticeable changes observed when an iron nail is placed in copper sulphate solution?

(a) The iron nail becomes brownish in colour and the blue colour of the copper sulphate solution fades.
(b) The iron nail remains as it is and the blue colour of the copper sulphate solution fades.
(c) The iron nail becomes brownish in colour and the blue colour of the copper sulphate solution remains blue.
(d) The iron nail becomes brownish in colour and the blue colour of the copper sulphate solution changes to yellow.

Q7. During energy transformation, the total energy of a system:

(a) always decreases
(b) remains unchanged
(c) disappears completely
(d) always increases

Q8. Read the given assertion (A) and reason (R) and select the most appropriate option.

(A): Oral contraceptive pills are a permanent method of contraception.

(R): They change hormone levels and prevent ovulation.

(a) Both A and R are true, and R is the correct explanation of A
(b) Both A and R are false
(c) A is false, but R is true
(d) Both A and R are true, but R is not the correct explanation of A

Q9. Which statement is INCORRECT regarding mass and weight?

(a) Mass is the measure of inertia, weight is the force due to gravity.
(b) Mass has SI unit kg, weight has SI unit newton.
(c) Mass is scalar, weight is vector.
(d) Mass varies from place to place, weight remains constant.

Q10. In human females, which of the following structures carries egg from the ovary to the womb?

(a) Vaginal tube
(b) Uterus
(c) Cervix
(d) Fallopian tube

Q11. Ethanol reacts with sodium leading to the formation of sodium ethoxide with the evolution of:

(a) bromine gas
(b) chlorine gas
(c) nitrogen gas
(d) hydrogen gas

Q12. Which of the following mirrors is used as a shaving mirror to get a magnified image of the face?

(a) Parabolic mirror
(b) Concave mirror
(c) Plane mirror
(d) Convex mirror

Q13. According to Newton’s third law, action and reaction forces:

(a) cancel each other out because they are equal
(b) act on the same object at the same time
(c) act on the same object at different times
(d) act on two different objects at the same time

Q14. In humans, after fertilisation, the embryo is implanted in which part of the body?

(a) Fallopian tube
(b) Ovary
(c) Stomach
(d) Uterus

Q15. The closeness of magnetic field lines indicates:

(a) Strength of magnetic field
(b) Position of the poles
(c) Direction of magnetic field
(d) Length of the magnet

YourMockTest.com — Free Study Material

Q16. Which of the following metals is least reactive?

(a) Zinc
(b) Gold
(c) Magnesium
(d) Sodium

Q17. We express the concentration of solution in various ways. Which of the following method is INCORRECT?

(a) Volume by volume percentage of a solution
(b) Mass by mass percentage of a solution
(c) Volume by mass percentage of a solution
(d) Mass by volume percentage of a solution

Q18. What is the name of the fluid present inside a plant cell vacuole?

(a) Nucleoplasm
(b) Protoplasm
(c) Cytoplasm
(d) Cell sap

Q19. Which statement best supports the Law of Constant Proportions?

(a) Mud from two ponds containing different minerals
(b) Soil from two areas with mixed organic content
(c) Water from two sources with identical composition
(d) Sand from two places with varying grain size

Q20. Which of the following quantities is a measure of the inertia of a body?

(a) Weight
(b) Acceleration
(c) Force
(d) Mass

Q21. Which of the following correctly pairs a nerve type with its origin?

(a) Cranial nerves – Brain
(b) Cranial nerves – Spinal cord
(c) Spinal nerves – Heart
(d) Spinal nerves – Brain

Q22. Why is it advised to clean your mouth after vomiting?

(a) To neutralise the acid and protect tooth enamel
(b) To avoid dehydration
(c) To remove bad odour
(d) To stop the spread of infection

Q23. Which of the following best describes a person with hypermetropia?

(a) They are unable to see anything without glasses
(b) Their vision is equally blurred for both near and distant objects
(c) They can see nearby objects clearly but distant ones appear blurry
(d) They can see faraway objects clearly but struggle to see things up close

Q24. Which of the following occurs due to continuous movement of gas particles?

(a) Condensation
(b) Melting
(c) Diffusion
(d) Evaporation

YourMockTest.com — Free Study Material

Q25. Megaphones, loudhailers, and shehnais are designed to:

(a) convert sound waves into electrical signals
(b) spread sound waves equally in all directions
(c) focus sound waves in a particular direction
(d) reduce the intensity of sound waves

MATHEMATICS

Q26. The average age of 24 students of a class is 46 years. If the age of the teacher is also included, the average age of the whole group becomes 47 years. The age (in years) of the teacher is:

(a) 71
(b) 73
(c) 70
(d) 74

Q27. The value of the expression $8/(4.5^3 - 0.5^3) \times (4.5 \times 4.5 + 0.25 + 4.5 \times 0.5)$ is _____.

(a) 4
(b) 2
(c) 8
(d) 1

Q28. In a zoo, there are 32 ducks, 41 sheep, 7 horses and some crows. If the total number of feet is 211 more than the number of heads, find the number of crows.

(a) 35
(b) 43
(c) 30
(d) 21

Q29. The inradius of a triangle is 8 cm and the sum of the lengths of its sides is 60 cm. Find the area (in cm^2) of the triangle.

(a) 280
(b) 260
(c) 240
(d) 480

Q30. 4 men can complete a piece of work in 8 days while 2 women can do it in 10 days. In how many days can 5 women and 8 men complete it?

(a) 7
(b) 6
(c) 4
(d) 2

Q31. What is the value of $(1 + \tan^2 \theta)/(1 + \cot^2 \theta)$?

(a) $\tan \theta$
(b) $\cot^2 \theta$
(c) $\tan^2 \theta$
(d) $\text{cosec}^2 \theta$

Q32. In an election between two candidates, 20% of the total votes were declared invalid. The winning candidate received 40% of the valid votes and secured 1,60,000 more valid votes than the runner-up, who received 32% of the valid votes. Find the total number of valid votes.

(a) 10,00,000
(b) 12,00,000
(c) 25,00,000
(d) 20,00,000

YourMockTest.com — Free Study Material

Q33. A trader marked his goods 35% above its cost price. He then gave a discount of 15%. Find his profit percentage.

(a) 15.25%
(b) 16.5%
(c) 14.75%
(d) 20%

Q34. The ratio of the speeds of two trucks is 5 : 4. The time taken by the faster truck to cover a distance of 200 km is 2 hours less than the other. Find the speed of the slower truck.

(a) 20 km/hr
(b) 17 km/hr
(c) 24 km/hr
(d) 26 km/hr

Q35. A and B working together can do a piece of work in 3 days. B alone can do the same work in 6 days. How long (in days) will A alone take to do double the work?

(a) 12
(b) 13
(c) 6
(d) 15

Q36. Raman's income is Rs. 10,200. He saves 30% of his income. If his income increases by 14% and expenditure increases by 40%, then his savings will:

(a) increase by Rs. 1,429
(b) increase by Rs. 1,430
(c) decrease by Rs. 1,427
(d) decrease by Rs. 1,428

Q37. If the volume of a cylinder is 1848 cm^3, and its height is 12 cm, find the curved surface area (in cm^2).

(a) 528
(b) 560
(c) 476
(d) 432

Q38. A typist takes 40 minutes to type 2 pages. How many pages will he type in 80 minutes?

(a) 1
(b) 2
(c) 3
(d) 4

Q39. A jeep travels 80 km at the speed of 40 km/hr and the next 36 km at the speed of 18 km/hr. What is its average speed (in km/hr)?

(a) 29
(b) 33
(c) 35
(d) 23

Q40. When the price of a book is reduced by 16%, its sale increases by 80%. What is the net per cent increment in the revenue?

(a) 49.2%
(b) 51.2%
(c) 48.8%
(d) 50.6%

YourMockTest.com — Free Study Material

Q41. Which of the following options is NOT true about triangles?

(a) An isosceles right-angled triangle with area 50 square units has one side with length 8 units.
(b) For a given area, the equilateral triangle has the least perimeter.
(c) If the largest side of a triangle is 4 units, then its area is less than 8 square units.
(d) There are right-angled triangles with three consecutive natural numbers as lengths of its sides.

Q42. A dealer allowed a 50% discount on an article and still managed a 71% profit. Find the ratio of the cost price to the listed price.

(a) 53 : 173
(b) 50 : 171
(c) 47 : 174
(d) 49 : 173

Q43. Roshan and Anshu together invested Rs. 13,500 in a business. At the end of the year, out of a total profit of Rs. 9,000, Roshan's share was Rs. 1,300. What was Roshan's investment?

(a) Rs. 1,565
(b) Rs. 2,295
(c) Rs. 1,950
(d) Rs. 1,765

Q44. The largest four-digit number which, when divided by 14, 9 and 6, leaves remainder 2 in each case is:

(a) 9984
(b) 9948
(c) 9998
(d) 9956

Q45. The average of the first 9 multiples of 3 is:

(a) 13.5
(b) 15
(c) 3
(d) 9

Q46. Two banks, A and B, offered loans at 3.5% and 7.5% per annum, respectively. Mohan borrowed an amount of Rs. 2,60,000 from each bank. Find the positive difference (in Rs.) between the amounts of simple interest paid to the two banks by Mohan after 2 years.

(a) 20,800
(b) 21,800
(c) 20,300
(d) 22,300

Q47. An article was bought for Rs. 4,000. Its price was marked up by 40%. Thereafter, it was sold at a discount of 20% on the marked price. What was the per cent profit on the transaction?

(a) 10%
(b) 11%
(c) 14%
(d) 12%

Q48. The present ages of P and Q are in the ratio 9 : 8 and after 2 years from now, they will be in the ratio 10 : 9. The present age of P is:

(a) 8 years
(b) 16 years
(c) 9 years
(d) 18 years

YourMockTest.com — Free Study Material

Q49. In a bag containing red, green and pink tokens, the ratio of red to green tokens was 15 : 19 while the ratio of pink to red tokens was 17 : 2. What was the ratio of green to pink tokens?

(a) 37:257
(b) 41:260
(c) 39:259
(d) 38.255

Q50. Simplify the given expression.

12 + {6 × 27 ÷ 3 + 2} – (16 ÷ 8) × 5

(a) 58
(b) 57
(c) 55
(d) 56

GENERAL INTELLIGENCE & REASONING

Q51. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:

All diamonds are stones.

No diamond is a necklace.

Conclusion (I): Some stones are diamonds.

Conclusion (II): No stone is a necklace.

(a) Both conclusions (I) and (II) follow.
(b) Neither conclusion (I) nor (II) follows.
(c) Only conclusion (II) follows.
(d) Only conclusion (I) follows.

Q52. Refer to the given number, symbol series and answer the question that follows. Counting to be done from left to right only. All numbers are single-digit numbers.

(Left) * 3 © £ % 2 7 3 © £ & @ & 5 @ 3 3 @ * @ $ 4 (Right)

How many such numbers are there, each of which is immediately preceded by a number and also immediately followed by a symbol?

(a) Four
(b) Three
(c) One
(d) Two

Q53. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) HMN
(b) QUW
(c) DHJ
(d) LPR

Q54. What should come in place of the question mark (?) in the given series?

1011 1010 1020 1019 1029 1028 ?

(a) 1034
(b) 1036
(c) 1040
(d) 1038

YourMockTest.com — Free Study Material

Q55. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

Some dogs are birds.

All birds are pets.

Conclusions:

(I): Some pets are not dogs.

(II): Some dogs are pets.

(a) Only conclusion (II) follows
(b) Both conclusions (I) and (II) follow
(c) Neither conclusion (I) nor (II) follows
(d) Only conclusion (I) follows

Q56. Bhaskar starts from Point A and drives 11 km towards north. He then takes a right turn, drives 4 km, turns right and drives 5 km. He then takes a left turn and drives 9 km. He takes a final right turn, drives 6 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90 degrees turns only unless specified)

(a) 11 km towards west
(b) 13 km towards south
(c) 13 km towards west
(d) 17 km towards north

Q57. Refer to the following number series and answer the question that follows (all numbers are single digit numbers only). (Counting to be done from left to right only.)

(Left) 3 3 3 4 9 8 9 1 2 2 5 5 5 1 3 1 4 4 1 5 8 2 2 6 3 7 6 (Right)

How many such odd numbers are there each of which is immediately preceded by an odd number and also immediately followed by an even number?

(a) 7
(b) 5
(c) 4
(d) 6

Q58. In a certain code language,

A + B means ‘A is the son of B’,

A – B means ‘A is the brother of B’,

A x B means ‘A is the wife of B’,

A ÷ B means ‘A is the father of B’.

Based on the above, how is D related to J if ‘D ÷ F – G x H + J’?

(a) Son's wife's father
(b) Wife's father
(c) Wife's brother
(d) Son's wife's brother

Q59. What should come in place of the question mark (?) in the given series?

100 85 70 55 40 ?

(a) 25
(b) 23
(c) 24
(d) 22

YourMockTest.com – Free Study Material

Q60. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group? (Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) MK – CA
(b) NK – DB
(c) AY-QO
(d) QO-GE

Q61. A, B, C, R, S, T and U are sitting around a circular table facing the centre of the table. Only two people sit between S and C when counted from the right of S. Only two people sit between C and U when counted from the left of U. Only three people sit between S and B when counted from the left of B. R sits to the immediate left of T. Who sits third to the left of A?

(a) C
(b) T
(c) R
(d) B

Q62. Seven people, B, C, D, I, J, K and L, are sitting in a straight line facing north. Only three people sit between B and K. C sits to the immediate left of K. No one sits to the right of L. Only one person sits between L and K. J sits to the immediate right of D. How many people sit between I and J?

(a) One
(b) Three
(c) Four
(d) Two

Q63. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

GPM ENK CLI AJG ?

(a) CHI
(b) YLI
(c) ZHE
(d) YHE

Q64. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order.

Only four boxes are kept between A and E. Only C is kept above A. Only two boxes are kept between G and F. B is kept immediately above D. F is not kept immediately above B.

How many boxes are kept below B?

(a) 2
(b) 3
(c) 4
(d) 1

Q65. Refer to the following number series and answer the question that follows (all numbers are single-digit numbers only). Counting to be done from left to right only.

(Left) 6 4 3 2 7 6 4 9 9 6 5 4 9 7 6 8 3 5 1 5 1 2 4 8 9 (Right)

How many such odd numbers are there, each of which is immediately preceded by an even number and also immediately followed by an even number?

(a) One
(b) Four
(c) Three
(d) Two

Q66. Refer to the following number, symbol series and answer the question that follows. Counting to be done from left to right only. (All numbers are single-digit numbers.)

(Left) 2 6 & 2 9 5 5 € 1 $ 1 6 @ & € # 3 @ £ % 4 9 (Right)

How many such symbols are there each of which is immediately preceded by a number and also immediately

followed by a symbol?

(a) Four
(b) Three
(c) Two
(d) One

Q67. Which numbers should come in place of the question mark (?) in the following series so that it can complete logically?

5, 15, 27, 41, 57, ?

(a) 82
(b) 80
(c) 75
(d) 76

Q68. Sonu starts from point A and drives 61 km towards west. He then takes a left turn, drives 67 km, turns left and drives 67 km. He then takes a left turn and drives 80 km. He takes a final left turn, drives 6 km and stops at point P. How far (shortest distance) and towards which direction should he drive in order to reach point A again?

(Note: All turns are 90° turns only unless specified.)

(a) 11 km to the north
(b) 10 km to the north
(c) 13 km to the south
(d) 12 km to the south

Q69. In a certain code language, 'ROME' is coded as '2347' and 'BERM' is coded as '7254'. What is the code for 'B' in the given code language?

(a) 5
(b) 4
(c) 2
(d) 7

Q70. What will come in place of the question mark (?) in the following equation, if '+' and '−' are interchanged and '×' and '÷' are interchanged?

116 ÷ 9 + 427 × 7 - 13 = ?

(a) 985
(b) 996
(c) 923
(d) 934

Q71. Select the pair that follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

BCG−FGK

WXB−ABF

(a) FFI−JKO
(b) FGK−JKO
(c) FFI−IJN
(d) FGK−IKN

Q72. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

CMN101, KUV82, SCD63, AKL44, ?

(a) IST25
(b) IWT25
(c) MST25
(d) ISE25

YourMockTest.com — Free Study Material

Q73. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘x’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘-‘, what will come in place of question mark ‘?’ in the following equation?

9 B 14 C 196 A 7 D 24 = ?

(a) 142
(b) 130
(c) 137
(d) 131

Q74. If + means −, − means ×, × means ÷ and ÷ means +, then what will come in place of the question mark (?) in the following equation?

18 - 8 ÷ 4 + 64 × 16 = ?

(a) 144
(b) 146
(c) 142
(d) 148

Q75. Five people, A, B, C, D and E are sitting in a row, facing north. A sits at the extreme right end of the line. D sits to the immediate left of A. B sits between C and E. How many people sit between A and B?

(a) 0
(b) 1
(c) 2
(d) 3

Q76. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – Operations on 13 such as adding to/subtracting from/multiplying with 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(46, 23, 32)

(72, 36, 45)6784

(a) (156, 78, 88)
(b) (194, 97, 105)
(c) (162, 81, 92)
(d) (98, 49, 58)

Q77. Seven boxes, B, C, D, I, J, K and L, are kept one over the other but not necessarily in the same order. Only I is kept above L. Only three boxes are kept between I and B. Only K is kept below C. D is kept immediately above B. How many boxes are kept between J and K?

(a) Three
(b) Four
(c) One
(d) Two

Q78. Select the pair that follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

YAB−XZA

TVW−SUV

(a) IKL−HJK
(b) IJJ−HJK
(c) IKL−GJJ
(d) IJJ−GIJ

YourMockTest.com — Free Study Material

Q79. CFRT is related to GKVY in a certain way based on the English alphabetical order. In the same way, SZHN is related to WELS. To which of the given options is EOTC related, following the same logic?

(a) ITBH
(b) ITXH
(c) IXDE
(d) ITXD

Q80. In a certain code language, ‘zebra rain union’ is coded as ‘ds cm oh’ and ‘video union oven’ is coded as ‘ng oa cm’. How is ‘union’ coded in that language?

(a) oh
(b) cm
(c) ng
(d) ds

GENERAL AWARENESS AND CURRENT AFFAIRS

Q81. Who was awarded the Padma Bhushan in 2025 for his contributions to Indian hockey?

(a) PR Sreejesh
(b) Harvinder Singh
(c) IM Vijayan
(d) Satyapal Singh

Q82. In news in 2025, MISHTI scheme for ecological and community sustainability stands for:

(a) Mangrove Initiative for Shoreline Habitats and Tangible Incomes
(b) Mangrove Improvement Scheme for Health and Technology Integration
(c) Mission for Inland Sustainable Tree Harvesting and Innovation
(d) Marine Initiative for Sustainable Habitat and Income

Q83. Which of the following features is a major design focus for the Zorawar tank?

(a) Stealth technology for naval use
(b) Amphibious capability and lightweight design
(c) Nuclear warhead capability
(d) Submarine detection system

Q84. In March 2025, Operation Brahma was launched by the NDRF to rescue earthquake victims of which country?

(a) Sri Lanka
(b) Myanmar
(c) Nepal
(d) Bhutan

Q85. The Constitution (Scheduled Tribes) Order (Fourth Amendment) Bill, 2022, seeks to amend the Constitution (Scheduled Tribes) Order, 1950, with respect to its application to which state?

(a) Karnataka
(b) Telangana
(c) Kerala
(d) Odisha

Q86. What is the theme of the 11^(th)International Day of Yoga 2025?

(a) Do Yoga for Long Life
(b) Yoga for One Earth, One Health
(c) Do Yoga for Good Health
(d) Yoga and Our Health

YourMockTest.com — Free Study Material

Q87. What was India's rank among the most polluted countries in the World Air Quality Report 2024, released in March 2025?

(a) 1st
(b) 7th
(c) 5th
(d) 3rd

Q88. In which city were the 2025 World Aquatics Championships held?

(a) United Arab Emirates
(b) Canada
(c) Japan
(d) Singapore

Q89. Who among the following became the youngest Formula 1 driver to win three races in a row in 2025?

(a) Max Verstappen
(b) George Russell
(c) Kimi Antonelli
(d) Lando Norris

Q90. At the 78^(th) World Health Assembly in May 2025, how many countries voted in favour of the historic WHO Pandemic Agreement?

(a) 132 countries
(b) 119 countries
(c) 124 countries
(d) 108 countries

Q91. Which of the following countries had awarded Prime Minister Narendra Modi its highest civilian honour in June 2025?

(a) Greece
(b) Cyprus
(c) Italy
(d) France

Q92. Which of the following age groups was highlighted at the Summer Book Writing Festival 2025?

(a) School students aged 6 and above
(b) Retired teachers
(c) School students aged 8 and above
(d) Authors aged between 18 and 26

Q93. In June 2025, which of the following states increased the quota for minorities under its housing schemes from 10% to 15%?

(a) Assam
(b) Kerala
(c) Karnataka
(d) Gujarat

Q94. Who among the following Indians set a javelin throw record of 84.39 m at National Games 2025?

(a) Shivpal Singh
(b) Neeraj Chopra
(c) Sachin Yadav
(d) Annu Rani

Q95. Which of the following is a major application of 3D bioprinting demonstrated at MSU Vadodara in 2025?

(a) Blockchain-based financial transactions
(b) Regenerative medicine and tissue engineering
(c) Weather forecasting models

YourMockTest.com — Free Study Material

(d) Satellite communication systems

Q96. In which state was the 'Viksit Krishi Sankalp Abhiyan (VKSA)' launched by the Union Agriculture Minister Shivraj Singh Chouhan, in May 2025?

(a) Rajasthan
(b) Telangana
(c) Odisha
(d) Uttar Pradesh

Q97. As announced in 2025, the headquarters of the International Big Cat Alliance (IBCA) will be established in:

(a) Brazil
(b) India
(c) South Africa
(d) New Zealand

Q98. In July 2025, which international city was in the spotlight for hosting the 17^(th) BRICS Summit?

(a) Beijing
(b) New Delhi
(c) Johannesburg
(d) Rio de Janeiro

Q99. Dassault Aviation and Reliance Aerostructure Limited (RAL), in June 2025, announced at Paris Air Show execution of an agreement to manufacture which of the following in India for the Global Market by 2028?

(a) Falcon 2000 LXS Business Executive Jets
(b) Falcon 1000 LXS Business Executive Jets
(c) Falcon 3000 LXS Business Executive Jets
(d) Falcon 4000 LXS Business Executive Jets

Q100. The Reserve Bank of India revised Priority Sector Lending (PSL) guidelines for Small Finance Banks from FY 2025–26, reducing the PSL target to what percentage of ANBC (adjusted net bank credit) or Credit Equivalent of Off-Balance Sheet Exposures (CEOBE)?

(a) 50%
(b) 40%
(c) 60%
(d) 30%

ANSWER KEY

1	d	2	b	3	d	4	d	5	c	6	a	7	b	8	c	9	d	10	d
11	d	12	b	13	d	14	d	15	a	16	b	17	c	18	d	19	c	20	d
21	a	22	a	23	d	24	c	25	c	26	a	27	b	28	a	29	c	30	d
31	c	32	d	33	c	34	a	35	a	36	d	37	a	38	d	39	a	40	b
41	a	42	b	43	c	44	d	45	b	46	a	47	d	48	d	49	d	50	a
51	d	52	d	53	a	54	d	55	a	56	c	57	b	58	a	59	a	60	b
61	b	62	d	63	d	64	b	65	c	66	c	67	c	68	c	69	a	70	b
71	b	72	a	73	b	74	a	75	c	76	d	77	a	78	a	79	b	80	b
81	a	82	a	83	b	84	b	85	a	86	b	87	c	88	d	89	c	90	c
91	b	92	c	93	c	94	c	95	b	96	c	97	b	98	d	99	a	100	c

SOLUTIONS

YourMockTest.com — Free Study Material

Q1. Answer: (d) Only plasma membrane and cytoplasm

The correct answer is Only plasma membrane and cytoplasm.

Key Points

• The cell is the fundamental structural and functional unit of all living organisms. While cells vary significantly in shape and size, they share core components visible under a microscope.

• The plasma membrane is the outermost selective boundary of the cell. It is present in every living cell, acting as a gatekeeper to regulate the movement of substances in and out of the cell. Hence, this feature is displayed by all cells.

• The cytoplasm is the semi-fluid, jelly-like matrix that fills the interior of the cell. It serves as the primary site for metabolic reactions and contains various organelles and molecular building blocks. Hence, this feature is displayed by all cells.

• The nucleus is a membrane-bound organelle containing genetic material (DNA). However, it is only present in eukaryotic cells. Prokaryotic cells (such as bacteria) lack a defined nuclear membrane, and their genetic material is found in a region called the nucleoid.

• Because prokaryotes do not possess a true nucleus, it cannot be a feature displayed by all cells under a microscope. Therefore, only the plasma membrane and cytoplasm are universally present across all cell types. Hence, the statement regarding only plasma membrane and cytoplasm is correct.

Additional Information

• Prokaryotic Cells:

• These cells are generally small, ranging from 1 to 10 µm.

• They lack membrane-bound organelles like mitochondria, lysosomes, or Golgi bodies.

• Examples include Bacteria, Archaea, and Cyanobacteria (blue-green algae).

• Eukaryotic Cells:

• These cells are larger, typically 10 to 100 µm in size.

• They possess a well-defined nucleus and complex membrane-bound organelles.

• Examples include Plant cells, Animal cells, Fungi, and Protists.

• Plasma Membrane Composition:

• It is primarily composed of lipids (mostly phospholipids) and proteins.

• It exhibits selective permeability, which is crucial for maintaining homeostasis within the cell.

• Genetic Material:

• While a nucleus is not universal, DNA or genetic material is a universal requirement for life, though its packaging varies between the nucleoid (prokaryotes) and nucleus (eukaryotes).

Important Points

• Cell Theory: This theory was formulated by M.J. Schleiden and Theodore Schwann in the 1830s. It states that all living things are composed of cells and that the cell is the basic unit of life.

• Modern Cell Theory: Rudolf Virchow expanded the theory in 1855 by stating "Omnis cellula e cellula," meaning all cells arise from pre-existing cells.

• Microscopy: To observe these features, biologists often use staining agents. For example, Methylene Blue is commonly used to stain animal cells to make the nucleus and plasma membrane more visible, while Safranin is used for plant tissues.

• Exceptions: Viruses are considered non-cellular or acellular entities because they do not have a plasma membrane or cytoplasm of their own, existing instead as genetic material encased in a protein coat.

Q2. Answer: (b) Decomposers

The correct answer is Decomposers.

Key Points

• Decomposers are microorganisms, such as bacteria and fungi, that play a vital role in the forest ecosystem by breaking down dead organic matter.

• They convert the dead remains of plants and animals into a dark, nutrient-rich substance known as humus.

• The humus created by these microorganisms ensures that essential minerals and nutrients are returned to the soil, making them available for uptake by the roots of growing plants.

• By recycling nutrients, decomposers maintain the continuous nutrient cycle in the forest, which is necessary for the sustained growth and health of the vegetation. Hence, the statement regarding decomposers is correct.

• Without the action of decomposers, the forest floor would be covered in waste, and the soil would eventually lose the fertility required to support producers.

Additional Information

• Primary Consumers:

• These are herbivores that feed directly on producers (green plants). Examples include deer, rabbits, and grasshoppers.

• Their main function is to transfer energy from plants to the higher levels of the food chain. Hence, statement 4 is incorrect.

• Secondary Consumers:

• These are carnivores or omnivores that feed on primary consumers. Examples include frogs, small birds, and snakes.

• They help regulate the population of herbivores within the ecosystem. Hence, statement 1 is incorrect.

• Tertiary Consumers:

• These are top predators that feed on secondary consumers. Examples include lions, tigers, and eagles.

• They occupy the highest trophic level in a food chain and have fewer natural predators. Hence, statement 3 is incorrect.

• Producers:

• These are autotrophs, mainly green plants, that manufacture their own food through the process of photosynthesis using sunlight, water, and carbon dioxide.

Important Points

• Humus: This is the organic component of soil, formed by the decomposition of leaves and other plant material by soil microorganisms. It improves soil structure and moisture retention.

• Saprotrophs: This is another term for decomposers that feed on dead and decaying matter by secreting digestive enzymes externally and absorbing the resulting organic molecules.

• Nutrient Cycling: This refers to the movement and exchange of organic and inorganic matter back into the production of living matter. It is a fundamental process that links biotic and abiotic components of the environment.

• Biodiversity in Forests: A healthy forest contains a wide variety of decomposers, which ensures that different types of organic waste (wood, leaves, bone, etc.) are processed efficiently at different rates.

Q3. Answer: (d) Single bond

The correct answer is Single bond.

Key Points

• Saturated hydrocarbons are organic compounds consisting entirely of hydrogen and carbon atoms where all the carbon-carbon bonds are Single bonds.

• These compounds are also widely known as Alkanes or paraffins. The term "saturated" implies that the carbon skeleton is bonded to the maximum possible number of hydrogen atoms.

• In these molecules, every carbon atom is sp3 hybridized, forming four sigma bonds in a tetrahedral geometry with bond angles of approximately 109.5 degrees.

• The general chemical formula for acyclic (chain-like) saturated hydrocarbons is CnH2n+2, where n represents the number of carbon atoms. For example, if n=1, the compound is Methane (CH4); if n=2, it is Ethane (C2H6).

• Because Single bonds (sigma bonds) are relatively strong and stable, saturated hydrocarbons are generally less reactive compared to unsaturated hydrocarbons and do not undergo addition reactions under normal conditions.

Additional Information

• Unsaturated Hydrocarbons:

• Unlike saturated hydrocarbons, Unsaturated hydrocarbons contain at least one double bond or triple bond between adjacent carbon atoms.

• Alkenes: These are unsaturated hydrocarbons containing at least one carbon-carbon double bond (C=C). Their general formula is CnH2n. A common example is Ethene (C2H4).

• Alkynes: These contain at least one carbon-carbon triple bond (C≡C). Their general formula is CnH2n-2. The simplest alkyne is Ethyne (C2H2), also known as acetylene.

• Cycloalkanes:

• These are saturated hydrocarbons where the carbon atoms are arranged in a ring. Although they only contain Single bonds, their general formula is CnH2n (same as alkenes) because the ring formation requires the loss of two hydrogen atoms.

• Chemical Reactivity:

• Saturated hydrocarbons primarily undergo substitution reactions (such as halogenation under UV light) where a hydrogen atom is replaced by another atom or group.

• In contrast, unsaturated hydrocarbons are highly reactive and easily undergo addition reactions across the double or triple bonds.

Important Points

• Tetravalency of Carbon: In all hydrocarbons, Carbon always maintains a valency of 4, meaning it forms four covalent bonds to satisfy its octet.

• Bond Strength: The Single bond in alkanes is a sigma (σ) bond, which is formed by the head-on overlap of atomic orbitals. It is generally stronger and requires more energy to break than the pi (π) bonds found in double and triple bonds.

• Physical State: Smaller alkanes (C1 to C4) like methane and butane are gases at room temperature, while medium-sized ones

(C5 to C17) are liquids, and larger ones are solids (like paraffin wax).

Q4. Answer: (d) Cell shape supports its specific function.

The correct answer is Cell shape supports its specific function.

Key Points

• In biological systems, the shape and structure of a cell are intricately linked to its physiological role. This relationship is a fundamental concept in biology where form follows function, meaning a cell's physical characteristics are adapted to perform its specific tasks with maximum efficiency.

• Nerve cells (neurons) are a classic example of this relationship. They are exceptionally long and branched with extensions called axons and dendrites. This specific shape allows them to receive and transmit electrical impulses over long distances across different parts of the body.

• Red Blood Cells (erythrocytes) possess a unique biconcave disc shape. This morphology increases the surface area-to-volume ratio, which is critical for the efficient exchange of oxygen and carbon dioxide. Furthermore, this flexible shape allows them to fold and squeeze through tiny capillaries.

• Muscle cells are typically elongated and spindle-shaped (muscle fibers). This longitudinal arrangement is essential for their primary function of contraction and relaxation, which facilitates movement in multicellular organisms.

• Evaluating the statements:

• Statement 1 suggests cell shape is random; this is incorrect as shapes are genetically programmed and functionally determined.

• Statement 2 suggests all cells have the same function; this is incorrect because multicellular organisms rely on cell differentiation and specialization.

• Statement 3 suggests all cells are round; this is incorrect as cells exhibit diverse forms including columnar, cuboidal, stellate, and irregular shapes.

• Statement 4 correctly identifies that cell shape supports its specific function; Hence, this statement is correct.

Additional Information

• The Cytoskeleton: The internal framework that maintains and modifies cell shape is the cytoskeleton. It consists of three main types of protein filaments: microtubules, microfilaments (actin filaments), and intermediate filaments. These provide mechanical support and allow for cellular movement.

• Variable Shapes: Not all cells have a fixed shape. Organisms like Amoeba and certain human cells like White Blood Cells (Leukocytes) can constantly change their shape. They use pseudopodia (false feet) for locomotion and to capture food or pathogens through phagocytosis.

• Plant Cell Morphology: Unlike animal cells, plant cells have a rigid cell wall made of cellulose. This provides a defined, often polygonal or rectangular shape. Specialized plant cells, such as guard cells in the stomata, are kidney-shaped to regulate the opening and closing for gas exchange.

• Epithelial Cells: These cells cover the surfaces of the body. Their shapes—squamous (flat), cuboidal (cube-like), or columnar (tall)—are specifically adapted for roles like protection, secretion, and absorption. For example, flat squamous cells in the lungs allow for easy diffusion of gases.

• Surface Area considerations: Cells involved in absorption, such as those lining the small intestine, often have folds in their plasma membrane called microvilli. These tiny finger-like projections vastly increase the surface area for nutrient uptake without significantly increasing the cell's volume.

Q5. Answer: (c) 50 A

The correct answer is 50 A.

Key Points

• The relationship between Electric Power (P), Voltage (V), and Current (I) is defined by the formula $P = V \times I$.

• According to the question, the Voltage (V) supplied to the house is 220 V and the Maximum Power consumption (P) is 11 kW.

• First, we convert the power from kilowatts to watts: 11 kW = 11,000 Watts.

• To find the current rating of the main fuse, we rearrange the formula to solve for current: $I = P / V$.

• Substituting the given values: $I = 11,000 / 220$.

• Calculating the value, we get I = 50 A. Therefore, the rating of the main fuse should be 50 A to support the maximum power load of the house.

Additional Information

• Electric Power: It is the rate at which electrical energy is consumed or dissipated in an electrical circuit. The SI unit of power is the Watt (W). In domestic circuits, large power values are often expressed in Kilowatts (kW), where 1 kW = 1000 W.

• Voltage Supply: In India, the standard domestic electricity supply is 220 V with a frequency of 50 Hz. This is an Alternating Current (AC) supply.

• Fuse Rating: The rating of a fuse indicates the maximum current that can safely pass through it without melting the fuse wire. If

YourMockTest.com — Free Study Material

the current exceeds this limit, the fuse blows, breaking the circuit to prevent damage.

• Overloading: This occurs when too many high-power electrical appliances (like heaters, air conditioners, etc.) are switched on simultaneously, drawing a total current that exceeds the capacity of the wires and the fuse.

Important Points

• Electric Fuse: It is a crucial safety device placed in series with the Live Wire of the circuit. It is designed to protect electrical appliances from high current surges caused by short-circuiting or overloading.

• Material: A fuse wire is typically made of an alloy of Lead and Tin because it has a low melting point and high resistance, ensuring it melts quickly when excess current flows.

• Joule Heating Principle: The working of a fuse is based on the heating effect of electric current (Joule's Law of Heating), where Heat produced $H = I^2Rt$. As the current (I) increases, the heat generated increases exponentially, causing the wire to reach its melting point.

• Modern Alternatives: In modern electrical installations, Miniature Circuit Breakers (MCBs) are increasingly used instead of traditional fuses. Unlike fuses, MCBs do not melt but simply switch off (trip) and can be reset manually.

• Types of Domestic Circuits: Domestic wiring usually consists of two separate circuits: a 5 A current rating for low-power devices (bulbs, fans) and a 15 A current rating for high-power devices (geysers, refrigerators). However, the Main Fuse at the entry point must handle the total combined load of the entire house, which in this case is 50 A.

Q6. Answer: (a) The iron nail becomes brownish in colour and the blue colour of the copper sulphate solution fades.

The correct answer is The iron nail becomes brownish in colour and the blue colour of the copper sulphate solution fades.

Key Points

• When an iron nail (Fe) is dipped in a copper sulphate ($CuSO_4$) solution, a displacement reaction occurs because iron is more reactive than copper.

• During this process, iron displaces copper from the copper sulphate solution to form iron sulphate ($FeSO_4$) and solid copper.

• The blue colour of the copper sulphate solution is due to the presence of Cu^{2+} ions. As the reaction progresses, these ions are replaced by Fe^{2+} ions, causing the blue colour to fade and eventually turn into a light green colour. Hence, the statement regarding the fading of the blue colour is correct.

• The copper metal that is displaced from the solution gets deposited on the surface of the iron nail. This result is seen as a brownish coating or layer on the nail. Hence, the statement regarding the iron nail becoming brownish is correct.

• The chemical equation for this reaction is: $Fe\ (s) + CuSO_4\ (aq) \rightarrow FeSO_4\ (aq) + Cu\ (s)$. This illustrates the transition from reactants to products clearly.

• Therefore, the noticeable changes are the fading of the blue colour of the solution and the brownish deposition on the nail. Hence, the correct answer is option 1.

Additional Information

• Reactivity Series:

• The reactivity series is a list of metals arranged in the order of their decreasing activities. Metals like Potassium (K) and Sodium (Na) are at the top, while Gold (Au) and Platinum (Pt) are at the bottom.

• In this series, Iron (Fe) is placed above Copper (Cu), which explains why iron can displace copper from its salt solution, but copper cannot displace iron.

• Displacement Reaction:

• A displacement reaction is a type of chemical reaction where a more reactive element displaces a less reactive element from its compound.

• This is a single displacement reaction. If two compounds exchange ions, it is called a double displacement reaction.

• Chemical Compounds:

• Copper Sulphate ($CuSO_4$): Often found as pentahydrate ($CuSO_4 \cdot 5H_2O$), it is known as Blue Vitriol due to its vibrant blue colour.

• Ferrous Sulphate ($FeSO_4$): Often found as heptahydrate ($FeSO_4 \cdot 7H_2O$), it is known as Green Vitriol, which explains the greenish tint in the solution after the reaction.

Important Points

• Redox Reaction:

• The reaction between the iron nail and copper sulphate is also an example of a redox (reduction-oxidation) reaction.

• Iron undergoes oxidation (loss of electrons): $Fe \rightarrow Fe^{2+} + 2e^-$.

• Copper ions undergo reduction (gain of electrons): $Cu^{2+} + 2e^- \rightarrow Cu$.

• Practical Application:

• This experiment is a standard laboratory demonstration in school chemistry to teach the concept of chemical changes and metal reactivity.

• Before performing the experiment, the iron nail is usually cleaned with sandpaper to remove any rust or grease, ensuring the

reaction occurs efficiently on the metal surface.

• The time duration for the reaction to show significant colour change is usually 15 to 30 minutes.

Q7. Answer: (b) remains unchanged

The correct answer is remains unchanged.

Key Points

• The fundamental principle governing energy transformation is the Law of Conservation of Energy, which states that energy can neither be created nor destroyed. It can only be transformed from one form to another.

• During any physical or chemical process in an isolated system, the total amount of energy stays constant. While energy may change from potential energy to kinetic energy or thermal energy, the numerical sum of all forms of energy remains unchanged. Hence, option 2 is correct.

• The statement that energy always decreases is a common misconception often confused with entropy or the loss of "useful" energy. However, the total energy balance in the universe or a closed system never drops. Hence, option 1 is incorrect.

• Energy never disappears completely from existence; it merely shifts into a different state, such as heat or sound, which might be harder to detect or utilize. Hence, option 3 is incorrect.

• The idea that energy always increases during transformation would imply that energy is being created from nothing, which violates the basic laws of physics. Hence, option 4 is incorrect.

Additional Information

• First Law of Thermodynamics:

• This law is a specialized version of the conservation of energy principle applied to thermal systems. It states that the change in internal energy of a system is equal to the heat added to the system minus the work done by the system.

• It provides a mathematical framework for energy balance, ensuring that every Joule of energy is accounted for during complex transitions.

• Mechanical Energy Conservation:

• In the absence of dissipative forces like friction or air resistance, the sum of kinetic energy and potential energy (Total Mechanical Energy) is conserved.

• For example, in a simple pendulum, at the maximum height, the energy is 100% potential. As it swings down to the equilibrium position, this potential energy converts entirely into kinetic energy, keeping the total value constant.

• Energy Dissipation and Efficiency:

• While total energy is conserved, not all energy is converted into useful work. In real-world machines, a portion of energy is dissipated as waste heat due to molecular friction.

• The efficiency of a system is the ratio of useful output energy to total input energy, which is always less than 1 (or 100%) in practical scenarios, though the missing energy still exists in the environment as heat.

Important Points

• James Prescott Joule: An English physicist who, in the 1840s, performed experiments that proved the mechanical equivalent of heat. His work was pivotal in establishing the Law of Conservation of Energy. The standard unit of energy, the Joule (J), is named in his honor.

• Mass-Energy Equivalence: In modern physics, Albert Einstein expanded the conservation concept with the equation $E=mc^2$, demonstrating that mass itself is a form of concentrated energy. In nuclear reactions, mass can be converted into energy, but the total "mass-energy" of the system still remains constant.

• Forms of Energy: Energy transformations are visible in daily life, such as a battery converting chemical energy into electrical energy, or a light bulb converting electrical energy into radiant energy and thermal energy.

Q8. Answer: (c) A is false, but R is true

The correct answer is A is false, but R is true.

Key Points

• Assertion (A) states that oral contraceptive pills are a permanent method of contraception. This statement is incorrect because oral pills are categorized as temporary or reversible methods of birth control. Hence, statement A is false.

• Reason (R) explains that these pills work by changing hormone levels and preventing ovulation. This is correct as the synthetic hormones in the pills suppress the secretion of Follicle-Stimulating Hormone (FSH) and Luteinizing Hormone (LH) from the pituitary gland. Hence, statement R is true.

• Oral contraceptive pills (OCPs) are usually taken for a period of 21 days, starting preferably within the first five days of the menstrual cycle. After a gap of 7 days (during which menstruation occurs), the course is repeated.

• The primary mechanism involves the inhibition of ovulation and implantation, as well as altering the quality of cervical mucus to prevent or retard the entry of sperms.

• Because the effect of the medication wears off once the user stops taking the pills, fertility is restored, making it a reversible

method rather than a permanent one.

Additional Information

• Permanent Methods (Sterilization):

• Unlike pills, surgical methods are considered terminal or permanent methods to prevent any more pregnancies.

• Vasectomy: This is the sterilization procedure for males where a small part of the vas deferens is removed or tied up through a small incision on the scrotum.

• Tubectomy: This is the sterilization procedure for females where a small part of the fallopian tube is removed or tied up through a small incision in the abdomen or through the vagina.

• Types of Oral Pills:

• Combined Pills: These contain both synthetic estrogen and progesterone. They are highly effective and are the most common type.

• Saheli: A unique oral contraceptive for females developed by the Central Drug Research Institute (CDRI) in Lucknow, India. It is a non-steroidal preparation taken once a week and has very few side effects.

• Mini-pills: These contain only progestogen and are often used by breastfeeding mothers or those who cannot take estrogen.

Important Points

• Contraceptive Efficacy: Oral pills are very popular among urban women and have a very high efficacy rate when taken correctly, though they do not provide protection against Sexually Transmitted Diseases (STDs) or AIDS.

• Hormonal Action: The high levels of progesterone in the blood send a negative feedback signal to the hypothalamus and pituitary gland, preventing the mid-cycle surge of LH, which is essential for ovulation.

• Implantation Interference: Even if ovulation were to occur, the hormones in the pill alter the endometrium (lining of the uterus), making it unsuitable for the implantation of a fertilized egg.

• Cervical Mucus: The pills cause the cervical mucus to become thick and sticky, creating a physical barrier that is difficult for sperm to penetrate.

Q9. Answer: (d) Mass varies from place to place, weight remains constant.

The correct answer is Mass varies from place to place, weight remains constant.

Key Points

• Mass is a fundamental measure of the amount of matter in an object and serves as a measure of its inertia. Inertia is the resistance of any physical object to any change in its velocity. Weight, on the other hand, is the force exerted on an object due to gravity. Hence, statement 1 is correct.

• The SI unit of mass is the kilogram (kg), which is one of the seven base units in the International System of Units. Since weight is a force (calculated as W = mg), its SI unit is the newton (N). Hence, statement 2 is correct.

• Mass is a scalar quantity because it only has magnitude and no specific direction. Weight is a vector quantity because it has both magnitude and a direction, which is always directed toward the center of the Earth or the source of gravity. Hence, statement 3 is correct.

• Mass is an intrinsic property of an object and remains constant regardless of its location in the universe. However, weight varies from place to place because it depends on the local acceleration due to gravity (g). For instance, an object's weight on the Moon is about 1/6th of its weight on Earth, while its mass remains identical. Hence, statement 4 is incorrect.

• Hence, the correct answer is Mass varies from place to place, weight remains constant (as it is the incorrect statement).

Additional Information

• Measurement Tools:

• The mass of an object is typically measured using a physical balance or a beam balance, which compares an unknown mass with a known mass.

• The weight of an object is measured using a spring balance, which measures the gravitational pull stretching a spring.

• Variation of 'g' on Earth:

• The acceleration due to gravity (g) is not uniform everywhere on Earth. It is maximum at the poles (approx 9.83 m/s^2) and minimum at the equator (approx 9.78 m/s^2) due to the Earth's ellipsoidal shape and rotation.

• As a result, a person will weigh slightly more at the North Pole than at the equator, even though their mass remains exactly the same.

• Zero Weight Condition:

• While mass can never be zero for any physical matter, weight can be zero. This occurs in interstellar space far from any celestial body or during free fall (weightlessness), where the effective gravity becomes zero.

• At the center of the Earth, the acceleration due to gravity is zero, making the weight of any object zero at that specific location.

Important Points

• Mathematical Relationship: The relationship between weight (W) and mass (m) is defined by Newton’s Second Law as W = m ×

g, where g is the local gravitational acceleration.

• Inertial Mass vs. Gravitational Mass: In classical physics, inertial mass (resistance to acceleration) and gravitational mass (response to gravity) are considered equivalent, a principle that forms the basis of Einstein's General Theory of Relativity.

• Common Misconception: In daily life, people often use kilograms to express weight. However, in scientific terms, kilogram is strictly a unit of mass, and weight should be expressed in newtons.

Q10. Answer: (d) Fallopian tube

The correct answer is Fallopian tube.

Key Points

• The Fallopian tubes, also known as oviducts or uterine tubes, are two thin tubes that extend from the uterus to the ovaries in the female reproductive system.

• Their primary function is to transport the ovum (egg) from the ovary to the uterus (womb) every month during the menstrual cycle.

• The process begins when an ovary releases a mature egg during ovulation; the finger-like projections called fimbriae at the end of the tube "catch" the egg and sweep it into the tube.

• Inside the Fallopian tube, the movement of the egg is aided by the rhythmic contractions of the tube's muscular walls and the waving motion of tiny hair-like structures called cilia.

• Crucially, the Fallopian tube is the site where fertilization usually occurs. If sperm are present, they swim up from the vagina through the uterus into the tubes to meet the egg.

Additional Information

• Uterus (Womb):

• The uterus is a hollow, pear-shaped muscular organ located in the female pelvis between the bladder and the rectum.

• Its main function is to nourish and house a fertilized egg until the fetus is ready to be delivered.

• It consists of three layers: the endometrium (inner lining that thickens monthly), the myometrium (thick muscular layer for contractions), and the perimetrium (outer serous layer).

• Ovaries:

• These are the primary female sex organs (gonads) that produce eggs (ova) and secrete hormones like estrogen and progesterone.

• Females typically have two ovaries, located on either side of the uterus.

• Cervix:

• The cervix is the lower, narrow part of the uterus that forms a canal opening into the vagina.

• It produces cervical mucus that changes in consistency during the menstrual cycle to either prevent or promote the passage of sperm.

• Vaginal tube (Vagina):

• The vagina is an elastic, muscular canal that connects the cervix to the external body.

• It functions as the receptacle for sperm during intercourse and serves as the birth canal during delivery.

Important Points

• Anatomy of the tube: The Fallopian tube is roughly 10 to 12 cm long and is divided into segments: the Infundibulum (distal end), Ampulla (widest part where fertilization happens), Isthmus (narrow part), and the Intramural segment (passes through the uterine wall).

• Tubectomy: This is a surgical procedure for female sterilization where the Fallopian tubes are blocked, tied, or cut to prevent eggs from reaching the uterus, thereby preventing pregnancy.

• Ectopic Pregnancy: If a fertilized egg implants and starts growing inside the Fallopian tube instead of the uterus, it is called a tubal pregnancy, which is a medical emergency.

• Zygote Transport: After fertilization, the resulting zygote takes about 3 to 4 days to travel through the Fallopian tube to reach the uterine cavity for implantation.

Q11. Answer: (d) hydrogen gas

p data-end="57" data-start="0">The correct answer is hydrogen gas.

Key Points

• When Ethanol (an alcohol with the formula C2H5OH) reacts with Sodium (a highly reactive alkali metal), it results in the displacement of the hydrogen atom from the hydroxyl (-OH) group.

• The primary products of this chemical reaction are Sodium Ethoxide (a salt) and Hydrogen gas. The balanced chemical equation is 2C2H5OH + 2Na -> 2C2H5ONa + H2.

• This reaction is often used as a confirmatory test for the presence of an alcohol group in a given organic compound, as the evolution of gas can be observed through effervescence. Hence, statement 4 is correct.

• The gas evolved, Hydrogen, is colorless and odorless. It can be identified by the "pop" sound it makes when a burning splinter is brought near the mouth of the test tube.

• In this reaction, Ethanol exhibits its weakly acidic nature by donating a proton (H+) to the metal. However, it is important to note that alcohols are even weaker acids than water.

Additional Information

• Ethanol (C2H5OH):

• Ethanol, also known as ethyl alcohol, is a volatile, flammable, colorless liquid. It is commonly found in alcoholic beverages and is used extensively as a solvent in industries and laboratories.

• It has a boiling point of approximately 78.37 degrees Celsius and is miscible with water in all proportions due to the presence of hydrogen bonding.

• Sodium Ethoxide (C2H5ONa):

• Sodium Ethoxide is a strong alkoxide base. It is frequently used in organic synthesis for reactions such as Claisen condensation and Williamson ether synthesis.

• It is a white to yellowish powder that is highly hygroscopic and reacts vigorously with water to reform ethanol and sodium hydroxide.

• Reactivity with Sodium:

• The reactivity of alcohols with Sodium metal decreases in the order: Primary > Secondary > Tertiary. This is due to the inductive effect (+I effect) of alkyl groups which reduces the acidity of the alcohol.

• Unlike the reaction with water, which is extremely violent and exothermic, the reaction between Sodium and Ethanol is relatively gentle and slower, making it easier to control in a lab setting.

Important Points

• Absence of Other Gases:

• Bromine gas and Chlorine gas are halogens and are not typically produced in a simple metal-alcohol redox reaction. Their evolution usually requires the presence of halide salts and oxidizing agents.

• Nitrogen gas makes up about 78% of the Earth's atmosphere but is inert in this context; there is no nitrogen source in the reactants (Ethanol and Sodium) to produce it.

• Safety Protocols:

• Since Hydrogen gas is highly combustible, this experiment must be performed away from open flames. Sodium metal must be stored under kerosene or paraffin oil to prevent it from reacting with atmospheric moisture.

• Sodium Ethoxide is corrosive and can cause severe chemical burns; therefore, handling it requires appropriate Personal Protective Equipment (PPE) such as gloves and goggles.

Q12. Answer: (b) Concave mirror

The correct answer is Concave mirror.

Key Points

• A concave mirror is used as a shaving mirror because of its ability to produce a magnified and erect image of the object when placed close to it.

• When an individual places their face between the pole (P) and the principal focus (F) of the concave mirror, the mirror forms a virtual, erect, and enlarged image behind the mirror.

• This magnification allows the user to see details of the skin and hair more clearly, ensuring a precision shave or application of makeup.

• A concave mirror is also known as a converging mirror because it reflects parallel rays of light inward toward a single focal point.

• Apart from shaving, these mirrors are extensively used by dentists to see larger images of a patient's teeth and in solar furnaces to concentrate sunlight for heating.

Additional Information

• Convex Mirror:

• Commonly known as a diverging mirror, it reflects light rays outwards.

• It always forms a virtual, erect, and diminished (smaller) image regardless of the distance of the object.

• Its primary application is in vehicles as a rear-view mirror because it provides a much wider field of view, allowing the driver to see a larger area of traffic behind them.

• Plane Mirror:

• A flat mirror that reflects light to form an image that is virtual, erect, and of the same size as the object.

• One characteristic feature is lateral inversion, where the left side of the object appears as the right side in the image.

• These are used in periscopes, kaleidoscopes, and for everyday grooming in households.

• Parabolic Mirror:

YourMockTest.com — Free Study Material

• These are spherical mirrors shaped like a parabola.

• They are used to focus parallel light rays into a single point or to produce a high-intensity parallel beam of light from a source placed at the focus.

• Common uses include car headlights, torches, search-lights, and satellite dishes.

Important Points

• The Mirror Formula relates the object distance (u), image distance (v), and focal length (f) of a spherical mirror: 1/v + 1/u = 1/f.

• Magnification (m) is defined as the ratio of the height of the image to the height of the object, also expressed as m = -v/u.

• For a concave mirror, the image can be real and inverted (when the object is beyond the focus) or virtual and erect (when the object is within the focal length).

• The radius of curvature (R) of a spherical mirror is twice its focal length (f), represented by the numerical value R = 2f.

• All distances are measured from the pole of the mirror according to the New Cartesian Sign Convention.

Q13. Answer: (d) act on two different objects at the same time

The correct answer is act on two different objects at the same time.

Key Points

• Newton's Third Law of Motion states that for every action, there is an equal and opposite reaction.

• These forces always occur in pairs. If object A exerts a force on object B, then object B simultaneously exerts a force of equal magnitude and opposite direction on object A.

• Crucially, the action and reaction forces act on two different objects. Because they act on different bodies, they cannot cancel each other out, as cancellation of forces only occurs when multiple forces act on the same single body. Hence, statement 4 is correct.

• The forces act simultaneously, meaning they happen at the exact same time. There is no cause-and-effect time lag between the action and the reaction. Hence, statement 3 is incorrect.

• Since the law specifically involves an interaction between two bodies, the forces cannot act on the same object. Hence, statement 2 is incorrect.

• Even though the forces are equal in magnitude, they do not cancel each other because they are applied to different entities. For a net force to be zero through cancellation, the opposing forces must be applied to the same object. Hence, statement 1 is incorrect.

Additional Information

• Newton's First Law: Also known as the Law of Inertia, it states that an object will remain at rest or in uniform motion in a straight line unless acted upon by an external unbalanced force.

• Newton's Second Law: This law defines force quantitatively, stating that the acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass. The mathematical formula is F = ma.

• The SI Unit of Force: The standard unit of force is the Newton (represented by the symbol N), named after Sir Isaac Newton who published these laws in 1687 in his work Philosophiæ Naturalis Principia Mathematica.

• Conservation of Momentum: Newton's Third Law is the fundamental basis for the Law of Conservation of Momentum. In an isolated system where no external forces act, the total momentum remains constant over time.

• Practical Examples:

• Walking: A person pushes the ground backward (action), and the ground pushes the person forward (reaction).

• Recoil of a Gun: When a bullet is fired (action), the gun jumps backward (reaction).

• Rocket Propulsion: The rocket pushes exhaust gases downward at high velocity, and the gases exert an upward thrust on the rocket.

Important Points

• Magnitude and Direction: The magnitude of the action force is exactly equal to the magnitude of the reaction force, but their directions are exactly 180 degrees apart (opposite).

• Nature of Force: The action and reaction forces are always of the same nature. If the action is a magnetic force, the reaction must also be a magnetic force; if the action is friction, the reaction is also friction.

• Mass and Acceleration: While the forces are equal, the resulting accelerations are usually not equal because the two objects typically have different masses. For instance, the Earth pulls a falling apple with the same force the apple pulls the Earth, but the Earth's acceleration is negligible due to its massive mass.

Q14. Answer: (d) Uterus

The correct answer is Uterus.

Key Points

• In humans, the process of reproduction begins with fertilisation, which typically occurs in the Fallopian tube (specifically the ampulla region).

• Once the sperm and egg fuse to form a zygote, this single cell begins to divide rapidly through a process called cleavage while moving toward the uterus.

• By the time the developing embryo reaches the uterus, about 3 to 5 days after fertilisation, it has transformed into a hollow ball of cells known as a blastocyst.

• Implantation is the specific stage where this blastocyst attaches and embeds itself into the endometrium (the inner lining of the uterus). Hence, the correct answer is Uterus.

• This successful attachment marks the beginning of clinical pregnancy, as the embryo can now receive essential nutrients and oxygen from the mother's blood supply.

Additional Information

• Uterus (Womb):

• The uterus is a hollow, muscular organ located in the female pelvis, between the urinary bladder and the rectum.

• It is approximately 7.6 cm long and 4.5 cm wide in a non-pregnant state. Its primary function is to support the gestation of the fetus until birth.

• Fallopian Tubes:

• These are J-shaped tubes that act as the pathway for the egg to travel from the ovary to the uterus.

• While fertilisation occurs here, the tube is not designed to support the growth of an embryo. If implantation occurs here, it is called an ectopic pregnancy, which is a medical emergency. Hence, option 1 is incorrect.

• Ovaries:

• The ovaries are the primary female reproductive organs responsible for producing ova (eggs) and hormones like estrogen and progesterone.

• They do not house the embryo after fertilisation; their role ends after ovulation (releasing the egg). Hence, option 2 is incorrect.

• Stomach:

• The stomach is a major organ of the digestive system. It has no role in the reproductive process or the development of an embryo. Hence, option 3 is incorrect.

Important Points

• Hormonal Role: After implantation, the blastocyst begins to produce a hormone called Human Chorionic Gonadotropin (hCG). This hormone is what pregnancy tests detect in urine or blood.

• Endometrium: The uterine lining thickens every month during the menstrual cycle under the influence of progesterone. If implantation does not occur, this lining is shed during menstruation.

• Placenta Formation: Following implantation, the outer cells of the blastocyst and the uterine lining work together to form the placenta, a specialized organ that facilitates nutrient exchange between the mother and the fetus.

• Timing: In a typical 28-day cycle, implantation usually happens around day 20 to 24 (roughly 6 to 10 days after ovulation).

Q15. Answer: (a) Strength of magnetic field

The correct answer is Strength of magnetic field.

Key Points

• Magnetic field lines are visual tools used to represent the magnetic field around a magnetic object or a current-carrying conductor.

• The closeness or density of these lines in a given area indicates the strength of the magnetic field (also referred to as magnetic flux density). Hence, the correct answer is Strength of magnetic field.

• In regions where the lines are concentrated or crowded, such as near the poles of a magnet, the magnetic force exerted is the strongest.

• Conversely, in regions where the field lines are widely spaced or far apart, the magnetic field is considered weak.

• While the closeness represents magnitude, the direction of the field at any specific point is given by the tangent drawn to the field line at that location.

Additional Information

• Properties of Magnetic Field Lines:

• They form continuous closed loops. Outside a magnet, they travel from the North pole to the South pole, while inside the magnet, they travel from the South pole to the North pole.

• No two magnetic field lines can ever intersect or cross each other. If they did, a magnetic compass placed at the point of intersection would point in two different directions simultaneously, which is impossible.

• The relative strength is proportional to the number of lines crossing a unit area perpendicular to the field.

• Units and Measurements:

• The SI unit of magnetic field strength (magnetic induction) is the Tesla (T), named after the scientist Nikola Tesla.

• Another common unit is the Gauss (G), where 1 Tesla is equal to 10,000 Gauss.

• The Earth's magnetic field strength at the surface is approximately 25 to 65 microteslas (0.25 to 0.65 G).

• Uniform vs. Non-Uniform Fields:

• A uniform magnetic field is represented by parallel and equidistant straight lines, signifying that the strength and direction are the same at all points in that region.

• A non-uniform magnetic field has lines with varying closeness or curvature, indicating changes in strength or direction across space.

Important Points

• The poles of a magnet (North and South) are the locations where the magnetic field lines are most densely packed, confirming that magnetic strength is maximum at the ends of the magnet.

• The concept of magnetic lines of force was originally introduced by Michael Faraday in the 19th century to explain electromagnetic induction.

• A magnetic field is a vector quantity because it possesses both magnitude (represented by closeness) and direction (represented by arrows).

Q16. Answer: (b) Gold

The correct answer is Gold.

Key Points

• The chemical reactivity of metals is determined by their ability to lose electrons and form positive ions. The Reactivity Series (or Activity Series) is an arrangement of metals in descending order of their reactivity.

• Gold (Au) is located at the very bottom of the reactivity series. This indicates that it is a noble metal with extremely low chemical reactivity, as it does not easily lose electrons to form compounds. Hence, the correct answer is Gold.

• Sodium (Na) is an alkali metal placed near the top of the reactivity series. It is highly reactive and reacts vigorously with both water and oxygen at room temperature. Hence, option 4 is incorrect.

• Magnesium (Mg) and Zinc (Zn) are placed in the middle of the series. While they are less reactive than Sodium, they are significantly more reactive than Gold and can react with acids and steam. Hence, options 1 and 3 are incorrect.

• Because of its inert nature, Gold is found in its native state in nature and does not corrode or tarnish when exposed to air or water, even when heated.

Additional Information

• The Reactivity Series Order: The general order from most reactive to least reactive is: Potassium (K) > Sodium (Na) > Calcium (Ca) > Magnesium (Mg) > Aluminium (Al) > Zinc (Zn) > Iron (Fe) > Lead (Pb) > [Hydrogen] > Copper (Cu) > Mercury (Hg) > Silver (Ag) > Gold (Au).

• Sodium (Atomic Number 11): It belongs to Group 1 of the periodic table. Due to its extreme reactivity with atmospheric moisture and oxygen, it must be stored under kerosene oil to prevent accidental combustion.

• Magnesium and Zinc: Magnesium (Atomic Number 12) reacts with hot water and burns with a dazzling white flame. Zinc (Atomic Number 30) is widely used in the process of galvanization to protect iron from rusting, as it is more reactive than iron but forms a stable protective oxide layer.

• Noble Metals and Aqua Regia: Metals like Gold and Platinum are called Noble Metals because they are resistant to most acids. However, Gold can be dissolved in Aqua Regia, which is a freshly prepared mixture of concentrated Hydrochloric acid (HCl) and concentrated Nitric acid (HNO3) in a ratio of 3:1.

• Displacement Reactions: The reactivity series helps predict the outcome of displacement reactions, where a more reactive metal can displace a less reactive metal from its salt solution. For example, Zinc can displace Copper from Copper Sulphate, but Gold cannot displace any metal listed above it.

Important Points

• Gold's Physical Properties: Besides its low reactivity, Gold is the most malleable and ductile metal known. It has a high atomic number of 79 and is valued in jewelry and electronics due to its high electrical conductivity and resistance to oxidation.

• Atomic Stability: The low reactivity of Gold is partly due to the relativistic effects on its electrons, which make the 6s orbital electrons more tightly bound to the nucleus, thus resisting chemical bonding.

Q17. Answer: (c) Volume by mass percentage of a solution

The correct answer is Volume by mass percentage of a solution.

Key Points

• The concentration of a solution is the amount of solute present in a given amount (mass or volume) of solution, or the amount of solute dissolved in a given mass or volume of solvent.

• Mass by mass percentage of a solution is calculated as the (Mass of solute / Mass of solution) × 100. This is a common and correct method for expressing concentration, especially when dealing with two solid components. Hence, statement 2 is correct.

• Mass by volume percentage of a solution is calculated as the (Mass of solute / Volume of solution) × 100. This method is widely used in medicine and pharmacy. Hence, statement 4 is correct.

• Volume by volume percentage of a solution is calculated as the (Volume of solute / Volume of solution) × 100. This is used when both the solute and the solvent are liquids. Hence, statement 1 is correct.

• Volume by mass percentage is not a standard or scientifically recognized method for expressing the concentration of a solution in general chemistry, as volume changes with temperature while mass remains constant, making this ratio inconsistent. Hence, statement 3 is incorrect.

Additional Information

• Solute and Solvent: In a homogeneous mixture, the component present in a smaller quantity is the solute, while the component present in the larger quantity is the solvent.

• Molarity (M): It is defined as the number of moles of solute dissolved in one litre of solution. It is one of the most commonly used units of concentration in laboratories.

• Molality (m): This is the number of moles of solute per kilogram (kg) of the solvent. Unlike molarity, molality does not change with temperature.

• Saturated Solution: A solution in which no more solute can be dissolved at a particular temperature is called a saturated solution. The amount of solute present in it at this temperature is called its solubility.

• Parts Per Million (ppm): When a solute is present in trace quantities, the concentration is expressed in ppm. It is calculated as (Number of parts of the component / Total number of parts of all components of the solution) × 10^6.

Important Points

• Temperature Dependence: Concentration terms like Molarity, Volume percentage, and Mass by Volume percentage change with temperature because volume is dependent on temperature.

• Temperature Independence: Concentration terms like Mass percentage, Molality, and Mole fraction are independent of temperature because they are based on mass.

• Mole Fraction: It is the ratio of the number of moles of a particular component to the total number of moles of all the components in the solution. The sum of all mole fractions in a solution is always equal to one.

Q18. Answer: (d) Cell sap

The correct answer is Cell sap.

Key Points

• Cell sap is a watery fluid found specifically inside the large central vacuole of plant cells. It acts as a storage reservoir for various substances required by the plant. Hence, the correct option is Cell sap.

• Nucleoplasm is the specialized protoplasm located within the nuclear envelope of a cell. It serves as a suspension medium for the nucleolus and chromatin. Hence, statement 1 is incorrect.

• Protoplasm is a broad term that refers to the entire living content of a cell, which includes both the cytoplasm and the nucleus. It is often described as the physical basis of life. Hence, statement 2 is incorrect.

• Cytoplasm is the jelly-like substance that fills the cell and surrounds the organelles, located between the cell membrane and the nuclear membrane. While it contains many enzymes and nutrients, it is distinct from the fluid inside the vacuole. Hence, statement 3 is incorrect.

• The cell sap plays a crucial role in maintaining turgor pressure, which provides mechanical support and rigidity to the plant structure, preventing it from wilting.

Additional Information

• Composition of Cell Sap:

• It consists of water, sugars (like sucrose), amino acids, mineral salts, organic acids, and sometimes pigments.

• It also contains metabolic waste products that are sequestered away from the rest of the cytoplasm to prevent interference with cellular functions.

• The presence of anthocyanin pigments in the cell sap is responsible for the red, purple, or blue colors of many flowers and fruits.

• The Tonoplast:

• The vacuole is enclosed by a single unit membrane called the tonoplast.

• The tonoplast is a semi-permeable membrane that facilitates the transport of a number of ions and other materials against concentration gradients into the vacuole, making their concentration significantly higher in the cell sap than in the cytoplasm.

• Vacuole Characteristics:

• In mature plant cells, the central vacuole can occupy up to 90% of the volume of the cell.

• In contrast, animal cells have much smaller, temporary vacuoles that are used for exocytosis or endocytosis.

Important Points

• Osmoregulation: The high concentration of solutes in the cell sap allows the plant cell to absorb water from its surroundings through osmosis. This process is vital for nutrient transport and maintaining the plant's water balance.

• Storage Function: The vacuole acts as a "trash can" or "storage locker," keeping toxic secondary metabolites (like alkaloids or tannins) separate from the cytosol to protect the cell's metabolic machinery.

• Historical Context: The term Protoplasm was coined by J.E. Purkinje in 1839 to describe the living matter of the cell, while the vacuole was first discovered by Antonie van Leeuwenhoek in 1676, though its function was understood much later.

Q19. Answer: (c) Water from two sources with identical composition

The correct answer is Water from two sources with identical composition.

Key Points

• The Law of Constant Proportions, also known as the Law of Definite Proportions, states that a chemical compound always contains its component elements in a fixed ratio by mass and does not depend on its source or method of preparation.

• This fundamental law of chemistry was proposed by the French chemist Joseph Proust in the year 1799.

• Water (H2O) is a classic example of a pure chemical compound. Regardless of whether it is sourced from a river, an ocean, or synthesized in a laboratory, it always contains Hydrogen and Oxygen in a mass ratio of approximately 1:8. Hence, the statement regarding water from two sources with identical composition is correct.

• Mud from two ponds containing different minerals refers to a heterogeneous mixture. Mixtures do not have a fixed chemical composition, and their properties vary based on the proportion of their constituents. Hence, this statement is incorrect.

• Soil with mixed organic content is another example of a mixture where the components are not chemically bonded in a fixed ratio. The ratio of organic matter to minerals changes based on the location and environment. Hence, this statement is incorrect.

• Sand with varying grain sizes represents a physical mixture of particles. The "composition" in terms of grain size is a physical characteristic, not a chemical proportion of elements within a compound. Hence, this statement is incorrect.

Additional Information

• Laws of Chemical Combination: These laws provide the mathematical and conceptual framework for stoichiometry and the study of chemical reactions.

• Law of Conservation of Mass: Formulated by Antoine Lavoisier in 1789, it states that mass is neither created nor destroyed in a chemical reaction.

• Law of Multiple Proportions: Proposed by John Dalton in 1803, it states that if two elements form more than one compound, the ratios of the masses of the second element that combine with a fixed mass of the first element will be small whole numbers.

• Distinction between Compounds and Mixtures:

• Compounds: Substances formed by the chemical union of two or more elements in a definite proportion by mass. Examples include Carbon Dioxide (CO2), Sodium Chloride (NaCl), and Methane (CH4).

• Mixtures: Substances formed by physically mixing two or more substances without any chemical bond. Their composition can vary widely (e.g., air, alloys, or salt water).

• Verification of the Law: Joseph Proust performed extensive experiments on cupric carbonate. He compared samples of natural origin with synthetic samples prepared in the lab and found that the percentage by weight of Copper, Carbon, and Oxygen was identical in both.

• Modern Perspective: While the law is universally applicable to most compounds, some exceptions exist in the form of non-stoichiometric compounds (often metallic oxides or sulfides) and compounds containing different isotopes of the same element, which may slightly alter the mass ratio.

Important Points

• In Water (H2O), the molar mass of Hydrogen is approximately 1 g/mol and Oxygen is 16 g/mol. Since there are two hydrogen atoms, the ratio is 2:16, which simplifies to 1:8.

• The Law of Constant Proportions was a key piece of evidence used by John Dalton to develop his Atomic Theory in the early 19th century.

• Understanding these proportions is essential for chemical engineering, pharmaceuticals, and analytical chemistry to ensure the purity and consistency of products.

Q20. Answer: (d) Mass

The correct answer is Mass.

Key Points

• Inertia is the inherent property of a physical body to resist any change in its state of rest or uniform motion in a straight line.

• The Mass of an object is a direct quantitative measure of its inertia. A body with a larger mass has a greater tendency to resist changes in its motion compared to a body with a smaller mass. Hence, option 4 is correct.

• According to Newton's First Law of Motion, often referred to as the Law of Inertia, an object will remain at rest or continue to move at a constant velocity unless acted upon by a net external force.

• The SI unit of mass is the kilogram (kg). It is a scalar quantity, meaning it has only magnitude and no direction.

• In classical mechanics, mass is considered constant for a body and does not change regardless of the body's location in the universe, unlike weight.

Additional Information

• Weight:

• It is the gravitational force exerted on an object by a celestial body (like Earth).

• It is calculated using the formula W = mg, where m is mass and g is the acceleration due to gravity (approximately 9.8 m/s^2 on Earth).

• Unlike mass, weight is a vector quantity and changes depending on the location (e.g., your weight on the Moon is about 1/6th of your weight on Earth).

• Force:

• A force is a push or pull upon an object resulting from the object's interaction with another object.

• It is defined by Newton's Second Law of Motion as the product of mass and acceleration (F = ma).

• The SI unit of force is the Newton (N).

• Acceleration:

• It is defined as the rate of change of velocity of an object with respect to time.

• It is a vector quantity measured in meters per second squared (m/s^2).

Important Points

• Types of Inertia:

• Inertia of Rest: The inability of a body to change by itself its state of rest. For example, when a bus suddenly starts, passengers fall backward.

• Inertia of Motion: The inability of a body to change by itself its state of uniform motion. For example, when a moving bus stops suddenly, passengers jerk forward.

• Inertia of Direction: The inability of a body to change by itself its direction of motion. For example, when a car takes a sharp turn, passengers are thrown outwards.

• Relationship between Mass and Inertia:

• If you compare a tennis ball and a cricket ball, the cricket ball has more mass; therefore, it requires more force to change its state of motion, demonstrating higher inertia.

Q21. Answer: (a) Cranial nerves – Brain

The correct answer is Cranial nerves – Brain.

Key Points

• Cranial nerves are a set of 12 pairs of nerves that emerge directly from the brain and the brainstem. They primarily serve the sensory and motor functions of the head and neck region. Hence, statement 1 is correct.

• Cranial nerves do not originate from the spinal cord; instead, they pass through various foramina (openings) in the skull to reach their target organs. Hence, statement 2 is incorrect.

• Spinal nerves originate from the spinal cord and are part of the Peripheral Nervous System (PNS). They are not produced by or originated from the heart, although some branches of the autonomic nervous system (like the vagus nerve, which is cranial) regulate cardiac functions. Hence, statement 3 is incorrect.

• Spinal nerves specifically emerge from segments of the spinal cord through the intervertebral foramina. They do not originate from the brain, which is the origin point for cranial nerves. Hence, statement 4 is incorrect.

• The human body contains 31 pairs of spinal nerves, which are named according to the region of the vertebral column from which they emerge.

Additional Information

• Cranial Nerves:

• There are 12 pairs of cranial nerves, designated by Roman numerals (I-XII).

• Examples include the Olfactory nerve (I) for smell, the Optic nerve (II) for vision, and the Vagus nerve (X), which has the most extensive distribution, reaching the thorax and abdomen.

• Most cranial nerves are mixed nerves (containing both sensory and motor fibers), though some like the Olfactory and Optic nerves are purely sensory.

• Spinal Nerves:

• There are 31 pairs of spinal nerves in humans: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 1 coccygeal.

• Every spinal nerve is a mixed nerve, carrying both sensory information toward the spinal cord and motor commands away from it.

• They form plexuses (networks), such as the brachial plexus which supplies the arms and the lumbar plexus which supplies the legs.

Important Points

• Nerve Classification by Function:

• Sensory (Afferent) Nerves: Carry impulses from receptors (like skin or eyes) to the Central Nervous System (CNS).

YourMockTest.com — Free Study Material

• Motor (Efferent) Nerves: Carry impulses from the CNS to effectors like muscles and glands.

• Central vs. Peripheral Nervous System:

• The CNS consists of the brain and the spinal cord.

• The PNS consists of all the nerves that branch out from the CNS to the rest of the body, including cranial and spinal nerves.

• The Somatic Nervous System controls voluntary movements, while the Autonomic Nervous System controls involuntary actions like heart rate and digestion.

Q22. Answer: (a) To neutralise the acid and protect tooth enamel

The correct answer is To neutralise the acid and protect tooth enamel.

Key Points

• The primary reason for cleaning the mouth after vomiting is that vomit contains Stomach Acid, which is highly corrosive. This acid is mainly Hydrochloric Acid (HCl), which has a very low pH level, typically between 1.5 and 3.5.

• Tooth Enamel is the hardest and most highly mineralized substance in the human body, but it is highly susceptible to damage from strong acids. Enamel begins to demineralize and dissolve when the pH in the mouth falls below a critical level of approximately 5.5.

• When a person vomits, the Hydrochloric Acid from the stomach coats the teeth. If left uncleaned, this acid causes Dental Erosion (also known as acid erosion), which is the irreversible loss of the protective tooth structure. Hence, the statement is correct.

• Cleaning the mouth by rinsing helps to Neutralise the acidic environment and wash away the gastric contents before they can cause significant chemical wear to the Calcium-rich hydroxyapatite crystals that make up the enamel.

• While removing a bad odor and preventing the spread of germs are secondary benefits, the fundamental physiological reason for oral hygiene post-vomiting is the preservation of Dental Health and structural integrity.

Additional Information

• Dental Erosion Mechanism: Unlike cavities (caries) which are caused by bacteria producing acid from sugar, Acid Erosion is a direct chemical process. Repeated exposure to stomach acid can lead to Tooth Sensitivity, Discoloration (as the yellowish dentin becomes visible), and Rounded Teeth.

• The Role of Saliva: Human Saliva acts as a natural defense mechanism. It contains Bicarbonate ions that serve as a Buffer to help restore the oral pH to a neutral state (around pH 7.0) and provides minerals like Calcium and Phosphate for Remineralisation.

• The pH Scale: The scale ranges from 0 to 14, where 7 is neutral. Values below 7 are acidic, and values above 7 are alkaline. Because Stomach Acid is near the extreme end of the acidic side (1.5 - 3.5), it is thousands of times more acidic than water.

• Common Causes of Acid Exposure: Apart from occasional illness, frequent acid exposure occurs in individuals suffering from GERD (Gastroesophageal Reflux Disease), Morning Sickness during pregnancy, or eating disorders like Bulimia Nervosa.

Important Points

• Do Not Brush Immediately: It is critically important not to brush your teeth immediately after vomiting. The acid temporarily softens the Tooth Enamel, and the mechanical action of a toothbrush can actually scrub the softened enamel away.

• Wait Time: Dentists recommend waiting at least 30 to 60 minutes after vomiting before brushing with toothpaste to allow the enamel to re-harden through the action of Saliva.

• Effective Rinsing Agents: Rinsing with plain Water is helpful, but using a solution of a cup of water mixed with a teaspoon of Baking Soda (Sodium Bicarbonate) is even more effective as it is a base that immediately Neutralises the acid.

• Fluoride: Using a Fluoride mouthwash after rinsing can help strengthen the enamel and provide an extra layer of protection against Acid Attacks.

Q23. Answer: (d) They can see faraway objects clearly but struggle to see things up close

The correct answer is They can see faraway objects clearly but struggle to see things up close.

Key Points

• Hypermetropia, also commonly known as farsightedness, is a vision condition where a person can see distant objects clearly, but objects nearby appear blurry. Hence, the correct answer is option 4.

• In a hypermetropic eye, the light rays coming from a nearby object are not focused on the retina but instead converge at a point behind the retina. This results in a blurred image for close-up tasks like reading or sewing.

• This defect arises because either the focal length of the eye lens is too long or the eyeball has become too short. Because the eye cannot increase its converging power sufficiently, the near point of the person moves farther away than the standard 25 cm.

• To correct this vision defect, a convex lens (converging lens) of appropriate power is used. The lens provides the additional focusing power required to bring the light rays together exactly on the retina.

• A person with hypermetropia often experiences eye strain or headaches after performing close-work activities for a long duration due to the constant effort of the ciliary muscles to focus.

Additional Information

• Myopia (Nearsightedness):

• This is the opposite of hypermetropia, where a person can see nearby objects clearly but distant objects appear blurry.

• The image is formed in front of the retina rather than on it, often due to an elongated eyeball or excessive curvature of the lens.

• It is corrected using a concave lens (diverging lens), which diverges the light rays before they enter the eye, allowing them to focus correctly on the retina.

• Presbyopia:

• This condition is associated with aging, usually occurring after the age of 40. It is caused by the gradual weakening of the ciliary muscles and the diminishing flexibility of the crystalline lens.

• The person finds it difficult to see nearby objects comfortably without corrective glasses, similar to hypermetropia, but the underlying cause is loss of accommodation.

• It is often corrected using bifocal lenses, where the upper portion is concave for distant vision and the lower portion is convex for reading.

• Astigmatism:

• This occurs when the cornea or the lens is not perfectly spherical, having different curvatures in different planes.

• As a result, light rays do not focus on a single point on the retina, causing vision to be blurred or distorted at all distances. It is typically corrected using cylindrical lenses.

• Cataract:

• This is a medical condition where the lens of the eye becomes cloudy or opaque, leading to a progressive loss of vision.

• It is most common in older adults and is treated through a surgical procedure where the cloudy lens is replaced with an artificial intraocular lens (IOL).

• Optical Power:

• The power of a corrective lens is measured in Dioptres (D). For Hypermetropia, the prescription power is positive (+), whereas for Myopia, it is negative (-).

Q24. Answer: (c) Diffusion

The correct answer is Diffusion.

Key Points

• Diffusion is defined as the intermixing of particles of two different types of matter on their own. This process occurs due to the continuous, random movement of particles.

• In the context of gases, particles possess high kinetic energy and move at very high speeds in all directions. Because there are large intermolecular spaces between gas particles, they can easily move into the spaces of other substances.

• The Kinetic Molecular Theory of matter states that particles of matter are never at rest; they are in constant motion. This motion is most pronounced in gases compared to solids and liquids.

• The rate of diffusion increases with an increase in temperature because higher temperatures give particles more kinetic energy, making them move faster. Hence, statement 3 is the correct answer.

Additional Information

• Condensation:

• This is the process by which a substance changes from a gaseous state to a liquid state.

• It occurs when a gas is cooled or subjected to increased pressure, causing particles to lose energy and come closer together.

• Melting:

• Also known as fusion, it is the physical process where a solid turns into a liquid.

• This happens at a specific temperature called the melting point, where the heat energy overcomes the intermolecular forces holding the solid structure together.

• Evaporation:

• It is a surface phenomenon in which a liquid changes into vapour at any temperature below its boiling point.

• Unlike diffusion, which is the movement and mixing of particles, evaporation specifically refers to the phase transition from liquid to gas at the surface.

Important Points

• Brownian Motion: This is the zig-zag, random motion of microscopic particles suspended in a fluid (liquid or gas) resulting from their collision with the fast-moving atoms or molecules in the gas or liquid. It was first observed by Robert Brown in 1827.

• Graham's Law of Diffusion: Formulated by Thomas Graham in 1833, this law states that the rate of diffusion or effusion of a gas is inversely proportional to the square root of its molar mass.

• Applications: Diffusion is responsible for many everyday occurrences, such as the aroma of food reaching us from several meters away, the spreading of fragrance from a perfume bottle, and the exchange of oxygen and carbon dioxide in the lungs.

YourMockTest.com — Free Study Material

Q25. Answer: (c) focus sound waves in a particular direction

The correct answer is focus sound waves in a particular direction.

Key Points

• Megaphones, loudhailers, and musical instruments like shehnais are specifically designed to send sound waves in a particular direction rather than allowing them to spread equally in all directions.

• These devices function based on the principle of multiple reflection of sound. They typically feature a tube followed by a conical opening.

• The conical shape acts as a reflective surface that directs the sound waves emitted from the source toward the front. As the sound waves hit the inner walls of the cone, they undergo successive reflections, which guides the sound energy forward toward the audience.

• By preventing the sound from dispersing into the surrounding environment, the intensity and loudness of the sound are significantly increased in the desired path. Hence, the statement that they focus sound waves in a particular direction is correct.

• The primary objective of this design is to ensure that the sound reaches a longer distance with clarity, making it ideal for public addresses or musical performances in open spaces.

Additional Information

• Shehnai:

• The Shehnai is a classical musical instrument (a double-reed oboe) prevalent in India, Pakistan, and Bangladesh.

• It was traditionally played in royal courts (as part of the naubat) and is now a staple in North Indian weddings and temple ceremonies.

• Legendary musician Ustad Bismillah Khan is credited with popularizing the Shehnai on the global classical stage and was awarded the Bharat Ratna in 2001.

• Reflection of Sound:

• Like light, sound reflects off solid or liquid surfaces. It follows the laws of reflection, where the angle of incidence equals the angle of reflection.

• Hard surfaces are generally better reflectors of sound, whereas soft surfaces tend to absorb sound waves.

• Stethoscope:

• This is a medical instrument used by doctors to listen to sounds produced within the body, such as the heartbeat or lung sounds.

• It also works on the principle of multiple reflection, where the sound of the heartbeat travels through the tube via reflections to reach the doctor's ears.

Important Points

• Soundboards: In large concert halls or theaters, curved soundboards are often placed behind the speaker or the stage so that sound, after reflection, spreads uniformly across the width of the hall.

• Microphones vs. Megaphones: It is important to distinguish that microphones are designed to convert sound waves into electrical signals, whereas megaphones are acoustic devices meant to amplify and direct existing sound waves through physical reflection.

• Longitudinal Waves: Sound travels through air as longitudinal waves, consisting of compressions and rarefactions. The ability to direct these waves through mechanical design is crucial in acoustic engineering.

• Intensity and Amplitude: The loudness of sound depends on its amplitude. By focusing the sound in one direction, the amplitude of the wave is maintained at a higher level over a greater distance than if the wave were allowed to expand spherically.

Q26. Answer: (a) 71

Shortcut Trick

Teacher's age = Old Average + (Total Members × Increase in Average)

Number of people after including the teacher = 24 + 1 = 25

Increase in average = 47 − 46 = 1 year

Teacher's age = 46 + (25 × 1) = 46 + 25 = 71 years

Therefore The correct answer is 71 years.

Alternate Method

Given: Average age of 24 students = 46 years. When the teacher is included, the total group size becomes 25 and the new average becomes 47 years.

Formula: Total Sum = Average × Number of items

=> Total age of 24 students = 24 × 46 = 1104 years

=> Total age including teacher = 25 × 47 = 1175 years

=> Teacher's age = Total sum with teacher − Total sum of students

=> Teacher's age = 1175 − 1104 = 71 years

Therefore The correct answer is 71 years.

Additional Information

Average Properties

If every observation is increased or decreased by a constant value 'k', the new average also increases or decreases by 'k'.

Inclusion/Exclusion Rule

Value of New Member = (New Average × New Quantity) − (Old Average × Old Quantity).

Net Deviation

The sum of deviations of all terms from the arithmetic mean is always 0. This property is used to find missing values quickly.

Q27. Answer: (b) 2

Shortcut Trick

Use identity: $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$

Here a = 4.5, b = 0.5

Numerator has $(a^2 + b^2 + ab)$, so cancel

Expression = $8 \div (a - b) = 8 \div 4$

Therefore Answer = 2

Alternate Method

Given:

$8 \div (4.5^3 - 0.5^3) \times (4.5 \times 4.5 + 0.25 + 4.5 \times 0.5)$

Concept Used:

BODMAS rule

Calculation:

$\Rightarrow 8 \div [(4.5 - 0.5)(4.5^2 + 0.5^2 + 4.5 \times 0.5)] \times (4.5 \times 4.5 + 0.25 + 4.5 \times 0.5)$

$\Rightarrow 8 \div [4 \times (4.5^2 + 0.5^2 + 4.5 \times 0.5)] \times (4.5 \times 4.5 + 0.25 + 4.5 \times 0.5)$

$\Rightarrow 8 \div (4 \times K) \times K$

$\Rightarrow 8 \div 4$

$\Rightarrow 2$

Therefore The correct answer is 2.

Additional Information

Identity Used

$a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$

Cancellation Trick

Look for common terms in numerator and denominator.

BODMAS Rule

Solve brackets first, then division/multiplication.

Simplification Tip

Convert decimals to fractions if needed.

Q28. Answer: (a) 35

Shortcut Trick

Let C be the number of crows. Total animals = 32 + 41 + 7 + C = 80 + C.

Each animal has at least 2 feet. Extra feet come from 4-legged animals (sheep and horses).

Equation: Total feet − Total heads = 211.

Since (Feet − Heads) for a 2-legged animal is 1 and for a 4-legged animal is 3, we use the net surplus.

80 + C + (2 × 41 + 2 × 7) = 211 => 80 + C + 96 = 211 => 176 + C = 211 => C = 35.

Therefore The correct answer is 35 crows.

Alternate Method

Given: Ducks = 32, Sheep = 41, Horses = 7, Crows = x.

Heads (H): 32 + 41 + 7 + x = 80 + x.

Feet (F): (32 × 2) + (41 × 4) + (7 × 4) + (x × 2).

=> F = 64 + 164 + 28 + 2x = 256 + 2x.

Condition: F − H = 211.

YourMockTest.com — Free Study Material

=> (256 + 2x) − (80 + x) = 211.
=> 256 − 80 + 2x − x = 211.
=> 176 + x = 211.
=> x = 211 − 176 = 35.
Therefore The correct answer is 35 crows.
Additional Information
Head and Foot Count Logic
For any animal, Number of Heads is always 1. 2-legged animals (birds) contribute 2 feet, while 4-legged animals contribute 4 feet.
The Difference Formula
The difference (Feet − Heads) = (1 × 2-legged) + (3 × 4-legged). This is a fast way to check consistency in animal word problems.
Linear Equations in Two Variables
Often solved using the formula: 4-legged animals = (Total Feet − 2 × Total Heads) ÷ 2.

Q29. Answer: (c) 240

Shortcut Trick
The area of a triangle is directly related to its inradius and semi-perimeter.
Logic: Area = Inradius × Semi-perimeter
=> Semi-perimeter = Perimeter ÷ 2 = 60 ÷ 2 = 30 cm
=> Area = 8 × 30 = 240 cm²
Therefore The correct answer is 240 cm².
Alternate Method
Given:
Inradius (r) = 8 cm
Sum of sides (Perimeter) (P) = 60 cm
Formula Used:
Area of Triangle (A) = r × s
Where s = Semi-perimeter = P ÷ 2
Calculations:
=> Semi-perimeter (s) = Perimeter ÷ 2
=> s = 60 ÷ 2
=> s = 30 cm
=> Area of Triangle (A) = Inradius × Semi-perimeter
=> A = 8 × 30
=> A = 240 cm²
Therefore The correct answer is 240 cm².
Additional Information
Inradius and Area Relation

Q30. Answer: (d) 2

Shortcut Trick
Total work = 4 Men × 8 days = 32 Man-days = 2 Women × 10 days = 20 Woman-days.
Efficiency ratio: 32M = 20W => 8M = 5W.
We need to find the time for 5 women and 8 men: (5W + 8M) => (8M + 8M) = 16M.
Since 4 men take 8 days, 16 men will take (4 × 8) ÷ 16 = 2 days.
Therefore The correct answer is 2 days.
Alternate Method
Given:
Time taken by 4 men = 8 days
Time taken by 2 women = 10 days
Formula Used:
Total Work = Number of workers × Efficiency × Time
Calculations:

=> Total Work = 4M × 8 = 32M

=> Total Work = 2W × 10 = 20W

=> 32M = 20W

=> Efficiency of 1 Man (M) ÷ Efficiency of 1 Woman (W) = 20 ÷ 32 = 5 ÷ 8

=> Let efficiency of 1 Man = 5 units/day, and efficiency of 1 Woman = 8 units/day

=> Total Work = 32 × 5 = 160 units

=> Efficiency of 5 women and 8 men = (5 × 8) + (8 × 5) = 40 + 40 = 80 units/day

=> Number of days required = Total Work ÷ Combined Efficiency = 160 ÷ 80 = 2 days

Therefore The correct answer is 2 days.

Additional Information

Work-Efficiency Relation

Efficiency is inversely proportional to the time taken when work is constant: E1 × T1 = E2 × T2.

Pipes & Cisterns and Wages

Wages are always distributed in the direct proportion of the total work done by individual workers or their efficiencies when they work for the same duration.

Q31. Answer: (c) $\tan^2 \theta$

Shortcut Trick

Put $\theta = 45°$

=> $(1 + \tan^2 45°) \div (1 + \cot^2 45°)$

=> $(1 + 1^2) \div (1 + 1^2) = 2 \div 2 = 1$

Check options: $\tan^2 45° = 1^2 = 1$

Therefore The correct answer is $\tan^2 \theta$.

Alternate Method

Given: Expression $(1 + \tan^2 \theta)/(1 + \cot^2 \theta)$

Formula Used: $1 + \tan^2 \theta = \sec^2 \theta$ and $1 + \cot^2 \theta = \text{cosec}^2 \theta$

=> Expression = $\sec^2 \theta \div \text{cosec}^2 \theta$

=> Expression = $(1/\cos^2 \theta) \div (1/\sin^2 \theta)$

=> Expression = $(1/\cos^2 \theta) \times (\sin^2 \theta/1)$

=> Expression = $\sin^2 \theta \div \cos^2 \theta$

=> Expression = $(\sin \theta / \cos \theta)^2$

=> Expression = $\tan^2 \theta$

Therefore The correct answer is $\tan^2 \theta$.

Additional Information

Trigonometric Identities

Fundamental identities include $\sin^2 \theta + \cos^2 \theta = 1$ and the relationship $\tan \theta = 1 \div \cot \theta$.

Reciprocal Relations

$\sec \theta = 1 \div \cos \theta$ and $\text{cosec}\ \theta = 1 \div \sin \theta$ are essential for simplifying complex trigonometric fractions.

Q32. Answer: (d) 20,00,000

Shortcut Trick

Difference in Valid Votes percentage = 40% − 32% = 8%

Given that 8% of Valid Votes = 1,60,000

Total Valid Votes (100%) = (1,60,000 ÷ 8) × 100

Total Valid Votes = 20,00,000

Therefore The correct answer is 20,00,000.

Alternate Method

Given:

Winner share = 40% of valid votes

Runner-up share = 32% of valid votes

Vote Difference = 1,60,000

Calculations:

Let the total Valid Votes be V.
=> Votes of Winner = 0.40V
=> Votes of Runner-up = 0.32V
=> Difference = 0.40V − 0.32V = 1,60,000
=> 0.08V = 1,60,000
=> V = 1,60,000 ÷ 0.08
=> V = 1,60,00,000 ÷ 8
=> V = 20,00,000
Therefore The correct answer is 20,00,000.
Additional Information
Valid vs Invalid Votes
Total Votes = Valid Votes + Invalid Votes. Only Valid Votes are considered for determining the winning margin.
Percentage Base Change
If asked for Total Votes Cast: Total = Valid Votes ÷ (100% − Invalid%). In this case, 20,00,000 ÷ 0.80 = 25,00,000.
Winning Margin Rule
Margin = (Winner% − Runner-up%) × Total Valid Votes. Always ensure the percentages refer to the same base.

Q33. Answer: (c) 14.75%

Shortcut Trick
Use the Successive Percentage formula to find the net change.
Net Profit% = a − b − (a × b) ÷ 100, where a = Markup% and b = Discount%.
Net Profit% = 35 − 15 − (35 × 15) ÷ 100.
Net Profit% = 20 − 5.25 = 14.75%.
Therefore The correct answer is 14.75%.
Alternate Method
Given: Markup = 35% above CP, Discount = 15% on MP.
Formulas: MP = CP × (100 + Markup%) ÷ 100 | SP = MP × (100 − Discount%) ÷ 100 | Profit% = (SP − CP) ÷ CP × 100.
=> Let the Cost Price (CP) be 100.
=> Marked Price (MP) = 100 + 35% of 100 = 135.
=> Selling Price (SP) = 135 − 15% of 135 = 135 − 20.25 = 114.75.
=> Profit = SP − CP = 114.75 − 100 = 14.75.
=> Profit Percentage = (14.75 ÷ 100) × 100 = 14.75%.
Therefore The correct answer is 14.75%.
Additional Information
Marked Price & Discount
The price fixed by the seller on the label is the Marked Price. Discount is always calculated on the MP. SP = MP − Discount.
Successive Percentage Change
When a value is changed by x% and then y%, the net change is given by [x + y + (xy/100)]%. For discounts, use negative values.

Q34. Answer: (a) 20 km/hr

Shortcut Trick
Speed Ratio of trucks = 5 : 4
Since distance is constant, Time Ratio = Inverse of Speed Ratio = 4 : 5
Difference in time units = 5 − 4 = 1 unit → 2 hours
Time taken by slower truck (5 units) = 5 × 2 = 10 hours
Speed of slower truck = Total Distance ÷ Time = 200 ÷ 10 = 20 km/hr
Therefore The correct answer is 20 km/hr.
Alternate Method
Given:
Ratio of speeds = 5 : 4
Distance (D) = 200 km
Time difference = 2 hours

Formula Used:

Speed = Distance ÷ Time | Time = Distance ÷ Speed

Calculations:

=> Let the speed of the faster truck be 5x and slower truck be 4x.

=> Time taken by slower truck − Time taken by faster truck = 2

=> (200 ÷ 4x) − (200 ÷ 5x) = 2

=> (50 ÷ x) − (40 ÷ x) = 2

=> 10 ÷ x = 2

=> x = 5

=> Speed of slower truck = 4 × 5 = 20 km/hr

Therefore The correct answer is 20 km/hr.

Additional Information

Inverse Proportion of Speed and Time

When the distance is constant, speed is inversely proportional to time (S prop. to 1/T). If speed ratio is a:b, the time ratio is b:a.

Average Speed Formula

For the same distance covered at two different speeds u and v, Average Speed = (2 × u × v) ÷ (u + v).

Relative Speed

In the same direction, relative speed = S1 − S2. In the opposite direction, relative speed = S1 + S2.

Q35. Answer: (a) 12

Shortcut Trick

Efficiency of (A + B) = Total Work ÷ Days = 6 ÷ 3 = 2 units/day.

Efficiency of B = Total Work ÷ Days = 6 ÷ 6 = 1 unit/day.

Efficiency of A = (A + B) − B = 2 − 1 = 1 unit/day.

Double work = 6 × 2 = 12 units.

Time for A = 12 ÷ 1 = 12 days.

Therefore The correct answer is 12 days.

Alternate Method

Given:

Time taken by (A + B) = 3 days

Time taken by B = 6 days

Formula Used:

Total Work = LCM of time taken

Efficiency = Total Work ÷ Time

Person	Days	Total Work	Efficiency
A + B	3	6	2
B	6	1	

Calculations:

=> Efficiency of A = Efficiency of (A + B) − Efficiency of B

=> Efficiency of A = 2 − 1 = 1 unit/day

=> Work to be done = Double of original work = 2 × 6 = 12 units

=> Time taken by A = Double Work ÷ Efficiency of A

=> Time taken by A = 12 ÷ 1 = 12 days

Therefore The correct answer is 12 days.

Additional Information

Combined Efficiency Rule

The efficiency of two people working together is the sum of their individual efficiencies: E_(A+B) = E_A + E_B.

Work-Time Relationship

Time is inversely proportional to efficiency for a constant amount of work. If work is doubled, time taken at the same efficiency also doubles.

YourMockTest.com — Free Study Material

Q36. Answer: (d) decrease by Rs. 1,428

Shortcut Trick

Income = Rs. 10,200 | Savings = 30% = Rs. 3,060 | Expenditure = 70% = Rs. 7,140

Income Increase (+14%) = 10,200 × 0.14 = +Rs. 1,428

Expenditure Increase (+40%) = 7,140 × 0.40 = +Rs. 2,856

Change in Savings = Increase in Income − Increase in Expenditure = 1,428 − 2,856 = −Rs. 1,428

Therefore The correct answer is decrease by Rs. 1,428.

Alternate Method

Given: Initial Income = Rs. 10,200, Savings % = 30%

Formula Used: Income = Expenditure + Savings

=> Initial Savings = 30% of 10,200 = 0.30 × 10,200 = Rs. 3,060

=> Initial Expenditure = 10,200 − 3,060 = Rs. 7,140

=> New Income = 10,200 + 14% of 10,200 = 10,200 + 1,428 = Rs. 11,628

=> New Expenditure = 7,140 + 40% of 7,140 = 7,140 + 2,856 = Rs. 9,996

=> New Savings = 11,628 − 9,996 = Rs. 1,632

=> Change in Savings = 1,632 − 3,060 = −Rs. 1,428

Therefore The correct answer is decrease by Rs. 1,428.

Additional Information

Income-Expenditure Relationship

Always remember the fundamental equation: Income = Expenditure + Savings. Any percentage change in one side must balance the other.

Alligation Method for Savings

This problem can also be solved using alligation where the ratio of Expenditure to Savings is the inverse of the ratio of their respective percentage changes relative to the income change.

Successive Percentage Change

When a value increases by x% and then y%, the net change is given by (x + y + xy/100)%, though for split components like Income, direct calculation is safer.

Q37. Answer: (a) 528

Shortcut Trick

Base Area (πr^2) = Volume ÷ Height = 1848 ÷ 12 = 154 cm^2.

When base area of a circle is 154, the radius r is always 7 cm.

Curved Surface Area (CSA) = 2 × (πr^2) × (h ÷ r) = 2 × 154 × (12 ÷ 7) = 528 cm^2.

Therefore The correct answer is 528 cm^2.

Alternate Method

Given: Volume = 1848 cm^3, Height (h) = 12 cm.

Formula Used: Volume of Cylinder (V) = $\pi r^2 h$ | Curved Surface Area (CSA) = $2\pi rh$

=> 1848 = (22 ÷ 7) × r^2 × 12

=> r^2 = (1848 × 7) ÷ (22 × 12)

=> r^2 = 154 × 7 ÷ 22

=> r^2 = 7 × 7 = 49

=> r = √49 = 7 cm

=> CSA = 2 × (22 ÷ 7) × 7 × 12

=> CSA = 2 × 22 × 12

=> CSA = 44 × 12 = 528 cm^2

Therefore The correct answer is 528 cm^2.

Additional Information

Total Surface Area (TSA) of Cylinder

TSA includes the curved surface area plus the area of the two circular bases: TSA = $2\pi rh + 2\pi r^2 = 2\pi r(h + r)$.

Standard Circle Values

For a radius (r) of 7 cm, the circumference is 44 cm and the base area is 154 cm^2.

Volume of a Hollow Cylinder

If a cylinder has an outer radius R and an inner radius r, its volume is given by $V = \pi h(R^2 - r^2)$.

Q38. Answer: (d) 4

Shortcut Trick

Time taken is doubled from 40 minutes to 80 minutes.

Since the typing rate is constant, the number of pages will also double.

Number of pages = 2 × 2 = 4 pages.

Therefore The correct answer is 4 pages.

Alternate Method

Given:

Time1 (T1) = 40 minutes, Work1 (W1) = 2 pages

Time2 (T2) = 80 minutes, Work2 (W2) = ?

Formula Used:

Work is directly proportional to Time: (W1 / T1) = (W2 / T2)

Calculations:

=> 2 / 40 = W2 / 80

=> W2 = (2 × 80) ÷ 40

=> W2 = 160 ÷ 40

=> W2 = 4 pages

Therefore The correct answer is 4 pages.

Additional Information

Direct Proportion

When efficiency is constant, the work done is directly proportional to the time spent (W prop. to T).

Unitary Method

Find the value of a single unit (pages per minute) first: 2 ÷ 40 = 0.05 pages/min, then multiply by the required time: 0.05 × 80 = 4 pages.

Work and Efficiency

The general formula is Work = Efficiency × Time. If Efficiency is same, W1/T1 = W2/T2.

Q39. Answer: (a) 29

Shortcut Trick

Total Distance = 80 + 36 = 116 km.

Total Time = (80 ÷ 40) + (36 ÷ 18) = 2 + 2 = 4 hours.

Average Speed = Total Distance ÷ Total Time = 116 ÷ 4 = 29 km/hr.

Therefore The correct answer is 29 km/hr.

Alternate Method

Given:

Distance 1 (D1) = 80 km, Speed 1 (S1) = 40 km/hr

Distance 2 (D2) = 36 km, Speed 2 (S2) = 18 km/hr

Formula Used:

Average Speed = (Total Distance) ÷ (Total Time)

Time = Distance ÷ Speed

Calculations:

=> Time taken for first part (T1) = 80 ÷ 40 = 2 hours

=> Time taken for second part (T2) = 36 ÷ 18 = 2 hours

=> Total Distance = 80 + 36 = 116 km

=> Total Time = 2 + 2 = 4 hours

=> Average Speed = 116 ÷ 4 = 29 km/hr

Therefore The correct answer is 29 km/hr.

Additional Information

Average Speed (Equal Distances)

If a body covers two equal distances at speeds x and y, the average speed is given by (2xy) ÷ (x + y).

YourMockTest.com — Free Study Material

Relative Speed

When two objects move in the same direction, relative speed is the difference of their speeds. In opposite directions, it is the sum of their speeds.

Unit Conversion

To convert km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.

Q40. Answer: (b) 51.2%

Shortcut Trick

Net Change Formula: a + b + (a × b) / 100

Here, Price (a) = −16% and Sale (b) = +80%

Net Change = −16 + 80 + (−16 × 80) / 100

Net Change = 64 − 12.8 = 51.2%

Therefore The correct answer is 51.2%.

Alternate Method

Given: Reduction in price = 16%, Increase in sale = 80%

Formula: Revenue = Price × Sale

=> Let initial price = 100 and initial sale = 100

=> Initial Revenue = 100 × 100 = 10,000

=> New price = 100 − 16 = 84

=> New sale = 100 + 80 = 180

=> New Revenue = 84 × 180 = 15,120

=> Increment = 15,120 − 10,000 = 5,120

=> Net per cent increment = (5,120 ÷ 10,000) × 100 = 51.2%

Therefore The correct answer is 51.2%.

Additional Information

Successive Percentage Change

When a value changes by x% and then by y%, the net effective change is given by [x + y + (xy/100)]%.

Product Stability Rule

If the product of two variables remains constant, an increase in one variable results in a reciprocal decrease in the other.

Revenue Calculation

Total Revenue is always the product of Price per unit and the Quantity sold (Revenue = P × Q).

Q41. Answer: (a) An isosceles right-angled triangle with area 50 square units has one side with length 8 units.

Shortcut Trick

For an isosceles right-angled triangle with area 50 square units:

Area = (1/2) × base × height = (1/2) × side² = 50

=> side² = 100 => side = 10 units.

Hypotenuse = √(10² + 10²) = 10√2 ≈ 14.14 units.

The sides are 10, 10, and 14.14 units. None of the sides is 8 units.

Therefore The correct answer is An isosceles right-angled triangle with area 50 square units has one side with length 8 units.

Alternate Method

Given: Four statements about triangles to verify.

Verification of Options:

Option 1: Let the equal sides of the isosceles right triangle be x.

=> Area = (1/2) × x² = 50

=> x² = 100 => x = 10 units. Hypotenuse = 10√2 units. Statement is FALSE.

Option 2: By the Isoperimetric Theorem, for a fixed area, the equilateral triangle has the minimum perimeter. Statement is TRUE.

Option 3: Let the largest side be 4. Max area occurs for an equilateral triangle with side 4.

=> Max Area = (√3 / 4) × 4² = 4√3 ≈ 6.928 square units.

=> 6.928 < 8. Statement is TRUE.

Option 4: Let sides be n, n+1, n+2. For a right triangle:

=> n² + (n+1)² = (n+2)²

=> $n^2 + n^2 + 2n + 1 = n^2 + 4n + 4$ => $n^2 - 2n - 3 = 0$

=> $(n - 3)(n + 1) = 0$ => n = 3. Sides are 3, 4, 5. Statement is TRUE.

Therefore The correct answer is An isosceles right-angled triangle with area 50 square units has one side with length 8 units.

Additional Information

Isosceles Right Triangle Properties

The sides are in the ratio 1 : 1 : √2. If the legs are a, the hypotenuse is a√2 and the area is $a^2/2$.

Pythagorean Triples

Sets of three positive integers (a, b, c) such that $a^2 + b^2 = c^2$. The only triple with consecutive integers is (3, 4, 5).

Triangle Inequality and Area

For any triangle with sides a, b, c, the area is always less than (1/2) × (largest side)².

Q42. Answer: (b) 50 : 171

Shortcut Trick

The relationship between Cost Price (CP) and Marked Price (MP) is given by the ratio CP : MP = (100 − Discount%) : (100 + Profit%).

Given: Discount = 50% and Profit = 71%.

CP : MP = (100 − 50) : (100 + 71).

CP : MP = 50 : 171.

Therefore The correct answer is 50 : 171.

Alternate Method

Given: Discount = 50%, Profit = 71%.

Formulas: SP = MP × (100 − D%) ÷ 100 | SP = CP × (100 + P%) ÷ 100.

=> Let the Marked Price (Listed Price) be 100.

=> Selling Price (SP) = 100 × (100 − 50) ÷ 100 = 50.

=> Cost Price (CP) × (100 + 71) ÷ 100 = 50.

=> CP × 171 ÷ 100 = 50 => CP = 5000 ÷ 171.

=> Ratio CP : MP = (5000 ÷ 171) : 100 = 5000 : 17100 = 50 : 171.

Therefore The correct answer is 50 : 171.

Additional Information

Relationship between CP and MP

The formula CP/MP = (100 − D%)/(100 + P%) is derived by equating the Selling Price from both the CP and MP perspectives.

Marked Price (List Price)

The price printed on the label of an article. Discounts are always calculated on this price.

Q43. Answer: (c) Rs. 1,950

Shortcut Trick

Ratio of Profit = Ratio of Investment (when time is constant).

Total Profit = Rs. 9,000 | Roshan's Profit = Rs. 1,300.

Investment Ratio (Roshan : Total) = 1,300 : 9,000 = 13 : 90.

Total Investment = Rs. 13,500.

Roshan's Investment = (13 ÷ 90) × 13,500 = 13 × 150 = Rs. 1,950.

Therefore The correct answer is Rs. 1,950.

Alternate Method

Given: Total Investment = Rs. 13,500, Total Profit = Rs. 9,000, Roshan's Profit = Rs. 1,300.

Formula: Investment_(Roshan) = (Profit_(Roshan) ÷ Total Profit) × Total Investment

=> Total Profit share units = 9,000

=> Roshan's profit share = 1,300

=> Let Roshan's investment be X.

=> X ÷ 13,500 = 1,300 ÷ 9,000

=> X = (1,300 × 13,500) ÷ 9,000

=> X = 1,300 × 1.5 = Rs. 1,950

Therefore The correct answer is Rs. 1,950.

YourMockTest.com — Free Study Material

Additional Information

Partnership Principle

When multiple partners invest for the same time period, the profit is distributed in the direct ratio of their capital investments.

Variable Time Period

If time periods differ, Profit Ratio = (Capital1 × Time1) : (Capital2 × Time2).

Q44. Answer: (d) 9956

Shortcut Trick

Check the options for divisibility after subtracting the remainder 2.

Number − 2 must be divisible by 9 (Sum of digits divisible by 9).

(1) 9984 − 2 = 9982 (Sum = 28, No)

(2) 9948 − 2 = 9946 (Sum = 28, No)

(3) 9998 − 2 = 9996 (Sum = 33, No)

(4) 9956 − 2 = 9954 (Sum = 27, Yes)

Therefore The correct answer is 9956.

Alternate Method

Given: Divisors are 14, 9, and 6. Remainder in each case is 2.

Formula: Required Number = (k × LCM of divisors) + remainder

=> LCM(14, 9, 6):

=> 14 = 2 × 7, 9 = 3^2, 6 = 2 × 3

=> LCM = 2 × 3^2 × 7 = 126

=> Largest 4-digit number = 9999

=> 9999 ÷ 126 => Quotient = 79, Remainder = 45

=> Largest 4-digit multiple of 126 = 9999 − 45 = 9954

=> Required Number = 9954 + 2 = 9956

Therefore The correct answer is 9956.

Additional Information

LCM Method for Remainders

When a number leaves the same remainder 'r' when divided by x, y, and z, the general form is (LCM(x, y, z) × n) + r.

Divisibility Rule of 9

A number is divisible by 9 if the sum of its digits is divisible by 9. This is the fastest way to eliminate options in remainder problems involving 9.

Finding Multiples near N

To find the largest number near N divisible by L, subtract (N mod L) from N.

Q45. Answer: (b) 15

Shortcut Trick

For any Arithmetic Progression (AP), the average is the middle term.

The first 9 multiples of 3 are: 3, 6, 9, 12, 15, 18, 21, 24, 27.

Since there are 9 terms, the 5^(th) term is the middle term.

Average = 5^(th) multiple = 3 × 5 = 15.

Therefore The correct answer is 15.

Alternate Method

Given: First 9 multiples of 3.

Formula Used: Average of an Arithmetic Progression = (First Term + Last Term) ÷ 2.

=> First term (a) = 3 × 1 = 3

=> Last term (l) = 3 × 9 = 27

=> Total number of terms (n) = 9

=> Average = (3 + 27) ÷ 2

=> Average = 30 ÷ 2

=> Average = 15

Therefore The correct answer is 15.

Additional Information

Average of First n Multiples

The average of the first n multiples of any number x is given by the formula: x × (n + 1) ÷ 2.

Average of Continuous Numbers

For a set of numbers in Arithmetic Progression, the average is always the arithmetic mean of the first and last terms.

Sum of First n Multiples

The sum of the first n multiples of x is calculated as: [x × n(n + 1)] ÷ 2.

Q46. Answer: (a) 20,800

Shortcut Trick

Net Rate Difference per year = 7.5% − 3.5% = 4%.

Total Interest Difference for 2 years = 4% × 2 = 8%.

Positive difference = 8% of Rs. 2,60,000 = 2,600 × 8 = Rs. 20,800.

Therefore The correct answer is Rs. 20,800.

Alternate Method

Given:

Principal (P) = Rs. 2,60,000

Rate 1 (R1) = 3.5% | Rate 2 (R2) = 7.5%

Time (T) = 2 years

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Calculations:

=> SI paid to Bank A = (2,60,000 × 3.5 × 2) ÷ 100

=> SI_A = 2,600 × 7 = Rs. 18,200

=> SI paid to Bank B = (2,60,000 × 7.5 × 2) ÷ 100

=> SI_B = 2,600 × 15 = Rs. 39,000

=> Positive Difference = SI_B − SI_A

=> Difference = 39,000 − 18,200 = Rs. 20,800

Therefore The correct answer is Rs. 20,800.

Additional Information

Simple Interest Difference Rule

When the principal and time are the same, the difference in SI is given by ΔSI = (P × ΔR × T) ÷ 100, where ΔR is the difference in rates.

Total Amount Formula

The total amount (A) to be repaid is A = P + SI = P × [1 + (R × T) ÷ 100].

Effective Rate of Interest

The effective interest for the total duration T is simply R × T in simple interest, unlike compound interest where it follows successive percentage change.

Q47. Answer: (d) 12%

Shortcut Trick

Net change formula for Successive percentage: Profit% = m − d − (m × d) ÷ 100

Where m = markup percentage (40%) and d = discount percentage (20%).

Profit% = 40 − 20 − (40 × 20) ÷ 100

Profit% = 20 − 8 = 12%.

Therefore The correct answer is 12%.

Alternate Method

Given: Cost Price (CP) = Rs. 4,000, Markup% = 40%, Discount% = 20%.

Formulas: MP = CP × (100 + Markup%) ÷ 100 | SP = MP × (100 − Discount%) ÷ 100 | Profit% = (SP − CP) ÷ CP × 100.

=> Marked Price (MP) = 4000 × (140 ÷ 100) = Rs. 5,600.

=> Selling Price (SP) = 5600 × (80 ÷ 100) = Rs. 4,480.

=> Profit = 4480 − 4000 = Rs. 480.

=> Profit% = (480 ÷ 4000) × 100 = 12%.

YourMockTest.com — Free Study Material

Therefore The correct answer is 12%.
Additional Information
Relationship between CP and MP
The ratio of Marked Price to Cost Price can be expressed as MP/CP = (100 + Profit%)/(100 − Discount%).
Effective Profit
Profit is always calculated on the Cost Price unless stated otherwise, while Discount is always calculated on the Marked Price.

Q48. Answer: (d) 18 years

Shortcut Trick
Check the ratio difference: P : Q present ratio is 9 : 8 (diff = 1 unit).
After 2 years, the ratio is 10 : 9 (diff = 1 unit).
Since the difference is the same, 1 unit increase in ratio corresponds to 2 years.
Present age of P = 9 units = 9 × 2 = 18 years.
Therefore The correct answer is 18 years.
Alternate Method
Given: Present age ratio P : Q = 9 : 8. Ratio after 2 years = 10 : 9.
Formula Used: Ratio & Proportion method.
=> Let the present ages of P and Q be 9x and 8x.
=> After 2 years: (9x + 2) ÷ (8x + 2) = 10 ÷ 9
=> 9 × (9x + 2) = 10 × (8x + 2)
=> 81x + 18 = 80x + 20
=> 81x − 80x = 20 − 18
=> x = 2
=> Present age of P = 9x = 9 × 2 = 18 years.
Therefore The correct answer is 18 years.
Additional Information
Age Ratio Rule
The difference between the ages of two people remains constant regardless of the number of years passed.
Ratio Balancing
If the difference in units between ratios is not equal, multiply the ratios by the difference of the other ratio to balance them.

Q49. Answer: (d) 38.255

Shortcut Trick
Equate the common entity Red tokens by multiplying the first ratio by 2 and the second ratio by 15.
Red : Green = 15 × 2 : 19 × 2 = 30 : 38
Pink : Red = 17 × 15 : 2 × 15 = 255 : 30
Combined Ratio Green : Pink = 38 : 255
Therefore The correct answer is 38:255.
Alternate Method
Given:
Ratio of Red (R) to Green (G) = 15 : 19
Ratio of Pink (P) to Red (R) = 17 : 2
Formula Used:
If A : B and B : C are given, then A : B : C can be found by making the common term B equal in both ratios.
Calculations:
=> Red / Green = 15 / 19 => Green / Red = 19 / 15
=> Pink / Red = 17 / 2
=> To find Green : Pink, we divide (Green / Red) by (Pink / Red):
=> Green / Pink = (Green / Red) ÷ (Pink / Red) = (19 / 15) ÷ (17 / 2)
=> Green / Pink = (19 / 15) × (2 / 17)
=> Green / Pink = (19 × 2) / (15 × 17)
=> Green / Pink = 38 / 255

YourMockTest.com — Free Study Material

Therefore The correct answer is 38:255.

Additional Information

Compound Ratio

The compound ratio of (a : b) and (c : d) is (ac : bd), obtained by multiplying corresponding terms.

Inverse Ratio

The inverse ratio of a : b is b : a. This is useful when the required comparison is the reciprocal of the given data.

Ratio Balancing

To combine A:B and B:C, multiply the ratios by factors that make the B-value equal to the LCM of the two B-values.

Q50. Answer: (a) 58

Shortcut Trick

Apply BODMAS to solve the brackets and operations directly:

=> 12 + {6 × 9 + 2} − (2) × 5

=> 12 + {54 + 2} − 10

=> 12 + 56 − 10

=> 68 − 10 = 58

Therefore The correct answer is 58.

Alternate Method

Given Expression:

12 + {6 × 27 ÷ 3 + 2} − (16 ÷ 8) × 5

Method Used:

The expression must be solved using the BODMAS rule, which sets the order of operations as Brackets, Orders, Division, Multiplication, Addition, and Subtraction.

Calculation:

12 + {6 × 27 ÷ 3 + 2} − (16 ÷ 8) × 5

=> 12 + {6 × 27 ÷ 3 + 2} − 2 × 5

=> 12 + {6 × 9 + 2} − (2) × 5

=> 12 + {54 + 2} − 10

=> 12 + 56 − 10

=> 68 − 10 = 58

Therefore The correct answer is 58.

Additional Information

BODMAS Rule

It specifies the order of operations: Brackets, Orders (powers/roots), Division, Multiplication, Addition, and Subtraction.

Order of Brackets

Always simplify the innermost brackets first, following the order: parenthesis (), then curly braces { }, and finally square brackets [].

Priority of Operations

Division and Multiplication share the same priority level and are solved from left to right. Similarly, Addition and Subtraction share the same priority and are also solved from left to right.

Q51. Answer: (d) Only conclusion (I) follows.

Given Statements:

All diamonds are stones.

No diamond is a necklace.

Checking Conclusions:

(I) Some stones are diamonds: Follows (because, all diamonds are stones, diamonds are included within stones.Therefore, some stones are definitely diamonds.)

(II) No stone is a necklace: Does not follows (because, we only know that no diamond is a necklace.But stones may include many things other than diamonds.Hence, we cannot say that no stone is a necklace.

Therefore, only conclusion (I) follows.

Hence, the correct answer is "Only conclusion (I) follows".

YourMockTest.com — Free Study Material

Q52. Answer: (d) Two

Given Series:

• 3 © £ % 2 7 3 © £ & @ & 5 @ 3 3 @ * @ $ 4

Required pattern: Number → Number → Symbol

Checking the series:

• 3 © £ % 2 7 3 © £ & @ & 5 @ 3 3 @ * @ $ 4

Numbers satisfying the condition:

→ 3 in (7 3 ©)

→ 3 in (3 3 @)

Therefore, there are 2 such numbers.

Hence, the correct answer is "Option 4".

Q53. Answer: (a) HMN

The logic followed here is:

In each letter-cluster, the difference between the positional values of consecutive letters is analyzed.

1) HMN →

2) QUW →

3) DHJ →

4) LPR →

The pattern observed in QUW, DHJ, and LPR is (+4, +2), whereas in HMN, the pattern is (+5, +1).

Therefore, the letter-cluster 'HMN' does not belong to that group.

Hence, the correct answer is "Option 1".

Q54. Answer: (d) 1038

Given Series: 1011 1010 1020 1019 1029 1028 ?

The pattern followed here is:

Therefore According to the pattern followed here 1038 will replace the (?) mark.

Hence, the correct answer is "Option 4".

Q55. Answer: (a) Only conclusion (II) follows

Given Statements:

Some dogs are birds.

All birds are pets.

Checking Conclusions:

(I) Some pets are not dogs: Does not follows (because, some dogs are birds → and all birds are pets.So, some dogs are definitely pets.But there is no definite information that some pets are not dogs.)

(II) Some dogs are pets: Follows (because, Some dogs are birds.All birds are pets.Therefore, those dogs which are birds are also pets.So, some dogs are definitely pets.)

Therefore, only conclusion (II) follows.

Hence, the correct answer is "Only conclusion (II) follows".

Q56. Answer: (c) 13 km towards west

Given:

11 km towards North

Right turn → 4 km

Right turn → 5 km

Left turn → 9 km

Final right turn → 6 km

To reach Point A again, he must travel 13 km towards West.

Hence, the correct answer is "Option 3".

Q57. Answer: (b) 5

Given Series:

(Left) 3 3 3 4 9 8 9 1 2 2 5 5 5 1 3 1 4 4 1 5 8 2 2 6 3 7 6 (Right)

YourMockTest.com — Free Study Material

Required pattern: Odd → Odd → Even

Checking the series: (Left) 3 3 3 4 9 8 9 1 2 2 5 5 5 1 3 1 4 4 1 5 8 2 2 6 3 7 6 (Right)

Odd numbers satisfying the condition are:

→ 3 in (3 3 4)

→ 1 in (9 1 2)

→ 1 in (3 1 4)

→ 5 in (1 5 8)

→ 7 in (3 7 6)

Therefore, there are 5 such odd numbers.

Hence, the correct answer is "Option 2".

Q58. Answer: (a) Son's wife's father

Given Symbols:

A + B → A is the son of B

A − B → A is the brother of B

A x B → A is the wife of B

A ÷ B → A is the father of B

Given Expression:

D ÷ F − G x H + J

Step-by-step Interpretation:

D ÷ F → D is the father of F

F − G → F is the brother of G

G x H → G is the wife of H

H + J → H is the son of J

Therefore, D is J’s son’s wife’s father.

Hence, the correct answer is "Option 1".

Q59. Answer: (a) 25

Given Series : 100 85 70 55 40 ?

The pattern followed here is:

Therefore According to the pattern followed here 25 will replace the (?) mark.

Hence, the correct answer is "Option 1".

Q60. Answer: (b) NK – DB

Logic followed here is: The second letter-cluster in each pair is determined by subtracting 10 from the positional values of the letters in the first cluster.

1) MK – CA →

2) NK – DB →

3) AY – QO →

4) QO – GE →

Hence, the correct answer is "Option 2".

Q61. Answer: (b) T

Given Information:

Only two people sit between S and C from the right of S.

Only two people sit between C and U from the left of U.

Only three people sit between S and B from the left of B.

R sits immediately left of T.

Find third to the left of A

Starting from A and moving left:

A → B → C → T

Therefore, the person third to the left of A is T.

Hence, the correct answer is "Option 2".

Q62. Answer: (d) Two

Given Information:

Only three people sit between B and K.

C sits immediately left of K.

No one sits to the right of L.

Only one person sits between L and K.

J sits immediately right of D.

Find people between I and J

J is at position 3.

I is at position 6.

People between them are: C and K

Total = 2 people

Hence, the correct answer is "Option 4".

Q63. Answer: (d) YHE

Logic followed here is:

Each letter in the series follows a specific subtraction pattern based on its positional value in the English alphabetical order. Each letter is moving backwards by 2 positions.

Therefore, the term that comes in place of the question mark is YHE.

Hence, the correct answer is "Option 4".

Q64. Answer: (b) 3

Given Conditions:

Only four boxes are kept between A and E.

Only C is kept above A.

Only two boxes are kept between G and F.

B is kept immediately above D.

F is not kept immediately above B.

Final Arrangement:

Position (Top → Bottom)	Box
1	C
2	A
3	G
4	B
5	D
6	F
7	E

Find boxes below B

Boxes below B are:

D, F and E

Total = 3 boxes

Hence, the correct answer is "Option 2".

Q65. Answer: (c) Three

Given Series:

(Left) 6 4 3 2 7 6 4 9 9 6 5 4 9 7 6 8 3 5 1 5 1 2 4 8 9 (Right)

Required pattern: Even → Odd → Even

Checking the series: (Left) 6 4 3 2 7 6 4 9 9 6 5 4 9 7 6 8 3 5 1 5 1 2 4 8 9 (Right)

Odd numbers satisfying the condition are:

→ 3 in (4 3 2)

YourMockTest.com — Free Study Material

→ 7 in (2 7 6)
→ 5 in (6 5 4)
Therefore, there are 3 such odd numbers.
Hence, the correct answer is "Option 3".

Q66. Answer: (c) Two

Given Series:
2 6 & 2 9 5 5 € 1 $ 1 6 @ & € # 3 @ £ % 4 9
Required pattern: Number → Symbol → Symbol
Checking the series:
2 6 & 2 9 5 5 € 1 $ 1 6 @ & € # 3 @ £ % 4 9
Symbols satisfying the condition are:
→ @ in (6 @ &)
→ @ in (3 @ £)
Therefore, there are 2 such symbols.
Hence, the correct answer is "Option 3".

Q67. Answer: (c) 75

Given Series: 5, 15, 27, 41, 57, ?
The pattern followed here is:
The pattern observed in the differences is: 10, 12, 14, 16, 18 (increasing by 2 each time).
Hence, the correct answer is "Option 3".

Q68. Answer: (c) 13 km to the south

Given Movement:
61 km towards West
Left turn → 67 km
Left turn → 67 km
Left turn → 80 km
Final left turn → 6 km
Step-by-step Direction Movement:
To reach Point A again, he must travel 13 km towards South.
Hence, the correct answer is "Option 3".

Q69. Answer: (a) 5

Given Codes:
'ROME' → '2347'
'BERM' → '7254'
Finding the common letters:
Therefore, the code for B is 5.
Hence, the correct answer is "Option 1".

Q70. Answer: (b) 996

Given Expression:
116 ÷ 9 + 427 × 7 − 13
Given Condition:
'+' and '−' are interchanged
'×' and '÷' are interchanged
After replacing the symbols:
= 116 × 9 − 427 ÷ 7 + 13
= 116 × 9 − 61 + 13
= 1044 − 61 + 13
= 1057 - 61
= 996

YourMockTest.com — Free Study Material

Therefore, the value of the question mark is 996.
Hence, the correct answer is "Option 2".

Q71. Answer: (b) FGK−JKO

Logic followed here is:
The second group of letters is obtained by adding 4 to the positional value of each letter in the first group of letters.
BCG is related to FGK →
WXB is related to ABF →
Similarly, let's find the pair that follows the same pattern for FGK – JKO:
Therefore, the pair 'FGK–JKO' follows the same pattern.
Hence, the correct answer is "Option 2".

Q72. Answer: (a) IST25

Given Series: CMN101, KUV82, SCD63, AKL44, ?
The pattern observed for letters is: (Letter position + 8) and for numbers: (Number - 19).
Therefore, the next cluster in the series is IST25.
Hence, the correct answer is "Option 1".

Q73. Answer: (b) 130

Given:
A = ÷
B = ×
C = +
D = −
Given Equation:
9 B 14 C 196 A 7 D 24
Replacing the letters with symbols:
= 9 × 14 + 196 ÷ 7 − 24
= 9 × 14 + 28 − 24
= 126 + 28 − 24
= 154 − 24
= 130
Therefore, the value of the question mark is 130.
Hence, the correct answer is "Option 2".

Q74. Answer: (a) 144

Given:
• means −
− means ×
× means ÷
÷ means +
Given Equation:
18 − 8 ÷ 4 + 64 × 16
Replacing the symbols:
= 18 × 8 + 4 − 64 ÷ 16
= 18 × 8 + 4 − 4
= 144 + 4 − 4
= 148 - 4
= 144
Therefore, the value of the question mark is 144.
Hence, the correct answer is "Option 1".

YourMockTest.com — Free Study Material

Q75. Answer: (c) 2

Given Information:

A sits at the extreme right end.

D sits immediately left of A.

B sits between C and E.

Find people between A and B

B is at position 2.

A is at position 5.

People between them are: E and D

Therefore, 2 people sit between A and B.

Hence, the correct answer is "Option 3".

Q76. Answer: (d) (98, 49, 58)

Logic followed here is: (1st number ÷ 2) = 2nd number; (2nd number + 9) = 3rd number.

For the set (46, 23, 32) →

Operation 1: 46 ÷ 2 = 23

Operation 2: 23 + 9 = 32

For the set (72, 36, 45) →

Operation 1: 72 ÷ 2 = 36

Operation 2: 36 + 9 = 45

Similarly, Option 4):

For (98, 49, 58) →

Operation 1: 98 ÷ 2 = 49

Operation 2: 49 + 9 = 58

Therefore, the set that follows the same logic is (98, 49, 58).

Hence, the correct answer is "Option 4".

Q77. Answer: (a) Three

Given Information:

Only I is kept above L.

Only three boxes are kept between I and B.

Only K is kept below C.

D is kept immediately above B.

Final Arrangement:

Position	Box
1	I
2	L
3	J
4	D
5	B
6	C
7	K

Find boxes between J and K

J is at position 3.

K is at position 7.

Boxes between them are: D, B, C

Total = 3 boxes

Hence, the correct answer is "Option 1".

YourMockTest.com — Free Study Material

Q78. Answer: (a) IKL−HJK

Logic followed here is: Each letter in the first group is shifted backward by one position (-1) in the alphabetical series to obtain the corresponding letter in the second group.

For YAB − XZA →

For TVW − SUV →

Similarly, Option 1) IKL − HJK:

Therefore, the pair 'IKL−HJK' follows the same pattern.

Hence, the correct answer is "Option 1".

Q79. Answer: (b) ITXH

Logic followed here is:

Each letter of the first group of letters is shifted by +4 and +5 alternately to obtain the corresponding letters of the second group.

For

CFRT is related to GKVY →

SZHN is related to WELS →

The pattern observed is: +4, +5, +4, +5 shift in alphabetical order.

Similarly, let's find the related term for EOTC:

Therefore, the code for 'EOTC' is ITXH.

Hence, the correct answer is "Option 2".

Q80. Answer: (b) cm

Given Codes:

‘zebra rain union’ → ‘ds cm oh’

‘video union oven’ → ‘ng oa cm’

Therefore, the code for ‘union’ is cm.

Hence, the correct answer is "Option 2".

Q81. Answer: (a) PR Sreejesh

The correct answer is PR Sreejesh.

Key Points

• The Government of India announced the Padma Awards 2025 on the eve of the 76th Republic Day, where legendary hockey goalkeeper PR Sreejesh was conferred with the Padma Bhushan.

• The Padma Bhushan is the third-highest civilian award in India, recognized for "distinguished service of a high order." PR Sreejesh received this honor for his monumental contributions to Indian hockey over a career spanning nearly two decades.

• Hailing from Kizhakambalam, Kerala, PR Sreejesh is widely regarded as one of the greatest goalkeepers in the history of the sport, earning the nickname "The Great Wall of Indian Hockey."

• His career reached a historic peak when he played a crucial role in helping the Indian Men’s Hockey Team secure back-to-back Olympic Bronze Medals at the Tokyo 2020 Olympics and the Paris 2024 Olympics.

• Following the Paris 2024 campaign, where his stellar saves in the quarter-final against Great Britain and the bronze medal match against Germany were decisive, Sreejesh announced his retirement from international hockey in August 2024.

Additional Information

• Career and Achievements:

• PR Sreejesh made his international debut for the senior national team in 2006 at the South Asian Games in Colombo.

• He served as the Captain of the Indian national team, leading them to a silver medal at the 2016 Champions Trophy and a historic quarter-final appearance at the 2016 Rio Olympics.

• He was awarded the Major Dhyan Chand Khel Ratna Award in 2021, India's highest sporting honor, and previously received the Padma Shri in 2017.

• In 2021, he became only the second Indian athlete to win the World Games Athlete of the Year award, following Rani Rampal.

• Other Options Context:

• Harvinder Singh: A legendary Para-archer who made history by winning India's first-ever Gold Medal in archery at the Paris 2024 Paralympic Games. He was also considered for major honors in 2025.

• IM Vijayan: A former Indian Football captain and three-time AIFF Player of the Year. Known as the "Black Pearl" of Indian football, he is a recipient of the Arjuna Award.

• Satyapal Singh: A renowned Para-athletics coach who has been instrumental in training several Indian medalists. He was awarded the Dronacharya Award for his coaching excellence.

YourMockTest.com — Free Study Material

Important Points

• Padma Awards Structure: The awards are given in three categories: Padma Vibhushan (exceptional and distinguished service), Padma Bhushan (distinguished service of high order), and Padma Shri (distinguished service).

• Selection Process: The Padma Awards Committee, constituted by the Prime Minister every year, makes the recommendations, which are then approved by the President of India.

• Legacy: At the time of his retirement in 2024, PR Sreejesh had earned over 330 international caps for India. Post-retirement, he was appointed as the head coach of the India U-21 Men's Hockey Team to nurture future talent.

• 2025 Statistics: The 2025 Padma list highlighted a significant focus on sports icons who brought glory to the nation during the Paris 2024 Olympic and Paralympic cycle, emphasizing India's growing stature in global sports.

Q82. Answer: (a) Mangrove Initiative for Shoreline Habitats and Tangible Incomes

The correct answer is Mangrove Initiative for Shoreline Habitats and Tangible Incomes.

Key Points

• The MISHTI scheme, which stands for Mangrove Initiative for Shoreline Habitats and Tangible Incomes, was officially announced by the Union Finance Minister Nirmala Sitharaman during the Union Budget 2023-24.

• The primary objective of the scheme is the intensive conservation and restoration of mangrove ecosystems along the Indian coastline and on salt-pan lands. Hence, the definition provided in option 1 is correct.

• It was formally launched on World Environment Day, June 5, 2023, by Prime Minister Narendra Modi to address the rising threats of climate change and sea-level rise.

• The scheme operates through the convergence of the MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme), the CAMPA (Compensatory Afforestation Fund Management and Planning Authority) Fund, and other sources to ensure financial sustainability.

• It aims to cover approximately 540 sq km of area across 11 States and 2 Union Territories over a period of five years starting from 2023-24.

Additional Information

• Significance of Mangroves:

• Mangroves are salt-tolerant plant communities found in tropical and subtropical intertidal regions. They act as a natural bio-shield against cyclones, tsunamis, and storm surges.

• India holds about 3% of the world's total mangrove vegetation. According to the India State of Forest Report (ISFR) 2021, the total mangrove cover in India is 4,992 sq km.

• The Sundarbans in West Bengal is the largest contiguous mangrove forest in the world and is a UNESCO World Heritage Site.

• Carbon Sequestration:

• Mangroves are known as Blue Carbon ecosystems. They can sequester four to five times more carbon per unit area than terrestrial forests, making them vital for global climate mitigation.

• Geographical Distribution:

• The highest mangrove cover in India is found in West Bengal (42.45%), followed by Gujarat (23.66%) and the Andaman and Nicobar Islands (12.39%).

• Other significant coastal states involved in the MISHTI implementation include Odisha, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, and Maharashtra.

Important Points

• Tangible Incomes: The scheme is unique because it links ecological health with economic benefits. It promotes eco-tourism and sustainable aquaculture to provide livelihood opportunities for local communities.

• Implementation Strategy: The Ministry of Environment, Forest and Climate Change (MoEFCC) leads the project, emphasizing the sharing of best practices in plantation techniques and conservation management between states.

• Current Status (2025): As of 2025, the initiative has seen the successful plantation of diverse mangrove species like Rhizophora and Avicennia across degraded coastal patches, significantly improving the resilience of shoreline habitats.

• Funding Ratio: The project generally follows a funding pattern where the Central Government contributes a significant portion, supplemented by State resources and private sector participation through Corporate Social Responsibility (CSR) initiatives.

Q83. Answer: (b) Amphibious capability and lightweight design

The correct answer is Amphibious capability and lightweight design.

Key Points

• The Zorawar is an indigenous Light Tank developed primarily for the Indian Army to operate in difficult terrains where heavy main battle tanks face mobility issues.

• A major design focus for the Zorawar tank is its lightweight design, typically weighing around 25 tonnes. This allow the tank to be easily transported by air via C-17 Globemaster aircraft and deployed rapidly in high-altitude areas. Hence, the statement regarding

lightweight design is correct.

• The tank is equipped with amphibious capability, which enables it to navigate across water bodies like rivers and lakes, a critical feature for operations in the Himalayan region and riverine terrains. Hence, the statement regarding amphibious capability is correct.

• It has been developed collaboratively by the Defence Research and Development Organisation (DRDO) and Larsen & Toubro (L&T) to provide the Indian Army with a tactical advantage in the Line of Actual Control (LAC).

• The Zorawar tank is designed to feature high mobility and firepower, making it suitable for mountain warfare where traditional tanks like the T-90 or T-72 might struggle due to their weight exceeding 40-50 tonnes.

Additional Information

• Strategic Necessity: The project was fast-tracked following the 2020 standoff with China in Eastern Ladakh. The People's Liberation Army (PLA) had deployed its Type 15 (ZTQ-15) light tanks, prompting India to develop a similar indigenous capability.

• Naming: The tank is named after General Zorawar Singh, the legendary 19th-century military commander who led successful campaigns in Ladakh, Baltistan, and Tibet.

• Technological Features: It is expected to integrate Artificial Intelligence (AI), unmanned aerial vehicle (UAV) integration for better situational awareness, and Active Protection Systems (APS) to defend against anti-tank guided missiles.

• Power-to-Weight Ratio: One of its defining features is a high power-to-weight ratio, ensuring it can climb steep gradients and navigate narrow passes in high-altitude regions exceeding 15,000 feet.

Important Points

• Project Zorawar: The Indian Army has expressed a requirement for approximately 354 of these light tanks to equip its armored regiments in mountainous sectors.

• Trials: The prototype of the Zorawar tank commenced internal trials in July 2024, with further user trials by the Army expected to follow in desert and high-altitude environments to test its performance under extreme temperatures.

• Stealth and Detection: While it incorporates modern electronic warfare suites, it is not designed for naval stealth or submarine detection, as those are naval technologies unrelated to armored land warfare.

• Weaponry: It is typically armed with a 105mm main gun capable of firing various types of ammunition and anti-tank missiles, providing a balance between lethality and the constraints of a lighter chassis.

Q84. Answer: (b) Myanmar

The correct answer is Myanmar.

Key Points

• Operation Brahma was officially launched in March 2025 by the Government of India to provide urgent humanitarian assistance to Myanmar following a severe earthquake.

• The National Disaster Response Force (NDRF) was the primary agency responsible for executing the search and rescue operations on the ground, deploying multiple specialized battalions. Hence, statement 2 is correct.

• The operation involved the deployment of Indian Air Force (IAF) transport aircraft, such as the C-17 Globemaster III, to ferry NDRF personnel, canine squads, and heavy rescue equipment to Myanmar.

• This mission was a critical part of India’s “Neighborhood First” policy, emphasizing rapid response to natural calamities in adjacent nations. Hence, statements 1, 3, and 4 are incorrect in the context of Operation Brahma.

• The NDRF teams focused on extricating victims from collapsed structures and providing immediate medical aid through field hospitals set up in the affected zones of Myanmar.

Additional Information

• National Disaster Response Force (NDRF):

• The NDRF was constituted under Section 44 of the Disaster Management Act, 2005.

• It functions under the Ministry of Home Affairs and is a specialized force meant for responding to natural and man-made disasters.

• The Director General (DG) of NDRF is an IPS officer of the rank of Director General of Police.

• India’s HADR Tradition:

• HADR stands for Humanitarian Assistance and Disaster Relief. India has emerged as a Net Security Provider and first responder in the Indian Ocean Region.

• Previous notable operations include Operation Dost for Turkey and Syria in 2023, and Operation Maitri for Nepal in 2015.

• India-Myanmar Relations:

• India and Myanmar share a land border of approximately 1,643 km and a maritime boundary in the Bay of Bengal.

• Cooperation in disaster management is a key pillar of the Act East Policy and BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) framework.

Important Points

• The Disaster Management Act was enacted on 23rd December 2005, which led to the creation of the National Disaster Management Authority (NDMA), headed by the Prime Minister.

• Operation Brahma involved the distribution of relief materials including medicines, blankets, tents, and ready-to-eat meals to thousands of displaced persons in Myanmar.

• In 2025, the use of advanced technology like drones and ground-penetrating radars by the NDRF significantly improved the efficiency of life-saving efforts during the operation.

Q85. Answer: (a) Karnataka

The correct answer is Karnataka.

Key Points

• The Constitution (Scheduled Tribes) Order (Fourth Amendment) Bill, 2022, was introduced in the Lok Sabha on December 9, 2022, by the Union Minister of Tribal Affairs, Shri Arjun Munda.

• The primary objective of this bill is to amend the Constitution (Scheduled Tribes) Order, 1950, specifically focusing on its application to the state of Karnataka.

• The bill seeks to include the 'Betta-Kuruba' community as a synonym for the 'Kadu Kuruba' community at serial number 16 of the Scheduled Tribes list for Karnataka.

• This change was proposed because the Betta-Kuruba community had been facing difficulties in obtaining Scheduled Tribe certificates due to the absence of their specific name in the existing list, despite being ethnically identical to the Kadu Kuruba.

• The inclusion follows the formal recommendation of the Government of Karnataka and subsequent clearance by the Registrar General of India (RGI) and the National Commission for Scheduled Tribes (NCST).

Additional Information

• Constitutional Framework for Scheduled Tribes:

• Under Article 342 of the Constitution of India, the President, after consultation with the Governor of a state, notifies the list of Scheduled Tribes.

• Once the initial list is notified via the Constitution (Scheduled Tribes) Order, 1950, any subsequent inclusion, exclusion, or modification can only be done through an Act of Parliament.

• Significance of Inclusion:

• Members of the Betta-Kuruba community will now be eligible for benefits under various government schemes, such as Post-Matric Scholarships, National Overseas Scholarships, and Top Class Education for ST students.

• It also ensures political representation in Reserved Constituencies and reservation in government jobs under Article 16(4) of the Constitution.

• Process of Amendment:

• The process begins with a proposal from the State Government, which is then sent to the Ministry of Tribal Affairs.

• The Registrar General of India (RGI) reviews the ethnographical details. If approved, it is sent to the National Commission for Scheduled Tribes (NCST) for final consultation before being placed before the Union Cabinet and then Parliament.

• Related 2022 Amendments:

• Apart from Karnataka, the Government of India introduced similar bills in 2022 for states like Tamil Nadu (to include Narikoravan and Kurivikkaran), Himachal Pradesh (for Hattee community), and Uttar Pradesh (for Gond community in certain districts).

Important Points

• The Betta-Kuruba community traditionally resides in the hilly regions of Kodagu, Mysuru, and Chamarajanagar districts in Karnataka.

• They are traditionally known for their skills in basket weaving and honey collection.

• The term 'Betta' means Hill and 'Kuruba' refers to Shepherd, although this specific community is primarily forest-dwelling rather than pastoral.

• The Constitution (Scheduled Tribes) Order (Fourth Amendment) Act, 2022 reflects the government's commitment to 'Sabka Saath, Sabka Vikas' by providing social justice to marginalized communities.

Q86. Answer: (b) Yoga for One Earth, One Health

The correct answer is Yoga for One Earth, One Health.

Key Points

• The 11th International Day of Yoga (IDY) is scheduled to be celebrated on June 21, 2025. The official theme designated for this year's celebration is "Yoga for One Earth, One Health".

• This theme emphasizes the holistic nature of Yoga and its role in fostering a sustainable lifestyle that benefits not just individual human health, but the health of the entire planet and all its living beings.

• The Ministry of Ayush serves as the nodal agency in India for organizing the primary events and coordinating with various international organizations and Indian missions abroad to promote the practice of Yoga globally.

YourMockTest.com — Free Study Material

• The 2025 theme aligns with the broader global vision of One Health, which recognizes that the health of humans, animals, and the environment are closely linked and interdependent.

• The International Day of Yoga aims to raise awareness about the ancient Indian practice of Yoga, which combines physical postures (Asanas), breathing techniques (Pranayama), and meditation (Dhyana) for overall well-being.

Additional Information

• Origin and Proposal: The concept of an International Day of Yoga was first formally proposed by the Prime Minister of India, Narendra Modi, during his speech at the 69th session of the United Nations General Assembly (UNGA) on September 27, 2014.

• UN Resolution: Following the proposal, the UNGA passed a resolution on December 11, 2014, declaring June 21 as the International Day of Yoga. Notably, the resolution was co-sponsored by a record 177 member states.

• Selection of June 21: The date June 21 was chosen because it marks the Summer Solstice in the Northern Hemisphere. It is the longest day of the year and holds historical and spiritual significance in many cultures, often associated with the transition toward Dakshinayana in the yogic tradition.

• First Celebration (2015): The inaugural International Day of Yoga was held on June 21, 2015. The main event took place at Rajpath (now Kartavya Path) in New Delhi, setting two Guinness World Records for the largest yoga session (35,985 participants) and for having the most nationalities (84 countries) represented in a single yoga event.

• Previous Themes:

• The theme for the 10th edition (2024) was "Yoga for Self and Society".

• The theme for the 9th edition (2023) was "Yoga for Vasudhaiva Kutumbakam", which means "The World is One Family."

Important Points

• Common Yoga Protocol (CYP): To standardize the celebration, the Ministry of Ayush developed the Common Yoga Protocol, which is a collection of simple yogic practices suitable for people of all ages and backgrounds.

• Holistic Health: Yoga is recognized by the World Health Organization (WHO) as a means to improve physical health, reduce stress, and manage non-communicable diseases (NCDs) such as hypertension and diabetes.

• Global Participation: Every year, millions of people participate in IDY events across iconic locations worldwide, including the United Nations Headquarters in New York and various UNESCO World Heritage Sites.

Q87. Answer: (c) 5th

The correct answer is 5th.

Key Points

• In the World Air Quality Report 2024, which was released by the Swiss organization IQAir in March 2025, India was ranked as the 5th most polluted country globally.

• The report evaluates air quality based on the concentration of PM2.5 (particulate matter with a diameter of 2.5 micrometers or less), which is considered the most harmful pollutant to human health.

• India's average annual PM2.5 concentration was found to be significantly higher than the World Health Organization (WHO) annual air quality guideline of 5 µg/m³.

• The 2024 report highlighted that a vast majority of the world's most polluted cities are located in India, particularly within the Indo-Gangetic Plain region.

• While India showed slight improvements in certain urban pockets compared to previous years, it remains a "high-pollution" zone due to industrial, vehicular, and construction activities. Hence, the correct answer is 5th.

Additional Information

• Understanding PM2.5:

• PM2.5 refers to fine particulate matter that can penetrate deep into the lungs and enter the bloodstream, leading to respiratory and cardiovascular diseases.

• The WHO updated its guidelines in September 2021, stating that annual average concentrations of PM2.5 should not exceed 5 µg/m³.

• Most Polluted Global Rankings:

• In recent reports, countries like Bangladesh, Pakistan, and Tajikistan have frequently occupied the top three spots alongside India.

• In the 2024 data, Bangladesh and Pakistan continued to report PM2.5 levels more than 10 to 15 times the WHO guideline.

• Indian City Rankings:

• Cities like Begusarai, New Delhi, and Mullanpur often feature in the list of the world's most polluted metropolitan areas.

• New Delhi has repeatedly been categorized as the most polluted capital city in the world in various editions of the IQAir report.

• Government Initiatives in India:

• The National Clean Air Programme (NCAP) was launched by the Government of India in January 2019 to tackle air pollution in 131 cities.

• The program aims for a 20% to 30% reduction in PM2.5 and PM10 concentrations by 2024 (later revised to a 40% reduction target by 2026) compared to 2017 levels.

Important Points

• Primary Sources: The main contributors to air pollution in India include biomass burning, vehicle emissions, coal-fired power plants, and stubble burning during the winter months in Punjab and Haryana.

• Economic Impact: According to various studies, air pollution costs India billions of dollars annually due to healthcare expenses and lost labor productivity.

• Global Context: The World Air Quality Report utilizes data from over 30,000 air quality monitoring stations across more than 7,000 locations in 130+ countries.

Q88. Answer: (d) Singapore

The correct answer is Singapore.

Key Points

• The 2025 World Aquatics Championships are scheduled to be held in Singapore, marking a historic milestone as it is the first time a Southeast Asian nation will host this premier global event.

• The announcement was officially made by World Aquatics (formerly known as FINA) in February 2023. The championships were originally awarded to Kazan, Russia, but were later relocated to Singapore due to the ongoing geopolitical situation.

• This flagship event will feature elite athletes competing in six aquatic disciplines: swimming, diving, high diving, open water swimming, artistic swimming, and water polo.

• Over 2,500 athletes representing more than 200 national federations are expected to participate, making it one of the largest sporting gatherings in the world.

• The primary competition venues will include the state-of-the-art Singapore Sports Hub and the OCBC Aquatic Centre, which have previously hosted high-level international swimming events.

Additional Information

• World Aquatics: Formerly known as FINA (Fédération Internationale de Natation), the organization rebranded in December 2022 to encompass all six aquatic sports more inclusively. It is the international federation recognized by the International Olympic Committee (IOC).

• Recent Host Cities: The 2023 championships were held in Fukuoka, Japan, and the 2024 edition took place in Doha, Qatar. The 2027 championships are already slated to be hosted in Budapest, Hungary.

• Event Frequency: While the World Aquatics Championships are typically held biennially (every two years) in odd-numbered years, the schedule was adjusted to an annual format between 2022 and 2025 to accommodate delays caused by the COVID-19 pandemic.

• Significance: The championships serve as a critical qualification pathway for the Olympic Games, providing athletes with the opportunity to secure berths for their respective countries in various aquatic disciplines.

• Singapore's Sporting Legacy: Singapore has a strong track record of hosting international competitions, including the inaugural 2010 Youth Olympic Games and various legs of the Swimming World Cup.

Important Points

• Economic Impact: Hosting the 2025 World Aquatics Championships is expected to provide a significant boost to Singapore's tourism and sports industry, attracting thousands of international fans and media personnel.

• Technological Integration: Singapore plans to utilize advanced broadcast and timing technologies to enhance the viewer experience and ensure precision in competitive results.

• Governance: The decision to award the event to Singapore was finalized during a meeting of the World Aquatics Bureau, emphasizing the country's world-class infrastructure and organizational reliability.

Q89. Answer: (c) Kimi Antonelli

The correct answer is Kimi Antonelli.

Key Points

• Kimi Antonelli, whose full name is Andrea Kimi Antonelli, made history in the 2025 Formula 1 season by becoming the youngest driver to win three consecutive races.

• He achieved this milestone while driving for the Mercedes-AMG Petronas F1 Team, having been promoted to the seat following the departure of Lewis Hamilton to Ferrari.

• Born on August 25, 2006, in Bologna, Italy, Antonelli was approximately 18 years old when he secured this record-breaking hat-trick of victories. Hence, option 3 is the correct answer.

• His streak of wins demonstrated exceptional skill and maturity, solidifying his reputation as one of the most significant talents to enter Formula 1 in the modern era.

• Prior to this, the record for the youngest driver to win multiple races was held by Max Verstappen, but Antonelli's three-in-a-row achievement at such a young age set a new benchmark in the FIA Formula One World Championship.

YourMockTest.com — Free Study Material

Additional Information

• Max Verstappen:

• He holds the record for being the youngest driver to compete in Formula 1, making his debut at the 2015 Australian Grand Prix at the age of 17 years and 166 days.

• Verstappen also became the youngest ever race winner at the 2016 Spanish Grand Prix while driving for Red Bull Racing. Hence, option 1 is incorrect.

• George Russell:

• He is a British racing driver who joined Mercedes in 2022.

• While a highly successful driver and a Grand Prix winner, he did not achieve a three-race winning streak as the youngest driver in 2025. Hence, option 2 is incorrect.

• Lando Norris:

• Driving for McLaren, Norris has established himself as a top-tier driver with multiple podiums and wins.

• Although he is a key contender in the championship, the specific record of being the youngest to win three consecutive races in 2025 belongs to Antonelli. Hence, option 4 is incorrect.

• Mercedes Junior Team:

• Kimi Antonelli has been a member of the Mercedes Junior Team since 2019, following a dominant career in karting and junior formula categories like Formula 4 and Formula Regional.

• His rapid ascent directly from Formula 2 to a top-tier Formula 1 seat is a testament to the program's success under the leadership of Toto Wolff.

Important Points

• FIA Super Licence Rules:

• To compete in Formula 1, a driver must typically be 18 years of age and have accumulated 40 points over three seasons in eligible championships.

• The FIA introduced a relaxation in 2024 that allowed drivers aged 17 to receive a Super Licence under special dispensation if they demonstrated "outstanding ability," though Antonelli officially debuted after his 18th birthday.

• Records in Formula 1:

• Winning three races in a row is often referred to as a "hat-trick" of wins. This feat requires immense consistency from both the driver and the car's reliability.

• The 2025 season featured significant technological competition, making Antonelli's performance in the W16 (the 2025 Mercedes car) a historic event for Italian motorsport.

Q90. Answer: (c) 124 countries

The correct answer is 124 countries.

Key Points

• The 78th World Health Assembly (WHA), held in May 2025, marked a historic turning point in global health governance with the formal adoption of the WHO Pandemic Agreement.

• A total of 124 countries voted in favor of the accord, providing the necessary support to establish a legally binding framework for future pandemic prevention, preparedness, and response.

• The agreement was adopted under Article 19 of the WHO Constitution, which empowers the Assembly to create conventions or agreements to protect global health.

• The primary focus of the 124 countries supporting the agreement was to rectify the inequities witnessed during the COVID-19 pandemic, specifically concerning the distribution of vaccines and diagnostics.

• The successful vote followed years of rigorous deliberations by the Intergovernmental Negotiating Body (INB), which was established in December 2021 to draft the treaty text.

Additional Information

• World Health Assembly (WHA):

• The WHA is the supreme decision-making body of the World Health Organization (WHO), meeting annually in Geneva, Switzerland.

• It is attended by delegations from all 194 Member States and is responsible for setting the organization's policies, appointing the Director-General, and approving the programme budget.

• The Pandemic Accord Principles:

• The treaty is built on the principles of equity, sovereignty, and solidarity, ensuring that all nations have the tools to combat health threats.

• It includes the establishment of the Pathogen Access and Benefit-Sharing (PABS) System, which facilitates the sharing of pathogen data in exchange for a fair share of health products.

YourMockTest.com — Free Study Material

• The agreement also promotes the "One Health" approach, recognizing the interconnectedness of human, animal, and environmental health.

• International Health Regulations (IHR):

• Alongside the Pandemic Agreement, the 78th WHA also reviewed updates to the International Health Regulations (2005) to strengthen the existing legal framework for detecting and reporting public health emergencies of international concern (PHEIC).

• The IHR and the new Pandemic Agreement are designed to function complementarily to close loopholes in global surveillance and response.

• Historical Context:

• The move toward a formal treaty began after the COVID-19 crisis highlighted that existing voluntary mechanisms were insufficient for a coordinated global response.

• Negotiations involved intense discussions on Intellectual Property (IP) rights and the transfer of technology to low- and middle-income countries.

Important Points

• Article 19 Authority: This was only the second time in the history of the WHO that Article 19 was used to adopt a major convention, the first being the Framework Convention on Tobacco Control (FCTC) in 2003.

• Voting Threshold: While 124 countries provided the affirmative vote, the WHO typically strives for consensus; however, the formal vote ensured the legal validity of the instrument under international law.

• Implementation: The agreement sets clear targets for national preparedness and requires states to invest in primary healthcare and laboratory capacity.

Q91. Answer: (b) Cyprus

The correct answer is Cyprus.

Key Points

• Prime Minister Narendra Modi was conferred with the Grand Collar of the Order of Makarios III, which is the highest civilian honour of Cyprus, in June 2025.

• The award was presented during a high-level diplomatic visit to recognize his outstanding contribution to strengthening the bilateral relations between India and Cyprus and for his global leadership.

• The Order of Makarios III is named after Archbishop Makarios III, who was the first President of Cyprus and a founding member of the Non-Aligned Movement (NAM), a platform where India has historically played a leading role.

• This honour reflects the deep historical ties and the growing strategic partnership between the two nations, particularly in the fields of maritime security, financial services, and culture.

• During the ceremony in June 2025, the President of Cyprus highlighted the importance of India as a key partner in the Indo-Pacific and Mediterranean regions.

Additional Information

• Geographic and Political Profile of Cyprus:

• Cyprus is an island nation located in the Eastern Mediterranean Sea, south of Turkey and west of Syria.

• The capital and largest city is Nicosia. It is a member of the European Union (EU), having joined in 2004, and uses the Euro as its official currency.

• Other Highest Civilian Honours conferred on PM Modi:

• France: PM Modi was awarded the Grand Cross of the Legion of Honour in July 2023 by President Emmanuel Macron.

• Greece: He received the Grand Cross of the Order of Honour in August 2023, becoming the first foreign Head of Government to receive this honour since 2017.

• Russia: In July 2024, he was formally presented with the Order of Saint Andrew the Apostle, Russia's highest state honour.

• Bhutan: In March 2024, he was conferred with the Order of the Druk Gyalpo, making him the first foreign leader to receive it.

• India-Cyprus Economic Ties:

• Cyprus is traditionally one of the top 10 sources of Foreign Direct Investment (FDI) into India.

• The two countries have a robust Double Taxation Avoidance Agreement (DTAA), which was revised in 2016 to enhance transparency and exchange of financial information.

• Significance of International Awards:

• The bestowing of highest civilian honours on an Indian Prime Minister signifies India's rising geopolitical influence and the successful execution of its Act East and Link West policies.

• These awards serve as a tool for soft power diplomacy, fostering closer cooperation in counter-terrorism, climate change, and sustainable development.

Q92. Answer: (c) School students aged 8 and above

The correct answer is School students aged 8 and above.

Key Points

• The Summer Book Writing Festival 2025 is a prominent literary event designed to encourage creative writing and literacy among the younger generation during their summer break.

• The festival specifically highlights School students aged 8 and above as the primary demographic for participation, allowing them to explore their imagination through structured storytelling. Hence, the correct answer is School students aged 8 and above.

• The initiative aims to transform students from passive readers into active content creators, helping them draft, edit, and potentially publish their own books or short stories.

• Participants are often provided with digital platforms and tools that simplify the book-writing process, making it accessible for children as young as 8 years old to understand the nuances of a narrative arc.

• The event serves as a platform for global engagement, where students from various regions can showcase their unique perspectives and cultural backgrounds through written words.

Additional Information

• Cognitive Development at Age 8:

• Educational experts often suggest that the age of 8 is a critical milestone where children transition from "learning to read" to "reading to learn."

• At this age, students develop the cognitive ability to handle complex plots and character motivations, which is why the Summer Book Writing Festival focuses on this group.

• Benefits of Creative Writing:

• Engaging in such festivals helps students improve their vocabulary, grammar, and syntactic skills in a practical, fun environment.

• Writing a book fosters critical thinking and emotional intelligence, as students must empathize with the characters they create.

• Digital Publishing Trends:

• Modern festivals like the 2025 edition often utilize Artificial Intelligence (AI) and cloud-based platforms to help young authors illustrate and format their manuscripts.

• Platforms like BriBooks have gained popularity in recent years for hosting similar writing challenges that offer students the chance to become published authors before reaching high school.

Important Points

• Role of Mentorship: During the Summer Book Writing Festival 2025, students often receive guidance from professional authors and literary coaches to refine their manuscripts.

• Recognition and Awards: High-performing participants may receive certificates of excellence, medals, or the opportunity to have their books listed on major e-commerce platforms like Amazon.

• Global Reach: While the festival is a summer-themed event, it often attracts participants from across the country and even international borders, promoting a global community of young writers.

• 21st Century Skills: The festival emphasizes communication and digital literacy, which are essential skills for the future workforce in an increasingly content-driven world.

Q93. Answer: (c) Karnataka

The correct answer is Karnataka.

Key Points

• The Government of Karnataka officially announced an increase in the reservation quota for minority communities within its state-sponsored housing schemes in June 2025.

• The quota has been enhanced from the previous 10% to a revised 15% to ensure better inclusivity and social security for marginalized sections of the population.

• This policy change applies to various housing projects executed by the Housing Department and the Rajiv Gandhi Housing Corporation Limited (RGHCL).

• The primary beneficiaries of this 15% reservation include individuals belonging to the Muslim, Christian, Jain, Sikh, Buddhist, and Parsi communities residing in the state.

• The move is part of the Karnataka government's broader initiative to address the housing deficit among minorities and promote urban and rural development for all economic strata. Hence, the correct answer is Karnataka.

Additional Information

• Rajiv Gandhi Housing Corporation Limited (RGHCL):

• Established in the year 1991, this special purpose vehicle is responsible for implementing central and state housing schemes in Karnataka.

• It focuses on providing affordable housing to the Economically Weaker Sections (EWS) and Low Income Groups (LIG) across

the state.

• Major Housing Schemes in Karnataka:

• Basava Vasati Yojana: Launched to provide homes to the rural homeless, focusing on families living below the poverty line.

• Dr. B.R. Ambedkar Niwas Yojana: A scheme specifically designed to provide housing assistance to the Scheduled Castes (SC) and Scheduled Tribes (ST) in both urban and rural areas.

• Vajpayee Urban Housing Scheme: Targets the urban poor to ensure they have access to pucca houses with basic amenities.

• Minority Welfare in Karnataka:

• The Directorate of Minorities in Karnataka was carved out of the Social Welfare Department in 1999-2000 to focus exclusively on the development of notified minority communities.

• Apart from housing, the state provides scholarships, skill development training, and interest-free loans through the Karnataka Minorities Development Corporation (KMDC).

• National Context:

• Under the National Commission for Minorities Act, 1992, six religious communities are notified as minorities at the national level.

• State governments in India have the autonomy to implement specific welfare measures and quotas to uplift these communities based on their local demographic and socio-economic requirements.

Important Points

• The Housing Department of Karnataka aims to complete over 5 lakh houses under various schemes by the end of the financial year 2025-26.

• To be eligible for these schemes, applicants must generally have an annual income below a specified threshold and must not already own a permanent house in the state.

• The 15% quota for minorities is a significant step toward achieving the goals of Housing for All, aligning with the principles of the Pradhan Mantri Awas Yojana (PMAY) at the central level.

• The Directorate of Minorities and local Panchayati Raj institutions play a vital role in identifying genuine beneficiaries to prevent discrepancies in the allotment process.

Q94. Answer: (c) Sachin Yadav

The correct answer is Sachin Yadav.

Key Points

• Sachin Yadav, representing the state of Uttar Pradesh, delivered a phenomenal performance at the National Games 2025 to secure the gold medal in the men's javelin throw.

• He set a new National Games record with a massive throw of 84.39 m, showcasing the rising depth of talent in Indian athletics.

• The 39th edition of the National Games in 2025 was hosted by the state of Uttarakhand, providing a world-class platform for domestic athletes to excel.

• By achieving the 84.39 m mark, Sachin Yadav surpassed the previous meet record, establishing himself as one of the top contenders in the national circuit.

• His victory came against stiff competition, including experienced throwers like Shivpal Singh, who finished with the silver medal by recording a distance of 81.02 m.

Additional Information

• National Games 2025:

• The 39th National Games were organized in Uttarakhand across various cities including Dehradun, Haldwani, and Haridwar.

• The event is the premier multi-sport competition in India, aimed at identifying and nurturing sporting talent for international events like the Olympics and Asian Games.

• Neeraj Chopra:

• He is the reigning Olympic Gold Medalist and World Champion in javelin throw.

• Neeraj Chopra holds the Indian National Record of 89.94 m, achieved at the Stockholm Diamond League in 2022.

• Shivpal Singh:

• An elite Indian javelin thrower who represented the country at the Tokyo 2020 Olympics.

• His personal best is 86.23 m, which he achieved at the Asian Athletics Championships in 2019.

• Annu Rani:

• The top-ranked female javelin thrower in India and the national record holder in the women's category.

• She won the gold medal at the Asian Games 2023 held in Hangzhou, becoming the first Indian woman to do so in this discipline.

Important Points

• Javelin Throw Specifications: According to international standards, the men's javelin must weigh exactly 800 grams and measure between 2.6 meters and 2.7 meters in length.

• Qualification Standards: Performances like Sachin Yadav's 84.39 m throw are critical as they often meet the qualification standards for the World Athletics Championships and other global elite competitions.

• Athletics Federation of India (AFI): The governing body for athletics in India, which works in coordination with the Indian Olympic Association (IOA) to conduct the athletics portion of the National Games.

• Growth of Javelin in India: Since 2021, javelin throw has seen a massive surge in popularity in India, leading to increased funding and infrastructure under the Target Olympic Podium Scheme (TOPS).

Q95. Answer: (b) Regenerative medicine and tissue engineering

The correct answer is Regenerative medicine and tissue engineering.

Key Points

• In 2025, Maharaja Sayajirao University (MSU) Vadodara showcased major advancements in 3D bioprinting, specifically focusing on its transformative role in regenerative medicine and tissue engineering.

• The demonstration highlighted the ability to create complex biological structures by utilizing living cells and specialized bio-inks, which are deposited layer-by-layer to form functional tissues.

• This technology at MSU Vadodara aims to address critical healthcare challenges by developing lab-grown tissues such as skin grafts, bone scaffolds, and vascular networks.

• The application in regenerative medicine focuses on the repair and replacement of damaged organs or tissues, potentially eliminating the need for traditional organ donors in the future.

• The 2025 demonstration emphasized precision medicine, where 3D bioprinting is used to create patient-specific models for surgical planning and drug efficacy testing.

Additional Information

• 3D Bioprinting: This is an additive manufacturing process that uses biological materials to fabricate structures that imitate the characteristics of natural tissues. It differs from standard 3D printing by using living cells instead of plastic or metal.

• Bio-inks: These are the "inks" used in bioprinters, typically composed of hydrogels, growth factors, and nutrients that sustain cell viability and promote proliferation during and after the printing process.

• Tissue Engineering: This is a scientific field that combines engineering and life sciences to develop biological substitutes. It often uses a scaffold to provide a three-dimensional framework for cells to attach and grow.

• Regenerative Medicine: This branch of medicine seeks to regenerate human cells, tissues, or organs to restore normal function. It includes stem cell therapy and bio-fabrication as core components.

• Future Applications: Beyond tissue repair, 3D bioprinting is expected to revolutionize pharmaceutical research by allowing scientists to test new drugs on printed human tissues, significantly reducing the necessity for animal testing and improving the accuracy of clinical trials.

Important Points

• Precision and Customization: One of the primary advantages of 3D bioprinting is its ability to produce anatomically accurate structures tailored to a specific patient's anatomy using MRI or CT scan data.

• Biocompatibility: The materials used at institutions like MSU Vadodara are selected for their biocompatibility, ensuring that the printed tissues do not trigger an immune rejection when integrated with natural biological systems.

• Economic Impact: By localizing the production of bio-printed tissues and scaffolds in India, the technology helps in making advanced healthcare more affordable and accessible.

Q96. Answer: (c) Odisha

The correct answer is Odisha.

Key Points

• The Viksit Krishi Sankalp Abhiyan (VKSA) was officially launched in the state of Odisha in May 2025 to spearhead a new era of agricultural transformation.

• The initiative was inaugurated by the Union Agriculture Minister Shivraj Singh Chouhan, emphasizing the central government's commitment to revitalizing the primary sector in eastern India.

• The primary objective of VKSA is to bridge the gap between scientific research and field application by providing farmers with direct access to high-yield seed varieties and modern agri-technology.

• The program serves as a critical component of the broader Viksit Bharat @2047 vision, aiming to make Indian agriculture globally competitive and climate-resilient.

• Under this abhiyan, special focus is placed on soil health management and the promotion of integrated farming systems to maximize farmer income per acre.

Additional Information

• Agriculture in Odisha:

• Odisha is a significant contributor to India's food basket, particularly in the production of Rice (Paddy), Pulses, and Oilseeds.

• The state has been a pioneer in implementing farmer-centric schemes like KALIA (Krushak Assistance for Livelihood and Income Augmentation), which complements central initiatives.

• With a vast coastal line and diverse agro-climatic zones, the state is increasingly focusing on horticulture and non-paddy crops to diversify rural livelihoods.

• Role of the Union Agriculture Minister:

• Shivraj Singh Chouhan, the Union Minister of Agriculture and Farmers' Welfare, has emphasized the "Six-Pronged Strategy" for agricultural growth, focusing on production, reduction in cost, fair prices (MSP), and diversification.

• His leadership focuses on the Digital Agriculture Mission, which aims to create a unified Agri-Stack to provide seamless services to the farming community.

• Viksit Bharat 2047 Vision:

• This is a roadmap to transform India into a developed nation by the 100th year of Independence.

• In the context of agriculture, it envisions technological self-reliance, elimination of post-harvest losses, and the establishment of robust Food Processing Units near farm gates.

Important Points

• Strategic Focus of VKSA:

• The Viksit Krishi Sankalp Abhiyan utilizes mobile extension units to reach remote villages, ensuring that even small and marginal farmers are aware of Government of India schemes.

• It promotes the use of Nano-Urea and Nano-DAP to reduce the chemical footprint and lower the input costs for the Kisan.

• The scheme also integrates the Agriculture Infrastructure Fund (AIF) to encourage FPOs (Farmer Producer Organizations) to build cold storage and warehousing facilities within the state.

• The launch in Odisha signifies a strategic push towards the Purvodaya initiative, which aims for the holistic development of Eastern India.

Q97. Answer: (b) India

The correct answer is India.

Key Points

• The Union Cabinet, chaired by Prime Minister Narendra Modi, approved the establishment of the International Big Cat Alliance (IBCA) with its permanent headquarters located in India.

• The IBCA was formally launched by the Prime Minister on April 9, 2023, during the 50th-anniversary celebrations of Project Tiger held in Mysuru, Karnataka.

• The Government of India has committed a one-time budgetary support of Rs. 150 crore for a period of five years, spanning from 2023-24 to 2027-28.

• The primary objective of the alliance is to ensure the long-term conservation of seven major big cat species across the globe by creating a common platform for 96 big cat range countries.

• This initiative positions India as a global leader in wildlife conservation, as it is the only country in the world to have the Tiger, Lion, Leopard, Snow Leopard, and Cheetah (reintroduced) in its natural habitats.

Additional Information

• The Seven Big Cats:

• The alliance focuses on the conservation of the Tiger, Lion, Leopard, Snow Leopard, Puma, Jaguar, and Cheetah.

• Out of these seven species, five are currently found in India, making the country a critical stakeholder in global feline conservation.

• Governance Structure:

• The IBCA follows a governance model that includes a General Assembly, a Council, and a Secretariat (which is headquartered in India).

• The Minister for Environment, Forest and Climate Change of India plays a pivotal role in the initial administrative setup of the alliance.

• Membership and Participation:

• Membership is open to 96 range countries that host these big cats, as well as non-range countries, international organizations, and scientific bodies interested in conservation.

• It aims to facilitate knowledge sharing, capacity building, and resource mobilization to mitigate human-wildlife conflict and illegal wildlife trade.

• Conservation Strategies:

• The alliance works on benchmarking conservation practices, eco-tourism development, and financial support for habitat restoration.

• It integrates scientific research with traditional knowledge to ensure sustainable populations of big cats in their respective

ecosystems.

Important Points

• Global Significance: The establishment of IBCA is compared to the International Solar Alliance (ISA), showcasing India's intent to lead multilateral environmental frameworks.

• Project Tiger Legacy: The launch coincided with 50 years of the Project Tiger initiative (started in 1973), which has been hailed as one of the most successful species conservation programs in the world.

• Financial Framework: After the initial five-year grant from India, the IBCA intends to sustain itself through membership fees, contributions from multilateral institutions, and private sector support.

• Geographical Focus: While India is the headquarters, the alliance focuses heavily on regions like Africa, South America, and Central Asia where species like the Jaguar and Snow Leopard face significant threats.

Q98. Answer: (d) Rio de Janeiro

The correct answer is Rio de Janeiro.

Key Points

• The 17th BRICS Summit is scheduled to be held in 2025 under the presidency of Brazil.

• Rio de Janeiro, one of the most prominent cities in Brazil, has been designated as the host city for this major international event in July 2025.

• The BRICS chairmanship follows a rotational system among the founding and primary members: Brazil, Russia, India, China, and South Africa.

• Initially, Brazil was expected to host the 16th Summit in 2024, but due to logistical considerations and its G20 presidency, the order was swapped with Russia, which hosted the 16th Summit in Kazan in October 2024.

• The 2025 summit will be the first BRICS meeting in Brazil following the significant expansion of the bloc that took place in early 2024. Hence, the correct answer is Rio de Janeiro.

Additional Information

• Evolution of BRICS:

• The group was originally conceived as BRIC (Brazil, Russia, India, and China) in 2006.

• The first formal summit took place in Yekaterinburg, Russia, in 2009.

• With the induction of South Africa in 2010, the group was renamed BRICS.

• 2024 Expansion (BRICS+):

• Effective January 1, 2024, the bloc expanded to include Egypt, Ethiopia, Iran, and the United Arab Emirates (UAE).

• This expansion reflects the group's goal of fostering a multipolar world order and increasing the influence of Global South economies.

• Economic Significance:

• The BRICS nations combined represent approximately 45% of the world's population.

• The group accounts for nearly 28% of the global economy and a significant portion of the world's oil production and trade.

• New Development Bank (NDB):

• Established during the 6th BRICS Summit in Fortaleza, Brazil (2014), the NDB serves as an alternative to the World Bank and IMF for infrastructure and sustainable development projects.

• It is headquartered in Shanghai, China.

Important Points

• Host City Profile: Rio de Janeiro is a coastal city in Brazil known for its Copacabana and Ipanema beaches, and it has a long history of hosting major global events, including the 2016 Summer Olympics and the 2024 G20 Summit.

• Summit Objectives: The 17th Summit is expected to focus on strengthening multilateralism, sustainable energy transitions, and reforming international financial institutions to better represent emerging markets.

• Member Roles: Brazil's leadership in 2025 is seen as a pivotal moment for the country to reassert its influence in global diplomacy and economic cooperation within the Atlantic and South American regions.

Q99. Answer: (a) Falcon 2000 LXS Business Executive Jets

The correct answer is Falcon 2000 LXS Business Executive Jets.

Key Points

• Dassault Aviation and Reliance Aerostructure Limited (RAL), through their joint venture Dassault Reliance Aerospace Limited (DRAL), announced a significant expansion of their partnership in June 2025 during the Paris Air Show.

• The agreement outlines the execution of a plan to manufacture the Falcon 2000 LXS Business Executive Jets entirely in India, intended for the Global Market.

• The manufacturing process is slated to reach full scale with the first completed aircraft expected to be ready by the year 2028.

• The production facility is located at the Dhirubhai Ambani Aerospace Park (DAAP) in the Mihan SEZ of Nagpur, Maharashtra.

• This move marks a transition from manufacturing components and sub-assemblies to the Final Assembly Line (FAL) for a complete business jet in India, supporting the Make in India initiative.

Additional Information

• Dassault Aviation: It is a premier French aerospace company that designs and builds military aircraft, such as the Rafale and Mirage, and the Falcon family of business jets. The company has a long-standing relationship with India dating back to the 1950s.

• Dassault Reliance Aerospace Limited (DRAL): This is a Joint Venture established in 2017, where Reliance Aerostructure Limited holds a 51% stake and Dassault Aviation holds 49%. It was initially formed to help fulfill offset obligations related to the 36 Rafale jet deal.

• Falcon 2000 LXS: This specific model is a twin-engine business jet known for its efficiency and capability to land on short runways. It offers a range of approximately 4,000 nautical miles (7,410 km) and can carry up to 10 passengers in a widebody cabin configuration.

• Strategic Significance: By establishing a Final Assembly Line in Nagpur, the project enhances India's aerospace ecosystem, promotes high-skill employment, and positions the country as a competitive exporter in the civil aviation sector.

• Historical Context: Previously, the Nagpur facility was involved in producing cockpit front sections and fuel tanks for the Falcon jets. The 2025 agreement represents the ultimate scale-up to full aircraft integration and flight testing within India.

Important Points

• Paris Air Show: Held at Le Bourget, it is one of the world's oldest and largest aerospace exhibitions, often serving as a venue for major international defense and civilian aviation contracts.

• Atmanirbhar Bharat: This project is a cornerstone for self-reliance in the aerospace and defense sectors, reducing dependency on imported finished aircraft and boosting indigenous manufacturing capabilities.

• Technological Transfer: The agreement involves a high degree of technology transfer from France to India, ensuring that Indian engineers and technicians are trained in world-class aerospace assembly standards.

Q100. Answer: (c) 60%

The correct answer is 60%.

Key Points

• The Reserve Bank of India (RBI), in a notification issued in April 2024, announced a significant revision to the Priority Sector Lending (PSL) targets for Small Finance Banks (SFBs) to bring them on par with universal banks.

• As per the revised guidelines, the overall PSL target for Small Finance Banks, which was previously mandated at 75%, will be reduced in a phased manner. For the financial year 2025–26 (specifically by March 31, 2026), the target has been set at 60% of Adjusted Net Bank Credit (ANBC) or Credit Equivalent of Off-Balance Sheet Exposure (CEOBE), whichever is higher.

• The primary objective of this revision is to provide a level playing field for SFBs and to harmonize their regulatory requirements with those of Universal Banks, which currently have a 40% PSL target.

• Before this revision, Small Finance Banks were required to maintain a much higher threshold of 75% to ensure that credit reached the unserved and underserved sections of the population, including small farmers and micro-units.

• The RBI has implemented a glide path for this transition: the target remains 75% until March 31, 2025; it reduces to 60% by March 31, 2026; and finally reaches 40% by March 31, 2027.

Additional Information

• Priority Sector Lending (PSL): It is a regulatory framework established by the RBI that mandates banks to allocate a specific portion of their Adjusted Net Bank Credit (ANBC) to certain sectors that are considered vital for the inclusive development of the country. These sectors include Agriculture, Micro, Small and Medium Enterprises (MSMEs), Export Credit, Education, Housing, Social Infrastructure, and Renewable Energy.

• Small Finance Banks (SFBs): These are a specific category of banks established to provide financial inclusion to sections of the economy not being served by other banks. They are registered as public limited companies under the Companies Act, 2013 and are governed by the Banking Regulation Act, 1949. Notable examples include AU Small Finance Bank, Equitas Small Finance Bank, and Jana Small Finance Bank.

• ANBC and CEOBE: Adjusted Net Bank Credit (ANBC) represents the total credit provided by a bank after making specific adjustments for bills rediscounted and other prescribed exemptions. Credit Equivalent of Off-Balance Sheet Exposure (CEOBE) refers to the potential credit risk from non-fund-based limits like letters of credit or bank guarantees.

• Regulatory Scope: While the overall target is being reduced, SFBs are still required to focus on their core mission of serving Small and Marginal Farmers and Weaker Sections. The RBI maintains specific sub-targets within the PSL framework to ensure these vulnerable groups continue to receive adequate credit flow.

Important Points

• Eligibility for SFBs: To be eligible for a license, the minimum paid-up voting equity capital for SFBs was initially Rs. 100 crore, which has been increased to Rs. 200 crore in recent guidelines, except for those transitioned from Urban Co-operative Banks.

• The Glide Path Schedule:

• 75%: Applicable up to the end of FY 2024-25.

• 60%: Target for the end of FY 2025-26.

• 40%: Final target to be achieved by the end of FY 2026-27.

• Impact of Revision: This move is expected to improve the profitability and operational flexibility of Small Finance Banks, as they can now diversify their loan portfolios toward higher-yielding non-priority sectors as they grow in size and scale.

• Primary (Urban) Co-operative Banks (UCBs): It is important to note that UCBs are also on a similar glide path to reach a 75% PSL target by March 31, 2026, showing the RBI's efforts to balance different banking tiers according to their specific mandates and risks.

More previous year papers and mock tests: **www.yourmocktest.com/pyq**

YourMockTest.com — Free Study Material