RRB NTPC (UG) CBT-I Official Paper (Held On 08 May, 2026 Shift 3) (Previous Year Paper)

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

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MATHEMATICS

Q1. Pipes A and B together can fill a cistern in 10 hours. Pipes B and C together can fill the same cistern in 20 hours, and pipes C and A together can fill it in 12 hours. Find the time taken by pipe B alone to fill the cistern.

(a) 24 hours
(b) 25 hours
(c) 28 hours
(d) 30 hours

Q2. A shopkeeper offers the following schemes on toys of the same marked price.

(A) Successive discounts of 21% and 8% on any number of toys bought.

(B) Successive discounts of 38%, 42% and 30% on any number of toys bought.

(C) 17% discount on the first 8 toys and 20% discount on each toy thereon.

(D) 7 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) A
(b) B
(c) C
(d) D

Q3. Simplify: $(0.25 \times 1.6) \div (0.04 \times 0.5)$

(a) 10
(b) 8
(c) 2
(d) 20

Q4. A delivery van covers the first 100 km at 50 km/h, the next 150 km at 60 km/h, and the last 50 km at 40 km/h. What is the average speed for the entire journey (correct to two places of decimal)?

(a) 52.17 km/h
(b) 48.29 km/h
(c) 50.05 km/h
(d) 54.54 km/h

Q5. A trader buys a consignment of goods for Rs. 2400. He sells one-third of the goods at a 20% profit, and one-fourth of the goods at a 10% loss, and the remaining goods at cost price. What is the overall profit or loss percentage?

(a) 4 1/5 %loss
(b) 4 1/6 % loss
(c) 4 1/5 % profit
(d) 4 1/6 % profit

Q6. Three numbers are in the ratio 3 : 7 : 2, and their LCM is 8820. Their HCF is:

(a) 240
(b) 210
(c) 235
(d) 208

Q7. If the interest on a sum of Rs. y at 4% per annum compounded annually for 2 years is Rs. 765, then the total amount payable at the end of the two-year period will be _____.

(a) Rs. 10,351
(b) Rs. 10,140
(c) Rs. 10,210
(d) Rs. 10,115

Q8. Sangeeta's salary is revised twice in two consecutive years. In the first year, the salary is increased by 12%. In the second year, it is decreased by 10%. Despite this, her salary after the second revision is Rs. 1,584 more than the original salary. What is Sangeeta's original monthly salary (in Rs.)?

(a) 1,75,000
(b) 1,98,000
(c) 1,89,000
(d) 2,00,000

Q9. In a college, the ratio of science to arts students is different for each of its three batches. In Batch A, the ratio is 5:8, in Batch B it is 7:11, and in Batch C it is 3:5. Which batch has the highest proportion of science students?

(a) Batch B
(b) All have the same proportion
(c) Batch A
(d) Batch C

Q10. If a man bought an article at 20% less than its marked price and sold it for Rs. 10 more than its marked price, his profit was 40%. What was the marked price (in Rs.) of the article (correct to two decimal places)?

(a) Rs. 86.66
(b) Rs. 83.33
(c) Rs. 73.33
(d) Rs. 76.66

Q11. A and B can do a piece of work in 12 days and 39 days, respectively. Both work for 4 days and then A leaves. How long (in days) will B take to complete the remaining work?

(a) 21
(b) 22
(c) 24
(d) 23

Q12. The amount under simple interest on a sum of Rs. 8,000 for 3 years at an interest rate of 7.5% per annum is

(a) Rs. 9800
(b) Rs. 10000
(c) Rs. 9400
(d) Rs. 9600

Q13. Which of the following ratios is equal to 3:2?

(a) 60:45
(b) 45:20
(c) 35:25
(d) 120:80

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Q14. A ladder leans against a wall, making an angle of 60° with the ground. If the foot of the ladder is 15 metres from the wall, what is the length of the ladder?

(a) 42 m
(b) 36 m
(c) 32 m
(d) 30 m

Q15. A train covers a distance of 300 kilometers in 5 hours. If the same train takes 6 hours to cover the same distance, what is the change in its speed?

(a) 15 km/h increase
(b) 15 km/h decrease
(c) 10 km/h increase
(d) 10 km/h decrease

Q16. Which of the following numbers is divisible by 11?

(a) 3,762
(b) 7,393
(c) 4,915
(d) 6,184

Q17. Evaluate $23^3 + (-14)^3 + (-9)^3$

(a) 8581
(b) 8502
(c) 8694
(d) 8498

Q18. A spherical water tank has an internal diameter of 10 meters. If the tank is coated with a material that costs Rs. 5 per square meter, what is the total cost to coat the entire internal surface? (Use $\pi = 3.14$)

(a) Rs. 1570
(b) Rs. 314
(c) Rs. 1257
(d) Rs. 785

Q19. The population of a town increases by 10% in the year 2015 and decreases by 15% in the year 2016. If the population of the town at the end of the year 2016 is 1,87,000, find the population of the town in the beginning of the year 2015.

(a) 2,15,000
(b) 2,00,000
(c) 1,95,000
(d) 2,10,000

Q20. In ΔXYZ, XY = XZ and angle X = 40°, what is the measure of angle Z?

(a) 80°
(b) 40º
(c) 60º
(d) 70°

Q21. A pair of shoes is marked at Rs. 2800 and is subject to a trade discount of 18%. Under a special offer, a customer buys 5 pairs at the discounted price and gets an additional 2 pairs at 50% off the discounted price. Find the total cost to the customer for 7 pairs of shoes.

(a) Rs. 13,676
(b) Rs. 13,776
(c) Rs. 13,876
(d) Rs. 13,667

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Q22. The present age of Person A is 5 years more than twice the age of Person B. If Person B is 15 years old, what is the present age (in years) of Person A?

(a) 33
(b) 32
(c) 35
(d) 34

Q23. Simplify: {16/36 ÷ 16/4} ÷(2/7 × 14/6+5/12)+4/7 ÷ 39/12 of 12/7

(a) 8/39
(b) -1/43
(c) 7/33
(d) 12/47

Q24. Simplify: (5^(3x) × (5²)^((x-1)))/(5^(4x-1))

(a) 5^(1- x)
(b) 5^(x-1)
(c) 5^(x-3)
(d) 5^(x+1)

Q25. The average monthly income of six employees in an office is Rs. 24,000. When a new employee joins the office, the average income of all seven employees becomes Rs. 25,500. What is the monthly income of the new employee?

(a) Rs. 33,500
(b) Rs. 33,000
(c) Rs. 34,500
(d) Rs. 34,000

Q26. In a division sum, the divisor is 14 times the quotient and 5 times the remainder. If the remainder is 56, what is the dividend?

(a) 5656
(b) 5653
(c) 5651
(d) 5655

Q27. Sphere A has a radius of 6 cm and Sphere B has a radius of 3 cm. What is the ratio of the surface area of A to that of B?

(a) 4:1
(b) 6:1
(c) 2:1
(d) 3:1

Q28. Eight mangoes and five oranges cost Rs. 164, while five mangoes and eight oranges cost Rs. 148. Determine the cost of three mangoes and three oranges.

(a) Rs. 70
(b) Rs. 76
(c) Rs. 72
(d) Rs. 74

Q29. The mean of the following data is 12.5. Find the missing frequency p.

Data Values (x): 10, 15

Frequency (f): 5, p

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

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Q30. If the third proportional to 4 and 20 is m and the third proportional to m and 50 is n, what is the value of n?

(a) 28
(b) 25
(c) 20
(d) 24

GENERAL AWARENESS

Q31. In which state of India are the three crops of rice — called ‘aus,’ ‘aman,’ and ‘boro’ — grown?

(a) Manipur
(b) Bihar
(c) West Bengal
(d) Nagaland

Q32. Which national statistical organization is being changed by the Indian government's September 2025 draft bill ahead of its centenary?

(a) National Sample Survey Office (NSSO)
(b) Ministry of Statistics & Programme Implementation (MoSPI)
(c) Indian Statistical Institute (ISI)
(d) Central Statistics Office (CSO)

Q33. Which of the following Union Territories of India was granted legislature through the Government of Union Territories Act, 1963?

(a) Chandigarh
(b) Delhi
(c) Puducherry
(d) Andaman & Nicobar

Q34. Hampi, a UNESCO World Heritage Site, was the capital of which empire?

(a) Vijayanagara Empire
(b) Gupta Empire
(c) Mughal Empire
(d) Maurya Empire

Q35. Which software type helps the operating system to manage hardware and provide services to applications?

(a) Utility software
(b) Application software
(c) System software
(d) Driver software

Q36. Which function of the Operating System deals with allocation of CPU time among different running processes?

(a) File Management
(b) Device Management
(c) Process Management
(d) Memory Management

Q37. Which mode of transport is most suitable for transporting heavy, bulky goods over long distances in India?

(a) Waterways
(b) Railways
(c) Roadways
(d) Airways

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Q38. Which Amendment Act restored the Right to Property as a legal right?

(a) 48th Amendment
(b) 42nd Amendment
(c) 46th Amendment
(d) 44th Amendment

Q39. Which issue acted as the immediate trigger for the uprising that began in 1857?

(a) Introduction of the Enfield rifle with cartridges feared to contain animal fat.
(b) New rules requiring sepoys to abandon traditional dress and customs.
(c) Mandatory service postings across overseas territories for all regiments.
(d) Suspension of military pensions for long-serving Indian sepoys.

Q40. The inscriptions of Ashoka and Kharavela were primarily written in which of the following languages?

(a) Pali
(b) Bengali
(c) Sanskrit
(d) Prakrit

Q41. What does PCB stand for in a Computer System?

(a) Programmed Control Board
(b) Physical Circuit Block
(c) Peripheral Circuit Board
(d) Printed Circuit Board

Q42. Which of the following correctly describes secondary memory?

(a) Volatile and faster than primary memory
(b) Non-volatile and larger in storage capacity
(c) Faster and more expensive than main memory
(d) Volatile and directly accessed by the CPU

Q43. Select the correct formula of Aluminium Sulphate.

(a) Al(SO4)3
(b) Al3SO4
(c) Al2(SO4)3
(d) Al2SO4

Q44. Which of the following agreements between India and Uzbekistan, signed in Tashkent in September 2024, officially came into force in May 2025?

(a) Comprehensive Economic Partnership Agreement - CEPA
(b) Double Taxation Avoidance Agreement - DTAA
(c) Bilateral Investment Treaty - BIT
(d) Mutual Logistics Support Agreement - MHR

Q45. In which year was the Planning Commission, later renamed as NITI Aayog, established?

(a) 1950
(b) 1971
(c) 1965
(d) 1947

Q46. Which Indian Constitutional Amendment Act has inserted the word ‘socialist’ into the Preamble of the Indian Constitution?

(a) 38th Constitutional Amendment Act
(b) 44th Constitutional Amendment Act
(c) 86th Constitutional Amendment Act
(d) 42nd Constitutional Amendment Act

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Q47. Which of the following is a correct match of a climate type with its vegetation or features as per Koeppen's scheme of classification of climate?

(a) BWh – Dense evergreen canopy
(b) ET – Tropical rainforest
(c) Aw – Deciduous forests and tree-shredded grasslands
(d) Cfa – Cold desert and permafrost

Q48. Who among the following is India's first-ever two-time Olympic medallist in an individual event and the first Indian to win a wrestling world championship?

(a) Geeta Phogat
(b) Col. Rajyavardhan Singh Rathore
(c) Bajrang Punia
(d) Sushil Kumar

Q49. What was the initial corpus of the Rural Infrastructure Development Fund (RIDF) when it was established in 1995-96?

(a) Rs. 1,000 crore
(b) Rs. 5,000 crore
(c) Rs. 10,000 crore
(d) Rs. 2,000 crore

Q50. Which Mughal ruler is credited with introducing the Zabti revenue system across major parts of empire?

(a) Akbar
(b) Babar
(c) Aurangzeb
(d) Humayun

Q51. The stomach secretes the enzyme pepsin to aid digestion. Pepsin mainly acts on which nutrient?

(a) Proteins
(b) Carbohydrates
(c) Fats
(d) Vitamins

Q52. Chandragupta I strengthened his political position by marrying Princess Kumaradevi of which tribal lineages?

(a) Avanti
(b) Panchala
(c) Lichchhavi
(d) Gandhara

Q53. Frequencies higher than the human audible limit of 20,000 Hz are classified as _____.

(a) Infrasound
(b) Supersonic
(c) Tones
(d) Ultrasound

Q54. What major engine milestone did ISRO achieve in March 2025?

(a) First ion engine test
(b) Flight acceptance hot testing of the CE20
(c) Solar electric propulsion demo
(d) Launch of a nuclear-based rocket engine

Q55. Which rules define the process of identification, determination, and remediation of contaminated sites?

(a) Urban Wetland Restoration Rules, 2025
(b) Environment Protection (Management of Contaminated Sites) Rules, 2025
(c) Green Industrial Policy Rules, 2025

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(d) Air Quality Standards Rules, 2025

Q56. Which of the following institutions was founded by Mahadev Govind Ranade?

(a) Brahmo Samaj
(b) Arya Samaj
(c) Widow Remarriage Association
(d) Indian National Congress

Q57. Why were tax incentives provided to foreign investors during the 1991 economic reform period in India?

(a) To attract foreign investment
(b) To increase tax revenue for the government
(c) To promote domestic monopolies
(d) To discourage foreign investment

Q58. Provision for 'living wage' and 'decent standard of life' for workers under the Directive Principle of State Policy (DPSP) is contained in which of the following Articles of the Indian Constitution?

(a) Article 43
(b) Article 47
(c) Article 42
(d) Article 41

Q59. In February 2025, which one of the following countries and India signed a declaration to establish a partnership focused on advanced and small modular nuclear reactors?

(a) France
(b) Japan
(c) Russia
(d) United States

Q60. The State Election Commission is responsible for conducting elections to the:

(a) Lok Sabha and Rajya Sabha
(b) Panchayats and Municipalities
(c) President and Vice-President
(d) State Assemblies

Q61. Which pollutant from the following is mainly responsible for the formation of acid rain?

(a) Carbon monoxide
(b) Ozone
(c) Ammonia
(d) Sulphur dioxide

Q62. Tholpavakoothu, the traditional shadow puppetry performance, originates from which Indian state?

(a) Odisha
(b) Andhra Pradesh
(c) West Bengal
(d) Kerala

Q63. The structural and functional unit of nature is _____.

(a) Environment
(b) Ecosystem
(c) Cell
(d) Ecology

Q64. Which of the following climatic regions has permafrost soil and low vegetation like mosses and lichens?

(a) Cfb – Marine west coast climate
(b) Aw – Tropical wet and dry climate
(c) ET – Tundra climate

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(d) BSh – Subtropical steppe climate

Q65. Which region of Maharashtra is known for iron ore production?

(a) Chandrapur and Bhandara
(b) Aurangabad and Jalna
(c) Nagpur and Wardha
(d) Pune and Thane

Q66. What is the name of India's first indigenous CRISPR-based gene therapy for Sickle Cell Disease, launched in November 2025?

(a) BIRSA 101
(b) GENO-1
(c) Sickle Cure
(d) CRISPR-X

Q67. How is a country's climate performance assessed in the CCPI (Climate Change Performance Index) 2025?

(a) Based on renewable energy production statistics only
(b) Combining emissions, energy use and expert-reviewed climate policy data
(c) By analyzing only national emission targets and forest cover data
(d) Through opinion polls and industrial development trends

Q68. In Uttar Pradesh, which city's police in December 2025 launched dedicated Closed User Group (CUG) phone numbers, enabling women to directly contact Mission Shakti Centre in-charges at police stations?

(a) Patna
(b) Lucknow
(c) Delhi
(d) Chandigarh

Q69. The Kakori train robbery of August 1925 was organised by the:

(a) Hindustan Republican Association in United Provinces
(b) Ghadr Party working from North America
(c) Anushilan Samiti in Bengal and Bihar
(d) HSRA unit based in Lahore and Delhi

Q70. Which Constitutional Amendment Act gave constitutional status to Urban Local Bodies (municipalities)?

(a) 86th Amendment Act
(b) 74th Amendment Act
(c) 42nd Amendment Act
(d) 73rd Amendment Act

GENERAL INTELLIGENCE AND REASONING

Q71. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) OH-KM
(b) QJ-MO
(c) LE-HJ
(d) JC-FG

Q72. FR 6 is related to JL 17 in a certain way. In the same way, EU 12 is related to IO 23. To which of the following is SL 3 related, following the same logic?

(a) WF 14
(b) YT 9
(c) OK 17

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(d) AK 11

Q73. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statement: All Chickens are Quails. All Quails are Pigeons.

Conclusion (I): No Pigeons are Chickens.

Conclusion (II): Some Pigeons are Chickens.

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

Q74. Seven people, R, B, Y, J, E, F and N, are sitting in a row, facing north.

Y sits third from the right end. Only three people sit between B and Y. N is the immediate neighbour of E and J. F sits second to the right of E.

How many people sit between R and J?

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

Q75. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

ICX 9, LFZ 16, OIB 25, RLD 36, ?

(a) UOF 49
(b) VOJ 48
(c) VPJ 49
(d) UPI 48

Q76. If '+' means '−', '−' means '×', '×' means '÷', '÷' means '+', then what will come in place of the question mark (?) in the following equation?

17 − 3 ÷ 8 + 21 × 3 = ?

(a) 49
(b) 50
(c) 52
(d) 51

Q77. If 1 is added to each odd digit and 2 is subtracted from each even digit in the number 5431786, what will be difference between the highest and lowest digits in the number thus formed?

(a) 6
(b) 5
(c) 2
(d) 8

Q78. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

EIJ 33 GKL 27 IMN 21 KOP 15 ?

(a) MQV 8
(b) MQR 9
(c) MRQ 9
(d) MPQ 8

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Q79. What should come in place of '?' in the given series?

23 32 42 53 65 78 ?

(a) 92
(b) 90
(c) 85
(d) 87

Q80. SMAL is related to VQFR in a certain way based on the English alphabetical order. In the same way, ECUJ is related to HGZP. To which of the following options is NOJB related, following the same logic?

(a) QSIO
(b) QSHO
(c) QOSH
(d) QSOH

Q81. What should come in place of '?' in the given series?

65 ? 24 15 11 10

(a) 42
(b) 44
(c) 40
(d) 38

Q82. Seven people, J, K, C, D, E, Q and H, are sitting in a row, facing north.

Only four people sit to the right of Q. Only two people sit to the right of E. K is the immediate neighbour of J and E. H sits third to the right of D.

How many people sit between C and K?

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

Q83. In a certain code language, 'jaw bush oven' is coded as 'ht vq xe' and 'zebra egg jaw' is coded as 'vq db ia'. How is 'jaw' coded in the given language?

(a) vq
(b) ht
(c) db
(d) xe

Q84. Each letter in the word MONKEYS 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 fourth from the right in the new letter cluster thus formed?

(a) 5
(b) 1
(c) 4
(d) 2

Q85. Refer to the given series and answer the question that follows. All numbers are single-digit numbers only. Counting to be done from left to right only.

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

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

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

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Q86. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order. Only two boxes are kept between C and G. Only F is kept above B. No box is kept below G. E is kept at some place below A but at some place above D. How many boxes are kept between F and D?

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

Q87. In a certain code language,

A x B means ‘A is the father of B’,

A ≠ B means ‘A is the son of B’,

A ÷ B means ‘A is the daughter of B’ and

A Rs. B means ‘A is the sister of B’.

Based on the above, how is C related to M if 'C Rs. D ≠ E ÷ L x M'?

(a) Sister
(b) Daughter
(c) Mother's mother
(d) Sister's daughter

Q88. What should come in place of the question mark (?) in the given series to make it logically complete?

MV7 PT13 RR19 ?

(a) TR27
(b) TQ26
(c) TP25
(d) SP25

Q89. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(5, 120, 12)

(3, 84, 14)

(a) (2, 78, 13)
(b) (4, 150, 19)
(c) (7, 155, 11)
(d) (6, 216, 18)

Q90. If 2 is added to each odd digit and 1 is subtracted from each even digit in the number 2563174, then how many digits will appear more than once in the new number thus formed?

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

Q91. Each letter in the word JUMBLED is arranged in the English alphabetical order. How many letters are there in the English alphabetical order between the letter which is fourth from the left and the one which is first from the right in the new letter cluster thus formed?

(a) 11
(b) 10
(c) 13
(d) 9

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Q92. 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) NPS
(b) QSV
(c) EGJ
(d) HJL

Q93. In a certain code language,

A ≤ B means ‘A is the son of B’

A ¥ B means ‘A is the father of B’

A @ B means ‘A is the brother of B’

A - B means ‘A is the wife of B’

Based on the above, how is P related to X if 'P - Q @ S ≤ T ¥ X'?

(a) Father's mother
(b) Son's wife
(c) Brother's wife
(d) Father's sister

Q94. In a certain code language, "WIAO" is coded as "40" and "TNCR" is coded as "47". What is the code for "FXAJ" in that given language?

(a) 33
(b) 30
(c) 39
(d) 41

Q95. Moksh starts from Point A and drives 21 km towards the south. He then takes a left turn, drives 14 km, turns left and drives 29 km. He then takes a left turn and drives 21 km. He takes a final left turn, drives 8 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 8 km to the east
(b) 7 km to the east
(c) 7 km to the west
(d) 8 km to the west

Q96. Select the pair which follows the same pattern as that followed by the two sets of pairs given below. Both pairs follow the same pattern.

GFK : JAE

LGP : OBJ

(a) CLW : FGQ
(b) JKH : MGB
(c) FNP : IIK
(d) GIM : JDH

Q97. Read the given statement(s) and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statement(s).

Statements:

All carpets are shoes.

All paintings are shoes.

Conclusions:

(I) Some carpets are paintings.

(II) Some shoes are paintings.

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

Q98. In a row of people all facing the north, Jonny is 24^(th) from the left end. Anuj is 28^(th) from the left end. Anuj is exactly between Jonny and Rishabh. If Rishabh is 16^(th) from the right end of the line, how many people are there in the row?

(a) 45
(b) 44
(c) 47
(d) 46

Q99. Anil ranked 27th from the top and 19th from the bottom in his class. How many students are there in his class?

(a) 45
(b) 44
(c) 46
(d) 43

Q100. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) QM - OK
(b) NJ - LH
(c) WS - UQ
(d) UQ - SP

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) 30 hours

Shortcut Trick
Let the total capacity of the cistern be the LCM of (10, 20, 12) = 60 units.
Combined Efficiency: (A+B) = 6, (B+C) = 3, (C+A) = 5.
Summing them: 2(A+B+C) = 6 + 3 + 5 = 14 => A+B+C = 7 units/hr.
Efficiency of Pipe B = (A+B+C) − (C+A) = 7 − 5 = 2 units/hr.
Time taken by B = 60 ÷ 2 = 30 hr.
Therefore The correct answer is 30 hr.
Alternate Method

Given:

Time taken by (Pipe A + Pipe B) = 10 hr

Time taken by (Pipe B + Pipe C) = 20 hr

Time taken by (Pipe C + Pipe A) = 12 hr

Formula Used:

Efficiency = Total Work ÷ Time taken

Pipes	Time (hr)	Total Work (LCM)	Efficiency (units/hr)
A + B	10	60	60 ÷ 10 = 6
B + C	20	60 ÷ 20 = 3	
C + A	12	60 ÷ 12 = 5	

Calculations:

=> Adding efficiencies: (A + B) + (B + C) + (C + A) = 6 + 3 + 5

=> 2(A + B + C) = 14

=> A + B + C = 14 ÷ 2 = 7 units/hr

=> We know efficiency of (C + A) = 5 units/hr

=> Efficiency of B = (A + B + C) − (C + A) = 7 − 5 = 2 units/hr

=> Time taken by Pipe B alone = Total Work ÷ Efficiency of B

=> Time = 60 ÷ 2 = 30 hr

Therefore The correct answer is 30 hr.

Additional Information

Combined Efficiency Rule

When pipes work in pairs, the sum of their individual efficiencies is half the sum of their pairwise efficiencies: (A+B+C) = [(A+B) + (B+C) + (C+A)] ÷ 2.

Pipes and Cisterns Basics

Inlet pipes perform positive work (filling), while outlet pipes perform negative work (emptying). Total work is the volume of the tank/cistern.

Time and Work Relation

Time taken and efficiency are inversely proportional to each other. Time = 1 ÷ Efficiency (for constant work).

Q2. Answer: (c) C

Shortcut Trick

Approximate Effective Discount for each Scheme:

(A) 21 + 8 − (21 × 8 / 100) = 27.32%

(B) Successive 38%, 42%, 30% → clearly much higher than 50% (≈ 74.8%)

(C) Weighted Average = [(8 × 17) + (2 × 20)] ÷ 10 = 17.6%

(D) Buy 10 Get 7 Free = [7 ÷ (10 + 7)] × 100 ≈ 41.18%

Comparing the values, 17.6% is the lowest discount, making it the least beneficial.

Therefore The correct answer is C.

Alternate Method

Given:

=> Total Toys to buy = 10

=> Let Marked Price (MP) of 1 toy = Rs. 100

=> Total Marked Price for 10 toys = Rs. 1000

Formula Used:

=> Successive Discount = a + b − (ab/100)

=> Buy X Get Y Free Discount % = [Y ÷ (X + Y)] × 100

Calculations:

Scheme (A): Successive 21% and 8%

=> Effective Discount = 21 + 8 − (21 × 8 / 100) = 29 − 1.68 = 27.32%

Scheme (B): Successive 38%, 42%, 30%

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=> First two: 38 + 42 − (38 × 42 / 100) = 80 − 15.96 = 64.04%

=> Final: 64.04 + 30 − (64.04 × 30 / 100) = 94.04 − 19.21 = 74.83%

Scheme (C): 17% on first 8, 20% on next 2

=> Discount on 8 toys = 8 × 17 = Rs. 136

=> Discount on 2 toys = 2 × 20 = Rs. 40

=> Total Discount = 136 + 40 = Rs. 176

=> Effective % = (176 ÷ 1000) × 100 = 17.6%

Scheme (D): Buy 10 Get 7 Free

=> Effective Discount % = [7 ÷ (10 + 7)] × 100 = (7 ÷ 17) × 100 ≈ 41.18%

=> Comparing all schemes, 17.6% is the minimum discount.

Therefore The correct answer is C.

Additional Information

Successive Discounts

When multiple discounts are applied one after another, the total discount is always less than the sum of individual percentages. Formula: a + b − (ab/100).

Buy X Get Y Free

The effective discount percentage in such offers is calculated as: [Free Items ÷ Total Items (Bought + Free)] × 100.

Least Beneficial vs Most Beneficial

For a customer, the least beneficial scheme is the one offering the lowest effective discount percentage, while the most beneficial offers the highest.

Q3. Answer: (d) 20

Shortcut Trick

Convert decimals to fractions for faster calculation: 0.25 = 1/4 and 0.5 = 1/2.

Numerator: (1/4) × 1.6 = 0.4

Denominator: 0.04 × (1/2) = 0.02

Result = 0.4 ÷ 0.02 = 40 ÷ 2 = 20

Therefore The correct answer is 20.

Alternate Method

Given: (0.25 × 1.6) ÷ (0.04 × 0.5)

Method Used: Apply the BODMAS rule (perform operations inside Brackets first).

=> Step 1 (First bracket): 0.25 × 1.6 = 0.400 = 0.4

=> Step 2 (Second bracket): 0.04 × 0.5 = 0.020 = 0.02

=> Step 3 (Division): 0.4 ÷ 0.02

=> To remove the decimal from the divisor, multiply both numerator and denominator by 100.

=> (0.4 × 100) ÷ (0.02 × 100) = 40 ÷ 2

=> Result = 20

Therefore The correct answer is 20.

Additional Information

BODMAS Rule

It stands for Brackets, Of, Division, Multiplication, Addition, and Subtraction. Operations must be performed in this specific order to get the correct result.

Multiplying Decimals

Multiply the numbers as if they were whole numbers, then place the decimal point in the product so that it has the same number of decimal places as the sum of the decimal places in the factors.

Dividing by Decimals

Move the decimal point in the divisor to the right until it is a whole number, and move the decimal point in the dividend the same number of places to the right before dividing.

Q4. Answer: (a) 52.17 km/h

Shortcut Trick

Average Speed = Total Distance ÷ Total Time

Total Distance = 100 + 150 + 50 = 300 km

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Total Time = (100/50) + (150/60) + (50/40) = 2 + 2.5 + 1.25 = 5.75 hours

Average Speed = 300 ÷ 5.75 ≈ 52.17 km/h

Therefore The correct answer is 52.17 km/h.

Alternate Method

Given:

Distance1 = 100 km, Speed1 = 50 km/h

Distance2 = 150 km, Speed2 = 60 km/h

Distance3 = 50 km, Speed3 = 40 km/h

Formula Used:

Time = Distance ÷ Speed

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

Calculations:

=> Time for first part (t1) = 100 ÷ 50 = 2 hours

=> Time for second part (t2) = 150 ÷ 60 = 2.5 hours

=> Time for third part (t3) = 50 ÷ 40 = 1.25 hours

=> Total Time (T) = 2 + 2.5 + 1.25 = 5.75 hours

=> Average Speed = 300 ÷ 5.75

=> Average Speed = 30000 ÷ 575 = 1200 ÷ 23

=> Average Speed ≈ 52.1739... km/h

Therefore The correct answer is 52.17 km/h.

Additional Information

Average Speed for Equal Distances

When a journey is divided into two equal distances with speeds x and y, the Average Speed is the harmonic mean: (2 × x × y) ÷ (x + y).

Average Speed for Equal Time Intervals

If an object travels at speed x for time T and then at speed y for the same time T, the Average Speed is the arithmetic mean: (x + y) ÷ 2.

Unit Conversion

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

Q5. Answer: (d) 4 1/6 % profit

Shortcut Trick

Assume the total quantity is 12 units (LCM of 3 and 4).

Net profit/loss units = (1/3 × 12 × 20) + (1/4 × 12 × (−10)) + (5/12 × 12 × 0)

Net effect = 80 − 30 + 0 = 50 units.

Overall percentage = 50 ÷ 12 = 25/6 = 4 ¹/6%.

Therefore The correct answer is 4 ¹/6% profit.

Alternate Method

Given: Total Cost Price (CP) = Rs. 2400

Formula Used: Profit % = (Total Profit ÷ Total CP) × 100

=> Profit on first part = (1/3) × 2400 × 20% = 800 × 0.20 = Rs. 160

=> Loss on second part = (1/4) × 2400 × 10% = 600 × 0.10 = Rs. 60

=> Remaining goods = 1 − (1/3 + 1/4) = 1 − 7/12 = 5/12

=> Profit/Loss on remaining part = (5/12) × 2400 × 0 = Rs. 0

=> Total Net Profit = 160 − 60 + 0 = Rs. 100

=> Overall Profit Percentage = (100 ÷ 2400) × 100 = 100/24 = 25/6 = 4 ¹/6%

Therefore The correct answer is 4 ¹/6% profit.

Additional Information

Weighted Average Profit/Loss

When goods are sold in parts, the net profit/loss percentage is the weighted average: % = (w1p1 + w2p2 + ...) ÷ (w1 + w2 + ...).

Cost Price Selling

Selling an item at its Cost Price (CP) implies there is no profit and no loss (0% change).

Fractional Parts Calculation

Always ensure the sum of all fractional parts equals 1 (e.g., 1/3 + 1/4 + 5/12 = 12/12 = 1).

Q6. Answer: (b) 210

Shortcut Trick

Let the HCF of the three numbers be x.

The numbers are then 3x, 7x, and 2x.

LCM of (3x, 7x, 2x) = x × LCM(3, 7, 2) = x × 42.

Given, 42x = 8820.

x = 8820 ÷ 42 = 210.

Therefore The correct answer is 210.

Alternate Method

Given:

Ratio of three numbers = 3 : 7 : 2

LCM of the numbers = 8820

Formula Used:

If numbers are in the ratio a : b : c, then the numbers can be represented as ax, bx, and cx, where x is their HCF.

The LCM of these numbers = x × LCM(a, b, c).

Calculations:

=> Let the numbers be 3x, 7x, and 2x.

=> LCM(3, 7, 2) = 3 × 7 × 2 = 42 (as they are co-prime).

=> LCM of (3x, 7x, 2x) = 42x.

=> 42x = 8820.

=> x = 8820 ÷ 42.

=> x = 210.

Therefore The correct answer is 210.

Additional Information

HCF (Highest Common Factor)

The greatest number that divides two or more numbers without leaving a remainder.

LCM (Least Common Multiple)

The smallest non-zero number that is a multiple of two or more numbers.

Product Rule for Two Numbers

For any two numbers A and B: A × B = HCF(A, B) × LCM(A, B).

Co-prime Numbers

Two or more numbers are co-prime if their HCF is 1. Their LCM is simply the product of the numbers.

Q7. Answer: (b) Rs. 10,140

Shortcut Trick

Effective Interest Rate for 2 years at 4% = 4 + 4 + (4 × 4)/100 = 8.16%.

Given that 8.16% of the Principal (y) = Rs. 765.

The Total Amount (A) percentage = 100% + 8.16% = 108.16%.

=> Amount = (765 ÷ 8.16) × 108.16

=> Amount = 93.75 × 108.16 = Rs. 10,140.

Therefore The correct answer is Rs. 10,140.

Alternate Method

Given: Principal (P) = Rs. y, Rate (R) = 4% p.a., Time (n) = 2 years, Compound Interest (CI) = Rs. 765.

Formula Used: $CI = P[(1 + R/100)^n - 1]$ and Amount (A) = P + CI

=> $765 = y[(1 + 4/100)^2 - 1]$

=> $765 = y[(1 + 1/25)^2 - 1]$

=> $765 = y[(26/25)^2 - 1]$

=> $765 = y[676/625 - 1]$

=> $765 = y[(676 - 625)/625]$

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=> 765 = y[51/625]

=> y = (765 × 625) ÷ 51

=> y = 15 × 625 = Rs. 9,375

=> Amount (A) = Principal (y) + CI

=> A = 9,375 + 765 = Rs. 10,140

Therefore The correct answer is Rs. 10,140.

Additional Information

Compound Interest Formula

The amount A is calculated as $A = P(1 + r/100)^n$, where P is principal, r is rate, and n is time.

Effective Rate for 2 Years

The net percentage interest for two years is given by x + y + (xy/100), where x and y are annual rates.

Difference between CI and SI

For 2 years, the difference between Compound Interest and Simple Interest is $P(R/100)^2$.

Q8. Answer: (b) 1,98,000

Shortcut Trick

Net percentage change = a + b + (ab ÷ 100)

Here, a = +12% and b = −10%

Net change = 12 − 10 + (12 × (−10) ÷ 100) = 2 − 1.2 = 0.8%

Given, 0.8% increase = Rs. 1,584

Original Salary (100%) = (1,584 ÷ 0.8) × 100 = 1,980 × 100 = Rs. 1,98,000

Therefore The correct answer is Rs. 1,98,000.

Alternate Method

Given:

First year revision = increased by 12%

Second year revision = decreased by 10%

Increase in original monthly salary = Rs. 1,584

Formula Used:

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

Calculations:

Let Sangeeta's salary be Rs. x.

=> Salary after 1st year = x × (112 ÷ 100) = 1.12x

=> Salary after 2nd year = 1.12x × (90 ÷ 100) = 1.008x

=> Total increase in salary = 1.008x − x = 0.008x

=> 0.008x = 1,584

=> x = 1,584 ÷ 0.008

=> x = 1,584,000 ÷ 8

=> x = 1,98,000

Therefore The correct answer is Rs. 1,98,000.

Additional Information

Successive Percentage Change

When a value is changed by a% and then by b%, the net effective change is (a + b + ab/100)%.

Multiplying Factor Method

For an increase of r%, the factor is (1 + r/100). For a decrease, the factor is (1 − r/100). Final value = Initial value × Factor1 × Factor2.

Base Value Property

Percentage changes are always calculated on the preceding value in a series of successive changes, not on the original base value each time.

Q9. Answer: (a) Batch B

Shortcut Trick

Convert science-to-total ratios into decimals to compare proportions:

Batch A: 5 ÷ (5 + 8) = 5/13 ≈ 0.3846

Batch B: 7 ÷ (7 + 11) = 7/18 ≈ 0.3888
Batch C: 3 ÷ (3 + 5) = 3/8 = 0.3750
Since 0.3888 > 0.3846 > 0.3750, Batch B has the highest proportion.
Therefore The correct answer is Batch B.
Alternate Method
Given:
Ratio of Science to Arts students:
Batch A = 5 : 8 | Batch B = 7 : 11 | Batch C = 3 : 5
Formula Used:
Proportion of Science students = Science ÷ (Science + Arts)
Calculations:
=> Batch A proportion = 5 / (5 + 8) = 5/13
=> Batch B proportion = 7 / (7 + 11) = 7/18
=> Batch C proportion = 3 / (3 + 5) = 3/8
=> Comparing 5/13 and 7/18 by cross-multiplication: 5 × 18 = 90 and 7 × 13 = 91. Since 91 > 90, Batch B > Batch A.
=> Comparing 7/18 and 3/8 by cross-multiplication: 7 × 8 = 56 and 3 × 18 = 54. Since 56 > 54, Batch B > Batch C.
=> Batch B has the highest proportion of science students.
Therefore The correct answer is Batch B.
Additional Information
Ratio to Proportion Conversion
If the ratio of two components is a:b, the proportion of the first component in the total is given by a/(a+b).
Comparing Fractions Shortcut
To compare a/b and c/d without division, compare the products (a × d) and (b × c). If ad > bc, then a c/d.
Percentage Share
The percentage share of a component is (Value / Total) × 100, which is useful for comparing proportions across different group sizes.

Q10. Answer: (b) Rs. 83.33

Shortcut Trick
Let Marked Price (MP) = 100 units.
Cost Price (CP) = 100 − 20% = 80 units.
Selling Price (SP) = 80 + 40% of 80 = 112 units.
Difference (SP − MP) = 112 − 100 = 12 units → Rs. 10.
Marked Price = (10 ÷ 12) × 100 = 1000 ÷ 12 = 83.33.
Therefore The correct answer is Rs. 83.33.
Alternate Method
Given:
Discount on Marked Price = 20%
Selling Price (SP) = Marked Price (MP) + Rs. 10
Profit Percentage = 40%
=> Let the Marked Price be x.
=> Cost Price (CP) = x − 20% of x = 0.8x.
=> Selling Price (SP) = x + 10.
=> Profit = SP − CP = (x + 10) − 0.8x = 0.2x + 10.
=> Profit Percentage = (Profit ÷ CP) × 100
=> 40 = [(0.2x + 10) ÷ 0.8x] × 100
=> 0.40 = (0.2x + 10) ÷ 0.8x
=> 0.32x = 0.2x + 10
=> 0.12x = 10
=> x = 10 ÷ 0.12 = 83.333...
Therefore The correct answer is Rs. 83.33.
Additional Information

Relationship between CP and MP

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

Successive Discounts

Two successive discounts of a% and b% are equivalent to a single discount of [a + b − (a × b)/100]%.

Mark-up Percentage

Mark-up % = [(MP − CP) ÷ CP] × 100. It represents how much more the Marked Price is compared to the Cost Price.

Q11. Answer: (b) 22

Shortcut Trick

Total Work (LCM of 12 and 39) = 156 units.

Efficiencies: A = 13, B = 4.

Work done by (A + B) in 4 days = (13 + 4) × 4 = 68 units.

Remaining work = 156 − 68 = 88 units.

Time taken by B = 88 ÷ 4 = 22 days.

Therefore The correct answer is 22 days.

Alternate Method

Given:

Time taken by A = 12 days

Time taken by B = 39 days

Formula Used:

Efficiency = Total Work ÷ Time

Remaining Work = Total Work − Work Completed

Person	Days	Total Work	Efficiency
A	12	156 (LCM)	13
B	39	4	

Calculations:

=> Total efficiency of A and B = 13 + 4 = 17 units/day

=> Work done by A and B together in 4 days = 17 × 4 = 68 units

=> Remaining work to be done = 156 − 68 = 88 units

=> A leaves, so B completes the 88 units of work.

=> Time taken by B = 88 ÷ 4 = 22 days

Therefore The correct answer is 22 days.

Additional Information

Pipes & Cisterns

Similar logic applies to pipes where inlet pipes have positive efficiency and outlet pipes have negative efficiency.

Work & Wages

Wages are distributed among workers in the ratio of their efficiency or the total work done by each.

Alternate Day Work

When people work on alternate days, calculate the work done in one complete cycle (e.g., 2 days) to find the total time.

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken to complete the work (Efficiency prop. to 1 ÷ Time).

Q12. Answer: (a) Rs. 9800

Shortcut Trick

Total interest percentage for 3 years = 7.5% × 3 = 22.5%

Total Amount percentage = 100% (Principal) + 22.5% (Interest) = 122.5%

Amount = 122.5% of Rs. 8,000

Amount = 1.225 × 8000 = Rs. 9,800

Therefore The correct answer is Rs. 9800.

Alternate Method

Given:

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Principal (P) = Rs. 8,000

Rate of Interest (R) = 7.5% per annum

Time (T) = 3 years

Formula Used:

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

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

Calculations:

=> SI = (8000 × 7.5 × 3) ÷ 100

=> SI = 80 × 22.5

=> SI = Rs. 1,800

=> Amount = 8000 + 1800

=> Amount = Rs. 9,800

Therefore The correct answer is Rs. 9800.

Additional Information

Simple Interest Concept

Simple Interest is calculated only on the initial principal amount throughout the entire period. SI = P × R × T / 100.

Amount in SI

The total value after adding interest to the principal is called the Amount. A = P(1 + RT/100).

SI vs CI Difference

For the first year, SI and Compound Interest (CI) are equal if interest is compounded annually. From the second year, CI > SI because interest is earned on interest.

Q13. Answer: (d) 120:80

Shortcut Trick

Convert the given target ratio 3:2 into decimal form: 3 ÷ 2 = 1.5.

Check the decimal values of the options:

60/45 ≈ 1.33 | 45/20 = 2.25 | 35/25 = 1.4 | 120/80 = 1.5.

Since 120/80 matches the decimal value 1.5, it is equivalent to 3:2.

Therefore The correct answer is 120:80.

Alternate Method

Given: Target Ratio = 3 : 2

Formula Used: Simplest form of a ratio is obtained by dividing both terms by their Highest Common Factor (HCF).

=> Option 1: 60 : 45 (HCF = 15) => (60 ÷ 15) : (45 ÷ 15) = 4 : 3

=> Option 2: 45 : 20 (HCF = 5) => (45 ÷ 5) : (20 ÷ 5) = 9 : 4

=> Option 3: 35 : 25 (HCF = 5) => (35 ÷ 5) : (25 ÷ 5) = 7 : 5

=> Option 4: 120 : 80 (HCF = 40) => (120 ÷ 40) : (80 ÷ 40) = 3 : 2

Therefore The correct answer is 120:80.

Additional Information

Simplest Form of Ratio

A ratio a:b is in its simplest form if the HCF of a and b is 1. To simplify, divide both terms by their common factors.

Equivalent Ratios

Ratios that represent the same relationship between numbers are called equivalent ratios. They can be found by multiplying or dividing both terms by the same non-zero number.

Proportion

When two ratios are equal, they are said to be in proportion. For a:b = c:d, the product of extremes (a×d) equals the product of means (b×c).

Q14. Answer: (d) 30 m

Shortcut Trick

In a 30°−60°−90° right-angled triangle, the sides are in the ratio 1 : √3 : 2.

The base (adjacent to 60°) corresponds to 1 unit.

Given, 1 unit = 15 m.

The ladder (hypotenuse) corresponds to 2 units.

Length of ladder = 2 × 15 = 30 m.

Therefore The correct answer is 30 m.

Alternate Method

Given:

Angle of elevation of the ladder with the ground (θ) = 60°

Distance of the foot of the ladder from the wall (Base) = 15 m

Formula Used:

In a right-angled triangle, cos θ = Base / Hypotenuse

Calculations:

Let the length of the ladder be L.

=> cos 60° = 15 / L

=> 1 / 2 = 15 / L

=> L = 15 × 2

=> L = 30 m

Therefore The correct answer is 30 m.

Additional Information

Trigonometric Ratios

Fundamental ratios in a right triangle: sin θ = P/H, cos θ = B/H, and tan θ = P/B (where P = Perpendicular, B = Base, H = Hypotenuse).

Standard Values of Cosine

Common values include cos 0° = 1, cos 30° = √3/2, cos 45° = 1/√2, cos 60° = 1/2, and cos 90° = 0.

Pythagoras Theorem

In any right-angled triangle, the relationship between the sides is given by $H^2 = P^2 + B^2$.

30-60-90 Triangle Rule

For a triangle with angles 30°, 60°, and 90°, the side lengths are always in the ratio x : x√3 : 2x.

Q15. Answer: (d) 10 km/h decrease

Shortcut Trick

When Distance is constant, Speed is inversely proportional to Time.

Ratio of Time = 5 : 6 → Ratio of Speed = 6 : 5.

Original Speed = 300 ÷ 5 = 60 km/h.

Here, 6 units = 60 km/h => 1 unit (change) = 10 km/h.

Since the ratio decreases from 6 to 5, the speed decreases.

Therefore The correct answer is 10 km/h decrease.

Alternate Method

Given:

Distance (D) = 300 km

Initial Time (T1) = 5 hr

New Time (T2) = 6 hr

Formula Used:

Speed (S) = Distance (D) ÷ Time (T)

Calculations:

=> Initial Speed (S1) = 300 ÷ 5 = 60 km/h

=> New Speed (S2) = 300 ÷ 6 = 50 km/h

=> Change in Speed = Initial Speed − New Speed

=> Change = 60 − 50 = 10 km/h

=> Since the new speed is lower, there is a decrease of 10 km/h.

Therefore The correct answer is 10 km/h decrease.

Additional Information

Speed-Time Relation

For a fixed distance, Speed and Time are inversely proportional. If time increases by a certain factor, speed must decrease by the same factor to cover the same distance.

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Average Speed

Average Speed is calculated as the Total Distance divided by the Total Time taken for the entire journey. Formula: Average Speed = (Total Distance) ÷ (Total Time).

Unit Conversion

To convert Speed from km/h to m/s, multiply the value by 5/18. To convert from m/s to km/h, multiply the value by 18/5.

Q16. Answer: (a) 3,762

Shortcut Trick

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

Check 3,762: (2 + 7) − (6 + 3) = 9 − 9 = 0.

Since the result is 0, the number 3,762 is divisible by 11.

Therefore The correct answer is 3,762.

Alternate Method

Given: Numbers are 3,762, 7,393, 4,915, and 6,184.

Divisibility Rule of 11: Let the digits of a number be checked from right to left. The difference (Sum of digits at positions 1, 3, 5...) − (Sum of digits at positions 2, 4, 6...) must be 0, 11, 22, etc.

=> For 3,762: (2 + 7) − (6 + 3) = 9 − 9 = 0 (Divisible)

=> For 7,393: (3 + 3) − (9 + 7) = 6 − 16 = −10 (Not divisible)

=> For 4,915: (5 + 9) − (1 + 4) = 14 − 5 = 9 (Not divisible)

=> For 6,184: (4 + 1) − (8 + 6) = 5 − 14 = −9 (Not divisible)

Therefore The correct answer is 3,762.

Additional Information

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.

Divisibility by 4

A number is divisible by 4 if the last two digits of the number are divisible by 4.

Divisibility by 8

A number is divisible by 8 if the last three digits of the number are divisible by 8.

Q17. Answer: (c) 8694

Shortcut Trick

Check if the sum of terms is zero: 23 + (−14) + (−9) = 23 − 23 = 0.

Apply the Algebraic Identity: If a + b + c = 0, then $a^3 + b^3 + c^3 = 3abc$.

Calculation: 3 × 23 × (−14) × (−9) = 3 × 23 × 126.

Result: 69 × 126 = 8694.

Therefore The correct answer is 8694.

Alternate Method

Given:

a = 23

b = −14

c = −9

Formula Used:

$a^3 + b^3 + c^3 − 3abc = (a + b + c)(a^2 + b^2 + c^2 − ab − bc − ca)$

Calculations:

=> First, evaluate the sum (a + b + c):

=> 23 + (−14) + (−9) = 23 − 14 − 9 = 0

=> Since the sum is zero, the right side of the identity becomes zero.

=> $a^3 + b^3 + c^3 − 3abc = 0 × (a^2 + b^2 + c^2 − ab − bc − ca) = 0$

=> $a^3 + b^3 + c^3 = 3abc$

=> Substitute the values: 3 × 23 × (−14) × (−9)

=> 3 × 23 × 126

=> 69 × 126 = 8694

Therefore The correct answer is 8694.

Additional Information

Conditional Algebraic Identity

The identity $a^3 + b^3 + c^3 = 3abc$ holds true if and only if $a + b + c = 0$ or $a = b = c$.

General Expansion

The expression $a^2 + b^2 + c^2 - ab - bc - ca$ can be rewritten as $1/2[(a-b)^2 + (b-c)^2 + (c-a)^2]$, which is always non-negative for real numbers.

Trinomial Square

Another useful identity is $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$.

Q18. Answer: (a) Rs. 1570

Shortcut Trick

Surface area of a sphere = $\pi \times d^2$

Area = $3.14 \times 10 \times 10 = 314\ m^2$

Total cost = Area × rate = 314×5

Therefore The correct answer is Rs. 1570.

Alternate Method

Given: Internal Diameter (d) = 10 m, Rate of coating = Rs. 5 per m^2, $\pi = 3.14$

Formula Used: Surface Area of a Sphere = $4\pi r^2$; Total Cost = Area × Rate

Calculations:

=> Radius (r) = Diameter ÷ 2 = 10 ÷ 2 = 5 m

=> Internal Surface Area = $4 \times 3.14 \times (5)^2$

=> Area = $4 \times 3.14 \times 25$

=> Area = $100 \times 3.14 = 314\ m^2$

=> Total Cost = 314×5

=> Total Cost = Rs. 1570

Therefore The correct answer is Rs. 1570.

Additional Information

Volume of a Sphere

The volume of a sphere is given by the formula $V = (4/3)\pi r^3$, where r is the radius.

Hemisphere Surface Area

For a hemisphere, the Curved Surface Area (CSA) is $2\pi r^2$ and the Total Surface Area (TSA) is $3\pi r^2$.

Surface Area in terms of Diameter

The total surface area of a sphere can also be written as πd^2, which often simplifies calculations when the diameter is known.

Q19. Answer: (b) 2,00,000

Shortcut Trick

Use the Ratio Method for successive changes:

Year 2015 (10% increase): 10 → 11

Year 2016 (15% decrease): 20 → 17 (since 15% = 3/20)

Overall Ratio: $(10 \times 20) : (11 \times 17) = 200 : 187$

Given final value: 187 units = 1,87,000 => 1 unit = 1,000

Initial Population = $200 \times 1,000 = 2,00,000$

Therefore The correct answer is 2,00,000.

Alternate Method

Let the Initial Population in the beginning of 2015 be P.

=> Population after 10% increase in 2015 = $P \times (1 + 10/100) = 1.1P$

=> Population after 15% decrease in 2016 = $1.1P \times (1 - 15/100)$

=> Population at the end of 2016 = $1.1P \times 0.85 = 0.935P$

=> According to the question: $0.935P = 1,87,000$

=> $P = 1,87,000 \div 0.935$

=> $P = (1,87,000 \times 1,000) \div 935$

=> P = 200 × 1,000 = 2,00,000

Therefore The correct answer is 2,00,000.

Additional Information

Successive Percentage Change Formula

For two successive changes of a% and b%, the effective net change is [a + b + (a × b)/100]%. Use positive for increase and negative for decrease.

Multiplier Method

Final Value = Initial Value × (1 ± r1/100) × (1 ± r2/100). This is widely used in population growth and depreciation problems.

Population Growth

If the population increases at a constant rate r% per annum, the population after n years is $P(1 + r/100)^n$.

Q20. Answer: (d) 70°

Shortcut Trick

In an isosceles triangle, angles opposite to equal sides are equal.

Given XY = XZ, therefore the base angles angle Y = angle Z.

Sum of angles in a triangle = 180°.

angle X + 2 × angle Z = 180° => 40° + 2 × angle Z = 180°.

2 × angle Z = 140° => angle Z = 70°.

Therefore The correct answer is 70°.

Alternate Method

Given:

In ΔXYZ, XY = XZ and vertex angle angle X = 40°.

Formula Used:

1. Isosceles Triangle Property: Angles opposite to equal sides are equal.

2. Angle Sum Property: The sum of all interior angles of a triangle is 180°.

Calculations:

=> In ΔXYZ, since XY = XZ, it is an isosceles triangle.

=> angle Y = angle Z (Property of isosceles triangles)

=> angle X + angle Y + angle Z = 180° (Angle sum property)

=> 40° + angle Z + angle Z = 180°

=> 40° + 2 × angle Z = 180°

=> 2 × angle Z = 180° − 40°

=> 2 × angle Z = 140°

=> angle Z = 140° ÷ 2

=> angle Z = 70°

Therefore The correct answer is 70°.

Additional Information

Isosceles Triangle Theorem

If two sides of a triangle are congruent, then the angles opposite those sides are congruent (Equal sides ↔ Equal angles).

Triangle Angle Sum Theorem

The sum of the measures of the interior angles of any triangle is exactly 180°.

Exterior Angle Property

The measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior angles.

Q21. Answer: (b) Rs. 13,776

Shortcut Trick

Marked Price per pair = Rs. 2800.

Discounted Price (DP) per pair = 82% of 2800 = Rs. 2296.

Special offer allows 5 pairs at full DP and 2 pairs at 50% DP (which is 1 pair at full DP).

Total effective cost for 7 pairs = (5 + 1) × 2296 = 6 × 2296.

Total Cost = Rs. 13,776.

Therefore The correct answer is Rs. 13,776.

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Alternate Method

Given:

Marked Price (MP) of a pair of shoes = Rs. 2800

Trade Discount = 18%

Quantity 1 = 5 pairs at discounted price

Quantity 2 = 2 pairs at 50% of discounted price

Formula Used:

Discounted Price = MP × (100 − Discount%) / 100

Total Cost = (Quantity1 × Price1) + (Quantity2 × Price2)

Calculations:

=> Trade Discount amount = 18% of 2800 = 0.18 × 2800 = Rs. 504

=> Discounted Price (DP) per pair = 2800 − 504 = Rs. 2296

=> Cost of first 5 pairs = 5 × 2296 = Rs. 11,480

=> Cost of next 2 pairs = 2 × (50% of 2296) = 2 × 1148 = Rs. 2,296

=> Total Cost for 7 pairs = 11480 + 2296 = Rs. 13,776

Therefore The correct answer is Rs. 13,776.

Additional Information

Marked Price and Selling Price

Selling Price (SP) is calculated as MP − Discount. If multiple items have different discounts, the total SP is the sum of individual SPs.

Successive Discounts

When two discounts d1% and d2% are applied successively, the effective discount is (d1 + d2 − (d1×d2)/100)%.

Trade Discount vs Cash Discount

Trade discount is given on the list price at the time of sale, while cash discount is offered for immediate or early payment.

Q22. Answer: (c) 35

Shortcut Trick

Direct calculation: Age of A = 2 × (Age of B) + 5

Given Person B is 15 years old.

Age of Person A = (2 × 15) + 5 = 30 + 5

Age of Person A = 35 years

Therefore The correct answer is 35 years.

Alternate Method

Given:

Present age of Person B = 15 years

Present age of Person A = 5 years more than twice the age of Person B

Formula Used:

Age_A = (2 × Age_B) + 5

Calculations:

=> Age of Person B = 15 years

=> Twice the age of Person B = 2 × 15 = 30 years

=> Age of Person A = 30 + 5

=> Age of Person A = 35 years

Therefore The correct answer is 35 years.

Additional Information

Linear Equations in Age Problems

Age relations such as 'twice as old' or 'n years older' are formulated as linear equations (y = mx + c) where m is the multiplier and c is the constant difference.

Constant Difference Rule

The difference between the ages of two individuals always remains constant, regardless of the number of years that pass.

Ratio Method

For complex age problems, ratios are used by finding a common multiplier (k) to satisfy the given conditions for different time

periods.

Q23. Answer: (a) 8/39

Shortcut Trick

Break the expression into three parts using the VBODMAS rule.

Part 1: {(16/36) ÷ (16/4)} = (4/9) ÷ 4 = 1/9.

Part 2: ((2/7) × (14/6) + 5/12) = (2/3 + 5/12) = 13/12.

Part 3: (4/7) ÷ (39/12 of 12/7) = (4/7) ÷ (39/7) = 4/39.

Final: (1/9 ÷ 13/12) + 4/39 = (1/9 × 12/13) + 4/39 = 4/39 + 4/39 = 8/39.

Therefore The correct answer is 8/39.

Alternate Method

Given: {(16/36) ÷ (16/4)} ÷ ((2/7) × (14/6) + (5/12)) + (4/7) ÷ (39/12) of (12/7)

Formula Used: Order of operations follows VBODMAS (Vinculum, Brackets, Of, Division, Multiplication, Addition, Subtraction).

=> Simplify first bracket: (16/36) ÷ (16/4) = 4/9 ÷ 4 = 4/9 × 1/4 = 1/9

=> Simplify inner part of second group: (2/7 × 14/6) = 2/7 × 7/3 = 2/3

=> Complete second bracket: 2/3 + 5/12 = 8/12 + 5/12 = 13/12

=> Simplify Of operation: (39/12) of (12/7) = 39/12 × 12/7 = 39/7

=> Remaining expression: (1/9 ÷ 13/12) + (4/7 ÷ 39/7)

=> Perform divisions: (1/9 × 12/13) + (4/7 × 7/39) = 4/39 + 4/39

=> Final Addition: 8/39

Therefore The correct answer is 8/39.

Additional Information

The VBODMAS Rule

It ensures mathematical consistency by prioritizing Brackets then Of (which is a form of multiplication) over Division and Multiplication.

Fraction Division

Dividing by a fraction is equivalent to multiplying by its reciprocal (inverted form): a/b ÷ c/d = a/b × d/c.

Common Denominators

When adding fractions like 2/3 and 5/12, find the LCM of denominators (12) to create a common base before adding numerators.

Q24. Answer: (b) 5^(x-1)

Shortcut Trick

Identify common base 5 and use the Net Power rule.

Net Power = (Power of term 1 + Power of term 2) − Power of denominator.

Calculation: [3x + 2(x − 1)] − (4x − 1).

=> (3x + 2x − 2) − 4x + 1 = 5x − 2 − 4x + 1 = x − 1.

The resulting expression is 5^(x-1).

Therefore The correct answer is 5^(x-1).

Alternate Method

Given: [5^(3x) × (5²)^((x-1))] ÷ 5^(4x-1)

Formula Used: (a^m)^n = a^(m×n) | a^m × a^n = a^(m+n) | a^m ÷ a^n = a^(m−n)

Step-by-step Simplification:

=> [5^(3x) × 5^(2(x-1))] ÷ 5^(4x-1)

=> [5^(3x) × 5^(2x-2)] ÷ 5^(4x-1)

=> 5^((3x + 2x − 2)) ÷ 5^(4x-1)

=> 5^((5x − 2)) ÷ 5^(4x-1)

=> 5^((5x − 2) − (4x − 1))

=> 5^(5x − 2 − 4x + 1)

=> 5^(x − 1)

Therefore The correct answer is 5^(x-1).

Additional Information

Product and Quotient Laws

When multiplying terms with the same base, add their exponents (a^m × aⁿ = a^(m+n)). When dividing, subtract them (a^m ÷ aⁿ = a^(m−n)).

Power of a Power Rule

Raising a power to another power requires multiplying the exponents: (a^m)ⁿ = a^(m×n).

Negative Exponents

Any non-zero base raised to a negative power is the reciprocal: a^(−n) = 1/aⁿ.

Zero Exponent Rule

Any non-zero base raised to the power of zero is always 1: a^0 = 1.

Q25. Answer: (c) Rs. 34,500

Shortcut Trick

Identify the increase in average: 25,500 − 24,000 = Rs. 1,500.

Income of new employee = New average + (Initial number of employees × Increase in average).

Income = 25,500 + (6 × 1,500) = 25,500 + 9,000 = Rs. 34,500.

Therefore The correct answer is Rs. 34,500.

Alternate Method

Given:

Initial number of employees = 6 | Initial average income = Rs. 24,000

Final number of employees = 7 | Final average income = Rs. 25,500

Formula Used:

Total Income = Average Income × Number of Employees

Calculations:

=> Total monthly income of 6 employees = 6 × 24,000 = Rs. 1,44,000

=> Total monthly income of 7 employees = 7 × 25,500 = Rs. 1,78,500

=> Monthly income of the new employee = Total (7 employees) − Total (6 employees)

=> Monthly income = 1,78,500 − 1,44,000 = Rs. 34,500

Therefore The correct answer is Rs. 34,500.

Additional Information

Net Deviation Concept

The sum of deviations of all observations from their arithmetic mean is always zero.

Weighted Average

When two groups are combined, the combined average is (n1A1 + n2A2) ÷ (n1 + n2).

Inclusion and Exclusion

If adding a new member increases the average, the new member's value is higher than the original average.

Q26. Answer: (a) 5656

Shortcut Trick

Divisor = 5 × Remainder = 5 × 56 = 280

Quotient = Divisor ÷ 14 = 280 ÷ 14 = 20

Dividend = (Divisor × Quotient) + Remainder

Dividend = (280 × 20) + 56 = 5600 + 56 = 5656

Therefore The correct answer is 5656.

Alternate Method

Given:

Remainder (r) = 56

Divisor (d) = 5 × Remainder

Divisor (d) = 14 × Quotient (q)

Formula Used:

Dividend = (Divisor × Quotient) + Remainder

Calculations:

=> Divisor = 5 × 56 = 280

=> 14 × Quotient = 280

=> Quotient = 280 ÷ 14 = 20
=> Dividend = (280 × 20) + 56
=> Dividend = 5600 + 56
=> Dividend = 5656
Therefore The correct answer is 5656.
Additional Information
Division Algorithm
For any two whole numbers, the dividend is always equal to the product of the divisor and quotient plus the remainder.
Remainder Property
The remainder must always be greater than or equal to 0 and strictly less than the divisor ($0 \le r < d$).
Euclid's Division Lemma
It states that for any two positive integers a and b, there exist unique integers q and r such that $a = bq + r$.

Q27. Answer: (a) 4:1

Shortcut Trick
The ratio of surface areas of two spheres is equal to the square of the ratio of their radii.
Radius of Sphere A : Radius of Sphere B = 6 : 3 = 2 : 1
Surface Area Ratio = $(2)^2 : (1)^2 = 4 : 1$
Therefore The correct answer is 4:1.
Alternate Method
Given:
Radius of Sphere A (r1) = 6 cm
Radius of Sphere B (r2) = 3 cm
Formula Used:
Surface Area (S) of a sphere = $4\pi r^2$
Calculations:
=> Surface Area of Sphere A (S1) = $4 \times \pi \times (6)^2$
=> S1 = $4 \times \pi \times 36 = 144\pi$ cm²
=> Surface Area of Sphere B (S2) = $4 \times \pi \times (3)^2$
=> S2 = $4 \times \pi \times 9 = 36\pi$ cm²
=> Ratio = S1 : S2 = $144\pi : 36\pi$
=> Ratio = 144 / 36 = 4 / 1
Therefore The correct answer is 4:1.
Additional Information
Volume of a Sphere
The volume (V) of a sphere is given by the formula $V = (4/3)\pi r^3$.
Ratio of Volumes
The ratio of the volumes of two spheres is equal to the cube of the ratio of their radii: $V1/V2 = (r1/r2)^3$.
Hemisphere Properties
For a hemisphere, the Curved Surface Area = $2\pi r^2$ and the Total Surface Area = $3\pi r^2$.

Q28. Answer: (c) Rs. 72

Shortcut Trick
Summing both conditions: (8 + 5) Mangoes + (5 + 8) Oranges = 164 + 148
=> 13 (Mangoes + Oranges) = Rs. 312
=> 1 (Mango + Orange) = 312 ÷ 13 = Rs. 24
=> 3 (Mangoes + Oranges) = 3 × 24 = Rs. 72
Therefore The correct answer is Rs. 72.
Alternate Method
Given:
Cost of 8 mangoes and 5 oranges = Rs. 164
Cost of 5 mangoes and 8 oranges = Rs. 148

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Formula Used:

Symmetrical Linear Equations: Add equations when coefficients are interchanged.

Calculations:

=> Let cost of 1 mango be M and 1 orange be O.

=> 8M + 5O = 164 --- (Equation 1)

=> 5M + 8O = 148 --- (Equation 2)

=> Adding Eq(1) and Eq(2): (8M + 5M) + (5O + 8O) = 164 + 148

=> 13M + 13O = 312

=> 13(M + O) = 312

=> M + O = 312 ÷ 13 = 24

=> Cost of 3 mangoes and 3 oranges = 3 × (M + O)

=> 3 × 24 = 72

Therefore The correct answer is Rs. 72.

Additional Information

Linear Equations in Two Variables

Equations expressed in the form ax + by = c, where a and b are coefficients and c is a constant.

Symmetrical Coefficients Property

When coefficients are interchanged (ax + by = m and bx + ay = n), adding them directly gives a simplified value for (x + y).

Unitary Method

A problem-solving technique where you first find the value of a single unit and then multiply it by the required quantity.

Q29. Answer: (d) 5

Shortcut Trick

In a distribution with two values, the mean acts as the balance point.

Difference between first value (10) and mean (12.5) = 12.5 − 10 = 2.5

Difference between second value (15) and mean (12.5) = 15 − 12.5 = 2.5

Since the deviations are equal in magnitude (2.5), the frequencies must also be equal.

Given first frequency = 5, therefore p = 5.

Therefore The correct answer is 5.

Alternate Method

Given:

Mean (χ) = 12.5

Values (x_i): 10, 15

Frequencies (f_i): 5, p

Formula Used:

Arithmetic Mean (χ) = $\sum f_i x_i \div \sum f_i$

Calculations:

=> 12.5 = (10 × 5 + 15 × p) ÷ (5 + p)

=> 12.5 × (5 + p) = 50 + 15p

=> 62.5 + 12.5p = 50 + 15p

=> 62.5 − 50 = 15p − 12.5p

=> 12.5 = 2.5p

=> p = 12.5 ÷ 2.5

=> p = 5

Therefore The correct answer is 5.

Additional Information

Properties of Arithmetic Mean

The algebraic sum of deviations of a set of observations from their arithmetic mean is always zero. $\sum f_i(x_i - \chi) = 0$.

Weighted Average Formula

When different values have different importance or frequency, the weighted mean is calculated as $\chi_w = (w1x1 + w2x2 + ... + w_nx_n) \div (w1 + w2 + ... + w_n)$.

Change of Origin and Scale

If every observation is increased by 'a', the mean increases by 'a'. If every observation is multiplied by 'k', the mean is multiplied by 'k'.

Q30. Answer: (b) 25

Shortcut Trick

The Third Proportional of a and b is calculated as $b^2 \div a$.

First, find m: $m = (20 \times 20) \div 4 = 100$.

Then, find n: $n = (50 \times 50) \div 100 = 25$.

Therefore The correct answer is 25.

Alternate Method

Given:

First pair: 4, 20 and m are in continuous proportion.

Second pair: m, 50 and n are in continuous proportion.

Formula Used:

If a, b, c are in continuous proportion, then $a : b = b : c \Rightarrow c = b^2 \div a$.

Calculations:

=> For the first set: $4 : 20 = 20 : m$

=> $m = (20 \times 20) \div 4$

=> $m = 400 \div 4 = 100$

=> For the second set: $100 : 50 = 50 : n$

=> $n = (50 \times 50) \div 100$

=> $n = 2500 \div 100 = 25$

Therefore The correct answer is 25.

Additional Information

Mean Proportional

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

Fourth Proportional

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

Continued Proportion

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

Q31. Answer: (c) West Bengal

The correct answer is West Bengal.

Key Points

• In India, particularly in states like West Bengal, Assam, and Odisha, the prevailing climatic conditions allow for the cultivation of three distinct crops of rice within a single agricultural year.

• The three varieties are identified based on their seasonal cycles and are locally named Aus, Aman, and Boro.

• Aman is the primary winter rice crop. It is typically sown during the onset of the Southwest Monsoon in June and July and harvested between November and December. It occupies the largest portion of the total rice area in the state.

• Aus is referred to as autumn rice. It is sown during the pre-monsoon period in May and June and harvested in the autumn months of September and October.

• Boro is known as summer rice. This variety is sown in the winter (November to January) and harvested in the summer (April to May). Its cultivation is heavily reliant on assured irrigation facilities during the dry season.

• The fertile alluvial soil and the hot, humid climate of the lower Gangetic plains in West Bengal provide the ideal environment for this intensive cropping pattern.

Additional Information

• Rice (Oryza sativa):

• It is the staple food crop for a significant majority of India’s population and is primarily a Kharif crop.

• Growth requires high temperatures (above 25°C), high humidity, and annual rainfall exceeding 100 cm.

• West Bengal is consistently among the top producers of rice in India, contributing significantly to the national food security.

• Geographical Context of Other Options:

• In Manipur and Nagaland, rice is often grown using Jhum (shifting) cultivation or terrace farming in hilly terrains, where a single crop is more common due to topographical constraints.

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• While Bihar is a major rice producer, the specific nomenclature and systematic triple-cropping of Aus, Aman, and Boro are most traditionally associated with the Bengal delta region.

Q32. Answer: (c) Indian Statistical Institute (ISI)

The correct answer is Indian Statistical Institute (ISI).

Key Points

• The Ministry of Statistics and Programme Implementation (MoSPI) has introduced a draft bill to amend the Indian Statistical Institute Act, 1959, aiming to modernize the governance and administrative framework of the Indian Statistical Institute (ISI).

• The Indian Statistical Institute was established by the legendary statistician Prasanta Chandra Mahalanobis on December 17, 1931, and was later declared an Institution of National Importance by an Act of Parliament in 1959.

• As the institute approaches its centenary year in 2031, the government seeks to restructure its organizational hierarchy to enhance efficiency and accountability in its academic and research pursuits.

• A significant proposal in the draft bill includes the redesignation of the head of the institute from Director to Director General, bringing it in line with the leadership structure of other elite scientific and research organizations in India.

• The proposed legislation also focuses on reforming the ISI Council, which is the apex governing body, to improve the decision-making process and integrate modern management practices within the premier statistical body.

Additional Information

• National Sample Survey Office (NSSO) and Central Statistics Office (CSO):

• The NSSO was previously responsible for conducting large-scale nationwide sample surveys on various socio-economic aspects.

• The CSO was the nodal agency for coordinating statistical activities and preparing National Accounts, including Gross Domestic Product (GDP) estimates.

• In May 2019, the Government of India merged the NSSO and the CSO to form a unified National Statistical Office (NSO) under the MoSPI.

• Ministry of Statistics & Programme Implementation (MoSPI):

• This ministry consists of two wings: the Statistics Wing (NSO) and the Programme Implementation Wing.

• It is responsible for the release of key economic indicators such as the Index of Industrial Production (IIP) and the Consumer Price Index (CPI).

• The ministry also monitors the progress of Central Sector Projects costing 150 crore rupees and above.

Q33. Answer: (c) Puducherry

The correct answer is Puducherry.

Key Points

• The Government of Union Territories Act, 1963 was enacted by the Parliament to provide for Legislative Assemblies and Councils of Ministers for certain Union Territories (UTs).

• This Act was a direct consequence of the 14th Constitutional Amendment Act, 1962, which introduced Article 239A to the Indian Constitution, allowing Parliament to create a local legislature for UTs.

• Puducherry (then Pondicherry) was officially granted its own legislature through this Act in 1963, shortly after its de jure transfer from French administration to India.

• The Legislative Assembly of Puducherry consists of 30 members chosen by direct election and up to 3 members nominated by the Central Government.

• Initially, the Act also provided legislatures for Himachal Pradesh, Manipur, Tripura, and Goa, Daman and Diu, though most of these territories eventually achieved full statehood.

Additional Information

• Delhi:

• While it has a legislature, it was not established by the 1963 Act. It was granted a Legislative Assembly through the 69th Constitutional Amendment Act, 1991 and Article 239AA.

• The Government of National Capital Territory of Delhi Act, 1991 provides the legal framework for its governance.

• Chandigarh:

• Created as a Union Territory in 1966 via the Punjab Reorganisation Act to serve as a shared capital.

• It is governed by an Administrator and does not have its own legislature or Council of Ministers.

• Andaman & Nicobar Islands:

• Established as a Union Territory in 1956, it is administered directly by the President through a Lieutenant Governor.

• It remains a UT without a Legislative Assembly.

Q34. Answer: (a) Vijayanagara Empire

The correct answer is Vijayanagara Empire.

Key Points

• Hampi, situated on the southern bank of the Tungabhadra River in the state of Karnataka, served as the magnificent capital of the Vijayanagara Empire from 1336 to 1565 AD.

• The empire was founded by two brothers, Harihara I and Bukka Raya I, belonging to the Sangama Dynasty, who established a stronghold against the expansion of the northern Sultanates.

• The city reached its cultural and territorial peak during the reign of Krishnadevaraya (1509–1529 AD), who is considered the most powerful ruler of the Tuluva Dynasty.

• Hampi was renowned globally for its architectural brilliance, featuring massive fortifications, complex Dravidian-style temples, and innovative urban planning including aqueducts and markets.

• The prosperity of the city came to a violent end in 1565 following the Battle of Talikota, where a coalition of Deccan Sultanates (Bijapur, Golconda, Ahmednagar, and Bidar) defeated and subsequently plundered the capital.

• In recognition of its historical and architectural significance, UNESCO designated the group of monuments at Hampi as a World Heritage Site in 1986.

Additional Information

• Gupta Empire:

• Often referred to as the Golden Age of India (4th to 6th century CE), its primary capital was located at Pataliputra (modern-day Patna).

• Known for advancements in Sanskrit literature, astronomy, and the decimal system.

• Mughal Empire:

• An empire of Central Asian origin established by Babur in 1526.

• The empire's prominent capitals included Agra, Fatehpur Sikri, and Shahjahanabad (Old Delhi).

• Maurya Empire:

• Founded by Chandragupta Maurya in 322 BCE, it was the first pan-Indian empire.

• Its administrative center and capital was Pataliputra, and it is most famous for the reign of Ashoka the Great.

• Virupaksha Temple:

• One of the oldest structures in Hampi, dedicated to Lord Shiva, which remained an active place of worship even after the city was abandoned.

Q35. Answer: (c) System software

The correct answer is System software.

Key Points

• System software is a comprehensive category of computer programs designed to operate and control the computer hardware directly while providing a platform for application software to run.

• It serves as the fundamental intermediary layer between the physical circuitry of the machine and the end-user, ensuring that hardware resources like the Central Processing Unit (CPU), Random Access Memory (RAM), and storage units are managed efficiently.

• The primary role of system software is to handle low-level tasks such as memory management, process scheduling, and file system organization, which are essential for the overall stability and performance of the computer.

• By providing standardized Application Programming Interfaces (APIs) and system calls, it allows developers to create software that can interact with complex hardware without needing to know the specific technical details of the underlying components.

• This software type typically initiates during the booting process and remains active in the background throughout the entire computing session to monitor system health and resource allocation.

Additional Information

• Application Software:

• These are end-user programs developed to perform specific, non-computing tasks such as word processing, spreadsheet management, or web browsing.

• Unlike system software, these programs interact mostly with the Operating System rather than the hardware directly.

• Utility Software:

• A subset of system software focused on the optimization, configuration, and maintenance of the computer system.

• Common examples include antivirus software, disk defragmenters, and backup utilities that help keep the system running securely and smoothly.

• Driver Software:

• Also known as device drivers, these are specialized components of system software that act as translators between the

Operating System and external peripherals.

• They allow the OS to recognize and utilize hardware like graphics cards, printers, and scanners by providing specific instruction sets.

Q36. Answer: (c) Process Management

The correct answer is Process Management.

Key Points

• Process Management is the fundamental function of an Operating System (OS) responsible for managing the execution of multiple tasks, ensuring that the Central Processing Unit (CPU) is utilized efficiently.

• The specific task of allocating CPU time is known as CPU Scheduling. The OS uses a Short-term Scheduler to select which process in the 'Ready' state will be executed next by the processor.

• The concept of sharing CPU cycles among various users or programs emerged with the development of Multiprogramming and Time-Sharing Systems in the 1960s, specifically with systems like Multics and IBM OS/360.

• To manage this, the OS maintains a Process Control Block (PCB) for each process, which contains essential data like the Process State, Program Counter, and CPU Registers.

• When switching from one process to another, the OS performs a Context Switch, saving the current state of the running process and loading the saved state of the next process to be executed.

• Modern operating systems like Linux utilize advanced algorithms such as the Completely Fair Scheduler (CFS) to ensure that every process gets a fair share of processor time, minimizing latency and starvation.

Additional Information

• Memory Management:

• This function involves managing the Primary Memory (RAM). It keeps track of which parts of memory are currently in use and by whom.

• It performs Memory Allocation and Deallocation, ensuring processes do not interfere with each other's address spaces through techniques like Paging and Segmentation.

• Device Management:

• The OS manages Input/Output (I/O) devices such as printers, disks, and monitors using Device Drivers.

• It acts as an intermediary between the hardware and the software, managing I/O Queues and Interrupts.

• File Management:

• This involves the management of Secondary Storage. It handles File Creation, Deletion, and Directory Structures.

• It implements Access Control lists to protect data and maintains the File Allocation Table (FAT) or New Technology File System (NTFS) structures.

Q37. Answer: (b) Railways

The correct answer is Railways.

Key Points

• Railways serve as the principal mode of transportation for freight in India, particularly for heavy and bulky goods over long distances, due to their immense load-bearing capacity and cost-efficiency.

• The Indian Railways network is one of the largest in the world, spanning over 68,000 kilometers, which allows for the seamless movement of materials between mineral-rich zones and industrial hubs.

• Bulk commodities like coal, iron ore, cement, food grains, and fertilizers constitute the majority of the freight traffic, as rail transport can carry massive volumes in a single trip compared to other modes.

• From a technical perspective, a single freight train can carry a load equivalent to approximately 70 to 100 trucks, making it far more energy-efficient and reducing the logistics cost per tonne-kilometer for the national economy.

• The development of Dedicated Freight Corridors (DFC), such as the Eastern and Western DFCs, has been specifically designed to increase the speed and efficiency of heavy goods movement across the country.

Additional Information

• Waterways:

• While scientifically the cheapest mode of transport, Inland Waterways in India are limited by the navigability of rivers and seasonal water levels, currently carrying a much smaller share of bulk freight compared to rail.

• Roadways:

• Best suited for short to medium distances and providing door-to-door service, but they become economically unviable for extremely heavy bulk goods over long stretches due to high fuel consumption.

• Airways:

• The most expensive mode, utilized primarily for perishable goods, high-value electronics, or emergency supplies, and is unsuitable for heavy industrial raw materials.

Q38. Answer: (d) 44th Amendment

The correct answer is 44th Amendment.

Key Points

• The Right to Property was originally established as a Fundamental Right under Article 19(1)(f), which guaranteed citizens the right to acquire, hold, and dispose of property, and Article 31, which provided protection against the compulsory acquisition of property.

• The 44th Amendment Act, 1978, enacted by the Janata Party Government led by Morarji Desai, deleted Article 19(1)(f) and Article 31 from the list of Fundamental Rights in Part III of the Indian Constitution.

• The amendment inserted a new Article 300A in Part XII of the Constitution, which states that 'no person shall be deprived of his property save by authority of law', thereby restoring it as a Legal Right or Constitutional Right.

• As a result of this change, a citizen cannot directly approach the Supreme Court under Article 32 for the enforcement of the right to property, although they can still seek remedies through the High Courts under Article 226.

• This shift allowed the state to implement land reforms and acquire private property for public purposes more effectively, provided such actions are backed by valid legislation.

Additional Information

• 42nd Amendment Act (1976):

• Commonly referred to as the Mini-Constitution, it introduced significant changes including the addition of Socialist, Secular, and Integrity to the Preamble.

• It also established Fundamental Duties for citizens under Part IV-A (Article 51A).

• 48th Amendment Act (1984):

• This amendment was specifically concerned with the extension of President's Rule in the state of Punjab beyond the normal one-year period due to internal disturbances.

• 46th Amendment Act (1982):

• Addressed legal complexities regarding the Sales Tax on the transfer of property in goods involved in the execution of works contracts and the delivery of goods on hire-purchase.

Q39. Answer: (a) Introduction of the Enfield rifle with cartridges feared to contain animal fat.

The correct answer is Introduction of the Enfield rifle with cartridges feared to contain animal fat.

Key Points

• The immediate cause of the 1857 Uprising was the introduction of the Enfield P-53 Rifle, which required a new type of greased cartridge.

• To load the rifle, sepoys had to bite off the ends of these cartridges, which were rumored to be lubricated with tallow (cow fat) and lard (pig fat).

• This caused massive outrage as the cow is sacred to Hindus, while the pig is considered unclean in Islam; hence, both communities felt their religious sentiments were being intentionally violated by the British East India Company.

• The first major sign of resistance occurred in Barrackpore on March 29, 1857, when Mangal Pandey of the 34th Native Infantry attacked his officers, leading to his execution on April 8, 1857.

• The full-scale mutiny eventually erupted on May 10, 1857, at the military station in Meerut, from where the soldiers marched to Delhi to proclaim Bahadur Shah Zafar as their leader.

Additional Information

• While the greased cartridges were the trigger, other underlying causes contributed to the revolt:

• General Service Enlistment Act of 1856: This act mandated that all recruits of the Bengal Army must be willing to serve overseas, which many Upper-caste Hindus believed would lead to a loss of caste (crossing the Kala Pani).

• Doctrine of Lapse: Introduced by Lord Dalhousie, this policy allowed the British to annex princely states like Jhansi, Satara, and Nagpur if the ruler died without a natural male heir.

• Religious Reforms: The abolition of Sati (1829), the Widow Remarriage Act (1856), and the activities of Christian Missionaries were viewed as direct interference in Indian social and religious customs.

• Economic Exploitation: Heavy land revenue demands and the destruction of local handicrafts led to widespread rural distress.

Q40. Answer: (d) Prakrit

The correct answer is Prakrit.

Key Points

• Ashokan Inscriptions: The majority of the edicts issued by the Mauryan Emperor Ashoka (reigned c. 268−232 BCE) were composed in Prakrit. These inscriptions were strategically placed across the Indian subcontinent to propagate his philosophy of Dhamma in the vernacular language of the common people.

• Hathigumpha Inscription: King Kharavela of the Chedi Dynasty (Mahameghavahana) of Kalinga inscribed his achievements in

the Hathigumpha Inscription at Udayagiri, Odisha. This 17-line record is written in Prakrit using the Brahmi script.

• Language vs. Script: It is essential to note that while the language was Prakrit, the scripts varied. Most inscriptions used Brahmi, but in the northwestern regions, Kharoshthi, Greek, and Aramaic were also employed to reach local populations.

• Administrative Use: During the 3rd and 2nd centuries BCE, Prakrit served as the primary language for royal proclamations and administrative records, preceding the dominance of Classical Sanskrit in later centuries.

Additional Information

• Pali

• Commonly associated with the Theravada Buddhist canon and the Tipitaka.

• While linguistically related to Prakrit, it was not the formal language used in the Ashokan or Kharavela inscriptions.

• Sanskrit

• The use of Sanskrit in royal inscriptions became prominent later, notably with the Junagadh Rock Inscription of Rudradaman I around 150 CE.

• It eventually became the court language during the Gupta Empire.

• Evolution of Writing

• The Brahmi script used in these Prakrit inscriptions is the ancestor of most modern Indian scripts, including Devanagari, Bengali, and Tamil.

Q41. Answer: (d) Printed Circuit Board

The correct answer is Printed Circuit Board.

Key Points

• A Printed Circuit Board (PCB) is a rigid structure that physically supports and electrically connects electronic components using conductive pathways, tracks, or signal traces etched from copper sheets.

• In the context of a Computer System, the most significant PCB is the Motherboard (also known as the mainboard or system board), which serves as the backbone for connecting the Central Processing Unit (CPU), Random Access Memory (RAM), and all other internal hardware.

• PCBs are typically manufactured using a non-conductive substrate material, most frequently FR-4, which is a flame-retardant fiberglass-reinforced epoxy laminate.

• The primary function of a PCB is to ensure a stable electrical connection between components like transistors, capacitors, and microprocessors, while providing a compact and reliable layout for complex circuitry.

• The production of PCBs involves a process called photolithography or chemical etching to remove unwanted copper, leaving only the required circuit traces that define the electronic architecture of the device.

Additional Information

• Structural Layers of a PCB:

• Solder Mask: The outermost layer (typically green) that protects the copper traces from oxidation and prevents solder bridges during component assembly.

• Silkscreen: A layer of ink traces used to print labels, component identifiers (reference designators), and logos for easier maintenance and repair.

• Process Control Block:

• In the domain of Operating Systems (software), the acronym PCB can also refer to a Process Control Block, which is a data structure used by the Kernel to store information about a specific active process.

• Evolution of Circuitry:

• Before PCBs, circuits were built using point-to-point wiring, which was highly susceptible to short circuits and mechanical failure as complexity increased. The transition to PCBs allowed for the miniaturization of modern laptops, smartphones, and high-performance servers.

Q42. Answer: (b) Non-volatile and larger in storage capacity

The correct answer is Non-volatile and larger in storage capacity.

Key Points

• Secondary memory, frequently referred to as auxiliary memory or external storage, is designed to store data and programs permanently. Unlike primary memory, it is not directly accessible by the Central Processing Unit (CPU); instead, data must be loaded into the Random Access Memory (RAM) via Input/Output channels before execution.

• A fundamental attribute of secondary memory is that it is non-volatile. This ensures that all stored information, including the Operating System (OS), software applications, and personal files, remains intact even after the computer is powered down or in the event of a power failure.

• Secondary memory devices offer a vastly larger storage capacity compared to main memory. While RAM typically ranges from 4 GB to 64 GB in modern personal computers, secondary storage solutions such as Hard Disk Drives (HDD) and Solid State Drives

(SSD) commonly provide capacities ranging from 256 GB to several terabytes (TB).

• In the memory hierarchy, secondary storage is positioned below primary memory because it is significantly slower in terms of data access speed but much more cost-effective per gigabyte of storage, allowing for the mass retention of data.

Additional Information

• Primary Memory (RAM):

• It is volatile, meaning it loses all data once the power supply is disconnected.

• It facilitates high-speed data transfer as it is directly connected to the CPU via the memory bus.

• Common Secondary Storage Devices:

• Magnetic Storage: Includes Hard Disk Drives (HDD) and Magnetic Tapes, which use magnetic fields to read and write data.

• Optical Storage: Includes CD-ROMs, DVDs, and Blu-ray Discs, which utilize laser technology for data retrieval.

• Flash Memory: Includes Solid State Drives (SSD), USB Flash Drives, and SD Cards, which are faster and more durable than traditional mechanical disks due to the absence of moving parts.

• Direct Memory Access (DMA): This is a feature that allows certain hardware subsystems to access main system memory independently of the CPU, but it does not apply to the CPU directly executing instructions from secondary storage.

Q43. Answer: (c) Al2(SO4)3

The correct answer is Al2(SO4)3.

Key Points

• The chemical formula of Aluminium Sulphate is determined using the valency or oxidation state of the constituent ions to ensure the resulting compound is electrically neutral.

• Aluminium (Al) is a group 13 element and typically forms a cation with a charge of +3 (Al^(3+)), meaning it loses three electrons to achieve a stable octet.

• The Sulphate ion (SO4) is a polyatomic anion consisting of one sulphur atom and four oxygen atoms, carrying a collective charge of -2 (SO4^(2−)).

• Applying the criss-cross method, the numerical value of the charge of the Aluminium ion (3) becomes the subscript for the Sulphate ion, and the numerical value of the charge of the Sulphate ion (2) becomes the subscript for the Aluminium ion.

• To balance the total charge: 2 × (+3) + 3 × (−2) = 0. Therefore, two aluminium atoms combine with three sulphate groups to form Al2(SO4)3.

Additional Information

• Properties and Characteristics:

• Molar Mass: The anhydrous form of Aluminium Sulphate has a molar mass of approximately 342.15 g/mol.

• Physical Appearance: It usually appears as a white crystalline solid or powder and is highly hygroscopic, meaning it readily absorbs moisture from the air.

• Solubility: It is highly soluble in water but virtually insoluble in ethanol. When dissolved in water, it undergoes hydrolysis to form an acidic solution.

• Industrial Uses:

• Water Purification: It acts as a coagulant, causing impurities to clump together (flocculation) so they can be easily filtered out.

• Paper Industry: Used as a sizing agent to adjust the paper's absorbency and improve its printability.

• Textile Dyeing: Functions as a mordant, helping dyes adhere to fabric fibers like cotton.

Q44. Answer: (c) Bilateral Investment Treaty - BIT

The correct answer is Bilateral Investment Treaty - BIT.

Key Points

• The Bilateral Investment Treaty (BIT) between India and Uzbekistan was signed on September 24, 2024, in Tashkent. This agreement represents a significant step in deepening economic cooperation and providing a secure legal framework for investors from both nations.

• The treaty was signed by the Union Minister for Finance and Corporate Affairs of India, Nirmala Sitharaman, and the Deputy Prime Minister of Uzbekistan, Jamshid Khodjaev, during the Minister’s visit to attend the 9th Annual Meeting of the Board of Governors of the Asian Infrastructure Investment Bank (AIIB) held in Samarkand.

• The BIT is designed to protect investments against non-commercial risks, ensuring fair and equitable treatment and protection from expropriation without adequate compensation. It replaces the previous Bilateral Investment Promotion and Protection Agreement (BIPPA) between the two countries.

• After both governments completed the necessary domestic ratification procedures, the treaty officially came into force in May 2025, establishing a predictable investment climate and facilitating greater capital flows into sectors like pharmaceuticals, information technology, and infrastructure.

Additional Information

• Bilateral Investment Treaty (BIT):

• This treaty is based on the 2015 Model BIT of India, which includes an Investor-State Dispute Settlement (ISDS) mechanism, requiring investors to exhaust local remedies for a specified period before moving to international arbitration.

• It aligns with India's Connect Central Asia Policy, aimed at strengthening ties with resource-rich Central Asian Republics.

• Comprehensive Economic Partnership Agreement (CEPA):

• A CEPA is a comprehensive free trade agreement that covers trade in goods, services, and investment. India has signed such agreements with the UAE and Mauritius, but the agreement with Uzbekistan in 2024 was specifically a BIT.

• Double Taxation Avoidance Agreement (DTAA):

• A DTAA is a tax treaty between two countries to avoid the same income being taxed twice. India and Uzbekistan already have a DTAA in place, which was originally signed in 1993 and subsequently updated.

Q45. Answer: (a) 1950

The correct answer is 1950.

Key Points

• The Planning Commission of India was established on 15 March 1950 through an executive resolution of the Government of India.

• It was created based on the recommendations of the Advisory Planning Board, which was constituted in 1946 under the chairmanship of K.C. Neogy.

• The organization functioned as an extra-constitutional and non-statutory body, meaning its existence was not defined by the Constitution of India nor created by an Act of Parliament.

• The Prime Minister of India served as the Ex-officio Chairman of the commission; Pandit Jawaharlal Nehru was its first chairman, while Gulzarilal Nanda served as the first Deputy Chairman.

• Its primary mandate was to formulate Five-Year Plans to promote the balanced and effective utilization of the country's resources for economic development.

Additional Information

• NITI Aayog (National Institution for Transforming India):

• Established on 1 January 2015, it replaced the Planning Commission to better serve the needs of a modern India.

• It serves as the premier policy Think Tank of the Union Government, providing both directional and policy inputs.

• Unlike the Planning Commission which followed a top-down approach, NITI Aayog emphasizes a bottom-up approach and the spirit of Cooperative Federalism.

• National Development Council (NDC):

• Formed on 6 August 1952, the NDC was the apex body responsible for the final approval of the Five-Year Plans prepared by the Planning Commission.

• The First Five-Year Plan:

• Launched in 1951 (covering the period 1951−1956), it was based on the Harrod-Domar model and focused primarily on the development of the agricultural sector.

Q46. Answer: (d) 42nd Constitutional Amendment Act

The correct answer is 42nd Constitutional Amendment Act.

Key Points

• The 42nd Constitutional Amendment Act, enacted in 1976 during the Internal Emergency under the Indira Gandhi administration, is the most extensive amendment in the history of the Indian Constitution.

• This amendment is famously known as the Mini-Constitution because it introduced massive changes to the constitutional structure, including the Preamble, Fundamental Rights, and Directive Principles.

• For the first and only time since the adoption of the Constitution, the Preamble was amended to include three new terms: Socialist, Secular, and Integrity.

• The insertion of the word Socialist was intended to emphasize the egalitarian goals of the Indian state, specifically Democratic Socialism, which aims to end poverty, ignorance, disease, and inequality of opportunity.

• The addition of Socialist formally aligned the Preamble with the Directive Principles of State Policy, particularly Article 39, which seeks the equitable distribution of material resources.

• Unlike the communistic socialism of the Soviet model, Indian Socialism is a Gandhian-Marxist blend that favors a mixed economy where the private and public sectors co-exist.

Additional Information

• 38th Constitutional Amendment Act (1975):

• Empowered the President to declare a state of Emergency that would be non-justiciable in a court of law.

• Ensured that Ordinances promulgated by the President or Governors could not be challenged in court.

• 44th Constitutional Amendment Act (1978):

• Enacted by the Janata Government to undo several controversial changes brought by the 42nd Amendment.

• It removed the Right to Property from the list of Fundamental Rights and made it a Legal Right under Article 300A.

• 86th Constitutional Amendment Act (2002):

• Inserted Article 21A, making Free and Compulsory Education a Fundamental Right for children aged 6 to 14 years.

• Added a new Fundamental Duty under Article 51A(k) for parents and guardians.

Q47. Answer: (c) Aw – Deciduous forests and tree-shredded grasslands

The correct answer is Aw - Deciduous forests and tree-shredded grasslands.

Key Points

• BWh represents the Subtropical Hot Desert climate. The letter B stands for arid climates, W for desert (Wüste), and h for hot. This climate is characterized by high temperatures and extremely low precipitation, supporting xerophytic vegetation like cacti and thorny bushes rather than a dense evergreen canopy. Hence, statement 1 is incorrect.

• ET stands for the Tundra climate within the Polar (E) group. In this climate, the average temperature of the warmest month is between 0°C and 10°C. The vegetation consists of mosses, lichens, and stunted shrubs, while tropical rainforests are associated with the Af climate. Hence, statement 2 is incorrect.

• Aw denotes the Tropical Savanna climate. It is defined by a distinct dry season (usually in winter) and a wet season. The vegetation comprises deciduous forests that shed leaves during the dry period and grasslands interspersed with trees (often referred to as savanna). Hence, statement 3 is correct.

• Cfa refers to the Humid Subtropical climate, characterized by hot, humid summers and mild winters with rainfall occurring throughout the year. Cold deserts (BWk) and permafrost (EF/ET) are found in much colder or more arid latitudinal zones. Hence, statement 4 is incorrect.

Additional Information

• Koeppen Climate Classification System: Developed by Wladimir Koeppen in 1884, it categorizes climates based on monthly and annual averages of temperature and precipitation.

• Group A (Tropical Humid): Tropical climates where the average temperature of every month is 18°C or higher.

• Af: Tropical Wet (Rainforest).

• Am: Tropical Monsoon.

• Aw: Tropical Wet and Dry (Savanna).

• Group B (Dry Climates): Regions where potential evapotranspiration exceeds precipitation.

• BSh: Semi-arid Steppe.

• BWk: Mid-latitude Cold Desert.

• Group C (Warm Temperate): Mid-latitude climates with mild winters; the coldest month average is between −3°C and 18°C.

Q48. Answer: (d) Sushil Kumar

The correct answer is Sushil Kumar.

Key Points

• Sushil Kumar is a former Indian freestyle wrestler who holds the distinction of being the first athlete from independent India to win two individual Olympic medals.

• He secured his first Olympic Bronze medal at the 2008 Beijing Olympics in the 66 kg freestyle category, ending a 56-year drought for India in Olympic wrestling since Kashaba Dadasaheb Jadhav won bronze in 1952.

• He achieved his second Olympic medal, a Silver, at the 2012 London Olympics, where he served as the flag bearer for the Indian contingent during the opening ceremony.

• In 2010, at the FILA World Wrestling Championships held in Moscow, he created history by becoming the first Indian wrestler to win a World Championship Gold medal.

• He was honored with India s highest sporting award, the Major Dhyan Chand Khel Ratna (formerly Rajiv Gandhi Khel Ratna), in 2009 for his exceptional contributions to the sport.

Additional Information

• Geeta Phogat:

• She is the first Indian female wrestler to win a Gold medal in wrestling at the Commonwealth Games (Delhi 2010).

• She was also the first Indian woman wrestler to qualify for the Olympic Games (London 2012).

• Col. Rajyavardhan Singh Rathore:

• An acclaimed shooter who won India s first individual Silver medal at the Olympics post-independence during the 2004 Athens Games in the Double Trap event.

• He later transitioned into politics and served as the Minister of State (Independent Charge) for Youth Affairs and Sports.

• Bajrang Punia:

• A highly decorated freestyle wrestler who won the Bronze medal at the 2020 Tokyo Olympics in the 65 kg category.

• He holds the record for being the only Indian wrestler to win four medals at the World Wrestling Championships (one silver and three bronze).

Q49. Answer: (d) Rs. 2,000 crore

The correct answer is Rs. 2,000 crore.

Key Points

• The Rural Infrastructure Development Fund (RIDF) was established by the Government of India during the financial year 1995-96.

• The primary motive behind creating this fund was to provide low-cost credit to State Governments and State-owned corporations to help them complete ongoing rural infrastructure projects that were stalled due to a lack of resources.

• The National Bank for Agriculture and Rural Development (NABARD) is the designated authority responsible for the administration and operational management of the RIDF.

• When the fund was launched under the RIDF I tranche in 1995-96, it began with an initial corpus of Rs. 2,000 crore.

Additional Information

• Funding Mechanism:

• The corpus of the RIDF is generated from the shortfall in lending to the Priority Sector (specifically agriculture) by Scheduled Commercial Banks.

• Banks that do not meet their Priority Sector Lending (PSL) targets are required to contribute to the fund as per the guidelines issued by the Reserve Bank of India (RBI).

• Scope and Coverage:

• Initially, the fund focused primarily on irrigation projects.

• Currently, it covers 39 eligible activities classified into three main categories: Agriculture and Related Sectors, Social Sector, and Rural Connectivity (roads and bridges).

• The Agriculture Sector accounts for a significant portion of the total sanctions, aiming to boost rural productivity and employment.

• Evolution of the Corpus:

• Since its inception with Rs. 2,000 crore, the annual allocation for the RIDF is announced in the Union Budget every year.

• The allocation has increased multi-fold over the years; for instance, the allocation for RIDF XXVII (2021-22) reached Rs. 40,000 crore to support rural growth.

Q50. Answer: (a) Akbar

The correct answer is Akbar.

Key Points

• The Zabti system, also known as the Dahshala system, was the most organized land revenue mechanism introduced during the reign of Emperor Akbar around 1580-1582.

• The system was developed and implemented by Akbar's Finance Minister, Raja Todar Mal, who was a brilliant administrator previously associated with Sher Shah Suri.

• Under this method, the revenue was fixed based on the average yield of land and the prevailing prices over the preceding ten years.

• It required a systematic measurement of land using a standardized unit called the Ilahi Gaz and a measuring tool made of bamboo called the Tanab.

• Revenue was collected strictly in cash, which helped the Mughal state maintain a stable treasury and facilitated the expansion of the imperial military and administrative machinery.

• The system was prevalent in the core provinces of the Mughal Empire, including Agra, Delhi, Lahore, Allahabad, and Malwa, where the administration could maintain detailed records.

Additional Information

• Land Classification: To ensure fair taxation, land was divided into four categories based on the frequency of cultivation:

• Polaj: Fertile land that was cultivated every year and never left fallow.

• Parauti: Land left fallow for a year or two to recover its natural fertility.

• Chachar: Land that remained uncultivated for three to four years.

• Banjar: Inferior land that remained out of cultivation for five years or more.

• Babar and Humayun: As the early Mughal rulers, they were primarily focused on territorial consolidation and military defense; hence, they did not establish a long-term administrative revenue framework like the Zabti.

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• Aurangzeb: During his later reign, the agrarian system faced severe stress due to high revenue demands and the Jagirdari crisis, where the available land (Paibaqi) was insufficient to meet the grants required for the growing number of Mansabdars.

Q51. Answer: (a) Proteins

The correct answer is Proteins.

Key Points

• Pepsin is a powerful enzyme found in Gastric Juice that initiates the digestion of proteins by breaking them down into smaller units called Peptones and Proteoses.

• It is secreted by the Chief Cells (peptic cells) of the stomach lining in an inactive proenzyme form known as Pepsinogen.

• The activation of Pepsinogen into Pepsin requires an acidic medium, which is provided by Hydrochloric Acid (HCl) secreted by the Oxyntic Cells (parietal cells).

• The stomach maintains a highly acidic pH level (approximately 1.8), which is the optimum environment for Pepsin to function efficiently as an Endopeptidase.

• By hydrolyzing internal peptide bonds, Pepsin transforms long-chain complex Proteins into shorter polypeptide chains, facilitating further digestion in the Small Intestine.

Additional Information

• Carbohydrates:

• Digestion begins in the Buccal Cavity through the action of Salivary Amylase (Ptyalin).

• Final breakdown into simple sugars like Glucose occurs in the small intestine via Pancreatic Amylase and Disaccharidases.

• Fats:

• Requires Emulsification by Bile Salts produced in the Liver and stored in the Gallbladder.

• The enzyme Lipase, primarily from the Pancreas, breaks down fats into Fatty Acids and Glycerol.

• Vitamins:

• These are Micronutrients essential for metabolic functions but do not require enzymatic breakdown for energy.

• They are absorbed directly in the Small Intestine, specifically in the Ileum for Vitamin B12.

Q52. Answer: (c) Lichchhavi

The correct answer is Lichchhavi.

Key Points

• Chandragupta I (reigned c. 319–335 CE) was the son of Ghatotkacha and the first powerful ruler of the Gupta dynasty to adopt the imperial title of Maharajadhiraja (King of Kings).

• He significantly elevated his political status and the influence of the Gupta Empire by marrying Princess Kumaradevi of the Lichchhavi tribe, an ancient and prestigious Kshatriya clan.

• The Lichchhavis were a dominant power in Vaishali (modern-day Bihar), and this matrimonial alliance provided the Guptas with substantial territorial and political leverage over the Magadha region.

• To commemorate this union, Chandragupta I issued a special series of gold coins known as the King-and-Queen type (or Chandragupta-Kumaradevi type), featuring the names and portraits of both the King and the Queen.

• The prestige associated with the Lichchhavi lineage was so high that their son, Samudragupta, proudly referred to himself as Lichchhavi-dauhitra (grandson of the Lichchhavis) in his famous Allahabad Pillar Inscription (Prayag Prashasti).

Additional Information

• Avanti:

• An ancient Indian Mahajanapada located in the Malwa region with its capital at Ujjain. It was later annexed into the Gupta Empire during the reign of Chandragupta II.

• Panchala:

• A historical region in the Ganges-Yamuna Doab of Northern India, known for being one of the sixteen Mahajanapadas mentioned in ancient Buddhist and Jain texts.

• Gandhara:

• A region situated in present-day Afghanistan and Pakistan, famous for its unique Gandhara School of Art and the ancient learning center at Takshashila.

Q53. Answer: (d) Ultrasound

The correct answer is Ultrasound.

Key Points

• The human auditory system is sensitive to a specific range of vibrations known as the audible range, which typically spans from 20 Hz to 20,000 Hz.

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• Sound waves with frequencies that surpass the upper limit of 20,000 Hz (or 20 kHz) are scientifically classified as ultrasound or ultrasonic waves.

• While these waves are physically identical to audible sound in terms of propagation, they are inaudible to the human ear because the tympanic membrane cannot vibrate at such high speeds.

• Many animals, including bats, dolphins, and porpoises, have the biological capability to produce and hear ultrasound, utilizing it for echolocation to hunt and navigate.

• The Hertz (Hz) is the standard SI unit of frequency, representing the number of cycles per second; thus, ultrasound involves over 20,000 vibrations every second.

Additional Information

• Infrasound:

• Refers to sound waves with a frequency below 20 Hz, which is the lower limit of human hearing.

• Sources include seismic waves from earthquakes, volcanic eruptions, and ocean tides.

• Large mammals like elephants and rhinoceroses communicate using infrasonic signals over vast distances.

• Supersonic:

• This term describes the velocity of an object rather than its frequency. An object is supersonic if it travels faster than the speed of sound (approximately 343 m/s in air).

• When an aircraft reaches supersonic speeds, it produces a sonic boom due to the accumulation of shock waves.

• Tones:

• A tone is a sound that consists of a single, pure frequency. Most musical sounds are actually "notes," which combine a fundamental frequency with several harmonics.

• Practical Applications of Ultrasound:

• Medical Imaging: Utilized in sonography to visualize fetuses and internal organs without ionizing radiation.

• SONAR: Used by submarines and ships to detect underwater obstacles and measure the depth of the sea.

• Industrial Cleaning: High-frequency vibrations are used to remove contaminants from delicate electronic components and surgical instruments.

Q54. Answer: (b) Flight acceptance hot testing of the CE20

The correct answer is Flight acceptance hot testing of the CE20.

Key Points

• On March 14, 2025, the Indian Space Research Organisation (ISRO) successfully conducted the flight acceptance hot testing of the CE20 cryogenic engine, marking a pivotal advancement in India's propulsion capabilities.

• This specific engine is identified for the LVM3-M6 mission, which is the sixth operational mission of the Launch Vehicle Mark-3 (LVM3).

• The test was carried out at the ISRO Propulsion Complex (IPRC) in Mahendragiri, Tamil Nadu, which is the primary facility for testing liquid propulsion systems.

• A major achievement of this session was firing the engine for a duration of 100 seconds under non-vacuum (sea-level) conditions, significantly exceeding previous limitations.

• The test utilized an innovative Nozzle Protection System (NPS), which allowed for longer firing durations without the risk of flow separation or thermal damage that typically occurs when testing high-area-ratio nozzles at sea level.

• Before this development, flight acceptance tests were typically conducted at the High-Altitude Test (HAT) facility with a maximum duration of 25 seconds due to the complexity of maintaining vacuum conditions.

Additional Information

• CE20 Cryogenic Engine:

• It is India's first indigenous cryogenic engine to use a Gas Generator cycle, providing high thrust to the Cryogenic Upper Stage (C25) of the LVM3.

• It operates using Liquid Oxygen (LOX) as the oxidizer and Liquid Hydrogen (LH2) as the fuel, delivering the high specific impulse necessary for heavy-lift missions.

• The CE20 has been successfully human-rated for the upcoming Gaganyaan mission, demonstrating its high reliability and safety standards.

• Other Milestones in March 2025:

• On March 28, 2025, ISRO reached another milestone by conducting the first successful hot test of the Semi-cryogenic Engine Power Head Test Article (PHTA).

• The semi-cryogenic engine is designed to use Refined Kerosene (ISROSENE) and Liquid Oxygen, aiming to boost the payload capacity of the LVM3 from 4 tonnes to 6 tonnes for GTO missions.

Q55. Answer: (b) Environment Protection (Management of Contaminated Sites) Rules, 2025

Concept:

The Ministry of Environment, Forest and Climate Change (MoEFCC) has introduced a specific legal framework to address the long-standing issue of toxic and hazardous substance contamination in soil and water. These rules provide a systematic, time-bound procedure for handling sites that pose a risk to human health and the environment due to historical industrial activities or waste dumping.

Key Points:

• Notification: The rules were notified on July 24, 2025, under the powers conferred by the Environment (Protection) Act, 1986.

• Process Stages: The framework involves Identification (listing suspected sites), Determination (conducting preliminary and detailed assessments to confirm contamination levels), and Remediation (executing cleanup plans).

• Accountability: They incorporate the 'Polluter Pays' principle, holding the responsible party liable for the costs of restoration.

• Thresholds: Sites are declared 'contaminated' if hazardous substance concentrations exceed the response levels specified in the rules.

Important Provisions:

• The State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) are responsible for the technical assessment and declaration of these sites.

• A centralized online portal is used to maintain an inventory of suspected, probable, and confirmed contaminated sites.

• Exclusions include sites affected strictly by radioactive waste, mining operations, or marine oil spills, which are governed by other specific acts unless contaminants exceed the response levels defined in these new rules.

Final Answer: The rules that define the process of identification, determination, and remediation of contaminated sites are the Environment Protection (Management of Contaminated Sites) Rules, 2025.

Q56. Answer: (c) Widow Remarriage Association

The correct answer is Widow Remarriage Association.

Key Points

• Mahadev Govind Ranade, often hailed as the Socrates of Maharashtra, was a distinguished Indian scholar, social reformer, and a judge of the Bombay High Court.

• He founded the Widow Remarriage Association in 1861 (also known as Punarvivahottejak Mandali) to promote the welfare of widows and encourage their remarriage, following the Hindu Widows Remarriage Act of 1856.

• Ranade was a primary leader of the Prarthana Samaj in Bombay, which focused on social reforms such as the education of women and the abolition of the caste system and child marriage.

• He established the Poona Sarvajanik Sabha in 1870, an organization aimed at representing the interests of the peasantry and acting as a mediator between the people and the British Government.

• He was a founding member of the Indian National Congress (1885) and initiated the Indian National Social Conference in 1887, which addressed social issues on a national platform.

• Known as the Father of Indian Economics, he advocated for state intervention to foster industrialization and economic growth in India.

Additional Information

• Brahmo Samaj:

• Founded by Raja Ram Mohan Roy in 1828 in Calcutta.

• It was the first major reform movement in Hinduism, advocating for monotheism and the abolition of Sati.

• Arya Samaj:

• Established by Swami Dayanand Saraswati in 1875 in Bombay.

• It promoted the infallible authority of the Vedas and introduced the Shuddhi movement to bring back converts to the Hindu fold.

• Indian National Congress:

• Founded in December 1885 at Gokuldas Tejpal Sanskrit College, Bombay.

• The organization was founded by Allan Octavian Hume (A.O. Hume), a retired British civil servant, with Womesh Chandra Bonnerjee serving as its first President.

Q57. Answer: (a) To attract foreign investment

The correct answer is To attract foreign investment.

Key Points

• The 1991 Economic Reforms were launched to tackle a severe Balance of Payments (BoP) crisis, where foreign exchange reserves had dropped to levels barely sufficient for two weeks of imports.

• Tax incentives, such as tax holidays and reduced corporate tax rates, were designed to lower the cost of entry for Multi-National

Corporations (MNCs) and Foreign Institutional Investors (FIIs).

• The primary objective was to encourage the inflow of Foreign Direct Investment (FDI) to supplement domestic capital, which was insufficient to fund industrial growth and infrastructure development.

• These incentives were intended to facilitate the transfer of advanced technology and modern managerial practices from developed nations to the Indian industrial sector.

• By attracting foreign capital, the government aimed to modernize the manufacturing sector and make Indian products more competitive in the global market.

Additional Information

• Liberalization:

• Involved the dismantling of the License-Permit Raj, allowing private players to enter sectors previously reserved for the government.

• Reduced the statutory liquidity ratio (SLR) and cash reserve ratio (CRR) to increase the lending capacity of banks.

• Globalization:

• Aimed at integrating the Indian economy with the World Economy by reducing import tariffs and export duties.

• Encouraged the convertibility of the rupee on the current account to facilitate smoother international trade.

• Privatization:

• Focused on the disinvestment of Public Sector Undertakings (PSUs) to improve efficiency through private ownership and management.

• Shifted the government's role from a producer to a regulator and facilitator of economic activity.

Q58. Answer: (a) Article 43

The correct answer is Article 43.

Key Points

• Article 43 of the Indian Constitution mandates that the State shall endeavor to secure, by suitable legislation or economic organization, a living wage and conditions of work ensuring a decent standard of life for all workers.

• This article covers all categories of workers, including those in the agricultural and industrial sectors, ensuring they have full enjoyment of leisure and social and cultural opportunities.

• The concept of a living wage is more comprehensive than a minimum wage, as it aims to provide for the basic requirements of a family, including food, clothing, housing, and education for children.

• Furthermore, Article 43 specifically mentions the promotion of cottage industries on an individual or cooperative basis in rural areas, reflecting the Gandhian Principles within the Directive Principles of State Policy.

Additional Information

• Article 41:

• Directs the State to ensure the right to work, to education, and to public assistance in cases of unemployment, old age, sickness, and disablement.

• Article 42:

• Requires the State to make provisions for securing just and humane conditions of work and for maternity relief.

• Article 47:

• Focuses on the duty of the State to raise the level of nutrition and the standard of living of its people and the improvement of public health.

• It also includes the endeavor to bring about the prohibition of the consumption of intoxicating drinks and drugs.

Q59. Answer: (a) France

The correct answer is France.

Key Points

• In February 2025, India and France strengthened their long-standing bilateral ties by signing a joint declaration to establish a partnership focused on Advanced and Small Modular Nuclear Reactors (SMRs).

• The agreement was formalized between India's Department of Atomic Energy (DAE) and the French Commissariat à l'énergie atomique et aux énergies alternatives (CEA).

• The partnership aims to facilitate technical cooperation, joint research, and development of low-carbon nuclear technologies to support industrial decarbonization and energy security.

• This initiative is a critical component of the Horizon 2047 roadmap, which outlines the strategic cooperation between the two nations for the next 25 years.

• The focus on Small Modular Reactors (SMRs) highlights a shift towards more flexible, cost-effective, and safer nuclear power solutions compared to traditional large-scale reactors.

Additional Information

• Small Modular Reactors (SMRs):

• These are advanced nuclear reactors with a power capacity of up to 300 MW(e) per unit.

• They are characterized by their modular design, allowing for factory fabrication and easier transportation to remote sites.

• SMRs offer enhanced safety features, such as passive cooling systems that do not require human intervention or external power.

• India-France Nuclear History:

• France was the first country to sign a Civil Nuclear Cooperation Agreement with India in 2008 after the Nuclear Suppliers Group (NSG) waiver.

• The two countries are already collaborating on the Jaitapur Nuclear Power Project in Maharashtra, which aims to install six Evolutionary Power Reactors (EPRs) with a total capacity of 9.6 GW.

• The Strategic Partnership between India and France was established in 1998, covering defense, space, and nuclear energy.

Q60. Answer: (b) Panchayats and Municipalities

The correct answer is Panchayats and Municipalities.

Key Points

• The State Election Commission (SEC) is a constitutional body created under the 73rd and 74th Constitutional Amendment Acts of 1992 to ensure the autonomous conduct of local government elections.

• According to Article 243K of the Constitution of India, the superintendence, direction, and control of the preparation of electoral rolls and the conduct of all elections to the Panchayats (Gram Panchayats, Panchayat Samitis, and Zilla Parishads) are vested in the State Election Commission.

• Similarly, Article 243ZA mandates that the SEC is responsible for conducting and supervising elections to Municipalities, including Municipal Corporations, Municipal Councils, and Nagar Panchayats.

• The State Election Commissioner is appointed by the Governor of the state, and their conditions of service and tenure are determined by state laws, providing them with a status equivalent to a High Court Judge regarding removal procedures.

Additional Information

• Election Commission of India (ECI):

• Established under Article 324, the ECI is an independent constitutional authority responsible for administering election processes at the national and state levels.

• The ECI conducts elections for the Lok Sabha, Rajya Sabha, State Legislative Assemblies, and State Legislative Councils.

• It is also the sole authority for conducting the elections of the President and Vice-President of India.

• Jurisdiction Differences:

• While the ECI manages parliamentary and legislative elections, it has no role in Panchayati Raj Institutions or Urban Local Bodies.

• The State Election Commission functions independently of the Election Commission of India for the specific purpose of Local Self-Government.

Q61. Answer: (d) Sulphur dioxide

The correct answer is Sulphur dioxide.

Key Points

• Acid rain refers to any form of precipitation, including rain, snow, or fog, that contains elevated levels of nitric and sulphuric acids.

• The primary chemical responsible for this phenomenon is Sulphur dioxide (SO2), which is released into the atmosphere through the combustion of fossil fuels (like coal and oil) in power plants and industrial boilers.

• Once in the atmosphere, SO2 reacts with water vapor, oxygen, and other chemicals to form Sulphuric acid (H2SO4), which eventually falls to the ground as acid rain.

• While normal rainwater is slightly acidic with a pH value of about 5.6 (due to dissolved Carbon dioxide), acid rain typically has a pH value between 4.2 and 4.4.

• The environmental impact of acid rain includes the acidification of aquatic environments, damage to forest vegetation, and the chemical weathering of stone buildings and cultural monuments like the Taj Mahal.

Additional Information

• Carbon monoxide (CO):

• A colorless, odorless, and highly toxic gas produced by the incomplete combustion of carbon-based fuels.

• It does not directly contribute to acid rain but poses significant health risks by reducing the oxygen-carrying capacity of blood.

• Ozone (O3):

• Found in the troposphere, it acts as a secondary pollutant and a major component of photochemical smog.

• While it helps catalyze some atmospheric oxidation processes, it is not a direct precursor to acid rain formation.

• Ammonia (NH3):

• An alkaline gas primarily emitted from agricultural activities, livestock management, and fertilizer use.

• In the atmosphere, it can act as a buffering agent to neutralize acidic compounds, though its deposition can still lead to soil and water issues.

Q62. Answer: (d) Kerala

The correct answer is Kerala.

Key Points

• Tholpavakoothu is a traditional ritualistic shadow puppetry art form that originated and is primarily practiced in the state of Kerala, specifically in the districts of Palakkad, Thrissur, and Malappuram.

• The name is a compound of three Malayalam words: Thol meaning leather, Pava meaning puppet, and Koothu meaning play or performance.

• It is traditionally performed in specially constructed permanent theaters called Koothumadams located within the premises of Bhadrakali temples, as an offering to the goddess.

• The performance is based on the Kamba Ramayana, the Tamil version of the epic written by the poet Kambar, spanning across 21 parts over 21 nights.

• The puppets are crafted from deer skin, meticulously perforated to create intricate patterns that project shadows onto a white cloth screen when illuminated by coconut-shell oil lamps (Chirathu).

Additional Information

• Puppetry Traditions in Other States:

• Andhra Pradesh: Known for Tholu Bommalata, where puppets are large, multicolored, and translucent, creating vibrant shadows.

• Odisha: Known for Ravana Chhaya, which uses puppets made from a single piece of leather without jointed limbs, resulting in opaque, non-colored shadows.

• West Bengal: Famous for various string and rod puppetry forms like Putul Nautch and Danger Putul Nach, often performed during local fairs.

• Karnataka: Practices Togalu Gombeyaata, a shadow puppet form similar to those in Andhra Pradesh but with distinct regional stylistic variations.

• Tamil Nadu: Has a similar form called Tholpavai Koothu, which shares historical roots with the Kerala tradition but has evolved differently in its musical and linguistic execution.

Q63. Answer: (b) Ecosystem

The correct answer is Ecosystem.

Key Points

• An ecosystem is considered the structural and functional unit of nature because it encompasses the complex interactions between living organisms and their physical environment.

• The term was coined by A.G. Tansley in 1935 to describe a self-regulating and self-sustaining system.

• The structural features of an ecosystem consist of biotic components (producers, consumers, and decomposers) and abiotic components (temperature, light, water, and soil).

• The functional aspects of an ecosystem include energy flow, nutrient cycling, productivity, and decomposition, which ensure the continuity of life within a specific geographical area.

• Ecosystems can vary significantly in scale, ranging from a small pond or a single tree to vast biomes like tropical rainforests or the entire biosphere.

Additional Information

• Environment:

• It refers to the sum total of all external conditions (physical, chemical, and biological) that surround and influence an organism.

• While it provides the setting for life, it lacks the specific internal functional cycles that define an ecosystem.

• Cell:

• The cell is the fundamental structural and functional unit of life or living organisms, not of nature as a whole.

• All living things are composed of cells, and the study of these units is known as Cytology.

• Ecology:

• Ecology is the scientific study of the relationships and interactions between organisms and their environment.

• The concept was popularized by Ernst Haeckel in 1866, who defined it as the study of the economy of nature.

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Q64. Answer: (c) ET – Tundra climate

The correct answer is ET - Tundra climate.

Key Points

• The Tundra climate (ET) is a polar climate characterized by extremely cold temperatures where the warmest month has an average temperature between 0°C and 10°C.

• The defining soil characteristic of this region is permafrost, which refers to ground, including rock or soil, that remains at or below 0°C for at least two consecutive years.

• Due to the presence of permafrost and a very short growing season, deep-rooted trees cannot survive; instead, the landscape is dominated by low-lying vegetation such as mosses, lichens, and small sedges.

• In the Koppen climate classification, the ET designation is primarily found in the high latitudes of the Northern Hemisphere, covering the Arctic coastal fringes of North America, Eurasia, and the Antarctic Peninsula.

• The moisture levels in these regions are low, making it a polar desert, but the low evaporation rates allow the soil to remain moist or waterlogged during the brief summer thaw.

Additional Information

• Cfb - Marine West Coast Climate:

• Characterized by mild winters and cool summers with high humidity and year-round precipitation.

• Supports dense temperate forests, including both deciduous and coniferous trees, primarily in Western Europe and the Pacific Northwest.

• Aw - Tropical Wet and Dry Climate:

• Also known as the Savanna climate, it features a distinct dry season during the winter months.

• The vegetation consists of tall grasses and scattered, drought-resistant trees like the Acacia or Baobab.

• BSh - Subtropical Steppe Climate:

• A semi-arid climate that serves as a transition zone between desert (BW) and more humid climates.

• It experiences high temperatures and erratic rainfall, supporting short-grass prairies and xerophytic shrubs.

Q65. Answer: (a) Chandrapur and Bhandara

The correct answer is Chandrapur and Bhandara.

Key Points

• Iron ore deposits in Maharashtra are geographically concentrated in two primary zones: the Eastern Vidarbha region and the South Konkan region.

• The Eastern Vidarbha belt includes districts such as Chandrapur, Gadchiroli, Gondia, and Bhandara, where minerals are found in ancient Metamorphic rock formations.

• In Chandrapur, high-grade Hematite iron ore is extracted from prominent localities such as Lohara, Asola, Dewalgaon, and Pipalgaon.

• Bhandara district contributes to the state mineral wealth with significant deposits located in areas like Khursipar and Pauni, often found in association with other metallic minerals.

• The iron ore in these regions is valued for its high iron content, typically ranging between 55% and 65%, making it suitable for industrial steel production.

Additional Information

• Sindhudurg District:

• Located in the Konkan region, it is a major producer of iron ore, particularly in the Redi area, which facilitates easy export through its coastal proximity.

• Deccan Trap Basalt:

• Regions like Aurangabad, Jalna, Pune, and Thane are largely covered by Basaltic lava flows, which are generally devoid of significant metallic mineral deposits like iron ore.

• Industrial Importance:

• The availability of Iron Ore along with Coal in the Vidarbha region has led to the establishment of several Sponge Iron plants and Steel industries in Chandrapur.

• Manganese and Coal:

• The Nagpur-Bhandara belt is also internationally recognized for the production of Manganese, while the Wardha Valley is the primary source of Coal in the state.

Q66. Answer: (a) BIRSA 101

The correct answer is BIRSA 101.

Key Points

• BIRSA 101 is India’s first indigenous CRISPR-Cas9 based gene therapy specifically designed to provide a curative treatment for Sickle Cell Disease (SCD).

• Launched in November 2025, the therapy represents a major breakthrough in India’s Atmanirbhar Bharat initiative in the field of advanced biotechnology and genomic medicine.

• The therapy was developed through a collaborative research effort led by the Council of Scientific and Industrial Research (CSIR) and the Institute of Genomics and Integrative Biology (IGIB), aimed at making expensive gene treatments affordable for the Indian population.

• The treatment mechanism involves harvesting the patient’s own hematopoietic stem cells, using CRISPR technology to edit the HBB gene or induce fetal hemoglobin (HbF), and then re-infusing them to produce healthy red blood cells.

• The naming of BIRSA 101 pays tribute to the tribal leader Birsa Munda, reflecting the therapy's primary target demographic, as Sickle Cell Disease disproportionately affects Scheduled Tribes across the tribal belt of India.

Additional Information

• Sickle Cell Disease (SCD):

• It is an inherited genetic blood disorder where red blood cells become rigid and sickle-shaped, leading to anemia, organ damage, and vaso-occlusive crises.

• India has the second-highest global burden of SCD, with a high prevalence in states like Madhya Pradesh, Gujarat, and Chhattisgarh.

• CRISPR Technology:

• Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) serves as a molecular scissor to edit DNA with high precision.

• It utilizes a guide RNA to identify the target genetic sequence and the Cas9 enzyme to execute the cut, allowing for the correction of genetic mutations.

• National Sickle Cell Anaemia Elimination Mission:

• Announced in the Union Budget 2023-24 and launched in July 2023, the mission aims to eliminate the disease as a public health threat by 2047.

• The mission focuses on universal screening of approximately 7 crore people in the age group of 0−40 years in 17 high-burden states.

Q67. Answer: (b) Combining emissions, energy use and expert-reviewed climate policy data

The correct answer is Combining emissions, energy use and expert-reviewed climate policy data.

Key Points

• The Climate Change Performance Index (CCPI) 2025 is an independent monitoring tool that evaluates the climate protection performance of 63 countries and the European Union, which together account for more than 90% of global greenhouse gas emissions.

• The assessment framework is divided into four distinct categories with specific weightings: Greenhouse Gas (GHG) Emissions (40%), Renewable Energy (20%), Energy Use (20%), and Climate Policy (20%).

• The GHG Emissions indicator tracks current emission levels, recent trends, and the alignment of national 2030 targets with the Paris Agreement goal of limiting global warming to 1.5 degrees Celsius.

• The Climate Policy component is unique because it incorporates qualitative data through expert-reviewed assessments provided by approximately 450 climate and energy experts from non-governmental organizations and think tanks.

• The index uses a standardized methodology to provide a comparable score for each country, determining whether their progress is Very High, High, Medium, Low, or Very Low.

Additional Information

• Publication and Authorship:

• The index is published annually by Germanwatch, the NewClimate Institute, and the Climate Action Network (CAN) International.

• The CCPI 2025 report was officially released during the COP29 summit held in Baku, Azerbaijan.

• Methodological Limitations of Other Approaches:

• Renewable Energy statistics only: This metric alone is insufficient as it does not account for the total carbon footprint or energy efficiency.

• Forest Cover and National Targets: While important for carbon sequestration, forest data is not a primary pillar of the CCPI, which prioritizes energy-related emissions and systemic decarbonization.

• Opinion Polls: Public sentiment is not a factor in the CCPI; it relies strictly on hard data from the International Energy Agency (IEA) and professional policy critiques.

Q68. Answer: (b) Lucknow

The correct answer is Lucknow.

Key Points

• In December 2025, the Lucknow Police Commissionerate introduced dedicated Closed User Group (CUG) mobile numbers for Mission Shakti Centre in-charges across all police stations in the city.

• The primary objective of this initiative is to eliminate communication barriers, allowing women to bypass the main station landlines and directly reach the officer-in-charge of women-centric help desks.

• This move ensures that women can report incidents, seek help, or track their complaints with greater privacy and accountability, as these numbers are permanently assigned to the Mission Shakti desk.

• The initiative is part of the broader Mission Shakti Phase 5.0, a flagship program of the Uttar Pradesh Government designed to enhance women's safety, dignity, and self-reliance through localized police intervention.

• By providing these dedicated numbers, the Lucknow Police aim to ensure 24/7 accessibility and improve the response time of the Mission Shakti teams during emergencies.

Additional Information

• Mission Shakti:

• Launched by the Government of Uttar Pradesh under the leadership of CM Yogi Adityanath, it focuses on the three pillars of Suraksha (Safety), Samman (Dignity), and Swavalamban (Self-reliance).

• It involves various stakeholders including the Department of Home, Women and Child Development, and the Education Department to create a safe environment for women and girls.

• Lucknow Police Commissionerate:

• Lucknow transitioned to a Commissionerate System in January 2020 to streamline law and order and provide more magisterial powers to senior police officers.

• Other women-safety initiatives in the city include Pink Booths, dedicated Pink Patrol scooters, and the 1090 Women Power Line.

• CUG (Closed User Group):

• These are mobile connections provided to government officials where the SIM card and number are linked to a specific designation rather than an individual, ensuring continuity of service during transfers.

Q69. Answer: (a) Hindustan Republican Association in United Provinces

The correct answer is Hindustan Republican Association in United Provinces.

Key Points

• The Kakori Train Robbery, also known as the Kakori Conspiracy, took place on August 9, 1925, at Kakori, a village near Lucknow in the then United Provinces.

• The operation was orchestrated by the Hindustan Republican Association (HRA), a revolutionary organization founded in October 1924 at Kanpur by Sachindra Nath Sanyal, Ram Prasad Bismil, and Jogesh Chandra Chatterjee.

• Revolutionaries including Ram Prasad Bismil, Ashfaqulla Khan, Rajendra Lahiri, Chandrashekhar Azad, and Sachindra Bakshi intercepted the 8-Down train traveling from Shahjahanpur to Lucknow.

• The primary objective of the robbery was to seize British government treasury funds to purchase weaponry and finance revolutionary propaganda aimed at achieving independence through armed struggle.

• The incident led to the Kakori Conspiracy Case, resulting in the execution of Bismil, Ashfaqulla Khan, Roshan Singh, and Lahiri in December 1927.

Additional Information

• HSRA (Hindustan Socialist Republican Association):

• Established in September 1928 at Feroz Shah Kotla in Delhi.

• It was a transformation of the HRA led by Chandrashekhar Azad, Bhagat Singh, and Sukhdev, adopting Socialist ideals.

• Ghadr Party:

• Founded in 1913 in San Francisco, USA, by Lala Hardayal and Sohan Singh Bhakna.

• It aimed to ignite a pan-Indian revolution among Indian expatriates and soldiers to end British rule.

• Anushilan Samiti:

• A secret revolutionary society active in Bengal and Bihar during the early 20th century.

• Prominent leaders included Pramathanath Mitra, Aurobindo Ghosh, and Barindra Kumar Ghosh, focusing on militant nationalism.

Q70. Answer: (b) 74th Amendment Act

The correct answer is 74th Amendment Act.

Key Points

• The 74th Constitutional Amendment Act, passed in 1992 and effective from June 1, 1993, provided constitutional recognition to

Urban Local Bodies (ULBs).

• It inserted Part IX-A into the Constitution of India, encompassing Articles 243-P to 243-ZG, which details the structure and powers of municipalities.

• The Act introduced the 12th Schedule, which lists 18 functional items placed under the purview of municipalities, such as urban planning, public health, and fire services.

• It mandated the creation of three types of municipalities based on population: Nagar Panchayats for transitional areas, Municipal Councils for smaller urban areas, and Municipal Corporations for larger urban areas.

• The legislation ensures democratic continuity by requiring elections every five years and provides reservation of seats for Scheduled Castes, Scheduled Tribes, and at least one-third of seats for women.

Additional Information

• 73rd Amendment Act:

• Enacted in 1992, it granted constitutional status to Panchayati Raj Institutions (PRIs) for rural governance.

• It added Part IX and the 11th Schedule, which contains 29 functional items.

• 86th Amendment Act:

• Passed in 2002, it made education a Fundamental Right under Article 21A for children aged 6 to 14 years.

• It also updated the Directive Principles (Article 45) and added a new Fundamental Duty (Article 51A(k)).

• 42nd Amendment Act:

• Known as the Mini-Constitution, it was enacted in 1976 during the National Emergency.

• It added the terms Socialist, Secular, and Integrity to the Preamble and introduced Fundamental Duties via Part IVA.

Q71. Answer: (d) JC-FG

The logic followed here is,

Logic: First letter of the second cluster = First letter of the first cluster − 4; Second letter of the second cluster = Second letter of the first cluster + 5.

OH-KM,

QJ-MO,

LE-HJ

JC-FG,

This pair does not follow the rule because the second letter transformation is +4 instead of +5.

Therefore, the letter-cluster pair that is different from the others is JC-FG.

Hence, the correct answer is 'Option 4'.

Q72. Answer: (a) WF 14

The logic followed here is,

Hence, the correct answer."Option 1"

Q73. Answer: (b) Only conclusion (II) follows

The least possible Venn diagram for the given statements is:

Conclusion

(I) No Pigeons are Chickens - Does not follow (All Chickens are Quails and all Quails are Pigeons that no Pigeons are Chickens is false)

(II) Some Pigeons are Chickens - Follow (All Chickens are Quails and all Quails are Pigeons.So, Some pigeons are chickens is true)

Only conclusion (II) follows

Hence, the correct answer is "Option 2".

Q74. Answer: (c) Four

Given: Seven people, R, B, Y, J, E, F and N, are sitting in a row, facing north.

1. Y sits third from the right end.

2. Only three people sit between B and Y.

3. N is the immediate neighbour of E and J.

4. F sits second to the right of E.

The Final Arrangement is,

Four people sit between R and J

Hence, the correct answer is "Option 3".

Q75. Answer: (a) UOF 49

The logic follows here,

Hence, the correct answer is "option 1"

Q76. Answer: (c) 52

BODMAS rule:

Given : 17 − 3 ÷ 8 + 21 × 3 = ?

After '+' means '−', '−' means '×', '×' means '÷', '÷' means '+',are interchanged then,

17 × 3 + 8 − 21 ÷ 3 = ?

Perform operations according to BODMAS:

=> 17 × 3 + 8 − 21 ÷ 3

=> 17 × 3 + 8 − 7

=> 51 + 8 − 7

=> 59 - 7

=>52

Hence,the correct answer is option 3

Q77. Answer: (a) 6

Given number: 5431786

According ti the given information,1 is added to each odd digit and 2 is subtracted from each even digit in the number 5431786

Difference between the highest and lowest digits in the number thus formed is 8 - 2 = 6.

Hence,the correct answer is 'Option 1'.

Q78. Answer: (b) MQR 9

The logic follows here,

Hence, the correct answer is "option 2"

Q79. Answer: (a) 92

The logic follows here,

• 23 + 9 = 32

• 32 + 10 = 42

• 42 + 11 = 53

• 53 + 12 = 65

• 65 + 13 = 78

• 78 + 14 = 92

Hence, the correct answer is "option 1"

Q80. Answer: (d) QSOH

The logic followed in this pattern is based on incremental alphabetical shifts for each letter of the word.

For 'SMAL' related to 'VQFR':

S(19)	**M(13)**	**A(1)**	**L(12)**
+3 ↓	+4 ↓	+5 ↓	+6 ↓
V(22)	Q(17)	F(6)	R(18)

For 'ECUJ' related to 'HGZP':

E(5)	**C(3)**	**U(21)**	**J(10)**
+3 ↓	+4 ↓	+5 ↓	+6 ↓
H(8)	G(7)	Z(26)	P(16)

Applying the same logic to 'NOJB':

N(14)	**O(15)**	**J(10)**	**B(2)**

+3 ↓	+4 ↓	+5 ↓	+6 ↓
Q(17)	S(19)	O(15)	H(8)

Thus, NOJB is related to QSOH.

Hence, the correct answer is 'Option 4'.

Q81. Answer: (c) 40

The logic follows here,

• $10+1^2=11$

• 11+22=1511 + 2^2 = 15

• 15+32=2415 + 3^2 = 24

• 24+42=4024 + 4^2 = 40

• 40+52=6540 + 5^2 = 65

Thus, the pattern is adding consecutive perfect squares (+1,+4,+9,+16,+25)(+1, +4, +9, +16, +25)

Hence, the correct answer is "Option 3"

Q82. Answer: (b) Three

Given: Seven people, J, K, C, D, E, Q and H, are sitting in a row, facing north.

1. Only four people sit to the right of Q.

2. Only two people sit to the right of E.

3. K is the immediate neighbour of J and E.

4. H sits third to the right of D.

The Final Arrangement is,

The number of people sitting between C and K is Three.

Hence, the correct answer is "Option 2".

Q83. Answer: (a) vq

The logic followed here is.

Logic: The code for a word is determined by comparing different sentences to identify the common words and their corresponding common codes.

Therefore, the code for the word jaw is vq.

Hence, the correct answer is "option 1"

Q84. Answer: (d) 2

Given Word : MONKEYS

After arranged in alphabetical order,

Original Word	**M**	**O**	**N**	**K**	**E**	**Y**	**S**
Alphabetical Order	E	K	M	N	O	S	Y

Left E K M N O S Y Right

There are 2 letters between L and M is K and N.

Hence, the correct answer is "option 4"

Q85. Answer: (b) Two

Given: 2 8 7 5 6 9 7 6 8 4 8 2 1 8 2 8 6 8 1 3 1 1 3

Required Condition: Odd Digit - Odd Digit - Even Digit

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

7 5 6, 9 7 6

Hence, the correct answer is 'Option 2'.

Q86. Answer: (a) 4

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

1. Only F is kept above B.

2. No box is kept below G.

Position	Box
7	F
6	B
5	
4	
3	
2	
1	G

1. Only two boxes are kept between C and G.

2. E is kept at some place below A but at some place above D.

Final Arrangement:

7	F
6	B
5	A
4	C
3	E
2	D
1	G

There are 4 boxes between F and D.

Hence, the correct answer is 'Option 1'.

Q87. Answer: (d) Sister's daughter

Family Chart:

Let us first decode the given symbols and then draw a family tree.

Symbol	×	≠	÷	Rs.
Meaning	Father	Son	Daughter	Sister

Given: C Rs. D ≠ E ÷ L × M

1) C Rs. D - 'C Rs. D' means C is the sister of D.

2) D ≠ E - 'D ≠ E' means D is the son of E.

3) E ÷ L - 'E ÷ L' means E is the daughter of L.

4) L × M - 'L × M' means L is the father of M.

E and M are siblings (children of L). C and D are children of E. Therefore, C is the Sister's daughter of M.

Hence, the correct answer is "Option 4".

Q88. Answer: (d) SP25

The logic follows here,

Hence, the correct answer is "option 4"

Q89. Answer: (d) (6, 216, 18)

The logic followed here is:

Logic: Second Number = (First Number × Third Number) × 2

For (5, 120, 12)

=> (5 × 12) × 2

=> 60 × 2 = 120.

For (3, 84, 14)

=> (3 × 14) × 2

=> 42 × 2 = 84.

Applying the same logic,

(6, 216, 18)

=> (6 × 18) × 2

=> 108 × 2 = 216.

Hence, the correct answer is 'Option 4'.

Q90. Answer: (c) Two

Given number: 2563174

According to the conditions, if 2 is added to each odd digit and 1 is subtracted from each even digit in the number 2563174,

So, there are two digits (3 and 5) that appear more than once in the new number.

Hence, the correct answer is 'Option 3'.

Q91. Answer: (b) 10

The logic followed here is:

Given word: 'JUMBLED'

After arranged in alphabetical order:

Alphabets	J	U	M	B	L	E	D
Alphabetical order	B	D	E	J	L	M	U

The letters are: Left B D E J L M U Right

Thier are 10 letter between J and U.

Hence, the correct answer is "option 2"

Q92. Answer: (d) HJL

The logic followed here is,

Logic: The difference between the first and second letter is +2, and the difference between the second and third letter is +3.

NPS,

QSV,

EGJ,

HJL,

Therefore, the letter cluster that does not belong to the group is HJL.

Hence, the correct answer is 'Option 4'.

Q93. Answer: (c) Brother's wife

Family Chart

Let us first decode the given symbols and then draw a family tree.

Symbol	≤	¥	@	•
Meaning	Son	Father	Brother	Wife

Given: P - Q @ S ≤ T ¥ X

Since Q, S, and X are siblings and P is the wife of Q, therefore P is the Brother's wife of X.

Hence, the correct answer is 'Option 3'.

Q94. Answer: (a) 33

The logic followed here is.

Logic: Sum of positional values and then subtracting 8 from the total sum.

For WIAO,

• Sum of positional values = 23 + 9 + 1 + 15 = 48

• Code = 48 − 8 = 40

For TNCR,

• Sum of positional values = 20 + 14 + 3 + 18 = 55

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• Code = 55 − 8 = 47

Applying the same logic FXAJ:

• Sum of positional values = 6 + 24 + 1 + 10 = 41

• Code = 41 − 8 = 33

Hence, the correct answer is "option 1"

Q95. Answer: (b) 7 km to the east

Given:

• Moksh starts from Point A and drives 21 km towards the south. He then takes a left turn, drives 14 km, turns left and drives 29 km.

• He then takes a left turn and drives 21 km.

• He takes a final left turn, drives 8 km and stops at Point P

The Final Diagram,

Since Point P is 7 km West of Point A, to reach Point A from Point P, Moksh must drive the shortest distance of 7 km towards the East.

Hence, the correct answer is "option 2"

Q96. Answer: (a) CLW : FGQ

The logic followed in this pattern is based on alphabetical shifts.

For 'GFK' related to 'JAE':

G(7)	**F(6)**	**K(11)**
+3 ↓	−5 ↓	−6 ↓
J(10)	A(1)	E(5)

For 'LGP' related to 'OBJ':

L(12)	**G(7)**	**P(16)**
+3 ↓	−5 ↓	−6 ↓
O(15)	B(2)	J(10)

Applying the same logic to 'CLW':

C(3)	**L(12)**	**W(23)**
+3 ↓	−5 ↓	−6 ↓
F(6)	G(7)	Q(17)

Thus, CLW is related to FGQ following the same pattern.

Hence, the correct answer is 'Option 1'.

Q97. Answer: (d) Only conclusion (II) follows

The least possible Venn diagram for the given statements is:

Conclusions:

(I) Some carpets are paintings. -Does not follow (

(II) Some shoes are paintings. Follows

Only conclusion (II) follows.

Hence, the correct answer is "Option 4".

Q98. Answer: (c) 47

The logic followed here is:

• Position of Jonny from the left end = 24^(th)

• Position of Anuj from the left end = 28^(th)

• Difference in positions between Jonny and Anuj = 28 − 24 = 4

• Since Anuj is exactly between Jonny and Rishabh, the number of positions between Anuj and Rishabh must be the same as between Jonny and Anuj.

• Position of Rishabh from the left end = Position of Anuj from the left + 4

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= 28 + 4

= 32^(nd)

Position of Rishabh from the right end = 16^(th)

Total number of people in the row = (Position of Rishabh from the left end + Position of Rishabh from the right end) − 1

= 32 + 16 − 1

= 47

Hence, the correct answer is 'Option 3'.

Q99. Answer: (a) 45

The logic followed here is:

• Rank of Anil from the top = 27^(th)

• Rank of Anil from the bottom = 19^(th)

• To find the total number of students in the class, we use the following formula:

Total number of students = (Rank from the top + Rank from the bottom) − 1

= (27 + 19) − 1

= 46 − 1

= 45

Hence, the correct answer is 'Option 1'.

Q100. Answer: (d) UQ - SP

The logic followed here is

For QM - OK,

For NJ - LH,

For WS - UQ,

For UQ - SP,

Therefore, the letter-cluster pair that is different from the others is UQ - SP.

Hence, the correct answer is 'Option 4'.

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