RRB NTPC (UG) CBT-I Official Paper (Held On 14 Jun, 2026 Shift 2) (Previous Year Paper)

RRB NTPC • 2026 • 100 questions • 90 minutes • Answer key and solutions

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MATHEMATICS

Q1. An article marked at Rs. 1,250 is sold at two successive discounts such that the selling price becomes Rs. 900. If the first discount is 20%, what is the second discount?

(a) 15%
(b) 12%
(c) 10%
(d) 8%

Q2. Find the mean proportional between (2 + √3) and (10 - √75).

(a) √2
(b) √5
(c) √3
(d) 2+√3

Q3. A cylindrical tank has a diameter of 12 m and a height of 10 m. If the tank is closed at both ends, what is the ratio of its curved surface area to its total surface area?

(a) 4:7
(b) 3:5
(c) 5:8
(d) 2:5

Q4. Two taps can fill a cistern in 4 hours and 22 hours, respectively. A third tap can empty it in 22 hours. How long (in hours) will it take to fill one-fourth of the empty cistern if all the taps are opened together?

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

Q5. A tank is filled by two pipes, A and B, and emptied by a third pipe C. Pipe A fills the tank in 10 hours and pipe B in 15 hours. Pipe C empties it in 20 hours. If all three pipes are opened together, and pipe C is closed after 4 hours, how much total time will it take to fill the tank?

(a) 8 hours
(b) 7.5 hours
(c) 7.2 hours
(d) 8.2 hours

Q6. A train overtakes two runners moving in the same direction at speeds of 5 km/h and 7 km/h, passing them completely in 18 seconds and 20 seconds, respectively. What is the length of the train (in metres)?

(a) 70
(b) 90
(c) 100

(d) 80

Q7. A shopkeeper sells two types of pens, A and B. The total number of pens sold in a day is 120. The price of pen A is Rs. 12 each and pen B is Rs. 8 each. If the total sale amount is Rs. 1120, how many pens of type A did he sell?

(a) 80
(b) 70
(c) 40
(d) 50

Q8. Simplify: 340/17 × 156/13 + 1484/28 - 14/10

(a) 291.6
(b) 261.6
(c) 271.6
(d) 281.6

Q9. Evaluate $22^3 + (-18)^3 + (-4)^3$

(a) 4800
(b) 4752
(c) 4819
(d) 4617

Q10. The mean proportional between 12 and a number is twice the mean proportional between 9 and 16. Find the number.

(a) 60
(b) 48
(c) 72
(d) 56

Q11. The largest four-digit number which when divided by 10, 11 and 8 leaves remainder 7 in each case is:

(a) 9687
(b) 9557
(c) 9398
(d) 9978

Q12. The average of 12 numbers is 38. If two more numbers 50 and 62 are included, the new average is (Round off your answer to two decimal places.)

(a) 41.57
(b) 39.57
(c) 38.57
(d) 40.57

Q13. X, Y, and Z enter into a partnership. X invests Rs. 60,000 for 12 months, Y invests Rs. 80,000 for 6 months, and Z invests Rs. 1,20,000 for 4 months. If the total profit is Rs. 77,000, what is the share of Z?

(a) Rs. 18,000
(b) Rs. 24,000
(c) Rs. 20,000
(d) Rs. 22,000

Q14. A shirt originally costing Rs. 800 is first decreased by 30% and then increased by 15%. What is its new price?

(a) Rs. 750
(b) Rs. 714
(c) Rs. 680
(d) Rs. 644

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Q15. 4 years ago, the age of Shyam was seven times the age of his son, Rajat. After 8 years, Shyam's age will be three times the age of Rajat. Find the present age of Shyam.

(a) 45 years
(b) 42 years
(c) 38 years
(d) 46 years

Q16. Nitin sells two articles for Rs. 2,973 each with no profit, no loss in the entire transaction. If one article was sold at a gain of 50%, then the other article is sold at a loss of:

(a) 22%
(b) 27%
(c) 25%
(d) 26%

Q17. The measure of an interior angle of a regular polygon is 162°. Find the number of sides of the polygon.

(a) 20
(b) 12
(c) 18
(d) 22

Q18. From the top of a cliff 80 meters high, the angles of depression of two ships in the same direction are 30° and 60°. Find the distance between the ships (rounded off to two decimal places).

(a) 92.18 meters
(b) 92.58 meters
(c) 92.78 meters
(d) 92.38 meters

Q19. Find the value of {((3)^(-5) × (8)^5 × $(125)^3$ × $(36)^3$)/((100)^4 × 256 × 216 × $(2)^2$)}.

(a) 2/7
(b) 5/9
(c) 4/5
(d) 3/8

Q20. A delivery rider travels from Warehouse A to Store B, a distance of 48 km, at a speed of 32 km/hr. On the return journey along the same route, due to traffic, he travels at a speed of 24 km/hr. What is the rider's average speed for the entire trip? (Round off up to two decimal places.)

(a) 26.85 km/hr
(b) 24.56 km/hr
(c) 27.43 km/hr
(d) 23.74 km/hr

Q21. The original price of a refrigerator was $1,500. During a clearance sale, it was initially discounted by 30%, followed by an additional 10% discount on the reduced price. What is the total percentage discount applied to the refrigerator?

(a) 37%
(b) 35%
(c) 30%
(d) 40%

Q22. Find the rate of interest at which the simple interest on Rs. 15,000 for 4 years is Rs. 3,600.

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

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Q23. Find the mean of the following data.

Class interval	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	4	6	7	3	12	8

(a) 29.3
(b) 25.2
(c) 27.4
(d) 30.5

Q24. Simplify: (cbrt4096/4√10000) × 5/48 × 186
(a) 36
(b) 30
(c) 29
(d) 31

Q25. The marked price of an article is Rs. 500. During a sale, its price is reduced to Rs. 450. What is the percentage decrease in price?
(a) 5%
(b) 8%
(c) 10%
(d) 12%

Q26. Which of the following is a pair of co-primes?
(a) 27 and 36
(b) 44 and 99
(c) 25 and 36
(d) 42 and 56

Q27. A shopkeeper marks the price of sugar 24% above the cost price and gives a discount of 18%, but uses a weight of 800 grams instead of 1 kg. Find his overall profit percentage.
(a) 28%
(b) 26%
(c) 25.4%
(d) 27.1%

Q28. Two banks, A and B, offered loans at 3.5% and 6.5% per annum, respectively. Ajay borrowed an amount of Rs. 2,60,000 from each bank. Find the positive difference between the amounts of simple interest (in Rs.) paid to the two banks by Ajay after 2 years.
(a) 17,100
(b) 15,600
(c) 15,100
(d) 16,600

Q29. The sides of a rectangular field are 55 m and 70 m long. Its area is equal to the area of a circular field. What is the perimeter (in m) of the circular field?
(Take π = 22/7)
(a) 197
(b) 181
(c) 174
(d) 220

Q30. Find the least value of (4K²+2M) for which the five digits number 7KM93 is divisible by 9.
(a) 12
(b) 27
(c) 14

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(d) 16

GENERAL AWARENESS

Q31. The First War of Independence (1857) began at which place?

(a) Delhi
(b) Lucknow
(c) Kanpur
(d) Meerut

Q32. A solution is prepared by dissolving 15 g of salt in 585 g of water. Calculate the mass percent (w/w) of the solution.

(a) 0.5%
(b) 1.5%
(c) 2.5%
(d) 2.1%

Q33. A disk defragmenter rearranges file fragments on a hard drive for faster access. Why is this tool classified as system software rather than application software?

(a) It primarily maintains and optimizes storage resources, not domain tasks like writing letters.
(b) It only works on removable media.
(c) It is always visible to the user.
(d) It requires Internet access to run.

Q34. Which of the following islands of India is closest to the Malabar Coast?

(a) Nicobar Islands
(b) Lakshadweep
(c) Andaman Islands
(d) Diu Island

Q35. What is a unitary feature of the Constitution of India?

(a) Bicameral legislature
(b) Dual government
(c) Integrated judiciary
(d) Supremacy of the Constitution

Q36. Which Indian ruler was the first to enter into a Subsidiary Alliance with the British in 1798?

(a) Maharaja of Jaipur
(b) Nawab of Oudh
(c) Nizam of Hyderabad
(d) Maharaja of Mysore

Q37. The basic unit of memory used by a computer to store binary data is called a:

(a) Byte
(b) Nibble
(c) Bit
(d) Word

Q38. What is the first phase of Kerala's Motor Vehicle Department (MVD) child safety rule implementation conducted in October 2024?

(a) Enforcement with penalties
(b) Social media awareness campaign
(c) Distribution of child restraint systems
(d) Stopping and warning violators

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Q39. The 42nd Amendment placed tribunals under which Part of the Constitution?

(a) Part XV
(b) Part XIV-A
(c) Part IX-B
(d) Part XII

Q40. In a population pyramid, a narrow base and a wider top are most likely to indicate which of the following?

(a) High birth rates and low death rates
(b) Low birth rates and high life expectancy
(c) Low birth rates and low life expectancy
(d) High birth rates and high death rates

Q41. Which of the following is the most important port-based industrial region in India?

(a) Hyderabad–Bengaluru corridor
(b) Hooghly industrial belt
(c) Ahmedabad–Vadodara region
(d) Chotanagpur plateau region

Q42. How did Sayyid Ahmad Khan's Aligarh Movement differ from the Arya Samaj?

(a) Aligarh Movement rejected modern learning, while Arya Samaj discouraged rational thinking.
(b) Aligarh Movement supported Western-style education, while Arya Samaj promoted Vedic studies.
(c) Aligarh Movement encouraged priestly control, while Arya Samaj rejected monotheism.
(d) Aligarh Movement opposed science, while Arya Samaj rejected old scriptures.

Q43. Where did the Prime Minister of India chair the 7^(th) National Board for Wildlife meeting in March 2025?

(a) Pench National Park
(b) Gir National Park
(c) Satpura Tiger Reserve
(d) Sariska Tiger Reserve

Q44. Starch, a major component of flour and potatoes, is a polysaccharide. What chemical process occurs when starch is heated with water?

(a) Gelatinization
(b) Saponification
(c) Caramelization
(d) Fermentation

Q45. Who among the following personalities received the Bharat Ratna in 2008 and is widely famous with his performance in 'Mile Sur Mera Tumhara'?

(a) Pandit Bhimsen Joshi
(b) Gangubai Hangal
(c) Bade Fateh Ali Khan
(d) Nayak Gopal

Q46. Which of the following sites has yielded Acheulian, Middle and Upper Palaeolithic and Mesolithic levels?

(a) Adamgarh in Madhya Pradesh
(b) Paisra in Munger district, Bihar
(c) Bhimbetka Rock Shelters in Madya Pradesh
(d) Chirki-Nevasa in Maharashtra

Q47. The largest freshwater lake in India is:

(a) Wular Lake
(b) Loktak Lake
(c) Chilika Lake
(d) Dal Lake

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Q48. As of Union Budget 2025-26, what is the proposed size of the new Fund of Funds for Startups?

(a) Rs. 10,000 crore
(b) Rs. 12,000 crore
(c) Rs. 5,000 crore
(d) Rs. 7,500 crore

Q49. By what percentage did rural road connectivity improve under the Pradhan Mantri Gram Sadak Yojana (PMGSY) between 2000 and 2020, according to the Ministry of Rural Development?

(a) 65%
(b) 55%
(c) 80%
(d) 40%

Q50. Which of the following machines was designed by Charles Babbage?

(a) Atanasoff–Berry Computer
(b) UNIVAC
(c) ENIAC
(d) Analytical Engine

Q51. Consider the following statements about Right to Information (RTI) and choose the correct option.

I. RTI has become a weapon to ensure maximum fairness and transparency.

II. RTI Act has also been used to enhance the efficiency of the working of the Consumer Forums.

(a) Only II is correct
(b) Neither I nor II is correct
(c) Both I and II are correct
(d) Only I is correct

Q52. In 2025, which Caribbean Island nation conferred the Honorary Order of Freedom on Indian Prime Minister Narendra Modi?

(a) Trinidad and Tobago
(b) Barbados
(c) Saint Lucia
(d) Jamaica

Q53. The zone on Earth where no S-waves are detected is known as:

(a) Seismic belt
(b) Shadow zone
(c) Active zone
(d) Epicentral gap

Q54. In March 2026, Jose Antonio Kast took oath as the President of which of the following countries?

(a) Chile
(b) Argentina
(c) Peru
(d) Brazil

Q55. Who commissioned the Konark Sun Temple?

(a) Ashoka
(b) Chandragupta II
(c) Harshavardhana
(d) Narasimhadeva I

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Q56. Which of the following countries became a member of the BRICS' New Development Bank in May 2025?

(a) Algeria
(b) Luxumberg
(c) Ethopia
(d) Tiawan

Q57. Which term in the Preamble indicates that India has an elected head of state, NOT hereditary?

(a) Secular
(b) Socialist
(c) Sovereign
(d) Republic

Q58. Which of the following keyboard shortcuts is used to paste copied content?

(a) Ctrl + V
(b) Ctrl + F
(c) Ctrl + S
(d) Ctrl + C

Q59. Swami Vivekananda represented India at which international event in 1893?

(a) Chicago World's Parliament of Religions
(b) First Indian National Congress
(c) Hague Peace Conference
(d) London Missionary Conference

Q60. What is the approximate speed of sound in air at room temperature (approximately 20°C)?

(a) 5000 m/s
(b) 1500 m/s
(c) 343 m/s
(d) 300 m/s

Q61. The Fundamental Duties suggested by the Swaran Singh Committee were incorporated through which Constitutional Amendment?

(a) 44^(th) Amendment
(b) 40^(th) Amendment
(c) 42^(nd) Amendment
(d) 48^(th) Amendment

Q62. "The Argumentative Indian," a book discussing Indian history and culture, is authored by:

(a) Ramachandra Guha
(b) Shashi Tharoor
(c) Jawaharlal Nehru
(d) Amartya Sen

Q63. In which of the following media does sound move the fastest at a particular temperature?

(a) Air
(b) Water
(c) Iron
(d) Vaccum

Q64. Which new industries grew after 1991 due to economic reforms?

(a) Oil and Gas only
(b) Space and Nuclear
(c) Banking and Information Technology
(d) Railways and Defence

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Q65. Population density is defined as the number of people per:

(a) Total population
(b) Unit of land area
(c) Urban center
(d) Arable land

Q66. Which union ministry primarily organized the national-level celebration for the 150^(th) anniversary of ‘Vande Mataram’?

(a) Ministry of Home Affairs
(b) Ministry of Culture
(c) Ministry of Education
(d) Ministry of Youth Affairs and Sports

Q67. What is the meaning of globalisation?

(a) Reduction in the volume of international trade
(b) Expansion of state ownership across major industries
(c) Economic isolation of countries from global markets
(d) Integration of a country’s economy with the world economy

Q68. Karagattam, a popular folk dance of Tamil Nadu performed mainly by women balancing decorated pots, is dedicated to which deity?

(a) Goddess Mariamman
(b) Goddess Kamakshi
(c) Goddess Andal
(d) Goddess Meenakshi

Q69. Through which two Indian states will the newly approved Greenfield High-Speed Corridor, sanctioned in April 2025, pass?

(a) Arunachal Pradesh and Sikkim
(b) Meghalaya and Assam
(c) Tripura and Mizoram
(d) Manipur and Nagaland

Q70. The Gram Nyayalayas Act was enacted in which of the following years?

(a) 2006
(b) 2005
(c) 2002
(d) 2008

GENERAL INTELLIGENCE AND REASONING

Q71. In a certain code language, ‘queen chin steak’ is coded as ' kc eq rq' and ‘steak arch food’ is coded as ‘yg kc mz’.

How is ‘steak’ coded in the given language?

(a) kc
(b) yg
(c) eq
(d) rq

Q72. 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 one 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 pairs.)

(a) KM – HA
(b) BE-YR

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(c) MP – JC
(d) OR-LE

Q73. 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?

22 C 10 D 9 A 21 B 42 = ?

(a) 12
(b) 15
(c) 14
(d) 16

Q74. Based on the alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) RQT
(b) BAE
(c) EDH
(d) AZD

Q75. In a certain code language,

A @ B means ‘A is the mother of B’,
A × B means ‘A is the wife of B.'
A + B means ‘A is the brother of B,' and
A ÷ B means ‘A is the father of B.'.
How is S related to H if ‘S × D + R @ Y ÷ H’?

(a) Father's mother's brother's daughter
(b) Father's mother's brother's wife
(c) Father's brother's wife
(d) Brother's wife

Q76. Refer to the following letter series and answer the question. (Counting to be done from left to right only.)

(Left) V A R V Y R A C M W S A I G Z O W V R R F (Right)

How many such vowels are there, each of which is immediately preceded by a consonant and also immediately followed by a consonant?

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

Q77. Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order. Only five boxes are kept above D. Only three boxes are kept between D and C. Only four boxes are kept between C and S. Only E is kept between C and B. R is kept at one of the positions above C. How many boxes are kept between Q and S?

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

Q78. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

DXN HCR LHV PMZ ?

(a) USC
(b) TRD
(c) SQE
(d) TSC

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Q79. R, E, A, D, I, N and G are sitting around a circular table, facing the centre of the table.

Only two people sit between R and G when counted from the right of R. Only three people sit between D and N when counted from the right of N. G sits to the immediate right of N. A sits to the immediate right of I.

Who sits fourth to the right of E?

(a) G
(b) R
(c) A
(d) N

Q80. In a certain code language,

A ^ B means ‘A is the mother of B’,

A ÷ B means ‘A is the daughter of B’,

A ! B means ‘A is the wife of B’, and

A √ B means ‘A is the father of B’.

Based on the above, how is T related to Z if 'T √ U ÷ V ^ W ! Z'?

(a) Wife's brother
(b) Wife's father
(c) Father's brother
(d) Brother's son

Q81. Select the triad that follows the same pattern as the one followed by the two triads given below. Both triads follow the same pattern.

PK - QL - RT

RM - SN - TV

(a) KG - MI - NO
(b) LG - MH - NP
(c) LG - MH - NO
(d) KG - MH - NO

Q82. Select the triad that follows the same pattern as that followed by the two triads given below. Both triads follow the same pattern.

JS-BJ-SB

LU-DL-UD

(a) NW-FN-WR
(b) NW-FN-OP
(c) NW-FN-KL
(d) NW-FN-WF

Q83. Each of the digits in the number 2536841 is arranged in ascending order from left to right. What will be the sum of the digits that are second from the left and second from the right in the new number thus formed?

(a) 8
(b) 10
(c) 11
(d) 7

Q84. Read the given statement(s) 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 statement(s).

Statements:

All diesels are petrol.

Some petrol are fuels.

Conclusions:

(I) No fuel is petrol.

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(II) No petrol is diesel.

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

Q85. Sikar starts from Point A and drives 17 km towards the north. He then takes a left turn, drives 14 km, turns left and drives 18 km. He then takes a left turn and drives 19 km. He takes a final left turn, drives 1 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 4 km to the east
(b) 5 km to the west
(c) 6 km to the west
(d) 3 km to the west

Q86. Seven people A, B, D, J, O, T and Z are sitting in a row, facing north. Only two people sit to the left of O. Only three people sit between O and Z. Only one person sits between Z and D. A sits to the immediate left of J. B is not an immediate neighbor of Z. Who sits immediately to the right of D?

(a) T
(b) Z
(c) B
(d) O

Q87. Select the pair which follows the same pattern as that followed by the two sets of pairs given below. Both pairs follow the same pattern.

FHI : GBE

KXN : LRJ

(a) BNU : CHQ
(b) MHD : NBA
(c) FKK : GEH
(d) HLP : IFM

Q88. Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order. No box is kept above E. Only B is kept between E and Q. Only R is kept below C. Only one box is kept between Q and D. How many boxes are kept between S and R?

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

Q89. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

RU29 QT37 PS45 OR53 ?

(a) NR62
(b) NQ62
(c) NR61
(d) NQ61

Q90. 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 etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

13, 196

17, 324

(a) 18, 381

(b) 19, 361
(c) 21, 400
(d) 15, 256

Directions

Q91. If 'A' stands for '÷', 'B' stands for '×', 'C' stands for '+' and 'D' stands for '−', what will come in place of the question mark '?' in the following equation?

9 A 3 C 15 B 2 = ? D 10

(a) 39
(b) 43
(c) 33
(d) 34

Q92. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. You have to decide which conclusions logically follow/s from the given statements.

Statements: All fans are motors. All motors are scooters.

Conclusion (I) : Some scooters are motors

Conclusion (II) : All fans are scooters

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

Q93. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) QOL
(b) IGD
(c) GFB
(d) KIF

Q94. Each vowel in the word BACKLOG is changed to the letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order. Which of the following letters will appear exactly twice in the new group of letters thus formed?

(a) P
(b) K
(c) J
(d) B

Q95. What should come in place of ? in the given series based on the English alphabetical order?

TWY VYA XAC ZCE ?

(a) BFF
(b) BCE
(c) BDF
(d) BEG

Q96. What should come in place of '?' in the given series?

184 164 145 127 110 94 ?

(a) 75
(b) 83
(c) 81
(d) 79

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Q97. What should come in place of '?' in the given series?

9 ? 18 45 109 234

(a) 15
(b) 10
(c) 17
(d) 12

Q98. In a certain code language, 'hall menu peak' is coded as 'yy ae wp' and 'peak boat owner' is coded as 'mr yy sf'. How is 'peak' coded in that language?

(a) ae
(b) yy
(c) mr
(d) wp

Q99. Refer to the following number series and answer the question. (All numbers are single-digit numbers only. Counting to be done from left to right only.)

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

How many such even digits are there, each of which is immediately preceded by an even digit and also immediately followed by an even digit?

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

Q100. Seven boxes, L, M, N, O, P, Q and R, are kept one over the other, but not necessarily in the same order.

P is kept second from the top. Only three boxes are kept between L and M. N is kept immediately before P. Only M is kept after O. R is kept immediately above O.

How many boxes are kept between Q and M?

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

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) 10%

Shortcut Trick

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Price after 20% discount = 1250 − 250 = Rs. 1,000

Final Selling Price = Rs. 900

Amount of second discount = 1000 − 900 = Rs. 100

Second Discount percentage = (100 ÷ 1000) × 100 = 10%

Therefore The correct answer is 10%.

Alternate Method

Given: Marked Price (MP) = Rs. 1,250, First Discount (D1) = 20%, Final Selling Price (SP) = Rs. 900

Formula: Selling Price = MP × (100 − D1)% × (100 − D2)%

=> Price after first discount = 1250 × (100 − 20) ÷ 100

=> Price after first discount = 1250 × 0.8 = Rs. 1,000

=> Now, the second discount is applied on Rs. 1,000 to get Rs. 900

=> Second Discount amount = 1000 − 900 = Rs. 100

=> Second Discount % = (Discount Amount ÷ Previous Price) × 100

=> Second Discount % = (100 ÷ 1000) × 100 = 10%

Therefore The correct answer is 10%.

Additional Information

Successive Discounts Formula

When two discounts 'a%' and 'b%' are given successively, the equivalent single discount is given by: [a + b − (a × b ÷ 100)]%.

Marked Price (MP) and Discount

Discount is always calculated on the Marked Price. The price obtained after subtracting the discount from the MP is the Selling Price (SP).

Relationship between SP and MP

SP = MP × [(100 − D1) ÷ 100] × [(100 − D2) ÷ 100] × ... × [(100 − D_n) ÷ 100].

Q2. Answer: (b) √5

Shortcut Trick

Simplify the second term: 10 − √75 = 10 − 5√3 = 5(2 − √3).

The numbers are (2 + √3) and 5(2 − √3).

Product = 5 × (2 + √3)(2 − √3) = 5 × (4 − 3) = 5.

Mean proportional = √Product = √5.

Therefore The correct answer is √5.

Alternate Method

Given:

First number (a) = 2 + √3

Second number (b) = 10 − √75

Formula Used:

The mean proportional between two numbers a and b is given by x = √(a × b).

=> First, simplify b = 10 − √(25 × 3) = 10 − 5√3

=> Factor out 5: b = 5(2 − √3)

=> Now, x = √[(2 + √3) × 5(2 − √3)]

=> x = √[5 × (2 + √3)(2 − √3)]

=> Using algebraic identity (a + b)(a − b) = $a^2 − b^2$:

=> x = √[5 × (2^2 − (√3)²)]

=> x = √[5 × (4 − 3)]

=> x = √[5 × 1] = √5

Therefore The correct answer is √5.

Additional Information

Mean Proportional

The mean proportional of two numbers a and b is x if a:x = x:b, which results in the formula x = √(ab).

Third Proportional

For two numbers a and b, the third proportional c is such that a:b = b:c, given by c = b^2/a.

Conjugate Surds

Surds of the form $(p + \sqrt{q})$ and $(p - \sqrt{q})$ are conjugates; their product is always a rational number $(p^2 - q)$.

Q3. Answer: (c) 5:8

Shortcut Trick

For any closed cylinder, the ratio of Curved Surface Area (CSA) to Total Surface Area (TSA) is always h : (r + h).

Given Height (h) = 10 m and Radius (r) = 12 ÷ 2 = 6 m.

Required Ratio = 10 : (6 + 10) = 10 : 16 = 5 : 8.

Therefore The correct answer is 5:8.

Alternate Method

Given values for the cylindrical tank:

=> Diameter = 12 m

=> Height (h) = 10 m

=> Radius (r) = Diameter ÷ 2 = 12 ÷ 2 = 6 m

=> Curved Surface Area (CSA) = 2 × π × r × h

=> Total Surface Area (TSA) = 2 × π × r × (r + h)

=> Ratio = [2 × π × r × h] ÷ [2 × π × r × (r + h)]

=> Ratio = h ÷ (r + h)

=> Ratio = 10 ÷ (6 + 10) = 10 ÷ 16

=> Ratio = 5 : 8

Therefore The correct answer is 5:8.

Additional Information

Volume of a Cylinder

The total space occupied by a cylinder is given by $V = \pi r^2 h$.

Base Area of a Cylinder

The area of each circular end of the cylinder is πr^2.

Surface Area for Open Tanks

If a cylindrical tank is open at the top, its total surface area is $2\pi rh + \pi r^2$.

Q4. Answer: (d) 1

Shortcut Trick

Net efficiency of all taps = 1/4 + 1/22 − 1/22 = 1/4 cistern/hr.

The question asks for the time to fill 1/4th of the empty cistern.

Time required = (Work to be done) ÷ (Net efficiency)

Time = (1/4) ÷ (1/4) = 1 hr.

Therefore The correct answer is 1 hr.

Alternate Method

Given:

Time taken by Tap 1 (filling) = 4 hr

Time taken by Tap 2 (filling) = 22 hr

Time taken by Tap 3 (emptying) = 22 hr

Formula Used:

Total Work = LCM of individual times

Efficiency = Total Work ÷ Individual Time

Tap	Time (hr)	Total Work (units)	Efficiency (units/hr)
Tap 1 (Fill)	4	44	11
Tap 2 (Fill)	22	2	
Tap 3 (Empty)	22	−2	

Calculations:

=> Total capacity of the cistern (LCM of 4 and 22) = 44 units.

=> Net efficiency when all taps are open = 11 + 2 − 2 = 11 units/hr.

=> Work to be completed (1/4th of the cistern) = 44 × (1/4) = 11 units.

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=> Time taken to fill 11 units = 11 ÷ 11 = 1 hr.

Therefore The time required to fill one-fourth of the cistern is 1 hr.

Therefore The correct answer is 1 hr.

Additional Information

Pipes and Cisterns Basics

If a pipe can fill a tank in x hours, then the part filled in 1 hour is 1/x. This is known as the efficiency of the pipe.

Inlet and Outlet Taps

An inlet tap performs positive work (filling), while an outlet or emptying tap performs negative work. The net rate is the algebraic sum of their individual efficiencies.

LCM Method

Using the Least Common Multiple (LCM) of the given time periods as the total capacity helps avoid working with complex fractions, making calculations faster.

Q5. Answer: (c) 7.2 hours

Shortcut Trick

Assume Total Capacity of the tank = LCM(10, 15, 20) = 60 units.

Net efficiency of (A + B + C) = 6 + 4 − 3 = 7 units/hr.

Work done in 4 hours = 7 × 4 = 28 units.

Remaining work = 60 − 28 = 32 units.

Time for A and B to fill remaining = 32 ÷ (6 + 4) = 3.2 hr.

Total Time = 4 + 3.2 = 7.2 hr.

Therefore The correct answer is 7.2 hr.

Alternate Method

Given: Pipe A fills in 10 hr, Pipe B fills in 15 hr, and Pipe C empties in 20 hr.

Formula Used: Total Work = Net Efficiency × Time

Person	Time (hr)	Total Work	Efficiency
Pipe A	10	60	6
Pipe B	15	4	
Pipe C	20	−3	

=> Net efficiency of all three pipes (A + B − C) = 6 + 4 − 3 = 7 units/hr.

=> Work completed in the first 4 hours = 7 × 4 = 28 units.

=> Remaining work to be completed after closing Pipe C = 60 − 28 = 32 units.

=> Efficiency of remaining pipes (A + B) = 6 + 4 = 10 units/hr.

=> Time taken to fill the remaining part = 32 ÷ 10 = 3.2 hr.

=> Total time required = Initial time + Remaining time = 4 hr + 3.2 hr = 7.2 hr.

Therefore The correct answer is 7.2 hr.

Additional Information

Inlet and Outlet Pipes

An Inlet pipe fills the tank (positive work), while an Outlet pipe empties the tank (negative work).

Net Efficiency

If multiple pipes operate simultaneously, the Net Efficiency is the algebraic sum of their individual efficiencies: Net Eff = Eff_(Inlet1) + Eff_(Inlet2) − Eff_(Outlet).

Time and Work Relation

Efficiency is inversely proportional to the Time taken to complete the work (Efficiency = 1 ÷ Time), assuming the work is constant.

Q6. Answer: (c) 100

Shortcut Trick

Length of train = (Difference in speeds × 5/18) × (t1 × t2) ÷ (t2 − t1)

Difference in speeds = 7 − 5 = 2 km/h

Length = (2 × 5/18) × (18 × 20) ÷ (20 − 18)

Length = (5/9) × 360 ÷ 2 = 5 × 20 = 100 m

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Therefore The correct answer is 100 m.

Alternate Method

Given: Speed of runner1 = 5 km/h, Speed of runner2 = 7 km/h, Time taken t1 = 18 s, t2 = 20 s.

Formula: Relative Speed (same direction) = Speed of train − Speed of object.

Let Speed of the train be V km/h.

=> Relative Speed with first runner = (V − 5) × 5/18 m/s

=> Relative Speed with second runner = (V − 7) × 5/18 m/s

=> Length L = (V − 5) × (5/18) × 18 = (V − 7) × (5/18) × 20

=> (V − 5) × 1 = (V − 7) × (20/18)

=> 18(V − 5) = 20(V − 7)

=> 18V − 90 = 20V − 140

=> 2V = 50 => V = 25 km/h

=> L = (25 − 5) × (5/18) × 18 = 20 × 5 = 100 m

Therefore The correct answer is 100 m.

Additional Information

Relative Speed in Same Direction

When two objects move in the same direction, the relative speed is the difference between their speeds: (u − v).

Relative Speed in Opposite Direction

When two objects move towards each other, the relative speed is the sum of their speeds: (u + v).

Unit Conversion

To convert speed from km/h to m/s, multiply by 5/18. To convert from m/s to km/h, multiply by 18/5.

Length of Train

When a train passes a point object (man, pole, runner), the distance covered equals the length of the train.

Q7. Answer: (c) 40

Shortcut Trick

Assume all 120 pens are of Type B (Rs. 8 each): Total sale = 120 × 8 = Rs. 960.

Actual total sale is Rs. 1120, so the difference is 1120 − 960 = Rs. 160.

Difference in price per pen between Type A and Type B = 12 − 8 = Rs. 4.

Number of Type A pens = 160 ÷ 4 = 40.

Therefore The correct answer is 40 pens.

Alternate Method

Given:

Total pens = 120 | Price of Type A = Rs. 12 | Price of Type B = Rs. 8 | Total Amount = Rs. 1120

Formula Used:

Weighted Average Total = (n1 × Price1) + (n2 × Price2)

Let the number of Type A pens be x and Type B pens be (120 − x).

=> 12 × x + 8 × (120 − x) = 1120

=> 12x + 960 − 8x = 1120

=> 4x + 960 = 1120

=> 4x = 1120 − 960

=> 4x = 160

=> x = 40

Therefore The correct answer is 40 pens.

Additional Information

Rule of Alligation

It is a rule that enables us to find the ratio in which two or more ingredients at their respective prices must be mixed to produce a mixture of a specified price.

Linear Equation Method

Standard method where unknown quantities are represented as variables (x, y) and solved using algebraic manipulation.

Weighted Average

The average of a data set that contains values with different levels of importance or frequency: Average = (Sum of all values) ÷

(Total number of items).

Q8. Answer: (a) 291.6

Given:

(340 / 17) × (156 / 13) + (1484 / 28) − (14 / 10)

Formula Used:

The BODMAS rule (Brackets, Orders, Division, Multiplication, Addition, Subtraction) is applied to simplify the expression.

Calculations:

(340 ÷ 17) × (156 ÷ 13) + (1484 ÷ 28) − (14 ÷ 10)

=> 20 × 12 + 53 − 1.4

=> 240 + 53 − 1.4

=> 293 − 1.4

=> 291.6

Therefore The correct answer is option (1).

Q9. Answer: (b) 4752

Shortcut Trick

Check the sum of the base numbers: 22 + (−18) + (−4) = 0.

When the sum of three numbers is zero, the sum of their cubes is 3 × Product of the numbers.

Required value = 3 × 22 × (−18) × (−4) = 66 × 72 = 4752.

Therefore The correct answer is 4752.

Alternate Method

Given:

The expression to evaluate is $22^3 + (-18)^3 + (-4)^3$.

Let a = 22, b = −18, and c = −4.

Formula Used:

We use the algebraic identity: $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Calculations:

=> First, calculate the sum of the variables: a + b + c = 22 + (−18) + (−4)

=> a + b + c = 22 − 22 = 0

=> Since a + b + c = 0, the identity simplifies to: $a^3 + b^3 + c^3 = 3abc$

=> Substituting the values: $22^3 + (-18)^3 + (-4)^3 = 3 \times 22 \times (-18) \times (-4)$

=> Value = 66 × 72

=> Value = 4752

Therefore, the correct option is 2.

Therefore The correct answer is 4752.

Additional Information

Cubic Identity Properties

The expression $a^3 + b^3 + c^3$ is equal to 3abc only if a + b + c = 0 or if a = b = c. This is a fundamental conditional identity in algebra.

General Expansion

For any three numbers, $a^3 + b^3 + c^3 - 3abc = ½ (a + b + c)[(a - b)^2 + (b - c)^2 + (c - a)^2]$.

Applications in Exams

This identity is frequently used to simplify large cubic calculations by checking if the sum of the bases equals zero before performing traditional multiplication.

Q10. Answer: (b) 48

Shortcut Trick

Mean proportional of 9 and 16 = √(9 × 16) = 12.

Given mean proportional of 12 and the number is twice this value.

Target MP = 2 × 12 = 24.

Using the property $(MP)^2$ = Product of numbers => 24^2 = 12 × Number.

Number = 576 ÷ 12 = 48.

Therefore The correct answer is 48.

Alternate Method

Given:

First set of numbers = 9 and 16

Second set of numbers = 12 and x (let the number be x)

Formula Used:

Mean proportional (MP) between two numbers a and b is √(a × b).

Calculations:

=> Mean proportional between 9 and 16 = √(9 × 16)

=> Mean proportional_((9,16)) = √144 = 12

=> According to the question, MP_((12,x)) = 2 × 12 = 24

=> √(12 × x) = 24

=> Squaring both sides: 12 × x = 24^2

=> 12 × x = 576

=> x = 576 ÷ 12

=> x = 48

Therefore The correct answer is 48.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is √(a × b). If x is the mean proportional, then a : x :: x : b.

Third Proportional

For two numbers a and b, the third proportional c is such that a : b :: b : c, which gives c = b^2 ÷ a.

Fourth Proportional

For three numbers a, b, and c, the fourth proportional d is such that a : b :: c : d, giving d = (b × c) ÷ a.

Q11. Answer: (a) 9687

Shortcut Trick

Step 1: Calculate the LCM of 10, 11, and 8 => 440.

Step 2: Find the largest 4-digit multiple of 440 => 440 × 22 = 9680.

Step 3: Add the required remainder (7) to this multiple => 9680 + 7 = 9687.

Therefore The correct answer is 9687.

Alternate Method

Given: Divisors are 10, 11, and 8; Remainder in each case is 7.

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

=> LCM(10, 11, 8) = 2^3 × 5 × 11 = 8 × 5 × 11 = 440

=> The largest four-digit number is 9999.

=> Dividing 9999 by 440: 9999 ÷ 440 = 22 with a remainder of 319.

=> The largest multiple of 440 below 10000 = 9999 − 319 = 9680.

=> The required number = 9680 + 7 = 9687.

Therefore The correct answer is 9687.

Additional Information

LCM (Least Common Multiple)

It is the smallest positive integer that is evenly divisible by all numbers in a given set.

The Remainder Property

If a number N leaves a constant remainder R when divided by a, b, and c, then N = LCM(a, b, c) × k + R.

Divisibility Rule of 11

A number is divisible by 11 if the difference between the sum of digits at odd places and even places is 0 or a multiple of 11.

Q12. Answer: (d) 40.57

Shortcut Trick

Total deviation from old average 38 = (50 − 38) + (62 − 38) = 12 + 24 = 36.

Total numbers now = 12 + 2 = 14.

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Average increase = Total deviation ÷ Total count = 36 ÷ 14 ≈ 2.57.

New Average = 38 + 2.57 = 40.57.

Therefore The correct answer is 40.57.

Alternate Method

Given: Average of 12 numbers = 38, Included numbers = 50 and 62.

Formula: New Average = (Old Sum + New Values) ÷ New Count

=> Sum of 12 numbers = 12 × 38 = 456

=> Sum of 14 numbers = 456 + 50 + 62 = 568

=> Total count = 12 + 2 = 14

=> New Average = 568 ÷ 14 = 40.5714...

=> Rounding to two decimal places, New Average = 40.57

Therefore The correct answer is 40.57.

Additional Information

Standard Average Formula

Average = (Sum of all observations) ÷ (Total number of observations).

Weighted Average

When two groups are combined, New Average = (n1A1 + n2A2) ÷ (n1 + n2).

Inclusion/Exclusion Rule

If the newly added value is greater than the current average, the new average will increase.

Q13. Answer: (d) Rs. 22,000

Shortcut Trick

Ratio of Profit = (Capital × Time)_X : (Capital × Time)_Y : (Capital × Time)_Z

Ratio = (60 × 12) : (80 × 6) : (120 × 4) = 720 : 480 : 480

Simplified Ratio = 3 : 2 : 2

Total units = 3 + 2 + 2 = 7 units → Rs. 77,000

Z's share (2 units) = (77,000 ÷ 7) × 2 = Rs. 22,000

Therefore The correct answer is Rs. 22,000.

Alternate Method

Given:

Investment of X = Rs. 60,000, Time = 12 months

Investment of Y = Rs. 80,000, Time = 6 months

Investment of Z = Rs. 1,20,000, Time = 4 months

Total Profit = Rs. 77,000

Formula Used:

Profit Share = Capital × Time Period

Calculations:

=> Profit share of X = 60,000 × 12 = 7,20,000

=> Profit share of Y = 80,000 × 6 = 4,80,000

=> Profit share of Z = 1,20,000 × 4 = 4,80,000

=> Ratio of profits X : Y : Z = 7,20,000 : 4,80,000 : 4,80,000

=> Ratio = 72 : 48 : 48 = 3 : 2 : 2

=> Sum of the ratio parts = 3 + 2 + 2 = 7

=> Share of Z = (2 ÷ 7) × 77,000

=> Share of Z = 2 × 11,000 = Rs. 22,000

Therefore The correct answer is Rs. 22,000.

Additional Information

Compound Partnership

A partnership where the partners invest their capitals for different periods of time. The profit is divided based on the product of capital and time.

Types of Partners

An Active Partner manages the business and may receive an extra share or salary, while a Sleeping Partner only invests money

without participating in daily operations.

Ratio of Capitals

If the profit and time periods are given, the ratio of capitals C1 : C2 is calculated as (P1/T1) : (P2/T2).

Q14. Answer: (d) Rs. 644

Shortcut Trick

Net percentage change formula: Net % = a + b + (ab/100)

Here, a = −30 (decrease) and b = +15 (increase).

Net change = −30 + 15 + [(−30 × 15) / 100] = −15 − 4.5 = −19.5%.

New Price = 800 − (19.5% of 800) = 800 − 156 = 644.

Therefore The correct answer is Rs. 644.

Alternate Method

Given: Original Price of the shirt = Rs. 800, First change = 30% decrease, Second change = 15% increase.

Method: Step-by-step price calculation using basic percentage.

=> Price after 30% decrease = Original Price × [(100 − 30) / 100]

=> Intermediate Price = 800 × (70 / 100) = Rs. 560

=> Final price after 15% increase = Intermediate Price × [(100 + 15) / 100]

=> New Price = 560 × (115 / 100) = 5.6 × 115 = Rs. 644

Thus, the final price of the shirt is Rs. 644, which corresponds to Option (4).

Therefore The correct answer is Rs. 644.

Additional Information

Successive Percentage Rule

When a value changes by x% and then y%, the effective change is [x + y + (xy/100)]%. Remember to use a negative sign for decrease/discount.

Multiplying Factor Method

For a decrease of d%, multiply the value by (1 − d/100). For an increase of i%, multiply the value by (1 + i/100).

Fractional Equivalents

Calculations are often faster using fractions: 30% = 3/10 (multiplier 7/10) and 15% = 3/20 (multiplier 23/20).

Q15. Answer: (d) 46 years

Shortcut Trick

Ratio of ages of Shyam and Rajat 4 years ago = 7 : 1 (Difference = 6 units)

Ratio of ages 8 years later = 3 : 1 (Multiply by 3 to balance difference) → 9 : 3 (Difference = 6 units)

Increase in ratio units = 9 − 7 = 2 units

Actual time interval = 4 + 8 = 12 years

2 units = 12 years => 1 unit = 6 years

Shyam's age 4 years ago = 7 × 6 = 42 years => Present age = 42 + 4 = 46 years

Therefore The correct answer is 46 years.

Alternate Method

Given:

Age of Shyam was 7 times Rajat 4 years ago.

Age of Shyam will be 3 times Rajat 8 years later.

Calculations:

Let the age of Rajat 4 years ago be x years.

=> Age of Shyam 4 years ago = 7x years.

=> Present age of Rajat = x + 4

=> Present age of Shyam = 7x + 4

=> Age after 8 years: Rajat = (x + 4) + 8 = x + 12; Shyam = (7x + 4) + 8 = 7x + 12

=> According to the condition: 7x + 12 = 3 × (x + 12)

=> 7x + 12 = 3x + 36

=> 7x − 3x = 36 − 12

=> 4x = 24

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=> x = 6

=> Present age of Shyam = 7(6) + 4 = 42 + 4 = 46 years.

=> Therefore, the age of Shyam is 46 years, which corresponds to Option (4).

Therefore The correct answer is 46 years.

Additional Information

Constant Age Difference

The difference between the ages of two individuals remains the same throughout their lives, regardless of how many years pass.

Ratio Balancing Method

To solve age problems using ratios, ensure the difference between ratio parts is equal for both time periods by multiplying with the cross-difference.

Average Age Shift

If the average age of n people is A years, then after k years, their average age will be A + k years.

Q16. Answer: (c) 25%

Shortcut Trick

Gain of 50% = 1/2 => Ratio of CP : SP for Article 1 = 2 : 3.

Since Selling Price is the same for both, SP of Article 2 = 3 units.

No profit, no loss condition implies: Profit on Article 1 = Loss on Article 2.

Profit on Article 1 = 3 − 2 = 1 unit. So, Loss on Article 2 = 1 unit.

CP of Article 2 = SP + Loss = 3 + 1 = 4 units.

Loss % on Article 2 = (1 ÷ 4) × 100 = 25%.

Therefore The correct answer is 25%.

Alternate Method

Given:

Selling Price (SP) of Article 1 = Rs. 2,973

Selling Price (SP) of Article 2 = Rs. 2,973

Gain % on Article 1 = 50%

Formula Used:

Cost Price (CP) = (SP × 100) ÷ (100 + Gain%)

Loss % = (Loss ÷ CP) × 100

Calculations:

=> CP of Article 1 = (2973 × 100) ÷ (100 + 50)

=> CP1 = (2973 × 100) ÷ 150 = Rs. 1,982

=> Profit on Article 1 = 2973 − 1982 = Rs. 991

=> Since overall there is no profit, no loss:

=> Loss on Article 2 = Profit on Article 1 = Rs. 991

=> CP of Article 2 = SP of Article 2 + Loss

=> CP2 = 2973 + 991 = Rs. 3,964

=> Loss % on Article 2 = (991 ÷ 3964) × 100

=> Loss % = 1/4 × 100 = 25%

Therefore The correct answer is 25%.

Additional Information

No Profit, No Loss Condition

This occurs when the total Cost Price of all articles equals the total Selling Price. Mathematically, Total CP = Total SP, or Profit from one item = Loss from another.

Cost Price with Gain/Loss

When gain is given, CP = SP × 100 / (100 + Gain%). When loss is given, CP = SP × 100 / (100 − Loss%).

Successive Changes

If an article's price is changed successively by x% and y%, the net change is given by the formula: [x + y + (xy ÷ 100)]%.

Q17. Answer: (a) 20

Shortcut Trick

For a regular polygon, the sum of an interior angle and an exterior angle at any vertex is always 180°.

=> Exterior angle = 180° − Interior angle = 180° − 162° = 18°.
The number of sides (n) of a regular polygon is given by 360° ÷ exterior angle.
=> n = 360° ÷ 18° = 20.
Therefore The correct answer is 20 sides.
Alternate Method
Given:
Measure of each interior angle = 162°
Formula Used:
Each interior angle of a regular polygon with n sides = [(n − 2) × 180°] ÷ n
Calculations:
=> 162° = [(n − 2) × 180°] ÷ n
=> 162n = (n − 2) × 180
=> 162n = 180n − 360
=> 180n − 162n = 360
=> 18n = 360
=> n = 360 ÷ 18
=> n = 20
Therefore The correct answer is 20 sides.
Additional Information
Sum of Interior Angles
The total sum of all interior angles of a polygon with n sides is always (n − 2) × 180°.
Sum of Exterior Angles
For any convex polygon, the sum of all exterior angles (one at each vertex) is exactly 360°.
Regular Polygon Properties
In a regular polygon, all sides are equal and all interior angles are equal. Each exterior angle = 360° ÷ n.

Q18. Answer: (d) 92.38 meters

Shortcut Trick
The distance d between two objects in the same direction from a cliff of height h is given by: d = h × (cot θ1 − cot θ2).
Given: h = 80 m, θ1 = 30°, and θ2 = 60°.
d = 80 × (cot 30° − cot 60°) = 80 × (√3 − 1/√3) = 80 × (2/√3).
d = 160 / 1.732 ≈ 92.38 m.
Therefore The correct answer is 92.38 m.
Alternate Method
Given: Height of the cliff (AB) = 80 m. Angles of depression of ships C and D are 60° and 30° respectively.
Formula Used: tan θ = Perpendicular / Base
In right-angled triangle ABC:
=> tan 60° = AB / BC
=> √3 = 80 / BC
=> BC = 80 / √3 m
In right-angled triangle ABD:
=> tan 30° = AB / BD
=> 1 / √3 = 80 / BD
=> BD = 80√3 m
Distance between ships (CD) = BD − BC:
=> CD = 80√3 − 80 / √3
=> CD = (80 × 3 − 80) / √3 = 160 / √3
=> CD = 160 / 1.73205 ≈ 92.376 m
Rounding off to two decimal places, we get 92.38 m.
Therefore The correct answer is 92.38 m.
Additional Information
Angle of Depression

The angle formed between the horizontal line and the line of sight when an observer looks downward at an object.

Distance for Opposite Sides

If ships are on opposite sides of the cliff, the distance between them is d = h(cot α + cot β).

Trigonometric Identities

For calculations, remember tan 30° = 1/√3, tan 60° = √3, and √3 ≈ 1.732.

Q19. Answer: (b) 5/9

Given:

(3^(-5) × 8^5 × 125³ × 36³)/(100^4 × 256 × 216 × 2²)

Formula used:

Exponent Laws:

(a^m)ⁿ = a^(m × n)

a^m × aⁿ = a^(m + n)

a^m ÷ aⁿ = a^(m − n)

a^(−n) = 1 / aⁿ

Calculations:

Express each term in its prime factor form (2, 3, and 5):

=> (3^(-5) × (2³)^5 × (5³)³ × (2² × 3²)³)/((2² × 5²)^4 × 2^8 × (2³ × 3³) × 2²)

=> (3^(-5) × 2^(15) × 5^9 × 2^6 × 3^6)/(2^8 × 5^8 × 2^8 × 2³ × 3³ × 2²)

Group the bases in the numerator and denominator:

=> (2^(15 + 6) × 3^(6 - 5) × 5^9)/(2^(8 + 8 + 3 + 2) × 3³ × 5^8)

=> (2²¹ × 3¹ × 5^9)/(2²¹ × 3³ × 5^8)

Divide by subtracting exponents of the same base:

=> 2^(21 − 21) × 3^(1 − 3) × 5^(9 − 8)

=> 2^0 × 3^(−2) × 5¹

=> 1 × (1 / 3²) × 5

=> 5 / 9

Therefore The correct answer is option (2).

Q20. Answer: (c) 27.43 km/hr

Shortcut Trick

Since the distance is the same for both ways (48 km), we use the Harmonic Mean formula for average speed.

Average Speed = (2 × s1 × s2) / (s1 + s2)

Average Speed = (2 × 32 × 24) / (32 + 24) = (2 × 32 × 24) / 56

Average Speed = (32 × 24) / 28 = (8 × 24) / 7 = 192 / 7 ≈ 27.43 km/hr.

Therefore The correct answer is 27.43 km/hr.

Alternate Method

Given:

Distance from Warehouse A to Store B = 48 km

Speed during onward journey (s1) = 32 km/hr

Speed during return journey (s2) = 24 km/hr

Formula used:

Average Speed = Total Distance ÷ Total Time

=> Total Distance = 48 + 48 = 96 km

=> Time taken for onward journey (t1) = Distance ÷ s1 = 48 ÷ 32 = 1.5 hours

=> Time taken for return journey (t2) = Distance ÷ s2 = 48 ÷ 24 = 2 hours

=> Total Time = t1 + t2 = 1.5 + 2 = 3.5 hours

=> Average Speed = 96 ÷ 3.5

=> Average Speed = 960 ÷ 35 = 192 ÷ 7 ≈ 27.4285...

Therefore The correct answer is 27.43 km/hr.

Additional Information

Average Speed (Fixed Distance)

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When an object covers equal distances at speeds x and y, the average speed is 2xy ÷ (x + y).

Average Speed (Fixed Time)

When an object travels for the same duration at speeds x and y, the average speed is the arithmetic mean: (x + y) ÷ 2.

General Average Speed

For any journey, Average Speed = (d1 + d2 + ... + d_n) ÷ (t1 + t2 + ... + t_n).

Unit Conversion

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

Q21. Answer: (a) 37%

Shortcut Trick

Apply the Successive Discount formula: a + b − (a × b)/100.

Given: a = 30% and b = 10%.

Net Discount % = 30 + 10 − (30 × 10)/100

Net Discount % = 40 − 3 = 37%

Therefore The correct answer is 37%.

Alternate Method

Given: Original Price = 1,500, First Discount = 30%, Second Discount = 10%.

=> First discount amount = 30% of 1,500 = (30/100) × 1500 = 450

=> Price after 1^(st) discount = 1500 − 450 = 1050

=> Second discount amount = 10% of 1,050 = (10/100) × 1050 = 105

=> Final Selling Price = 1050 − 105 = 945

=> Total Discount = 1500 − 945 = 555

=> Equivalent Discount % = (Total Discount / Original Price) × 100

=> Equivalent Discount % = (555 / 1500) × 100 = 37%

Therefore The correct answer is 37%.

Additional Information

Net Discount for Three Rates

For three successive discounts a%, b%, and c%, the net discount is calculated by first finding the net of a and b, then applying the formula to that result and c.

Marked Price (MP) and Selling Price (SP)

Discount is always computed on the Marked Price. SP = MP × (100 − D1%)/100 × (100 − D2%)/100.

Multiplying Factor Method

Final Price = Initial Price × 0.70 × 0.90. The overall multiplier is 0.63, which implies a (1 − 0.63) × 100 = 37% discount.

Q22. Answer: (c) 6%

Shortcut Trick

Interest earned in 1 year = 3600 ÷ 4 = Rs. 900

Rate of Interest % = (Annual Interest ÷ Principal) × 100

Rate % = (900 ÷ 15000) × 100 = 6%

Therefore The correct answer is 6%.

Alternate Method

Given:

Principal (P) = Rs. 15,000

Time (T) = 4 years

Simple Interest (SI) = Rs. 3,600

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Rate (R) = (SI × 100) ÷ (P × T)

Calculations:

=> R = (3600 × 100) ÷ (15000 × 4)

=> R = 360000 ÷ 60000

=> R = 6

Therefore The correct answer is 6%.

Additional Information

Amount Calculation

The total sum to be repaid after the time period is the Amount, calculated as Amount = Principal + Simple Interest.

Time and Rate Relationship

For a fixed interest amount and principal, the Rate of Interest is inversely proportional to the Time (R prop. to 1/T).

Constant Annual Interest

In Simple Interest, the interest earned remains the same for each year of the time period.

Q23. Answer: (c) 27.4

Shortcut Trick

Pick Assumed Mean (A) = 28. Find the mid-point (x) for each class interval: 4, 12, 20, 28, 36, 44.

Calculate deviations d = x − A: −24, −16, −8, 0, 8, 16.

Calculate Σf×d = 4(−24) + 6(−16) + 7(−8) + 3(0) + 12(8) + 8(16) = −96 − 96 − 56 + 0 + 96 + 128 = −24.

Mean = A + (Σfd ÷ Σf) = 28 + (−24 ÷ 40) = 28 − 0.6 = 27.4.

Therefore The correct answer is 27.4.

Alternate Method

Given: Frequencies and class intervals for a dataset.

Formula Used: Direct Method Mean (μ) = Σ(f_i × x_i) ÷ Σf_i

Step 1: Calculate Mid-points (x_i) and Products (f_ix_i):

=> (0-8): x1 = 4, f1x1 = 4 × 4 = 16

=> (8-16): x2 = 12, f2x2 = 6 × 12 = 72

=> (16-24): x3 = 20, f3x3 = 7 × 20 = 140

=> (24-32): x4 = 28, f4x4 = 3 × 28 = 84

=> (32-40): x5 = 36, f5x5 = 12 × 36 = 432

=> (40-48): x6 = 44, f6x6 = 8 × 44 = 352

Step 2: Calculate Total Frequency and Sum of Products:

=> Σf_i = 4 + 6 + 7 + 3 + 12 + 8 = 40

=> Σf_ix_i = 16 + 72 + 140 + 84 + 432 + 352 = 1096

Step 3: Calculate the Mean:

=> Mean = 1096 ÷ 40

=> Mean = 27.4

Therefore The correct answer is 27.4.

Additional Information

Direct Method for Mean

It is the simplest method where Mean = Σf_ix_i ÷ Σf_i, used when values of x_i and f_i are small.

Assumed Mean Method

Used to simplify calculations by choosing a central value A. Mean = A + (Σf_id_i ÷ Σf_i), where d_i = x_i − A.

Step-Deviation Method

Used when class sizes (h) are uniform. Mean = A + [(Σf_iu_i ÷ Σf_i) × h], where u_i = (x_i − A) ÷ h.

Empirical Relationship

The connection between the three measures of central tendency: 3 × Median = Mode + 2 × Mean.

Q24. Answer: (d) 31

Given:

((³√4096) ÷ (^4√10000)) × (5/48) × 186

Formula used:

Cube root: ³√x = x^(1/3)

Fourth root: ^4√x = x^(1/4)

Calculations:

Evaluate the roots:

³√4096 = 16

^4√10000 = 10

Substitute values and simplify the expression:

=> (16 ÷ 10) × (5 ÷ 48) × 186

=> (8/5) × (5/48) × 186

=> (8/48) × 186

=> (1/6) × 186

=> 31

Therefore The correct answer is option (4).

Q25. Answer: (c) 10%

Shortcut Trick

Ratio of Marked Price to Reduced Price = 500 : 450 = 10 : 9.

Decrease in price = 10 − 9 = 1 unit.

Percentage decrease = (Decrease ÷ Original Price) × 100 = (1 ÷ 10) × 100 = 10%.

Therefore The correct answer is 10%.

Alternate Method

Given:

Marked Price (MP) = Rs. 500

Reduced Price (SP) = Rs. 450

Formula Used:

Percentage Decrease = [(Original Value − New Value) ÷ Original Value] × 100

Calculations:

=> Total reduction in price = 500 − 450 = Rs. 50

=> Percentage decrease = (50 ÷ 500) × 100

=> Percentage decrease = (1 ÷ 10) × 100

=> Percentage decrease = 10%

Therefore The correct answer is 10%.

Additional Information

Discount and Marked Price

The amount deducted from the Marked Price is called the Discount. Discount % is always calculated on the Marked Price: Discount % = (Discount ÷ MP) × 100.

Successive Discounts

When two or more discounts are applied one after another, the effective discount is calculated using the formula: x + y − (x × y ÷ 100).

Selling Price Calculation

The final price after the discount is the Selling Price (SP). SP = MP × (100 − Discount %) ÷ 100.

Q26. Answer: (c) 25 and 36

Shortcut Trick

Co-prime numbers are pairs that have no common factor other than 1 (HCF = 1).

Analyze options: 27 and 36 are divisible by 9; 44 and 99 are divisible by 11; 42 and 56 are divisible by 14.

For 25 and 36, their factors do not overlap: 25 (5 × 5) and 36 (2 × 2 × 3 × 3).

Therefore The correct answer is 25 and 36.

Alternate Method

Given: A set of number pairs to identify the co-prime pair.

Definition: Two numbers are co-prime if their Highest Common Factor (HCF) is 1.

Calculation for all options:

=> Option 1: HCF(27, 36) → Factors of 27 = {1, 3, 9, 27}; Factors of 36 = {1, 2, 3, 4, 6, 9, ...} => HCF = 9

=> Option 2: HCF(44, 99) → Factors of 44 = {1, 2, 4, 11, 22, 44}; Factors of 99 = {1, 3, 9, 11, 33, 99} => HCF = 11

=> Option 3: HCF(25, 36) → Factors of 25 = {1, 5, 25}; Factors of 36 = {1, 2, 3, 4, 6, 9, 12, 18, 36} => HCF = 1

=> Option 4: HCF(42, 56) → Factors of 42 = {1, 2, 3, 6, 7, 14, ...}; Factors of 56 = {1, 2, 4, 7, 8, 14, ...} => HCF = 14

Therefore The correct answer is 25 and 36.

Additional Information

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Properties of Co-prime Numbers

Any two prime numbers are always co-prime to each other. Also, any two consecutive numbers are always co-prime (e.g., 9 and 10).

HCF and LCM Relation

For a pair of co-prime numbers a and b, their HCF = 1 and their LCM = a × b.

Perfect Squares

Two perfect squares can be co-prime if their square roots do not share any common factors (e.g., $25 = 5^2$ and $36 = 6^2$).

Q27. Answer: (d) 27.1%

Shortcut Trick

The overall profit is the product of individual multipliers for markup, discount, and weight fraud.

Net Multiplier = (1 + 24/100) × (1 − 18/100) × (1000 ÷ 800)

Net Multiplier = 1.24 × 0.82 × 1.25

Net Multiplier = 1.0168 × 1.25 = 1.271

Profit % = (1.271 − 1) × 100 = 27.1%

Therefore The correct answer is 27.1%.

Alternate Method

Given:

Markup = 24% above CP | Discount = 18% | Actual weight = 800 g | Declared weight = 1 kg (1000 g).

Formula Used:

Overall Profit % = [(Total SP − Total CP) ÷ Total CP] × 100

Calculations:

=> Let the Cost Price (CP) of 1000 g of sugar be Rs. 1000 (so Rs. 1 per gram).

=> Marked Price (MP) = 1000 + 24% of 1000 = Rs. 1240.

=> Selling Price (SP) = 1240 − 18% of 1240 = 1240 − 223.2 = Rs. 1016.8.

=> Since the shopkeeper gives only 800 g, his actual CP = Rs. 800.

=> Total Profit = SP − Actual CP = 1016.8 − 800 = Rs. 216.8.

=> Overall Profit % = (216.8 ÷ 800) × 100 = 27.1%.

Therefore The correct answer is 27.1%.

Additional Information

Successive Percentage Change

When multiple changes occur, the net effect is calculated using multipliers: Net Factor = (1 ± r1/100) × (1 ± r2/100) × ...

Dishonest Dealer Rule

Profit % due to weight fraud = [(True Weight − False Weight) ÷ False Weight] × 100, assuming sale is at CP.

CP, MP, and SP Relationship

The direct ratio is given by (100 + Profit%) ÷ (100 − Discount%) = Marked Price ÷ Cost Price.

Q28. Answer: (b) 15,600

Shortcut Trick

Net Rate Difference per year = 6.5% − 3.5% = 3%.

Total Interest Difference for 2 years = 3% × 2 = 6%.

Required Difference = 6% of Rs. 2,60,000.

=> 2,60,000 × (6 ÷ 100) = 2,600 × 6 = 15,600.

Therefore The correct answer is Rs. 15,600.

Alternate Method

Given:

Principal (P) for Bank A and Bank B = Rs. 2,60,000 each.

Interest Rate (R1) for Bank A = 3.5% per annum.

Interest Rate (R2) for Bank B = 6.5% per annum.

Time period (T) = 2 years.

Formula Used:

Simple Interest (SI) = (Principal × Rate × Time) ÷ 100

Calculations:

=> Interest paid to Bank A (SI_A) = (2,60,000 × 3.5 × 2) ÷ 100

=> SI_A = 2,600 × 7 = 18,200

=> Interest paid to Bank B (SI_B) = (2,60,000 × 6.5 × 2) ÷ 100

=> SI_B = 2,600 × 13 = 33,800

=> Positive Difference = SI_B − SI_A

=> Difference = 33,800 − 18,200 = 15,600

According to the calculation, the interest difference is Rs. 15,600 which corresponds to option (2).

Therefore The correct answer is Rs. 15,600.

Additional Information

Simple Interest Principle

Simple interest is calculated only on the initial Principal amount. The formula is SI = (P × R × T) ÷ 100, where P is Principal, R is annual rate, and T is time in years.

Interest Difference Shortcut

When Principal and Time are constant, the difference in interest is directly proportional to the difference in rates: Difference = [P × T × (R2 − R1)] ÷ 100.

Total Amount

The total amount (A) to be repaid after the time period is the sum of the Principal and the Interest: A = P + SI.

Q29. Answer: (d) 220

Shortcut Trick

Area of rectangular field = 55 × 70 = 3850 m².

As per the problem, Area of circular field = πr² = 3850 m².

=> (22/7) × r² = 3850 => r² = 175 × 7 = 1225 => r = 35 m.

Perimeter (Circumference) = 2πr = 2 × (22/7) × 35 = 220 m.

Therefore The correct answer is 220 m.

Alternate Method

Given:

Length of the rectangular field (L) = 70 m

Breadth of the rectangular field (B) = 55 m

Formula Used:

Area of rectangle = Length × Breadth

Area of circular field = π × r²

Perimeter (Circumference) of circle = 2 × π × r

Calculations:

=> Area of rectangular field = 70 × 55 = 3850 m²

=> Area of circular field = 3850 m²

=> πr² = 3850

=> (22/7) × r² = 3850

=> r² = (3850 × 7) ÷ 22

=> r² = 175 × 7 = 1225

=> Radius (r) = √1225 = 35 m

=> Perimeter = 2 × (22/7) × 35

=> Perimeter = 2 × 22 × 5 = 220 m

Therefore The correct answer is 220 m.

Additional Information

Circle Properties

The ratio of the circumference to the diameter of any circle is always constant, denoted by π (≈ 22/7 or 3.14).

Comparison of Perimeter

For a given area, a circle has the shortest perimeter compared to any other plane figure like a rectangle or square.

Unit Conversion

Ensure all dimensions are in the same units (e.g., meters) before equating areas or calculating perimeters.

Q30. Answer: (d) 16

Shortcut Trick

For a number to be divisible by 9, the sum of its digits must be a multiple of 9.

Sum of digits for 7KM93 = 7 + K + M + 9 + 3 = 19 + K + M.

Possible sums are 27 or 36, giving K + M = 8 or K + M = 17.

To minimize $4K^2 + 2M$, keep K as small as possible because it has a higher power and coefficient.

Let K = 0, then M = 8 => $4(0)^2 + 2(8) = 16$.

Therefore The correct answer is 16.

Alternate Method

Given: A five-digit number 7KM93 is divisible by 9. We need to find the least value of the expression $4K^2 + 2M$.

Formula Used: Sum of digits for divisibility by 9.

=> Sum of digits = 7 + K + M + 9 + 3 = 19 + K + M

=> Since the number is divisible by 9, 19 + K + M = 27 or 36

=> Case 1: K + M = 27 − 19 = 8. Possible (K, M) are (0, 8), (1, 7), (2, 6), ..., (8, 0).

=> For K = 0, M = 8: $4(0)^2 + 2(8) = 16$.

=> For K = 1, M = 7: $4(1)^2 + 2(7) = 4 + 14 = 18$.

=> Case 2: K + M = 36 − 19 = 17. Possible (K, M) are (8, 9) or (9, 8).

=> For K = 8, M = 9: $4(8)^2 + 2(9) = 4(64) + 18 = 256 + 18 = 274$.

=> Comparing all values, the least value is 16.

Therefore The correct answer is 16.

Additional Information

Divisibility by 3

A number is divisible by 3 if the sum of all its digits is divisible by 3.

Divisibility by 11

A number is divisible by 11 if the difference between the sum of digits at odd positions and even positions is either 0 or a multiple of 11.

Divisibility by 8

A number is divisible by 8 if its last three digits form a number that is divisible by 8.

Q31. Answer: (d) Meerut

The correct answer is Meerut.

Key Points

• The First War of Independence, historically referred to as the Sepoy Mutiny or the Rebellion of 1857, officially began on May 10, 1857, in the garrison town of Meerut.

• The immediate spark for the uprising was the introduction of the Enfield rifle, which required soldiers to bite off the ends of cartridges rumored to be greased with cow and pig fat, offending both Hindu and Muslim religious sentiments.

• Sepoys of the 3rd Native Cavalry in Meerut refused to use these cartridges, leading to the court-martial and imprisonment of 85 soldiers on May 9, 1857.

• On the following day, their comrades revolted, killed their British officers, liberated the imprisoned soldiers, and set fire to the Meerut Cantonment.

• The success of the outbreak in Meerut emboldened the troops to march toward the nearby Mughal capital, effectively transforming a military mutiny into a nationwide struggle against the British East India Company.

Additional Information

• Delhi

• The mutineers from Meerut arrived in Delhi on May 11, 1857, and proclaimed Bahadur Shah Zafar as the Emperor of Hindustan.

• The city served as the symbolic and political focal point of the rebellion until it was recaptured by the British in September 1857.

• Lucknow

• The rebellion in Lucknow was led by Begum Hazrat Mahal, the wife of the exiled Nawab of Awadh, starting in June 1857.

• It is famous for the Siege of the Residency, which lasted for several months before the city was finally cleared by British forces.

• Kanpur

• In Kanpur, the revolt was spearheaded by Nana Sahib, the adopted son of the last Peshwa, Baji Rao II.

• He was assisted by the military commander Tantia Tope and his diplomat Azimullah Khan in driving out the British garrison.

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Q32. Answer: (c) 2.5%

The correct answer is 2.5%.

Key Points

• Mass percent (w/w) is a measure of the concentration of a solute in a solution, representing the mass of the solute per 100 units of the total mass of the solution.

• The mass of the solute (salt) in this specific problem is provided as 15 g.

• The mass of the solvent (water) is provided as 585 g.

• The total mass of the solution is the sum of the mass of the solute and the mass of the solvent, which is 15 g + 585 g = 600 g.

• To calculate the mass percent, the formula used is: (Mass of solute / Total mass of solution) × 100.

• Applying the values to the formula: (15 / 600) × 100. This simplifies to 1500 / 600, which equals 2.5%.

Additional Information

• Solute and Solvent:

• The solute is the substance being dissolved (usually present in a smaller amount), while the solvent is the medium doing the dissolving (usually present in a larger amount).

• In aqueous solutions, water is almost always the solvent due to its polar nature and ability to dissolve many substances.

• Solution Characteristics:

• A solution is a homogeneous mixture where the particles of the solute are evenly distributed at the molecular level throughout the solvent.

• The law of conservation of mass applies here, meaning the mass of the resulting solution is exactly equal to the sum of the masses of the components added.

• Concentration Units:

• Apart from mass percentage (w/w), other common expressions include volume percentage (v/v), mass by volume percentage (w/v), molarity, and parts per million (ppm).

• Mass percentage is particularly useful in industrial chemical applications where temperature-independent concentration measurements are required.

Q33. Answer: (a) It primarily maintains and optimizes storage resources, not domain tasks like writing letters.

The correct answer is It primarily maintains and optimizes storage resources, not domain tasks like writing letters..

Key Points

• A disk defragmenter is a utility program designed to increase data access speed by rearranging files stored on a disk to occupy contiguous storage locations, a process known as defragmentation.

• System software is a type of computer program that is designed to run a computer's hardware and application programs; it provides the platform upon which other software operates.

• The classification of a defragmenter as system software stems from its fundamental role in resource management and hardware optimization, rather than performing user-centric domain tasks like data entry or image editing.

• Unlike application software, which serves the user's specific needs, utility software like defragmenters serves the needs of the computer system itself to ensure efficient performance and stability.

Additional Information

• System Software Categories:

• Operating Systems (OS): Examples include Windows, macOS, and Linux, which manage CPU scheduling and memory allocation.

• Device Drivers: Specialized programs that allow the OS to communicate with hardware like printers or graphics cards.

• Utility Software: Tools like antivirus programs, backup software, and disk cleaners that maintain the system.

• Application Software Characteristics:

• Designed for end-users to perform specific tasks such as word processing (e.g., MS Word), web browsing (e.g., Chrome), or accounting.

• They rely on the underlying system software to interact with hardware resources.

Q34. Answer: (b) Lakshadweep

The correct answer is Lakshadweep.

Key Points

• Lakshadweep is an archipelago located in the Arabian Sea and is the closest group of islands to the Malabar Coast of India.

• It is situated at a distance of approximately 220 km to 440 km from the coastal city of Kochi in Kerala.

• The Union Territory consists of 36 islands, of which only 10 are inhabited, including Kavaratti, Agatti, and Minicoy.

• These islands are unique for being of coral origin (atolls), and they are considered a northward extension of the Chagos-Laccadive Ridge.

• Due to its proximity to the Malabar Coast, the islands share deep cultural, linguistic, and historical ties with the state of Kerala, with Malayalam being the most widely spoken language.

Additional Information

• Andaman and Nicobar Islands:

• Located in the Bay of Bengal, these islands are significantly farther from the Malabar Coast (which is on the western side of India).

• They are separated from the Indonesian archipelago by the Great Channel and from Myanmar by the Preparis Channel.

• Diu Island:

• This is a small island located off the southern coast of the Kathiawar Peninsula in Gujarat.

• While it is on the western coast, it is far to the north of the Malabar Coast, which primarily covers the Kerala shoreline.

• Malabar Coast:

• It represents the southwestern coastline of the Indian Peninsula, extending from Goa to Kanyakumari.

• It is famous for its backwaters (Kayals) and historically served as a major hub for the international spice trade.

Q35. Answer: (c) Integrated judiciary

The correct answer is Integrated judiciary.

Key Points

• The Indian Constitution is described as quasi-federal in nature, meaning it contains both federal and unitary features.

• An Integrated Judiciary refers to a single system of courts that enforces both Central laws and State laws. In this hierarchy, the Supreme Court of India stands at the apex, followed by High Courts in the states and Subordinate Courts at the district level.

• This system contrasts with a pure federal system (like in the United States), where there is a dual system of courts: one for federal laws and another for state laws.

• The integrated nature ensures uniformity in the administration of justice across the entire territory of India, which is a hallmark of a unitary state.

• Under this structure, the Supreme Court has supervisory and appellate jurisdiction over all other courts in the country, reinforcing centralized judicial control.

Additional Information

• Federal Features of the Indian Constitution:

• Bicameral legislature: The existence of two houses, the Lok Sabha (representing the people) and the Rajya Sabha (representing the states), is a federal feature ensuring representation of states at the center.

• Dual government: The establishment of governments at both the Union and State levels with specific jurisdictions is a core federal characteristic.

• Supremacy of the Constitution: This ensures that both the Center and the States are bound by the Constitution, and neither can unilaterally alter the basic structure or division of powers.

• Independent Judiciary: While the judiciary is integrated (unitary), its independence from the executive and legislature is a federal necessity to settle disputes between the Center and States.

• Other Unitary Features include:

• Single Constitution for both Union and States.

• Single Citizenship for all citizens regardless of their state of residence.

• Appointment of the Governor by the President of India.

• All-India Services (IAS, IPS, etc.) where officers are recruited by the Center but serve in the States.

Q36. Answer: (c) Nizam of Hyderabad

The correct answer is Nizam of Hyderabad.

Key Points

• The Subsidiary Alliance was a landmark diplomatic and military policy introduced by Lord Richard Wellesley, who served as the Governor-General of India from 1798 to 1805.

• The Nizam of Hyderabad (Nizam Ali Khan) was the first Indian ruler to formally accept the terms of the Subsidiary Alliance in September 1798.

• Under this treaty, the Nizam was compelled to disband his French-trained battalions and replace them with a permanent British subsidiary force.

• The Nizam agreed to pay for the maintenance of these troops and accepted a British Resident at his court, effectively surrendering his external sovereignty and foreign relations to the British East India Company.

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Additional Information

• The alliance system was designed to eliminate European rivals (specifically the French) and bring Indian princely states under British paramountcy.

• Several other major Indian powers were forced into this system over the following years:

• Maharaja of Mysore: Following the fall of Seringapatam and the death of Tipu Sultan in the Fourth Anglo-Mysore War (1799), the Wodeyar dynasty was restored and forced to sign the alliance.

• Nawab of Oudh: Saadat Ali Khan II was pressured into the Subsidiary Alliance in November 1801, ceding substantial territories like Rohilkhand and the Lower Doab to the Company.

• Peshwa Baji Rao II: The Marathas entered the fold after the Peshwa signed the Treaty of Bassein in 1802.

• Maharaja of Jaipur: The Rajput states, including Jaipur, Jodhpur, and Udaipur, signed similar treaties much later, predominantly between 1817 and 1818, during the tenure of Lord Hastings.

Q37. Answer: (c) Bit

The correct answer is Bit.

Key Points

• A Bit, which is a portmanteau of Binary Digit, represents the smallest possible unit of data and memory in a digital computer or communication system.

• It functions as a logical state that can only hold one of two values: 0 or 1. These values typically represent binary conditions such as Off/On, False/True, or Low/High voltage levels.

• All complex data types, including text, images, and executable programs, are ultimately stored and processed as long sequences of bits.

• In hardware, bits are physically stored using capacitors (charge/no charge), transistors (conducting/non-conducting), or magnetic polarity on storage disks.

• The concept of the bit was pioneered by Claude Shannon in 1948, forming the basis of modern Information Theory and digital electronics.

Additional Information

• Byte:

• A Byte is a sequence of exactly 8 bits and is considered the standard unit of addressable memory.

• It is used to represent a single alphanumeric character in encoding schemes like ASCII or EBCDIC.

• Nibble:

• A Nibble consists of 4 bits, which is equivalent to half of a standard byte.

• This unit is frequently utilized in microcontroller programming and to represent a single hexadecimal digit (0-F).

• Word:

• A Word is the natural unit of data used by a computer CPU, representing the number of bits processed in a single cycle.

• Common word sizes in modern computer architecture include 32-bit and 64-bit configurations, which dictate the processing power and memory capacity of the system.

Q38. Answer: (b) Social media awareness campaign

The correct answer is Social media awareness campaign.

Key Points

• The Kerala Motor Vehicle Department (MVD) initiated a phased implementation of stringent child safety regulations beginning in October 2024 to ensure compliance with the Motor Vehicles (Amendment) Act.

• The first phase was strategically designed as a social media awareness campaign to educate the public, especially parents and guardians, about the legal requirements for child safety while traveling.

• This phase focused on disseminating information through platforms like Facebook, Instagram, and WhatsApp, highlighting the critical importance of helmets for children on two-wheelers and Child Restraint Systems (CRS) in four-wheelers.

• The objective of starting with an awareness drive was to ensure that citizens were well-informed about the safety standards and potential risks before the department transitioned to stricter enforcement and penalties.

• The campaign specifically targeted the reduction of pediatric road fatalities by explaining the technical specifications of safety gear suitable for different age groups.

Additional Information

• Child Restraint Systems (CRS):

• These are specialized seats or equipment designed to protect children from injury during vehicle collisions or sudden braking.

• Under the Central Motor Vehicles Rules, children below the age of 12 years are required to be secured with a seatbelt or a CRS appropriate for their weight and height.

• Two-Wheeler Safety for Children:

• According to the Ministry of Road Transport and Highways (MoRTH), children above 9 months must wear a crash helmet of BIS standard when riding on a motorcycle.

• The speed of the motorcycle carrying a child below 4 years must not exceed 40 kmph.

• Section 194B of the MV Act:

• This section stipulates penalties for failing to secure children with safety belts or restraint systems, aiming to enforce the Safety of Children clause introduced in the 2019 amendment.

• Phased Enforcement Strategy:

• Modern traffic management in Kerala often follows a Three-Tier approach: initial Public Awareness, followed by Stopping and Warning (Phase 2), and concluding with Financial Penalties and License Suspension (Phase 3).

Q39. Answer: (b) Part XIV-A

The correct answer is Part XIV-A.

Key Points

• The 42nd Constitutional Amendment Act, 1976, which is widely known as the Mini-Constitution, introduced Part XIV-A to the Indian Constitution to deal specifically with Tribunals.

• This Part contains two key articles: Article 323A, which deals with Administrative Tribunals, and Article 323B, which deals with Tribunals for other matters.

• Article 323A empowers the Parliament to establish administrative tribunals for resolving disputes related to the recruitment and conditions of service of persons appointed to public services and posts in connection with the affairs of the Union or any State.

• Article 323B allows the Parliament and the State Legislatures to create tribunals for matters such as Taxation, Foreign Exchange, Industrial and Labour disputes, Land Reforms, Ceiling on urban property, and Elections to Parliament and State Legislatures.

• The inclusion of these provisions followed the recommendations of the Swaran Singh Committee, aimed at reducing the mounting pressure on the High Courts and ensuring speedy justice in specialized areas.

Additional Information

• Part XV

• This Part comprises Articles 324 to 329 and provides the constitutional framework for Elections in India, including the establishment of the Election Commission.

• Part IX-B

• This Part was inserted by the 97th Constitutional Amendment Act, 2011, and focuses on the management and regulation of Co-operative Societies.

• Part XII

• Spanning Articles 264 to 300A, this Part deals with Finance, Property, Contracts and Suits, including the distribution of revenues between the Union and States and the Right to Property.

• Administrative Tribunals Act, 1985

• Enacted under the authority of Article 323A, this act led to the formation of the Central Administrative Tribunal (CAT) to adjudicate service-related matters for central government employees.

Q40. Answer: (b) Low birth rates and high life expectancy

The correct answer is Low birth rates and high life expectancy.

Key Points

• A population pyramid, also known as an age-sex pyramid, is a graphical illustration that shows the distribution of various age groups in a population. A narrow base indicates that the proportion of children and infants is relatively small, which is a direct consequence of low birth rates.

• A wider top or an apex that remains broad into the upper age brackets signifies that a significant portion of the population survives into old age. This structural feature is the primary indicator of high life expectancy and low geriatric mortality.

• This specific shape is characteristic of a constrictive pyramid. It represents a population that is aging and may eventually face a natural decrease if birth rates remain below the replacement level (typically 2.1 children per woman).

• Such demographic profiles are most commonly found in developed countries that have completed the Demographic Transition Model. Examples include nations like Japan, Germany, and Italy, where healthcare and socio-economic stability support longevity.

Additional Information

• Types of Population Pyramids:

• Expansive Pyramid:

• Features a very wide base and a narrow top.

• Indicates high birth rates and high death rates (or short life expectancy).

• Common in developing nations with high fertility and limited healthcare access.

• Stationary Pyramid:

• Displays somewhat equal proportions across most age groups, tapering only at the very top.

• Reflects stable birth rates and death rates, often seen in countries like the United States or Australia.

• Dependency Ratio:

• In a pyramid with a narrow base and wide top, the old-age dependency ratio increases.

• This places economic pressure on the working-age population (typically ages 15 to 64) to support social security and healthcare for the elderly.

Q41. Answer: (b) Hooghly industrial belt

The correct answer is Hooghly industrial belt.

Key Points

• The Hooghly industrial belt is recognized as the most prominent port-based industrial region in India, extending along the banks of the Hooghly River for about 100 km from Bansberia to Birlapur.

• The region owes its industrial dominance to the Kolkata Port and the Haldia Dock Complex, which provide vital maritime access for the import of raw materials and the export of finished products to international markets.

• Historically, the belt developed as a major center during the colonial era, specifically after the opening of the first jute mill at Rishra in 1855, supported by British capital.

• It is the world's leading hub for jute manufacturing and houses a diverse range of industries including heavy engineering, chemicals, pharmaceuticals, cotton textiles, paper, and leather goods.

• The belt benefits from the geographical advantage of being close to the Chotanagpur Plateau, ensuring a consistent supply of coal, iron ore, and other minerals, while the river serves as a source of cheap inland water transport.

Additional Information

• Hyderabad-Bengaluru corridor:

• This region is primarily a knowledge-based industrial hub rather than a port-based one.

• It is famous for Information Technology (IT), Biotechnology, Aerospace, and Precision Engineering sectors.

• Ahmedabad-Vadodara region:

• Located in Gujarat, this region is a major center for cotton textiles and petrochemicals.

• While it utilizes nearby ports like Kandla and Mundra, its industrial core is historically rooted in local cotton production.

• Chotanagpur plateau region:

• Known as the mineral heartland or the Ruhr of India, spanning across Jharkhand, West Bengal, and Odisha.

• It is an inland industrial region focused on iron and steel and metallurgical industries due to vast deposits of coal and metallic minerals.

Q42. Answer: (b) Aligarh Movement supported Western-style education, while Arya Samaj promoted Vedic studies.

The correct answer is Aligarh Movement supported Western-style education, while Arya Samaj promoted Vedic studies..

Key Points

• The Aligarh Movement, led by Sir Sayyid Ahmad Khan, primarily aimed at the social and educational advancement of Indian Muslims by reconciling Islamic teachings with modern Western education and scientific temperament.

• The movement established the Muhammadan Anglo-Oriental College in 1875 at Aligarh, which later became the Aligarh Muslim University, focusing on English literature and physical sciences.

• In contrast, the Arya Samaj, founded by Swami Dayanand Saraswati in 1875, was a revivalist movement that sought to reform Hinduism by returning to the original teachings of the Vedas.

• The core philosophy of Arya Samaj was captured in the slogan Back to the Vedas, emphasizing Vedic studies, monotheism, and the rejection of idol worship and ritualistic priesthood.

• While both movements advocated for social reform (such as women's education and the removal of social evils), their academic foundations differed significantly: one looked toward the modern West for intellectual progress, while the other looked toward ancient Indian scriptures.

Additional Information

• Sir Sayyid Ahmad Khan:

• He authored the journal Tahzib-ul-Akhlaq to spread awareness about social reforms and rationalism.

• He believed that the Muslim community could only progress by cooperating with the British administration and mastering Western sciences.

• Swami Dayanand Saraswati:

• His famous work, Satyarth Prakash (The Light of Truth), detailed his interpretations of the Vedas and criticized later Puranic

distortions.

• The Arya Samaj also introduced the Shuddhi movement to bring individuals back into the Hindu fold, which marked a shift toward organized proselytization.

• Educational Legacy:

• The Dayanand Anglo-Vedic (DAV) schools were a later compromise that integrated Vedic education with modern curriculum, whereas the Aligarh Movement remained the standard-bearer for Western-style higher education in the 19th century.

Q43. Answer: (b) Gir National Park

The correct answer is Gir National Park.

Key Points

• The 7th National Board for Wildlife (NBWL) meeting was chaired by the Prime Minister of India in March 2025 at Gir National Park in Gujarat. This high-level meeting marked a significant shift in conducting apex wildlife policy discussions directly within iconic biodiversity hotspots.

• The National Board for Wildlife (NBWL) is a statutory body established under Section 5A of the Wildlife (Protection) Act, 1972. While the Prime Minister chairs the full Board, the Standing Committee of the NBWL is chaired by the Union Minister of Environment, Forest and Climate Change.

• The primary focus of the March 2025 session was the review of Project Lion @ 2047, a roadmap aimed at securing the genetic diversity and habitat of the Asiatic Lion (Panthera leo persica), which is found exclusively in the Saurashtra region of Gujarat.

• The meeting also addressed the expansion of the Protected Area (PA) network and the implementation of the Integrated Development of Wildlife Habitats (IDWH) scheme, emphasizing the use of satellite tracking and AI-based monitoring for preventing human-wildlife conflict.

• Choosing Gir National Park as the venue served to highlight the success of community-led conservation efforts by the Maldhari tribes and the Gujarat Forest Department, which have seen lion populations grow from approximately 523 in 2015 to over 674 in the 2020 estimation.

Additional Information

• Pench National Park

• Located across the Seoni and Chhindwara districts of Madhya Pradesh and parts of Maharashtra.

• It is renowned as the ecological setting for Rudyard Kipling's famous work, The Jungle Book.

• The park is dominated by Teak (Tectona grandis) forests and serves as a critical corridor between Kanha and Satpura Tiger Reserves.

• Satpura Tiger Reserve

• Situated in the Hoshangabad district of Madhya Pradesh, it is part of the Pachmarhi Biosphere Reserve.

• It features unique terrain including deep gorges, sandstone peaks, and is home to the Indian Giant Squirrel and the Malabar Whistling Thrush.

• Sariska Tiger Reserve

• Located in the Alwar district of Rajasthan within the Aravalli Range.

• It made history in 2008 as the site of the world's first successful aerial translocation of tigers to restore a locally extinct population.

Q44. Answer: (a) Gelatinization

The correct answer is Gelatinization.

Key Points

• Gelatinization is a biochemical process that occurs when starch granules are heated in the presence of water, causing the granules to absorb moisture and swell significantly.

• Starch consists of two types of polysaccharide molecules: Amylose (linear) and Amylopectin (branched). During heating, the hydrogen bonds between these molecules are weakened, allowing water to enter the granule.

• As water is absorbed, the crystalline structure of the starch is disrupted, leading to the leaching of Amylose into the surrounding liquid, which results in an increase in viscosity and the formation of a starch paste.

• The temperature at which this process begins is known as the gelatinization temperature, which typically ranges from 60°C to 75°C for most common food starches like those found in flour and potatoes.

• This phenomenon is crucial in cooking for thickening soups, sauces, and providing the characteristic texture to boiled potatoes and baked bread.

Additional Information

• Saponification

• This is a chemical reaction between a fat or oil (triglyceride) and a strong alkali (such as Sodium Hydroxide or Potassium Hydroxide) to produce soap and glycerol.

• Caramelization

• This is the non-enzymatic browning of sugars that occurs at high temperatures (above 160°C). It involves the removal of water (as steam) and the pyrolysis of the sugar, creating complex flavors and a brown color.

• Fermentation

• This is an anaerobic metabolic process where microorganisms like yeast or bacteria convert carbohydrates (sugars) into ethanol, lactic acid, and Carbon Dioxide. It is essential in the production of yogurt, beer, and the rising of dough.

Q45. Answer: (a) Pandit Bhimsen Joshi

The correct answer is Pandit Bhimsen Joshi.

Key Points

• Pandit Bhimsen Gururaj Joshi (1922–2011) was an legendary Hindustani classical vocalist belonging to the Kirana Gharana, celebrated for his powerful voice and breathtaking breath control.

• In 2008, he was conferred with the Bharat Ratna, the highest civilian award of India, for his unparalleled contributions to the field of classical music.

• He achieved nationwide fame for his appearance in the iconic 1988 music video 'Mile Sur Mera Tumhara', which promoted national integration; he famously sang the opening verses in Raga Bhairavi.

• He was a disciple of Sawai Gandharva and later founded the Sawai Gandharva Music Festival in Pune in 1953 to honor his guru, which remains one of the largest music festivals in the world.

• His musical repertoire was diverse, spanning Khayal singing, Thumri, and his deeply moving Marathi Abhangs (devotional songs dedicated to Lord Vitthal).

Additional Information

• Gangubai Hangal:

• She was a prominent female vocalist of the Kirana Gharana known for her deep, masculine voice texture.

• She was honored with the Padma Bhushan (1971) and Padma Vibhushan (2002) but did not receive the Bharat Ratna.

• Bade Fateh Ali Khan:

• A legendary classical singer from the Patiala Gharana, he was based in Pakistan and was a master of Khayal and Thumri styles.

• He was part of the famous duo with his brother, Amanat Ali Khan, and received the Pride of Performance award from the Government of Pakistan.

• Nayak Gopal:

• A medieval Indian musician of the 13th-14th century, he was a contemporary of Amir Khusro during the reign of Alauddin Khalji.

• He is traditionally associated with the Dhrupad style of singing and is a figure of historical significance in the evolution of Indian classical music.

Q46. Answer: (c) Bhimbetka Rock Shelters in Madya Pradesh

The correct answer is Bhimbetka Rock Shelters in Madya Pradesh.

Key Points

• The Bhimbetka Rock Shelters are located in the Raisen District of Madhya Pradesh, within the Vindhya Range, and were discovered by archaeologist V.S. Wakankar in 1957-58.

• This site is unique because it provides a continuous stratigraphic record of human occupation spanning from the Lower Palaeolithic (Acheulian) through the Middle Palaeolithic and Upper Palaeolithic, leading into the Mesolithic period and beyond.

• The Acheulian levels at Bhimbetka are characterized by large stone tools such as handaxes and cleavers, predominantly made of quartzite found locally in the Vindhyan hills.

• The Middle Palaeolithic layer shows a transition to smaller flake-based tools, while the Upper Palaeolithic is marked by the appearance of blades and burins, signifying advanced cognitive and technical skills.

• The Mesolithic layer is the most prolific at the site, yielding vast quantities of microliths and providing world-renowned evidence of prehistoric rock paintings depicting hunting, dancing, and social life.

• Due to its exceptional cultural continuity and archaeological significance, it was designated a UNESCO World Heritage Site in 2003.

Additional Information

• Adamgarh in Madhya Pradesh:

• Located near Hoshangabad on the Narmada River, this site is famous for Mesolithic remains.

• It provided some of the earliest evidence of animal domestication (specifically cattle and sheep/goats) in India, dated to approximately 5000 BCE.

• Paisra in Munger district, Bihar:

• It is a significant Acheulian site known for providing evidence of early habitation structures.

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• Excavations revealed stone-paved floors and post-holes, suggesting that Lower Palaeolithic humans constructed temporary shelters or huts.

• Chirki-Nevasa in Maharashtra:

• Situated on the Pravara River, it is identified as a massive factory site for Acheulian tools.

• The site is noted for the production of heavy-duty tools using basalt rather than the more common quartzite.

Q47. Answer: (a) Wular Lake

The correct answer is Wular Lake.

Key Points

• Wular Lake is the largest freshwater lake in India and one of the largest in Asia, situated in the Bandipora district of the Union Territory of Jammu and Kashmir.

• The lake basin was formed as a result of tectonic activity and is primarily fed by the Jhelum River, which flows into and out of the lake.

• Its surface area is highly seasonal, fluctuating from approximately 30 square kilometers during dry periods to nearly 260 square kilometers during peak flood seasons.

• On March 23, 1990, it was designated as a Wetland of International Importance under the Ramsar Convention due to its immense ecological value.

• The lake serves as a critical flood-absorption basin for the Kashmir Valley, helping to regulate water flow and prevent flooding in downstream areas.

• It is a vital source of livelihood for the local population, supporting a large-scale fishing industry and the harvesting of water chestnuts (Trapa natans).

Additional Information

• Loktak Lake:

• Located in Manipur, it is the largest freshwater lake in Northeast India and is famous for its floating islands called Phumdis.

• It hosts the Keibul Lamjao National Park, the world’s only floating national park, which is the last natural home of the endangered Sangai deer.

• Chilika Lake:

• Situated in Odisha, it is the largest brackish water lagoon in India and the second largest in the world, serving as a major wintering ground for migratory birds.

• It is well-known for being a habitat for the Irrawaddy dolphins and was the first Indian wetland to be designated a Ramsar Site in 1981.

• Dal Lake:

• Known as the 'Jewel in the crown of Kashmir', this freshwater lake in Srinagar is iconic for its houseboats and Shikara rides.

• It features unique floating gardens, known as 'Rad', where vegetables and flowers are cultivated.

Q48. Answer: (a) Rs. 10,000 crore

The correct answer is Rs. 10,000 crore.

Key Points

• The Union Budget 2025-26, presented by Union Finance Minister Nirmala Sitharaman on February 1, 2025, introduced a major financial boost for the Indian startup ecosystem.

• A new Fund of Funds for Startups (FFS) with a total corpus of Rs. 10,000 crore was proposed to provide stable and long-term equity capital to budding entrepreneurs.

• The primary objective of this fund is to address the funding gap faced by startups during their growth and scaling phases, thereby fostering innovation and job creation.

• This initiative aligns with the Viksit Bharat 2047 vision, aiming to transform India into a global hub for deep-tech, green-tech, and high-innovation sectors.

• By mobilizing this corpus, the government intends to catalyze further investments from the private sector through Alternative Investment Funds (AIFs), multiplying the total available capital for the market.

Additional Information

• Fund of Funds Mechanism:

• Unlike direct investment schemes, a Fund of Funds does not invest directly in startups. It provides capital to SEBI-registered Alternative Investment Funds (AIFs).

• These AIFs (daughter funds) are then responsible for selecting and investing in high-potential Indian startups, ensuring professional management of the corpus.

• Nodal Agency:

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• The Small Industries Development Bank of India (SIDBI) typically serves as the implementing agency for managing such funds of funds on behalf of the government.

• Space Sector Fund:

• Apart from the general startup fund, the budget also highlighted a specific Rs. 1,000 crore Venture Capital Fund dedicated to the Space Sector to encourage private participation in the space economy.

• Startup India Initiative:

• Launched in January 2016, this initiative has led India to become the third-largest startup ecosystem in the world, with over 1.2 lakh recognized startups.

Q49. Answer: (c) 80%

The correct answer is 80%.

Key Points

• The Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December 2000 by the Government of India as a Centrally Sponsored Scheme to provide all-weather road connectivity to eligible unconnected habitations.

• At the time of its inception in 2000, it was estimated that approximately 40% of the rural habitations in India lacked connectivity to all-weather roads, which severely hindered their socio-economic development.

• According to the Ministry of Rural Development, the implementation of PMGSY over two decades (2000–2020) resulted in a transformative increase in connectivity, with the coverage percentage reaching approximately 80% or higher for the targeted habitations across the country.

• The scheme has played a pivotal role in poverty reduction by providing rural populations access to Gramin Agricultural Markets (GrAMs), higher education institutions, and specialized healthcare centers.

• The construction progress involved massive engineering efforts, with road construction rates reaching an average of nearly 100 to 130 kilometers per day during peak implementation phases between 2014 and 2020.

• The improved 80% connectivity has facilitated a shift from subsistence farming to commercial agriculture, as farmers can now transport perishable goods to urban centers more efficiently.

Additional Information

• Phases of PMGSY:

• PMGSY-I: The initial phase focused on connecting habitations with a population of 500 and above in plain areas and 250 and above in Hilly States, Desert Areas, and Tribal Areas.

• PMGSY-II: Approved in 2013, this phase aimed at the consolidation of 50,000 km of the existing Rural Road Network to improve transport efficiency.

• PMGSY-III: Launched in 2019, it focuses on the consolidation of 1,25,000 km of through routes and major rural links connecting habitations to hospitals and schools.

• Funding and Governance:

• The funding pattern for the scheme is shared between the Central Government and State Governments in a 60:40 ratio for general states and 90:10 for North Eastern and Himalayan States.

• The National Rural Infrastructure Development Agency (NRIDA) provides technical and managerial support for the effective implementation of the program.

• Usage of Green Technology, including waste plastic, cold mix technology, and fly ash, has been prioritized to ensure environmental sustainability in road construction.

Q50. Answer: (d) Analytical Engine

The correct answer is Analytical Engine.

Key Points

• The Analytical Engine was a proposed mechanical computer designed by the English mathematician and inventor Charles Babbage in 1837, following his work on the Difference Engine.

• It is historically significant as the first conceptual design for a general-purpose computer that could be programmed to perform any logical or mathematical operation.

• The architecture of the machine included fundamental components found in modern systems, such as the Mill (the equivalent of a Central Processing Unit) and the Store (the equivalent of Memory).

• Babbage incorporated the use of punched cards, a technology adapted from the Jacquard loom, to provide instructions and data to the engine, allowing for sequential control and conditional branching.

• While it was never fully constructed during Babbage's lifetime due to its immense complexity and financial constraints, it laid the logical foundation for the development of modern digital computing.

Additional Information

• Atanasoff-Berry Computer (ABC):

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• Developed by John Vincent Atanasoff and Clifford Berry between 1937 and 1942 at Iowa State College.

• It was the first electronic digital computing device to use vacuum tubes and binary arithmetic, though it was not programmable.

• ENIAC (Electronic Numerical Integrator and Computer):

• Completed in 1945 by John Mauchly and J. Presper Eckert at the University of Pennsylvania.

• This was the world's first programmable, electronic, general-purpose digital computer, originally designed for calculating artillery firing tables.

• UNIVAC (Universal Automatic Computer):

• Also designed by Eckert and Mauchly, the UNIVAC I became the first commercial computer produced in the United States in 1951.

• It gained fame for successfully predicting the outcome of the 1952 U.S. Presidential Election.

Therefore, the Analytical Engine is the correct answer.

Q51. Answer: (c) Both I and II are correct

The correct answer is Both I and II are correct.

Key Points

• The Right to Information (RTI) Act, 2005 was designed to empower citizens by providing a legal right to access records held by Public Authorities. By mandating proactive disclosure and enabling public scrutiny of government files, the Act curbs corruption and ensures that administrative decisions are made with maximum fairness and transparency. Hence, statement I is correct.

• The RTI Act is frequently utilized as a strategic tool to improve the efficiency of the Consumer Redressal Forums. Litigants often file RTI applications to inquire about the status of their cases, the reasons for judicial delays, and whether the statutory timelines for case disposal are being met. This administrative pressure forces these quasi-judicial bodies to be more accountable and responsive to consumers. Hence, statement II is correct.

Additional Information

• The RTI Act, 2005:

• The Act replaced the older Freedom of Information Act, 2002 to provide a more robust and practical regime for citizens.

• Information must normally be provided within 30 days of the application, or 48 hours if it concerns the life or liberty of a person.

• The Central Information Commission (CIC) and State Information Commissions (SIC) are the final appellate authorities under the Act.

• Section 8 of the Act lists specific exemptions, such as matters affecting National Security or Foreign Relations, where information can be legally withheld.

• Consumer Forums and Accountability:

• Consumer Forums were established under the Consumer Protection Act, 1986 (replaced by the Act of 2019) to provide speedy and inexpensive grievance redressal.

• The three-tier machinery consists of the District Commission, State Commission, and National Commission.

• The integration of RTI with consumer rights allows for Social Audits of the judiciary's administrative performance, ensuring that consumer rights are not neglected due to bureaucratic lethargy.

Q52. Answer: (b) Barbados

The correct answer is Barbados.

Key Points

• The government of Barbados conferred its highest national honor, the Honorary Order of Freedom, on Indian Prime Minister Narendra Modi in recognition of his significant contribution to the island nation and his global leadership.

• This prestigious award highlights the strengthening of bilateral ties between India and Barbados, particularly following India's humanitarian assistance during the COVID-19 pandemic.

• Under the Vaccine Maitri initiative, India was the first country to provide Made-in-India vaccines to Barbados in early 2021, which played a crucial role in the nation's early response to the health crisis.

• The conferment took place during a period of enhanced engagement between India and the Caribbean Community (CARICOM), showcasing India's South-South Cooperation model and its commitment to the Global South.

• The award ceremony underscored the mutual respect and shared values between the two nations, focusing on sectors like healthcare, climate change, and technology.

Additional Information

• During the same diplomatic cycle and the 2nd India-CARICOM Summit, other Caribbean nations also honored the Indian Prime Minister:

• Guyana: Conferred its highest national award, the Order of Excellence, for PM Modi's efforts in promoting global cooperation.

• Dominica: Bestowed the Dominica Award of Honour in recognition of India's support during the pandemic and for strengthening India-Dominica relations.

• Trinidad and Tobago and Jamaica: While these nations maintain robust historical and cultural links with India, including membership in CARICOM and the Commonwealth, they were part of the broader regional discussions on energy security and digital public infrastructure.

• Prime Minister Narendra Modi has received more than 15 highest international awards from various countries across the Middle East, Europe, and the Pacific, reflecting India's expanding diplomatic footprint.

Q53. Answer: (b) Shadow zone

The correct answer is Shadow zone.

Key Points

• An earthquake Shadow Zone refers to the specific region on the Earth surface where seismographs are unable to detect seismic waves from a particular epicenter.

• Secondary waves (S-waves) are transverse body waves that can only propagate through solid media; they possess no shear strength to pass through fluids like liquids or gases.

• The Earth structure includes a liquid outer core, which begins at the Gutenberg Discontinuity at a depth of approximately 2,900 kilometers.

• Because S-waves cannot travel through the liquid outer core, they are completely blocked, creating a massive shadow zone that extends from an angular distance of 103 degrees to 180 degrees from the epicenter.

• The S-wave shadow zone is significantly larger than the P-wave shadow zone, covering nearly 40 percent of the entire Earth surface.

• The existence of this zone provided scientists like Richard Dixon Oldham and Inge Lehmann with the primary evidence that the Earth has a liquid core.

Additional Information

• Seismic Waves and Barriers:

• P-wave Shadow Zone: Primary waves (P-waves) are longitudinal and can pass through solids and liquids; however, they are refracted (bent) at the core-mantle boundary, creating a shadow zone between 103 degrees and 142 degrees from the epicenter.

• Seismic Belt: This refers to elongated regions of high seismic activity, such as the Alpide belt or the Circum-Pacific Belt (Ring of Fire), where plate boundaries frequently generate earthquakes.

• Epicentral Gap: Also known as a seismic gap, this is a segment of an active tectonic fault that has not slipped in a long time compared to other segments, indicating a high probability of a future major earthquake.

• Active Zone: Geologically unstable regions characterized by frequent tectonic movements, volcanism, and seismic energy release.

Q54. Answer: (a) Chile

The correct answer is Chile.

Key Points

• Jose Antonio Kast, the leader of the Republican Party (Partido Republicano), assumed the presidency of Chile in March 2026.

• He emerged victorious in the 2025 Chilean general elections, which were held in November 2025 (first round) and December 2025 (ballot/runoff).

• The inauguration ceremony took place on March 11, 2026, which is the traditional date for the transfer of power in Chile as mandated by the constitution.

• Kast succeeded Gabriel Boric, whose four-year term (2022–2026) concluded upon the swearing-in of the new president.

• Political analysts characterize his administration as conservative and right-wing, with a policy focus on economic deregulation, border security, and tax reductions.

• Chile operates under a presidential republic system where the President serves as both the head of state and head of government for a non-renewable four-year term.

Additional Information

• Regional Leadership Context:

• Argentina: Javier Milei was inaugurated in December 2023. The Argentine presidential term is four years, meaning the next election would typically occur in late 2027.

• Brazil: Luiz Inácio Lula da Silva (Lula) took office in January 2023. Brazil follows a four-year cycle, with the next scheduled inauguration in January 2027.

• Peru: Following the 2022 political crisis, Dina Boluarte assumed office; Peru follows a different electoral calendar with general elections typically held in April and inaugurations in July.

• Chilean Constitution: Under current laws, a sitting president cannot run for immediate re-election, which is why Gabriel Boric was ineligible to contest the 2025 cycle.

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Q55. Answer: (d) Narasimhadeva I

The correct answer is Narasimhadeva I.

Key Points

• King Narasimhadeva I, a prominent ruler of the Eastern Ganga Dynasty, commissioned the construction of the Konark Sun Temple during the mid-13th century (approximately 1250 CE).

• The temple was built to commemorate the king's military triumph over the Tughral Tughan Khan of the Bengal Sultanate, signifying the height of the Ganga Empire power in Odisha.

• Designed as a colossal stone chariot for the Sun God, Surya, the temple features 24 intricately carved wheels, each about 10 feet in diameter, and is pulled by seven horses representing the days of the week.

• The architecture follows the Kalinga style, specifically the Pancha-ratha plan, and was constructed using khondalite rocks, involving the labor of over 1,200 artisans for nearly 12 years.

• Located on the shores of the Bay of Bengal, it was historically used as a navigation landmark by sailors and was famously referred to as the Black Pagoda due to its dark appearance and magnetic properties.

Additional Information

• Ashoka

• He was the third emperor of the Mauryan Dynasty (reigned c. 268−232 BCE) and is celebrated for promoting Buddhism across Asia after the Kalinga War.

• His architectural contributions include the Sanchi Stupa, Barabar Caves, and various Ashokan Pillars featuring the Lion Capital.

• Chandragupta II

• Known as Vikramaditya, he ruled the Gupta Empire during its peak (c. 375−415 CE) and was a great patron of Sanskrit literature and the arts.

• His reign saw the creation of the Iron Pillar of Delhi and the expansion of the empire into Western India.

• Harshavardhana

• A member of the Pushyabhuti Dynasty, he ruled North India from 606 to 647 CE with Kannauj as his capital.

• He is famous for convening the Prayag Assembly and for the detailed historical accounts written by his court poet Banabhatta in the Harshacharita.

• UNESCO Recognition

• The Konark Sun Temple was designated a UNESCO World Heritage Site in 1984 due to its unique architectural grandeur and cultural importance in Indian heritage.

Q56. Answer: (a) Algeria

The correct answer is Algeria.

Key Points

• The New Development Bank (NDB), formerly known as the BRICS Development Bank, officially authorized the membership of Algeria following the 9th Annual Meeting of the Board of Governors held in August 2024 in Cape Town, South Africa.

• Algeria successfully finalized its accession process, including the necessary domestic legislative approvals and capital contributions, to become a formal member by May 2025.

• The decision to admit Algeria was confirmed by the NDB President, Dilma Rousseff, who emphasized the bank's commitment to expanding its reach among Emerging Markets and Developing Countries (EMDCs).

• Membership in the NDB provides Algeria with access to diverse financial resources for infrastructure and sustainable development projects, supporting the country's efforts to diversify its economy beyond hydrocarbons.

• Unlike traditional global lenders, the NDB operates on a model of equal voting power for its founding members, ensuring that no single nation has a veto, which appeals to nations like Algeria seeking a more equitable Global South financial architecture.

Additional Information

• New Development Bank (NDB)

• Established in July 2014 during the 6th BRICS Summit held in Fortaleza, Brazil, it is headquartered in Shanghai, China.

• The bank was founded by the BRICS nations: Brazil, Russia, India, China, and South Africa, with an initial authorized capital of 100 billion USD.

• Its primary objective is to mobilize resources for projects in BRICS and other developing economies, complementing the efforts of the World Bank and IMF.

• Other recent members who joined the bank include the United Arab Emirates (UAE), Egypt, and Bangladesh, while Uruguay remains a prospective member.

• Distinction between BRICS Bloc and NDB

• Ethiopia officially joined the BRICS political bloc (the group of nations) on January 1, 2024, alongside Egypt, Iran, and the UAE.

• Membership in the BRICS political group is distinct from membership in the New Development Bank; countries must undergo a

separate legal and financial process to join the bank's capital structure.

• Taiwan is not a member of the NDB or BRICS, as the organization strictly recognizes the One-China policy, with China being a founding member of the institution.

Q57. Answer: (d) Republic

The correct answer is Republic.

Key Points

• The term Republic in the Preamble of the Constitution of India signifies that the Head of the State is an elected official and not a hereditary monarch.

• In the Indian context, the President of India serves as the Head of State and is elected indirectly by the people through an electoral college for a fixed tenure of five years.

• A republican form of government ensures that political sovereignty is vested in the citizens of the country rather than a single individual like a King or Queen.

• It further implies the absence of any privileged class, meaning all public offices are open to every citizen without any discrimination based on caste, creed, or religion.

• India chose to be a Republic upon the commencement of the Constitution on January 26, 1950, effectively ending its status as a British dominion and replacing the King with an elected President.

Additional Information

• Sovereign

• This term declares that India is an independent authority and not a dependency or dominion of any external power.

• It means the Parliament of India has the power to enact laws within the restrictions imposed by the Constitution without outside interference.

• Socialist

• Inserted via the 42nd Amendment Act, 1976, it reflects the commitment to Democratic Socialism.

• It aims to end poverty, ignorance, and inequality of opportunity through a mixed economy where both public and private sectors co-exist.

• Secular

• Also added by the 42nd Amendment Act, it signifies that the State has no official religion.

• It guarantees that all religions in India enjoy the same status and support from the government, as protected under Articles 25 to 28.

Q58. Answer: (a) Ctrl + V

The correct answer is Ctrl + V.

Key Points

• Ctrl + V is a universally recognized keyboard shortcut designed to execute the Paste command, which inserts the content currently stored in the system clipboard into the active document or field.

• This shortcut was pioneered by the computer scientist Larry Tesler while working at Xerox PARC between 1973 and 1976; it has since become a fundamental component of Graphical User Interfaces (GUI).

• The operation relies on the Clipboard, a temporary storage buffer in the computer's Random Access Memory (RAM) that holds data retrieved via the Copy (Ctrl + C) or Cut (Ctrl + X) commands.

• In macOS, the equivalent functional shortcut is Command + V, but across Windows and Linux distributions, Ctrl + V remains the standard for text editors, web browsers, and file management systems.

• When used, it identifies the insertion point (cursor position) and replicates the data format (if supported) such as plain text, rich text, or embedded objects.

Additional Information

• Ctrl + C:

• This shortcut performs the Copy function, which duplicates the selected information and places it on the clipboard while leaving the original content intact.

• Ctrl + S:

• This is the Save shortcut used to write the current data of an application from the volatile RAM to a non-volatile storage device like an SSD or HDD.

• Ctrl + F:

• Commonly known as the Find command, this shortcut opens a search utility within applications like Google Chrome or Microsoft Word to locate specific strings of text.

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Q59. Answer: (a) Chicago World's Parliament of Religions

The correct answer is Chicago World's Parliament of Religions.

Key Points

• Swami Vivekananda represented India and Hinduism at the World's Parliament of Religions held in Chicago, United States, in September 1893.

• The Parliament was a part of the World's Columbian Exposition, organized to celebrate the 400th anniversary of Christopher Columbus's arrival in the New World.

• On September 11, 1893, Vivekananda delivered his inaugural speech, famously beginning with the address 'Sisters and brothers of America!', which earned him a two-minute standing ovation from the audience of nearly seven thousand people.

• His participation is credited with introducing the Indian philosophies of Vedanta and Yoga to the Western world and establishing Hinduism as a major world religion during the late 19th century.

• The event aimed to facilitate a formal dialogue between representatives of various Eastern and Western spiritual traditions to promote religious tolerance and global understanding.

Additional Information

• Swami Vivekananda:

• Born as Narendranath Datta in 1863, he was the chief disciple of the 19th-century mystic Ramakrishna Paramahansa.

• He founded the Ramakrishna Mission on May 1, 1897, to carry out humanitarian work and social service.

• His birthday, January 12, is celebrated as National Youth Day in India.

• First Indian National Congress:

• It was formed in 1885, with its first session held in Bombay (now Mumbai) under the presidency of Womesh Chandra Bonnerjee.

• Hague Peace Conference:

• The first conference took place in 1899 in the Netherlands, primarily focusing on international law, disarmament, and the peaceful settlement of international disputes.

Q60. Answer: (c) 343 m/s

The correct answer is 343 m/s.

Key Points

• The speed of sound is defined as the distance traveled per unit of time by a sound wave as it propagates through an elastic medium. In air, sound is a longitudinal wave that moves through a series of compressions and rarefactions.

• The speed of sound in a medium depends primarily on the elasticity and density of that medium. In the case of gases, the temperature is the most critical variable affecting speed.

• At a standard temperature of 0°C (273 K), the speed of sound in dry air is approximately 331.5 m/s.

• As the temperature of the air increases, the kinetic energy of the molecules increases, allowing the sound vibration to be transmitted more rapidly. The relationship is expressed by the approximate formula: $v = 331.5 + 0.6 \times T$, where T represents the temperature in degrees Celsius.

• For a typical room temperature of 20°C, the calculation is $v = 331.5 + (0.6 \times 20)$, resulting in 343.5 m/s. Consequently, 343 m/s is recognized as the standard approximate value for sound speed at this temperature.

Additional Information

• Speed of sound in various media:

• Solids: Sound travels fastest in solids because the particles are very close together. In Steel, the speed is approximately 5960 m/s, and in Aluminum, it reaches about 6420 m/s.

• Liquids: Sound travels faster in liquids than in gases but slower than in solids. In distilled water at 20°C, the speed is roughly 1482 m/s, while in Seawater, it is approximately 1531 m/s.

• Gases: Sound travels slowest in gases. For example, in Helium at 0°C, the speed is about 965 m/s, which is faster than in air due to helium's lower density.

• Environmental Factors:

• Humidity: Increased humidity leads to a slight increase in the speed of sound because water vapor is less dense than the nitrogen and oxygen molecules it replaces in the air.

• Pressure: In an ideal gas, the speed of sound is independent of pressure as long as the temperature remains constant.

Q61. Answer: (c) 42^(nd) Amendment

The correct answer is 42^(nd) Amendment.

Key Points

• The Fundamental Duties were incorporated into the Indian Constitution following the recommendations of the Swaran Singh Committee, which was established by the government in 1976.

• The committee suggested that a separate chapter on fundamental duties be added to ensure that citizens are aware of their obligations while enjoying their Fundamental Rights, particularly during the National Emergency.

• Based on these suggestions, the 42^(nd) Constitutional Amendment Act, 1976 was enacted, which introduced a new Part IV-A and a single new Article 51A to the Constitution.

• Initially, the committee recommended the inclusion of eight fundamental duties; however, the 42^(nd) Amendment actually included ten duties.

• The recommendations included a provision for Parliament to impose penalties for non-compliance, but this specific suggestion was not accepted and thus not included in the final amendment.

Additional Information

• 44^(th) Amendment Act, 1978:

• This amendment was passed by the Janata Government to undo several changes made during the Emergency.

• It famously stripped the Right to Property of its status as a Fundamental Right and made it a legal right under Article 300A.

• 86^(th) Amendment Act, 2002:

• This amendment added the 11^(th) Fundamental Duty to the existing list, which pertains to providing educational opportunities to children aged 6 to 14 years.

• It also established the Right to Education as a Fundamental Right under Article 21A.

• Other Amendments:

• The 40^(th) Amendment Act, 1976 empowered Parliament to define the limits of India's territorial waters and the Exclusive Economic Zone (EEZ).

• The 48^(th) Amendment Act, 1984 was specifically concerned with the extension of President’s Rule in the state of Punjab.

• Origins:

• The concept of Fundamental Duties in India was inspired by the Constitution of the former USSR.

• These duties are non-justiciable in nature, meaning they cannot be directly enforced by the courts through writs.

Q62. Answer: (d) Amartya Sen

The correct answer is Amartya Sen.

Key Points

• The Argumentative Indian: Writings on Indian History, Culture and Identity is a landmark collection of sixteen essays published in 2005 by the Nobel laureate Amartya Sen.

• The book explores the intellectual history of India, positing that the country has a deep-seated tradition of public reasoning, skepticism, and intellectual pluralism that predates Western influences.

• Sen argues that the success of secularism and democracy in modern India is fundamentally linked to this historical legacy of heterodoxy and open debate.

• The text references historical figures and texts, such as the philosophical dialogues in the Bhagavad Gita and the inclusive, secular governance models of emperors Ashoka and Akbar.

• The work aims to broaden the understanding of Indian identity beyond narrow religious or ethnic definitions, highlighting a heritage of rational argument and diversity.

Additional Information

• Amartya Sen:

• Awarded the Nobel Memorial Prize in Economic Sciences in 1998 for his contributions to welfare economics and social choice theory.

• Recipient of the Bharat Ratna in 1999, he is known for developing the Human Development Index (HDI) alongside Mahbub ul Haq.

• Ramachandra Guha:

• A distinguished historian and biographer famous for books such as India After Gandhi and Gandhi Before India.

• Shashi Tharoor:

• A prolific author and politician known for An Era of Darkness: The British Empire in India and The Great Indian Novel, which reimagines the Mahabharata in a modern political context.

• Jawaharlal Nehru:

• The first Prime Minister of India and author of several classic texts, including The Discovery of India, written during his imprisonment at Ahmednagar Fort.

Q63. Answer: (c) Iron

The correct answer is Iron.

Key Points

• Sound is a mechanical longitudinal wave that requires a material medium to propagate, traveling through the periodic compression and rarefaction of particles.

• The speed of sound depends on the elasticity and density of the medium. It is mathematically represented as the square root of the ratio of the elastic modulus to the inertial density.

• In solids, atoms are more closely packed and bound by stronger intermolecular forces compared to liquids or gases. This high elasticity allows the vibrational energy to be transferred much more efficiently and rapidly between adjacent atoms.

• Among the given options, Iron is a solid with a high stiffness (Young's modulus). Consequently, sound travels fastest through it at a speed of approximately 5,130 m/s at room temperature.

• As a general rule, the speed of sound follows the order: Solids > Liquids > Gases.

Additional Information

• Air

• It is a gaseous medium where molecules are widely separated and interact weakly.

• The speed of sound in air is relatively slow, measured at approximately 343 m/s at a standard temperature of 20°C.

• Water

• As a liquid, it is less compressible than air but far more compressible than solids.

• Sound travels at an intermediate speed in water, roughly 1,480 m/s, which is about four times faster than in air but significantly slower than in metals.

• Vacuum

• A vacuum is a space devoid of matter. Since sound is a mechanical wave that relies on particle-to-particle interaction, it cannot propagate in a vacuum.

• The speed of sound in a vacuum is zero.

Q64. Answer: (c) Banking and Information Technology

The correct answer is Banking and Information Technology.

Key Points

• The New Economic Policy (NEP) launched in 1991 by the P.V. Narasimha Rao government marked a paradigm shift from a command economy to a market-oriented economy through Liberalization, Privatization, and Globalization (LPG).

• The Information Technology (IT) sector witnessed exponential growth due to the removal of Industrial Licensing and the drastic reduction in import duties on computer hardware and software, facilitating the entry of multinational corporations and the rise of domestic giants like Infosys and TCS.

• The Banking sector underwent a transformation following the Narasimham Committee (1991) report, which recommended financial sector reforms. This led the Reserve Bank of India (RBI) to grant licenses to New Private Sector Banks such as HDFC, ICICI, and Axis Bank, introducing competition and advanced Core Banking Solutions.

• The establishment of Software Technology Parks of India (STPI) in 1991 provided critical infrastructure and tax incentives, turning India into a global hub for Business Process Outsourcing (BPO) and software exports.

• These industries became the backbone of the Service Sector, which currently contributes more than 50 percent to India's Gross Domestic Product (GDP), shifting the economic focus from traditional agriculture and heavy manufacturing.

Additional Information

• Strategic and Reserved Sectors

• Space and Nuclear: These remained strictly under the control of the Department of Space and Department of Atomic Energy for national security and strategic reasons. Private participation in these sectors was largely restricted until very recent reforms.

• Railways and Defence: Under the Industrial Policy Resolution of 1956, these were reserved exclusively for the Public Sector. While Defence was opened to 26 percent FDI in 2001, Railways (except specific infrastructure projects) remains a government monopoly.

• Oil and Gas: Although the NELP (New Exploration Licensing Policy) was introduced in 1997-98 to encourage private investment, the sector continued to be dominated by Maharatna PSUs like ONGC and IOCL immediately after 1991.

• Key Reform Mechanisms

• Abolition of MRTP Act: The Monopolies and Restrictive Trade Practices Act was relaxed to allow large firms to expand without prior government approval.

• Currency Devaluation: In July 1991, the Indian Rupee was devalued to boost export competitiveness, directly benefiting the emerging IT services industry.

Q65. Answer: (b) Unit of land area

The correct answer is Unit of land area.

Key Points

• Population density is a geographical measurement of the number of people residing within a specific region relative to its size,

typically expressed as people per unit of land area, such as a square kilometer or square mile.

• The most common method of calculation is Arithmetic Density, which is derived by dividing the total population of a country or region by its total land area in square units.

• According to the 2011 Census of India, the national population density was recorded at 382 persons per square kilometer, reflecting a steady increase from 324 persons per square kilometer in 2001.

• This metric serves as a vital tool for demographers and urban planners to assess the carrying capacity of land, plan infrastructure development, and determine the distribution of public services.

• Globally, factors such as topography, climate, soil fertility, and economic opportunities heavily influence how densely a unit of land is populated.

Additional Information

• Arable land:

• This refers to land that is physically and chemically suitable for agricultural cultivation.

• The ratio of total population to arable land is termed Physiological Density, which provides a more accurate measure of a country's ability to sustain its population through food production.

• Total population:

• This is the absolute count of every individual living within a defined territory at a specific time, usually gathered through a national Census.

• Urban center:

• Represents a highly developed and densely populated area, such as a city or metropolis, characterized by significant industrial, commercial, and administrative activities.

Q66. Answer: (b) Ministry of Culture

The correct answer is Ministry of Culture.

Key Points

• The Ministry of Culture is the nodal agency of the Government of India responsible for the preservation of heritage and the commemoration of centenaries and significant anniversaries of national importance.

• The national-level celebration for the 150th anniversary of the composition of Vande Mataram falls under the administrative purview of this ministry to highlight the song’s role in the Indian Independence Movement.

• Vande Mataram was composed by Bankim Chandra Chattopadhyay in the 1870s (specifically around 1875-1876) and was later included in his famous Bengali novel Anandamath, published in 1882.

• The song was first sung in a political context by Rabindranath Tagore at the 1896 session of the Indian National Congress held in Calcutta.

• The Ministry of Culture coordinates with the National Implementation Committee (NIC) to organize events, seminars, and exhibitions that educate the public about such national symbols.

• On January 24, 1950, the Constituent Assembly of India adopted Vande Mataram as the National Song, giving it a status equal to the National Anthem, Jana Gana Mana.

Additional Information

• Ministry of Home Affairs:

• Responsible for internal security, border management, and the administration of Union Territories.

• It handles matters related to the National Flag and the Official Languages Act, but cultural commemorations are secondary to its core functions.

• Ministry of Education:

• Formerly known as the Ministry of Human Resource Development, it focuses on literacy, primary education, and higher education policies.

• While it integrates patriotic songs into the school curriculum, it is not the primary organizer of national anniversary celebrations.

• Ministry of Youth Affairs and Sports:

• Focuses on youth development through organizations like Nehru Yuva Kendra Sangathan (NYKS) and National Service Scheme (NSS).

• It promotes sports infrastructure and youth empowerment but does not hold the mandate for official cultural commemorations of national symbols.

Q67. Answer: (d) Integration of a country’s economy with the world economy

The correct answer is Integration of a country’s economy with the world economy.

Key Points

• Globalisation is defined as the process of rapid integration or interconnection between countries through the increased flow of goods, services, investments, and people across international borders.

• It involves the opening up of domestic markets to foreign players and the removal of various trade barriers, such as tariffs and quotas, to facilitate a seamless exchange in the global market.

• The process is significantly driven by advancements in Information and Communication Technology (ICT) and transport, which have made the physical distance between countries less relevant for economic activities.

• In India, globalisation became a cornerstone of the New Economic Policy (NEP) launched in July 1991, shifting the nation away from a closed economy toward an outward-oriented economic framework.

• Multinational Corporations (MNCs) play a pivotal role in this process by setting up production units and offices in multiple countries, thereby linking disparate economies through Foreign Direct Investment (FDI).

Additional Information

• Globalisation is often discussed alongside two other core concepts of the 1991 Reforms:

• Liberalisation: The policy of reducing or eliminating government regulations and restrictions on private business and industry to encourage competition.

• Privatisation: The transfer of ownership, management, and control of Public Sector Undertakings (PSUs) to the private sector to improve efficiency.

• World Trade Organization (WTO): Established in 1995, this international body oversees the rules of trade between nations and works toward the liberalisation of global trade.

• Outsourcing: An important outcome of globalisation where companies delegate business processes (like BPOs) to external providers in countries with lower costs, such as India.

• The concepts of Economic Isolation or Autarky are the direct opposites of globalisation, where a country avoids international trade and aims for self-sufficiency.

Q68. Answer: (a) Goddess Mariamman

The correct answer is Goddess Mariamman.

Key Points

• Karagattam is an ancient and vibrant folk dance of Tamil Nadu that involves balancing a decorated pot called a Karagam on the head while performing intricate steps and acrobatic movements.

• The dance is traditionally dedicated to Goddess Mariamman, who is revered in South Indian tradition as the Goddess of Rain and the protector against infectious diseases like smallpox and cholera.

• The performance is deeply rooted in Dravidian culture and is typically held during temple festivals, especially in the Tamil month of Aadi, to invoke the goddess for a bountiful harvest and rainfall.

• There are two main variants of this dance: Sakthi Karagam, which is performed strictly within temple premises for religious rituals, and Atta Karagam, which is a more theatrical version performed for public entertainment.

• The Karagam pot is usually made of mud, bronze, or brass and is filled with uncooked rice or water to provide the necessary weight for balance; it is topped with a conical arrangement of flowers and a wooden or paper parrot.

• Dancers perform to the rhythmic beats of the Naiyandi Melam, which includes instruments like the Thavil, Pambai, and Urumi, showcasing extraordinary physical coordination and balance.

Additional Information

• Goddess Kamakshi:

• She is a form of Tripura Sundari or Parvati and is the presiding deity of the Kanchi Kamakshi Amman Temple in Kanchipuram.

• She is depicted in a Padmasana (yogic) posture, holding a sugarcane bow and floral arrows, representing love and devotion.

• Goddess Andal:

• She is the only female Alvar saint among the twelve Vaishnavite saints of South India, known for her compositions like Thiruppavai.

• She is worshipped as an incarnation of Bhu Devi (Mother Earth) and is central to the traditions of the Srivilliputhur temple.

• Goddess Meenakshi:

• An avatar of Parvati, she is the primary deity of the historic Meenakshi Amman Temple in Madurai.

• She is often represented with a parrot on her shoulder and is celebrated for her role as the sovereign queen of the Pandyan kingdom.

Q69. Answer: (b) Meghalaya and Assam

Concept:

In April 2025, the Government of India, under the PM Gati Shakti National Master Plan and the Bharatmala Pariyojana, sanctioned a significant infrastructure project to enhance connectivity in the Northeast Region. This Greenfield High-Speed Corridor was designed to reduce travel time and improve logistics between major economic hubs in Assam and Meghalaya. Greenfield projects are built from scratch on undeveloped land, allowing for straighter alignments and higher speed limits compared to upgrading existing brownfield roads.

Key Points:

• The corridor aims to provide a high-capacity transport link between Guwahati, the gateway to the Northeast, and key administrative and commercial centers in Meghalaya.

• The project was officially sanctioned by the Ministry of Road Transport and Highways (MoRTH) in April 2025 to boost cross-border trade and regional economic integration.

• The corridor is strategically important as it links the Brahmaputra Valley in Assam with the hilly terrain of Meghalaya, facilitating easier movement of goods and passengers.

• The project includes the construction of several bridges and tunnels to maintain the high-speed design standard across the challenging topography of the two states.

Explanation

Based on the development plans and official sanctions recorded for April 2025, the specific Greenfield High-Speed Corridor project is focused on the connectivity between Meghalaya and Assam. This alignment was chosen to bypass heavily congested existing routes and provide a dedicated expressway-standard road. Therefore, the two states that will be traversed by this newly approved corridor are Meghalaya and Assam.

Final Answer: Meghalaya and Assam

Q70. Answer: (d) 2008

The correct answer is 2008.

Key Points

• The Gram Nyayalayas Act was enacted by the Parliament of India in 2008 with the primary objective of establishing Gram Nyayalayas or village courts at the grass-roots level.

• The legislation was a response to the 114th Report of the Law Commission of India, which recommended the creation of Nyaya Panchayats to reduce the burden on higher courts and provide inexpensive justice.

• The Act aims to fulfill the mandate of Article 39A of the Constitution of India, which directs the State to provide free legal aid and ensure that the operation of the legal system promotes justice on a basis of equal opportunity.

• These courts are designed to be mobile courts, exercising both civil and criminal jurisdiction over specific offenses and disputes mentioned in the schedules of the Act.

• The Gram Nyayalayas Act, 2008 received the assent of the President of India on January 7, 2009, and officially came into force on October 2, 2009, marking the birth anniversary of Mahatma Gandhi.

Additional Information

• Structure and Appointment:

• A Gram Nyayalaya is established for every Panchayat at intermediate level (Mandal or Block level) or for a group of contiguous Panchayats.

• The presiding officer of the court is known as the Nyayadhikari, who possesses the same qualifications, salary, and service conditions as a Judicial Magistrate of the First Class.

• Nyayadhikaris are appointed by the State Government in consultation with the respective High Court.

• Jurisdiction and Procedures:

• The court follows a summary procedure for criminal trials and is not strictly bound by the complex rules of the Indian Evidence Act, 1872, but is guided by the principles of natural justice.

• It has the power to try criminal offenses, civil suits, claims, or disputes specified in the First Schedule and Second Schedule of the Act, which can be amended by the Central or State Governments.

• The Act emphasizes conciliation and mandates the court to make efforts to settle disputes through conciliators before proceeding to trial.

• Appeals in criminal cases lie to the Court of Session, while appeals in civil cases lie to the District Court, both of which must be heard and disposed of within six months.

Q71. Answer: (a) kc

The logic follows here,

The common code in both sets is 'kc'.

Therefore, the code for the word 'steak' is 'kc'.

Hence, the correct answer is "option 1"

Q72. Answer: (a) KM – HA

The logic follows here,

For KM – HA,

For BE-YR,

For MP – JC,

For OR-LE,

Therefore, the letter-cluster pair that is different from the others is KM - HA.

Hence, the correct answer is 'Option 1'.

Q73. Answer: (c) 14

BODMAS Table:

Symbol Meaning:

Letter	Mathematical Sign
A	÷
B	×
C	•
D	−

Given Equation: 22 C 10 D 9 A 21 B 42 = ?

Substituting the signs into the equation and applying the BODMAS rule, we get:

= 22 + 10 − 9 ÷ 21 × 42

= 22 + 10 − 3/7 × 42

= 22 + 10 − 18

= 32 − 18

= 14

Hence, the correct answer is "option 3"

Q74. Answer: (a) RQT

The logic follows here,

Logic: 1st letter − 1 = 2nd letter; 2nd letter + 4 = 3rd letter.

For RQT,

For BAE,

For EDH,

For AZD,

Therefore, the letter cluster that is different from the others is RQT.

Hence, the correct answer is 'Option 1'.

Q75. Answer: (b) Father's mother's brother's wife

Preparing the family tree diagram by using the following symbols:

As per the given information:

Symbol	@	×	•	÷
Meaning	Mother	Wife	Brother	Father

Given expression: ‘S × D + R @ Y ÷ H’

Therefore, S is the wife of D, who is the brother of R (the mother of Y, who is the father of H). S is the wife of the brother of the mother of the father of H. S is the Father's mother's brother's wife of H.

Hence, the correct answer is 'Option 2'.

Q76. Answer: (d) Three

The logic follows here,

Required Condition: Consonant − Vowel − Consonant

(Left) V A R V Y R A C M W S A I G Z O W V R R F (Right)

Therefore, there are a total of three such vowels in the given series.V A R, R A C and Z O W

Hence, the correct answer is "Option 4"

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Q77. Answer: (c) One

Given: Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order.

1. Only five boxes are kept above D.
2. Only three boxes are kept between D and C.

Position	Box
7	
6	C
5	
4	
3	
2	D
1	

1. Only four boxes are kept between C and S.
2. Only E is kept between C and B.
3. R is kept at one of the positions above C.
4. Q is kept at the remaining position.

Final Arrangement:

7	R
6	C
5	E
4	B
3	Q
2	D
1	S

Thus, only one box is kept between Q and S.

Hence, the correct answer is "Option 3"

Q78. Answer: (b) TRD

The logic follows here,

Combining the results, we get the term TRD.

Hence, the correct answer is "option 2."

Q79. Answer: (c) A

Given: R, E, A, D, I, N and G are sitting around a circular table, facing the centre of the table.

1. Only two people sit between R and G when counted from the right of R.
2. Only three people sit between D and N when counted from the right of N.
3. G sits to the immediate right of N.
4. A sits to the immediate right of I.
5. The Final Arrangement is,

So, A sits fourth to the right of E.

Hence, the correct answer is 'Option 3'.

Q80. Answer: (b) Wife's father

Preparing the family tree diagram by using the following symbols:

As per the given information:

Let us first decode the given symbols and then draw a family tree.

Symbol	^	÷	!	√
Meaning	Mother	Daughter	Wife	Father

Given : T √ U ÷ V ^ W ! Z

Therefore, T is the father of W, who is the wife of Z .T is the Wife's father of Z.

Hence, the correct answer is 'Option 2'.

Q81. Answer: (b) LG - MH - NP

The logic follows here,

For PK - QL - RT,

For RM - SN - TV,

Applying the same logic,

For LG - MH - NP,

Hence, the correct answer is "option 2"

Q82. Answer: (d) NW-FN-WF

The logic follows here,

For JS-BJ-SB,

For LU-DL-UD.

Applying to the same logic

Hence, the correct answer is "Option 4"

Q83. Answer: (a) 8

Given number: 2536841

Arranging the digits in ascending order from left to right, the new number formed is 1234568.

• The second digit from the left is 2 (1234568)

• The second digit from the right is 6 (1234568)

So, the sum of the second digit from the left and the second digit from the right is: 2 + 6 = 8.

Hence, the correct answer is 'Option 1'.

Q84. Answer: (c) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:

Conclusions:

(I) No fuel is petrol - Doesn't follow (Some petrol are fuels and some fuels are petrol)

(II) No petrol is diesel - - Doesn't follow (Some petrol are fuels and some fuels are petrol)

Neither conclusion (I) nor (II) follows

Hence, the correct answer is "Option 3"

Q85. Answer: (b) 5 km to the west

Given:

• Sikar starts from Point A and drives 17 km towards the north. He then takes a left turn, drives 14 km, turns left and drives 18 km.

• He then takes a left turn and drives 19 km.

• He takes a final left turn, drives 1 km and stops at Point P

The Final Diagram,

Sikar must drive 5 km towards the West to reach Point A again.

Hence, the correct answer is "Option 2"

Q86. Answer: (a) T

Given: Seven people A, B, D, J, O, T and Z are sitting in a row, facing north.

1. Only two people sit to the left of O.

2. Only three people sit between O and Z.

3. Only one person sits between Z and D.

1. A sits to the immediate left of J.

2. B is not an immediate neighbor of Z

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The Final Arrangement is,

T sits immediately to the right of D.

Hence, the correct answer is "option 1"

Q87. Answer: (a) BNU : CHQ

The logic followed here is:

Logic: (1st letter + 1), (2nd letter − 6), (3rd letter − 4)

For FHI : GBE

For KXN : LRJ

Applying same logic, for BNU : CHQ

Hence, the correct answer is "option 1"

Q88. Answer: (d) Two

Given: Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order

1. No box is kept above E.
2. Only B is kept between E and Q.
3. Only R is kept below C.

Position	Box
7	E
6	B
5	Q
4	
3	
2	C
1	R

1. Only one box is kept between Q and D.
2. S is kept at the only remaining position.

Final Arrangement:

7	E
6	B
5	Q
4	S
3	D
2	C
1	R

Based on the final arrangement, the boxes kept between S and R are D and C.

Thus, the number of boxes between S and R is Two.

Hence, the correct answer is 'Option 4'.

Q89. Answer: (d) NQ61

The logic follows here,

.

Combining these patterns, the cluster that replaces the question mark is NQ61.

Hence, the correct answer is "option 4"

Q90. Answer: (d) 15, 256

The logic followed here is:

Logic: Second Number = (First Number + 1)²

For the first set 13, 196
=> $(13 + 1)^2$
=> $14^2 = 196$.
For the second set 17, 324
=> $(17 + 1)^2$
=> $18^2 = 324$.
Applying the same logic to Option 4
15, 256
=> $(15 + 1)^2$
=> $16^2 = 256$.
Hence, the correct answer is 'Option 4'.

Q91. Answer: (b) 43

BODMAS Table:
letters to signs:

Letter	A	B	C	D
Sign	÷	×	•	−

Given: 9 A 3 C 15 B 2 = ? D 10
Substituting the signs into the equation and using the BODMAS rule we get:
=> 9 ÷ 3 + 15 × 2 = ? − 10
=> 3 + 15 × 2 = ? − 10
=> 3 + 30 = ? − 10
=> 33 = ? − 10
=> 43 = ?
Hence, the correct answer is "Option 2"

Q92. Answer: (a) Both conclusions (I) and (II) follow

The least possible Venn diagram for the given statements is:
(I) Some scooters are motors - Follows (All motors are scooters. Some scooters are motors and Some motors are scooters)
(II) All fans are scooters - Follows (All fans are motors and all motors are scooters. Hence all fans are scooters)
Both conclusions (I) and (II) follow.
Hence, the correct answer is "Option 1"

Q93. Answer: (c) GFB

The logic follows here,
Logic: Second letter = First letter − 2, Third letter = Second letter − 3.
For QOL,
IGD,
GFB,
For KIF,
Therefore, the letter cluster that is different from the others is GFB.
Hence, the correct answer is "Option 3"

Q94. Answer: (d) B

The logic follows here,
Given word: BACKLOG.

B	A	C	K	L	O	G
− 1	• 1	− 1	− 1	− 1	• 1	− 1
A	B	B	J	K	P	F

The letter that appears exactly twice is B.
Hence, the correct answer is " Option 4"

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Q95. Answer: (d) BEG

The logic follows here,

The missing term in the series is BEG.

The correct answer is option 4

Q96. Answer: (d) 79

The logic followed here is:

• 184 − 20 = 164

• 164 − 19 = 145

• 145 − 18 = 127

• 127 − 17 = 110

• 110 − 16 = 94

• 94 − 15 = 79

Hence, the correct answer is 'Option 4';

Q97. Answer: (b) 10

The logic follows here,

Logic: The difference between consecutive numbers in the series represents the cubes of consecutive natural numbers starting from 1.

• $9 + 1^3 = 9 + 1 = 10$

• $10 + 2^3 = 10 + 8 = 18$

• $18 + 3^3 = 18 + 27 = 45$

• $45 + 4^3 = 45 + 64 = 109$

• $109 + 5^3 = 109 + 125 = 234$

the missing number in the series is 10.

Hence, the correct answer is "option 2"

Q98. Answer: (b) yy

The logic follows here,

In the first code set yy ae wp and the second code set mr yy sf, the common code is yy.

Hence, the correct answer is "option 2"

Q99. Answer: (a) One

Given series: 5 3 8 6 6 3 5 7 9 7 3 4 8 3 9 2 5 5 1 5 6 1 2

Required Conditions: Even-Even-Even

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

Thus, there is only one such digit in the series - 8 6 6

Hence, the correct answer is 'Option 1'.

Q100. Answer: (c) Two

Given: Seven boxes, L, M, N, O, P, Q and R, are kept one over the other, but not necessarily in the same order.

1. P is kept second from the top.

2. N is kept immediately before P.

3. Only M is kept after O.

4. R is kept immediately above O.

Position	Box
7	N
6	P
5	
4	
3	R

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2	O
1	M

1. Only three boxes are kept between L and M.
2. Q is the only box remaining and will occupy the only vacant position.

Final Arrangement:

Position	Box
7	N
6	P
5	L
4	Q
3	R
2	O
1	M

Thus, two boxes are kept between Q and M.

Hence, the correct answer is 'Option 3'.

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