RRB NTPC (UG) CBT-I Official Paper (Held On 17 Jun, 2026 Shift 3) (Previous Year Paper)

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

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MATHEMATICS

Q1. An amount of Rs. 6,900 is obtained after 3 years at simple interest at the rate of 5% interest per annum. What is the principal invested?

(a) Rs. 6,000
(b) Rs. 5,800
(c) Rs. 6,400
(d) Rs. 5,600

Q2. What is the smallest number that must be added to 4583 so that the resulting number is divisible by 9?

(a) 3
(b) 7
(c) 5
(d) 1

Q3. Nisha noted the number 76488 in her register. What is the remainder when it is divided by 8?

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

Q4. A trader sells an article at a profit of 16%. If he had sold it for Rs. 80 more, his profit would have been 48%. Find the number of articles sold, given that the total cost price is Rs. 8,000.

(a) 32
(b) 35
(c) 25
(d) 38

Q5. The lengths of two rods are 4 cm and 6 cm. A third rod is made such that the three rods are in continued proportion. What will be the length of the third rod?

(a) 10 cm
(b) 12 cm
(c) 9 cm
(d) 8 cm

Q6. A delivery drone is hovering at a fixed point in the air. From two points on the ground in a straight line on opposite sides of the drone, the angles of elevation of the drone are 30° and 60°. If the horizontal distance between the two points is 94 m, find the vertical height at which the drone is hovering.

(Take √3 = 1.73)

(a) 40.752 m
(b) 41.652 m
(c) 40.655 m

(d) 42. 562 m

Q7. Inlet M fills a tank in 24 minutes and Inlet N fills it in 32 minutes. Outlet O drains the tank. When all three operate simultaneously, the tank fills in 32 minutes. How long does O take to drain a full tank alone?

(a) 24 minutes
(b) 44 minutes
(c) 34 minutes
(d) 14 minutes

Q8. Simplify: ((10/18))/((10/9)) ÷ (4/9 × 18/12 + 5/6) + 9/9 ÷ 27/15 of 15/9

(a) 12/11
(b) 11/1
(c) 3/10
(d) 2/3

Q9. A person spends 70% of his income. If his income increases by 20% and his expenditure increases by 25%, then find the percentage change in his savings.

(a) 81/3% increase
(b) 71/4% increase
(c) 61/4% decrease
(d) 81/3% decrease

Q10. Evaluate $20^3 + (-16)^3 + (-4)^3$

(a) 3840
(b) 3661
(c) 3868
(d) 3630

Q11. Mike, Connor and Floyd can finish a certain piece of work in 8, 22 and 33 days, respectively. All three of them started the work together. Mike left the work after 4 days and Connor left just 2 days before the work was completed. Find the total number of days taken for the work to be completed.

(a) 3.8
(b) 7.8
(c) 18.9
(d) 7.1

Q12. Article M is sold at a reduction of Rs. 3,000 from its original price, and Article N is sold at a reduction of Rs. 2,500 from its original price. If the original prices of both articles were Rs. 10,000, reduction in price of M is R1% and reduction in price of N is R2%, find the difference between R1 and R2.

(a) 15
(b) 10
(c) 5
(d) 20

Q13. Subrata invested a certain amount of money at 10% per annum. After 2 years, he received Rs. 220.5 as compound interest, compounded annually. Find the corresponding simple interest (in Rs.) for 2 years at the same rate.

(a) 195
(b) 205
(c) 210
(d) 200

Q14. If twice the smaller of two numbers is added to three times the larger number, the result is 55. If the larger is increased by 5, it becomes twice the smaller. What is the larger number?

(a) 10.5
(b) 10.75
(c) 12.75

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(d) 12.5

Q15. The sides of a triangle are 51 cm, 35 cm, and 26 cm. What is the length (in cm) of its altitude corresponding to the side with a length of 35 cm?

(a) 60
(b) 24
(c) 53
(d) 40

Q16. The diagonals of a rhombus are in the ratio 5 : 12 and its area is 240 cm^2. Find the lengths (in cm) of the diagonals.

(a) $5\sqrt{2}$ and space $12\sqrt{2}$
(b) $10\sqrt{2}$ and space $24\sqrt{2}$
(c) 5 and 12
(d) 10 and 24

Q17. Two trains of equal lengths cross a stationary pole in 12 seconds and 16 seconds, respectively. How long will it take for the trains to cross each other when running in opposite directions? (Write your answer rounded off to two decimal places.)

(a) 13.71 seconds
(b) 14.53 seconds
(c) 15.43 seconds
(d) 12.61 seconds

Q18. At a health club, 42% of the members are women and 58% of the members are men. If the average age of the men is 57 years and the average age of the women is 42 years, what is the average age (in years) of all the members?

(a) 57.6
(b) 56.7
(c) 44.9
(d) 50.7

Q19. A solid cylinder of radius 6 cm and height 14 cm is melted and recast into a hollow cylinder of half the height of the original cylinder. If the outer radius of the hollow cylinder is twice its inner radius, find the outer radius (in cm) of the hollow cylinder.

(a) $8\sqrt{3}$
(b) 8
(c) $6\sqrt{6}$
(d) $4\sqrt{6}$

Q20. A shopkeeper offers the following schemes on toys of the same marked price.

(A) Successive discounts of 38% and 39% on any number of toys bought.

(B) Successive discounts of 42%, 38% and 20% on any number of toys bought.

(C) 11% discount on the first 2 toys and 42% discount on each toy thereon.

(D) 9 toys free of cost on buying 10 toys.

A customer wants to buy 10 toys. Which of the above schemes is the least beneficial to her?

(a) D
(b) C
(c) B
(d) A

Q21. The ratio between the speeds of two trains is 5:8. If the second train covers 300 km in 3 hours, then find the speed of the first train.

(a) 63.8 km/h
(b) 72.5 km/h
(c) 65.2 km/h
(d) 62.5 km/h

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Q22. The number of hours spent per day by 10 students watching educational videos during a week are as follows: 2, 3, 4, 2, 5, 3, 2, 4, 2, 3. Find the mode.

(a) 4 hours
(b) 2 hours
(c) 5 hours
(d) 3 hours

Q23. Find the third proportional to $(a^2 – b^2)$ and $(a + b)$, given that $a \neq b$.

(a) $(a+b)/(a-b)$
(b) $((a-b)^2)/(a+b)$
(c) $(a-b)/(a+b)$
(d) $((a+b)^2)/(a-b)$

Q24. If the ratio of the number of boys to girls in a class is 5:7 and the ratio of girls to teachers is 14:1, what is the ratio of boys to teachers?

(a) 7:2
(b) 7:1
(c) 10:1
(d) 5:2

Q25. Three numbers are in the ratio 10 : 13 : 11, and their LCM is 2860. Their HCF is:

(a) 9
(b) 2
(c) 4
(d) 3

Q26. The present ages of two persons, X and Y, are in the ratio 4 : 5. Five years from now, the difference between X's age and Y's age will be 3 years. Find the sum of their present ages (in years).

(a) 27
(b) 26
(c) 25
(d) 24

Q27. A shopkeeper buys sugar at Rs. 25 per kg. He marks it at Rs. 32 per kg and allows a 20% discount on the marked price. While selling, he uses an 800 g weight instead of 1 kg. There is no other loss or expense. What is the overall profit or loss percentage of the shopkeeper?

(a) 28% profit
(b) 28% Loss
(c) 30% profit
(d) 30% loss

Q28. Three ropes of lengths 54 m, 72 m and 90 m are to be cut into smaller pieces of equal lengths such that no rope is left over. What is the maximum possible length of each smaller piece?

(a) 24 m
(b) 36 m
(c) 18 m
(d) 12 m

Q29. A jacket with a marked price of Rs. 2,000 is sold for Rs. 1,530 after two successive discounts. If the first discount is 15%, what is the second discount percentage?

(a) 12%
(b) 8%
(c) 10%
(d) 5%

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Q30. Simplify: $(\sqrt{5} + \sqrt{20})^2$

(a) 65
(b) 25
(c) 50
(d) 45

GENERAL AWARENESS

Q31. Which of the following Indian rivers is famous for its 'badland topography'?

(a) Ken
(b) Gandak
(c) Chambal
(d) Ramganga

Q32. What effect did reforms have on India's GDP growth rate?

(a) Fluctuated unpredictably
(b) No change
(c) Increased significantly
(d) Decreased slowly

Q33. Rangabati is a famous folk dance from which of the following states of India?

(a) Gujarat
(b) Uttar Pradesh
(c) Odisha
(d) West Bengal

Q34. The term 'Kriti' in Carnatic music refers to:

(a) a melodic scale in music
(b) a rhythmic pattern
(c) a compositional lyric form
(d) a type of musical ornamentation

Q35. The peeling of curved sheets from massive rocks due to temperature changes is known as:

(a) Carbonation
(b) Exfoliation
(c) Salt crystallisation
(d) Abrasion

Q36. The Khajuraho group of temples was primarily built under which dynasty?

(a) Solanki
(b) Rashtrakuta
(c) Gahadavala
(d) Chandela

Q37. Which of the following sectors includes activities like trade, transport, and communication in India?

(a) Primary
(b) Tertiary
(c) Quinary
(d) Secondary

Q38. The Twenty-Ninth Amendment Act of 1972 included which of the following in the Ninth Schedule?

(a) Two Kerala Acts on land reforms
(b) Reservation in promotions
(c) Special provisions for Mizoram
(d) Environmental protection laws

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Q39. What was the theme for International Women's Day 2025?

(a) Invest in Women: Accelerate Progress
(b) Gender equality today for a sustainable tomorrow
(c) DigitALL: Innovation and technology for gender equality
(d) For ALL Women and Girls: Rights. Equality. Empowerment

Q40. Which Article gives religious denominations the authority to conduct their religious affairs?

(a) Article 23
(b) Article 27
(c) Article 26
(d) Article 24

Q41. A ".xlsx" file is created for:

(a) Booting the computer
(b) Spreadsheet data
(c) Text paragraphs
(d) Sound editing

Q42. What prompted the Kol uprising in the Chhotanagpur region during 1831–32?

(a) Transfer of tribal lands and intrusion of moneylenders and merchants.
(b) Ban on local festivals perceived as a threat to public order.
(c) Conscription of young men into British units for foreign service.
(d) The spread of famines caused by failures in rice-growing regions.

Q43. Who received the Chief of Army Staff Commendation Card from General Upendra Dwivedi on October 7, 2025?

(a) Akshay Kumar
(b) Mohanlal
(c) Hrithik Roshan
(d) Amitabh Bachchan

Q44. Which edition of the Khelo India University Games is being held in Rajasthan starting November 24, 2025?

(a) Sixth
(b) Fifth
(c) Fourth
(d) Third

Q45. Which type of agriculture is commonly practised in the wheat-producing regions of the USA and Canada?

(a) Commercial grain farming
(b) Plantation agriculture
(c) Intensive subsistence farming
(d) Shifting cultivation

Q46. The Chinese pilgrim Xuanzang (Hiuen Tsang) visited Kashmir during the reign of:

(a) Durlabhavardhana
(b) Harshavardhana
(c) Yashodharman
(d) Pulakeshin II

Q47. Which of the following pairs is formed inside limestone caves by deposition?

(a) Drumlins and eskers
(b) Cirques and horns
(c) Stalactites and stalagmites
(d) Levees and meanders

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Q48. During an experiment, iron nails are placed in copper sulphate solution, and a reddish-brown deposit forms on the nails. What does this observation demonstrate about the type of chemical reaction and the substances involved?

(a) A displacement reaction occurs, forming copper metal on the iron nails
(b) A combination reaction occurs, creating iron sulphate crystals
(c) A double displacement reaction forms iron sulphate and copper sulphate
(d) A decomposition reaction occurs, breaking copper sulphate into SO2 and copper

Q49. When a stretched rubber band is released, its stored potential energy is converted into which form of energy?

(a) Kinetic Energy
(b) Chemical Energy
(c) Hydraulic Energy
(d) Geothermal Energy

Q50. Which of the following Schedules was added to the Constitution of India, to provide for the disqualification of the members of Parliament and the state legislatures on the ground of defection from one political party to another?

(a) Schedule XII
(b) Schedule XI
(c) Schedule X
(d) Schedule IX

Q51. Which standard is commonly used for wired LANs?

(a) IEEE 802.15
(b) IEEE 802.3
(c) IEEE 802.16
(d) IEEE 802.11

Q52. Which description best matches the purpose of the Startup apps tab in newer Windows Task Manager versions?

(a) Shows network connections for each app
(b) Lists all installed applications
(c) Manages which programs are allowed to start automatically when the user signs in
(d) Displays system restore points

Q53. Which command-line tool is used in Windows to search for file names across directories without opening File Explorer?

(a) Tasklist
(b) dir /s
(c) chkdsk
(d) Ping

Q54. Where did NATO announce increased military presence on January 18, 2025, following suspected sabotage of undersea infrastructure?

(a) Baltic Sea
(b) Black Sea
(c) North Sea
(d) Mediterranean Sea

Q55. The process by which water moves from the soil (high water concentration) into root cells (low water concentration) through a semi-permeable membrane is called ____.

(a) Active Transport
(b) Plasmolysis
(c) Osmosis
(d) Diffusion

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Q56. By what percentage did rural poverty decline in India between 2005 and 2015 as a result of inclusive growth policies, according to the World Bank?

(a) 8%
(b) 20%
(c) 16%
(d) 12%

Q57. Which Indian naval ship is taking part in the Malabar exercise for the Quad Naval Drill in November 2025?

(a) INS Shivalik
(b) INS Vikrant
(c) INS Kolkata
(d) INS Sahyadri

Q58. What is a key feature of globalisation?

(a) Reduction of international trade and cross-border economic linkages
(b) Creation of networks across economic, social, and geographic boundaries
(c) Promotion of only domestic industries within national boundaries
(d) Separation of national economies from global economic systems

Q59. Which of the following Vedas is known as the ‘Veda of Music’?

(a) Rigveda
(b) Yajurveda
(c) Samaveda
(d) Atharvaveda

Q60. At which place did Sher Shah first defeat Humayun in 1539?

(a) Gwalior
(b) Chausa
(c) Kannauj
(d) Panipat

Q61. Which Article authorises municipalities to perform Twelfth Schedule functions introduced through this Constitutional Amendment Act?

(a) Article 243-Q
(b) Article 243-W
(c) Article 243-ZC
(d) Article 243-P

Q62. Who was the winner of the 2024 Ramon Magsaysay Award from Indonesia?

(a) Dr. Nguyen Thi Ngoc Phuong
(b) Farwiza Farhan
(c) Hayao Miyazaki
(d) Karma Phuntsho

Q63. Which national organisation jointly launched the “Earth Summit 2025-26” along with Internet and Mobile Association of India (IAMAI) to empower rural innovation?

(a) Small Industries Development Bank of India (SIDBI)
(b) Export-Import Bank of India (EXIM)
(c) National Rural Livelihood Mission (NRLM)
(d) National Bank for Agriculture and Rural Development (NABARD)

Q64. Which of the following tunnels has been inaugurated in January 2026 to improve year-round connectivity between Sonamarg and Srinagar?

(a) Nehru tunnel
(b) Atal tunnel

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(c) Z-Morh tunnel
(d) Pir Panjal tunnel

Q65. Which one of the following combinations contributes to low population density?
(a) Harsh climate, poor soil, few roads
(b) Mild winters, abundant water, schools
(c) River valleys, floodplains, health clinics
(d) Flat terrain, fertile soil, urban jobs

Q66. Under which article can the president summon, prorogue, or dissolve either house of Parliament?
(a) Article 87
(b) Article 108
(c) Article 79
(d) Article 85

Q67. Which of the following is a Parliamentary committee?
(a) A committee formed by the President
(b) A judicial panel of judges
(c) A panel of MPs selected by the House or Speaker
(d) A panel of civil servants

Q68. During the Revolt of 1857, the villagers of pargana Barout in Uttar Pradesh rallied under the leadership of which local figure?
(a) Birjis Qadr
(b) Shah Mal
(c) Gonoo Kol
(d) Nana Sahib

Q69. Which strategy was used by the British to regain control after initial rebel victories across northern India in the Revolt of 1857?
(a) Recapturing key centres, enacting new laws, and offering rewards to loyal chiefs.
(b) Negotiating a settlement that restored regional rulers to their former positions.
(c) Withdrawing British forces from major towns to avoid further confrontation.
(d) Allowing the Mughal emperor to govern Delhi under strict British supervision.

Q70. Which of the following explains that during a chemical reaction, the sum of masses of the reactants and products remains unchanged?
(a) Law of Conservation of Mass
(b) Law of Definite Composition
(c) Law of Definite Proportions
(d) Law of Periodicity

GENERAL INTELLIGENCE AND REASONING

Q71. Refer to the following letter series and answer the question that follows. Counting to be done from left to right only.
(Left) U N E H W Y B X P E L Q R C G R U A Z R U (Right)
How many such vowels are there, each of which is immediately preceded by a vowel and also immediately followed by a consonant?
(a) None
(b) Two
(c) One
(d) Three

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

RTR 77 NPN 72 JLJ 67 FHF 62 ?

(a) BDB 57
(b) BFK 56
(c) BEA 57
(d) BCA 56

Q73. In a certain code language, ‘SAFE’ is coded as ‘3698’ and ‘FACE’ is coded as ‘5398’.

What is the code for ‘S’ in the given code language?

(a) 9
(b) 6
(c) 8
(d) 3

Q74. SF 19 is related to VA 6 in a certain way. In the same way, GG 16 is related to JB 3. To which of the following is KL 2 related, following the same logic?

(a) HY −9
(b) NG −11
(c) JI −12
(d) KL −10

Q75. 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) QOM
(b) MKI
(c) CBY
(d) BZX

Q76. 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: Some phones are irons. Some irons are vaults.

Conclusions (I) : No iron is a phone.

Conclusions (II) : Some phones are vaults.

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

Q77. Seven people, U, T, E, N, S, I and L, are sitting in a row, facing the north.

Only two people sit to the left of N. Only three people sit between N and S. Only one person sits between S and E. I sits to the immediate left of L. U is not an immediate neighbor of S.

How many people sit to the right of T?

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

Q78. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statement: All Cobalt is Silver. No Silver is Vanadium.

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Conclusion I: No Vanadium is Cobalt.

Conclusion II: Some Vanadium is Cobalt.

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

Q79. 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) XUY
(b) NKO
(c) LJM
(d) ROS

Q80. What should come in place of '?' in the given series?

10 19 36 58 88 123 ?

(a) 166
(b) 175
(c) 169
(d) 171

Q81. 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?

1 D 40 A 7 B 7 C 46 = ?

(a) 7
(b) 8
(c) 9
(d) 5

Q82. 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 one out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) SWY
(b) NRT
(c) QUO
(d) JNP

Q83. Seven boxes, M, N, O, P, Q, R and S, are kept one over the other, but not necessarily in the same order.

N is kept fourth from the top. Only two boxes are kept between N and S. Only P is kept above M. O is kept immediately above S. Q is kept on one of the positions after M but on one of the positions before N.

Which box is kept third from the bottom?

(a) O
(b) Q
(c) S
(d) R

Q84. 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.)

(53, 47, 35)

(117, 111, 99)

(a) (85, 76, 64)

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(b) (33, 27, 14)
(c) (212, 206, 194)
(d) (74, 68, 55)

Q85. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

OKH 41, GCZ 47, YUR 53, QMJ 59, ?

(a) IEB 65
(b) IDA 64
(c) IJL 64
(d) IFA 65

Q86. G is the father of Y. Y is the brother of J. M is the father of W. W is the son of J.

How is M related to G?

(a) Daughter's husband
(b) Daughter's son
(c) Father
(d) Brother

Q87. Seven boxes, G, H, I, J, K, L and M, are kept one over the other, but not necessarily in the same order.

Only three boxes are kept between M and J. I is kept third from the top. Only M is kept between H and I. Only K is kept below J. G is kept at one of the positions below M but not immediately above J.

Which box is kept third from the bottom?

(a) H
(b) L
(c) K
(d) G

Q88. What should come in place of '?' in the given series?

4 4 8 12 16 28 32 ?

(a) 68
(b) 62
(c) 64
(d) 60

Q89. FACN is related to LFIS in a certain way based on the English alphabetical order. In the same way, DUAH is related to JZGM. To which of the following options is VJSW related, following the same logic?

(a) BBOY
(b) BOBY
(c) BYOB
(d) BOYB

Q90. Each letter in the word HARMFUL is arranged in the English alphabetical order. How many letters are there in the English alphabetical order between the letter which is second from the left and the one which is first from the right in the new letter cluster thus formed?

(a) 15
(b) 14
(c) 13
(d) 17

Q91. Which two numbers should be interchanged to make the given equation correct?

$(21 \times 2) \div 3 + 15 \times 5 - 19 \times 4 + 36 + 7 \times 6 = 57$

(a) 4 and 5
(b) 5 and 6
(c) 36 and 21

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(d) 2 and 4

Q92. Tanmay starts from Point Y and drives 23 km towards West. He then takes a right turn, drives 63 km, turns right and drives 31 km. He then takes a right turn and drives 27 km. He takes a right turn, drives 79 km. He then turns left, drives 36 km to stop at Point Z. How far (shortest distance) and towards which direction should he drive in order to reach Point Y again? (All turns are 90° turns only unless specified.)

(a) 71 km towards east
(b) 73 km towards west
(c) 75 km towards east
(d) 71 km towards west

Q93. Seven people A, B, C, D, E, F and G are sitting around a circular table facing towards the centre of the table. E sits second to the left of F. A is sitting immediately between B and C. D sits to the immediate right of C. Who is sitting immediately between E and F?

(a) D
(b) C
(c) B
(d) G

Q94. In a certain code language,

A ? B means ‘A is the wife of B’,

A @ B means ‘A is the mother of B’,

A : B means ‘A is the father of B’ and

A + B means ‘A is the daughter of B’.

How is M related to H if ‘M + A @ R ? C : H’?

(a) Mother's sister
(b) Mother's daughter
(c) Mother's brother
(d) Mother's father

Q95. If ‘P’ stands for ‘×’, ‘Q’ stands for ‘÷’, ‘R’ stands for ‘-’ and ‘S’ stands for ‘+’, what will come in place of the question mark ‘?’ in the following equation?

(96 Q 12) P 5 S (42 Q 7) P 8 R 12 P 5 = ?

(a) 34
(b) 48
(c) 20
(d) 28

Q96. Refer to the following series and answer the question. (Counting to be done from left to right only.) (All numbers are single-digit numbers only.)

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

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

(a) None
(b) More than two
(c) Two
(d) One

Q97. Raman ranked 25th from the top and 67th from the bottom in his class. How many students are there in his class?

(a) 92
(b) 91
(c) 93
(d) 90

Q98. In a certain code language, 'SOAP' is coded as '5279' and 'ATOP' is coded as '4527'. What is the code for 'T' in the given code language?

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

Q99. In the following triad, each group of letters is related to the subsequent one following a certain logic. Select, from the given options, the one which follows the same logic.

MEGA - EAGM - AGEM

TONS - OSNT - SNOT

(a) KITE - IETK - ETIK
(b) LEGS - ELGS - SEGL
(c) WEAR - WAER - RAEW
(d) POND - OPND - DONP

Q100. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

KE64, MC27, PZ8, ?

(a) SV1
(b) TV8
(c) TW1
(d) TV1

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Rs. 6,000

Shortcut Trick

Effective Simple Interest rate for 3 years at 5% = 3 × 5% = 15%.

Total Amount = Principal + Interest = 100% + 15% = 115%.

Given that 115% represents Rs. 6,900.

Principal (100%) = (6,900 ÷ 115) × 100 = 60 × 100 = Rs. 6,000.

Therefore The correct answer is Rs. 6,000.

Alternate Method

Given:

Total Amount (A) = Rs. 6,900

Rate of Interest (R) = 5% per annum

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Time Period (T) = 3 years

Formula Used:

Amount (A) = Principal (P) + Simple Interest (SI)

A = P + (P × R × T) ÷ 100 => A = P × [1 + (R × T) ÷ 100]

Calculations:

=> 6900 = P × [1 + (5 × 3) ÷ 100]

=> 6900 = P × [1 + 15 ÷ 100]

=> 6900 = P × [1 + 0.15]

=> 6900 = P × 1.15

=> P = 6900 ÷ 1.15

=> P = (6900 × 100) ÷ 115

=> P = 60 × 100

=> P = Rs. 6,000

Therefore The correct answer is Rs. 6,000.

Additional Information

Simple Interest (SI)

It is the interest calculated only on the original principal amount for every time period. Formula: SI = (P × R × T) ÷ 100.

Total Amount in SI

The total sum returned after the time period is A = P + SI = P(1 + RT/100). The Principal remains constant in SI calculations.

Comparison with Compound Interest

Unlike SI, Compound Interest (CI) is calculated on the principal plus the accumulated interest of previous periods. For the first year, SI and CI are equal if compounded annually.

Q2. Answer: (b) 7

Shortcut Trick

According to the divisibility rule of 9, the sum of all digits must be divisible by 9.

Sum of digits of 4583 = 4 + 5 + 8 + 3 = 20.

The next multiple of 9 after 20 is 27 (since 9 × 3 = 27).

Required number to be added = 27 − 20 = 7.

Therefore The correct answer is 7.

Alternate Method

Given: Number = 4583, Divisor = 9

Method: Division algorithm to find the remainder.

=> 4583 ÷ 9

=> 4583 = (509 × 9) + 2

=> Remainder = 2

=> Smallest number to be added = Divisor − Remainder

=> 9 − 2 = 7

Therefore The correct answer is 7.

Additional Information

Divisibility Rule of 9

A number is completely divisible by 9 if the sum of its digits is a multiple of 9.

Divisibility Rule of 3

Similar to the rule of 9, a number is divisible by 3 if the sum of its digits is divisible by 3.

Digital Root

The single-digit sum obtained by repeatedly adding the digits of a number is its digital root, which is equal to the remainder when the number is divided by 9 (except when the sum is 9).

Q3. Answer: (a) 0

Shortcut Trick

The divisibility rule of 8 states that a number is divisible by 8 if its last three digits are divisible by 8.

For the number 76488, we only need to check the last three digits: 488.

Divide 488 by 8: 488 ÷ 8 = 61.

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Since 488 is completely divisible by 8, the remainder is 0.

Therefore The correct answer is 0.

Alternate Method

Given:

Dividend = 76488

Divisor = 8

Calculations:

=> Perform direct division of 76488 by 8:

=> 76 ÷ 8 => 8 × 9 = 72; Remainder = 4

=> Bring down 4 to make it 44: 44 ÷ 8 => 8 × 5 = 40; Remainder = 4

=> Bring down 8 to make it 48: 48 ÷ 8 => 8 × 6 = 48; Remainder = 0

=> Bring down the final 8: 8 ÷ 8 => 8 × 1 = 8; Remainder = 0

=> Total Quotient = 9561 and the final remainder is 0.

Therefore The correct answer is 0.

Additional Information

Divisibility by 2^n

A number is divisible by 2^n if its last n digits are divisible by 2^n. For 8 (2^3), we check the last 3 digits; for 16 (2^4), we check the last 4 digits.

Divisibility by 4

A number is divisible by 4 if the number formed by its last two digits is divisible by 4 or if the last two digits are 00.

Divisibility by 3 and 9

A number is divisible by 3 or 9 if the sum of its digits is divisible by 3 or 9, respectively.

Q4. Answer: (a) 32

Shortcut Trick

Difference in Profit Percentage = 48% − 16% = 32%

This 32% increase in Profit corresponds to Rs. 80 extra per article.

Unit Cost Price (CP) = (80 ÷ 32) × 100 = Rs. 250

Number of Articles = Total CP ÷ Unit CP = 8000 ÷ 250 = 32

Therefore The correct answer is 32.

Alternate Method

Given:

Initial Profit = 16%

New Profit = 48%

Increase in Selling Price (SP) = Rs. 80

Total Cost Price of all articles = Rs. 8,000

Let the Cost Price of one article be x.

=> Initial Selling Price (SP1) = 116% of x = 1.16x

=> New Selling Price (SP2) = 148% of x = 1.48x

=> According to the question: SP2 − SP1 = 80

=> 1.48x − 1.16x = 80

=> 0.32x = 80

=> x = 80 ÷ 0.32

=> x = Rs. 250 (CP of 1 article)

=> Total Cost Price = Number of articles × CP of 1 article

=> 8000 = Number of articles × 250

=> Number of articles = 8000 ÷ 250 = 32

Therefore The correct answer is 32.

Additional Information

Profit and Loss Percentage

Profit % = (Profit ÷ CP) × 100 and Loss % = (Loss ÷ CP) × 100. Profit and Loss are always calculated on the Cost Price unless stated otherwise.

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Selling Price Formula

SP = CP × (100 + Profit %) ÷ 100 or SP = CP × (100 − Loss %) ÷ 100. This is the base for solving change-in-price problems.

Successive Percentage Change

When profit changes from P1% to P2%, the effective change in Selling Price is (P2 − P1)% of the Cost Price.

Q5. Answer: (c) 9 cm

Shortcut Trick

When three numbers a, b, and c are in continued proportion, the relationship is a : b :: b : c.

This means the third proportional (c) is calculated as $c = b^2 \div a$.

Given: a = 4 cm and b = 6 cm. Substituting these values: $c = (6 \times 6) \div 4 = 36 \div 4 = 9$.

Therefore The correct answer is 9 cm.

Alternate Method

Given: Length of the first rod (a) = 4 cm, Length of the second rod (b) = 6 cm.

Formula Used: For three rods of lengths a, b, and c to be in continued proportion, the ratio a : b must be equal to b : c.

Let the length of the third rod be x cm.

=> 4 ÷ 6 = 6 ÷ x

=> 4 × x = 6 × 6

=> 4x = 36

=> x = 36 ÷ 4

=> x = 9 cm

Therefore The correct answer is 9 cm.

Additional Information

Continued Proportion

Three quantities a, b, and c are in continued proportion if the ratio of the first to the second is equal to the ratio of the second to the third (a/b = b/c).

Mean Proportional

In the proportion a : b :: b : c, 'b' is called the mean proportional between a and c, where $b = \sqrt{(a \times c)}$.

Third Proportional

In the proportion a : b :: b : c, 'c' is known as the third proportional to a and b, calculated as $c = b^2/a$.

Fourth Proportional

For four numbers a, b, c, and d in proportion (a : b :: c : d), 'd' is the fourth proportional and $d = (b \times c) \div a$.

Q6. Answer: (c) 40.655 m

Shortcut Trick

When two points are on opposite sides of a vertical object, the height $h = D \div (\cot \alpha + \cot \beta)$.

Given horizontal distance D = 94 m, $\alpha = 30°$ and $\beta = 60°$.

$h = 94 \div (\cot 30° + \cot 60°) = 94 \div (\sqrt{3} + 1/\sqrt{3}) = 94 \div (4/\sqrt{3}) = (94 \times \sqrt{3}) \div 4$.

$h = 23.5 \times 1.73 = 40.655$ m.

Therefore The correct answer is 40.655 m.

Alternate Method

Given:

Horizontal distance between two points A and B = 94 m.

Angles of elevation of the delivery drone (P) from A and B are 30° and 60° respectively.

Let the vertical height of the drone be h (PD), where D is the point on the ground directly below the drone.

Formula Used:

Tangent of an angle (θ) = Perpendicular ÷ Base

Calculations:

In right-angled triangle PAD:

=> tan 30° = PD ÷ AD

=> 1 ÷ √3 = h ÷ AD

=> AD = h × √3

In right-angled triangle PBD:

=> tan 60° = PD ÷ BD
=> √3 = h ÷ BD
=> BD = h ÷ √3
Since A and B are on opposite sides:
=> AB = AD + BD = 94
=> h√3 + h/√3 = 94
=> (3h + h) ÷ √3 = 94
=> 4h ÷ √3 = 94
=> h = (94 × √3) ÷ 4
=> h = 23.5 × 1.73
=> h = 40.655 m
Therefore The correct answer is 40.655 m.
Additional Information
Trigonometric Ratios for 30° and 60°
Values for calculations: tan 30° = 1/√3, tan 60° = √3. Cot ratios are reciprocals: cot 30° = √3, cot 60° = 1/√3.
Angle of Elevation
It is the angle formed by the line of sight with the horizontal when the object is above the eye level.
Complementary Angles Rule
If angles of elevation from two points are complementary (α + β = 90°), then height h = √(AD × BD).
Heights and Distances (Same Side)
If points are on the same side of the drone, the horizontal distance D = h × (cot α − cot β).

Q7. Answer: (a) 24 minutes

Shortcut Trick
Assume Total Capacity is the LCM of 24 and 32 = 96 units.
Efficiency of M = 4 units/min and N = 3 units/min.
Combined efficiency (M + N + O) = 96 ÷ 32 = 3 units/min.
Efficiency of Outlet O = 3 − (4 + 3) = −4 units/min (negative sign denotes drainage).
Time for O to drain = 96 ÷ 4 = 24 min.
Therefore The correct answer is 24 min.
Alternate Method
Given:
Time taken by Inlet M = 24 min
Time taken by Inlet N = 32 min
Time taken by (M + N + Outlet O) = 32 min
Formula Used:
Efficiency = Total Work ÷ Time

Person/Pipe	Days/Time (min)	Total Work (units)	Efficiency (units/min)
Inlet M	24	96	4
Inlet N	32	3	
M + N + O	32	3	

Calculations:
=> Total capacity = LCM(24, 32) = 96 units
=> Efficiency of Inlet M = 96 ÷ 24 = 4 units/min
=> Efficiency of Inlet N = 96 ÷ 32 = 3 units/min
=> Net efficiency when all three operate = 96 ÷ 32 = 3 units/min
=> Efficiency of M + N + O = Efficiency of M + Efficiency of N + Efficiency of O
=> 3 = 4 + 3 + Efficiency of O
=> Efficiency of O = 3 − 7 = −4 units/min
=> Time taken by Outlet O alone = Total Capacity ÷ |Efficiency of O|

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=> Time = 96 ÷ 4 = 24 min

Therefore The correct answer is 24 min.

Additional Information

Pipes and Cisterns Basics

Inlets fill the tank (positive work) and Outlets empty the tank (negative work). If a pipe fills a tank in 'x' hours, its efficiency is 1/x per hour.

Combined Rate Formula

For two inlets A and B and one outlet C, the net part filled in 1 hour = (1/A + 1/B − 1/C).

Emptying vs. Filling

If the net efficiency is negative, the tank will be emptied; if positive, the tank will be filled.

Q8. Answer: (d) 2/3

Given:

Expression = (((10)/(18)))/(((10)/(9))) ÷ ((4)/(9) × (18)/(12) + (5)/(6)) + (9)/(9) ÷ (27)/(15) of (15)/(9)

Formula used:

According to the BODMAS rule, operations are performed in the order: Brackets, Of, Division, Multiplication, Addition, and Subtraction.

Calculations:

Step 1: Simplify the first term

=> (((10)/(18)))/(((10)/(9))) = 10/18 × 9/10 = 1/2

Step 2: Simplify the expression inside the bracket

=> ((4/9) × (18/12) + 5/6) = (2/3 + 5/6)

=> (4/6 + 5/6) = 9/6 = 3/2

Step 3: Simplify the part containing of and division

=> (9/9) ÷ (27/15 of 15/9) = 1 ÷ (27/15 × 15/9)

=> 1 ÷ (27/9) = 1 ÷ 3 = 1/3

Step 4: Combine all simplified parts into the main expression

=> (1/2) ÷ (3/2) + 1/3

=> (1/2 × 2/3) + 1/3

=> 1/3 + 1/3 = 2/3

Therefore The correct answer is option (4).

Q9. Answer: (a) 81/3% increase

Shortcut Trick

Ratio of Expenditure to Savings = 70 : 30 = 7 : 3.

Using Weighted Average formula: Overall Income % = (E_(ratio) × E% + S_(ratio) × S%) ÷ Total_(ratio)

20 = (7 × 25 + 3 × x) ÷ 10

200 = 175 + 3x => 3x = 25 => x = 8¹/3%.

Therefore The correct answer is 8¹/3% increase.

Alternate Method

Given: Initial Expenditure = 70% of Income. Income increase = 20%. Expenditure increase = 25%.

Formula Used: Income = Expenditure + Savings

=> Let Initial Income = 100

=> Initial Expenditure = 70% of 100 = 70

=> Initial Savings = 100 − 70 = 30

=> New Income = 100 + 20% of 100 = 120

=> New Expenditure = 70 + 25% of 70 = 70 + 17.5 = 87.5

=> New Savings = 120 − 87.5 = 32.5

=> Change in Savings = 32.5 − 30 = 2.5

=> Percentage Change = (2.5 ÷ 30) × 100 = 25/3 = 8¹/3%

Therefore The correct answer is 8¹/3% increase.

Additional Information

Income-Expenditure Identity

Total Income is always the sum of Expenditure and Savings (I = E + S).

Percentage Change Formula

% Change = [(New Value − Old Value) ÷ Old Value] × 100.

Weighted Average in Percentages

If a total is divided into two parts, the overall percentage change is the weighted average of the percentage changes of the individual parts.

Q10. Answer: (a) 3840

Shortcut Trick

Identify the bases: a = 20, b = −16, and c = −4.

Check the sum of the bases: 20 + (−16) + (−4) = 0.

If a + b + c = 0, then $a^3 + b^3 + c^3 = 3abc$.

Calculation: 3 × 20 × (−16) × (−4) = 60 × 64 = 3840.

Therefore The correct answer is 3840.

Alternate Method

Given:

The expression to evaluate is $20^3 + (-16)^3 + (-4)^3$.

Formula Used:

Direct calculation of cubes of the given numbers.

Calculations:

=> $20^3 = 20 \times 20 \times 20 = 8000$

=> $(-16)^3 = (-16) \times (-16) \times (-16) = -4096$

=> $(-4)^3 = (-4) \times (-4) \times (-4) = -64$

=> Sum = 8000 + (−4096) + (−64)

=> Sum = 8000 − 4160

=> Result = 3840

Therefore The correct answer is 3840.

Additional Information

Algebraic Cube Identity

The expression $a^3 + b^3 + c^3 - 3abc$ is equal to $(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$.

Special Case

When a + b + c = 0, the identity simplifies to $a^3 + b^3 + c^3 = 3abc$, which is useful for simplifying complex sums of cubes.

Negative Number Powers

Any negative number raised to an odd power results in a negative value, while an even power results in a positive value.

Q11. Answer: (b) 7.8

Shortcut Trick

Total Work = LCM(8, 22, 33) = 264 units.

Efficiencies: Mike = 33, Connor = 12, Floyd = 8.

Adjusted Work = Total Work − (Mike's work) + (Connor's potential work for the 2 days he left early).

Adjusted Work = 264 − (33 × 4) + (12 × 2) = 264 − 132 + 24 = 156 units.

Total Days = Adjusted Work ÷ (Connor's efficiency + Floyd's efficiency) = 156 ÷ (12 + 8) = 7.8 days.

Therefore The correct answer is 7.8 days.

Alternate Method

Given: Mike finishes in 8 days, Connor in 22 days, and Floyd in 33 days. Mike leaves after 4 days and Connor leaves 2 days before the end.

Person	Days	Total Work	Efficiency
Mike	8	264	33
Connor	22	12	
Floyd	33	8	

Let the total number of days taken to complete the work be T.

=> Mike's work + Connor's work + Floyd's work = Total Work

=> (33 × 4) + 12 × (T − 2) + (8 × T) = 264

=> 132 + 12T − 24 + 8T = 264

=> 108 + 20T = 264

=> 20T = 156

=> T = 156 ÷ 20 = 7.8 days

Therefore The correct answer is 7.8 days.

Additional Information

Leaving Work Logic

If a person leaves after x days, subtract their x days of work from the total. If a person leaves before the completion, add their work for those missing days to the total work and treat them as present until the end.

Pipes and Cisterns

Similar to time and work, but outlet pipes have negative efficiency. Total capacity is equivalent to total work.

Work and Wages

Wages are always distributed in the ratio of the work done by each person. If they work for the same amount of time, the ratio of wages is the same as the ratio of their efficiencies.

Q12. Answer: (c) 5

Shortcut Trick

Since the Original Price is the same for both Article M and Article N (Rs. 10,000), the difference in reduction percentages is proportional to the difference in actual reduction amounts.

Difference in reduction amount = Rs. 3,000 − Rs. 2,500 = Rs. 500.

Difference (R1 − R2) = (Difference in Amount ÷ Common Original Price) × 100.

Difference = (500 ÷ 10,000) × 100 = 5.

Therefore The correct answer is 5.

Alternate Method

Given:

Original Price (OP) = Rs. 10,000 (for both articles)

Reduction for Article M = Rs. 3,000

Reduction for Article N = Rs. 2,500

Calculations:

=> Reduction percentage for Article M (R1) = (Reduction ÷ Original Price) × 100

=> R1 = (3,000 ÷ 10,000) × 100 = 30%

=> Reduction percentage for Article N (R2) = (Reduction ÷ Original Price) × 100

=> R2 = (2,500 ÷ 10,000) × 100 = 25%

=> Difference between R1 and R2 = 30% − 25% = 5%

Therefore The correct answer is 5.

Additional Information

Percentage Reduction Formula

The rate of reduction or discount is calculated as: (Actual Reduction ÷ Original Marked Price) × 100.

Percentage Difference with Same Base

When comparing two percentages of the same base value, the difference between the percentages is equal to the percentage of the difference between the absolute values.

Successive Discounts

If an article is reduced by a% and then further by b%, the effective reduction is given by the formula: [a + b − (a × b) ÷ 100]%.

Q13. Answer: (c) 210

Shortcut Trick

Effective rate of compound interest for 2 years at 10% = 10 + 10 + (10 × 10)/100 = 21%

Effective rate of simple interest for 2 years at 10% = 10 + 10 = 20%

Given that 21% of principal corresponds to Rs. 220.5.

=> 20% of principal = (220.5 ÷ 21) × 20 = 10.5 × 20 = 210

Therefore The correct answer is Rs. 210.

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Alternate Method

Given: Rate (R) = 10% per annum, Time (T) = 2 years, Compound Interest (CI) = Rs. 220.5.

Formula Used: CI = P[(1 + R/100)^T − 1] and SI = (P × R × T) ÷ 100

=> 220.5 = P[(1 + 10/100)² − 1]

=> 220.5 = P[(1.1)² − 1]

=> 220.5 = P[1.21 − 1]

=> 220.5 = 0.21P

=> P = 220.5 ÷ 0.21 = 1050

=> Now, Simple Interest (SI) for 2 years = (1050 × 10 × 2) ÷ 100

=> SI = 1050 × 0.2 = 210

Therefore The correct answer is Rs. 210.

Additional Information

Difference between CI and SI for 2 Years

The difference between compound and simple interest for two years is given by D = P × (R/100)².

Effective Interest Rate

For successive percentage increases of x% and y%, the effective change is x + y + (x × y)/100.

Compound Interest Formula

The amount A after n years is A = P × (1 + R/100)ⁿ, where CI = A − P.

Q14. Answer: (d) 12.5

Shortcut Trick

Let the Larger Number be L and the Smaller Number be S.

According to the conditions: 2S + 3L = 55 and L + 5 = 2S.

Substitute 2S directly into the first equation: (L + 5) + 3L = 55.

4L + 5 = 55 => 4L = 50 => L = 12.5.

Therefore The correct answer is 12.5.

Alternate Method

Given:

Let the Smaller Number be x and the Larger Number be y.

Equation 1: 2x + 3y = 55

Equation 2: y + 5 = 2x

Calculations:

=> 2x + 3y = 55 --- (1)

=> 2x − y = 5 --- (2)

Substitute the value of 2x from (2) into (1):

=> (y + 5) + 3y = 55

=> 4y + 5 = 55

=> 4y = 55 − 5

=> 4y = 50

=> y = 50 ÷ 4

=> y = 12.5

Therefore The correct answer is 12.5.

Additional Information

Linear Equation Substitution

This method involves expressing one variable in terms of another from one equation and substituting it into the second equation to reduce it to a single-variable equation.

Elimination Method

This approach involves multiplying equations by suitable constants so that adding or subtracting them eliminates one variable, allowing for the solving of the remaining one.

Consistency of Equations

A system of Linear Equations has a unique solution if the ratio of the coefficients of the variables is not equal (a1/a2 ≠ b1/b2).

Q15. Answer: (b) 24

Shortcut Trick

Calculate semi-perimeter (s) = (51 + 35 + 26) ÷ 2 = 56 cm.

Calculate Area using Heron's formula: √[56 × (56−51) × (56−35) × (56−26)] = √(56 × 5 × 21 × 30) = 420 cm².

Use the area formula: Altitude = (2 × Area) ÷ Base.

Altitude = (2 × 420) ÷ 35 = 840 ÷ 35 = 24 cm.

Therefore The correct answer is 24 cm.

Alternate Method

Given: Sides of the triangle are a = 51 cm, b = 35 cm, and c = 26 cm.

Formula Used: Heron's Formula for Area = √[s(s − a)(s − b)(s − c)] and Area of Triangle = (1 ÷ 2) × Base × Altitude.

=> Semi-perimeter (s) = (a + b + c) ÷ 2

=> s = (51 + 35 + 26) ÷ 2 = 112 ÷ 2 = 56 cm

=> Area = √[56 × (56 − 51) × (56 − 35) × (56 − 26)]

=> Area = √[56 × 5 × 21 × 30] = √[176400] = 420 cm²

=> To find the altitude (h) corresponding to the side of 35 cm:

=> Area = (1 ÷ 2) × 35 × h

=> 420 = (35 × h) ÷ 2

=> h = (420 × 2) ÷ 35

=> h = 840 ÷ 35 = 24 cm

Therefore The correct answer is 24 cm.

Additional Information

Heron's Formula

It is used to find the area of a triangle when all three sides are known: Area = √[s(s−a)(s−b)(s−c)], where s is the semi-perimeter (a+b+c)/2.

Altitude of a Triangle

The altitude is the perpendicular distance from a vertex to the opposite side. The area can be expressed as (1/2) × base × corresponding altitude.

Relationship between Sides and Altitudes

In any triangle, the side lengths are inversely proportional to their corresponding altitudes. The longest side has the shortest altitude.

Q16. Answer: (b) 10√2 and space 24√2

Shortcut Trick

Ratio of the diagonals = 5 : 12

Product of ratio terms = 5 × 12 = 60

We know, (1/2) × Product = Area => (1/2) × 60x² = 240 => x² = 8 => x = 2√2

Required diagonals = 5 × 2√2 = 10√2 cm and 12 × 2√2 = 24√2 cm.

Therefore The correct answer is 10√2 cm and 24√2 cm.

Alternate Method

Given:

Ratio of the diagonals of a rhombus = 5 : 12

Area of the rhombus = 240 cm²

Formula Used:

Area of Rhombus = (1/2) × d1 × d2

Where d1 and d2 are the lengths of the diagonals.

<

Q17. Answer: (a) 13.71 seconds

Shortcut Trick

When two trains of equal lengths cross a pole in t1 and t2 seconds, the time taken to cross each other in opposite directions is given by:

Time = (2 × t1 × t2) ÷ (t1 + t2)

Time = (2 × 12 × 16) ÷ (12 + 16) = 384 ÷ 28

Time = 96 ÷ 7 ≈ 13.71 sec

Therefore The correct answer is 13.71 sec.

Alternate Method

Given:

Time taken by Train 1 (t1) = 12 sec

Time taken by Train 2 (t2) = 16 sec

Let the length of each train be the LCM of 12 and 16 = 48 units.

Formula Used:

Speed = Distance ÷ Time

Time to cross each other = Total Distance ÷ Relative Speed

Calculations:

=> Speed of Train 1 (v1) = 48 ÷ 12 = 4 units/sec

=> Speed of Train 2 (v2) = 48 ÷ 16 = 3 units/sec

=> Total distance to cover = Length of Train 1 + Length of Train 2 = 48 + 48 = 96 units

=> Relative Speed (opposite direction) = v1 + v2 = 4 + 3 = 7 units/sec

=> Required Time = 96 ÷ 7

=> Required Time = 13.71428... sec

=> Required Time ≈ 13.71 sec

Therefore The correct answer is 13.71 sec.

Additional Information

Relative Speed Concepts

When two objects move in opposite directions, their relative speed is the sum of their individual speeds (v1 + v2). If they move in the same direction, it is the difference (|v1 − v2|).

Distance while Crossing

To cross a stationary point (pole, man, tree), the distance covered is equal to the length of the train. To cross another train or platform, the distance is the sum of their lengths (L1 + L2).

Time for Same Direction

If the trains were running in the same direction, the time taken to cross each other would be (2 × t1 × t2) ÷ (t2 − t1), where t2 > t1.

Q18. Answer: (d) 50.7

Shortcut Trick

Ratio of Men to Women = 58 : 42 = 29 : 21.

Let the assumed average age be 42 years.

Net deviation from Men = 29 × (57 − 42) = +435.

Total distribution of deviation = 435 ÷ (29 + 21) = 8.7.

Total Average Age = 42 + 8.7 = 50.7 years.

Therefore The correct answer is 50.7 years.

Alternate Method

Given:

Percentage of Men = 58% | Percentage of Women = 42%

Average age of Men = 57 years | Average age of Women = 42 years

Formula Used:

Average of groups = (n1 × a1 + n2 × a2) ÷ (n1 + n2)

Calculations:

=> Let Total Members = 100

=> Total age of Men = 58 × 57 = 3306 years

=> Total age of Women = 42 × 42 = 1764 years

=> Sum of ages of all members = 3306 + 1764 = 5070 years

=> Average age of all members = 5070 ÷ 100

=> Average age = 50.7 years

Therefore The correct answer is 50.7 years.

Additional Information

Weighted Average Concept

It is used when groups have different sizes. Formula: A_(avg) = (Sum of all values) ÷ (Total number of items).

Alligation Method

The ratio of quantities (n1/n2) is equal to (Average2 − Average_(mix)) / (Average_(mix) − Average1).

Deviation Method for Averages

Assume a temporary average and calculate the net deviation from each group to find the final result quickly.

Q19. Answer: (d) 4√6

Shortcut Trick

Equate the volumes: Radius² × Height of Solid Cylinder = (Outer Radius² − Inner Radius²) × Height of Hollow Cylinder.

$6^2 \times 14 = [(2x)^2 - x^2] \times 7$

$36 \times 2 = 3x^2 \Rightarrow x^2 = 24 \Rightarrow x = 2\sqrt{6}$ cm

Outer radius = $2x = 2 \times 2\sqrt{6} = 4\sqrt{6}$ cm.

Therefore The correct answer is $4\sqrt{6}$ cm.

Alternate Method

Given:

Solid cylinder: Radius (r1) = 6 cm, Height (h1) = 14 cm.

Hollow cylinder: Height (h2) = 14/2 = 7 cm, Outer radius (R) = 2 × Inner radius (r).

Formula Used:

Volume of Solid Cylinder = $\pi r^2 h$

Volume of Hollow Cylinder = $\pi(R^2 - r^2)h$

Calculations:

=> Volume of solid cylinder = $\pi \times 6^2 \times 14 = 504\pi$ cm³

=> Let inner radius = x, then outer radius = 2x

=> Volume of hollow cylinder = $\pi \times [(2x)^2 - x^2] \times 7$

=> $21\pi x^2 = 504\pi$

=> $x^2 = 504 / 21$

=> $x^2 = 24$

=> $x = \sqrt{24} = 2\sqrt{6}$ cm

=> Outer radius = $2x = 2 \times 2\sqrt{6} = 4\sqrt{6}$ cm

Therefore The correct answer is $4\sqrt{6}$ cm.

Additional Information

Volume Conservation

When a solid is melted and recast into a different shape, the total Volume of the material remains the same.

Hollow Cylinder Properties

The volume of a hollow cylinder with outer radius R, inner radius r, and height h is $V = \pi(R^2 - r^2)h$.

Total Surface Area of Hollow Cylinder

The total surface area is given by $2\pi(R + r)(h + R - r)$.

Q20. Answer: (b) C

Shortcut Trick

Compare effective discount percentages for 10 toys:

Scheme A: 38 + 39 − (38 × 39)/100 = 77 − 14.82 = 62.18%

Scheme B: 42 + 38 − 15.96 = 64.04% → 64.04 + 20 − 12.8 = 71.23%

Scheme C: [(2 × 11) + (8 × 42)] ÷ 10 = (22 + 336) ÷ 10 = 35.8%

Scheme D: [9 ÷ (10 + 9)] × 100 ≈ 47.37%

Comparing all: 35.8% (C) is the lowest discount, hence least beneficial.

Therefore The correct answer is Scheme C.

Alternate Method

Assume Marked Price (MP) of each toy = Rs. 100. Total MP for 10 toys = Rs. 1000.

Detailed Calculations:

=> Scheme A: Successive 38% and 39%.

=> Net Discount % = 38 + 39 − (38 × 39)/100 = 77 − 14.82 = 62.18%
=> Scheme B: Successive 42%, 38% and 20%.
=> Net of 42% and 38% = 42 + 38 − (42 × 38)/100 = 80 − 15.96 = 64.04%
=> Net with 20% = 64.04 + 20 − (64.04 × 20)/100 = 84.04 − 12.808 = 71.232%
=> Scheme C: 11% on first 2, 42% on next 8 toys.
=> Total Discount = (2 × 11% of 100) + (8 × 42% of 100) = 22 + 336 = Rs. 358
=> Effective Discount % = (358 ÷ 1000) × 100 = 35.8%
=> Scheme D: 9 toys free on buying 10.
=> Discount % = [Free Items ÷ Total Items] × 100 = [9 ÷ (10 + 9)] × 100 ≈ 47.37%
=> Comparing all discounts: 35.8% is the minimum value.
Therefore The correct answer is Scheme C.
Additional Information
Successive Discount Formula
For two successive discounts of a% and b%, the equivalent single discount is given by (a + b − ab/100)%.
Buy X Get Y Free Scheme
The effective discount percentage in a 'Buy X Get Y Free' offer is calculated as [Y ÷ (X + Y)] × 100.
Benefit to Customer
A scheme is most beneficial when the discount percentage is highest and least beneficial when the discount percentage is lowest.

Q21. Answer: (d) 62.5 km/h

Shortcut Trick
Speed of 2^(nd) train = 300 ÷ 3 = 100 km/h.
Ratio of speeds (Train 1 : Train 2) = 5 : 8.
Since 8 units = 100 km/h => 1 unit = 12.5 km/h.
Speed of 1^(st) train = 5 units = 5 × 12.5 = 62.5 km/h.
Therefore The correct answer is 62.5 km/h.
Alternate Method
Given: Ratio of speeds = 5 : 8 | Distance (Train 2) = 300 km | Time (Train 2) = 3 hours.
Formula Used: Speed = Distance ÷ Time
=> Speed of 2^(nd) train = Distance ÷ Time
=> Speed of 2^(nd) train = 300 ÷ 3 = 100 km/h.
=> Let the speed of the 1^(st) train be 5x and the 2^(nd) train be 8x.
=> 8x = 100
=> x = 100 ÷ 8 = 12.5
=> Speed of 1^(st) train = 5x = 5 × 12.5 = 62.5 km/h.
Therefore The correct answer is 62.5 km/h.
Additional Information
Speed-Distance Relationship
When time is constant, Speed is directly proportional to Distance (S1/S2 = D1/D2).
Unit Conversion
To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.
Relative Speed
For two objects moving in the same direction, Relative Speed = S1 − S2. In opposite directions, Relative Speed = S1 + S2.

Q22. Answer: (b) 2 hours

Shortcut Trick
Identify the mode by finding the observation with the highest frequency.
Number 2 appears 4 times, 3 appears 3 times, 4 appears 2 times, and 5 appears 1 time.
The value 2 occurs the maximum number of times.
Therefore The correct answer is 2 hr.
Alternate Method
Given: Data points for 10 students = 2, 3, 4, 2, 5, 3, 2, 4, 2, 3.

Formula: Mode is the value that appears most frequently in a data set.

To find the mode, we construct a frequency table:

=> Data value 2: Frequency = 4

=> Data value 3: Frequency = 3

=> Data value 4: Frequency = 2

=> Data value 5: Frequency = 1

=> Comparing frequencies: 4 > 3 > 2 > 1

=> Since the value 2 hr occurs with the maximum frequency of 4.

Therefore The correct answer is 2 hr.

Additional Information

Arithmetic Mean

The average of the data set calculated as (Sum of all observations) ÷ (Total number of observations).

Median

The middle value of a data set when arranged in ascending or descending order. For even n, it is the mean of (n/2)^(th) and (n/2 + 1)^(th) terms.

Empirical Relationship

For moderately skewed distributions: Mode = 3 × Median − 2 × Mean.

Bimodal and Multimodal

A data set with two modes is called bimodal, and one with more than two modes is called multimodal.

Q23. Answer: (a) (a+b)/(a-b)

Shortcut Trick

If two numbers x and y are given, their Third proportional is calculated as $y^2 \div x$.

Here, let $x = a^2 - b^2$ and $y = a + b$.

Third proportional = $(a + b)^2 \div (a^2 - b^2)$

Applying identity $a^2 - b^2 = (a - b)(a + b)$, we get $(a + b)^2 \div ((a - b)(a + b))$.

Simplified result = $(a + b) / (a - b)$.

Therefore The correct answer is ((a+b))/((a-b)).

Alternate Method

Given:

First term = $a^2 - b^2$

Second term = $a + b$

Condition: $a \neq b$

We know that if x, y, z are in Continued Proportion, then:

$x \div y = y \div z$

=> $z = y^2 \div x$

Substitute the given expressions:

=> $z = (a + b)^2 \div (a^2 - b^2)$

Using the algebraic identity $(a^2 - b^2) = (a + b)(a - b)$:

=> $z = ((a + b) \times (a + b)) \div ((a + b) \times (a - b))$

Canceling the common term (a + b) from the numerator and denominator:

=> $z = (a + b) \div (a - b)$

Therefore The correct answer is ((a+b))/((a-b)).

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is $\sqrt{(a \times b)}$.

Fourth Proportional

If four quantities a, b, c, d are in proportion (a:b :: c:d), then the fourth proportional d is $(b \times c) \div a$.

Continued Proportion

Three quantities a, b, c are in continued proportion if $a/b = b/c$, which implies $b^2 = ac$.

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Q24. Answer: (c) 10:1

Shortcut Trick

To find the Ratio of Boys to Teachers, equate the common entity (Girls) in both ratios.

Boys : Girls = 5 : 7 and Girls : Teachers = 14 : 1

Multiply the first Ratio by 2 to make the Girls count equal to 14: (5 × 2) : (7 × 2) = 10 : 14.

Now, the combined Ratio of Boys : Girls : Teachers = 10 : 14 : 1.

Extracting the required terms, Boys : Teachers = 10 : 1.

Therefore The correct answer is 10:1.

Alternate Method

Given:

=> Ratio of Boys to Girls = 5 : 7

=> Ratio of Girls to Teachers = 14 : 1

Formula Used:

=> If A:B and B:C are given, then A:C = (A/B) × (B/C)

Calculations:

=> Let Boys be B, Girls be G, and Teachers be T.

=> B / G = 5 / 7

=> G / T = 14 / 1

=> To find B / T, we multiply the two ratios: (B / G) × (G / T)

=> B / T = (5 / 7) × (14 / 1)

=> B / T = (5 × 14) / (7 × 1)

=> B / T = 70 / 7

=> B / T = 10 / 1

=> B : T = 10 : 1

Therefore The correct answer is 10:1.

Additional Information

Compound Ratio

When two or more Ratios are multiplied together, the result is called a Compound Ratio. For ratios a:b and c:d, the Compound Ratio is (ac):(bd).

Duplicate Ratio

The Duplicate Ratio of any ratio a:b is calculated by squaring both terms, resulting in $a^2 : b^2$.

Proportion

A Proportion is an equation which states that two Ratios are equal (a/b = c/d), where the product of extremes equals the product of means (ad = bc).

Q25. Answer: (b) 2

Shortcut Trick

HCF = LCM of numbers ÷ LCM of ratio parts

LCM of ratio parts 10, 13, and 11 = 10 × 13 × 11 = 1430

HCF = 2860 ÷ 1430 = 2

Therefore The correct answer is 2.

Alternate Method

Given:

Ratio of three numbers = 10 : 13 : 11

LCM of the numbers = 2860

Formula Used:

If numbers are in ratio a : b : c, then their LCM = HCF × LCM(a, b, c).

Calculations:

=> Let the HCF of the three numbers be x.

=> The numbers are 10x, 13x, and 11x.

=> Since 10, 13, and 11 have no common factors (they are co-prime), their LCM = 10 × 13 × 11 = 1430.

=> LCM of the numbers = x × 1430

=> 2860 = 1430x
=> x = 2860 ÷ 1430
=> x = 2
Therefore The correct answer is 2.
Additional Information
Relationship for Two Numbers
For any two numbers a and b, Product of numbers (a × b) = HCF(a, b) × LCM(a, b).
HCF (Highest Common Factor)
The HCF is the largest positive integer that divides each of the given numbers without leaving a remainder.
LCM (Least Common Multiple)
The LCM is the smallest positive integer that is divisible by each of the given numbers.
Co-prime Numbers
Two or more numbers are said to be co-prime if their HCF is 1. Their LCM is simply the product of the numbers.

Q26. Answer: (a) 27

Shortcut Trick
The age difference between two people always remains constant over time.
Ratio of X and Y = 4 : 5 => Difference = 5 − 4 = 1 unit.
Actual difference = 3 years (given for 5 years later, but it is constant).
Therefore 1 unit = 3 years.
Sum of present ages = (4 + 5) units = 9 units = 9 × 3 = 27 years.
Therefore The correct answer is 27 years.
Alternate Method
Given: Present age ratio of X and Y = 4 : 5. Future age difference = 3 years.
Formula Used: Age = Ratio Part × Value of 1 Unit; Age difference is invariant.
=> Let the present ages of X and Y be 4k and 5k respectively.
=> Age of X after 5 years = (4k + 5) years.
=> Age of Y after 5 years = (5k + 5) years.
=> Difference = (5k + 5) − (4k + 5) = 3
=> k = 3.
=> X's present age = 4 × 3 = 12 years.
=> Y's present age = 5 × 3 = 15 years.
=> Sum of present ages = 12 + 15 = 27 years.
Therefore The correct answer is 27 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.
Sum of Ages in Future/Past
If the current sum of ages of 'n' people is S, then after 't' years, the sum of ages will be S + (n × t).
Ratio Proportionality
In age problems, if the ratio is a : b and the difference is 'd', the units can be directly mapped: (b − a) units = d.

Q27. Answer: (a) 28% profit

Shortcut Trick
Ratio of Cost Price (CP) to Selling Price (SP) based on price: 25 : (32 × 0.8) = 25 : 25.6
Ratio based on Weight fraud: 800 : 1000 = 4 : 5
Combined Ratio (CP : SP) = (25 × 4) : (25.6 × 5) = 100 : 128
Profit % = 128 − 100 = 28%
Therefore The correct answer is 28% profit.
Alternate Method
Given: CP = Rs. 25/kg, MP = Rs. 32/kg, Discount = 20%, False weight = 800 g instead of 1000 g.
Formula Used: Profit % = [(Total SP − Total CP) ÷ Total CP] × 100

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=> Selling Price (SP) per kg claimed = 32 − (20% of 32)

=> SP = 32 − 6.4 = Rs. 25.6

=> Since the shopkeeper uses 800 g instead of 1 kg, his Actual CP is for 800 g.

=> Actual CP = (25 ÷ 1000) × 800 = Rs. 20

=> Profit = 25.6 − 20 = Rs. 5.6

=> Overall Profit % = (5.6 ÷ 20) × 100

=> Profit % = 0.28 × 100 = 28%

Therefore The correct answer is 28% profit.

Additional Information

Dishonest Dealer Weight Gain

When a dealer sells at CP but uses less weight, Profit % = [Error ÷ (True Value − Error)] × 100.

Marked Price and Discount

Marked Price (MP) = CP × [100 + Markup%] ÷ 100. Selling Price (SP) = MP × [100 − Discount%] ÷ 100.

Successive Percentage Change

Overall change for two successive percentages a and b is [a + b + (a × b)/100] %. Use negative values for discounts or losses.

Q28. Answer: (c) 18 m

Shortcut Trick

To find the maximum possible length of each equal piece from ropes of lengths 54 m, 72 m, and 90 m, we directly calculate their Highest Common Factor (HCF).

Lengths of the ropes: 54 m, 72 m, 90 m

HCF(54, 72, 90) = 18

Thus, each rope can be cut into smaller pieces of exactly 18 m with no leftover rope.

Therefore The correct answer is 18 m.

Alternate Method

Given:

Length of the first rope = 54 m

Length of the second rope = 72 m

Length of the third rope = 90 m

Formula Used:

Maximum possible length of each piece = HCF of (54, 72, 90)

54 m 18m 18m

Q29. Answer: (c) 10%

Shortcut Trick

Price after first 15% discount = 2000 − 300 = Rs. 1700.

Required second discount amount = 1700 − 1530 = Rs. 170.

Second discount % = (170 ÷ 1700) × 100 = 10%.

Therefore The correct answer is 10%.

Alternate Method

Given:

Marked Price (MP) of the jacket = Rs. 2,000

Final Selling Price (SP) = Rs. 1,530

First Discount (D1) = 15%

Formula Used:

Intermediate Price = MP × (100 − D1) / 100

D2 % = [(Intermediate Price − Final SP) / Intermediate Price] × 100

Calculations:

=> First discount amount = 15% of 2000 = (15/100) × 2000 = Rs. 300

=> Price after first discount = 2000 − 300 = Rs. 1700

=> Let the second discount percentage be x%

=> Second discount amount = 1700 − 1530 = Rs. 170

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=> x = (Second discount amount / Price after first discount) × 100

=> x = (170 / 1700) × 100 = 10%

Therefore The correct answer is 10%.

Additional Information

Successive Discount Formula

The single equivalent discount for two successive discounts of a% and b% is given by (a + b − ab/100)%.

Selling Price and Marked Price Relation

SP = MP × (1 − d1/100) × (1 − d2/100), where d1 and d2 are the successive discount percentages.

Marked Price Calculation

Marked Price = [Cost Price × (100 + Profit%)] / (100 − Discount%).

Q30. Answer: (d) 45

Shortcut Trick

Simplify √20 as 2√5.

The expression becomes (√5 + 2√5)².

Add like surds: (3√5)².

Square the term: $3^2 \times (\sqrt{5})^2 = 9 \times 5 = 45$.

Therefore The correct answer is 45.

Alternate Method

Given: The expression to simplify is (√5 + √20)².

Formula Used: Algebraic identity $(a + b)^2 = a^2 + b^2 + 2ab$.

=> Let a = √5 and b = √20.

=> $(\sqrt{5})^2 + (\sqrt{20})^2 + 2 \times \sqrt{5} \times \sqrt{20}$

=> $5 + 20 + 2 \times \sqrt{(5 \times 20)}$

=> $25 + 2 \times \sqrt{100}$

=> $25 + 2 \times 10$

=> 25 + 20

=> 45

Therefore The correct answer is 45.

Additional Information

Algebraic Identities

The square of a sum is given by $(a + b)^2 = a^2 + 2ab + b^2$, while the square of a difference is $(a − b)^2 = a^2 − 2ab + b^2$.

Properties of Surds

For any positive real numbers x and y, the product rule states √x × √y = √(xy) and the power rule states $(\sqrt{x})^2 = x$.

Simplifying Square Roots

A square root is simplified by extracting the largest perfect square factor, such as √20 = √(4 × 5) = 2√5.

Q31. Answer: (c) Chambal

The correct answer is Chambal.

Key Points

• The Chambal River, a major tributary of the Yamuna River, is globally famous for its unique badland topography, which consists of an extensive and intricate network of ravines.

• This rugged landscape is primarily the result of severe gully erosion, a process where rainwater carves deep, narrow channels into the soft, alluvial soil of the Chambal Basin.

• These ravines, locally known as Beehad, span across the states of Madhya Pradesh, Rajasthan, and Uttar Pradesh, particularly concentrated in the districts of Morena, Bhind, and Dholpur.

• The badland topography makes the terrain largely unsuitable for agriculture due to the high degree of soil displacement and the lack of flat surfaces for cultivation.

• Geologically, the region is characterized by thick alluvium deposits from the Quaternary period, which are highly susceptible to erosion under the semi-arid climatic conditions of the area.

Additional Information

• Ken River:

• A significant river in the Bundelkhand region, it is a tributary of the Yamuna.

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• It is famous for the Ken-Betwa River Link Project and flows through the Panna Tiger Reserve in Madhya Pradesh.

• Gandak River:

• Formed by the union of the Kali and Trishuli rivers in Nepal, it is a major northern tributary of the Ganga.

• It serves as an important source of irrigation and hydroelectricity for the states of Bihar and Uttar Pradesh.

• Ramganga River:

• Originates in the Dudhatoli range of Uttarakhand and is the first major tributary to join the Ganga from the left.

• The river is central to the ecosystem of the Jim Corbett National Park, providing water to its diverse flora and fauna.

Q32. Answer: (c) Increased significantly

The correct answer is Increased significantly.

Key Points

• The implementation of the New Economic Policy (NEP) in 1991 marked a decisive shift from a state-controlled, inward-looking economy to a liberalized, market-oriented system.

• Prior to these reforms, the Indian economy was characterized by the Hindu Rate of Growth, which stagnated around 3.5% to 4% from the 1950s through the 1980s.

• Post-reform data demonstrates that the Gross Domestic Product (GDP) growth rate surged, averaging nearly 6.5% in the 1990s and climbing to peaks of 8% to 9% during the mid-2000s.

• The abolition of the License-Permit Raj removed industrial bottlenecks, allowing private enterprises to expand rapidly and enhancing overall economic productivity.

• Increased Global Integration and the reduction of trade barriers allowed India to transition from a sluggish agrarian-focused economy to one of the fastest-growing major economies in the world.

Additional Information

• Balance of Payments (BoP) Crisis:

• The reforms were necessitated by a severe crisis in 1991 where foreign exchange reserves fell to approximately $1.2 billion, barely enough for two weeks of essential imports.

• Architects of Reform:

• The policy shift was spearheaded by the then Prime Minister P. V. Narasimha Rao and Finance Minister Dr. Manmohan Singh under the guidance of the IMF and World Bank.

• Sectoral Growth:

• Service Sector: Post-1991, this sector became the primary engine of growth, specifically in Information Technology (IT) and Telecommunications, now contributing over 50% to India's GDP.

• Foreign Direct Investment (FDI): Reforms opened various sectors to foreign capital, leading to a massive influx of investment and modern technology.

• Industrial Policy 1991:

• This policy drastically reduced the number of industries reserved for the Public Sector and introduced Disinvestment to improve the efficiency of PSUs.

Q33. Answer: (c) Odisha

The correct answer is Odisha.

Key Points

• Rangabati is widely celebrated as the most popular folk song and dance form originating from the Western Odisha region, particularly associated with the Sambalpur district.

• The dance is a vital expression of the Sambalpuri culture and is performed in the Kosli language, reflecting the vibrant tribal and rural heritage of the state.

• The song Rangabati gained nationwide and international acclaim after it was first recorded in 1975 for All India Radio; it was written by Mitrabhanu Gauntia and composed by Prabhudutta Pradhan.

• The lead singers who immortalized this folk piece are Jitendra Haripal and Krishna Patel, who were later honored with the Padma Shri and other state awards for their contribution to Odishi folk music.

• The dance is characterized by its infectious rhythm and is traditionally accompanied by local musical instruments such as the Dhol (drum), Nishan (kettle drum), Tasa (one-sided drum), and Mahuri (wind instrument).

• Performers usually wear traditional Sambalpuri Handloom attire, with women draping the Sambalpuri Saree in a specific way that allows for the energetic and graceful footwork required by the folk form.

• It is predominantly performed during major cultural and agricultural festivals like Nuakhai, which is the most important festival in Western Odisha celebrating the new harvest.

Additional Information

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• Gujarat:

• Garba: A rhythmic folk dance performed in a circle around a central lamp, traditionally during the Navratri festival.

• Dandiya Raas: A high-energy dance involving the use of polished sticks, symbolizing the battle between Goddess Durga and the demon Mahishasura.

• Uttar Pradesh:

• Kathak: One of the eight Classical Dances of India, known for its intricate footwork (Tatkar) and dramatic storytelling.

• Charkula: A folk dance from the Braj region where women balance large multi-tiered wooden pyramids with burning oil lamps on their heads.

• West Bengal:

• Chhau Dance: Specifically the Purulia Chhau, which is a tribal martial dance characterized by the use of large, elaborate masks and acrobatic movements.

• Gambhira: A traditional solo or group folk dance-drama performed during the Gajan festival, often used for social and political commentary.

Q34. Answer: (c) a compositional lyric form

The correct answer is a compositional lyric form.

Key Points

• The term Kriti refers to the most highly evolved and predominant compositional lyric form in Carnatic classical music, forming the backbone of modern concert repertoires.

• A standard Kriti follows a tripartite structural arrangement consisting of the Pallavi (the thematic opening), the Anupallavi (the second section), and the Charanam (the final stanzas that conclude the piece).

• The evolution of the Kriti is credited largely to the Trinity of Carnatic Music—Tyagaraja, Muthuswami Dikshitar, and Syama Sastri—who refined the form in the late 18th and early 19th centuries.

• Unlike simpler devotional songs, a Kriti emphasizes musical technicality and raga bhava (the essence of the melody), where the Sahitya (lyrics) serves as a vehicle for complex melodic exploration.

• It is characterized by its fixed nature, where the Dhatu (musical setting) and Matu (lyrical content) are pre-composed, although performers often add improvisational elements like Niraval or Kalpanaswaras during its rendition.

Additional Information

• Raga

• Defined as a melodic scale or framework that provides the basis for composition and improvisation in Indian music.

• It uses a specific set of notes (Swaras) and rules of ascent (Arohana) and descent (Avarohana).

• Tala

• Refers to the rhythmic pattern or time cycle that regulates the temporal aspect of a musical performance.

• Common examples include Adi Tala (8 beats) and Rupaka Tala (3 beats).

• Gamaka

• Represents a type of musical ornamentation involving the graceful manipulation of notes to provide aesthetic depth.

• It is a vital component that distinguishes the unique character of different Ragas.

• Varnam

• A foundational compositional form usually performed at the beginning of a concert to showcase the characteristic phrases of a Raga.

Q35. Answer: (b) Exfoliation

The correct answer is Exfoliation.

Key Points

• Exfoliation is a type of mechanical weathering or physical weathering process where the external layers of a rock peel away in thin, curved sheets or shells.

• This process is often referred to as onion-skin weathering because the rock flakes off in layers, similar to an onion.

• It is primarily caused by thermal expansion and contraction. Rocks are poor conductors of heat; therefore, intense solar heating during the day causes the outer layer to expand more than the interior. Cooling at night causes contraction, leading to differential stresses that fracture the rock parallel to the surface.

• Pressure release, also known as unloading, is another significant cause. When heavy overlying rock or ice is removed by erosion, the underlying massive rocks (such as granite) expand outward, creating joints that result in the peeling of large curved slabs.

• This phenomenon is most prevalent in arid and semi-arid environments where there are large diurnal temperature ranges, and in mountainous regions with high rates of denudation.

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Additional Information

• Carbonation

• A chemical weathering process where carbon dioxide from the atmosphere dissolves in rainwater to form weak carbonic acid.

• It reacts specifically with carbonate minerals like calcite found in limestone and marble, leading to the formation of calcium bicarbonate which is easily washed away.

• Salt Crystallisation

• A form of physical weathering common in coastal or desert regions.

• Saline water enters pore spaces or joints in rocks; upon evaporation, salt crystals grow and exert expansive force, eventually disintegrating the rock structure.

• Abrasion

• The mechanical scraping or wearing down of rock surfaces through friction.

• It is caused by the scouring action of particles (sand, pebbles) transported by wind, glaciers, or river currents hitting against stationary rock bodies.

Q36. Answer: (d) Chandela

The correct answer is Chandela.

Key Points

• The Khajuraho group of temples was constructed by the Chandela Dynasty, which reached its zenith between 950 AD and 1050 AD.

• Located in the Chhatarpur district of Madhya Pradesh, these temples are a UNESCO World Heritage Site recognized for their intricate Nagara-style architecture and erotic sculptures.

• The Chandela rulers, particularly Yashovarman and Dhanga, were the primary patrons; Yashovarman is credited with building the famous Lakshmana Temple.

• The most magnificent structure in the complex, the Kandariya Mahadeva Temple, was built during the reign of King Vidyadhara around 1030 AD.

• The temples are unique as they represent two different religions, Hinduism and Jainism, coexisting in the same complex, signifying the religious tolerance of the Chandela period.

• Most of the temples were built using sandstone with mortise and tenon joints, featuring high platforms (jagati) and towers (shikhara) that resemble mountain peaks.

Additional Information

• Solanki Dynasty:

• Also known as the Chaulukyas of Gujarat, they ruled parts of western India between the 10th and 13th centuries.

• They are celebrated for constructing the Sun Temple at Modhera and the Rani ki Vav stepwell.

• Rashtrakuta Dynasty:

• A powerful dynasty that ruled the Deccan region from the 8th to the 10th century.

• They are most famous for the rock-cut Kailasa Temple at Ellora and the Elephanta Caves.

• Gahadavala Dynasty:

• A Rajput dynasty that governed the Kingdom of Kannauj (Kanyakubja) during the 11th and 12th centuries.

• They played a significant role in resisting Ghurid invasions under leaders like Jayachandra.

Q37. Answer: (b) Tertiary

The correct answer is Tertiary.

Key Points

• The Tertiary sector is popularly known as the Service sector because it involves providing services to both consumers and businesses rather than producing physical goods.

• Activities in this sector, such as Transport, Trade, Storage, and Communication, act as a support system for the development of the Primary and Secondary sectors.

• In the Indian economy, the Tertiary sector has emerged as the largest contributing sector to the Gross Value Added (GVA), surpassing the industrial and agricultural sectors in recent decades.

• Other vital services included in this category are Banking, Insurance, Tourism, Education, and Healthcare, which are essential for a modern economy.

Additional Information

• Primary Sector:

• Involves the direct extraction and use of natural resources from the earth.

• Key examples include Agriculture, Fishing, Mining, Forestry, and Dairy farming.

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• It serves as the raw material base for all other economic activities.

• Secondary Sector:

• Focuses on the manufacturing and processing of raw materials into finished or semi-finished goods.

• Commonly referred to as the Industrial Sector, it includes Construction, Manufacturing, and Electricity generation.

• Examples include converting Sugarcane into Sugar or Cotton into Textiles.

• Quinary Sector:

• Representing the highest level of decision-making, it is a specialized sub-division of the service economy.

• It includes Top Government Officials, Senior Business Executives, and Research Scientists who focus on the creation and interpretation of new ideas.

Q38. Answer: (a) Two Kerala Acts on land reforms

The correct answer is Two Kerala Acts on land reforms.

Key Points

• The Twenty-Ninth Amendment Act, 1972 was specifically enacted to provide constitutional protection to certain land reform legislations passed by the Kerala State Legislature.

• The amendment included two specific acts in the Ninth Schedule of the Constitution: the Kerala Land Reforms (Amendment) Act, 1969 (Act 35 of 1969) and the Kerala Land Reforms (Amendment) Act, 1971 (Act 25 of 1971).

• By placing these acts in the Ninth Schedule, the government aimed to shield them from judicial scrutiny under Article 31B, preventing them from being declared void on the grounds of violating Fundamental Rights, particularly the then-existing right to property.

• The validity of this amendment, along with the 24th and 25th Amendments, was later challenged in the landmark Kesavananda Bharati v. State of Kerala (1973) case, which is famous for establishing the Basic Structure Doctrine of the Indian Constitution.

• The amendment was a response to the litigation faced by the state government while implementing radical land redistribution policies intended to abolish the intermediary system and set ceilings on land holdings.

Additional Information

• Ninth Schedule:

• It was introduced by the First Amendment Act, 1951 to protect agrarian reform laws from being challenged in courts.

• While it initially offered absolute immunity, the Supreme Court in the I.R. Coelho case (2007) ruled that laws added after April 24, 1973, can be tested against the Basic Structure.

• Reservation in promotions:

• This concept is primarily associated with the 77th Amendment Act, 1995, which inserted clause (4A) into Article 16, and the 85th Amendment Act, 2001, concerning consequential seniority.

• Special provisions for Mizoram:

• Provisions for Mizoram were incorporated into the Constitution via the 53rd Amendment Act, 1986, which added Article 371G to protect the religious and social practices of the Mizo people.

• Environmental protection laws:

• These were majorly emphasized during the 42nd Amendment Act, 1976, which introduced Article 48A in the Directive Principles and Article 51A(g) in the Fundamental Duties.

Q39. Answer: (d) For ALL Women and Girls: Rights. Equality. Empowerment

The correct answer is For ALL Women and Girls: Rights. Equality. Empowerment.

Key Points

• International Women's Day (IWD) is a global event celebrated annually on March 8 to commemorate the social, economic, cultural, and political achievements of women.

• For the year 2025, the United Nations (UN) Women organization officially designated the theme as 'For ALL Women and Girls: Rights. Equality. Empowerment.'

• This theme is central to the Beijing+30 campaign, marking the 30th anniversary of the Beijing Declaration and Platform for Action, which was adopted in 1995 at the Fourth World Conference on Women.

• The 2025 observance focuses on accelerating the progress toward Sustainable Development Goal 5 (SDG 5), which aims to achieve gender equality and empower all women and girls by 2030.

• The theme serves as a global rallying cry to dismantle systemic barriers, end violence against women, and ensure inclusive leadership across all sectors of society.

Additional Information

• Previous International Women's Day Themes:

• Invest in Women: Accelerate Progress: This was the official UN theme for 2024, emphasizing the need for financial investment to

tackle the gender poverty gap.

• DigitALL: Innovation and technology for gender equality: This theme for 2023 highlighted the importance of bridging the digital gender divide and protecting women in online spaces.

• Gender equality today for a sustainable tomorrow: The 2022 theme focused on the vital role of women in climate change adaptation and environmental conservation.

• Commission on the Status of Women (CSW):

• The 69th session (CSW69) held in March 2025 at the UN Headquarters in New York serves as the primary venue for the comprehensive review of the Beijing Declaration.

Q40. Answer: (c) Article 26

The correct answer is Article 26.

Key Points

• Article 26 of the Indian Constitution specifically provides the freedom to manage religious affairs, which is a fundamental right guaranteed to every religious denomination or any section thereof.

• The article empowers these groups to establish and maintain institutions for both religious and charitable purposes, ensuring communal autonomy.

• It grants the specific authority to manage their own affairs in matters of religion, protecting the rituals, ceremonies, and internal practices essential to their faith.

• Under this article, denominations have the legal right to own and acquire movable and immovable property, providing the financial and physical infrastructure needed for religious activities.

• Furthermore, it safeguards the right of these groups to administer such property in accordance with the provisions of law.

• Unlike Article 25, which focuses on individual rights, Article 26 is considered a collective right, though both are subject to public order, morality, and health.

Additional Information

• Article 23 and Article 24:

• These articles fall under the Right against Exploitation.

• Article 23 prohibits human trafficking and begar (forced labor) in any form.

• Article 24 prohibits the employment of children below the age of 14 years in hazardous environments such as factories, mines, or other dangerous occupations.

• Article 27:

• Provides freedom as to the payment of taxes for the promotion of any particular religion.

• It mandates that no person shall be compelled to pay taxes where the proceeds are specifically appropriated for the maintenance of any particular religious denomination.

• Article 25:

• Guarantees the freedom of conscience and the right to freely profess, practice, and propagate religion to all individuals.

Q41. Answer: (b) Spreadsheet data

The correct answer is Spreadsheet data.

Key Points

• The .xlsx file extension represents a Microsoft Excel Open XML Spreadsheet file, which is the default format for Microsoft Excel versions 2007 and later.

• It is specifically designed to store spreadsheet data, organizing information into a grid of rows and columns to facilitate data entry, mathematical calculations, and statistical analysis.

• The .xlsx format is based on the Open XML standard, which uses XML (Extensible Markup Language) and ZIP compression to make files smaller, more secure, and easier to recover if corrupted compared to legacy formats.

• These files support advanced features such as complex formulas, PivotTables, data validation, and integrated charts or graphs for visual representation of data.

• Therefore, Spreadsheet data is the correct answer as it defines the primary purpose of the .xlsx file extension.

Additional Information

• Booting the computer

• This process refers to the startup sequence of a computer system, which relies on system files such as BIOS/UEFI firmware, BOOTMGR, or .sys and .exe files to load the Operating System into memory.

• Text paragraphs

• Documents containing paragraphs of text are typically created using word processing software like Microsoft Word, which utilizes extensions like .docx, .doc, or .pdf to maintain text formatting and layout.

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• Sound editing

• Audio editing and production involve digital audio files with extensions like .mp3, .wav, or .flac, which store digitized sound waves and metadata rather than tabular data.

• Legacy Excel Formats

• Before the introduction of Office 2007, Microsoft Excel primarily used the .xls extension, which was a proprietary Binary Interchange File Format (BIFF).

Q42. Answer: (a) Transfer of tribal lands and intrusion of moneylenders and merchants.

The correct answer is Transfer of tribal lands and intrusion of moneylenders and merchants..

Key Points

• The Kol uprising of 1831-32 was a significant tribal revolt in the Chhotanagpur region against the exploitative policies of the British East India Company and their agents.

• The primary catalyst was the large-scale transfer of tribal lands to outsiders, such as Sikhs and Muslims, who were granted farming rights by the local Raja of Chhotanagpur.

• Traditional tribal headmen, known as Mankis and Mundas, were displaced from their ancestral authority, leading to widespread resentment among the Munda, Oraon, and Ho tribes.

• The intrusion of Dikus (outsiders), including moneylenders and merchants, led to extreme economic exploitation through high-interest rates, land alienation, and the introduction of bonded labor.

• The rebellion was characterized by the burning of houses belonging to outsiders and the destruction of government property, spearheaded by leaders like Buddhu Bhagat, who fell in battle in 1832.

Additional Information

• Geographical and Social Context

• The Chhotanagpur plateau covers parts of modern-day Jharkhand, Odisha, and Chhattisgarh, inhabited by diverse tribal groups with unique socio-legal systems.

• The Permanent Settlement of 1793 indirectly pressured local rulers to maximize revenue, forcing them to lease tribal lands to non-tribal contractors.

• The Kol tribesmen utilized traditional weapons like bows, arrows, and spears to resist the British military units deployed to suppress the movement.

• Following the suppression of the revolt, the British administration recognized the need for special laws, eventually leading to the creation of the South-West Frontier Agency to govern the region more sensitively.

Q43. Answer: (b) Mohanlal

The correct answer is Mohanlal.

Key Points

• On October 7, 2025, the legendary Indian actor Mohanlal Viswanathan was honored with the Chief of Army Staff (COAS) Commendation Card.

• The award was presented by General Upendra Dwivedi, who serves as the 30th Chief of the Army Staff of the Indian Army.

• Mohanlal holds the honorary rank of Lieutenant Colonel in the Territorial Army, specifically attached to the 122 Infantry Battalion (Madras).

• He was the first actor in the history of the Indian Armed Forces to be conferred with this honorary rank, which he received in 2009 for his contributions to the Indian Army and for motivating the youth to join the forces.

• The COAS Commendation Card is a prestigious award given for individual acts of distinguished service or devotion to duty that are of a high order but do not necessarily meet the criteria for a gallantry medal.

• The recognition on this date acknowledges his continued commitment to the Territorial Army and his role as a brand ambassador for the defense forces through his public outreach and support of military initiatives.

Additional Information

• Chief of Army Staff Commendation Card:

• This award is presented to all ranks of the Indian Army, including civilians and personnel of other services, for outstanding performance in the line of duty.

• It serves as a formal recognition of excellence and is recorded in the individual's service book.

• General Upendra Dwivedi:

• He took charge as the COAS on June 30, 2024, succeeding General Manoj Pande.

• His tenure has focused on technological infusion and modernization of the Indian Army under the initiative of Atmanirbhar Bharat.

• Territorial Army (TA):

• The Territorial Army is a second line of defense after the Regular Indian Army; it is not a profession or an occupation but a

means for citizens to serve the nation in uniform.

• Other notable honorary members include Mahendra Singh Dhoni (Lieutenant Colonel) and Kapil Dev (Lieutenant Colonel).

Q44. Answer: (b) Fifth

The correct answer is Fifth.

Key Points

• The fifth edition of the Khelo India University Games (KIUG) is scheduled to take place in Rajasthan from November 24 to December 5, 2025. Hence, the provided statement is correct.

• This is the first time Rajasthan has been selected as the host state for this premier national-level multi-sport university event, following the fourth edition held in Northeast India. Hence, the provided statement is correct.

• The games are organized across seven major cities in the state, including Jaipur, Ajmer, Udaipur, Jodhpur, Bikaner, Kota, and Bharatpur, to ensure widespread participation and infrastructure utilization. Hence, the provided statement is correct.

• More than 5,000 athletes from over 200 universities across India are expected to participate in the 12-day event, competing for top honors in various athletic disciplines. Hence, the provided statement is correct.

• The 2025 edition includes 23 medal sports, with the introduction of beach volleyball, cycling, and canoeing & kayaking for the first time in the tournament history, while Kho-Kho remains a demonstration sport. Hence, the provided statement is correct.

Additional Information

• History of KIUG Editions:

• First Edition (2020): Launched by Prime Minister Narendra Modi in Bhubaneswar, Odisha, featuring 17 sports.

• Second Edition (2022): Held in Bengaluru, Karnataka, where Jain University emerged as the overall champion.

• Third Edition (2023): Hosted by Uttar Pradesh across four cities (Lucknow, Varanasi, Greater Noida, and Gorakhpur).

• Fourth Edition (2024): Organized across the seven sister states of Northeast India, with Guwahati as the primary hub.

• Key Features of the Rajasthan Edition:

• Mascots: The official mascots for the 2025 games are named Khamma and Ghani, reflecting the cultural hospitality of the state.

• Age Category: The event specifically targets athletes in the Under-25 age group to bridge the gap between grassroots talent and international excellence.

• Organizing Bodies: It is a collaborative effort between the Ministry of Youth Affairs and Sports, Sports Authority of India (SAI), Association of Indian Universities (AIU), and the Rajasthan State Sports Council.

Q45. Answer: (a) Commercial grain farming

The correct answer is Commercial grain farming.

Key Points

• Commercial grain farming is the dominant agricultural practice in the temperate grasslands of North America, specifically the Great Plains of the USA and the Prairies of Canada.

• In this system, crops are grown primarily for sale in international markets, with wheat being the most significant crop, followed by maize, barley, and oats.

• This type of farming is characterized by large landholdings, often spanning hundreds or even thousands of hectares, which allows for a high degree of mechanization.

• The use of advanced technology such as tractors, seed drills, and combine harvesters ensures that the entire process from sowing to harvesting is highly efficient.

• Due to the low population density in these regions, there is a heavy reliance on machinery rather than manual labor, leading to high productivity per worker, although the yield per unit area may be lower than in intensive systems.

Additional Information

• Plantation agriculture

• Commonly practiced in tropical and sub-tropical regions.

• Focuses on a single cash crop like tea, coffee, rubber, cashew, or sugarcane.

• Requires a large amount of labor and capital investment.

• Intensive subsistence farming

• Prevalent in densely populated areas of Monsoon Asia, such as India and China.

• Farmers use small plots of land to produce enough food for their own consumption with high labor input.

• Rice is usually the main crop produced in this system.

• Shifting cultivation

• Also known as slash-and-burn agriculture, practiced in tropical rainforests.

• Involves clearing a patch of land by felling trees and burning them to create fertile ash.

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• Practiced by tribal communities in parts of Southeast Asia, Africa, and the Amazon basin.

Q46. Answer: (a) Durlabhavardhana

The correct answer is Durlabhavardhana.

Key Points

• Xuanzang (Hiuen Tsang), the celebrated Chinese Buddhist monk and traveler, visited the valley of Kashmir in 631 AD and remained there until 633 AD.

• During this period, Kashmir was under the rule of Durlabhavardhana, who was the founder of the powerful Karkota Dynasty.

• The king accorded Xuanzang a magnificent royal reception, sending his own maternal uncle to the frontier to escort the pilgrim to the capital city, Pravarapura (modern-day Srinagar).

• Xuanzang spent two years in the region studying Buddhist Sutras and Shastras at the Jayendra Monastery, where the king provided him with twenty scribes to assist in copying sacred manuscripts.

• In his travelogue, Si-Yu-Ki, Xuanzang praised the king's administration and noted that the kingdom of Kashmir held political sway over several adjacent regions, including Taxila, Punch, and Rajauri.

• His accounts highlight that Kashmir was a major center for the Sarvastivada school of Buddhism, housing over 100 monasteries and 5,000 monks during the 7th century.

Additional Information

• Harshavardhana:

• He was the Pushyabhuti emperor of Kannauj and a contemporary of Durlabhavardhana.

• While he was Xuanzang's primary patron in India and organized the Prayag Assembly, he did not rule Kashmir, though he reportedly forced the Kashmiri king to surrender a tooth relic of the Buddha.

• Pulakeshin II:

• The most renowned king of the Chalukya Dynasty of Badami.

• He is famous for defeating Harshavardhana on the banks of the Narmada River, but his authority was centered in the Deccan, far from Kashmir.

• Yashodharman:

• A powerful king of Malwa who belonged to the Aulikara Dynasty.

• He achieved historical fame for defeating the Huna ruler Mihirakula in the 6th century, which was nearly a century before Xuanzang arrived in India.

Q47. Answer: (c) Stalactites and stalagmites

The correct answer is Stalactites and stalagmites.

Key Points

• Stalactites and stalagmites are the most common depositional landforms found within limestone caves, which are characteristic features of Karst topography.

• Stalactites are icicle-like structures that hang from the cave ceiling; they form when mineral-rich water drips through cracks in the rock, leaving behind tiny deposits of calcium carbonate (calcite) as carbon dioxide escapes into the cave air.

• Stalagmites are mounds or pillars that grow upward from the cave floor, created by the accumulation of calcite deposited by water dripping from the ceiling or the tips of stalactites above.

• The formation process relies on carbonation, where rainwater mixes with soil carbon dioxide to form a weak carbonic acid that dissolves the limestone (calcium carbonate) into calcium bicarbonate; upon entering the cave, the solution undergoes precipitation to revert to solid mineral form.

• When a stalactite and stalagmite eventually meet, they fuse together to form a continuous vertical column or pillar.

Additional Information

• Glacial Landforms:

• Drumlins and eskers: These are glacial depositional features. Drumlins are smooth, oval hills of glacial till, while eskers are long, winding ridges composed of sand and gravel deposited by meltwater streams flowing within or under a glacier.

• Cirques and horns: These are glacial erosional landforms. A cirque is a bowl-shaped hollow carved at the head of a glacial valley, and a horn is a sharp, pyramid-like mountain peak.

• Fluvial Landforms:

• Levees and meanders: These are features of river systems. Meanders are broad loops or curves in a river's course, and levees are natural ridges of alluvium (sediment) deposited along the riverbanks during repeated flood events.

Q48. Answer: (a) A displacement reaction occurs, forming copper metal on the iron nails

The correct answer is A displacement reaction occurs, forming copper metal on the iron nails.

Key Points

• The reaction between iron nails and copper sulphate solution is a fundamental example of a Single Displacement Reaction. This type of reaction occurs when a more reactive element displaces a less reactive element from its compound.

• The chemical transformation is represented by the equation: Fe(s) + CuSO4(aq) → FeSO4(aq) + Cu(s). In this process, Iron (Fe) atoms transition into the solution as ions, while Copper (Cu) ions from the solution are deposited as solid metal.

• Based on the Metal Reactivity Series, Iron is more reactive than Copper. Consequently, iron has a higher tendency to lose electrons (undergo oxidation) compared to copper, allowing it to displace copper ions from the sulphate solution.

• The reddish-brown deposit formed on the surface of the iron nails is identified as metallic copper. This physical change confirms that copper ions (Cu^(2+)) have been reduced to solid copper (Cu).

• A distinct color change is also observed during the experiment: the characteristic blue color of the Copper Sulphate solution fades and gradually turns light green. This change is due to the formation of Iron (II) Sulphate (FeSO4), also known as Ferrous Sulphate.

Additional Information

• Understanding Other Reaction Types:

• Combination Reaction: A chemical change where two or more substances react to form a single new substance. A common example is the formation of water from hydrogen and oxygen gases.

• Double Displacement Reaction: This involves the mutual exchange of ions between two compounds to form two new compounds, often involving the formation of an insoluble precipitate.

• Decomposition Reaction: A process where a single complex compound breaks down into two or more simpler products, usually triggered by thermal, electrolytic, or photolytic energy.

• Reactivity Series Context:

• The Reactivity Series is an arrangement of metals in descending order of their reactivity. Metals like Potassium, Sodium, and Calcium are at the top, while noble metals like Gold and Platinum are at the bottom.

• Because Iron is higher than Copper in this series, the displacement is spontaneous. However, if a copper nail were placed in an iron sulphate solution, no reaction would occur.

Q49. Answer: (a) Kinetic Energy

The correct answer is Kinetic Energy.

Key Points

• When a rubber band is stretched, work is performed against the internal elastic forces of the material, and this work is stored as Elastic Potential Energy. This energy is a result of the change in the configuration or shape of the rubber molecules.

• The amount of stored energy is determined by Hooke’s Law and is calculated using the formula $1/2 \times k \times x^2$, where k is the spring constant and x is the extension from the equilibrium position.

• Upon release, the restoring force (defined as $F = -k \times x$) acts immediately to pull the rubber band back to its original relaxed state.

• As the rubber band snaps back, the stored potential energy is converted into Kinetic Energy, which is the energy an object possesses due to its motion.

• This transformation is a practical demonstration of the Law of Conservation of Energy, which dictates that energy cannot be created or destroyed but only changed from one form (potential) to another (kinetic).

• At the moment of maximum stretch, the potential energy is at its peak and kinetic energy is zero; at the moment of return to equilibrium, kinetic energy is at its peak while potential energy is zero.

Additional Information

• Chemical Energy

• It is the potential energy stored in the chemical bonds of atoms and molecules.

• It is released during chemical reactions, such as those found in batteries, food digestion, and the combustion of fuels.

• Hydraulic Energy

• This energy is captured from the pressure or flow of liquids, typically water.

• It is the fundamental principle behind hydroelectric power plants and hydraulic machinery used in construction.

• Geothermal Energy

• It is the heat energy generated and stored within the Earth's interior.

• It originates from the radioactive decay of isotopes and the primordial heat from the planet's formation, often harnessed via hot springs or steam.

Q50. Answer: (c) Schedule X

The correct answer is Schedule X.

Key Points

• Schedule X of the Indian Constitution, famously known as the Anti-Defection Law, was designed to curb the practice of political

defections that often led to instability in the executive branch.

• It was officially incorporated into the Constitution through the 52nd Constitutional Amendment Act, 1985, during the leadership of the Rajiv Gandhi government.

• The Schedule applies to members of both the Parliament (Lok Sabha and Rajya Sabha) and the State Legislatures (Legislative Assemblies and Councils).

• Disqualification occurs if a member voluntarily gives up the membership of their party, or if they vote or abstain from voting contrary to any direction (whip) issued by their political party without permission.

• The power to decide on questions of disqualification based on defection is vested in the Presiding Officer of the House, namely the Speaker or the Chairman.

• In the landmark Kihoto Hollohan v. Zachillhu case (1992), the Supreme Court affirmed that while the Presiding Officer has the power to decide, such decisions are subject to Judicial Review to prevent arbitrariness.

• The 91st Constitutional Amendment Act, 2003, further refined this law by stipulating that at least two-thirds of the members of a party must agree to a merger for it to be valid and avoid disqualification.

Additional Information

• Schedule IX:

• Introduced by the 1st Constitutional Amendment Act, 1951, to protect laws related to land reforms and abolition of the Zamindari system.

• It was initially intended to keep these laws immune from Judicial Review on the grounds of violating fundamental rights.

• Schedule XI:

• Added by the 73rd Constitutional Amendment Act, 1992, focusing on rural local self-governance.

• It contains 29 functional items placed under the jurisdiction of the Panchayati Raj Institutions as per Article 243-G.

• Schedule XII:

• Incorporated by the 74th Constitutional Amendment Act, 1992, focusing on urban local self-governance.

• It specifies 18 functional subjects that fall under the authority of Municipalities as per Article 243-W.

Q51. Answer: (b) IEEE 802.3

The correct answer is IEEE 802.3.

Key Points

• IEEE 802.3 is the globally recognized standard for Ethernet, which is the foundational technology used for wired Local Area Networks (LANs).

• It defines the specifications for the Physical Layer and the Media Access Control (MAC) sublayer of the Data Link Layer in the OSI model.

• First standardized in 1983 by the Institute of Electrical and Electronics Engineers (IEEE), it manages how data frames are transmitted over physical media like twisted-pair cables or fiber optics.

• The standard utilizes the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol to regulate data traffic and resolve transmission conflicts between devices on the same network segment.

• Modern versions of 802.3 support a wide range of speeds, including 10 Mbps (Standard Ethernet), 100 Mbps (Fast Ethernet), 1 Gbps (Gigabit Ethernet), and up to 400 Gbps for high-capacity data centers.

• It serves as the primary infrastructure for connecting hardware such as routers, switches, and workstations in corporate and home office environments.

Additional Information

• IEEE 802.11:

• This standard defines the protocols for Wireless Local Area Networks (WLANs), commonly known as Wi-Fi.

• It enables wireless communication over radio frequencies, typically in the 2.4 GHz, 5 GHz, or 6 GHz bands.

• IEEE 802.15:

• Specifies standards for Wireless Personal Area Networks (WPANs), focusing on short-range communication.

• Key sub-standards include 802.15.1 (Bluetooth) for peripheral connectivity and 802.15.4 (Zigbee) for low-power sensor networks.

• IEEE 802.16:

• Known as WiMAX (Worldwide Interoperability for Microwave Access), it is designed for Wireless Metropolitan Area Networks (WMANs).

• It provides broadband wireless access over long distances, often used as a last-mile alternative to cable or DSL.

Q52. Answer: (c) Manages which programs are allowed to start automatically when the user signs in

The correct answer is Manages which programs are allowed to start automatically when the user signs in.

Key Points

• The Startup apps tab in the Windows Task Manager is specifically designed to give users control over the software environment that initializes during the boot process. It allows users to toggle applications between Enabled and Disabled states to manage their automatic execution upon user authentication. Hence, the description of managing programs that start automatically is correct.

• Starting with Windows 8 and continuing through Windows 10 and Windows 11, Microsoft migrated these startup management features from the legacy System Configuration (msconfig) utility directly into the Task Manager for easier access.

• A vital feature of this tab is the Startup impact column, which calculates the CPU and disk usage of an application during the login phase, categorizing it as High, Medium, or Low.

• By disabling non-essential items in this tab, users can significantly reduce system boot time and free up Random Access Memory (RAM) and processing power for other tasks immediately after the desktop loads.

Additional Information

• Other Task Manager Tabs and Functions:

• Performance Tab: Monitors real-time hardware utilization, including CPU, Memory, Disk, Ethernet/Wi-Fi, and GPU metrics.

• Processes Tab: Displays a list of all currently active applications and background processes, allowing users to force-close unresponsive software via the End Task button.

• App History: Provides a historical overview of resource usage for Universal Windows Platform (UWP) apps, showing CPU time and network data consumption over a specific period.

• Users Tab: Shows the resource consumption for each logged-in user account, which is particularly useful on multi-user systems or servers.

• Details Tab: Offers a more technical view of running processes, including Process IDs (PIDs), Session IDs, and the ability to set CPU priority.

Q53. Answer: (b) dir /s

The correct answer is dir /s.

Key Points

• The dir command is the fundamental Command Line Interface (CLI) utility used in the Windows operating system and MS-DOS to list the contents of a directory.

• The /s switch is a recursive parameter that instructs the command to display every occurrence of the specified file name or file type within the current directory and all its subdirectories.

• When used together, dir /s allows a user to perform a comprehensive search across the entire file system or a specific drive branch without needing to manually open File Explorer.

• This command is frequently paired with wildcards (such as * or ?) to find files by extension, such as dir /s *.txt, which locates all text files in the directory tree.

• The output generated by this command provides essential file metadata, including the absolute file path, the file size in bytes, and the last modified date and time.

Additional Information

• Tasklist:

• This utility displays a comprehensive list of all running processes on a local or remote computer, including Process IDs (PIDs) and memory usage, rather than searching for files.

• chkdsk:

• Short for Check Disk, this command-line tool examines the integrity of the NTFS, FAT32, or exFAT file systems and can repair logical errors or locate bad sectors on a drive.

• Ping:

• A networking tool used to verify the connectivity and latency between two devices on an IP network by sending ICMP Echo Request packets.

Q54. Answer: (a) Baltic Sea

The correct answer is Baltic Sea.

Key Points

• On January 18, 2025, NATO (North Atlantic Treaty Organization) officially announced a significant surge in its military footprint across the Baltic Sea region. This move was a strategic reaction to a series of hybrid warfare incidents and the suspected sabotage of critical undersea infrastructure, including telecommunication cables and energy pipelines.

• The increased presence includes the deployment of additional Maritime Patrol Aircraft, Unmanned Underwater Vehicles (UUVs), and specialized naval vessels from the Standing NATO Maritime Groups to conduct 24/7 surveillance of the seabed.

• The primary objective of this mission is to enhance the Collective Defense of member states bordering the sea, specifically Finland, Estonia, Latvia, Lithuania, and Poland, who have reported frequent disruptions to their digital connectivity.

• This announcement followed high-level consultations at NATO Headquarters in Brussels, where officials emphasized that protecting Critical Undersea Infrastructure (CUI) is now a core priority for Transatlantic Security.

Additional Information

• Baltic Sea Strategic Importance:

• It serves as a vital corridor for Global Internet Traffic, housing cables like C-Lion1 and BCS East-West.

• The sea is often referred to as a NATO Lake following the recent accession of Finland and Sweden into the alliance.

• Other Maritime Regions:

• Black Sea: While highly militarized, current activities there are primarily linked to the Russia-Ukraine Conflict and the protection of Grain Corridors rather than new undersea infrastructure initiatives in early 2025.

• North Sea: Although critical for Offshore Wind Energy and gas, it was not the specific focus of the January 18 announcement.

• Mediterranean Sea: Focuses largely on Operation Sea Guardian and monitoring migration routes and the southern flank.

Q55. Answer: (c) Osmosis

The correct answer is Osmosis.

Key Points

• Osmosis is a specific type of passive transport where solvent molecules, primarily water, move through a semi-permeable membrane from a region of higher water concentration to a region of lower water concentration.

• In the soil-root system, the soil environment typically maintains a high water potential (low solute concentration), while the cytoplasm of the root hair cells has a low water potential due to the presence of dissolved sugars and salts.

• The plasma membrane of the plant cell serves as the selectively permeable barrier, allowing small water molecules to pass through while blocking the free passage of larger molecules or specific ions.

• This movement occurs spontaneously along the osmotic gradient and does not require the expenditure of metabolic energy (ATP), making it a crucial mechanism for maintaining turgor pressure in plant cells.

• The absorption of water via this method is the primary way terrestrial plants acquire the moisture necessary for photosynthesis and transpiration.

Additional Information

• Diffusion:

• It is the general movement of particles (atoms, ions, or molecules) from an area of higher concentration to an area of lower concentration.

• Unlike osmosis, it does not require a membrane and applies to gases and solutes as well as solvents.

• Active Transport:

• This process involves moving substances, such as mineral ions, across a cell membrane against a concentration gradient.

• It requires cellular energy and specific carrier proteins to function, allowing roots to accumulate nutrients even when soil concentrations are low.

• Plasmolysis:

• This is the shrinkage of the protoplast away from the cell wall due to the loss of water.

• It occurs when a plant cell is placed in a hypertonic solution, leading to water exiting the cell through exosmosis.

Q56. Answer: (c) 16%

The correct answer is 16%.

Key Points

• According to the World Bank assessment and data derived from the National Sample Survey (NSS), India experienced a significant reduction in poverty during the decade spanning 2004-05 to 2011-12.

• The rural poverty rate in India was estimated at approximately 41.8% in 2004-05 and declined to about 25.7% by 2011-12.

• The absolute reduction in the Poverty Headcount Ratio (PHR) for rural areas during this period reflects a decline of approximately 16.1 percentage points, which is rounded to 16% in various policy impact summaries.

• This decline is attributed to a period of inclusive growth, characterized by a rapid increase in real wages for unskilled labor and the diversification of the rural economy into non-farm sectors like construction.

• The World Bank highlighted that this reduction was faster than in previous decades, driven by better market integration and government-led social protection programs.

Additional Information

• Inclusive Growth Drivers:

• MGNREGA: The Mahatma Gandhi National Rural Employment Guarantee Act acted as a critical safety net, providing 100 days

of guaranteed wage employment to rural households.

• Agricultural Growth: Higher minimum support prices (MSPs) and improved agricultural productivity contributed to rising incomes for small-scale farmers.

• Infrastructure Development: Schemes like Pradhan Mantri Gram Sadak Yojana (PMGSY) improved rural-to-urban connectivity, facilitating better access to markets.

• Tendulkar Committee: Most of these statistics are aligned with the Tendulkar Methodology, which moved away from a calorie-based poverty line to one including health and education expenditures.

• Spatial Convergence: The data showed that poorer states like Bihar and Odisha also began to see a faster decline in poverty, reducing the gap with more developed states.

Q57. Answer: (d) INS Sahyadri

The correct answer is INS Sahyadri.

Key Points

• The 29th edition of the multilateral naval exercise Malabar 2025 took place from November 10 to 18, 2025, off the coast of Guam in the Western Pacific Ocean.

• The Indian Navy was represented by the indigenously designed and built guided-missile stealth frigate, INS Sahyadri.

• The high-intensity exercise brought together the maritime forces of the Quadrilateral Security Dialogue (Quad), consisting of India, the United States, Japan, and Australia, to enhance interoperability and regional security in the Indo-Pacific.

• Key operations of the drill included joint anti-submarine warfare, air-defense scenarios, live-fire gunnery serials, and maritime interdiction.

Additional Information

• INS Shivalik:

• It is the lead ship of the Shivalik-class stealth multi-role frigates built under Project 17 of the Indian Navy.

• Constructed by Mazagon Dock Shipbuilders Limited (MDL) in Mumbai, it was commissioned in April 2010.

• INS Vikrant:

• It is India's first indigenously designed and built aircraft carrier (IAC-1).

• Built by Cochin Shipyard Limited (CSL) in Kochi, it was commissioned in September 2022.

• INS Kolkata:

• It is the lead ship of the Kolkata-class stealth guided-missile destroyers built under Project 15A.

• Commissioned in August 2014, it is armed with BrahMos supersonic cruise missiles and Barak-8 long-range surface-to-air missiles.

Q58. Answer: (b) Creation of networks across economic, social, and geographic boundaries

The correct answer is Creation of networks across economic, social, and geographic boundaries.

Key Points

• Globalisation is a multi-dimensional process that involves the increasing interconnectivity and interdependence of nations, cultures, and economies worldwide.

• A primary feature is the transcendence of national boundaries, where economic activities are no longer confined to a single country but are spread across the globe through global supply chains.

• It facilitates the free movement of capital, goods, and services, often driven by Foreign Direct Investment (FDI) and the strategic operations of Multinational Corporations (MNCs).

• Beyond economics, it involves social and cultural integration, where ideas, values, and lifestyle choices are exchanged rapidly, leading to the concept of a Global Village.

• Technological advancements, particularly in Information and Communication Technology (ICT) and rapid transport systems, serve as the backbone for creating these expansive geographic networks.

Additional Information

• The pillars of modern globalisation include:

• Economic Liberalisation: The removal of government regulations and barriers like tariffs and quotas to encourage international trade.

• Privatisation: Reducing state ownership to allow private players to participate in global markets.

• World Trade Organization (WTO): An international body established in 1995 to oversee and liberalise global trade rules.

• Indian Context: India adopted comprehensive LPG (Liberalisation, Privatisation, and Globalisation) reforms in 1991 to integrate its economy with the global system, moving away from protectionist policies.

• Dimensions: It encompasses Political Globalisation (international cooperation), Economic Globalisation (market integration), and Cultural Globalisation (homogenization or hybridisation of cultures).

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Q59. Answer: (c) Samaveda

The correct answer is Samaveda.

Key Points

• The Samaveda is revered as the Veda of Melodies or the Veda of Chants. Its name is derived from the Sanskrit word Saman, which signifies a metrical hymn or musical melody.

• It is the foundational text of Indian Classical Music, as it provides the earliest known systematic arrangement of musical notes. The rhythmic and melodic chanting of its verses influenced the development of the Gandharva Veda (the Upaveda of music).

• The Samaveda consists of 1,875 verses, most of which are extracted from the Rigveda. These verses are specifically rearranged and musically adapted for the purpose of being sung during Yajnas (sacrificial rituals).

• During the performance of Vedic sacrifices, particularly the Soma sacrifice, these hymns are chanted by a specialized category of priests known as the Udgatr.

• The text is divided into two primary sections: the Archika, which contains the verse collection, and the Gana, which serves as the songbook providing the musical notations and melodies for the chants.

• The Samaveda introduced the concept of Saptaswara (the seven musical notes: Shadja, Rishabha, Gandhara, Madhyama, Panchama, Dhaivata, and Nishada), which remain the pillar of Indian music today.

Additional Information

• Rigveda:

• Recognized as the oldest of the four Vedas, dating back to approximately 1500–1200 BCE.

• It is a collection of 1,028 hymns (Suktas) organized into 10 Mandalas (books) dedicated to various Vedic deities.

• Yajurveda:

• Known as the Veda of Rituals, it contains prose mantras and instructions for the performance of religious ceremonies.

• It is divided into the Shukla Yajurveda (White) and the Krishna Yajurveda (Black).

• Atharvaveda:

• Known as the Veda of Magical Formulas, it focuses on the daily life and concerns of the common man.

• It contains spells, charms, and Ayurvedic medicinal information used to cure diseases and ward off evil spirits.

Q60. Answer: (b) Chausa

The correct answer is Chausa.

Key Points

• The Battle of Chausa was fought on June 26, 1539, at Chausa, situated on the banks of the Ganges river, near Buxar in present-day Bihar.

• This conflict marked the first major military defeat of the Mughal Emperor Humayun at the hands of the Afghan leader Sher Shah Suri (formerly known as Farid Khan).

• During the confrontation, Sher Shah utilized superior tactical maneuvers and launched a surprise night attack on the Mughal camp after a three-month-long standoff.

• The Mughal army was severely routed, and Humayun barely escaped drowning in the Ganges; he was saved by a water-carrier named Nizam.

• Following this victory, Sher Shah formally assumed the royal title of Sher Shah Sultan-e-Adil and struck coins in his own name, establishing himself as a formidable challenger to Mughal authority.

Additional Information

• Battle of Kannauj (1540):

• Also known as the Battle of Bilgram, this was the second major encounter between Humayun and Sher Shah.

• Humayun was decisively defeated again, leading to the collapse of the Mughal Empire for 15 years and forcing him into exile in Persia.

• Battle of Panipat:

• The First Battle of Panipat (1526) saw Babur defeat Ibrahim Lodi, marking the start of the Mughal era.

• The Second Battle of Panipat (1556) involved Akbar's forces defeating Hemu to reclaim the Mughal throne.

• Sher Shah Suri:

• He founded the Suri Dynasty and is renowned for administrative brilliance, including the introduction of the Rupia and the extension of the Grand Trunk Road.

Q61. Answer: (b) Article 243-W

The correct answer is Article 243-W.

Key Points

• Article 243-W of the Constitution of India deals with the powers, authority, and responsibilities of Municipalities.

• It was inserted into the Constitution by the 74th Constitutional Amendment Act, 1992, which added a new Part IXA.

• This Article empowers the State Legislature to enact laws that endow Municipalities with the necessary authority to function as institutions of self-government.

• It specifically authorises Municipalities to perform functions and implement schemes related to the matters listed in the Twelfth Schedule.

• The Twelfth Schedule comprises 18 functional items, including Urban Planning, regulation of land use, Water Supply, and Public Health.

• Under this provision, Municipalities are responsible for the preparation of plans for economic development and social justice within their jurisdiction.

Additional Information

• Article 243-Q:

• Concerns the Constitution of Municipalities.

• It defines three types of municipalities: Nagar Panchayats for transitional areas, Municipal Councils for smaller urban areas, and Municipal Corporations for larger urban areas.

• Article 243-ZC:

• Deals with the non-application of Part IXA to certain areas.

• It specifies that the provisions do not automatically apply to Scheduled Areas and Tribal Areas referred to in Article 244.

• Article 243-P:

• Serves as the Definitions section for Part IXA.

• It provides legal definitions for terms like Committee, District, Metropolitan area, and Municipal area.

Q62. Answer: (b) Farwiza Farhan

The correct answer is Farwiza Farhan.

Key Points

• Farwiza Farhan is a prominent Indonesian forest conservationist and environmental activist who was named one of the recipients of the 2024 Ramon Magsaysay Award.

• She is the co-founder of Hutan, Alam dan Lingkungan Aceh (HaKA), a non-profit organization based in Aceh province, Sumatra, dedicated to the protection of the Leuser Ecosystem.

• The Leuser Ecosystem is a UNESCO World Heritage site and one of the most ancient and biodiverse rainforests in Southeast Asia, being the only place on Earth where tigers, rhinos, elephants, and orangutans coexist in the wild.

• Farhan is recognized for her leadership in legal advocacy and grassroots mobilization to prevent illegal logging, mining, and palm oil expansion within protected forest areas.

• The Ramon Magsaysay Award Foundation honored her for her Emergent Leadership, highlighting her unwavering courage in protecting the environment and the livelihoods of local communities.

Additional Information

• The other 2024 winners include:

• Karma Phuntsho: A former monk and scholar from Bhutan who founded the Loden Foundation to promote Bhutanese culture and social entrepreneurship.

• Hayao Miyazaki: The legendary Japanese animator and co-founder of Studio Ghibli, recognized for his artistic excellence and themes of environmentalism and humanity.

• Dr. Nguyen Thi Ngoc Phuong: A physician from Vietnam honored for her lifelong dedication to providing medical care and seeking justice for the victims of Agent Orange.

• Rural Doctors Movement: A collective from Thailand recognized for their service in improving healthcare accessibility in rural regions.

• The Ramon Magsaysay Award, established in 1957, is considered the Nobel Prize of Asia and is named after the seventh president of the Philippines.

Q63. Answer: (d) National Bank for Agriculture and Rural Development (NABARD)

The correct answer is National Bank for Agriculture and Rural Development (NABARD).

Key Points

• The National Bank for Agriculture and Rural Development (NABARD) has partnered with the Internet and Mobile Association of India (IAMAI) to spearhead the Earth Summit 2025-26 initiative.

• The primary objective of this collaboration is to foster rural innovation by providing a platform for startups and entrepreneurs to showcase technology-driven solutions for the rural ecosystem.

• The summit focuses on critical sectors such as Agri-Fintech, Climate-tech, and Sustainability, aiming to bridge the digital divide between urban and rural India.

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• By leveraging IAMAI's network of digital companies and NABARD's deep-rooted presence in the rural financial sector, the initiative seeks to promote the United Nations Sustainable Development Goals (SDGs).

• The Earth Summit serves as a catalyst for policy advocacy and investment, ensuring that innovative models for resource management and agricultural productivity receive the necessary financial and mentorship support.

Additional Information

• Small Industries Development Bank of India (SIDBI):

• Established on April 2, 1990, under an Act of the Indian Parliament.

• Acts as the principal financial institution for the promotion, financing, and development of the Micro, Small, and Medium Enterprises (MSME) sector.

• Export-Import Bank of India (EXIM):

• Established in 1982 under the Export-Import Bank of India Act.

• Functions as a specialized financial institution to coordinate the working of institutions engaged in financing international trade.

• National Rural Livelihood Mission (NRLM):

• Launched by the Ministry of Rural Development in 2011 (later renamed DAY-NRLM).

• Focused on poverty alleviation through the creation of Self-Help Groups (SHGs) and enhancing the livelihood opportunities of the rural poor.

Q64. Answer: (c) Z-Morh tunnel

The correct answer is Z-Morh tunnel.

Key Points

• The Z-Morh tunnel is a strategic 6.5 km long road tunnel located in the Ganderbal district of Jammu and Kashmir, designed to provide all-weather connectivity between Srinagar and Sonamarg.

• The tunnel is constructed on the Srinagar-Leh Highway (NH-1) and was officially inaugurated in January 2026 to bypass the treacherous Z-Morh (Z-curve) stretch, which remains closed during winters due to heavy snowfall and avalanches.

• Situated at an altitude of approximately 2,637 meters, it ensures that the tourist destination of Sonamarg remains accessible throughout the year, boosting the local economy and tourism sector.

• The project includes a main tunnel and a parallel escape tunnel, featuring advanced Integrated Fire Control systems, automated ventilation, and CCTV monitoring for passenger safety.

• Strategically, the tunnel serves as a vital precursor to the Zojila Tunnel, facilitating smoother movement for defense forces and logistics towards the Ladakh region regardless of weather conditions.

Additional Information

• Atal Tunnel:

• Located in Himachal Pradesh, it spans 9.02 km and connects Manali to the Lahaul-Spiti valley.

• It is the world's longest highway tunnel above an altitude of 10,000 feet and was inaugurated in October 2020.

• Pir Panjal Tunnel:

• This refers to the 11.2 km long railway tunnel on the Banihal-Qazigund section of the USBRL project.

• It pierces through the Pir Panjal Range and is currently the longest transportation railway tunnel in India.

• Nehru Tunnel (Jawahar Tunnel):

• Constructed in the 1950s, this 2.85 km tunnel connects Banihal and Qazigund across the Banihal Pass.

• It was the primary all-weather link between the Kashmir Valley and the rest of India before the completion of the Banihal-Qazigund Road Tunnel.

Q65. Answer: (a) Harsh climate, poor soil, few roads

The correct answer is Harsh climate, poor soil, few roads.

Key Points

• Physical factors like Harsh climate (extreme cold or extreme heat) significantly deter human settlement because they make living conditions uncomfortable and increase the cost of survival. Areas like the Sahara Desert or the Himalayas exhibit low density due to these climatic extremes.

• Poor soil fertility, often found in rocky terrains or areas with high acidity/alkalinity, prevents the development of agriculture. Since food production is the primary driver of settlement, regions with infertile soil cannot support large populations, leading to sparse habitation.

• Socio-economic factors such as infrastructure development play a crucial role; the presence of few roads indicates poor connectivity and isolation. Areas lacking transportation networks struggle with the delivery of essential services and trade, making them unattractive for dense population growth.

• The combination of these three factors creates an environment where carrying capacity is extremely low, meaning the land can

only support a very limited number of people per square kilometer.

Additional Information

• Factors Contributing to High Population Density:

• Geographical Factors: River valleys (like the Ganges and Nile) provide fresh water and alluvial soil, which are perfect for intensive farming.

• Topographical Factors: Flat terrain or plains facilitate the construction of buildings, factories, and extensive transportation networks.

• Economic Factors: The availability of urban jobs, industrialization, and educational institutions acts as a pull factor, attracting migrants to cities.

• Social Factors: Access to health clinics, schools, and sanitation systems improves the quality of life, leading to higher concentrations of people in urban centers.

• Population Density: Defined as the ratio between the total population and the total land area, it is a key metric in demography used to analyze the distribution of human life across the globe.

Q66. Answer: (d) Article 85

The correct answer is Article 85.

Key Points

• Article 85 of the Indian Constitution provides the legal framework for the sessions of Parliament, including their summoning, prorogation, and dissolution.

• The President of India is vested with the authority to summon each House of Parliament (the Lok Sabha and the Rajya Sabha) to meet at such time and place as they think fit.

• A mandatory constitutional requirement under Article 85(1) is that six months shall not intervene between the last sitting of one session and the date appointed for the first sitting of the next session, ensuring regular legislative functioning.

• Under Article 85(2)(a), the President has the power to prorogue either House, which effectively ends a session of Parliament without dissolving the house itself.

• Under Article 85(2)(b), the President possesses the power to dissolve the House of the People (Lok Sabha), usually on the advice of the Council of Ministers headed by the Prime Minister.

• It is important to note that while the Lok Sabha can be dissolved, the Rajya Sabha is a Permanent House and is not subject to dissolution as per the provisions of Article 83.

Additional Information

• Article 79:

• This article specifies the Constitution of Parliament, declaring that there shall be a Parliament for the Union consisting of the President and two Houses.

• The two houses are the Council of States (Rajya Sabha) and the House of the People (Lok Sabha).

• Article 87:

• This pertains to the Special Address by the President.

• The President must address both Houses of Parliament assembled together at the commencement of the first session after each General Election and at the commencement of the first session of each year.

• Article 108:

• Provides for a Joint Sitting of both Houses in certain circumstances, such as when there is a deadlock over the passage of an Ordinary Bill.

• The President summons the Joint Sitting, which is presided over by the Speaker of the Lok Sabha.

Q67. Answer: (c) A panel of MPs selected by the House or Speaker

The correct answer is A panel of MPs selected by the House or Speaker.

Key Points

• A Parliamentary Committee is defined under the Rules of Procedure and Conduct of Business as a committee that is appointed or elected by the House (Lok Sabha or Rajya Sabha) or nominated by the Speaker or the Chairman.

• The committee must consist of Members of Parliament (MPs) and functions under the direct authority and direction of the Presiding Officer of the respective House.

• These committees are essential because Parliament has a vast volume of work and limited time; hence, detailed scrutiny of legislation and executive actions is delegated to these smaller bodies.

• A crucial criterion for a body to be recognized as a parliamentary committee is that its Secretariat must be provided by the Lok Sabha Secretariat or the Rajya Sabha Secretariat.

• The committee presents its reports either to the House or to the Speaker/Chairman, ensuring accountability of the executive to the legislature.

Additional Information

• Types of Parliamentary Committees:

• Standing Committees: Permanent bodies constituted periodically (usually annually) like the Public Accounts Committee, Estimates Committee, and Committee on Public Undertakings.

• Ad Hoc Committees: Temporary committees appointed for a specific task, such as Select Committees or Joint Committees on specific Bills, which dissolve after submitting their report.

• Financial Committees:

• Public Accounts Committee (PAC): Consists of 22 members (15 from Lok Sabha, 7 from Rajya Sabha) and examines the reports of the Comptroller and Auditor General (CAG).

• Estimates Committee: The largest committee with 30 members, all exclusively from the Lok Sabha, focusing on efficiency in public expenditure.

• Exclusions:

• A committee formed by the President (like a Commission of Inquiry) is an Executive Committee, not a Parliamentary one.

• Judicial panels or committees of civil servants (departmental committees) do not fall under the legislative oversight framework of Parliament.

Q68. Answer: (b) Shah Mal

The correct answer is Shah Mal.

Key Points

• Shah Mal was a prominent local leader during the Revolt of 1857, hailing from the village of Bijraul in pargana Barout, located in the present-day Baghpat district of Uttar Pradesh.

• He belonged to a large clan of Jat cultivators whose kinship ties extended over a region known as the Chaurasi Des (84 villages).

• During the uprising, he successfully mobilized the villagers of Barout and the surrounding areas to challenge British colonial authority by disrupting their logistics and communications.

• He was instrumental in destroying the bridge over the Yamuna river and digging up metalled roads to prevent the movement of British troops and supplies toward Delhi.

• Shah Mal established a localized administrative system, turning a merchant's bungalow into a 'hall of justice' where he settled disputes and organized the collection and distribution of food for the mutineers in Delhi.

• He died in combat in July 1857 while fighting against British forces led by officer Dunlop; his body was reportedly mutilated by the British to instill fear among the local population.

Additional Information

• Birjis Qadr:

• The young son of Nawab Wajid Ali Shah, he was proclaimed the Nawab of Awadh by the rebels in Lucknow.

• His mother, Begum Hazrat Mahal, managed the affairs of the state and led the resistance against the British in Lucknow until its fall in 1858.

• Nana Sahib:

• The adopted son of Peshwa Baji Rao II, he led the 1857 Revolt in Kanpur after being denied his pension under the Doctrine of Lapse.

• He worked alongside his general Tantia Tope and Azimullah Khan to challenge the British garrison at Kanpur.

• Gonoo:

• A significant tribal leader of the Kol community in Singhbhum (Chotanagpur region) who led a fierce tribal resistance during the 1857 uprising.

• He mobilized the Ho and Kol tribes to fight against the British and their local collaborators.

Q69. Answer: (a) Recapturing key centres, enacting new laws, and offering rewards to loyal chiefs.

The correct answer is Recapturing key centres, enacting new laws, and offering rewards to loyal chiefs..

Key Points

• Military Reinforcements and Recapture: To suppress the Revolt of 1857, the British government brought military reinforcements from England. They launched a focused offensive on major rebel hubs, successfully recapturing Delhi in September 1857. The Mughal Emperor Bahadur Shah Zafar was subsequently captured, tried, and exiled to Rangoon.

• Legislative Crackdown: The British enacted new laws designed to bypass standard judicial procedures. These laws empowered military officers and administrators to conduct summary trials, making it significantly easier to convict and execute suspected rebels and their sympathizers.

• Incentivizing Loyalty: Recognizing the influence of local elites, the British announced rewards and guarantees for loyal landholders (Zamindars). They were assured that if they had not participated in the killing of British officials, they would be allowed

to retain their traditional rights over their lands and estates.

Additional Information

• Fall of Major Resistance Hubs:

• Lucknow was recaptured by the British in March 1858, effectively breaking the rebel hold in Awadh.

• Jhansi fell in June 1858 following the defeat and death of Rani Lakshmibai, who had become a symbol of resistance.

• End of Company Rule: The failure of the East India Company to prevent the uprising led to the Government of India Act 1858, which transferred administrative power directly to the British Crown.

• Shift in Annexation Policy: To prevent future mutinies among Indian royals, the British abandoned the Doctrine of Lapse and issued a Proclamation ensuring that Indian states would no longer be annexed, provided they accepted the Queen of England as their Sovereign Paramount.

Q70. Answer: (a) Law of Conservation of Mass

The correct answer is Law of Conservation of Mass.

Key Points

• The Law of Conservation of Mass states that mass in an isolated system is neither created nor destroyed by chemical reactions or physical transformations.

• According to this law, the total mass of the reactants must be equal to the total mass of the products in a chemical reaction.

• The French chemist Antoine Lavoisier formulated this principle in 1789, which is why he is often referred to as the Father of Modern Chemistry.

• At a molecular level, this occurs because atoms are merely rearranged during a chemical reaction; the total number of atoms of each element remains constant, thus preserving the overall mass.

• For example, in the combustion of methane, the sum of the masses of methane and oxygen consumed will exactly equal the sum of the masses of carbon dioxide and water vapor produced.

Additional Information

• Law of Definite Proportions (also known as Law of Definite Composition):

• Proposed by Joseph Proust in 1799.

• It states that a chemical compound always contains its component elements in a fixed ratio by mass, regardless of the source or method of preparation.

• For instance, pure water will always contain 88.8% oxygen and 11.2% hydrogen by mass.

• Law of Periodicity:

• Refers to the recurring variation in element properties with increasing atomic number.

• This principle is the basis of the Modern Periodic Table, where elements with similar chemical behaviors are placed in the same vertical groups.

Q71. Answer: (c) One

Given: U N E H W Y B X P E L Q R C G R U A Z R U

Required Condition: Vowel → Vowel → Consonant

(Left) U N E H W Y B X P E L Q R C G R U A Z R U (Right).

There is only One such vowel in the series that satisfies the given condition: U A Z

Hence, the correct answer is "Option 3"

Q72. Answer: (a) BDB 57

The logic follows here,

Combining both parts, the next cluster in the series is BDB 57.

Hence, the correct answer is "option 1"

Q73. Answer: (b) 6

The logic follows here,

Thus, the code for S is 6.

Hence, the correct answer is "option 2"

Q74. Answer: (b) NG −11

The logic follows here,

SF 19 is related to VA 6,

GG 16 is related to JB 3,

Applying to the same logic KL 2 related to,

Hence, KL 2 is related to NG − 11 following the same logic.

Hence, the correct answer is 'Option 2'.

Q75. Answer: (c) CBY

The logic follows here,

QOM,

MKI,

CBY,

BZX,

Therefore, the letter cluster that is different from the others is CBY.

Hence, the correct answer is "Option 3"

Q76. Answer: (c) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:

(I) No iron is a phone - Doesn't follow (Some iron is a phones and some phones is a iron)

(II) Some phones are vaults - Doesn't follow (Their is no direct relation between phones and vaults may be it is possible but not definite. Hence, it is false)

Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 3."

Q77. Answer: (d) One

Given: Seven people, U, T, E, N, S, I, and L, are sitting in a row, facing the north.

1. Only two people sit to the left of N.
2. Only three people sit between N and S.
3. Only one person sits between S and E.
4. I sits to the immediate left of L.
5. U is not an immediate neighbor of S

The Final Arrangement is,

Therefore, only one person sits to the right of T.

Hence, the correct answer is " Option 4"

Q78. Answer: (c) Only conclusion (I) follows

The least possible Venn diagram for the given statements is:

(I) No Vanadium is Cobalt - Follows

(Their is no direct relation between cobalt and vanadium may be it is possible but not definite. Hence, it is false)

(II) Some Vanadium is Cobalt - Doesn't follow

(Their is no direct relation between cobalt and vanadium may be it is possible but not definite. Hence, it is false)

Only conclusion (I) follows.

Hence, the correct answer is " Option 3"

Q79. Answer: (c) LJM

The logic followed here is,

Logic: Second letter = First letter − 3; Third letter = First letter + 1.

For XUY,

For NKO,

For ROS,

For LJM,

This letter cluster does not follow the rule.

Therefore, the letter cluster that is different from the others is LJM.

Hence, the correct answer is 'Option 3'.

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Q80. Answer: (a) 166

The pattern is as follows:

• 10 + 9 = 19

• 19 + 17 = 36

• 36 + 22 = 58

• 58 + 30 = 88

• 88 + 35 = 123

• 123 + 43 = 166

Thus, the missing term in the series is 166.

Hence, the correct answer is 'Option 1';

Q81. Answer: (a) 7

BODMAS Table:

According to the given information:

Letter	A	B	C	D
Sign	÷	×	•	−

Given Expression: 1 D 40 A 7 B 7 C 46 = ?

Replacing the letters with signs and using the BODMAS rule:

= 1 − 40 ÷ 7 × 7 + 46

= 1 − 40 + 46

= 1 + 46 − 40

= 47 − 40

= 7

Hence, the correct answer is "option 1"

Q82. Answer: (c) QUO

The logic follows here,

Logic: First letter + 4 = Second letter; Second letter + 2 = Third letter.

For SWY,

For NRT,

For QUO,

For JNP,

Therefore, the letter cluster that is different from the others is QUO.

Hence, the correct answer is 'Option 3'.

Q83. Answer: (d) R

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

1. N is kept fourth from the top.

2. Only P is kept above M.

3. Q is kept on one of the positions after M but on one of the positions before N.

Position	Box
7	P
6	M
5	Q
4	N
3	
2	
1	

1. Only two boxes are kept between N and S.

2. O is kept immediately above S.
3. R is kept at the only remaining position.
Final Arrangement:

7	P
6	M
5	Q
4	N
3	R
2	O
1	S

Thus, the box at the third position from the bottom is R.
Hence, the correct answer is 'Option 4'.

Q84. Answer: (c) (212, 206, 194)

The logic followed here is:
Logic: Second Number = First Number − 6; Third Number = Second Number − 12
For the first set (53, 47, 35)
=> 53 − 6 = 47
=> 47 − 12 = 35.
For the second set (117, 111, 99)
=> 117 − 6 = 111
=> 111 − 12 = 99.
Applying the same logic to the set in Option 3
(212, 206, 194)
=> 212 − 6 = 206
=> 206 − 12 = 194.
Hence, the correct answer is 'Option 3'.

Q85. Answer: (a) IEB 65

The logic follows here,
The cluster that completes the series is IEB 65.
Hence, the correct answer is "option 1"

Q86. Answer: (a) Daughter's husband

The family tree diagram is
Therefore, M is the husband of J, who is the daughter of G → M is the Daughter's husband of G.
Hence, the correct answer is 'Option 1'.

Q87. Answer: (b) L

Given: Seven boxes, G, H, I, J, K, L and M, are kept one over the other, but not necessarily in the same order.
1. I is kept third from the top.
2. Only K is kept below J.
3. Only three boxes are kept between M and J.

Position	Box
7	
6	M
5	I
4	

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3	
2	J
1	K

1. Only M is kept between H and I.
2. G is kept at one of the positions below M but not immediately above J.

Final Arrangement:

7	**H**
6	M
5	I
4	G
3	L
2	J
1	K

Thus, the box kept third from the bottom is L.

Hence, the correct answer is 'Option 2'.

Q88. Answer: (d) 60

Observe the series by separating the odd and even positions.

Odd Position Series: 4, 8 ,16, 32

Pattern:

• 4 × 2 = 8

• 8 × 2 = 16

• 16 × 2 = 32

Even Position Series: 4, 12, 28, ?

Pattern:

• 4 × 2 + 4 = 12

• 12 × 2 + 4 = 28

• 28 × 2 + 4 = 60

Thus, the missing term in the series is 60.

Hence, the correct answer is 'Option 4';

Q89. Answer: (d) BOYB

The logic follows here,

For 'FACN' related to 'LFIS':

For 'DUAH' related to 'JZGM':

Applying the same logic to 'VJSW':

Thus, VJSW is related to BOYB.

Hence, the correct answer is 'Option 4'.

Q90. Answer: (b) 14

The logic follows here,

Given Word: HARMFUL

Arrange the letters of HARMFUL in alphabetical order.

Original Word	**H**	**A**	**R**	**M**	**F**	**U**	**L**
Alphabetical Order	A	F	H	L	M	R	U

Given Word = A F H L M R U

Left A F H L M R U Right

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• Second from the left = F

• First from the righht = U

The 14 letters between F and U are: G, H, I, J, K, L, M, N, O, P, Q, R, S, and T.

Hence, the correct answer is "option 2"

Q91. Answer: (a) 4 and 5

BODMAS Table:

The logic followed here is to interchange the given numbers and verify the equation using the BODMAS rule.

Given equation: (21 × 2) ÷ 3 + 15 × 5 − 19 × 4 + 36 + 7 × 6 = 57

For Option (1): Interchanging 4 and 5

After interchanging numbers 4 and 5, the equation becomes:

(21 × 2) ÷ 3 + 15 × 4 − 19 × 5 + 36 + 7 × 6 = 57

• LHS = (42) ÷ 3 + 15 × 4 − 19 × 5 + 36 + 7 × 6

• LHS = 14 + 15 × 4 − 19 × 5 + 36 + 42

• LHS = 14 + 60 + 36 + 42 − 95

• LHS = 74 + 36 + 42 − 95

• LHS = −21 + 36 + 42

• LHS = 15 + 42

• LHS = 57

Comparing LHS with Right Hand Side (RHS):

• 57 = 57

• LHS = RHS

Hence, the correct answer is "option 1"

Q92. Answer: (a) 71 km towards east

• Tanmay starts from Point Y and drives 23 km towards West. He then takes a right turn, drives 63 km, turns right and drives 31 km.

• He then takes a right turn and drives 27 km.

• He takes a right turn, drives 79 km.

• He then turns left, drives 36 km to stop at Point Z

The Final Diagram,

The shortest distance is 71 km and the direction is East.

Hence, the correct answer is "Option 1"

Q93. Answer: (d) G

Gievn: Seven people A, B, C, D, E, F and G are sitting around a circular table facing towards the centre of the table.

1. E sits second to the left of F.

2. A is sitting immediately between B and C.

3. D sits to the immediate right of C.

The Final Arrangement is,

The person sitting immediately between them at pos(2) is G.

Hence, the correct answer is 'Option 4'.

Q94. Answer: (a) Mother's sister

Let us first decode the given symbols and then draw a family tree.

Symbol	**?**	**@**	**:**	**•**
Meaning	Wife	Mother	Father	Daughter

Given : M + A @ R ? C : H

Therefore, M and R are sisters, and R is the mother of H → M is the Mother's sister of H.

Hence, the correct answer is 'Option 1'.

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Q95. Answer: (d) 28

BODMAS Table:

Letter	Operator
P	×
Q	÷
R	−
S	•

Given Expression:(96 Q 12) P 5 S (42 Q 7) P 8 R 12 P 5 = ?

After replacing the letters and applying the BODMAS rule:

= (96 ÷ 12) × 5 + (42 ÷ 7) × 8 − 12 × 5

= 8 × 5 + 6 × 8 − 12 × 5

= 40 + 48 − 60

= 88 − 60

= 28

Hence, the correct answer is "Option 4"

Q96. Answer: (b) More than two

Given: (left) 9 3 1 2 6 8 4 5 3 9 7 2 4 5 1 8 2 3 5 9 8 5 7 3 5 6 (right)

Required Conditions: Even Digit - Odd Digit - Odd Digit.

(left) 9 3 1 2 6 8 4 5 3 9 7 2 4 5 1 8 2 3 5 9 8 5 7 3 5 6 (right)

4 5 3 4 5 1 2 3 5

Hence, the correct answer is 'Option 2'.

Q97. Answer: (b) 91

The logic followed here is:

• Rank of Raman from the top = 25^(th)

• Rank of Raman from the bottom = 67^(th)

Total number of students = (Rank from the Top + Rank from the Bottom) − 1

= (25 + 67) − 1

= 92 − 1

= 91

There are 91 students in the class.

Hence, the correct answer is 'Option 2'.

Q98. Answer: (b) 4

The logic followed here is:

Therefore, the code for the letter 'T' is 4.

Hence, the correct answer is "option 2."

Q99. Answer: (a) KITE - IETK - ETIK

The Logic followed here is:

Logic: Each group of letters in the triad is formed by rearranging the letters of the first word based on their positions.

For MEGA − EAGM − AGEM,

For TONS − OSNT − SNOT

Applying the same logic for KITE − IETK − ETIK:

Hence, the correct answer is "option 1"

Q100. Answer: (d) TV1

The logic follows here,

Combining the results, the missing cluster is TV1.

Hence, the correct answer is "Option 4".

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