RRB Group D Official Paper (Held On: 08 Dec, 2025 Shift 1) (Previous Year Paper)

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

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GENERAL SCIENCE

Q1. Now a days, which of the following petroleum products is used in place of coal-tar for metalling the roads?

(a) Coke
(b) Paraffin wax
(c) Bitumen
(d) Naphthalene

Q2. Which of the following statements is correct?

(a) Electrons have much smaller mass than protons and neutrons.
(b) The size of the nucleus is large as compared to the size of the atom.
(c) The electrons revolve around the nucleus in triangular paths.
(d) The electrons do not revolve around the nucleus in circular paths.

Q3. A car with a mass of 150 kg is moving at a speed of 36 km/hr. What is the amount of work required to increase its speed to 72 km/hr?

(a) 22,500 J
(b) 37,500 J
(c) 7500 J
(d) 30,000 J

Q4. Which of the following is an enzyme that is secreted in the stomach during the process of digestion?

(a) Mucus
(b) Amylase
(c) Trypsin
(d) Pepsin

Q5. When touching a hot object with the hand, human beings are able to remove their hand immediately because:

(a) every living organism can do so
(b) human beings are more intelligent than others
(c) human beings are sensitive to the stimulus of touch
(d) human beings are the supreme creatures of the living world

Q6. A student cannot clearly see objects placed at a distance but can read a book comfortably. The defect in the eye is:

(a) presbyopia
(b) hypermetropia
(c) myopia
(d) astigmatism

Q7. In which part of the female reproductive system is the egg fertilised by sperm?

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

Q8. What happens in a longitudinal wave?

(a) Particles move in circles around their rest position
(b) Particles oscillate back and forth about their position of rest
(c) Particles stay completely still as the wave passes
(d) Particles oscillate up and down about their mean position

Q9. Bohr's model is only applicable to:

(a) hydrogen
(b) beryllium
(c) lithium
(d) helium

Q10. A block exerts a thrust of 500 N on a surface of area 0.25 m^2. The pressure exerted by the block is _____.

(a) 125 N/m^2
(b) 250 N/m^2
(c) 500 N/m^2
(d) 2000 N/m^2

Q11. In the process of sexual reproduction in flowering plants, what is the primary role of the pistil?

(a) Supports the flower with nutrients
(b) Attracts pollinators with colorful petals
(c) Produces pollen grains
(d) Receives pollen and houses the ovules for fertilisation

Q12. Why does growth in plants occur only at specific regions?

(a) Because all plant cells stop growing after maturity
(b) Because all plant tissues can divide only once
(c) Because meristematic tissues are located only in specific regions
(d) Because permanent tissues keep dividing throughout the plant

Q13. What type of bonding exists in most organic compounds?

(a) Coordinate
(b) Covalent
(c) Ionic
(d) Metallic

Q14. The method of extraction of a metal depends on its:

(a) Mass number
(b) Atomic number
(c) Position in the reactivity series
(d) Colour

Q15. Which non-metal exhibits a lustrous shine like metals?

(a) Flourine
(b) Chlorine
(c) Sulphur
(d) Iodine

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Q16. During the Chlor-Alkali process, which of the following products is NOT obtained directly from the electrolysis of brine?

(a) Chlorine gas at the anode
(b) Sodium hydroxide solution
(c) Sodium metal deposited at the cathode
(d) Hydrogen gas at the cathode

Q17. Which of the following statements is correct about plant's response to environmental stimulus?

(a) Plants have very weak muscles to respond environmental stimulus.
(b) Plants have special connective tissues to receive environmental stimulus.
(c) Some plants can respond to the stimulus of touch.
(d) Plants have very fine nerves to receive environmental stimulus.

Q18. Two objects are being accelerated — one has a mass of 3 kg and is accelerated at 4 m/s², and the other has a mass of 5 kg and is accelerated at 2 m/s². Which one needs a greater force to move?

(a) The 5 kg object
(b) It cannot be determined without knowing the distance
(c) The 3 kg object
(d) Both require the same force

Q19. Which of the following is a common use of baking soda?

(a) Increasing acidity in soil beds
(b) Reacting with alcohol to make soap
(c) Neutralising excess stomach acid
(d) Preventing bacterial decomposition

Q20. Which rule helps determine the direction of the magnetic field inside a current-carrying loop?

(a) Fleming's right-hand rule
(b) Left-hand thumb rule
(c) Right-hand thumb rule
(d) Fleming's left-hand rule

Q21. If you apply pressure to a gas, what happens to the intermolecular spaces and forces?

(a) Intermolecular spaces decrease, intermolecular forces increase.
(b) Both intermolecular spaces and forces remain unchanged.
(c) Intermolecular spaces increase, intermolecular forces decrease.
(d) Intermolecular spaces and forces both increase.

Q22. Which statement is INCORRECT about a household electric circuit?

(a) All appliances are connected in parallel.
(b) A fuse is always connected in the live wire.
(c) Current through each appliance is the same.
(d) A fuse protects the circuit from excessive current.

Q23. White light is incident obliquely on a glass prism, which of the following statement(s) is/are true?

(i) Red colour undergoes maximum deviation.
(ii) The speed of violet colour is the least while travelling through the prism.
(iii) The refractive index of violet is minimum.
(iv) The refractive index of red is minimum.

(a) Both (i) and (iv)
(b) Both (ii) and (iv)
(c) Both (i) and (iii)
(d) Both (ii) and (iii)

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Q24. Which of the following can be considered a reason for Mendel's success in formulating laws of inheritance?

(a) He had supernatural power.
(b) He was a monk.
(c) He had knowledge of mathmatics.
(d) He was a well-trained scientist.

Q25. A gun fires a bullet horizontally. Which of the following statements is correct?

(a) The bullet exerts no force on the gun.
(b) The gun experiences a smaller backward force than the bullet's forward force.
(c) Recoil depends on gravity.
(d) The gun experiences a backward force equal to the forward force on the bullet.

MATHEMATICS

Q26. A child inflates a balloon, increasing its size by 50%. Later, while tying it, the balloon's size decreases by 20%. What is the overall percentage change in the size of the balloon?

(a) 10% (increment)
(b) 20% (decrement)
(c) 20% (increment)
(d) 10% (decrement)

Q27. The diameter of a hemispherical bowl is 11.2 cm. How many litres of liquid can it hold ? (Use $\pi = 22/7$ and round off your answer to three decimal places)

(a) 2.380 litres
(b) 3.168 litres
(c) 0.525 litres
(d) 0.368 litres

Q28. The marks of P are 10 more than the marks of Q. The marks of Q are 10 more than half of the marks of P. The marks of Q are ____.

(a) 20
(b) 30
(c) 36
(d) 40

Q29. In a triangle with sides 12 units, 5 units and 13 units, the perpendiculars are drawn from all vertices. The length of the smallest perpendicular (in units) is:

(a) 73/13
(b) 50/13
(c) 60/13
(d) 40/13

Q30. The average age of 44 students of a class is 34 years. If the age of the teacher is also included, the average age of the whole group becomes 35 years. The age (in years) of the teacher is:

(a) 78
(b) 77
(c) 76
(d) 79

Q31. In 330 litres solution of acid and water, the ratio of acid and water is 1:2. How many litres of acid must be added to it to get the solution in which the ratio of acid and water is 8:5?

(a) 243
(b) 242
(c) 240
(d) 241

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Q32. If $4x/(0.75^2 - 0.25^2) = 0.5$, find the value of x.

(a) 0.0975
(b) 0.03125
(c) 0.0625
(d) 0.125

Q33. One pipe can fill a tank in 10 minutes while another pipe can empty the completely filled tank in 20 minutes. If both the pipes are opened together when the tank is empty, how many minutes will it take to fill one-half of the tank?

(a) 11
(b) 21
(c) 20
(d) 10

Q34. The average of the first 7 odd natural numbers is:

(a) 3.5
(b) 6
(c) 7
(d) 8

Q35. Two trains are moving in opposite directions at speeds of 50 km/hr and 90 km/hr. The length of one train is 430 m. The time taken by them to cross each other is 31 seconds. The length (in m) of the other train, rounded off to 2 decimal places, is:

(a) 786.76
(b) 765.66
(c) 781.49
(d) 775.56

Q36. A man standing on the line joining the feet of two towers of heights 10 m, 15 m observes the top of the towers with the angles of elevation 45° and 60°, respectively. What is the distance (in metres) between the feet of two towers (take $\sqrt{3} = 1.73$)?

(a) 20.25
(b) 15.75
(c) 16.54
(d) 18.67

Q37. The ratio of the present ages of Shreya and her mother is 3 : 5 and the ratio of present ages of her mother and her grandmother is 10 : 13. If the average age of Shreya, her mother and her grandmother is 58 years, then find the present age of her mother.

(a) 36 years
(b) 60 years
(c) 78 years
(d) 84 years

Q38. Pipe P can fill 4/5 part of a tank in 28 hours and pipe Q can fill 2/3 part of the same tank in 42 hours. Both P and Q were kept open for 7 hours, then both were closed. Pipe R alone was then opened and it emptied the water in the tank in 14 hours.

Pipes P, Q and R together can fill the empty tank in:

(a) 53 hours
(b) 45 hours
(c) 64 hours
(d) 26 hours

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Q39. Two numbers are in the ratio 5 : 7. Find the sum of the numbers, if their HCF is 23.

(a) 284
(b) 276
(c) 258
(d) 236

Q40. Simplify: $(4/7)^2 - 1/7 + 1/3.5 + 5\ 2/7$

(a) 5 2/49
(b) 4 1/7
(c) 4 37/49
(d) 5 37/49

Q41. If third proportional of 9 and 60 be x, then what is the value of x?

(a) 400
(b) 401
(c) 398
(d) 402

Q42. The amount on a sum of Rs. 2,500 at 10% per annum compound interest, compounded annually, in 2 years will be:

(a) Rs. 2,895
(b) Rs. 3,714
(c) Rs. 3,025
(d) Rs. 3,623

Q43. Two trains, 133 m and 227 m long, are moving in the same direction at speeds of 93 km/hr and 51 km/hr, respectively. How much time will the faster train take to completely cross the slower one?

(a) 9 seconds
(b) 25 5/7 seconds
(c) 30 6/7 seconds
(d) 18 seconds

Q44. In an election, four candidates received 1242, 832, 1426 and 1100 votes, respectively. The difference between the winning candidate`s votes percentage and runner up candidate vote percentage is:

(a) 3%
(b) 5%
(c) 6%
(d) 4%

Q45. If $x^{(2m)} \times y^5 \times (x^2)/(y^{(m-1)}) = (y^2 x^3)^2$, find the value of m.

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

Q46. A shop that sells towels has offers going on, wherein customers can buy 2 towels and get 3 free. What is the percentage discount that the customer gets?

(a) 65%
(b) 60%
(c) 70%
(d) 55%

Q47. A trader sells a watch at a loss of 28%. If he had sold it for Rs. 280 more, he would have made neither a profit nor a loss. What is the cost price of the watch?

(a) Rs. 1,200
(b) Rs. 1,000

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(c) Rs. 1,400
(d) Rs. 800

Q48. After selling an article at a discount of 37%, the profit percentage obtained is 50%. What is the mark-up percentage (rounded off to two decimal places)?
(a) 138.10%
(b) 140.41%
(c) 136.35%
(d) 140.46%

Q49. A person saves 60% of his income. If his expenditure is Rs. 520, then his income (in Rs.) is:
(a) 1312
(b) 1300
(c) 1208
(d) 1340

Q50. If the radius of a sphere is decreased by 25% and becomes 6 cm, find the decrease in its volume.
(a) 450 1/4 π cm^3
(b) 574 3/4 π cm^3
(c) 662 1/3 π cm^3
(d) 394 2/3 π cm^3

GENERAL INTELLIGENCE & REASONING

Q51. Seven boxes A, B, C, D, I, J and K are kept one over the other but not necessarily in the same order. Only B is kept above I. Only C is kept between I and J. Only A is kept below K. How many boxes are kept between D and A?
(a) One
(b) Three
(c) Four
(d) Two

Q52. O, P, Q, R, W, X, and Y are sitting in a straight line facing the north. No one sits to the left of P. Only four people sit between P and Q. Only three people sit to the right of Y. X sits to the immediate left of R. W is not an immediate neighbour of Y.

Who sits third to the left of W?
(a) Q
(b) Y
(c) R
(d) O

Q53. Refer to the number series given below and answer the question that follows. Counting to be done from left to right only.

(NOTE: All numbers are single-digit numbers only.)

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

How many such even numbers are there each of which is immediately preceded by an odd number and also immediately followed by an odd number?
(a) 4
(b) 5
(c) 3
(d) 2

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Q54. Town U is to the north of Town V. Town W is to the east of Town U. Town X is to the south of Town W. Town Y is to the west of Town X. Town V is to the south-west of Town Y. What is the position of Town U with respect to Town Y?

(a) North-east
(b) North-west
(c) South-east
(d) South-west

Q55. Seven people, A, B, C, D, E, F and G are sitting in a row, facing north.

Only three people sit to the right of C. Only four people sit between A and B, neither of whom sits on the left end. D sits immediately to the left of F. Only three people sit between G and B. How many people sit between F and G?

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

Q56. Select the triad which follows the same pattern as that followed by the two triads given below. Both triads follow the same pattern.

IC-LF-NP

KE-NH-PR

(a) MG-PJ-RT
(b) MG-PJ-RU
(c) NG-PI-RU
(d) NG-PJ-RU

Q57. What should come in place of the question mark (?) in the given series?

3 13 24 36 49 ?

(a) 63
(b) 60
(c) 56
(d) 53

Q58. What should come in place of the question mark (?) in the given series?

191 177 163 149 135 ?

(a) 130
(b) 117
(c) 121
(d) 133

Q59. Refer to the following series and answer the question that follows (all numbers are single digit numbers only). Counting to be done from left to right only.

(Left) 1 8 4 2 8 3 5 1 4 1 5 1 1 9 8 3 5 5 9 4 6 9 6 1 1 9 5 (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) 2
(b) 3
(c) 0
(d) 1

Q60. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘×’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘−’, then what will come in place of the question mark (?) in the following equation?

64 A 8 C 4 B 11 D 3 = ?

(a) 50
(b) 47
(c) 49

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(d) 48

Q61. MU 4 is related to PO −10 in a certain way. In the same way, DL 8 is related to GF −6. To which of the given options is HP 12 related, following the same logic?

(a) NJ 5
(b) KJ −2
(c) UH −4
(d) RT −1

Q62. Each of the digits in the number 8312467 is arranged in ascending order from left to right. What will be the sum of the digits which are second from the left and second from the right in the new number thus formed?

(a) 6
(b) 9
(c) 8
(d) 7

Q63. Select the triad which follows the same pattern as that followed by the two triads given below. Both triads follow the same pattern.

NH-PJ-RT

LF-NH-PR

(a) ID-LF-NO
(b) JD-LF-NO
(c) JD-LF-NP
(d) ID-LE-NO

Q64. Each of the digits in the number 7123458 is arranged in ascending order from left to right. What will be the sum of the digits which are second from the left and second from the right in the new number thus formed? 4367

(a) 11
(b) 6
(c) 9
(d) 8

Q65. In a certain code language, ‘speak the truth’ is coded as ‘pc rd st’ and ‘truth always wins’ is coded as ‘mo st kl’. How is ‘truth’ coded in the given language? 3476

(a) pc
(b) mo
(c) kl
(d) st

Q66. In a certain code language, ‘some good questions’ is coded as ‘jm ik cd’ and ‘many good problems’ is coded as ‘cd rc gh’. How is ‘good’ coded in the given language?

(a) cd
(b) rc
(c) jm
(d) ik

Q67. Refer to the following series and answer the question that follows (all numbers are single digit numbers only). Counting to be done from left to right only.

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

How many such even numbers are there each of which is immediately preceded by an odd number and also immediately followed by an odd number?15230

(a) 7
(b) 8
(c) 9
(d) 6

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Q68. 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/subtracting/multiplying to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(15, 28, 64)

(63, 76, 112)6781

(a) (44, 57, 83)
(b) (82, 95, 132)
(c) (74, 87, 123)
(d) (159, 172, 207)

Q69. 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 is the letter-cluster pair that 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) HD-AF
(b) PL-IM
(c) MI-FK
(d) JF-CH

Q70. 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:

All roads are trucks.

No truck is a sheep.

Conclusions:

(I) Some roads are sheep.

(II) All trucks are sheep.

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

Q71. Himangi starts from Point A and drives 2 km towards the east. She then takes a right turn, drives 7 km, turns left and drives 9 km. She then takes a left turn and drives 3 km. She takes a final left turn, drives 11 km and stops at Point P. How far (shortest distance) and towards which direction should she drive in order to reach Point A again? (All turns are 90 degrees turns only unless specified.)

(a) 4 km towards the south
(b) 3 km towards the west
(c) 3 km towards the east
(d) 4 km towards the north

Q72. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

EWR ASN WOJ SKF ?

(a) OGB
(b) OVB
(c) OBC
(d) OGY

Q73. 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 apples are fruits.

Some fruits are sweet.

Conclusions:

(I) Some apples are sweet.

(II) All sweet are apples.

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

Q74. Refer to the number and symbol series given below and answer the question that follows. Counting to be done from left to right only. (All numbers are single-digit numbers only.)

(Left) 3 @ 2 ^ @ % \ 8 9 \ / ? 8 7 6 # & # + 7 \ (Right)

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

(a) Two
(b) Three
(c) One
(d) None

Q75. 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) QV-SO
(b) OT-QM
(c) MR-OK
(d) SX-UR

Q76. In a certain code language,

A + B means ‘A is the mother of B’,

A – B means ‘A is the father of B’,

A * B means ‘A is the husband of B’, and

A ÷ B means ‘A is the sister of B’.

Based on the above, how is P related to T if ‘P – Q ÷ R * S + T’?

(a) Mother’s Father
(b) Father’s brother
(c) Father’s Father
(d) Father

Q77. What should come in place of the question mark (?) in the given series?

8, 64, 9, 81, 10, 100, 11, 121, ?, 144

(a) 9
(b) 11
(c) 12
(d) 8

Q78. Rajesh ranked 38^(th) from the top and 27^(th) from the bottom in his class. How many students are there in his class?

(a) 64
(b) 65
(c) 63
(d) 62

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Q79. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

LNT 81, PKP 75, THL 69, XEH 63, ?

(a) BBD 57
(b) CAE 57
(c) BAC 55
(d) ACD 55

Q80. A, B, C, R, S, T and U are sitting around a circular table, facing the centre of the table. R is the immediate neighbour of both C and T. T sits third to the left of U. B sits to the immediate left of U. S is not an immediate neighbour of T. Who sits second to the right of A?

(a) S
(b) B
(c) U
(d) C

GENERAL AWARENESS AND CURRENT AFFAIRS

Q81. Which cabinet minister of Inda in June 2025 held bilateral talks with Dong Jun of China at the conclave of the Shanghai Cooperation Organization (SCO) in the Chinese port city of Qingdao, with a focus on maintaining peace and tranquillity along the Line of Actual Control (LAC)?

(a) Gajendra Singh Shekhawat
(b) Amit Shah
(c) Manohar Lal
(d) Raj Nath Singh

Q82. Who announced the launch of India's first homegrown semiconductor chip in May 2025?

(a) Piyush Goyal
(b) Nirmala Sitharaman
(c) Rajeev Chandrasekhar
(d) Ashwini Vaishnaw

Q83. In which sport did Indian athletes secure a mixed relay medal at the 2025 Asian Indoor Games?

(a) Mixed relay
(b) Swimming
(c) Wrestling
(d) Shooting

Q84. Which organ under MHA launched the e-Zero FIR system for cyber-fraud cases?

(a) Central Bureau of Investigation
(b) State Police of India
(c) Cyber Appellate Tribunal
(d) Indian Cyber Crime Coordination Centre (I4C)

Q85. The state government of which of the following states, in September 2025, mandated a child protection policy in all residential schools and hostels?

(a) Karnataka
(b) Andhra Pradesh
(c) Kerala
(d) Tamil Nadu

Q86. Which of the following cities in Gujarat houses the Veer Savarkar Sports Complex, inaugurated by Union Home Minister Amit Shah in September 2025?

(a) Ahmedabad
(b) Surat

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(c) Rajkot
(d) Vadodara

Q87. Which of the following ministries launched the State Health Regulatory Excellence Index (SHRESTH), a first-of-its-kind national initiative to benchmark and strengthen state drug regulatory systems through a transparent, data-driven framework in August 2025?
(a) Ministry of Science and Technology
(b) Ministry of Health and Family Welfare
(c) Ministry of Chemicals and Fertilizers
(d) Ministry of Ayush

Q88. 22 March 2025 marks which important regional day in Bihar?
(a) Bihar Reorganisation Day
(b) Bihar Liberation Day
(c) Bihar Brotherhood Day
(d) Bihar Statehood Day

Q89. Which lake, known as India's longest and a Ramsar site in Kerala is currently facing severe ecological degradation?
(a) Vembanad Lake
(b) Pulicat Lake
(c) Chilika Lake
(d) Loktak Lake

Q90. In 2025, which of the following states emerged as the national leader in mangrove afforestation, covering 19020 hectares in just two years under the Centre's 'MISHTI' scheme, launched in 2023?
(a) Maharashtra
(b) Kerala
(c) Gujarat
(d) Uttar Pradesh

Q91. As per the Union Budget 2025-26, what is the target for nuclear power capacity of India by 2047?
(a) 80GW
(b) 100GW
(c) 150GW
(d) 50GW

Q92. As per the Economic Survey 2024–25, what corpus amount has been launched under the Self-Reliant India (SRI) Fund for MSMEs?
(a) Rs. 25,000 crore
(b) Rs. 75,000 crore
(c) Rs. 1 lakh crore
(d) Rs. 50,000 crore

Q93. Who among the following was elected as the 80th president of United Nations General Assembly (UNGA) in June 2025?
(a) Annalena Baerbock
(b) Dennis Francis
(c) Volkan Bozkır
(d) Phielemon Yang

Q94. The Indian Navy conducted the fifth edition of the Indo-Indonesian Joint Maritime Drill 'Samudra Shakti – 2025' between 14 and 17 October 2025 at _____.
(a) Kochi
(b) Mumbai
(c) Chennai
(d) Visakhapatnam

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Q95. In June 2025, Canada signed a historic defence agreement with which of the following to strengthen cooperation amid global tensions?

(a) European Union
(b) African Union
(c) BRICS
(d) ASEAN

Q96. The ICC Under-19 Women's T20 World Cup 2025 was played in Malaysia in January 2025. Which team won the tournament?

(a) England
(b) South Africa
(c) Australia
(d) India

Q97. What is the sports budget allocation for India for the 2025-26 fiscal year?

(a) Rs. 2,594.30 crore
(b) Rs. 4,394.20 crore
(c) Rs. 3,794.30 crore
(d) Rs. 1,794.30 crore

Q98. What is a distinguishing feature of "Kruti", launched in 2025 by Ola's Krutrim?

(a) It supports voice and text in multiple Indian languages.
(b) It is optimized only for English language interfaces.
(c) It is designed only for navigation services in rural areas.
(d) It works solely with proprietary hardware provided by Ola.

Q99. The new Rs. 20 note announced by the Reserve Bank of India in May 2025 is part of _____.

(a) Mahatma Gandhi (New) Series
(b) Azadi Ka Amrit Mahotsav Series
(c) Gandhi Heritage Series
(d) Mahatma Gandhi (Old) Series

Q100. Where did Neeraj Chopra achieve his national record throw of 90.23 m in 2025?

(a) Tokyo Olympics
(b) Commonwealth Games
(c) Doha Diamond League
(d) World Athletics Championships

ANSWER KEY

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

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SOLUTIONS

Q1. Answer: (c) Bitumen

The correct answer is Bitumen.

Key Points

• Bitumen is widely used as a binder in road construction instead of coal tar due to its superior properties and availability.

• Bitumen is a black, viscous material derived from the distillation of petroleum. It provides excellent binding and waterproofing qualities, essential for road metalling.

• Coal tar was historically used for road construction; however, it was replaced by bitumen because coal tar can emit toxic fumes and is less environmentally friendly.

• Bitumen is more durable and has better resistance to temperature changes and wear and tear, making it ideal for modern road construction.

• It is used in various forms, such as hot mix asphalt, emulsions, and cutbacks, depending on the type of road construction and maintenance required.

Additional Information

• Bitumen Properties:

• Bitumen has high viscosity and adhesive properties, making it an effective binder for aggregates in road construction.

• It is waterproof and provides resistance to moisture, which helps prevent damage to roads during heavy rains.

• Bitumen is flexible and can absorb stress caused by traffic loads and temperature variations.

• Uses of Bitumen:

• Primarily used in road construction as asphalt concrete.

• Used for waterproofing roofs and structures in construction.

• Utilized in paints and coatings for corrosion resistance.

• Comparison with Coal Tar:

• Coal tar is a byproduct of coal processing, whereas bitumen is derived from petroleum.

• Coal tar contains carcinogenic compounds, making it less safe for widespread use.

• Bitumen is more environmentally friendly and widely available compared to coal tar.

• Global Usage:

• Bitumen is extensively used worldwide for paving roads and highways due to its adaptability and cost-effectiveness.

• Countries like the United States, India, and China are among the largest consumers of bitumen for infrastructure development.

Important Points

• Environmental Impact:

• Bitumen is less harmful to the environment compared to coal tar, but it still poses challenges in terms of recycling and disposal.

• Advancements in technology have led to the development of recycled asphalt, which helps in reducing environmental impact.

• Modern Road Construction Techniques:

• Hot mix asphalt is prepared by heating bitumen and aggregates, ensuring better bonding and durability.

• Cold mix asphalt using bitumen emulsions is employed for temporary and low-traffic roads.

• Health and Safety:

• Bitumen is safe for use in construction as long as appropriate handling and safety measures are followed.

• Coal tar usage is strictly regulated in many countries due to its toxicity and carcinogenic properties.

Q2. Answer: (a) Electrons have much smaller mass than protons and neutrons.

The correct answer is Electrons have much smaller mass than protons and neutrons..

Key Points

• Electrons have much smaller mass than protons and neutrons: The mass of an electron is approximately 9.1 × 10^-31 kg, while the mass of a proton or neutron is about 1.67 × 10^-2^7 kg. This means electrons are nearly 2000 times lighter than protons and neutrons. Hence, this statement is correct.

• The size of the nucleus is large as compared to the size of the atom: This statement is incorrect. The nucleus is extremely small compared to the atom. The radius of the nucleus is about 10^-1^5 meters, while the atomic radius is around 10^-1^0 meters. Thus, the atom is much larger than the nucleus.

• The electrons revolve around the nucleus in triangular paths: This is incorrect. According to the Bohr model and later quantum mechanical models, electrons revolve around the nucleus in circular or elliptical paths (Bohr model) or occupy orbitals of different shapes (quantum mechanics). Triangular paths are not scientifically valid.

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• The electrons do not revolve around the nucleus in circular paths: This statement is partially correct. In the quantum mechanical model of atoms, electrons do not revolve in fixed circular paths as described by earlier models like the Bohr model. Instead, they exist in regions called orbitals, which have shapes such as spherical, dumbbell, etc. But in simpler atomic models, circular paths are assumed. Hence, this statement is not entirely correct.

Additional Information

• Structure of an Atom:

• An atom consists of a nucleus (containing protons and neutrons) and electrons that revolve around the nucleus.

• The nucleus is positively charged due to protons, while electrons carry a negative charge.

• Most of the atom's mass is concentrated in the nucleus, while the electrons contribute negligibly to the mass.

• Protons:

• Protons are positively charged particles with a mass of 1.67 × 10^-²^7 kg.

• They determine the atomic number of an element and its chemical properties.

• Neutrons:

• Neutrons are neutral particles with a mass similar to protons (1.67 × 10^-²^7 kg).

• They contribute to the stability of the nucleus and do not carry any charge.

• Electrons:

• Electrons are negatively charged particles with a mass of 9.1 × 10^-³¹ kg.

• They occupy orbitals around the nucleus and are responsible for chemical bonding and reactions.

Important Points

• Bohr Model: The Bohr model proposed that electrons revolve in fixed circular paths called orbits or shells. These orbits have fixed energy levels.

• Quantum Mechanical Model: In modern atomic theory, electrons do not follow fixed paths but exist in regions of probability called orbitals.

• Relative Sizes: The atomic radius is about 10^-¹^0 meters, while the nuclear radius is about 10^-¹^5 meters. This shows that the nucleus is extremely small compared to the atom.

• Charge Distribution: Protons and electrons have equal but opposite charges, making the atom electrically neutral overall.

Q3. Answer: (a) 22,500 J

The correct answer is 22,500 J.

Key Points

• The work required to increase the speed of the car can be calculated using the work-energy theorem, which states that the work done on an object is equal to the change in its kinetic energy.

• The formula for kinetic energy is given as: K.E. = (1/2)mv², where m is the mass of the object and v is its velocity.

• The initial speed of the car is 36 km/hr, which needs to be converted into meters per second: 36 km/hr = 36 × (1000 / 3600) = 10 m/s.

• The final speed of the car is 72 km/hr, which is converted into meters per second: 72 km/hr = 72 × (1000 / 3600) = 20 m/s.

• Using the kinetic energy formula, calculate the initial kinetic energy: K.E. initial = (1/2) × 150 × (10)² = 7500 J.

• Calculate the final kinetic energy: K.E. final = (1/2) × 150 × (20)² = 30,000 J.

• The work done (or energy required) to increase the speed is the difference in kinetic energies: Work = K.E. final - K.E. initial = 30,000 J - 7500 J = 22,500 J.

• Therefore, the correct amount of work required is 22,500 J.

Additional Information

• Kinetic Energy:

• Kinetic energy is the energy possessed by an object due to its motion.

• The formula for kinetic energy is: K.E. = (1/2)mv², where m is the mass and v is the velocity.

• It is measured in joules (J), the SI unit of energy.

• Work-Energy Theorem:

• The work-energy theorem states that the net work done on an object is equal to the change in its kinetic energy.

• This principle is crucial for solving problems involving the relationship between work and energy.

• Conversion of Units:

• Speed is often given in km/hr, but for physics calculations, it must be converted to m/s.

• The conversion factor is: 1 km/hr = (1000 / 3600) m/s.

• Practical Applications:

• Understanding work and energy principles is essential for engineering tasks such as calculating the energy required to accelerate vehicles.

• This concept is also used in designing engines, braking systems, and safety measures in automobiles.

Important Points

• Work:

• Work is the transfer of energy that occurs when a force is applied over a distance.

• Formula: Work = Force × Distance × cos(θ), where θ is the angle between the force and displacement direction.

• Energy Conservation:

• The principle of energy conservation states that energy cannot be created or destroyed but can only be transformed from one form to another.

• In this case, mechanical energy (kinetic energy) is increased by doing work on the car.

• SI Units:

• Energy is measured in joules (J), and 1 joule is equivalent to 1 newton-meter (N·m).

• Speed is measured in meters per second (m/s), and mass is measured in kilograms (kg).

Q4. Answer: (d) Pepsin

The correct answer is Pepsin.

Key Points

• Pepsin is a digestive enzyme that is secreted by the stomach, specifically from the gastric glands located in the lining of the stomach.

• Pepsin is secreted in an inactive form called pepsinogen. Pepsinogen is activated into pepsin by hydrochloric acid (HCl) present in the stomach.

• Function of Pepsin: It plays a critical role in breaking down proteins into smaller peptides during the process of digestion. Proteins are complex molecules, and pepsin facilitates their breakdown into more digestible forms.

• Location: Pepsin activity occurs in the highly acidic environment of the stomach, where the pH is around 1.5-3.5. This acidic condition is essential for its optimal functioning.

• Importance: Pepsin is one of the first enzymes to initiate the digestion of dietary proteins. Without it, protein digestion would be significantly impaired.

Additional Information

• Mucus:

• Mucus is secreted by the stomach lining but it is not an enzyme. It serves as a protective layer to prevent the stomach lining from being damaged by the acidic gastric juice and digestive enzymes.

• Its primary function is protection rather than digestion.

• Amylase:

• Amylase is a carbohydrate-digesting enzyme that is secreted by the salivary glands and pancreas, not the stomach.

• It breaks down starch into simpler sugars like maltose.

• Amylase does not function in the acidic environment of the stomach. It is active in the mouth and small intestine.

• Trypsin:

• Trypsin is a protein-digesting enzyme secreted by the pancreas in an inactive form called trypsinogen.

• It becomes active in the small intestine and aids in further digestion of proteins after pepsin has initiated the process in the stomach.

• It does not play a role in digestion within the stomach.

• Hydrochloric Acid (HCl):

• HCl is secreted by the parietal cells in the stomach lining. It creates an acidic environment that is essential for the activation and functioning of pepsin.

• It helps in killing harmful bacteria present in food and denaturing proteins for easier digestion.

• Protein Digestion:

• The process of protein digestion starts in the stomach with pepsin and is completed in the small intestine with enzymes like trypsin and chymotrypsin.

• The breakdown of proteins is essential for the absorption of amino acids, which are the building blocks for various bodily functions.

Important Points

• Stomach Enzymes: The stomach primarily secretes pepsin for protein digestion, but it also produces other components like mucus and hydrochloric acid for maintaining digestion and protecting the stomach lining.

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• Pepsinogen Activation: The activation of pepsinogen into pepsin is a self-regulating process that ensures enzyme activity occurs only when needed, preventing damage to the stomach lining.

• pH Dependency: Pepsin requires a very low pH to function effectively. This is why the stomach environment is highly acidic, maintained by hydrochloric acid secretion.

• Role in Overall Digestion: While pepsin works in the stomach, other enzymes like amylase and trypsin function in different parts of the digestive system, ensuring comprehensive digestion of food.

Q5. Answer: (c) human beings are sensitive to the stimulus of touch

The correct answer is human beings are sensitive to the stimulus of touch.

Key Points

• Human beings are sensitive to the stimulus of touch: When a person touches a hot object, the sensory neurons present in the skin detect the intense heat. This triggers a reflex action, enabling the individual to withdraw their hand immediately. This sensitivity is due to the complex nervous system and is a fundamental survival mechanism.

• Reflex action: The process of withdrawing the hand occurs through a reflex arc, which is an automatic and quick response to a harmful stimulus. The message is carried by sensory neurons to the spinal cord, which sends a direct signal to motor neurons to remove the hand without involving the brain immediately.

• Role of the nervous system: The nervous system, particularly the peripheral nervous system, plays a critical role in detecting stimuli such as heat, cold, or pain and initiating an appropriate response. The skin contains specialized nerve endings that are highly sensitive to such stimuli.

• Survival mechanism: This ability to sense and react to harmful stimuli such as heat is an evolutionary adaptation. It prevents damage to tissues and helps in survival by avoiding prolonged exposure to harmful conditions.

• Specificity of human sensory response: While many living organisms possess the ability to react to stimuli, the human nervous system is more advanced, allowing for quick and precise responses to protect the body from harm.

Additional Information

• Reflex Arc:

• The reflex arc is the neural pathway that mediates a reflex action. It consists of five components: receptor, sensory neuron, integration center (spinal cord), motor neuron, and effector.

• For example, when a person touches a hot object, the heat stimulates the pain receptors in the skin (receptor), which send a signal via sensory neurons to the spinal cord. The spinal cord processes the signal and sends a response via motor neurons to the muscles (effector), causing the hand to withdraw.

• Types of stimuli: Stimuli can be physical (heat, pressure, touch) or chemical (changes in pH, presence of certain molecules). The human body uses different receptors to detect these stimuli, such as thermoreceptors for heat and nociceptors for pain.

• Comparison with other organisms: Many animals, including insects and reptiles, exhibit reflex actions. However, the human nervous system is more advanced, allowing for faster and more complex responses to stimuli.

• Importance of reflex actions: Reflex actions are crucial for survival as they allow the body to respond to potentially harmful situations without the delay of conscious thought. Examples include blinking to protect the eyes from foreign objects and sneezing to expel irritants from the nose.

• Role of myelin sheath: The myelin sheath covering neurons increases the speed of electrical impulses, ensuring rapid communication between sensory and motor neurons during reflex actions.

Important Points

• Misconceptions about reflexes: Reflex actions do not involve intelligence or conscious thought. They are automatic, involuntary responses controlled by the spinal cord and peripheral nervous system.

• Examples of reflex actions: Common reflexes include the knee-jerk reflex, blinking, coughing, and withdrawing a hand from a hot surface.

• Stimulus detection: Human skin contains specialized sensory structures such as Meissner's corpuscles (for light touch), Pacinian corpuscles (for pressure), and free nerve endings (for pain and temperature).

• Speed of response: Reflex actions occur within milliseconds, making them one of the fastest physiological responses in the human body.

• Neurotransmitters: Chemical messengers such as acetylcholine play a role in transmitting signals between neurons during reflex actions.

Q6. Answer: (c) myopia

The correct answer is Myopia.

Key Points

• Myopia, also known as near-sightedness, is a common vision defect where an individual can see nearby objects clearly but struggles to view distant objects.

• This condition occurs when the eyeball is elongated or the cornea is too curved, causing light rays to focus in front of the retina

instead of directly on it.

• Myopia can be corrected using concave lenses, which help redirect light rays to focus correctly on the retina.

• The primary symptom of myopia is blurry vision for distant objects, while near vision remains unaffected.

• It commonly develops during childhood or adolescence and may worsen with age if not managed properly.

Additional Information

• Presbyopia:

• Presbyopia is an age-related vision defect that typically develops around the age of 40, causing difficulty in focusing on close objects.

• This condition occurs due to the loss of elasticity in the lens of the eye, making it harder to focus on nearby objects.

• Presbyopia is corrected using convex lenses or bifocal lenses.

• Unlike myopia, presbyopia is not caused by the shape of the eyeball but by the natural aging process.

• Hypermetropia:

• Also known as far-sightedness, hypermetropia is a defect where distant objects are seen clearly, but nearby objects appear blurry.

• This occurs when the eyeball is too short or the lens is too flat, causing light rays to focus behind the retina.

• Hypermetropia can be corrected using convex lenses, which help light rays focus directly on the retina.

• It is more common in children and may improve with age as the eyeball grows.

• Astigmatism:

• Astigmatism is a vision defect caused by an irregularly shaped cornea or lens, leading to distorted or blurred vision at all distances.

• This condition causes light rays to focus on multiple points on the retina instead of a single point.

• Astigmatism can be corrected with cylindrical lenses or through surgical procedures like LASIK.

• It can occur in combination with myopia or hypermetropia.

• Important Characteristics of Myopia:

• Myopia is often genetic but can also be influenced by environmental factors such as prolonged near work (e.g., reading or using digital devices).

• It is diagnosed through an eye examination that includes testing visual acuity and refraction.

• Severe cases of myopia, known as high myopia, may increase the risk of complications such as retinal detachment or glaucoma.

• Myopia management strategies, such as orthokeratology lenses or atropine eye drops, are used to slow the progression of the condition in children.

Q7. Answer: (b) Fallopian tube

The correct answer is Fallopian tube.

Key Points

• The Fallopian tube is a part of the female reproductive system, and it is the site where fertilization of the egg (ovum) by the sperm typically occurs.

• The process of fertilization usually happens in the ampulla, which is the widest section of the Fallopian tube.

• The Fallopian tubes play a crucial role in the female reproductive process by transporting the egg from the ovary to the uterus.

• The sperm reaches the Fallopian tube after traveling through the vagina, cervix, and uterus, and fertilizes the egg in the tube.

• If fertilization occurs successfully, the resulting zygote (fertilized egg) travels to the uterus, where it implants in the uterine lining and begins development.

Additional Information

• Key Functions of the Fallopian Tubes:

• The Fallopian tubes are two thin tubes, one on each side of the uterus, that connect the ovaries to the uterus.

• They serve as the pathway for the egg to travel from the ovary to the uterus during ovulation.

• They are lined with small hair-like structures called cilia, which help move the egg toward the uterus.

• In the event of fertilization, the sperm meets the egg in the ampulla of the Fallopian tube.

• Role of Other Reproductive Organs (Incorrect Options):

• Uterus: The uterus is where the fertilized egg implants and develops into a fetus. Fertilization does not occur here.

• Ovary: The ovaries produce and release eggs during ovulation but are not the site of fertilization.

• Vagina: The vagina is the entry point for sperm during intercourse, but fertilization does not occur here.

• Fertilization Process:

• Fertilization occurs when a sperm cell penetrates an egg, resulting in the formation of a zygote.

• The zygote undergoes several cell divisions as it travels through the Fallopian tube to the uterus for implantation.

• If fertilization does not occur, the egg disintegrates and is shed during menstruation.

• Important Points:

• The Fallopian tubes are vital for natural conception. Any damage, blockage, or dysfunction in the tubes can lead to infertility or an ectopic pregnancy (where the fertilized egg implants outside the uterus).

• Conditions like pelvic inflammatory disease (PID) or previous surgeries can affect the health of the Fallopian tubes.

• Egg fertilization in the Fallopian tube is a critical step in the process of reproduction.

Q8. Answer: (b) Particles oscillate back and forth about their position of rest

The correct answer is Particles oscillate back and forth about their position of rest.

Key Points

• A longitudinal wave is a type of wave where the particles of the medium oscillate parallel to the direction of wave propagation.

• The motion of particles involves compression and rarefaction. During compression, particles come closer, and during rarefaction, they move apart.

• This back-and-forth motion happens around the particles' mean (rest) position, creating regions of high and low pressure as the wave passes through the medium.

• Examples of longitudinal waves include sound waves, which travel through air, liquids, or solids by causing the particles in the medium to oscillate.

• Unlike transverse waves, longitudinal waves do not involve motion perpendicular to the direction of wave propagation. This makes the oscillatory motion distinct.

Additional Information

• Characteristics of Longitudinal Waves:

• The displacement of particles is parallel to the direction of energy transfer.

• They require a medium to propagate (e.g., air, water, or solids).

• Regions of compression correspond to areas of high pressure, while rarefactions correspond to areas of low pressure.

• They cannot propagate in a vacuum since they rely on particle interaction.

• Difference Between Longitudinal and Transverse Waves:

• Longitudinal waves: Particles oscillate parallel to the direction of wave travel (e.g., sound waves).

• Transverse waves: Particles oscillate perpendicular to the direction of wave travel (e.g., light waves).

• Longitudinal waves are often represented by pressure variations, while transverse waves are represented by crests and troughs.

• Examples of Longitudinal Waves:

• Sound waves: Produced by vibrating objects, such as vocal cords or musical instruments.

• Seismic P-waves: These are primary waves in earthquakes, traveling through the Earth's interior.

• Ultrasound waves: Used in medical imaging and industrial applications.

• Applications of Longitudinal Waves:

• Communication: Sound waves allow humans and animals to communicate.

• Medical uses: Ultrasound imaging helps in diagnosing internal body conditions.

• Seismology: Longitudinal seismic waves help geologists study the Earth's structure.

• Important Points:

• Sound waves, a common example of longitudinal waves, travel at different speeds in different media. For example, sound travels faster in solids than in air due to the higher particle density in solids.

• The speed of sound in air at room temperature is approximately 343 m/s.

• In longitudinal waves, energy transfer occurs without the permanent displacement of particles in the medium, as they return to their original positions after the wave has passed.

Q9. Answer: (a) hydrogen

The correct answer is hydrogen.

Key Points

• Bohr’s Model is specifically applicable to systems with a single electron, such as the hydrogen atom or hydrogen-like ions (e.g., He^+, Li^(2+)). It cannot accurately describe multi-electron systems.

• The model explains the quantized energy levels of electrons in an atom and is most effective for simpler atomic systems.

• In the case of hydrogen, it has only one electron, making it the ideal candidate for the application of Bohr’s theory.

• The model assumes that electrons travel in fixed circular orbits around the nucleus without radiating energy, which aligns with the behavior of a single-electron system like hydrogen.

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• For multi-electron atoms like beryllium, lithium, or helium, the presence of electron-electron interactions and shielding effects makes Bohr's model insufficient and inaccurate.

Additional Information

• Bohr's Postulates:

• Electrons revolve in specific discrete orbits or energy levels around the nucleus, called stationary states.

• While in these orbits, electrons do not radiate energy. Radiation occurs only when an electron transitions between energy levels.

• The energy difference between two orbits is given by $\Delta E = h\nu$, where h is Planck's constant and ν is the frequency of radiation.

• The angular momentum of an electron in orbit is quantized and defined as $mvr = n(h/2\pi)$, where n is an integer (principal quantum number).

• Hydrogen Atom:

• The hydrogen atom is the simplest atom, containing only one proton in its nucleus and one electron revolving around it.

• Bohr's model successfully explains the spectral lines of hydrogen, such as the Balmer, Lyman, and Paschen series.

• The model calculates the energy levels for hydrogen as $E_n = -13.6/n^2$ eV, where n is the principal quantum number.

• Limitations of Bohr's Model:

• The model cannot describe multi-electron atoms due to electron-electron interactions and the lack of quantum mechanical treatment.

• It fails to account for the Zeeman effect (splitting of spectral lines in a magnetic field) and the Stark effect (splitting in an electric field).

• It does not explain the wave-particle duality of electrons or quantum uncertainty principles.

• Characteristics of Other Options:

• Beryllium: A multi-electron atom with atomic number 4. The presence of four electrons makes Bohr's model insufficient to explain its atomic behavior.

• Lithium: A three-electron system. Bohr's model cannot describe the complex interactions within this atom.

• Helium: Although it has only two electrons, the electron-electron repulsion invalidates Bohr's assumptions.

Q10. Answer: (d) 2000 N/m ²

The correct answer is 2000 N/m².

Key Points

• The formula for calculating pressure is: Pressure = Force / Area.

• In the given problem, the block exerts a force (thrust) of 500 N on a surface with an area of 0.25 m².

• Using the formula: Pressure = 500 N / 0.25 m².

• The result is: Pressure = 2000 N/m².

• Hence, the pressure exerted by the block is 2000 N/m².

Additional Information

• Definition of Pressure:

• Pressure is defined as the force applied per unit area on a surface in a direction perpendicular to that surface.

• It is expressed in the SI unit Pascal (Pa), where 1 Pascal = 1 N/m².

• Formula for Pressure:

• The formula is: Pressure (P) = Force (F) / Area (A).

• Here, Force (F) is measured in Newtons (N), and Area (A) is measured in square meters (m²).

• Applications of Pressure:

• Industrial Use: Pressure is critical in designing machines like hydraulic presses, vacuum pumps, and aerodynamics of airplanes.

• Medical Use: Blood pressure measurement is essential for diagnosing health conditions.

• Environmental Studies: Atmospheric pressure plays a significant role in weather prediction and climate studies.

• Factors Affecting Pressure:

• Pressure increases with an increase in the force applied.

• Pressure decreases with an increase in the surface area over which the force is distributed.

Important Points

• Unit of Pressure: The SI unit is Pascal (Pa). Other units include bar, atm (atmosphere), mmHg (millimeters of mercury), and psi (pounds per square inch).

• Hydrostatic Pressure: It is the pressure exerted by a fluid at rest, depending on the fluid's density, gravitational force, and depth.

• Example of Pressure in Daily Life:

• Car Tires: Proper air pressure ensures smooth driving and safety.

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• Sharp Objects: Knives and needles exert more pressure due to their small surface area, making them effective for cutting or piercing.

• Hydraulics: Hydraulic brakes in cars work on the principle of pressure.

Q11. Answer: (d) Receives pollen and houses the ovules for fertilisation

The correct answer is Receives pollen and houses the ovules for fertilisation.

Key Points

• The pistil is the female reproductive part of a flowering plant. It consists of three main structures: the stigma, style, and ovary, each of which plays a crucial role in reproduction.

• The stigma, located at the top of the pistil, is sticky and serves as the site where pollen grains are received.

• The style is the tube-like structure that connects the stigma to the ovary. It facilitates the movement of the pollen tube down to the ovary for fertilisation.

• Inside the ovary are ovules, which house the female gametes. After successful fertilisation, these ovules develop into seeds.

• The primary role of the pistil is to enable fertilisation by providing a structure for the pollen to reach the ovules, ensuring the development of seeds and fruits.

Additional Information

• Functions of the Pistil:

• Receiving Pollen: The stigma is specially adapted to trap and hold pollen grains for fertilisation.

• Facilitating Fertilisation: The style provides a pathway for the pollen tube to grow and reach the ovary.

• Seed Formation: Post-fertilisation, the ovules in the ovary develop into seeds, and the ovary matures into fruit.

• Role of Other Flower Structures:

• Petals: Brightly coloured to attract pollinators like bees and butterflies.

• Sepals: Protect the flower bud before it blooms.

• Stamens: Male reproductive parts that produce and release pollen grains.

• Pollination:

• Self-pollination: Pollen from the anther of a flower lands on the stigma of the same flower or another flower on the same plant.

• Cross-pollination: Pollen is transferred from the anther of one plant's flower to the stigma of another plant's flower, increasing genetic diversity.

• Examples of Flowering Plants:

• Monocots: Maize, rice, wheat (single cotyledon).

• Dicots: Rose, sunflower, mango (two cotyledons).

Important Points

• Stigma Adaptations: The stigma can be sticky or feathery, depending on whether the plant relies on insect or wind pollination.

• Pollination Agents: Pollination can occur through biotic agents like insects and birds or abiotic agents like wind and water.

• Fertilisation Process: After the pollen tube reaches the ovule, sperm cells are released, and one of them fuses with the egg cell to form a zygote.

• Seed Dispersal: Post-fertilisation, seeds are dispersed via wind, water, animals, or mechanical means to ensure plant propagation.

Q12. Answer: (c) Because meristematic tissues are located only in specific regions

The correct answer is Because meristematic tissues are located only in specific regions..

Key Points

• Meristematic tissues are specialized tissues in plants that are responsible for growth. These tissues have the ability to divide actively and are found in specific regions like the tips of roots and shoots, as well as in the cambium.

• Growth in plants is localized because meristematic tissues are restricted to certain areas, such as the apical meristem (found at the tips of roots and shoots), lateral meristem (responsible for secondary growth), and intercalary meristem (found at nodes).

• Plant cells in permanent tissues lose their ability to divide and differentiate, which limits growth to regions where meristematic tissues are present.

• The meristematic cells are characterized by their ability to continuously divide, small size, dense cytoplasm, and lack of vacuoles, ensuring constant growth in specific regions of the plant body.

• Unlike animals, plants exhibit indeterminate growth, meaning they continue to grow throughout their lifetime, but this growth occurs only in areas with meristematic tissues.

Additional Information

• Types of Meristematic Tissues:

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• Apical Meristem: Found at the tips of roots and shoots, it is responsible for primary growth, increasing the length of the plant.

• Lateral Meristem: Located along the sides of stems and roots, it facilitates secondary growth, increasing the thickness of the plant.

• Intercalary Meristem: Found at the base of leaves or internodes, it helps in the elongation of specific parts like grass stems.

• Permanent Tissues:

• Permanent tissues, such as parenchyma, collenchyma, and sclerenchyma, are derived from meristematic tissues but lose their ability to divide after differentiation.

• These tissues perform various functions like storage, support, and protection, but do not contribute to growth.

• Key Differences Between Meristematic and Permanent Tissues:

• Meristematic tissues: Actively dividing, found in specific regions, small cells, dense cytoplasm, no vacuoles.

• Permanent tissues: Non-dividing, widely distributed, larger cells, vacuoles present, specialized functions.

• Plant Growth Characteristics:

• Plants exhibit indeterminate growth due to the presence of meristematic tissues that allow continuous division.

• Growth is influenced by environmental factors like water, nutrients, and sunlight.

• Applications of Meristematic Tissues:

• Used in plant tissue culture for cloning plants.

• Essential for repairing damage to plants (e.g., when branches or roots are pruned).

• Facilitates breeding of new varieties of crops through controlled growth.

Important Points

• Option 1: "Because all plant cells stop growing after maturity" – This is incorrect because only permanent cells stop dividing, while meristematic cells continue growing.

• Option 2: "Because all plant tissues can divide only once" – This is incorrect as meristematic tissues divide continuously.

• Option 3: "Because meristematic tissues are located only in specific regions" – This is correct, as growth occurs only in areas with meristematic tissues.

• Option 4: "Because permanent tissues keep dividing throughout the plant" – This is incorrect, as permanent tissues do not divide after differentiation.

Q13. Answer: (b) Covalent

The correct answer is Covalent.

Key Points

• Covalent bonding is the primary type of bonding in most organic compounds. It involves the sharing of electrons between atoms to form stable molecules.

• Organic compounds are primarily composed of carbon (C), hydrogen (H), oxygen (O), nitrogen (N), and other nonmetals. These elements tend to form covalent bonds because of their electronegativity and need to complete their valence shell.

• Covalent bonds allow the formation of complex molecular structures, such as chains, rings, and branches, which are characteristic of organic compounds.

• Examples of organic compounds with covalent bonding include methane (CH_4), ethanol (C_2H_5OH), and glucose ($C_6H_{12}O_6$).

• Single, double, and triple covalent bonds are common in organic molecules, depending on the number of electrons shared between atoms.

Additional Information

• Coordinate Bonding:

• A coordinate bond involves one atom donating a pair of electrons to another atom. It is often seen in complexes or inorganic compounds, such as in ammonia-boron trifluoride (NH_3-BF_3).

• Organic compounds rarely exhibit coordinate bonding, except in specific cases involving metal-organic complexes.

• Ionic Bonding:

• Ionic bonding occurs when electrons are transferred from one atom to another, resulting in oppositely charged ions. This is typical in compounds like NaCl and MgO.

• Organic compounds rarely exhibit ionic bonding. However, ionic interactions may occur in salts of organic acids or bases, such as sodium acetate (CH_3COONa).

• Metallic Bonding:

• Metallic bonding is present in metals where valence electrons form a "sea of electrons" around positive metal ions. This type of bonding is responsible for properties like conductivity and malleability in metals.

• Organic compounds do not exhibit metallic bonding as they are composed of nonmetals.

• Examples of Organic Molecules:

• Hydrocarbons: Methane (CH4), Ethene (C2H4), Ethyne (C2H2).

• Functional Groups: Alcohols (C2H5OH), Aldehydes (HCHO), and Ketones (CH3COCH3).

• Biomolecules: Glucose (C6H12O6), Amino Acids, and Lipids.

Important Points

• Nature of Organic Compounds: Organic chemistry deals with compounds containing carbon. Carbon's ability to form four covalent bonds makes it uniquely suited for creating diverse and complex molecular structures.

• Types of Covalent Bonds: Organic molecules may contain single bonds (alkanes), double bonds (alkenes), or triple bonds (alkynes). These bonds significantly influence the chemical properties and reactivity of the molecules.

• Applications of Organic Compounds: Organic compounds are used in pharmaceuticals, polymers, fuels, and agriculture. For example, ethanol serves as a solvent and fuel, while glucose is vital for biological energy.

• Functional Groups: Functional groups like -OH (hydroxyl), -COOH (carboxyl), and -NH2 (amino) confer specific properties to organic molecules, enabling a wide range of applications in chemistry and biology.

• Importance of Covalent Bonding: Covalent bonds allow the creation of stable and versatile molecules necessary for life and various industries. The ability of carbon to form covalent bonds is the foundation of organic chemistry.

Q14. Answer: (c) Position in the reactivity series

The correct answer is Position in the reactivity series.

Key Points

• The method of extraction of a metal is primarily determined by its position in the reactivity series, which categorizes metals based on their chemical reactivity.

• Metals low in the reactivity series, such as gold and silver, are often found in their native state and require minimal extraction processes like physical separation or amalgamation.

• Metals in the middle of the reactivity series, like zinc and iron, are usually found in the form of oxides, sulfides, or carbonates. These metals are extracted using processes like reduction with carbon or carbon monoxide in a blast furnace.

• Highly reactive metals such as sodium, potassium, and aluminum, found at the top of the reactivity series, are extracted using electrolysis. These metals form very stable compounds, and electrolysis is necessary to break these bonds.

• The reactivity series provides a systematic way to predict how metals react with water, acids, and other substances, which directly influences the extraction method.

Additional Information

• Reactivity Series:

• The reactivity series is a list of metals arranged in order of decreasing reactivity.

• Highly reactive metals like potassium, sodium, and calcium are at the top, while gold and platinum, which are unreactive, are at the bottom.

• The series helps determine whether a metal can displace another metal from its compound, which is crucial in choosing the right extraction method.

• Extraction Processes:

• Electrolysis: Used for highly reactive metals like aluminum, where electricity breaks down compounds into their elements.

• Reduction with carbon: Used for moderately reactive metals like iron. The metal oxide is reduced to the metal by heating with carbon.

• Physical methods: For less reactive metals like gold, where methods like panning or amalgamation are sufficient.

• Examples of Metals:

• Sodium and Potassium: Extracted using electrolysis due to their high reactivity.

• Zinc and Iron: Extracted using reduction with carbon or carbon monoxide.

• Gold and Silver: Found in native form and extracted using physical methods.

• Applications of Reactivity Series:

• Predicting the outcome of displacement reactions.

• Identifying suitable methods for metal extraction.

• Understanding the corrosion behavior of metals.

Important Points

• Mass Number: The mass number of a metal is unrelated to its extraction process. It refers to the sum of protons and neutrons in an atom.

• Atomic Number: The atomic number, which indicates the number of protons in the nucleus, is also not directly related to the extraction method.

• Colour: The color of a metal does not influence its extraction technique. It is a physical property unrelated to chemical reactivity.

• Reactivity Series: This is the primary determinant of the extraction process, as it reflects the chemical stability of the metal

compounds.

Q15. Answer: (d) Iodine

The correct answer is Iodine.

Key Points

• Iodine is a non-metal that exhibits a lustrous shine, similar to metals, when observed in its crystalline form. This unique property distinguishes it from other non-metals.

• The lustrous appearance of iodine is due to its ability to reflect light efficiently, which is a property generally associated with metals.

• Iodine exists as a dark gray or purplish-black solid under standard conditions and sublimates (changes directly from solid to gas) into a violet gas when heated, another notable characteristic.

• Unlike other non-metals like fluorine, chlorine, and sulfur, iodine displays metallic-like luster, making it an exception among non-metals. Fluorine and chlorine are gases, while sulfur is a dull yellow solid.

• Iodine is used in various applications, including the production of iodized salt, medical disinfectants, and in photography, due to its unique physical and chemical properties.

Additional Information

• Fluorine:

• Fluorine (F) is the most reactive and electronegative element of the periodic table.

• It is a pale yellow gas under standard conditions and is used in the production of fluorinated compounds like Teflon and refrigerants.

• Fluorine does not exhibit any metallic properties such as luster.

• Chlorine:

• Chlorine (Cl) is a greenish-yellow gas with a strong, pungent odor.

• It is widely used as a disinfectant in water treatment and in the production of PVC (polyvinyl chloride).

• Chlorine lacks the metallic luster found in iodine.

• Sulfur:

• Sulfur (S) is a bright yellow, brittle solid under normal conditions.

• It is used in the production of sulfuric acid, vulcanization of rubber, and as a fungicide.

• Sulfur does not exhibit a metallic shine; instead, it has a dull, non-lustrous appearance.

• Iodine:

• Iodine (I) is a halogen and is unique among non-metals for its lustrous, metallic appearance.

• It sublimates into a violet gas upon heating and is used in various industries, including healthcare (as an antiseptic) and nutrition (in iodized salt).

• Iodine is also crucial for thyroid health, as it is a key component of thyroid hormones.

Important Points

• The periodic table categorizes elements into metals, non-metals, and metalloids based on their physical and chemical properties.

• Non-metals generally lack properties like luster, conductivity, and malleability, which are characteristic of metals. However, iodine is an exception due to its metallic luster.

• Halogens (Group 17 elements), such as fluorine, chlorine, bromine, and iodine, share certain chemical properties but differ significantly in their physical states and appearances.

• Iodine's unique properties make it valuable in both industrial and biological applications, such as in the synthesis of drugs and as a tracer in medical diagnostics.

Q16. Answer: (c) Sodium metal deposited at the cathode

The correct answer is Sodium metal deposited at the cathode.

Key Points

• The Chlor-Alkali process involves the electrolysis of brine (a concentrated solution of sodium chloride, NaCl).

• During the process:

• Chlorine gas is released at the anode due to the oxidation of chloride ions (Cl^-).

• Hydrogen gas is produced at the cathode by the reduction of water molecules (H2O).

• Sodium hydroxide (NaOH) is formed as a by-product and remains in the solution.

• Sodium metal is not deposited at the cathode because water is reduced preferentially over sodium ions due to its lower reduction potential.

• The products obtained directly from the process are chlorine gas, hydrogen gas, and sodium hydroxide.

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• Hence, sodium metal is not obtained directly in the Chlor-Alkali process.

Additional Information

• Chlor-Alkali Process:

• The process is an industrial method for the production of chlorine (Cl2), hydrogen (H2), and sodium hydroxide (NaOH).

• The reaction occurs in an electrolytic cell where brine (NaCl solution) is subjected to electrolysis.

• The key reactions are:

• At the anode: 2Cl^- → Cl2 (gas) + 2e^-

• At the cathode: 2H2O + 2e^- → H2 (gas) + 2OH^-

• Reasons Sodium Metal is Not Produced:

• The reduction potential of sodium ions (Na^+) is lower than that of water, meaning water is more easily reduced to hydrogen gas.

• As a result, hydrogen gas is liberated at the cathode instead of sodium metal.

• Applications of the Products:

• Chlorine: Used in water purification, production of PVC, and manufacturing of bleaching agents.

• Hydrogen: Used as a fuel, in ammonia production, and in hydrogenation reactions.

• Sodium hydroxide: Used in soap-making, textiles, paper industries, and as a strong chemical base in laboratories.

• Environmental Concerns:

• The process can lead to the release of harmful chlorine gas into the environment if not properly managed.

• Energy consumption in the electrolytic process is a significant concern in terms of sustainability.

Important Points

• The Chlor-Alkali process is typically conducted in three types of cells: diaphragm cell, mercury cell, and membrane cell.

• Among these, the membrane cell is considered the most environmentally friendly as it prevents mercury pollution and reduces energy consumption.

• The brine used in the process must be purified to prevent the formation of unwanted by-products and to protect the cell components.

• Safety measures are crucial in handling chlorine gas, as it is toxic and can cause respiratory issues if inhaled in large quantities.

Q17. Answer: (c) Some plants can respond to the stimulus of touch.

The correct answer is Some plants can respond to the stimulus of touch..

Key Points

• Plants exhibit response to stimuli through movements called tropisms or nastic movements. One of the most well-known examples is the response to touch, known as thigmonasty.

• The classic example of this is the Touch-Me-Not plant (Mimosa pudica). When touched, its leaves fold and droop due to changes in turgor pressure in the cells.

• Unlike animals, plants lack muscles and nervous systems. Their responses are driven by biochemical and physiological changes.

• Some plants also exhibit touch-sensitive responses for survival purposes, such as trapping insects. For instance, the Venus flytrap closes its lobes upon sensing prey via hair-like structures.

• Thigmotropism is another form of touch response, where plants like climbing vines use tendrils to wrap around supporting structures.

Additional Information

• Explanation of Incorrect Options:

• Option 1: Plants do not have muscles. Their movements are driven by biochemical changes such as the flow of water (turgor pressure) or growth responses regulated by plant hormones, making this statement incorrect.

• Option 2: Plants lack connective tissues like those found in animals. Instead, they rely on specialized cells and structures to detect and respond to environmental stimuli, making this statement incorrect.

• Option 4: Plants do not have nerves. Their responses are not mediated by a nervous system but by chemical signaling and growth regulators, making this statement incorrect.

• Types of Plant Movements:

• Tropisms: Directional growth movements in response to stimuli (e.g., phototropism, gravitropism).

• Nastic Movements: Non-directional movements, such as the folding of Mimosa pudica leaves.

• Role of Plant Hormones:

• Auxins: Regulate growth in response to light and gravity.

• Ethylene: Plays a role in leaf abscission and ripening.

• Abscisic Acid: Helps plants respond to stress, such as drought.

• Examples of Plant Responses:

• Phototropism: Growth towards light.

• Geotropism: Growth in response to gravity.

• Thigmotropism: Growth influenced by touch (e.g., tendrils wrapping around a support).

• Applications in Agriculture: Understanding plant responses to stimuli aids in techniques like controlled irrigation, plant growth regulators, and crop improvement.

Important Points

• Thigmonasty: The rapid folding of leaves in Mimosa pudica is caused by a loss of water pressure in specific cells (pulvinus region).

• Venus Flytrap: Its snap-trap mechanism is triggered by hair-like sensors inside the lobes, which signal the plant to close when prey is detected.

• Plant Hormone Studies: Research on auxins and gibberellins has led to advancements in agriculture, such as increasing fruit size and promoting flowering.

• Environmental Adaptations: Touch-sensitive plants can deter herbivores or enhance nutrient acquisition by trapping insects.

Q18. Answer: (c) The 3 kg object

The correct answer is Option 3: The 3 kg object.

Key Points

• To determine the force required to move an object, we use Newton's Second Law of Motion, which states: Force (F) = Mass (m) × Acceleration (a).

• For the 3 kg object, the acceleration is given as 4 m/s². Hence, the force required is: F = 3 × 4 = 12 N.

• For the 5 kg object, the acceleration is given as 2 m/s². Thus, the force required is: F = 5 × 2 = 10 N.

• Comparing the two forces, the 3 kg object requires a greater force (12 N) than the 5 kg object (10 N).

• Hence, the correct answer is Option 3: The 3 kg object.

Additional Information

• Newton's Second Law of Motion:

• It states that the force acting on an object is equal to the rate of change of its momentum.

• In its simplest form, the formula is F = m × a, where F is the force, m is the mass, and a is the acceleration.

• This law is fundamental in understanding the dynamics of objects in motion.

• Acceleration:

• It is the rate of change of velocity of an object over time, measured in m/s².

• Higher acceleration requires greater force when mass is constant.

• Mass:

• Mass is the measure of the amount of matter in an object, expressed in kilograms (kg).

• Objects with greater mass generally require more force to achieve the same acceleration.

• Relationship between Force, Mass, and Acceleration:

• The relationship is linear: increasing either mass or acceleration increases the required force.

• This principle is used in various applications, such as designing vehicles and machinery.

Important Points

• Force is a vector quantity: It has both magnitude and direction. The direction of the force determines the direction of acceleration.

• Units of Force: The SI unit of force is the Newton (N), defined as the force required to accelerate a 1 kg mass by 1 m/s².

• Applications of Newton's Second Law: This law is widely applied in mechanics, aerospace, automotive industries, and various engineering fields.

• Practical Implications: This principle explains phenomena like rocket propulsion, vehicle acceleration, and the functioning of machines.

Q19. Answer: (c) Neutralising excess stomach acid

The correct answer is Neutralising excess stomach acid.

Key Points

• Baking soda, chemically known as sodium bicarbonate (NaHCO3), is commonly used as an antacid to neutralize excess stomach acid. This property makes it effective in relieving conditions like acid reflux, heartburn, and indigestion.

• When consumed, baking soda reacts with hydrochloric acid (HCl) in the stomach to produce sodium chloride (NaCl), water (H2O), and carbon dioxide (CO2). This reaction helps reduce acidity levels, providing relief from discomfort.

• The reaction is as follows: NaHCO3 + HCl → NaCl + H2O + CO2. The release of carbon dioxide may lead to burping, which

helps alleviate pressure in the digestive system.

• This use of baking soda is temporary and should be done in moderation as excessive use can lead to metabolic alkalosis, a condition caused by an imbalance in the body's pH levels.

• Baking soda is widely accessible and is often a part of home remedies for mild gastrointestinal discomfort.

Additional Information

• Other Uses of Baking Soda:

• Cleaning Agent: Baking soda is widely used as an abrasive cleaning agent. It is effective in removing stains, deodorizing surfaces, and cleaning kitchen appliances.

• Cooking and Baking: In culinary applications, baking soda acts as a leavening agent. It reacts with acidic ingredients like vinegar or lemon juice to produce carbon dioxide, which helps dough rise.

• Personal Care: Baking soda is used in toothpaste formulations to whiten teeth and as a natural deodorant to neutralize body odor.

• Pest Control: It is sometimes used to deter pests like ants and cockroaches by disrupting their physiological processes.

• Option Analysis:

• Option 1: Increasing acidity in soil beds – Baking soda is alkaline in nature and is not used to increase acidity. Instead, it may be used to reduce soil acidity in small quantities. This option is incorrect.

• Option 2: Reacting with alcohol to make soap – Soap making involves the use of strong alkalis like sodium hydroxide (NaOH), not sodium bicarbonate. This option is incorrect.

• Option 4: Preventing bacterial decomposition – Baking soda does not directly prevent bacterial decomposition. However, its alkaline nature may create conditions unfavorable for bacterial growth. This option is misleading.

• Option 5: (No statement provided) – This option is not applicable. This option is invalid.

• Important Considerations:

• While baking soda is safe for occasional use as an antacid, overuse can lead to side effects such as nausea, bloating, or electrolyte imbalances.

• It is not recommended for individuals with certain medical conditions like high blood pressure or kidney disease due to its sodium content.

• Always consult a healthcare professional before using baking soda as a remedy for stomach issues, especially for long-term use.

Q20. Answer: (c) Right-hand thumb rule

The correct answer is Right-hand thumb rule.

Key Points

• The Right-hand thumb rule is used to determine the direction of the magnetic field generated inside a current-carrying loop or conductor.

• According to the rule, if you curl the fingers of your right hand around the loop in the direction of the current, the extended thumb points in the direction of the magnetic field.

• This rule is essential for understanding the relationship between the current flow and the magnetic field in systems such as solenoids or circular loops.

• The magnetic field inside a current-carrying loop forms concentric circles, and the direction can be visualized easily using this rule.

• Applications: The rule is widely used in analyzing electromagnetic devices like motors, generators, and inductors, where current and magnetic field interactions are critical.

Additional Information

• Fleming’s Right-hand Rule:

• This rule helps determine the direction of induced current when a conductor moves in a magnetic field.

• It is used in applications like electric generators and explains the generation of electricity through electromagnetic induction.

• The thumb represents the direction of motion, the first finger indicates the magnetic field, and the middle finger shows the induced current.

• Fleming’s Left-hand Rule:

• This rule determines the direction of force experienced by a current-carrying conductor in a magnetic field.

• The thumb represents the force, the first finger represents the magnetic field, and the middle finger represents the current.

• It is used in applications like electric motors, where the interaction of current and magnetic field produces motion.

• Left-hand Thumb Rule:

• This rule is used to determine the direction of the magnetic field around a straight current-carrying conductor.

• If you hold the conductor in your left hand with your thumb pointing in the direction of the current, your curled fingers indicate the direction of the magnetic field.

• Applications of Magnetic Field Rules:

• These rules are extensively applied in electromagnetic systems, including solenoids, transformers, and inductors, to analyze the behavior of magnetic fields and currents.

• They are also used in engineering and physics for designing electric machinery and studying electromagnetic waves.

Important Points

• Magnetic Field Characteristics:

• The magnetic field strength depends on the amount of current and the distance from the conductor.

• Inside a solenoid, the magnetic field lines are nearly parallel, indicating a uniform magnetic field.

• The direction of the magnetic field is crucial in determining the polarity and function of electromagnetic devices.

• Right-hand Thumb Rule Applications:

• Used in studying magnetic flux and its interactions in various devices.

• Helps visualize the magnetic field lines and their orientation for designing circuits and analyzing electromagnetic fields.

Q21. Answer: (a) Intermolecular spaces decrease, intermolecular forces increase.

The correct answer is Intermolecular spaces decrease, intermolecular forces increase.

Key Points

• When pressure is applied to a gas, the particles are forced closer together, resulting in a decrease in intermolecular spaces.

• As the gas particles are compressed, the distance between molecules decreases, which increases the frequency of collisions between them.

• With reduced intermolecular spaces, the intermolecular forces become stronger as the particles are brought closer to one another.

• This phenomenon aligns with the principles of Boyle's Law, which states that the pressure of a gas is inversely proportional to its volume at constant temperature. Hence, option 1 is correct.

• Increasing pressure on gases is commonly observed in systems like compressed gas cylinders, where molecules are densely packed due to high pressure.

Additional Information

• Intermolecular Spaces:

• Intermolecular spaces refer to the distance between molecules in a substance. Gases have the largest intermolecular spaces compared to liquids and solids.

• When pressure is applied, the gas particles are compressed, significantly reducing these spaces.

• For example, in a balloon, the gas molecules have more room to move freely when deflated but are compressed when inflated.

• Intermolecular Forces:

• Intermolecular forces are the forces of attraction or repulsion between molecules.

• In gases, these forces are relatively weak due to large distances between molecules.

• When pressure is applied, these forces strengthen due to reduced intermolecular spaces.

• Example: In liquefied gases, such as LPG (Liquefied Petroleum Gas), high pressure causes the gas to condense, increasing intermolecular forces.

• Boyle's Law:

• Boyle's Law states that at constant temperature, the volume of a gas is inversely proportional to the pressure exerted on it.

• Mathematically expressed as $P \times V = \text{constant}$, where P is pressure and V is volume.

• When pressure increases, the gas volume decreases, causing particles to come closer, thus reducing intermolecular spaces and increasing intermolecular forces.

• Applications of Gas Compression:

• Compressed Gas Cylinders: Used in industries for welding, medical oxygen, and chemical processing.

• Refrigeration Systems: Pressure changes in gases are utilized for cooling and condensation in refrigerators and air conditioners.

• Aerosol Cans: High pressure keeps the substance in the liquid state until released as a spray.

Important Points

• Option 2: Both intermolecular spaces and forces remain unchanged is incorrect because pressure directly affects these properties in gases.

• Option 3: Intermolecular spaces increase, intermolecular forces decrease is incorrect because pressure decreases spaces and increases forces.

• Option 4: Intermolecular spaces and forces both increase is incorrect as these properties are inversely related under compression.

• Real-Life Example: Compression of gases into liquids, such as in LPG, demonstrates the effect of pressure on intermolecular

spaces and forces.

Q22. Answer: (c) Current through each appliance is the same.

The correct answer is Current through each appliance is the same..

Key Points

• All appliances are connected in parallel: In household electric circuits, appliances are connected in parallel. This ensures that each appliance receives the same voltage as the main supply, and they can operate independently without affecting one another. This statement is correct.

• A fuse is always connected in the live wire: The fuse is a safety device that is connected to the live wire to protect the circuit from excessive current. It breaks the circuit when the current exceeds the safe limit. This statement is correct.

• Current through each appliance is the same: This statement is incorrect. In a parallel connection, the current through each appliance depends on its resistance or power rating. The total current in the circuit is the sum of the currents through all individual appliances.

• A fuse protects the circuit from excessive current: The primary function of a fuse is to protect the circuit by breaking the connection when the current exceeds the rated capacity. This prevents damage to appliances and reduces fire hazards. This statement is correct.

Additional Information

• Parallel Connection:

• In a parallel connection, all appliances are connected across the same voltage source.

• This allows each appliance to operate independently, so switching off one device does not affect the others.

• For example, in a household circuit, the fan, lights, and refrigerator are all connected in parallel.

• Fuse:

• A fuse is a low-resistance device that acts as a protective element in the circuit.

• When the current exceeds the rated value, the fuse wire melts, breaking the circuit and preventing damage.

• It is always connected in the live wire to disconnect the appliance from the high potential source.

• Current in a Parallel Circuit:

• The current in a parallel circuit is divided among the branches based on the resistance of each branch.

• Appliances with lower resistance draw more current, while those with higher resistance draw less current.

• The total current in the circuit is the sum of the currents in all branches.

• Voltage in a Parallel Circuit:

• All appliances connected in parallel have the same voltage as the source.

• This ensures that each appliance functions as intended, regardless of its position in the circuit.

Important Points

• Household Electric Circuits:

• Operate on alternating current (AC) with a typical voltage of 220-240V in many countries like India.

• The circuits are designed to distribute power efficiently and safely to various appliances in the house.

• Safety Devices:

• Devices like circuit breakers and Residual Current Devices (RCDs) are also used alongside fuses to enhance safety.

• These devices automatically disconnect the circuit in case of overload, short circuit, or leakage current.

• Power Distribution:

• In a parallel circuit, power is distributed among appliances based on their individual power ratings.

• For instance, high-power devices like air conditioners draw more current compared to low-power devices like LED lights.

Q23. Answer: (b) Both (ii) and (iv)

The correct answer is Both (ii) and (iv).

Key Points

• Statement (i): Red colour undergoes maximum deviation.

This statement is incorrect. Red light undergoes the least deviation because it has the longest wavelength among visible light, and deviation is inversely proportional to the wavelength in a prism.

• Statement (ii): The speed of violet colour is the least while travelling through the prism.

This statement is correct. Violet light has the shortest wavelength and thus experiences the maximum interaction with the prism material, leading to its speed being the slowest.

• Statement (iii): The refractive index of violet is minimum.

This statement is incorrect. The refractive index of a material is higher for shorter wavelengths. Since violet has the shortest

wavelength, its refractive index is the highest.

• Statement (iv): The refractive index of red is minimum.

This statement is correct. Red light, having the longest wavelength, has the lowest refractive index as it interacts least with the prism material.

• In a glass prism, due to the phenomenon of dispersion, white light splits into its constituent colours (VIBGYOR). Each colour bends differently because of varying refractive indices, and violet deviates the most while red deviates the least.

Additional Information

• Dispersion of Light:

• Dispersion occurs when white light passes through a prism and splits into its constituent colours due to variation in refractive indices for different wavelengths.

• The order of colours observed is Violet, Indigo, Blue, Green, Yellow, Orange, and Red (VIBGYOR).

• Refractive Index and Wavelength:

• The refractive index of a medium is inversely proportional to the wavelength of light.

• Shorter wavelengths (e.g., violet) have higher refractive indices, causing more deviation.

• Longer wavelengths (e.g., red) have lower refractive indices, causing less deviation.

• Prism and Deviation:

• A prism bends light due to the phenomenon of refraction.

• The angle of deviation depends on the wavelength of light and the material of the prism.

• Violet light, being of shorter wavelength, deviates the most, while red light deviates the least.

• Applications of Dispersion:

• Dispersion helps in the formation of rainbows when sunlight passes through water droplets.

• Prisms are used in spectrometers to study the spectrum of light.

• Important Values:

• The refractive index of glass is typically higher for violet (around 1.53) and lower for red (around 1.51).

• The speed of light in a material is given by: v = c/n, where c is the speed of light in a vacuum, and n is the refractive index.

Important Points

• Wavelength and Colour:

• The wavelength of violet light is approximately 400 nm, whereas red light has a wavelength of around 700 nm.

• The difference in wavelength leads to different speeds and refractive indices for various colours in a medium.

• Deviation and Spectrum:

• Deviation in a prism is caused by the change in speed of light as it enters and exits the prism.

• The visible spectrum observed after dispersion provides insights into the properties of light and the material of the prism.

Q24. Answer: (c) He had knowledge of mathmatics.

The correct answer is He had knowledge of mathematics..

Key Points

• Gregor Johann Mendel, known as the "Father of Genetics," successfully formulated the laws of inheritance by applying his knowledge of mathematics and probability to biology, which was a groundbreaking approach during his time.

• His use of statistical methods in analyzing the inheritance patterns of traits in pea plants provided a quantitative foundation for his conclusions, making his work highly reliable.

• Mendel conducted controlled experiments, such as cross-pollination of pea plants, and meticulously recorded data over multiple generations, demonstrating his analytical and mathematical prowess.

• He applied the principles of ratios and probability to predict and explain the occurrence of dominant and recessive traits, which later formed the basis of Mendel's laws: the Law of Segregation and the Law of Independent Assortment.

• While Mendel was a monk and not a formally trained scientist, his knowledge of mathematics was instrumental in ensuring the accuracy and reproducibility of his experiments, highlighting the importance of interdisciplinary knowledge in scientific discoveries.

Additional Information

• Gregor Mendel’s Background:

• Mendel was born in 1822 in Heinzendorf, Austria (modern-day Czech Republic) and joined a monastery in 1843.

• While at the monastery, he studied mathematics and natural sciences at the University of Vienna, which greatly influenced his scientific approach.

• Pea Plant Experiments:

• Mendel chose pea plants (Pisum sativum) for his experiments because they have distinct traits (e.g., flower color, seed shape) and can be easily controlled for cross-pollination.

• He studied seven traits, each with two contrasting forms, such as tall vs. short plants and round vs. wrinkled seeds.

• Mendel’s Laws of Inheritance:

• Law of Segregation: Alleles (gene variants) separate during gamete formation, and each gamete receives one allele.

• Law of Independent Assortment: Genes for different traits assort independently during gamete formation, provided they are not linked.

• Rediscovery of Mendel’s Work:

• Mendel’s research was largely ignored during his lifetime. His work was rediscovered in 1900 by three scientists: Hugo de Vries, Carl Correns, and Erich von Tschermak.

• Today, Mendel’s principles are the foundation of modern genetics, including fields like molecular biology and genetic engineering.

• Importance of Mathematics in Biology:

• Mendel’s use of mathematics demonstrated the potential of quantitative methods in biology, paving the way for biostatistics and computational biology.

• His statistical approach enabled accurate predictions of trait inheritance, which remain fundamental to understanding genetic probabilities.

Important Points

• Option 1: He had supernatural power: This is incorrect. Mendel’s success was due to his scientific methodology and mathematical analysis, not any supernatural ability.

• Option 2: He was a monk: While Mendel was a monk, this fact was incidental and not the reason for his scientific success.

• Option 3: He had knowledge of mathematics: This is the correct answer, as Mendel’s application of mathematical principles was pivotal in formulating the laws of inheritance.

• Option 4: He was a well-trained scientist: Although Mendel studied sciences, he was not formally recognized as a trained scientist during his time.

Q25. Answer: (d) The gun experiences a backward force equal to the forward force on the bullet.

The correct answer is The gun experiences a backward force equal to the forward force on the bullet..

Key Points

• Newton’s Third Law of Motion: According to Newton’s third law, for every action, there is an equal and opposite reaction. When the gun fires a bullet, the bullet moves forward with a certain force, and the gun experiences an equal and opposite force backward. Hence, this statement is correct.

• Recoil of the Gun: The backward movement of the gun is called recoil. This happens because the gun experiences a backward force equal to the forward force exerted on the bullet.

• Momentum Conservation: The firing of the bullet is an example of the law of conservation of momentum. Initially, the total momentum of the system (gun + bullet) is zero. After firing, the forward momentum of the bullet is equal in magnitude and opposite in direction to the backward momentum of the gun. This ensures the total momentum remains conserved.

• Force Exerted on Gun and Bullet: The force exerted on the bullet by the gun is equal in magnitude to the force exerted on the gun by the bullet, as per Newton's third law. Hence, statement 4 is correct.

• Irrelevance of Gravity: Recoil is a result of forces acting within the system (gun and bullet) and is independent of external factors like gravity. Hence, the statement "Recoil depends on gravity" is incorrect.

Additional Information

• Newton’s Third Law of Motion:

• It states that if an object A exerts a force on object B, then object B simultaneously exerts a force of equal magnitude and in the opposite direction on object A.

• This principle underlies many physical interactions, including the recoil of guns, the propulsion of rockets, and even walking, where the feet push against the ground.

• Conservation of Momentum:

• The law of conservation of momentum states that the total momentum of a closed system remains constant, provided no external forces act on it.

• In the case of a gun firing a bullet, the forward momentum of the bullet is balanced by the backward momentum of the gun to conserve the total momentum of the system.

• Recoil Velocity:

• The recoil velocity of the gun can be calculated using the formula:

$v_g = -(m_b \times v_b) / m_g$

where v_g is the gun's recoil velocity, m_b is the bullet's mass, v_b is the bullet's velocity, and m_g is the gun's mass.

• This formula shows that the heavier the gun, the smaller the recoil velocity for a given bullet momentum.

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• Applications of Newton’s Third Law:

• Rocket Propulsion: Rockets work on the principle of Newton’s third law. The ejected gases exert a backward force, and the rocket moves forward due to the equal and opposite reaction force.

• Firearms: The recoil experienced when a gun is fired is a direct consequence of Newton’s third law.

• Swimming: When a swimmer pushes water backward with their hands, the water exerts an equal and opposite force, propelling them forward.

Important Points

• Incorrect Statements in the Question:

• “The bullet exerts no force on the gun”: Incorrect because the bullet exerts an equal and opposite force on the gun as per Newton's third law.

• “The gun experiences a smaller backward force”: Incorrect because the gun experiences a force equal in magnitude to the bullet’s forward force.

• “Recoil depends on gravity”: Incorrect because recoil is an internal force within the system and is not influenced by gravity.

Q26. Answer: (c) 20% (increment)

Shortcut Trick

Apply the successive percentage change formula: a + b + (a × b)/100

Where a = +50% (increase) and b = −20% (decrease).

Net Change = 50 − 20 + (50 × (−20))/100

Net Change = 30 − 10 = +20%

Therefore The correct answer is 20% (increment).

Alternate Method

Given: Initial increase = 50%, Subsequent decrease = 20%.

Formula: Final Value = Initial Value × (1 + r1/100) × (1 − r2/100)

=> Let the initial size of the balloon be 100 units.

=> Size after 50% increase = 100 + (50% of 100) = 150 units.

=> Size after 20% decrease = 150 − (20% of 150) = 150 − 30 = 120 units.

=> Overall Change = 120 − 100 = 20 units.

=> Percentage Change = (20/100) × 100 = 20%.

Therefore The correct answer is 20% (increment).

Additional Information

Successive Percentage Formula

For two successive changes of x% and y%, the effective change is [x + y + (xy/100)]%. Use positive for increase and negative for decrease.

Fraction Method

Convert percentages to fractions: 50% = 1/2 (Ratio 2 → 3) and 20% = 1/5 (Ratio 5 → 4). Final ratio = (2×5) : (3×4) = 10 : 12, which is a 20% increase.

Net Percentage Change

If the result of the calculation is positive, it indicates an increment; if negative, it indicates a decrement.

Q27. Answer: (d) 0.368 litres

Shortcut Trick

Radius (r) = 11.2 ÷ 2 = 5.6 cm.

Volume = (2/3) × (22/7) × $(5.6)^3$ ≈ 367.957 cm^3.

Capacity in litres = 367.957 ÷ 1000 ≈ 0.368 litres.

Therefore The correct answer is 0.368 litres.

Alternate Method

Given:

=> Diameter of the hemispherical bowl (d) = 11.2 cm

=> Radius (r) = d ÷ 2 = 11.2 ÷ 2 = 5.6 cm

Formula Used:

=> Volume of a hemisphere = (2/3) × π × r^3

=> 1000 cm^3 = 1 litre

Calculations:

=> Volume = (2/3) × (22/7) × $(5.6)^3$

=> Volume = (2/3) × (22/7) × 175.616

=> Volume = (44 × 175.616) ÷ 21

=> Volume = 7727.104 ÷ 21 ≈ 367.95733 cm^3

=> Capacity in litres = 367.95733 ÷ 1000

=> Capacity ≈ 0.367957 litres

=> Rounding off to three decimal places ≈ 0.368 litres

Therefore The correct answer is 0.368 litres.

Additional Information

Volume of a Sphere

The volume of a full sphere is exactly double that of a hemisphere, given by V = (4/3) × π × r^3.

Surface Area of Hemisphere

The Curved Surface Area (CSA) is $2\pi r^2$ and the Total Surface Area (TSA) including the flat base is $3\pi r^2$.

Metric Conversions

Standard liquid volume conversion: 1 litre = 1000 cm^3 = 1000 ml. Also, 1 m^3 = 1000 litres.

Q28. Answer: (b) 30

Shortcut Trick

Let P be the marks of P.

From the first statement, Q = P − 10.

Substitute this into the second statement: P − 10 = 10 + P/2.

P/2 = 20 => P = 40 marks.

Q = 40 − 10 = 30 marks.

Therefore The correct answer is 30.

Alternate Method

Given:

P = Q + 10 ... (i)

Q = (P / 2) + 10 ... (ii)

Calculations:

Substitute the value of P from equation (i) into equation (ii):

=> Q = [(Q + 10) / 2] + 10

=> Q = (Q / 2) + 5 + 10

=> Q − (Q / 2) = 15

=> Q / 2 = 15

=> Q = 15 × 2

=> Q = 30

Therefore The correct answer is 30.

Additional Information

Linear Equations in Two Variables

A system of equations like ax + by = c can be solved using substitution, elimination, or cross-multiplication methods.

Ratio and Proportion

If the marks were given in ratios, the marks of P and Q would satisfy P/Q = k, which is useful in comparison-based word problems.

Q29. Answer: (c) 60/13

Shortcut Trick

Identify the triangle: $5^2 + 12^2 = 13^2$, so it is a right-angled triangle.

The three perpendiculars (altitudes) are the two legs (5 and 12) and the altitude to the hypotenuse.

Altitude to hypotenuse = (Product of Legs) ÷ Hypotenuse = (5 × 12) ÷ 13 = 60/13.

Since 60/13 (≈ 4.61) < 5 < 12, the smallest perpendicular is 60/13.

Therefore The correct answer is 60/13 units.

Alternate Method

Given: Side lengths are 5 units, 12 units, and 13 units.

Formula Used: Area of Triangle = 1/2 × Base × Height | Altitude = (2 × Area) ÷ Corresponding Side

=> First, check if it is a right-angled triangle: $5^2 + 12^2 = 25 + 144 = 169 = 13^2$.

=> Area of the triangle = 1/2 × 5 × 12 = 30 sq. units.

=> Perpendicular from vertex A to side BC (5 units) = 12 units.

=> Perpendicular from vertex C to side AB (12 units) = 5 units.

=> Perpendicular from vertex B to hypotenuse AC (13 units) = p.

=> 1/2 × 13 × p = 30 => p = 60/13 units.

=> Comparing the three lengths: 12, 5, and 60/13 (≈ 4.615). The smallest is 60/13.

Therefore The correct answer is 60/13 units.

Additional Information

Altitudes in a Right Triangle

In a right triangle, the two legs are themselves the altitudes to each other. The third altitude is drawn from the right-angle vertex to the hypotenuse.

Smallest Altitude Property

In any triangle, the shortest altitude is always the one drawn to the longest side.

Altitude to Hypotenuse Formula

For a right triangle with legs a and b and hypotenuse c, the altitude to the hypotenuse is h = (a × b) ÷ c.

Q30. Answer: (d) 79

Shortcut Trick

Age of new person = New Average + (Initial Number of persons × Change in Average)

Change in Average = 35 − 34 = 1 year

Initial Number of students = 44

Teacher's age = 35 + (44 × 1) = 35 + 44 = 79 years

Therefore The correct answer is 79 years.

Alternate Method

Given:

Number of students = 44 | Initial Average = 34 years

New Average (including teacher) = 35 years

Formula Used:

Average = Sum of all observations ÷ Total number of observations

Sum of ages = Average × Number of persons

Calculations:

=> Total sum of ages of 44 students = 44 × 34 = 1496 years

=> Total number of members (students + teacher) = 44 + 1 = 45

=> Total sum of ages of 45 members = 45 × 35 = 1575 years

=> Age of the teacher = Total sum with teacher − Total sum of students

=> Age of the teacher = 1575 − 1496 = 79 years

Therefore The correct answer is 79 years.

Additional Information

Net Deviation Method

The sum of deviations from the average is always zero. If the average increases, the new value added must be greater than the previous average by the total increase distributed over all members.

Weighted Average Formula

Combined Average = (n1 × A1 + n2 × A2) ÷ (n1 + n2). This is useful when groups of different sizes and averages are merged.

Average Property

If every number in a data set is increased by a constant 'k', the average also increases by 'k'.

Q31. Answer: (b) 242

Shortcut Trick

Initial Ratio (Acid : Water) = 1 : 2

Final Ratio (Acid : Water) = 8 : 5

Equate Water parts (multiply initial by 5 and final by 2): Initial = 5 : 10, Final = 16 : 10

Total initial units = 5 + 10 = 15 units → 330 litres Therefore 1 unit = 22 litres

Acid added = 16 − 5 = 11 units → 11 × 22 = 242 litres

Therefore The correct answer is 242 litres.

Alternate Method

Given: Total solution = 330 litres, Initial ratio = 1:2, Target ratio = 8:5.

=> Initial Acid = 330 × (1/3) = 110 litres

=> Initial Water = 330 × (2/3) = 220 litres

=> Let x litres of Acid be added.

=> New Acid / New Water = 8 / 5

=> (110 + x) / 220 = 8 / 5

=> 5 × (110 + x) = 8 × 220

=> 550 + 5x = 1760

=> 5x = 1210

=> x = 242

Therefore The correct answer is 242 litres.

Additional Information

Concept of Constant Quantity

In problems where only one component is added or removed, the quantity of the other component remains constant. Focus on equating the non-changing part.

Ratio Balancing

To balance ratios A:B and C:D when B is constant, find the LCM of B and D to make them equal across both ratios.

Percentage to Ratio

Mixture problems often use percentages; convert them to ratios for faster calculation (e.g., 20% acid means Acid:Water = 20:80 = 1:4).

Q32. Answer: (c) 0.0625

Given:

$4x \div (0.75^2 - 0.25^2) = 0.5$

Formula Used:

$a^2 - b^2 = (a - b) \times (a + b)$

Calculation:

=> $0.75^2 - 0.25^2 = (0.75 - 0.25) \times (0.75 + 0.25)$

=> $= 0.5 \times 1 = 0.5$

=> $4x \div 0.5 = 0.5$

=> $4x = 0.5 \times 0.5$

=> $4x = 0.25$

=> $x = 0.25 \div 4$

=> $x = 0.0625$

Therefore The correct answer is 0.0625.

Q33. Answer: (d) 10

Shortcut Trick

Net efficiency for filling the tank = (1/10) − (1/20) = 1/20 unit/min.

Time to fill the full tank = 20 minutes.

Time to fill one-half of the tank = 20 ÷ 2 = 10 minutes.

Therefore The correct answer is 10 minutes.

Alternate Method

Given: Filling pipe (P1) = 10 min, Emptying pipe (P2) = 20 min.

Formula: Total Work = LCM of time taken; Efficiency = Total Work ÷ Time.

Pipe	Time (min)	Total Capacity (LCM)	Efficiency
P1 (Fill)	10	20 units	+2

P2 (Empty)	20	−1	

=> Net efficiency of both pipes = 2 − 1 = 1 unit/min.
=> Target volume (one-half tank) = 20 ÷ 2 = 10 units.
=> Time required = Target volume ÷ Net efficiency = 10 ÷ 1 = 10 minutes.
Therefore The correct answer is 10 minutes.
Additional Information
Pipes and Cisterns Efficiency
Filling pipes have positive efficiency whereas emptying pipes (leakage) have negative efficiency in calculations.
Shortcut for Two Pipes
If one pipe fills in 'x' and another empties in 'y', net time to fill is (x × y) ÷ (y − x) for the full tank.
Partial Filling
Time taken to fill 'k' fraction of a tank = k × (Total time to fill the full tank).

Q34. Answer: (c) 7

Shortcut Trick
The average of the first n odd natural numbers is always equal to n.
In this question, we need the average of the first 7 odd numbers.
Therefore n = 7
Average = 7
Therefore The correct answer is 7.
Alternate Method
Given: First 7 odd natural numbers.
Formula Used: Average = (Sum of all observations) ÷ (Total number of observations)
The first 7 odd natural numbers are: 1, 3, 5, 7, 9, 11, 13
=> Sum = 1 + 3 + 5 + 7 + 9 + 11 + 13 = 49
=> Total Numbers = 7
=> Average = 49 ÷ 7
=> Average = 7
Therefore The correct answer is 7.
Additional Information
Sum of Odd Numbers
The sum of the first n odd natural numbers is given by the formula n^2.
Average of Even Numbers
The average of the first n even natural numbers is always (n + 1).
Arithmetic Progression Property
For any series in A.P. (like odd/even numbers), the Average is always the Middle Term if the number of terms is odd.

Q35. Answer: (d) 775.56

Shortcut Trick
Relative Speed in opposite directions = 50 + 90 = 140 km/hr.
Convert Speed to m/s: 140 × (5/18) = 700/18 m/s.
Total Distance (L1 + L2) = Speed × Time = (700/18) × 31 = 21700/18 = 1205.555... m.
L2 = 1205.56 − 430 = 775.56 m.
Therefore The correct answer is 775.56 m.
Alternate Method
Given: Speed1 = 50 km/hr, Speed2 = 90 km/hr, Length1 = 430 m, Time = 31 s.
Formula Used: Distance = Relative Speed × Time; Speed in m/s = Speed in km/hr × (5/18).
=> Relative Speed = 50 + 90 = 140 km/hr
=> Relative Speed (m/s) = 140 × (5/18) = 38.888... m/s
=> Total Distance (L1 + L2) = 38.888... × 31
=> 430 + L2 = 1205.555...

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=> L2 = 1205.56 − 430

=> L2 = 775.56 m

Therefore The correct answer is 775.56 m.

Additional Information

Relative Speed Concept

When two objects move in opposite directions, relative speed = S1 + S2. If moving in the same direction, relative speed = |S1 − S2|.

Unit Conversion

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

Train Crossing Case

When a train crosses another train, the total distance covered is the sum of the lengths of both trains (L1 + L2).

Q36. Answer: (d) 18.67

Shortcut Trick

For elevation 45°, distance = height × cot(45°) = 10 × 1 = 10 m.

For elevation 60°, distance = height × cot(60°) = 15 ÷ √3 = 15 ÷ 1.732 ≈ 8.67 m.

Total distance between feet = 10 + 8.67 = 18.67 m.

Therefore The correct answer is 18.67 m.

Alternate Method

Given: Height of first tower (h1) = 10 m, angle (θ1) = 45°. Height of second tower (h2) = 15 m, angle (θ2) = 60°.

Formula Used: tan(θ) = Perpendicular ÷ Base

=> For first tower: tan(45°) = 10 ÷ x

=> 1 = 10 ÷ x => x = 10 m

=> For second tower: tan(60°) = 15 ÷ y

=> √3 = 15 ÷ y

=> y = 15 ÷ 1.73 = 8.6705 m

=> Total Distance = x + y = 10 + 8.67

=> Total Distance = 18.67 m

Therefore The correct answer is 18.67 m.

Additional Information

Trigonometric Ratios in Heights and Distances

Commonly used values: tan(30°) = 1/√3, tan(45°) = 1, tan(60°) = √3.

Angle of Elevation vs Depression

Angle of elevation is measured looking up from the horizontal, while angle of depression is measured looking down. Numerically, they are equal for the same line of sight due to alternate interior angles.

Q37. Answer: (b) 60 years

Shortcut Trick

Ratio of Shreya : Mother = 3 : 5 (or 6 : 10)

Ratio of Mother : Grandmother = 10 : 13

Combined Ratio = 6 : 10 : 13 | Sum of ratios = 6 + 10 + 13 = 29 units

Total age = Average × 3 = 58 × 3 = 174 years

1 unit = 174 ÷ 29 = 6 years | Mother (10 units) = 10 × 6 = 60 years

Therefore The correct answer is 60 years.

Alternate Method

Given: Present age ratio S : M = 3 : 5 and M : G = 10 : 13. Average age = 58 years.

Formula Used: Combined Ratio; Total Age = Average × Number of persons.

=> Ratio of Shreya (S) : Mother (M) = 3 : 5

=> Ratio of Mother (M) : Grandmother (G) = 10 : 13

=> Equating M in both: S : M : G = (3×2) : (5×2) : 13 = 6 : 10 : 13

=> Total age = 58 × 3 = 174 years

=> 6x + 10x + 13x = 174

=> 29x = 174

=> x = 6

=> Mother's age = 10 × 6 = 60 years

Therefore The correct answer is 60 years.

Additional Information

Combined Ratio Rule

If A:B = x:y and B:C = p:q, then A:B:C is calculated by making the common term B equal in both ratios.

Average Age Concept

Average = Sum of observations ÷ Number of observations. To find the sum, multiply the average by the count of people.

Ratio-Unitary Method

Total quantity = (Sum of ratio parts) × Value of 1 unit. This is the fastest way to solve age-based problems.

Q38. Answer: (b) 45 hours

Shortcut Trick

Full filling time for Pipe P = 28 × (5/4) = 35 hours.

Full filling time for Pipe Q = 42 × (3/2) = 63 hours.

LCM of 35 and 63 is 315 units (Total Work). Efficiencies: P = 9, Q = 5.

Work by (P+Q) in 7 hrs = (9+5) × 7 = 98 units. Pipe R empties 98 units in 14 hrs => Efficiency of R = −7.

Combined efficiency (P+Q+R) = 9 + 5 − 7 = 7. Time = 315 ÷ 7 = 45 hours.

Therefore The correct answer is 45 hr.

Alternate Method

Given: P fills 4/5 part in 28 hr; Q fills 2/3 part in 42 hr; R empties the filled portion in 14 hr.

Person	Days	Total Work	Efficiency
Pipe P	35 hr	315 units	9
Pipe Q	63 hr	5	

=> Full time for P = 28 ÷ (4/5) = 35 hr.

=> Full time for Q = 42 ÷ (2/3) = 63 hr.

=> In 7 hours, portion filled by P and Q = 7 × (9 + 5) = 98 units.

=> Efficiency of Pipe R (Emptying) = 98 units ÷ 14 hr = 7 units/hr (negative).

=> Net efficiency of (P + Q + R) = 9 + 5 − 7 = 7 units/hr.

=> Time required to fill the tank = Total Work ÷ Net Efficiency = 315 ÷ 7 = 45 hours.

Therefore The correct answer is 45 hr.

Additional Information

Pipes & Cisterns Efficiency

Filling pipes have positive efficiency, while outlet/leakage pipes (like Pipe R) have negative efficiency.

Fractional Work to Total Time

If 1/x part is done in t hours, the total time to complete the work is t × x hours.

Combined Work Formula

Total Time = (Total Capacity) ÷ (Sum of Efficiencies). For emptying pipes, subtract the efficiency.

Q39. Answer: (b) 276

Shortcut Trick

Ratio of numbers = 5 : 7

Sum of ratio parts = 5 + 7 = 12 units

Sum of numbers = (Sum of ratio parts) × HCF

Sum = 12 × 23 = 276

Therefore The correct answer is 276.

Alternate Method

Given:

Ratio of two numbers = 5 : 7

Highest Common Factor (HCF) = 23

Formula Used:

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If numbers are in ratio a : b, then numbers are ax and bx, where x is the HCF.
Calculations:
=> Let the numbers be 5x and 7x.
=> Since 5 and 7 are co-prime, their HCF is x.
=> x = 23
=> First number = 5 × 23 = 115
=> Second number = 7 × 23 = 161
=> Sum of numbers = 115 + 161
=> Sum = 276
Therefore The correct answer is 276.
Additional Information
Relationship between LCM and HCF
For two numbers A and B: Product of numbers (A × B) = HCF × LCM.
LCM of Numbers in Ratio
If two numbers are in ratio a : b and their HCF is x, then their LCM = a × b × x.
Co-prime Numbers
Two numbers are co-prime if their HCF is 1. In any ratio a : b reduced to its simplest form, a and b are always co-prime.

Q40. Answer: (d) 5 37/49

Given:
$(4/7)^2$ - 1/7 + 1/3.5 + 52/7
Concept Used:
BODMAS rule
Calculation:
$(4/7)^2$ - 1/7 + 1/3.5 + 52/7
=> 16/49 - 1/7 + 1/3.5 + 52/7
=> 16/49 - 7/49 + 1/3.5 + 52/7
=> 9/49 + 1/3.5 + 52/7
=> 9/49 + 2/7 + 52/7
=> 9/49 + 14/49 + 52/7
=> 23/49 + 52/7
=> 23/49 + 5 + 2/7
=> 23/49 + 14/49 + 5
=> 37/49 + 5
=> (245 + 37)/49
=> 282/49
=> 5 37/49
Therefore The correct answer is 5 37/49

Q41. Answer: (a) 400

Shortcut Trick
If third proportional of a and b is x, then $x = b^2 \div a$.
Here, a = 9 and b = 60.
x = (60 × 60) ÷ 9
x = 3600 ÷ 9 = 400
Therefore The correct answer is 400.
Alternate Method
Given: First number (a) = 9, Second number (b) = 60, Third proportional = x
Formula Used: In a continued proportion a : b :: b : x, the product of extremes equals the product of means.
=> 9 ÷ 60 = 60 ÷ x
=> 9 × x = 60 × 60
=> 9x = 3600

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=> x = 3600 ÷ 9
=> x = 400
Therefore The correct answer is 400.
Additional Information
Mean Proportional
The mean proportional between two numbers a and b is given by √(a × b).
Fourth Proportional
If a : b :: c : d, then d is the fourth proportional, calculated as d = (b × c) ÷ a.
Continued Proportion
Three numbers a, b, c are in continued proportion if a/b = b/c, which implies $b^2 = ac$.

Q42. Answer: (c) Rs. 3,025

Shortcut Trick
Effective Compound Interest rate for 2 years at 10% = 10 + 10 + (10 × 10)/100 = 21%.
Total Amount percentage = 100% (Principal) + 21% (Interest) = 121%.
Amount = 121% of Rs. 2,500 = 1.21 × 2,500 = Rs. 3,025.
Therefore The correct answer is Rs. 3,025.
Alternate Method
Given:
Principal (P) = Rs. 2,500
Rate (R) = 10% per annum
Time (n) = 2 years
Formula Used:
Amount (A) = $P(1 + R/100)^n$
Calculations:
=> $A = 2500 \times (1 + 10/100)^2$
=> $A = 2500 \times (1 + 1/10)^2$
=> $A = 2500 \times (11/10) \times (11/10)$
=> A = 2500 × 121 / 100
=> A = 25 × 121
=> A = Rs. 3,025
Therefore The correct answer is Rs. 3,025.
Additional Information
Difference between CI and SI
For 2 years, the difference between Compound Interest and Simple Interest is given by $D = P \times (R/100)^2$.
Effective Rate of Interest
The effective rate for CI for 2 years can be calculated using the successive percentage formula: x + y + (xy/100).
Compounding Half-Yearly
When interest is compounded half-yearly, the rate is halved (R/2) and the time period is doubled (2n).

Q43. Answer: (c) 30 6/7 seconds

Shortcut Trick
Relative Speed (Same direction) = 93 − 51 = 42 km/hr
Conversion to m/s = 42 × 5/18 = 35/3 m/s
Total Distance = 133 + 227 = 360 m
Time = Distance ÷ Relative Speed = 360 ÷ (35/3) = 1080/35 = 216/7 = 30 6/7 sec
Therefore The correct answer is 30 6/7 sec.
Alternate Method
Given:
Length of Faster Train (L1) = 133 m
Length of Slower Train (L2) = 227 m
Speed of Faster Train (S1) = 93 km/hr

Speed of Slower Train (S2) = 51 km/hr

Formula Used:

Time = (L1 + L2) ÷ (S1 − S2)

Conversion: 1 km/hr = 5/18 m/s

Calculations:

=> Total Distance = 133 + 227 = 360 m

=> Relative Speed = 93 − 51 = 42 km/hr

=> Relative Speed in m/s = 42 × 5/18 = 7 × 5/3 = 35/3 m/s

=> Time = 360 ÷ (35/3)

=> Time = (360 × 3) ÷ 35 = 1080 ÷ 35

=> Time = 216/7 = 30 6/7 sec

Therefore The correct answer is 30 6/7 sec.

Additional Information

Relative Speed Rules

When two objects move in the same direction, relative speed is S1 − S2. When they move in opposite directions, relative speed is S1 + S2.

Unit Conversion

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

Train Crossing Distance

When a train crosses another train or a bridge, the Total Distance is always the sum of their lengths (L1 + L2).

Q44. Answer: (d) 4%

Shortcut Trick

Total votes = 1242 + 832 + 1426 + 1100 = 4600.

Winner = 1426 votes | Runner up = 1242 votes.

Difference in votes = 1426 − 1242 = 184.

Percentage difference = (184 ÷ 4600) × 100 = 4%.

Therefore The correct answer is 4%.

Alternate Method

Given:

Votes of 4 candidates: 1242, 832, 1426, 1100.

Calculations:

=> Total Votes = 1242 + 832 + 1426 + 1100 = 4600

=> Winner Votes = 1426 (Highest value)

=> Runner up Votes = 1242 (Second highest value)

=> Winner % = (1426 ÷ 4600) × 100 = 31%

=> Runner up % = (1242 ÷ 4600) × 100 = 27%

=> Percentage Difference = 31% − 27% = 4%

Therefore The correct answer is 4%.

Additional Information

Percentage Change Formula

Percentage = (Value ÷ Total Value) × 100. Always ensure the base value (total) is the sum of all components in an election.

Winner and Runner up Logic

In any multi-candidate election, the Winner is the candidate with the most votes, and the Runner up is the candidate with the second-highest number of votes.

Valid vs Invalid Votes

If invalid votes are mentioned, subtract them from Total Polled Votes to get Valid Votes before calculating individual percentages.

Q45. Answer: (b) 2

Given:

x^(2m) × y^5 × $(x^2)/(y^{(m-1)}) = (y^2 x^3)^2$

Concept Used:

Laws of exponents

Calculation:

=> x^(2m) × x² × y^5 × y^(-(m-1)) = (y²)² × (x³)²

=> x^(2m+2) × y^(5-(m-1)) = y^4 × x^6

=> x^(2m+2) × y^(6-m) = x^6 × y^4

=> 2m + 2 = 6

=> 2m = 4

=> m = 2

=> 6 - m = 4

=> m = 2

Therefore The correct answer is 2

Q46. Answer: (b) 60%

Shortcut Trick

Discount % = [Free Items ÷ Total Items] × 100

Free Items = 3

Total Items = 2 (Paid) + 3 (Free) = 5

Discount % = (3 ÷ 5) × 100 = 60%

Therefore The correct answer is 60%.

Alternate Method

Given:

Number of towels Bought (Paid) = 2

Number of towels Free = 3

Formula Used:

Discount % = (Discount ÷ Marked Price) × 100

Assume Marked Price (MP) of 1 towel = Rs. 1

=> Total MP of 5 towels = Rs. 5

=> Selling Price (SP) (Customer pays for 2 towels) = Rs. 2

=> Discount Amount = MP − SP = 5 − 2 = Rs. 3

=> Discount % = (3 ÷ 5) × 100

=> Discount % = 60%

Therefore The correct answer is 60%.

Additional Information

Buy X Get Y Free Concept

In these offers, the discount is always calculated on the total quantity (X+Y) handed over to the customer, while the price is paid only for X.

Successive Discounts

If two discounts d1 and d2 are given, the equivalent single discount is d1 + d2 − (d1 × d2) ÷ 100.

Marked Price vs Selling Price

Marked Price (MP) is the listed price. Selling Price (SP) = MP × (100 − Discount%) ÷ 100.

Q47. Answer: (b) Rs. 1,000

Shortcut Trick

Loss percentage = 28%

Neither profit nor loss means Selling Price = Cost Price (100%)

Difference in percentage = 100% − 72% = 28%

28% → Rs. 280

100% → (280 ÷ 28) × 100 = Rs. 1,000

Therefore The correct answer is Rs. 1,000.

Alternate Method

Given:

Loss = 28%

Increase in SP = Rs. 280

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New condition: No profit, no loss (SP = CP)
Calculations:
=> Let the Cost Price (CP) be 100 units.
=> Initial Selling Price (SP1) at 28% loss = 100 − 28 = 72 units.
=> New Selling Price (SP2) for no profit/loss = 100 units.
=> Difference in SP = 100 − 72 = 28 units.
=> According to the question, 28 units = Rs. 280.
=> 1 unit = 280 ÷ 28 = Rs. 10.
=> Cost Price (100 units) = 100 × 10 = Rs. 1,000.
Therefore The correct answer is Rs. 1,000.
Additional Information
No Profit No Loss Condition
This state occurs when the Selling Price is exactly equal to the Cost Price (SP = CP).
Cost Price Formula
CP = [100 ÷ (100 − Loss%)] × SP or CP = [100 ÷ (100 + Profit%)] × SP.
Profit/Loss on SP Difference
CP = (Difference in Price × 100) ÷ (Total change in % profit/loss).

Q48. Answer: (a) 138.10%

Shortcut Trick
Use the direct relationship formula: MP/CP = (100 + Profit%) / (100 − Discount%)
=> MP/CP = (100 + 50) / (100 − 37) = 150 / 63
=> MP/CP = 50 / 21
=> Mark-up % = (50 − 21) / 21 × 100 = 2900 / 21 ≈ 138.10%
Therefore The correct answer is 138.10%.
Alternate Method
Given: Discount = 37%, Profit = 50%
Formula Used: SP = CP × (100 + P%)/100 and SP = MP × (100 − D%)/100
=> Let Cost Price (CP) = 100
=> Selling Price (SP) = CP × 1.50 = 150
=> Marked Price (MP) × (100 − 37)/100 = 150
=> MP × 0.63 = 150
=> MP = 150 / 0.63 = 15000 / 63 ≈ 238.095
=> Mark-up % = (MP − CP) / CP × 100
=> Mark-up % = (238.095 − 100) / 100 × 100 = 138.095% ≈ 138.10%
Therefore The correct answer is 138.10%.
Additional Information
Mark-up and Discount Relation
The relationship between CP and MP is given by MP/CP = (100 + P%)/(100 − D%). This bypasses calculating the SP.
Successive Percentage Method
Net Profit% = Markup% − Discount% − (Markup × Discount)/100. This is useful when markup and discount are known.
Marked Price (MP)
MP is also known as the List Price or Sticker Price. Discount is always calculated on the MP unless stated otherwise.

Q49. Answer: (b) 1300

Shortcut Trick
Savings = 60%, so Expenditure = 100% − 60% = 40%.
40% of Income = Rs. 520
1% of Income = 520 ÷ 40 = 13
100% (Total Income) = 13 × 100 = Rs. 1300
Therefore The correct answer is Rs. 1300.
Alternate Method

Given:

Savings percentage = 60%

Expenditure = Rs. 520

Formula:

Income = Expenditure + Savings

Calculations:

=> Let total income be 100%.

=> Expenditure percentage = 100% − 60% = 40%

=> According to the question, 40% = Rs. 520

=> Total Income = (520 ÷ 40) × 100

=> Total Income = 13 × 100

=> Total Income = Rs. 1300

Therefore The correct answer is Rs. 1300.

Additional Information

Income Components

The fundamental relation in financial arithmetic is Income = Expenditure + Savings.

Percentage Change in Income

If income increases by x% and expenditure increases by y%, the change in savings can be calculated using the weighted average method.

Savings Ratio

Savings Rate = (Savings ÷ Income) × 100. In this case, the savings rate is 60%.

Q50. Answer: (d) 394 2/3 π cm³

Shortcut Trick

Ratio of radius (Old : New) = 100 : 75 = 4 : 3.

Given New Radius (3 units) = 6 cm => 1 unit = 2 cm. So, Old Radius = 8 cm.

Decrease in Volume = Volume_(old) − Volume_(new) = 4/3 π ($8^3 - 6^3$) cm³.

Decrease = 4/3 π (512 − 216) = 4/3 π × 296 = 1184/3 π = 394 (2/3) π cm³.

Therefore The correct answer is 394 (2/3) π cm³.

Alternate Method

Given:

Final radius (r) = 6 cm

Decrease percentage = 25%

Formula Used:

Volume of a sphere = 4/3 π r^3

Original Radius (R) = Final Radius ÷ (1 − Decrease%)

Calculations:

=> Let Original Radius be R.

=> R × (100% − 25%) = 6 cm

=> R × (75/100) = 6 => R × (3/4) = 6

=> R = (6 × 4) ÷ 3 = 8 cm

=> Initial Volume (V1) = 4/3 π $(8)^3$ = 4/3 π × 512 = 2048/3 π cm³

=> Final Volume (V2) = 4/3 π $(6)^3$ = 4/3 π × 216 = 864/3 π cm³

=> Decrease in Volume = V1 − V2

=> Decrease = (2048/3 π) − (864/3 π) = (1184/3) π cm³

=> Decrease = 394 (2/3) π cm³

Therefore The correct answer is 394 (2/3) π cm³.

Additional Information

Volume and Surface Area of Sphere

The volume is given by V = 4/3 π r^3 and the total surface area is given by A = 4 π r^2.

Percentage Change in Volume

If the radius changes by x%, the volume changes by approximately $3x + 3x^2/100 + x^3/10000$ percent. For a 25% decrease, the

volume decreases by about 57.8%.

Hemisphere formulas

Volume of hemisphere = 2/3 π r³. Total Surface Area of solid hemisphere = 3 π r².

Q51. Answer: (a) One

Given: Seven boxes A, B, C, D, I, J and K are kept one over the other but not necessarily in the same order.

1. Only B is kept above I.
2. Only C is kept between I and J.
3. Only A is kept below K.

B
I
C
J
K
A

D, the only box left will occupy the vacant position.

B
I
C
J
D
K
A

Thus, one box is kept between D and A.

Hence, the correct answer is "Option 1".

Q52. Answer: (b) Y

Given: O, P, Q, R, W, X, and Y are sitting in a straight line facing the north.

1. No one sits to the left of P.
2. Only four people sit between P and Q.
3. Only three people sit to the right of Y.
4. X sits to the immediate left of R.
5. W is not an immediate neighbour of Y.

O, the only person left will occupy the vacant position.

Thus, Y sits third to the left of W.

Hence, the correct answer is "Option 2".

Q53. Answer: (d) 2

Given: (Left) 2 1 6 9 1 9 6 4 2 4 4 6 7 6 4 1 8 7 9 2 4 4 7 6 8 7 2 (Right)

Now,

Even numbers, each of which is immediately preceded by an odd number and also immediately followed by an odd number.

So, the needed pattern is: Odd — Even — Odd

Thus, there are 2 even numbers, each of which is immediately preceded by an odd number and also immediately followed by an odd number.

Hence, the correct answer is "Option 4".

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Q54. Answer: (b) North-west

Given: Town U is to the north of Town V. Town W is to the east of Town U. Town X is to the south of Town W. Town Y is to the west of Town X. Town V is to the south-west of Town Y.

Thus, Town U is to the North-west with respect to Town Y.

Hence, the correct answer is "Option 1".

Q55. Answer: (b) 2

Given: Seven people, A, B, C, D, E, F and G are sitting in a row, facing north.

1. Only three people sit to the right of C.

2. Only four people sit between A and B, neither of whom sits on the left end.

3. D sits immediately to the left of F.

4. Only three people sit between G and B.

E, the only person left will occupy the vacant position.

Thus, 2 people sit between F and G.

Hence, the correct answer is "Option 2".

Q56. Answer: (a) MG-PJ-RT

The position and positional values or English Alphabets are:

The pattern followed here is:

Each letter-cluster triad follows the pattern +3, +3 and +2, +10.

IC-LF-NP

KE-NH-PR

Let's check each option:

1. MG-PJ-RT

This letter-cluster triad follows the pattern +3, +3 and +2, +10.

2. MG-PJ-RU

This letter-cluster triad does not follow the pattern +3, +3 and +2, +10.

3. NG-PI-RU

This letter-cluster triad does not follow the pattern +3, +3 and +2, +10.

4. NG-PJ-RU

This letter-cluster triad does not follow the pattern +3, +3 and +2, +10.

Thus, MG-PJ-RT follows the same pattern.

Hence, the correct answer is "Option 1".

Q57. Answer: (a) 63

Given: 3 13 24 36 49 ?

The logic followed here is:

Thus, 63 should come in place of the question mark (?) in the given series.

Hence, the correct answer is "Option 1".

Q58. Answer: (c) 121

Given: 191 177 163 149 135 ?

The logic followed here is:

Thus, 121 should come in place of the question mark (?) in the given series.

Hence, the correct answer is "Option 3".

Q59. Answer: (d) 1

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

Now,

Odd numbers, each of which is immediately preceded by an even number and also immediately followed by an even number.

So, the needed pattern is: Even — Odd — Even

Thus, there is 1 odd number, which is immediately preceded by an even number and also immediately followed by an even number.

Hence, the correct answer is "Option 4".

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Q60. Answer: (c) 49

BODMAS Rule:

Decoding the given information:

Letter	A	B	C	D
Meaning	÷	×	•	•

Given equation: 64 A 8 C 4 B 11 D 3 = ?

Now replacing the sign from left to right using BODMAS Rule, we get:

=> 64 ÷ 8 + 4 × 11 − 3 = ?

=> 8 + 4 × 11 − 3 = ?

=> 8 + 44 − 3 = ?

=> 52 − 3 = ?

=> 49 = ?

Hence, the correct answer is "Option 3".

Q61. Answer: (b) KJ −2

The position and positional values or English Alphabets are:

Given: MU 4 is related to PO −10 in a certain way. In the same way, DL 8 is related to GF −6.

The logic followed here is:

Similarly,

Thus, HP12 is related to KH-2.

Hence, the correct answer is "Option 2".

Q62. Answer: (b) 9

Given: Each of the digits in the number 8312467 is arranged in ascending order from left to right.

Digit second from the left = 2

Digit second from the right = 7

Sum = 2 + 7 = 9

Thus, 9 will be the sum of the digits which are second from the left and second from the right in the new number thus formed.

Hence, the correct answer is "Option 2".

Q63. Answer: (c) JD-LF-NP

The position and positional values or English Alphabets are:

The pattern followed here is:

Each letter-cluster triad follows the pattern +2, +2 and +2, +10.

NH-PJ-RT

LF-NH-PR

Let's check each option:

1. ID-LF-NO

This letter-cluster triad does not follow the pattern +2, +2 and +2, +10.

2. JD-LF-NO

This letter-cluster triad does not follow the pattern +2, +2 and +2, +10.

3. JD-LF-NP

This letter-cluster triad follows the pattern +2, +2 and +2, +10.

4. ID-LE-NO

This letter-cluster triad does not follow the pattern +2, +2 and +2, +10.

Thus, JD-LF-NP follows the same pattern.

Hence, the correct answer is "Option 3".

Q64. Answer: (c) 9

Given: Each of the digits in the number 7123458 is arranged in ascending order from left to right.

Digit second from the left = 2

Digit second from the right = 7

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Sum = 2 + 7 = 9

Thus, 9 will be the sum of the digits which are second from the left and second from the right in the new number thus formed.

Hence, the correct answer is "Option 3".

Q65. Answer: (d) st

Given: In a certain code language, ‘speak the truth’ is coded as ‘pc rd st’ and ‘truth always wins’ is coded as ‘mo st kl’.

Thus, ‘truth’ is coded as 'st' in the given language.

Hence, the correct answer is "Option 4".

Q66. Answer: (a) cd

Given: In a certain code language, ‘some good questions’ is coded as ‘jm ik cd’ and ‘many good problems’ is coded as ‘cd rc gh’.

Thus, 'good’ is coded as 'cd' in the given language.

Hence, the correct answer is "Option 1".

Q67. Answer: (a) 7

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

Now,

Even numbers, each of which is immediately preceded by an odd number and also immediately followed by an odd number.

So, the needed pattern is: Odd — Even — Odd

Thus, there are 7 even numbers, each of which is immediately preceded by an odd number and also immediately followed by an odd number.

Hence, the correct answer is "Option 1".

Q68. Answer: (c) (74, 87, 123)

The logic followed here is:

Logic: (a, b, c) → b = a + 13, c = b + 36

(15, 28, 64) → 15 + 13 = 28, 28 + 36 = 64

(63, 76, 112) → 63 + 13 = 76, 76 + 36 = 112

Let's check each option:

1. (44, 57, 83) → 44 + 13 = 57, 57 + 36 = 93 ≠ 83

2. (82, 95, 132) → 82 + 13 = 95, 95 + 36 = 131 ≠ 132

3. (74, 87, 123) → 74 + 13 = 87, 87 + 36 = 123

4. (159, 172, 207) → 159 + 13 = 172, 172 + 36 = 208 ≠ 207

Thus, (74, 87, 123) is the set in which the numbers are related in the same way as the given sets.

Hence, the correct answer is "Option 3".

Q69. Answer: (b) PL-IM

The position and positional values or English Alphabets are:

The pattern followed here is:

Each letter-cluster pair follows the pattern -7, +2.

1. HD-AF

This letter-cluster pair follows the pattern -7, +2.

2. PL-IM

This letter-cluster pair does not follow the pattern -7, +2.

3. MI-FK

This letter-cluster pair follows the pattern -7, +2.

4. JF-CH

This letter-cluster pair follows the pattern -7, +2.

Thus, PL-IM is the odd one out.

Hence, the correct answer is "Option 2".

Q70. Answer: (b) Neither conclusion (I) nor (II) follows

Statements:

All roads are trucks.

No truck is a sheep.

The least possible Venn diagram for the given statement is:

Conclusions:

(I) Some roads are sheep. - False (Because, All roads are trucks and No truck is a sheep, which means all roads being trucks are not sheep.)

(II) All trucks are sheep. - False (Because, No truck is a sheep.)

Thus, Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 2".

Q71. Answer: (d) 4 km towards the north

Given: Himangi starts from Point A and drives 2 km towards the east. She then takes a right turn, drives 7 km, turns left and drives 9 km. She then takes a left turn and drives 3 km. She takes a final left turn, drives 11 km and stops at Point P.

Thus, she should drive 4 km towards the north in order to reach Point A again.

Hence, the correct answer is "Option 4".

Q72. Answer: (a) OGB

The position and positional values or English Alphabets are:

Given: EWR ASN WOJ SKF ?

The logic followed here is:

Thus, OGB should come in place of the question mark (?) in the given series based on the English alphabetical order.

Hence, the correct answer is "Option 1".

Q73. Answer: (a) Neither conclusion (I) nor (II) follows.

Statements:

All apples are fruits.

Some fruits are sweet.

The least possible Venn diagram for the given statement is:

Conclusions:

(I) Some apples are sweet. - False (There is no definite relation between apples and sweet, it can be possible but it is not definite.)

(II) All sweet are apples. - False (There is no definite relation between apples and sweet, it can be possible but it is not definite.)

Thus, Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 1".

Q74. Answer: (c) One

Given: (Left) 3 @ 2 ^ @ % \ 8 9 \ / ? 8 7 6 # & # + 7 \ (Right)

Now,

Symbols, each of which is immediately preceded by a number and also immediately followed by a number.

So, the needed pattern is: Number — Symbol — Number

Thus, there is one symbol, which is immediately preceded by a number and also immediately followed by a number.

Hence, the correct answer is "Option 3".

Q75. Answer: (d) SX-UR

The position and positional values or English Alphabets are:

The pattern followed here is:

Each letter-cluster pair follows the pattern +2, -7.

1. QV-SO

This letter-cluster pair follows the pattern +2, -7.

2. OT-QM

This letter-cluster pair follows the pattern +2, -7.

3. MR-OK

This letter-cluster pair follows the pattern +2, -7.

4. SX-UR

This letter-cluster pair does not follow the pattern +2, -7.

Thus, SX-UR is the odd one out.

Hence, the correct answer is "Option 4".

Q76. Answer: (c) Father's Father

Family Chart:

Decoding the Symbols:

A is				
Symbol	•	•	x	÷
Meaning	mother	father	husband	sister
to B				

Given: P – Q ÷ R * S + T

It means: P is the father of Q, Q is the sister of R, R is the husband of S, S is the mother of T.

Thus, P is T's Father's Father.

Hence, the correct answer is "Option 3".

Q77. Answer: (c) 12

Given: 8, 64, 9, 81, 10, 100, 11, 121, ?, 144

The logic followed here is:

Thus, 12 should come in place of the question mark (?) in the given series.

Hence, the correct answer is "Option 3".

Q78. Answer: (a) 64

Given: Rajesh ranked 38th from the top and 27th from the bottom in his class.

Total number of students = 38 + 27 - 1

= 65 - 1

= 64

Thus, 64 students are there in his class.

Hence, the correct answer is "Option 1".

Q79. Answer: (a) BBD 57

The position and positional values or English Alphabets are:

Given: LNT 81, PKP 75, THL 69, XEH 63, ?

The logic followed here is:

Thus, BBD 57 will replace the question mark (?) in the given series to make it logically complete.

Hence, the correct answer is "Option 1".

Q80. Answer: (c) U

Given: A, B, C, R, S, T and U are sitting around a circular table, facing the centre of the table.

1. T sits third to the left of U.
2. B sits to the immediate left of U.
3. S is not an immediate neighbour of T.
4. R is the immediate neighbour of both C and T.

A, the only person left will occupy the vacant position.

Thus, U sits second to the right of A.

Hence, the correct answer is "Option 3".

Q81. Answer: (d) Raj Nath Singh

The correct answer is Raj Nath Singh.

Key Points

• Raj Nath Singh, the Defence Minister of India, held bilateral talks with Dong Jun, a senior Chinese official, during the Shanghai Cooperation Organization (SCO) conclave in June 2025.

• The discussions took place in the Chinese port city of Qingdao, which has previously hosted high-profile international summits.

• The talks primarily focused on maintaining peace and tranquillity along the Line of Actual Control (LAC), which is the de facto border between India and China.

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• The meeting aimed to address ongoing border tensions and reinforce agreements to avoid escalations in sensitive areas, particularly in regions like Eastern Ladakh.

• Raj Nath Singh also emphasized the importance of resolving disputes through diplomatic and peaceful means, aligning with India's consistent approach to international relations.

Additional Information

• Shanghai Cooperation Organization (SCO):

• The SCO is a regional intergovernmental organization established in 2001, with a primary focus on political, economic, and security cooperation.

• Its founding members include China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. India and Pakistan joined as full members in 2017.

• The organization provides a platform for member states to collaborate on issues like counter-terrorism, border security, and economic development.

• Line of Actual Control (LAC):

• The LAC is a 3,488 km long boundary between India and China, separating Indian-controlled territory from Chinese-controlled territory.

• It is divided into three sectors: the Western Sector (Ladakh), the Middle Sector (Himachal Pradesh and Uttarakhand), and the Eastern Sector (Sikkim and Arunachal Pradesh).

• Frequent tensions arise along the LAC, requiring diplomatic and military engagement to maintain stability.

• India-China Border Relations:

• The two nations have a history of border disputes, with significant conflicts like the 1962 Sino-Indian War and recent standoffs like the Galwan Valley clash in 2020.

• To manage disputes, both countries have signed agreements such as the 1993 Border Peace and Tranquillity Agreement and the 1996 Confidence-Building Measures Agreement.

• Despite agreements, incidents of transgressions and military build-ups continue to strain relations.

• Raj Nath Singh:

• He is a senior leader of the Bharatiya Janata Party (BJP) and has served as the Defence Minister of India since 2019.

• Under his leadership, India has strengthened its defence capabilities and emphasized self-reliance through the Atmanirbhar Bharat initiative in the defence sector.

• He has played a key role in addressing border security challenges and modernizing the armed forces.

Important Points

• Qingdao:

• A major port city in Shandong Province, China, known for hosting international events like the SCO Summit in 2018.

• It is strategically significant due to its location and infrastructure, making it a preferred venue for diplomatic engagements.

• Significance of India-China Talks:

• Such bilateral meetings are crucial for reducing border tensions and fostering cooperation in other areas like trade and regional security.

• They also reflect India's commitment to peaceful conflict resolution and adherence to international norms.

• India’s Defence Diplomacy:

• India has been actively engaging with international partners through platforms like the Quad, SCO, and BRICS to strengthen its strategic partnerships.

• The Defence Minister's participation in global forums underscores India's increasing role in shaping regional and global security dynamics.

Q82. Answer: (c) Rajeev Chandrasekhar

The correct answer is Rajeev Chandrasekhar.

Key Points

• Rajeev Chandrasekhar, who is the Minister of State for Electronics and Information Technology in India, announced the launch of India’s first homegrown semiconductor chip in May 2025.

• The announcement marked a significant milestone for India’s ambition to become a global hub for semiconductor manufacturing and reduce dependence on imports.

• This initiative is part of the broader Semicon India Programme, launched by the government to develop a robust semiconductor ecosystem in the country with a financial outlay of Rs. 76,000 crore.

• The homegrown semiconductor chip is expected to bolster India's position in the global electronics supply chain, which has been disrupted due to geopolitical tensions and the pandemic.

• Semiconductors are the backbone of modern electronics, including smartphones, laptops, automobiles, and defense equipment.

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This development is aligned with the government's mission of Aatmanirbhar Bharat (Self-Reliant India).

Additional Information

• Semicon India Programme:

• Launched by the Government of India in December 2021, the programme aims to establish India as a global hub for semiconductor design, manufacturing, and technology development.

• It includes initiatives to attract investments from global semiconductor companies and foster research and development in this field.

• The programme is expected to create job opportunities and enhance India's capabilities in critical technologies.

• Importance of Semiconductors:

• Semiconductors are essential components in electronic devices such as microprocessors, sensors, and memory chips.

• They enable the functioning of various sectors, including telecommunications, healthcare, automotive, and defense.

• India has been heavily dependent on imports for its semiconductor needs, making the development of indigenous chips a strategic move.

• Rajeev Chandrasekhar's Role:

• Rajeev Chandrasekhar is a prominent Indian politician and entrepreneur with expertise in technology and innovation.

• He has been actively involved in shaping India's digital economy and promoting initiatives like Digital India and Make in India.

• As the Minister of State for Electronics and IT, he has played a crucial role in the formulation and execution of policies aimed at enhancing India's technological capabilities.

• Global Semiconductor Market:

• The global semiconductor market was valued at approximately USD 555.9 billion in 2021 and is expected to grow significantly in the coming years.

• The demand for semiconductors has been driven by advancements in 5G technology, artificial intelligence, and IoT (Internet of Things).

• India's entry into semiconductor manufacturing is expected to increase its competitiveness in the global market and reduce reliance on imports from countries like China and Taiwan.

Important Points

• Challenges in Semiconductor Manufacturing:

• Setting up a semiconductor fabrication unit is capital-intensive, requiring investments ranging from USD 3 billion to USD 15 billion.

• The process involves complex technological requirements, including cleanrooms, equipment, and skilled professionals.

• India faces challenges in terms of infrastructure, supply chain development, and the availability of raw materials like silicon wafers.

• Global Supply Chain Issues:

• The semiconductor industry has faced disruptions due to the COVID-19 pandemic and geopolitical tensions, leading to a global chip shortage.

• India's initiative to develop homegrown chips is a step towards reducing dependency on global supply chains and ensuring self-reliance.

• Future Prospects:

• The success of India's semiconductor initiative will depend on its ability to attract investments, develop skilled manpower, and create a conducive business environment.

• Collaborations with global technology leaders and academic institutions will be crucial for building a robust semiconductor ecosystem.

• India's efforts in this sector are expected to contribute significantly to its GDP growth and technological advancements.

Q83. Answer: (a) Mixed relay

The correct answer is Mixed Relay.

Key Points

• Mixed Relay refers to a team event in sports where male and female athletes compete together in relay races, often divided into specific legs or segments.

• Indian athletes secured a medal in the Mixed Relay event at the 2025 Asian Indoor Games, showcasing their strong teamwork and competitive spirit.

• The Asian Indoor Games is a prestigious multi-sport event held every four years, featuring various indoor sports, including athletics, swimming, and shooting.

• Mixed Relay events have gained popularity worldwide due to their inclusive format, promoting gender equality and cooperation among athletes.

• The Indian team's performance in the Mixed Relay highlights their growing prowess in track and field events, backed by rigorous training and international exposure.

Additional Information

• Asian Indoor Games:

• Organized by the Olympic Council of Asia, the Asian Indoor Games include sports that are traditionally played indoors.

• The first edition was held in 2005, and subsequent editions have expanded in scope and participation.

• Events include athletics, swimming, chess, futsal, and esports, among others.

• Mixed Relay in Athletics:

• The Mixed Relay event often combines male and female athletes in a single team, running alternating legs of the relay.

• One popular format is the 4x400m Mixed Relay, introduced at the World Athletics Championships and later at the Olympics.

• This format emphasizes both speed and strategy, as teams must determine the order of male and female runners for optimal performance.

• India's Growing Success in Athletics:

• India has made significant progress in athletics, with athletes excelling at both regional and global levels.

• Indian relay teams have benefitted from improved infrastructure, coaching, and international exposure.

• Recent successes include medals in various relay formats at the Asian Games and Commonwealth Games.

• Other Sports at the Asian Indoor Games:

• Swimming: Indoor swimming events are a major attraction, with India gradually enhancing its competitiveness.

• Wrestling: Indian wrestlers have historically performed well in various international competitions, including regional games.

• Shooting: India has consistently excelled in shooting events, with athletes frequently winning medals at world and regional levels.

Important Points

• Mixed Relay Format: Teams must strategize the order of runners to balance speed and endurance, ensuring competitive advantage.

• India's Relay Achievements: Indian teams have increasingly secured medals in mixed relay events, reflecting advancements in training and team coordination.

• Gender Inclusion: Mixed relay events highlight gender inclusion, promoting equal representation and collaboration in sports.

• Asian Indoor Games: India's participation in these games has grown steadily, with athletes competing across multiple disciplines and winning medals.

Q84. Answer: (d) Indian Cyber Crime Coordination Centre (I4C)

The correct answer is Indian Cyber Crime Coordination Centre (I4C).

Key Points

• The Indian Cyber Crime Coordination Centre (I4C), which operates under the Ministry of Home Affairs (MHA), launched the e-Zero FIR system to help tackle cyber fraud cases.

• This initiative aims to allow victims of cybercrime to file a First Information Report (FIR) online, even if the crime occurs outside their jurisdiction.

• The e-Zero FIR system is part of the government's broader effort to address the growing issue of cybercrimes and ensure that victims receive timely assistance in reporting and resolving such cases.

• The I4C was established in 2018 and became fully operational in 2020 to combat cybercrime and oversee the implementation of related policies nationwide.

• This platform is integrated with the National Cyber Crime Reporting Portal, which serves as a centralized platform to file complaints related to various cybercrimes, including financial fraud, identity theft, and online harassment.

Additional Information

• Indian Cyber Crime Coordination Centre (I4C):

• The I4C was established to handle cybercrime prevention, investigation, and capacity building in India.

• It acts as a nodal agency to coordinate efforts among various states and union territories to combat cybercrime.

• The I4C comprises seven components, including a National Cyber Crime Reporting Portal, a research and innovation center, and a training ecosystem to enhance cybercrime investigation skills.

• Its major goal is to create a safe and secure cyberspace in India.

• National Cyber Crime Reporting Portal:

• The portal was launched under the I4C initiative to allow citizens to report cybercrimes online.

• It primarily focuses on crimes against women and children, such as online harassment, child pornography, and cyberstalking.

• The platform also handles cases related to financial fraud, including UPI or debit/credit card frauds.

• The portal has been designed to be user-friendly and accessible to people from all regions of India.

• Cybercrime in India:

• India has witnessed a significant rise in cybercrimes due to the increasing penetration of digital platforms and online financial transactions.

• According to the National Crime Records Bureau (NCRB), cybercrime cases in India have been steadily increasing, with financial frauds being the most common.

• The government has introduced several measures, including the establishment of cyber forensic laboratories and the promotion of awareness campaigns to educate citizens about cyber safety.

• Other Organizations under MHA:

• The Central Bureau of Investigation (CBI) investigates high-profile crimes, including corruption and economic offenses, but does not primarily handle cybercrimes.

• The Cyber Appellate Tribunal, established under the IT Act 2000, handles appeals related to cyber law cases but does not oversee the implementation of cybercrime prevention systems.

• The State Police departments handle cybercrime cases at the local level but rely on centralized platforms like I4C for advanced tools and coordination.

Important Points

• The e-Zero FIR system ensures that victims of cybercrime can file FIRs without jurisdictional barriers, making it easier for law enforcement to investigate cases.

• The I4C's efforts align with the government's Digital India initiative, which aims to enhance digital security and promote the safe use of technology.

• Citizens are encouraged to report cybercrimes promptly to prevent further damage and assist law enforcement in tracking offenders.

• The government has also introduced awareness programs on cyber hygiene to educate people about secure online practices.

Q85. Answer: (a) Karnataka

The correct answer is Karnataka.

Key Points

• The Karnataka state government mandated a child protection policy in all residential schools and hostels in September 2025. This decision was aimed at ensuring the safety and welfare of children in educational institutions.

• The policy was introduced to address concerns over child abuse, neglect, exploitation, and harassment in residential schools and hostels, promoting a safe learning environment for children.

• The mandate specifically applies to all government-run and private residential schools and hostels, ensuring uniformity in safeguarding measures across the state.

• Key features of this policy include regular inspections, mandatory background checks for staff, and the establishment of internal committees to address grievances and ensure accountability.

• The government partnered with non-governmental organizations (NGOs) and child welfare committees to ensure proper implementation and monitoring of the policy.

Additional Information

• Child Protection Policies:

• Child protection policies are frameworks designed to safeguard children against abuse, exploitation, and neglect within institutions like schools, hostels, and childcare facilities.

• These policies include guidelines on staff behavior, reporting mechanisms for abuse cases, and strategies to create a child-friendly environment.

• Globally, organizations like UNICEF have emphasized the importance of child protection policies in improving the welfare of children.

• Residential Schools and Hostels:

• Residential schools and hostels are facilities where children reside and study, often away from their families. They are common in rural and tribal areas to improve educational access.

• While these institutions provide educational opportunities, they also pose risks such as bullying, peer pressure, and abuse if not regulated properly.

• Ensuring child safety in these institutions is crucial for promoting mental well-being, academic growth, and social development.

• Government Initiatives in Karnataka:

• Karnataka has been at the forefront of child welfare measures, including the implementation of schemes like Kishori Shakti Yojana and Anganwadi programs.

• The state has also collaborated with childline services and NGOs to address issues related to child abuse and exploitation.

• National Child Welfare Policies:

• India has implemented various policies to protect children, including the Protection of Children from Sexual Offences (POCSO) Act and the Juvenile Justice (Care and Protection of Children) Act.

• These policies aim to ensure the safety, education, and well-being of children, particularly those in vulnerable situations.

Important Points

• The Karnataka government's move aligns with global efforts to ensure child protection in institutional settings and addresses the recommendations by UNICEF and other child welfare organizations.

• Such policies play a vital role in empowering children, promoting their rights, dignity, and ensuring a nurturing environment for their overall development.

• Regular monitoring and evaluation of the policy's implementation will be essential to measure its impact and address any gaps in safeguarding measures.

• The collaboration between government bodies, NGOs, and educational institutions ensures a holistic approach to child protection in Karnataka.

Q86. Answer: (a) Ahmedabad

The correct answer is Ahmedabad.

Key Points

• Veer Savarkar Sports Complex was inaugurated by Union Home Minister Amit Shah in September 2025 in Ahmedabad, Gujarat.

• This complex is named after Veer Savarkar, a prominent freedom fighter and social reformer, to honor his contributions to the nation.

• The sports complex is aimed at promoting various sports activities and enhancing sports infrastructure in Ahmedabad, a city known for its active participation in sports and cultural events.

• Ahmedabad, being one of the largest cities in Gujarat, has been a focal point for infrastructural developments, including sports-related projects.

• This initiative aligns with the government's vision to create world-class sports facilities across India and encourage youth participation in sports.

Additional Information

• Amit Shah:

• He is the current Union Home Minister of India, appointed in May 2019.

• Amit Shah has been instrumental in launching several initiatives to improve infrastructure and development across the nation, including Gujarat, his home state.

• Veer Savarkar:

• Veer Savarkar was a prominent Indian freedom fighter, writer, and social reformer, who played a significant role in India's struggle for independence.

• He is known for his revolutionary writings and efforts to mobilize support against British colonial rule.

• Sports Infrastructure in Ahmedabad:

• Ahmedabad is home to several world-class sports facilities, including the Narendra Modi Stadium, the largest cricket stadium globally.

• The city has hosted numerous national and international sporting events, making it a hub for sports development in Gujarat.

• Government's Vision for Sports Development:

• The Indian government has been focusing on creating modern sports facilities under schemes like Khelo India to nurture talent and promote sports culture across the nation.

• Such initiatives aim to identify and support young athletes while improving grassroots-level sports infrastructure.

Important Points

• Ahmedabad:

• It is the largest city in Gujarat and is often referred to as the economic and cultural capital of the state.

• Ahmedabad has a rich history and is known for landmarks like Sabarmati Ashram and Jama Masjid.

• Union Government's Role:

• Under the leadership of Prime Minister Narendra Modi, there has been a significant push to improve sports infrastructure and promote India as a sporting nation globally.

• Various policies and programs like Khelo India and Fit India Movement have been launched to achieve this goal.

Q87. Answer: (b) Ministry of Health and Family Welfare

The correct answer is Ministry of Health and Family Welfare.

Key Points

• The State Health Regulatory Excellence Index (SHRESTH) was launched by the Ministry of Health and Family Welfare in August

2025.

• It is a first-of-its-kind national initiative aiming to benchmark and strengthen state drug regulatory systems through a transparent and data-driven framework.

• The primary goal of SHRESTH is to enhance the efficiency, transparency, and accountability of drug regulatory systems across different states.

• This initiative is expected to ensure that quality medicines are accessible to citizens by improving the regulation and monitoring of pharmaceutical products.

• The Ministry of Health and Family Welfare plays a pivotal role in ensuring the implementation of the framework, addressing gaps in the existing drug regulatory systems.

Additional Information

• State Health Regulatory Excellence Index (SHRESTH):

• This initiative aims to create a robust mechanism for state drug regulators to identify their strengths and weaknesses.

• It provides a standardized evaluation system and promotes a uniform regulatory framework for pharmaceuticals across India.

• Data and analytics play a significant role in ensuring evidence-based decision-making for policymakers and regulators.

• Ministry of Health and Family Welfare:

• This ministry is responsible for the implementation of health-related schemes and policies in India.

• It oversees the regulation of pharmaceuticals, medical devices, and healthcare services in the country.

• Some of its other key initiatives include Ayushman Bharat, the National Health Mission, and the National Digital Health Mission.

• Importance of Drug Regulatory Systems:

• Drug regulation ensures that only safe and effective medicines are available in the market.

• It prevents the circulation of substandard or counterfeit drugs, safeguarding public health.

• India, as a major global supplier of generic medicines, requires strong drug regulatory frameworks to maintain its position in the global pharmaceutical industry.

• Examples of Other Regulatory Initiatives:

• The Drugs and Cosmetics Act, 1940, regulates the import, manufacture, distribution, and sale of drugs in India.

• The establishment of Central Drugs Standard Control Organization (CDSCO) ensures compliance with drug standards across India.

• Recent digital initiatives like eSanjeevani and the National Digital Health Blueprint aim to integrate technology into healthcare systems.

Important Points

• Ministry of Science and Technology:

• Primarily focuses on scientific research, innovation, and technology development.

• It does not oversee drug regulation or healthcare initiatives.

• Ministry of Chemicals and Fertilizers:

• Responsible for the production and development of fertilizers, chemicals, and petrochemicals.

• The Department of Pharmaceuticals under this ministry focuses on pharmaceutical production but not regulatory frameworks.

• Ministry of Ayush:

• Oversees the development of traditional medicine systems like Ayurveda, Yoga, Unani, Siddha, and Homeopathy.

• While it plays a role in promoting alternative medicine, it does not handle state drug regulatory systems.

Q88. Answer: (d) Bihar Statehood Day

The correct answer is Bihar Statehood Day.

Key Points

• Bihar Statehood Day is celebrated annually on 22 March to commemorate the formation of Bihar as a separate state.

• This day marks the historical event in 1912, when Bihar was carved out from the Bengal Presidency during British rule in India.

• The statehood of Bihar was part of the British administrative reforms aimed at improving governance by dividing the vast Bengal Presidency.

• Bihar was formed as an independent province, along with Orissa, under the Government of India Act 1912.

• The day is celebrated with cultural events, public gatherings, and official ceremonies across the state to honor its rich heritage and culture.

Additional Information

• Historical Context:

• The Bengal Presidency was one of the largest administrative divisions during British rule, encompassing modern-day West Bengal, Bihar, Odisha, and parts of Assam.

• The Government of India Act 1912 led to the division of Bengal into smaller provinces for better administrative efficiency.

• Bihar's separation was primarily driven by the need to address the unique cultural, linguistic, and administrative requirements of the region.

• Geographical and Cultural Significance of Bihar:

• Bihar is known for its rich cultural heritage, including ancient sites like Nalanda University and Bodh Gaya, which are of global importance.

• The state played a pivotal role in India's ancient history, being the center of major empires like Magadha and the birthplace of prominent religions like Buddhism and Jainism.

• Celebrations and Observances:

• Bihar Statehood Day is celebrated with cultural programs, historical exhibitions, and government-led initiatives to promote the state's heritage.

• Programs often include performances highlighting Bihar's folk traditions, music, and dance forms.

• Economic and Political Importance:

• Bihar is an important agricultural state, contributing significantly to India's rice, wheat, and sugarcane production.

• It is also a hub for industries like handloom weaving, leather production, and tourism.

Important Points

• Formation of Bihar:

• The separation of Bihar from Bengal was announced on 22 March 1912, marking its establishment as a separate administrative province.

• This event was part of broader reforms by the British to decentralize governance and improve administrative efficiency in India.

• Recognition of Heritage:

• Bihar Statehood Day serves as an opportunity to reflect on the state's historical contributions and its role in shaping India's cultural and political landscape.

• The day is also used to promote awareness about Bihar's tourism potential, including its ancient heritage sites.

Q89. Answer: (a) Vembanad Lake

The correct answer is Vembanad Lake.

Key Points

• Vembanad Lake is the longest lake in India and the largest lake in Kerala, stretching across multiple districts like Alappuzha, Kottayam, and Ernakulam.

• It has been designated as a Ramsar site, making it an internationally recognized wetland of ecological importance.

• The lake plays a critical role in Kerala's ecosystem, supporting a variety of flora and fauna, including migratory birds and aquatic species.

• It is a hub for activities like fishing, agriculture, backwater tourism, and transportation, contributing significantly to the local economy.

• Currently, the lake is facing severe ecological degradation due to issues like pollution, industrial waste, and encroachments, threatening its biodiversity and sustainability.

Additional Information

• Vembanad Lake – Features and Importance:

• It spans an area of approximately 230 square kilometers and is connected to multiple rivers like Pamba, Meenachil, Achankovil, and Periyar.

• The lake hosts the famous Nehru Trophy Boat Race, an annual event that draws tourists worldwide.

• It serves as a source of livelihood for thousands of local communities who rely on fishing and agriculture.

• The lake also supports unique ecosystems such as the Kumarakom Bird Sanctuary, a haven for migratory birds.

• Other Options:

• Pulicat Lake:

• Located between Andhra Pradesh and Tamil Nadu, Pulicat is the second-largest brackish water lake in India.

• It is known for the Pulicat Bird Sanctuary and supports flamingos and other migratory birds.

• This lake does not face degradation at the same level as Vembanad Lake.

• Chilika Lake:

• Situated in Odisha, Chilika Lake is the largest coastal lagoon in India.

• It is also a Ramsar site and renowned for its Irrawaddy dolphins and migratory birds.

• Although Chilika Lake faces ecological concerns, the question specifically pertains to Kerala.

• Loktak Lake:

• Located in Manipur, Loktak Lake is famous for its floating islands called phumdis.
• It houses the Keibul Lamjao National Park, the world's only floating national park.
• While it is ecologically significant, it is not in Kerala.
• Ecological Challenges at Vembanad Lake:
• Increased levels of pollution due to industrial waste, urban runoff, and agricultural effluents.
• Encroachment and reclamation activities have led to the shrinkage of the lake area.
• Overfishing and unsustainable tourism have disrupted the lake's delicate ecosystem balance.
• The lack of effective management and conservation policies further exacerbates the degradation.

Important Points

• Ramsar Sites in Kerala:
• Kerala is home to three Ramsar sites: Vembanad Lake, Ashtamudi Lake, and Sasthamkotta Lake.
• These wetlands are crucial for biodiversity conservation and act as natural buffers against flooding and other environmental challenges.
• Conservation Efforts:
• Various NGOs and state government initiatives are working toward restoring Vembanad Lake's ecosystem.
• Programs to reduce pollution, regulate fishing, and promote sustainable tourism are being implemented.
• Community participation is essential for effective conservation of the lake.

Q90. Answer: (c) Gujarat

The correct answer is Gujarat.

Key Points

• Under the Centre’s Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI) scheme, Gujarat emerged as the national leader in mangrove afforestation, covering 19,020 hectares between 2023 and 2025.
• The MISHTI scheme, launched in 2023, aims to promote sustainable mangrove development and conservation in coastal regions across India.
• Gujarat, with its extensive coastline and favorable geographical conditions, played a pivotal role in achieving this milestone, contributing significantly to the scheme’s success.
• The initiative supports the restoration of degraded mangrove ecosystems, which are crucial for carbon sequestration, biodiversity conservation, and coastal protection.
• The state government collaborated with the Ministry of Environment, Forest and Climate Change and local communities to successfully implement large-scale afforestation projects under MISHTI.

Additional Information

• MISHTI Scheme:
• The MISHTI scheme was announced in the Union Budget 2023-24 to facilitate the regeneration and conservation of mangroves in coastal states and union territories.
• It aims to enhance ecosystem services, including climate resilience, coastal protection, and sustainable livelihoods for local communities.
• The scheme is implemented through convergence between the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Compensatory Afforestation Fund Management and Planning Authority (CAMPA), and other funding sources.
• Importance of Mangroves:
• Mangroves play a critical role in mitigating climate change by acting as carbon sinks, absorbing significant amounts of carbon dioxide from the atmosphere.
• They provide habitats for diverse marine and terrestrial species, supporting biodiversity conservation.
• Mangroves act as natural barriers, protecting coastal regions from storm surges, tsunamis, and erosion.
• Gujarat’s Coastal Ecosystem:
• Gujarat has India’s longest coastline, stretching over 1,600 kilometers, making it a key region for mangrove conservation.
• The state is home to significant mangrove forests, especially in the Gulf of Kutch and Gulf of Khambhat, which are known for their rich biodiversity.
• Other States’ Efforts:
• Maharashtra: Focused on mangrove conservation in the Mumbai region but lagged behind Gujarat in afforestation efforts.
• Kerala: Emphasized wetland and coastal ecosystem conservation but faced challenges due to limited mangrove cover.
• Uttar Pradesh: Although not a coastal state, it has taken steps to conserve riverine ecosystems but is not directly involved in mangrove afforestation under MISHTI.

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Important Points

• India’s Mangrove Cover:

• According to the India State of Forest Report (ISFR) 2021, India’s total mangrove cover is 4,992 square kilometers, with major contributions from states like Gujarat, West Bengal, and Maharashtra.

• West Bengal leads in mangrove cover due to the Sundarbans, while Gujarat has shown remarkable progress in mangrove afforestation.

• Global Mangrove Conservation:

• Globally, mangrove conservation is aligned with the UN Sustainable Development Goals (SDGs), particularly Goal 13 (Climate Action) and Goal 14 (Life Below Water).

• Organizations like the International Union for Conservation of Nature (IUCN) and the Global Mangrove Alliance actively promote mangrove restoration and protection.

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Q91. Answer: (b) 100GW

The correct answer is 100GW.

Key Points

• Union Budget 2025-26 outlines India’s ambitious target of achieving 100 GW nuclear power capacity by the year 2047, marking the centenary of Indian independence.

• The target aligns with India’s commitment to transitioning towards clean energy, reducing dependence on fossil fuels, and meeting the net-zero emission goals by 2070.

• Nuclear energy is prioritized due to its ability to provide reliable, base-load power with minimal carbon emissions, contributing to India’s sustainability agenda.

• India currently has a nuclear power capacity of approximately 7.48 GW across 22 reactors, and the expansion plan includes setting up new reactors and utilizing advanced technologies like Fast Breeder Reactors (FBRs) and Small Modular Reactors (SMRs).

• The government is actively promoting indigenous development of nuclear technology under the “Make in India” initiative to reduce dependency on foreign expertise and create domestic employment opportunities.

Additional Information

• Current Status of Nuclear Power in India:

• India has 22 operational nuclear reactors, primarily located in states like Tamil Nadu, Maharashtra, Rajasthan, and Gujarat.

• The largest nuclear power plant in India is the Kudankulam Nuclear Power Plant, located in Tamil Nadu, which is being expanded with Russian collaboration.

• India ranks 14th globally in terms of installed nuclear power capacity.

• Advantages of Nuclear Power:

• Low greenhouse gas emissions: Nuclear energy generates electricity with minimal carbon footprint compared to fossil fuels.

• High energy density: A small amount of nuclear fuel can produce a vast amount of energy.

• Reliable base-load power: Unlike renewable sources like solar and wind, nuclear power plants provide consistent electricity output.

• Long-term sustainability: Advanced reactor technologies like FBRs utilize uranium more efficiently, reducing waste.

• Challenges in Nuclear Power Expansion:

• High initial capital cost: Building nuclear power plants requires significant investment in infrastructure and technology.

• Safety concerns: Nuclear accidents like Chernobyl and Fukushima have raised global concerns about reactor safety.

• Radioactive waste management: The disposal and long-term storage of nuclear waste remain a critical issue.

• Public opposition: Resistance from local communities due to environmental and safety concerns can delay projects.

• Key Government Initiatives:

• The is the central public sector enterprise responsible for the development and operation of nuclear power plants.

• Under the ,” India collaborates with countries like Russia, France, and the USA for reactor technology and fuel supply.

• The ” regulates nuclear energy in India, ensuring safe and peaceful usage.

• India is a member of the, which oversees nuclear safety and security worldwide.

• Global Perspective:

• Countries like France and USA heavily rely on nuclear energy, with France generating over 70% of its electricity from nuclear power.

• China is rapidly expanding its nuclear capacity, targeting 70 GW by 2035.

• The European Union has included nuclear energy under its “Green Taxonomy” for sustainable investment.

Important Points

• Fast Breeder Reactors (FBRs):

• India’s Prototype Fast Breeder Reactor (PFBR) in Kalpakkam is expected to play a vital role in achieving the nuclear capacity target.

• FBRs offer higher fuel efficiency by utilizing plutonium and uranium-238 from spent fuel.

• Small Modular Reactors (SMRs):

• SMRs are compact reactors with lower construction costs and shorter installation times, making them suitable for remote areas.

• India is exploring SMR technology for decentralized power generation.

• Thorium Utilization:

• India possesses 25% of the world’s thorium reserves, and research is underway to use thorium in advanced reactors.

• Thorium-based reactors are safer and produce less nuclear waste compared to uranium-based reactors.

• Role of Renewable Energy:

• While nuclear power is significant, India also focuses on expanding its solar, wind, and hydroelectric power capacity to achieve energy security.

• The ” targets 280 GW of solar power by 2030.

Q92. Answer: (d) Rs. 50,000 crore

The correct answer is Rs. 50,000 crore.

Key Points

• The Self-Reliant India (SRI) Fund was established to provide financial support to Micro, Small, and Medium Enterprises (MSMEs), emphasizing their importance in the Indian economy.

• Under the Economic Survey 2024–25, the government announced a corpus of Rs. 50,000 crore for the SRI Fund to boost MSMEs.

• The fund aims to ensure ease of access to equity financing for MSMEs, facilitating their expansion and innovation.

• This initiative aligns with the vision of Aatma Nirbhar Bharat, enabling MSMEs to become globally competitive and self-reliant.

• The SRI Fund will focus on creating opportunities for MSMEs in sectors such as manufacturing, technology, and exports, contributing to sustainable economic growth.

Additional Information

• Role of MSMEs in India:

• Micro, Small, and Medium Enterprises are a vital segment of the Indian economy, contributing around 30% to India's GDP.

• They employ approximately 11 crore people, making them the second-largest employment generator after agriculture.

• MSMEs account for nearly 48% of India’s exports, playing a crucial role in the global supply chain.

• Key Features of the SRI Fund:

• The fund will provide equity support to MSMEs, enabling them to scale operations without the burden of debt financing.

• It is implemented through professional fund managers and institutions to ensure efficient allocation of resources.

• The SRI Fund is expected to generate employment opportunities and enhance technological capabilities within MSMEs.

• Government's Vision for MSMEs:

• The government aims to make MSMEs the backbone of the Aatma Nirbhar Bharat initiative by fostering innovation, enhancing productivity, and ensuring global competitiveness.

• Policy reforms such as collateral-free loans, production-linked incentives (PLI), and simplified compliance requirements have been introduced to support MSMEs.

• Other Important Schemes for MSMEs:

• Credit Guarantee Fund Scheme: Provides collateral-free credit to MSMEs to encourage entrepreneurship.

• Udyam Registration: A simplified process for MSMEs to register and avail benefits under government schemes.

• Prime Minister's Employment Generation Programme (PMEGP): Aims to generate employment opportunities through MSME projects.

Important Points

• Challenges faced by MSMEs:

• Limited access to credit: MSMEs often struggle to secure loans due to high collateral requirements.

• Technological gaps: Many MSMEs operate with outdated technology, affecting their competitiveness.

• Regulatory compliance: Complex regulations and high compliance costs can hinder MSME growth.

• Future Outlook:

• The SRI Fund is expected to boost MSME contributions to India’s GDP and exports, driving the nation’s economic growth.

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• With the right support, MSMEs can become key players in sectors such as renewable energy, e-commerce, and advanced manufacturing.

Q93. Answer: (b) Dennis Francis

The correct answer is Dennis Francis.

Key Points

• Dennis Francis, a diplomat from Trinidad and Tobago, was elected as the 80th President of the United Nations General Assembly (UNGA) in June 2025.

• He is recognized for his extensive experience in international diplomacy, having served as his country's Permanent Representative to the United Nations in New York since 2016.

• His election as the UNGA President emphasizes the importance of representation from smaller states, particularly from the Caribbean region, in global governance.

• The UN General Assembly presidency rotates annually among the five geographic groups: Africa, Asia-Pacific, Eastern Europe, Latin America and the Caribbean, and Western Europe and Others. In 2025, it was the turn of the Latin America and Caribbean Group (GRULAC).

• Francis's priorities as the UNGA President include addressing climate change, promoting sustainable development, and fostering peace and security globally.

Additional Information

• The Role of the UNGA President:

• The President of the UN General Assembly serves as the presiding officer of the General Assembly sessions, which include representatives from all 193 UN member states.

• The President's responsibilities include organizing debates, ensuring the smooth conduct of meetings, and representing the General Assembly at various international forums.

• The position is largely ceremonial, but the President can influence the agenda and highlight critical global issues.

• United Nations General Assembly (UNGA):

• The UNGA is one of the six principal organs of the United Nations and serves as a forum for multilateral discussions on global issues.

• Each member state has one vote, regardless of size or economic power, ensuring equal representation.

• Key responsibilities include approving the UN budget, appointing non-permanent members to the Security Council, and making recommendations on international peace and security.

• Other Prominent Figures Who Have Served as UNGA Presidents:

• Volkan Bozkır (Turkey) was the President of the 75th session in 2020-2021, focusing on issues like the COVID-19 pandemic.

• Abdulla Shahid (Maldives) served as the 76th President in 2021-2022, emphasizing climate change and vaccine equity.

• Trinidad and Tobago's Role in International Diplomacy:

• Trinidad and Tobago is a Caribbean island nation and a member of the Commonwealth of Nations.

• The country has been active in promoting issues related to climate change and sustainable development, particularly for small island developing states (SIDS).

Important Points

• Selection Process for UNGA President:

• The President is elected annually by a simple majority vote of the General Assembly members.

• Candidates are often nominated by their regional groups, and the position rotates among the five geographic regions.

• The Importance of Small States in the UN:

• The election of representatives from small states like Trinidad and Tobago highlights the inclusive nature of the UN.

• Such representation ensures that the concerns of smaller and developing nations are addressed on the global stage.

• UNGA's 2025 Priorities:

• Addressing climate change and its impact on vulnerable regions.

• Promoting global health initiatives, especially in the aftermath of the COVID-19 pandemic.

• Encouraging peacebuilding and conflict resolution in war-torn regions.

Q94. Answer: (d) Visakhapatnam

The correct answer is Visakhapatnam.

Key Points

• Samudra Shakti is a bilateral maritime exercise between the Indian Navy and the Indonesian Navy. It aims to enhance maritime cooperation and strengthen interoperability between the two navies.

• The fifth edition of this exercise, Samudra Shakti – 2025, was conducted from 14 to 17 October 2025 in Visakhapatnam, a key

maritime hub on the eastern coast of India.

• The location, Visakhapatnam, holds strategic importance as it is home to the Eastern Naval Command of the Indian Navy and one of the largest natural harbors in India.

• The exercise focused on various naval operations, including tactical maneuvers, surface warfare exercises, air defense operations, and search and rescue (SAR) missions.

• The primary objective of the drill was to enhance mutual understanding and cooperation between the two navies in safeguarding the regional maritime domain.

Additional Information

• Visakhapatnam:

• It is a port city located on the eastern coast of India in the state of Andhra Pradesh.

• It serves as the headquarters of the Eastern Naval Command, making it a significant maritime and strategic location for the Indian Navy.

• The city is also home to major shipbuilding facilities like the Hindustan Shipyard Limited.

• It hosts the annual International Fleet Review (IFR), showcasing India's naval capabilities.

• Indo-Indonesian Relations:

• India and Indonesia share a strong maritime heritage and a commitment to maintaining peace and security in the Indian Ocean Region (IOR).

• Both countries are members of important regional groupings such as ASEAN and Indian Ocean Rim Association (IORA).

• Cooperation in defense, trade, and culture has been growing steadily over the years, with exercises like Samudra Shakti playing a vital role.

• Indian Navy's Bilateral Exercises:

• Malabar Exercise: Conducted with the navies of the USA, Japan, and Australia.

• Varuna: A bilateral naval exercise between India and France.

• SIMBEX: Conducted with the Republic of Singapore Navy.

• Indo-Pacific Endeavour: Aimed at enhancing regional security and cooperation.

• Importance of Maritime Security:

• The Indian Ocean is a critical region for global trade and energy transportation.

• Maritime exercises like Samudra Shakti help ensure the safety of sea lanes and combat piracy, smuggling, and other illicit activities.

• They also enhance the navy's operational readiness and foster trust among regional partners.

Important Points

• Samudra Shakti:

• The name translates to "Sea Power" and reflects the shared maritime heritage of India and Indonesia.

• The exercise demonstrates the commitment of both nations to ensuring freedom of navigation and upholding international maritime laws.

• Strategic Importance of Visakhapatnam:

• It is a critical naval base for India, enabling rapid deployment of forces in the Bay of Bengal and beyond.

• The location allows monitoring of vital sea routes, including the Malacca Strait, a crucial chokepoint for global shipping.

Q95. Answer: (a) European Union

The correct answer is European Union.

Key Points

• In June 2025, Canada signed a historic defence agreement with the European Union (EU). This agreement was aimed at strengthening cooperation in light of increasing global tensions and geopolitical challenges.

• The agreement focuses on joint efforts in areas such as cybersecurity, military training, and intelligence sharing, addressing modern security threats like cyberattacks and hybrid warfare.

• The partnership signifies a growing bond between Canada and the European Union, highlighting their shared commitment to upholding democratic values and international peace.

• This defence cooperation is also aligned with NATO's objectives, as both Canada and most EU member states are part of this military alliance.

• The agreement comes at a time when global tensions, particularly in regions like Eastern Europe and the Indo-Pacific, are reshaping international security dynamics, emphasizing the need for close collaboration among allies.

Additional Information

• European Union (EU):

• The European Union is a political and economic union comprising 27 member countries, primarily located in Europe.

• It was established by the Maastricht Treaty in 1993 and has a single market, allowing the free movement of goods, services, capital, and people.

• The EU also emphasizes foreign policy coordination, defense cooperation, and addressing global challenges like climate change and security threats.

• Canada's Defence Policies:

• Canada actively participates in several international alliances, including NATO, and emphasizes multilateral cooperation for global peace and security.

• The country has a strong focus on cybersecurity, peacekeeping operations, and countering emerging global threats.

• Global Tensions in 2025:

• Conflicts in regions like Eastern Europe, particularly involving Russia and Ukraine, have heightened global security concerns.

• The rise of China as a global power in the Indo-Pacific region has also led to increased efforts among Western allies to ensure stability and counterbalance geopolitical shifts.

• Canada-EU Relations:

• Canada and the EU already share strong trade relations through the Comprehensive Economic and Trade Agreement (CETA), which came into effect in 2017.

• The defence agreement further enhances their collaboration, expanding beyond trade to include security and strategic concerns.

Q96. Answer: (d) India

The correct answer is India.

Key Points

• The ICC Under-19 Women's T20 World Cup 2025 was held in Malaysia in January 2025.

• This tournament marked a significant milestone for women's cricket, encouraging young talent and promoting the sport globally.

• India emerged victorious in the tournament, showcasing exceptional performances throughout.

• The Indian team demonstrated consistent dominance, excelling in both batting and bowling departments.

• The win further cemented India's position as a leading nation in women's cricket, inspiring aspiring players worldwide.

Additional Information

• Women's Cricket Growth:

• Over the years, women's cricket has seen significant growth in terms of participation, viewership, and sponsorship.

• Events like the Under-19 Women's T20 World Cup provide a platform for young talents to showcase their skills.

• India has invested heavily in the development of women's cricket infrastructure, enabling players to compete at the highest levels.

• India's Performance:

• The Indian team has consistently performed well in international tournaments, including the senior-level World Cups.

• India's victory in the Under-19 Women's T20 World Cup highlights the strength of their youth development programs.

• Key players from this tournament are likely to transition to the senior team, strengthening India's future squads.

• Malaysia as Host:

• Malaysia provided excellent facilities for hosting the ICC Under-19 Women's T20 World Cup 2025, ensuring smooth execution of matches.

• The choice of venue underscored the ICC's commitment to promoting cricket in non-traditional cricketing nations.

• Impact on Women's Cricket:

• This tournament served as a stepping stone for many young players aiming to make their mark in international cricket.

• The increasing focus on women's cricket aligns with global efforts to ensure gender equality in sports.

Q97. Answer: (c) Rs. 3,794.30 crore

The correct answer is Rs. 3,794.30 crore.

Key Points

• The Indian government has allocated a sports budget of Rs. 3,794.30 crore for the fiscal year 2025-26. This reflects a focus on enhancing sports infrastructure, training, and athlete development across the country.

• This allocation is aimed at supporting various initiatives under the Ministry of Youth Affairs and Sports, including the Khelo India Programme, which is a flagship scheme for promoting grassroots sports development and talent identification.

• A significant portion of the budget is expected to be utilized for preparing Indian athletes for upcoming international events, such as the Olympics, Asian Games, and Commonwealth Games, ensuring they receive world-class training and facilities.

• The allocation also includes funding for the development of sports facilities in rural and urban areas to make them accessible to

a wider audience and encourage participation in sports.

• This budgetary increase aligns with India's long-term vision of becoming a global powerhouse in sports and fostering a culture of fitness and physical activities among its citizens.

Additional Information

• Khelo India Programme:

• The Khelo India Programme was launched in 2018 to revive the sports culture in India at the grassroots level through organized talent identification, nurturing, and infrastructure creation.

• It covers various components, including sports infrastructure development, talent development, and financial assistance to athletes.

• This program also promotes inclusivity by targeting rural and underprivileged communities to participate in sports actively.

• Target Olympic Podium Scheme (TOPS):

• Launched in 2014, the TOPS program aims to identify and support athletes with medal-winning potential for the Olympics.

• The scheme provides financial support, access to world-class coaching, and exposure to international competitions.

• The budget allocation for sports in 2025-26 is expected to include funds for the TOPS program to enhance its effectiveness.

• Sports Infrastructure Development:

• India has been focusing on building state-of-the-art sports infrastructure to host international events and provide athletes with modern training facilities.

• Programs like the Urban Sports Infrastructure Scheme (USIS) aim to create sports facilities in urban areas.

• Rural Sports Development:

• The government has emphasized the development of sports in rural areas through initiatives like Panchayat Yuva Krida aur Khel Abhiyan (PYKKA).

• This ensures equitable access to sports facilities and promotes participation from all sections of society.

Important Points

• Global Context:

• India's sports budget allocation aligns with global trends where governments are increasingly investing in sports to foster international competitiveness and promote national pride.

• Countries like China and USA invest heavily in sports to dominate international events like the Olympics.

• Employment Generation:

• Sports development contributes to employment generation through opportunities for athletes, coaches, physiotherapists, and event management professionals.

• Social Benefits:

• Investments in sports help foster a culture of discipline, teamwork, and fitness, which are essential for societal well-being.

Q98. Answer: (a) It supports voice and text in multiple Indian languages.

The correct answer is It supports voice and text in multiple Indian languages..

Key Points

• "Kruti", launched by Ola's Krutrim in 2025, is a cutting-edge AI platform designed to cater to the diverse linguistic needs of India.

• The platform is specifically designed to support voice and text interfaces in multiple Indian languages, addressing a significant barrier to technology adoption in a linguistically diverse country like India.

• It aims to provide an inclusive experience for users from different linguistic backgrounds, enabling greater accessibility and usability for non-English speakers in India.

• This multilingual functionality ensures that the platform can cater to users across urban and rural areas, making it highly adaptable to India's socio-cultural diversity.

• The introduction of "Kruti" aligns with the broader goal of leveraging AI and natural language processing to bridge technological gaps and empower users in their native languages.

Additional Information

• Features of "Kruti":

• "Kruti" is built using advanced Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies to ensure accurate voice and text recognition in multiple Indian languages.

• The platform supports regional languages such as Hindi, Tamil, Telugu, Bengali, Marathi, and Kannada, among others, ensuring broad regional coverage.

• It is designed for seamless integration with various applications, including navigation, ride-hailing, e-commerce, and customer service platforms.

• By supporting local languages, "Kruti" reduces dependency on English-centric interfaces, making technology more accessible to rural and semi-urban populations.

• Why Multilingual Support is Important:

• India has over 22 scheduled languages and hundreds of regional dialects, making multilingual support crucial for inclusivity in technology.

• According to the 2011 Census, only about 10% of India's population speaks English, highlighting the need for platforms like "Kruti" to cater to the majority.

• Multilingual interfaces can improve digital literacy, especially in rural areas where regional languages dominate.

• It aligns with the government's initiatives, such as "Digital India", aimed at empowering citizens through technology.

• Comparison with Other Options:

• Option 2: The claim that "Kruti" is optimized only for English interfaces is incorrect, as its primary feature is multilingual support.

• Option 3: While "Kruti" is designed to be inclusive, it is not restricted to rural areas and can be used across urban and rural settings.

• Option 4: The statement that "Kruti" works solely with proprietary hardware is false. It is designed for compatibility across multiple platforms and devices.

• Applications of "Kruti":

• It enhances the user experience in ride-hailing services by providing voice and text support in native languages.

• It can be integrated into customer support systems to address queries in regional languages.

• "Kruti" can be used in education and e-learning platforms to deliver content in multiple languages, bridging the linguistic gap in education.

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Q99. Answer: (a) Mahatma Gandhi (New) Series

The correct answer is Mahatma Gandhi (New) Series.

Key Points

• The Mahatma Gandhi (New) Series was introduced by the Reserve Bank of India (RBI) in November 2016 after the demonetization of Rs. 500 and Rs. 1000 notes.

• This series features enhanced security features such as micro-lettering, intaglio printing, and a color-shifting security thread to ensure counterfeit deterrence.

• Each denomination in the series has a unique color scheme and motif that reflects India's cultural heritage. For instance, the Rs. 20 note in the Mahatma Gandhi (New) Series features the motif of Ellora Caves on the reverse side.

• The front side of the note features a portrait of Mahatma Gandhi, the RBI emblem, and other security elements like watermark and electrotype.

• The size and dimensions of the notes under this series vary for each denomination, making them user-friendly for visually impaired individuals.

Additional Information

• Azadi Ka Amrit Mahotsav Series:

• This series does not exist as of now. It is a hypothetical option included in the question.

• The term "Azadi Ka Amrit Mahotsav" refers to the celebration of 75 years of Indian Independence, but no specific currency series has been launched under this name.

• Gandhi Heritage Series:

• The Gandhi Heritage Series pertains to special commemorative coins and stamps launched by the Government of India to honor Mahatma Gandhi's legacy.

• This series is not related to the issuance of banknotes.

• Mahatma Gandhi (Old) Series:

• This series was introduced in 1996 and remained in circulation until the introduction of the Mahatma Gandhi (New) Series in 2016.

• It included denominations such as Rs. 10, Rs. 20, Rs. 50, Rs. 100, Rs. 500, and Rs. 1000, all featuring Mahatma Gandhi's portrait.

• The series lacked advanced security features compared to the New Series and was phased out gradually.

Important Points

• Ellora Caves:

• Located in the state of Maharashtra, the Ellora Caves are a UNESCO World Heritage Site.

• The caves are renowned for their rock-cut architecture, representing three major religions: Hinduism, Buddhism, and Jainism.

• The motif of Ellora Caves on the Rs. 20 note highlights India's rich cultural and historical heritage.

• Security Features in Mahatma Gandhi (New) Series:

• Color-shifting security thread to prevent counterfeiting.

• Micro-lettering of denomination for enhanced authentication.

• Raised printing for visually impaired individuals.

• Watermark of Mahatma Gandhi and electrotype numeral for easy identification.

• Introduction Timeline:

• Rs. 500 and Rs. 2000 notes in the Mahatma Gandhi (New) Series were the first denominations introduced during demonetization in November 2016.

• Other denominations like Rs. 10, Rs. 20, Rs. 50, and Rs. 100 were gradually introduced in subsequent years.

Q100. Answer: (c) Doha Diamond League

The correct answer is Doha Diamond League.

Key Points

• Neeraj Chopra, India's ace javelin thrower, achieved his national record throw of 90.23 meters during the Doha Diamond League event held in 2025.

• The Doha Diamond League is an international athletics event that serves as one of the prestigious meets in the Diamond League series, which attracts elite athletes from across the globe.

• The record-breaking performance by Neeraj Chopra at the Doha Diamond League further solidified his position as one of the leading javelin throwers globally and marked a historic milestone for Indian athletics.

• Neeraj Chopra's throw of 90.23 meters surpassed his previous best and demonstrated his consistent improvement in technique, strength, and performance.

• The event was conducted under the World Athletics regulations, ensuring the accuracy and legitimacy of the recorded distances.

• This achievement not only showcased Neeraj Chopra's exceptional skill but also highlighted India's growing presence in international athletics competitions.

Additional Information

• Neeraj Chopra's Career Highlights:

• Neeraj Chopra became a global sensation after winning the gold medal in javelin throw at the Tokyo Olympics 2021, making him the first Indian to achieve this feat in athletics.

• He also won the gold medal at the Commonwealth Games 2018 held in Gold Coast, Australia.

• His consistent performances have earned him accolades such as the Rajiv Gandhi Khel Ratna Award, India's highest sporting honor.

• Neeraj Chopra has been a prominent figure in popularizing athletics in India and inspiring young athletes to pursue sports at an international level.

• Doha Diamond League:

• The Doha Diamond League is part of the Diamond League series, which is an annual series of elite track and field competitions organized by World Athletics.

• Held in Doha, Qatar, the event attracts top athletes from around the globe and serves as a platform for world-class performances.

• The competition is known for its high-quality facilities and favorable conditions for athletes, making it ideal for record-breaking performances.

• Javelin Throw in Athletics:

• The javelin throw is a track and field event where athletes aim to throw a spear-like implement, known as a javelin, as far as possible.

• The sport requires a combination of strength, speed, and technique for optimal performance.

• The javelin used in international competitions must meet specific specifications set by World Athletics, including its weight, length, and balance.

• Indian Athletics Achievements:

• India has made significant strides in athletics, with athletes like Neeraj Chopra, Hima Das, and Anju Bobby George earning recognition on the global stage.

• Government initiatives such as Target Olympic Podium Scheme (TOPS) have played a crucial role in supporting elite athletes.

• India's improved performance in athletics is a testament to the growing investment in sports infrastructure, coaching, and training programs.

Important Points

• Javelin Specifications: The javelin used in international competitions must weigh 800 grams for men and 600 grams for women and should be made of metal or composite material.

• Neeraj Chopra's Training: He trains under world-class coaches and utilizes advanced techniques and equipment to enhance his

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performance.

• Performance Metrics: Key factors influencing a javelin throw include the angle of release, speed, and grip technique.

• World Record: The current world record for men's javelin throw is held by Jan Železný of the Czech Republic, with a throw of 98.48 meters in 1996.

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