RRB NTPC (UG) CBT-I Official Paper (Held On: 09 Sept, 2025 Shift 1) (Previous Year Paper)

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

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GENERAL AWARENESS

Q1. What is the main cause of different seasons on the Earth?

(a) Earth's distance from the Sun
(b) Earth's rotation
(c) Solar flares
(d) Earth's tilt and revolution around the Sun

Q2. Rajasthan's Desert National Park (Desert National Park) is located in which districts of the state?

(a) Jaisalmer and Barmer
(b) Phalodi and Jodhpur
(c) Udaipur and Rajsamand
(d) Dhaulpur and Bharatpur

Q3. Which biochemist was awarded the Nobel Prize in 1958 for his work on the structure of proteins, especially insulin?

(a) Frederick Sanger
(b) Rosalind Franklin
(c) Eduard Buchner
(d) Carl Neuberg

Q4. In which Schedule are the forms of oath and affirmation for various constitutional offices specified?

(a) Fourth Schedule
(b) Fifth Schedule
(c) Tenth Schedule
(d) Third Schedule

Q5. Who predicted the existence of a new particle, now known as the neutrino, in 1931, using the conservation laws of energy and momentum for β-decay?

(a) Paul Dirac
(b) Wolfgang Pauli
(c) Enrico Fermi
(d) James Chadwick

Q6. Which index combines life expectancy, education and per capita income to measure a country’s human development?

(a) GDP per capita
(b) Human Development Index (HDI)
(c) Consumer Price Index
(d) Gini Index

Q7. Which of the following Articles of the Indian Constitution specifically deal with the establishment of Tribunals for administrative and other matters?

(a) Articles 323A and 323B
(b) Articles 32 and 226
(c) Articles 356C and 360D
(d) Articles 14 and 15

Q8. Which plateau is NOT a part of the Patland series?

(a) Ranchi Plateau
(b) Deccan Plateau
(c) Malwa Plateau
(d) Hazaribagh Plateau

Q9. In December 2024, India's Defence Ministry signed a contract with HAL to purchase how many Su-30MKI aircraft?

(a) 5
(b) 15
(c) 12
(d) 8

Q10. In which venue was the World Health Summit (WHS) Regional Meeting 2025 hosted for the first time in India?

(a) India Expo Centre, Greater Noida
(b) Bharat Mandapam, New Delhi
(c) Ashoka University, Sonipat
(d) Pragati Maidan, New Delhi

Q11. What is the primary objective of the Waqf (Amendment) Act, 2025?

(a) To restrict the establishment of new Waqf properties
(b) To enhance transparency and inclusivity in the management of Waqf properties
(c) To nationalise all Waqf properties under central government control and conduct an audit of new Waqf properties
(d) To repeal the Waqf Act, 1995 and abolish Waqf Boards

Q12. Which Indian female shooter won a silver medal in the women's skeet event at the ISSF Junior World Cup 2025?

(a) Maheshwari Chauhan
(b) Parinaaz Dhaliwal
(c) Raiza Dhillon
(d) Ganemat Sekhon

Q13. Which of the following Indian startups was selected to develop the country's first indigenous large language model under the India AI Mission April 2025?

(a) Sarvam AI
(b) AI4Bharat
(c) Infosys
(d) Wadhwani AI

Q14. Which policy was adopted by the British in the post-1857 revolt in India due to distrust of Hindu-Muslim unity?

(a) Doctrine of Lapse
(b) Forward Policy
(c) Subsidiary Alliance
(d) Divide and Rule

Q15. What is the name of India's indigenous anti-drone system that was tested in May 2025?

(a) Akashteer
(b) Trinetra
(c) Nagastra
(d) Bhargavastra

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Q16. How many AMRUT stations were inaugurated by Prime Minister Shri Narendra Modi on 22 May 2025?

(a) 110
(b) 100
(c) 103
(d) 108

Q17. Pazhassi Raja was a freedom fighter from the modern _____ state.

(a) Gujarat
(b) Kerala
(c) Telangana
(d) Andhra Pradesh

Q18. To adjust the screen resolution or change the desktop background in Windows, which of the following would a user typically access?

(a) This PC
(b) Documents
(c) Settings
(d) Run

Q19. In which year was the PM JI-VAN (Biofuel-Vatra Sukla Crop Residue Removal) scheme launched?

(a) 2018
(b) 2019
(c) 2020
(d) 2017

Q20. Which of the following Indian Coast Guard ships participated in NAVDEX 2025 to strengthen India-UAE maritime cooperation?

(a) ICGS Sujata
(b) INS Rajdhwaj
(c) ICGS Shoor
(d) INS Veera

Q21. Which Constitutional Amendment granted constitutional status to Co-operative Societies in India?

(a) 74^(th) Constitutional Amendment Act, 1992
(b) 73^(rd) Constitutional Amendment Act, 1992
(c) 97^(th)Constitutional Amendment Act, 2011
(d) 86^(th) Constitutional Amendment Act, 2002

Q22. The _____ of the Indian Constitution protects laws from being challenged in courts under judicial review.

(a) Eleventh Schedule
(b) Ninth Schedule
(c) Fifth Schedule
(d) Third Schedule

Q23. What is the mandated time for the Public Information Officer (PIO) to provide information?

(a) 15 days for urgent matters
(b) 60 days for all cases
(c) 30 days generally and 48 hours for life or liberty cases
(d) 10 days for personal requests

Q24. The Unique Land Parcel Identification Number (ULPIN), part of the Digital India Land Records Modernization Programme (DILRMP), is a unique identification number of how many digits based on the longitude and latitude coordinates of the land parcel?

(a) 10 digits
(b) 12 digits

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(c) 16 digits
(d) 14 digits

Q25. Which of the following statements about the National Rural Livelihoods Mission (NRLM) is correct?
(a) It guarantees minimum support prices for rural produce.
(b) It aims to organise rural poor into Self-Help Groups (SHGs).
(c) It offers 100 days of guaranteed employment to rural poor
(d) It provides direct employment in rural public sector units.

Q26. The Planning Commission was the apex body responsible for formulating Five-Year Plans. In which year was the Planning Commission of India established?
(a) 1948
(b) 1950
(c) 1952
(d) 1951

Q27. Which of the following was NOT a feature of the Green Revolution in India?
(a) Increased use of fertilisers and irrigation
(b) Expansion of agricultural land
(c) Mechanisation of agriculture
(d) Use of high-yielding variety seeds

Q28. Which of the following is true for Read-Only Memory (ROM)?
(a) It stores the booting instructions permanently.
(b) It is volatile memory that stores data temporarily.
(c) It stores data that can be modified by the user.
(d) It processes the logic operations

Q29. During the expansion of the Gurjara-Pratihara dynasty, which of the following cities became the capital of Vatsaraja?
(a) Ujjain
(b) Mathura
(c) Kannauj
(d) Malwa

Q30. In which Swiss city was the annual meeting of the World Economic Forum (WEF) held in January 2025?
(a) Davos
(b) Zurich
(c) Geneva
(d) Vienna

Q31. Hriday Narayan Dixit, who received the Padma Shri award in 2025 and is a renowned thinker, philosopher, politician and social worker, belongs to which Indian state?
(a) Uttar Pradesh
(b) Rajasthan
(c) Bihar
(d) Madhya Pradesh

Q32. Which movement marked Mahatma Gandhi’s entry into all-India politics?
(a) Civil Disobedience Movement
(b) Khilafat and Non-Cooperation Movement
(c) Salt Satyagraha
(d) Champaran Satyagraha

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Q33. Which institution celebrated the Rashtriya Boudhik Sampada Mahotsav (RBSM) on 29 May 2025?

(a) CSIR-Indian Institute of Petroleum, Dehradun
(b) Rajiv Gandhi Institute of Petroleum Technology, Ameth
(c) Indian Institute of Petroleum and Energy, Visakhapatnam
(d) Indian Oil Institute of Petroleum Management, Haryana

Q34. Babur, the first Mughal ruler, was related to two of the medieval world's greatest conquerors. If he was related to the Mongol conqueror Genghis Khan on his maternal side, to whom was he related on his paternal side?

(a) Mohammed Ghori
(b) Mahmud Ghazni
(c) Timur
(d) Ibrahim Lodi

Q35. In May 2025, India assumed the chairmanship of which regional organisation focused on productivity enhancement?

(a) Asian Productivity Organization (APO)
(b) Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
(c) South Asian Association for Regional Cooperation (SAARC)
(d) Association of Southeast Asian Nations (ASEAN)

Q36. Vedantam Prahlad Sharma, born in Andhra Pradesh in 1923, was initiated into which of the following Indian classical dance styles?

(a) Bharatanatyam
(b) Kathak
(c) Odissi
(d) Kuchipudi

Q37. Which of the following states is known for the tribal settlement of the Gond community?

(a) Kerala
(b) Haryana
(c) Punjab
(d) Chhattisgarh

Q38. Who among the following was the first Indian athlete to win the Rajiv Gandhi Khel Ratna Award?

(a) Sachin Tendulkar
(b) PV Sindhu
(c) Leander Paes
(d) Viswanathan Anand

Q39. The element with atomic number 21 is _____.

(a) Calcium
(b) Scandium
(c) Titanium
(d) Zinc

Q40. Which two state governments held official-level talks in Guwahati in April 2025 to resolve the long-standing inter-state border dispute?

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

MATHEMATICS

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Q41. Vikram, Komal, and Rishi invested Rs. 1,540, Rs. 1,760, and Rs. 1,170, respectively, to start a business. If the profit at the end of the year is Rs. 1,490, what is Rishi's share of the profit?

(a) Rs. 392
(b) Rs. 390
(c) Rs. 391
(d) Rs. 388

Q42. What sum of money (in Rs.) will amount to Rs. 2,280 in 4 years at 5% per annum simple interest?

(a) Rs. 1,900
(b) Rs. 11,400
(c) Rs. 1,850
(d) Rs. 1,950

Q43. Find the value of [147 / {29 + 2(4 - 8)}].

(a) 8
(b) 9
(c) 3
(d) 7

Q44. A man travels from Bhopal to Indore at a speed of 6 km/hr and returns to Bhopal via the same route at a speed of 12 km/hr. Find his average speed (in km/hr) for the entire journey.

(a) 4
(b) 10
(c) 6
(d) 8

Q45. Simplify the following:

$1/(\tan^2\theta) + (\tan^2\theta)/(\sin^2\theta) \times \cos^2\theta$

(a) $\sec^2\theta$
(b) $\sin^2\theta$
(c) $\text{cosec}^2\theta$
(d) 1

Q46. ABCD is a trapezam in which BC || AD and AC = CD. If angle ABC = 45° and angle BAC = 104°, then what is the measure of angle ACD (in degree)?

(a) 114°
(b) 130°
(c) 117°
(d) 118°

Q47. Find the value of 69−^4 ÷ 69^(10) × 69^(−17).

(a) 69^(−36)
(b) 69^(−31)
(c) 69^{-32}
(d) 69^(−21)

Q48. Find the least common multiple (LCM) of $5^2 \times 9^2 \times 14$, $5^2 \times 14^2 \times 19$, and $9^3 \times 14^2 \times 19^2$.

(a) $5^3 \times 9^3 \times 14^2 \times 19^2$
(b) $5^3 \times 9^2 \times 14^2 \times 19$
(c) $5^2 \times 9^2 \times 14^2 \times 19^3$
(d) $5^2 \times 9^3 \times 14^2 \times 19^2$

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Q49. The cost of 13 pens and 3 pencils is Rs. 152. If the price of pens is reduced by Rs. 1 per pen and the price of pencils is increased by Rs. 7 per pencil, the cost of 18 pens and 3 pencils becomes Rs. 165. What is the original price of 12 pens and 11 pencils?

(a) Rs. 481
(b) Rs. 486
(c) Rs. 489
(d) Rs. 483

Q50. The number of prime numbers lying between 402 and 409, both included, is:

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

Q51. The average runs scored by a batsman in 23 matches are 40. In the next 10 matches, the batsman scored an average of 15. Find his average runs (rounded off to two decimal places) in all 33 matches.

(a) 31.42
(b) 32.42
(c) 33.42
(d) 34.42

Q52. The sum of two numbers is 40 and their least common multiple (LCM) is 351. Find the two numbers.

(a) 13, 27
(b) 18, 22
(c) 11, 29
(d) 6, 34

Q53. Raman's income is Rs. 41,400. He saves 24% of his income. If his income increases by 22% and his expenses increase by 25%, there will be _____ in his savings.

(a) an increase of Rs. 1,242
(b) a decrease of Rs. 1,241
(c) a decrease of 1,244
(d) an increase of Rs. 1,245

Q54. Wasim travels 234 km at a speed of 78 km/hr, the next 441 km at a speed of 49 km/hr, and the next 488 km at a speed of 61 km/hr. What is his average speed (in km/hr) for the entire journey?

(a) 50.87
(b) 50.13
(c) 58.15
(d) 54.83

Q55. Find the volume (in cm^3, rounded to the nearest integer) of a sphere of radius 7 cm.

(Use π = frac227)

(a) 1442 cm^3
(b) 1437 cm^3
(c) 1436 cm^3
(d) 1446 cm^3

Q56. Which of the following ratios is the largest?

(a) 37 : 56
(b) 38 : 75
(c) 33 : 54
(d) 35 : 80

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Q57. A number when increased by 80% gives 2430. Find the number.

(a) 4050
(b) 2700
(c) 675
(d) 1350

Q58. Eight times P's present age is 12 years more than Q's present age. Eight years from now, three times Q's age will be 28 years less than eight times P's age. Find Q's present age (in years).

(a) 12
(b) 8
(c) 15
(d) 7

Q59. Abhay and Bharat can complete a certain task in 5 and 15 days, respectively. They started working together, and after 2 days, Bharat left. In how many days will Abhay complete the remaining work?

(a) 11/3
(b) 21/3
(c) 41/3
(d) 31/3

Q60. The number 740705 is divisible by which of the following?

(a) 12
(b) 9
(c) 4
(d) 5

Q61. Mahesh bought some sharpeners for Rs. 150 per dozen. He sold them for Rs. 21 each. His profit percentage is _____%.

(a) 66
(b) 70
(c) 72
(d) 68

Q62. The marked price of a jacket is Rs. 2400. If it is sold at a discount of 20%, find the selling price.

(a) Rs. 1,900
(b) Rs. 1,980
(c) Rs. 1,920
(d) Rs. 2,000

Q63. Find the average weight of a family of five whose members weigh 40 kg, 49 kg, 56 kg, 73 kg and 37 kg respectively.

(a) 52 kg
(b) 53 kg
(c) 51 kg
(d) 50 kg

Q64. By selling an article at frac27 of its original selling price, Manav incurs a loss of 24%. If he sells the article at 55% of its original selling price, find the profit percentage.

(a) 48.7%
(b) 46.9%
(c) 47.6%
(d) 46.3%

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Q65. The marked price of an item is Rs. 280. A 12.5% discount is given on the marked price, making a profit of 40%. Find the cost price of the item.

(a) Rs. 165
(b) Rs. 180
(c) Rs. 175
(d) Rs. 185

Q66. M and N start a business. M invests Rs. 43,000 more than N for 6 months and N invests for 7 months. M's share is Rs. 472 more than that of N, out of a total profit of Rs. 3,304. Find the capital contributed by M.

(a) Rs. 1,20,400
(b) Rs. 1,20,000
(c) 1,20,600
(d) Rs. 1,21,400

Q67. A sum of Rs. 1,000,000 is invested in a bank at an interest rate of 11% per annum, compounded annually. Upon maturity, the amount payable is Rs. 1,367,631. Find the investment's time period.

(a) 3 years
(b) 1 year
(c) 2.5 years
(d) 3.5 years

Q68. A can complete a piece of work in 9 days and B can complete the same work in 18 days. If they work together for 5 days, what fraction of the work will remain?

(a) frac16
(b) frac76
(c) frac56
(d) frac116

Q69. The perimeter of a square is 160 m. Find its area (in m^2).

(a) 1600
(b) 1588
(c) 1572
(d) 1597

Q70. Simplify the following:

$2((3/2)x^2 - 28x + 14) - 3(x^2 + 6x - 11)$

(a) $-74x - 61$
(b) $74x - 61$
(c) $74x + 61$
(d) $-74x + 61$

GENERAL INTELLIGENCE AND REASONING

Q71. A, B, C, D, J, K and L are sitting around a circular table, facing the centre of the table. Only one person sits between A and L when counted from the left of L. K sits third to the right of J. C sits third to the left of B. K sits to the immediate right of C. D is not an immediate neighbour of C.

How many people sit between D and L when counted from the right of D?

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

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Q72. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster does not belong to that group? (Note: The odd letter-cluster is not based on the number of consonants/vowels or their position.)

(a) SVR
(b) KNJ
(c) NQM
(d) UXS

Q73. Each of the digits in the number 36719542 is arranged in ascending order from left to right. The position(s) of how many digits will remain unchanged as compared to that in the original number?

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

Q74. What will come in place of question mark (?) in the given series?

10 13 19 28 40 ?

(a) 60
(b) 52
(c) 55
(d) 50

Q75. If '÷' and '-' are interchanged and '×' and '+' are interchanged, then what will come in place of question mark (?) in the following equation?

93 × 9 ÷ 9 - 3 × 8 + 23 × 6 ÷ 3 - 3 × 2 = ?

(a) 235
(b) 274
(c) 290
(d) 266

Q76. What will come in place of question mark (?) in the given series?

90 87 83 78 72 ?

(a) 63
(b) 67
(c) 66
(d) 65

Q77. If 1 is added to each odd digit and 2 is subtracted from each even digit in the number 3174658, then how many digits will appear more than once in the new number thus formed?

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

Q78. In a certain code language, 'NOPE' is coded as '6712' and 'NOTE' is coded as '2178'. What is the code for 'T' in the given code language?

(a) 7
(b) 8
(c) 1
(d) 6

Q79. Based on the English alphabetical order, CFJP is related to FINT in a certain way. In the same way, ORZF is related to RUDJ. Following the same logic, which of the given options is XALR related to?

(a) APOI
(b) ADPV

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(c) ADVP
(d) POID

Q80. Manish starts from Point A and drives 9 km towards east. He then takes a right turn, drives 2 km, turns right and drives 4 km. He then takes a right turn and drives 11 km. He takes a final left turn, drives 5 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° turns only unless specified.)

(a) 9 km towards north
(b) 9 km towards south
(c) 12 km towards east
(d) 12 km towards north

Q81. Seven people, F, G, H, I, J, K and R, are sitting in a row facing North. Only two people sit between H and R. Only F sits to the right of J. Only one person sits between R and J. G sits at some place to the right of I but at some place to the left of K. Who sits third from the right end of the line?

(a) I
(b) J
(c) K
(d) G

Q82. Seven boxes C, D, E, M, N, O and P are kept one over the other but not necessarily in the same order.

O is kept second from the bottom. Only three boxes are kept between O and E. P is kept at one of the positions below O. Only M is kept between E and D. C is kept at one of the positions above E.

How many boxes are kept between P and C?

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

Q83. What will come in place of question mark (?) in the given series?

271 216 172 139 117?

(a) 106
(b) 111
(c) 82
(d) 95

Q84. This question is based on the five, three-digit numbers given below.

(Left) 285 106 346 349 408 (Right)

(Example- 697 – First digit = 6, second digit = 9 and third digit = 7)

(NOTE: All operations to be done from left to right.)

What will be the resultant if the third digit of the highest number is added to the third digit of the lowest number?

(a) 12
(b) 8
(c) 11
(d) 14

Q85. If '÷' and '×' are interchanged and '+' and '-' are interchanged, then what will come in place of question mark (?) in the following equation?

38 - 8 ÷ 2 + 16 × 8 = ?

(a) 52
(b) 54
(c) 55
(d) 53

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Q86. Karan ranks 27th from the top and 16th from the bottom in his class. How many students are there in his class?

(a) 41
(b) 44
(c) 42
(d) 43

Q87. Which of the following letter-number clusters when placed in place of the question mark (?) in the given series so that the series is logically complete.

A25D E36H I49L M64P?

(a) R81U
(b) S81T
(c) Q81T
(d) R81S

Q88. In a certain way, TG 21 is related to OE 4. In the same way, LE 18 is related to GC 1. Following the same logic, RT 26 is related to which of the following?

(a) LS 11
(b) LR 11
(c) MR 9
(d) LR 9

Q89. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

Some plants are trees.

Some trees are grasses.

Conclusions:

(I) Some plants are grasses.

(II) Some trees are plants.

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

Q90. Which of the following letter-number clusters when placed in place of the question mark (?) in the given series so that the series is logically complete.

WDK 84, BIP 79, GNU 74, LSZ 69, QXE 64, ?

(a) VCJ 59
(b) VCI 49
(c) VYJ 61
(d) UCJ 59

Q91. Refer to the following number and symbol series and answer the question below. Counting should be done from left to right only.

(left) 2 @ 2 # * 0 8 µπ3 0 1869 $4 & 9 β 9 (right)

How many symbols are there each which is immediately preceded by a perfect square number and immediately followed by a perfect square number?

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

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Q92. Person X starts from point A and drives 5 km towards the south. He then takes a left turn, drives 5 km, turns right and drives 5 km. He then takes a right turn and drives 7 km. He then takes a right turn, drives 10 km. He then takes a final right turn and drives 1 km and stops at point B. How far (shortest distance) and towards which direction should he drive in order to reach point A again? (All turns are 90 degrees unless specified)

(a) 2 km east
(b) 1 km east
(c) 1 km north
(d) 2 km west

Q93. In a certain code language, 'FORM' is coded as '4629' and 'RISE' is coded as '1395'. What is the code for 'R' in the given code language?

(a) 6
(b) 5
(c) 1
(d) 9

Q94. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair does not belong to that group? (Note: The odd letter-cluster pair is not based on the number of consonants/vowels in it or their position.)

(a) MQ-PT
(b) NR-OU
(c) IM-LP
(d) EI-HL

Q95. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair does not belong to that group? (Note: The odd letter-cluster pair is not based on the number of consonants/vowels or their position.)

(a) XN - DK
(b) QG - WD
(c) KA - QX
(d) DS - JO

Q96. R is the brother of C. C is the sister of A. A is the father of G. G is the son of H. How is R related to H?

(a) Husband's father
(b) Husband
(c) Brother
(d) Husband's brother

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 conclusion(s) logically follow(s) from the statement(s).

Statements:

No Police Officers are Pilots.

All Pilots are Soldiers.

Conclusions:

I. No Soldiers are Police Officers.

II. Some Police Officers are Soldiers.

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

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Q98. Based on the English alphabetical order, RBNE is related to VXRA in a certain way. ZTVW is related to DPZS in the same way. Following the same logic, HLDO is related to which of the following?

(a) LHHK
(b) LGFK
(c) MFGJ
(d) KGHL

Q99. Anshul ranks 38th from the top and 34th from the bottom in his class. How many students are there in his class?

(a) 72
(b) 71
(c) 73
(d) 70

Q100. Select the set in which the numbers are related in the same way as the numbers in the following sets.

(Note: Operations must be performed on whole numbers, without breaking the numbers into their component digits. For example, take 13. Operations on 13 such as adding to / subtracting from / multiplying with 13, etc., can be performed. Breaking 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(5, 12, 7)

(22, 30, 8)

(a) (35, 63, 25)
(b) (25, 30, 2)
(c) (18, 24, 3)
(d) (18, 31, 13)

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) Earth's tilt and revolution around the Sun

The correct answer is Earth's tilt and revolution around the Sun.

Key Points

• The Earth's axis is tilted at an angle of approximately 23.5 degrees relative to its orbital plane. This tilt is the primary reason for the occurrence of seasons.

• As the Earth revolves around the Sun, different parts of the planet receive varying amounts of sunlight at different times of the year, causing seasonal changes.

• When the Northern Hemisphere is tilted toward the Sun, it experiences summer, while the Southern Hemisphere experiences winter, and vice versa.

• The equinoxes (around March 21 and September 23) occur when the Earth's axis is not tilted toward or away from the Sun, resulting in nearly equal day and night durations worldwide.

• The solstices (around June 21 and December 21) mark the longest and shortest days of the year, depending on which

hemisphere is tilted toward the Sun.

Additional Information

• Earth's distance from the Sun:

• The Earth's orbit around the Sun is elliptical, causing slight variations in the distance between the Earth and the Sun throughout the year.

• However, these changes in distance are not significant enough to cause seasons. For instance, the Earth is closest to the Sun (perihelion) in January, during the Northern Hemisphere's winter.

• Earth's rotation:

• The Earth's rotation on its axis causes the cycle of day and night but does not contribute to the seasonal changes.

• The rotation occurs approximately every 24 hours and is unrelated to the Earth's axial tilt or its revolution around the Sun.

• Solar flares:

• Solar flares are sudden bursts of energy from the Sun's surface caused by magnetic activity. They can impact Earth's communication systems and satellites but do not influence the seasons.

• Seasons are a result of the Earth's axial tilt and orbital dynamics, not solar activity.

Q2. Answer: (a) Jaisalmer and Barmer

The correct answer is Jaisalmer and Barmer.

Key Points

• Desert National Park is located in the districts of Jaisalmer and Barmer in the state of Rajasthan.

• It is one of the largest national parks in India, covering an area of approximately 3,162 square kilometers.

• The park is known for its unique desert ecosystem, featuring sand dunes, salt lakes, and rocky terrains.

• Desert National Park is home to a wide variety of wildlife, including the critically endangered Great Indian Bustard, a flagship species of the park.

• The park also hosts other species like desert foxes, chinkaras, and a variety of migratory and resident birds.

Additional Information

• Phalodi and Jodhpur

• Phalodi is a town in Jodhpur district and is known as the "Salt City" due to its salt production.

• Jodhpur, also referred to as the "Blue City", is famous for the Mehrangarh Fort and its rich cultural heritage.

• Udaipur and Rajsamand

• Udaipur, known as the "City of Lakes", is famous for its palaces, lakes, and temples.

• Rajsamand is known for the Rajsamand Lake, which is one of the largest artificial lakes in India.

• Dhaulpur and Bharatpur

• Dhaulpur is renowned for its red sandstone quarries and historical significance.

• Bharatpur is famous for the Keoladeo National Park, a UNESCO World Heritage Site and a renowned bird sanctuary.

Q3. Answer: (a) Frederick Sanger

The correct answer is Frederick Sanger.

Key Points

• Frederick Sanger, a British biochemist, was awarded the Nobel Prize in Chemistry in 1958 for his groundbreaking work on the structure of proteins, particularly insulin.

• He was the first scientist to determine the complete amino acid sequence of a protein, proving that proteins have a specific structure.

• His work on insulin revealed its precise amino acid sequence, a discovery that significantly advanced the understanding of protein chemistry and molecular biology.

• Sanger’s research laid the foundation for the development of modern techniques in protein sequencing and contributed to the broader field of genetic research.

• He remains one of only four individuals to have received the Nobel Prize in Chemistry twice, the second being in 1980 for his work on DNA sequencing.

Additional Information

• Rosalind Franklin

• She was a British scientist whose work on X-ray diffraction was crucial in the discovery of the DNA double-helix structure.

• Franklin’s famous "Photo 51" provided critical evidence about the helical structure of DNA, which was later used by Watson and Crick in their model.

• Eduard Buchner

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• Eduard Buchner was a German chemist who won the Nobel Prize in Chemistry in 1907 for his research on fermentation.

• He demonstrated that fermentation could occur in cell-free extracts of yeast, which helped establish that enzymes are responsible for biochemical reactions.

• Buchner's work is considered foundational in the field of biochemistry and enzymology.

• Carl Neuberg

• Carl Neuberg was a German biochemist often referred to as the "father of modern biochemistry."

• He made significant contributions to the study of carbohydrates and enzymes and worked on the chemical processes of fermentation.

Q4. Answer: (d) Third Schedule

The correct answer is Third Schedule.

Key Points

• The Third Schedule of the Indian Constitution specifies the forms of oath and affirmation for various constitutional offices, such as the President, Vice-President, Ministers, Members of Parliament, Judges of the Supreme Court and High Court, and others.

• Oaths are essential to ensure allegiance to the Constitution and commitment to uphold the sovereignty and integrity of India.

• This schedule contains specific formats for oaths or affirmations to be taken while assuming office or performing official duties.

• It applies to several high-ranking officials, including the Union Ministers, State Ministers, Governors, Members of the Legislative Assemblies, and others.

• The forms of oath or affirmation ensure that every officeholder acknowledges their constitutional responsibilities and duties.

Additional Information

• Fourth Schedule:

• The Fourth Schedule of the Indian Constitution deals with the allocation of seats in the Rajya Sabha (Council of States) to different states and union territories.

• It specifies the number of representatives each state or union territory can send to the Rajya Sabha, based on their population.

• The allocation is meant to ensure proportional representation of states in the Rajya Sabha.

• Fifth Schedule:

• The Fifth Schedule pertains to the administration and control of Scheduled Areas and Scheduled Tribes under Articles 244(1) and 244(2) of the Constitution.

• It outlines provisions for the governance, welfare, and protection of Scheduled Tribes in India.

• It also includes recommendations for the formation and functioning of Tribes Advisory Councils in states having Scheduled Areas.

• Tenth Schedule:

• The Tenth Schedule, commonly known as the "Anti-Defection Law," was added to the Constitution in 1985 through the 52nd Amendment.

• It deals with disqualification of members of Parliament and State Legislatures on grounds of defection.

• The law aims to curb political defection by ensuring that elected representatives maintain loyalty to their party.

Q5. Answer: (b) Wolfgang Pauli

The correct answer is Wolfgang Pauli.

Key Points

• Wolfgang Pauli, an Austrian-born theoretical physicist, proposed the existence of the neutrino in 1931 to resolve the apparent violation of energy conservation and momentum conservation in beta decay.

• The neutrino was theorized as a small, neutral particle with extremely low mass and no electric charge, making it difficult to detect.

• Pauli's postulate was later confirmed experimentally in 1956 by Clyde Cowan and Frederick Reines, who detected neutrinos in a nuclear reactor experiment.

• The term "neutrino" was coined by Enrico Fermi, who developed the theory of beta decay incorporating Pauli's neutrino.

• Pauli's prediction of the neutrino is considered one of the most significant contributions to particle physics, as it laid the foundation for modern neutrino physics.

Additional Information

• Paul Dirac

• Paul Dirac was a British theoretical physicist known for his work on quantum mechanics and quantum field theory.

• He formulated the Dirac equation, which describes the behavior of fermions and predicted the existence of antimatter (positrons).

• His contributions to quantum theory and particle physics earned him the Nobel Prize in Physics in 1933.

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• Enrico Fermi

• Enrico Fermi was an Italian-American physicist known as the "architect of the nuclear age" for his pioneering work in nuclear physics.

• He developed the first theoretical framework for beta decay, incorporating Pauli's neutrino, and named the particle "neutrino."

• Fermi also led the team that created the first nuclear reactor, the Chicago Pile-1, in 1942.

• He was awarded the Nobel Prize in Physics in 1938 for his work on induced radioactivity.

• James Chadwick

• James Chadwick was a British physicist who discovered the neutron in 1932, a subatomic particle with no electric charge.

• His discovery was crucial to the development of nuclear physics and the construction of nuclear reactors and weapons.

• For his groundbreaking work, Chadwick was awarded the Nobel Prize in Physics in 1935.

Q6. Answer: (b) Human Development Index (HDI)

The correct answer is Human Development Index (HDI).

Key Points

• The Human Development Index (HDI) is a composite statistic developed by the United Nations Development Programme (UNDP) to measure a country's overall achievement in three basic dimensions of human development: life expectancy, education, and per capita income.

• Life expectancy is used to represent the health and longevity of a population.

• Education is measured through a combination of mean years of schooling for adults aged 25 years and expected years of schooling for children entering the education system.

• Per capita income is adjusted for purchasing power parity (PPP) to ensure a fair comparison of living standards across countries.

• The HDI is published annually in the Human Development Report, providing valuable insights into global development and highlighting disparities between nations.

Additional Information

• GDP per capita:

• Gross Domestic Product (GDP) per capita is an economic metric that measures a country's economic output per person.

• It is calculated by dividing the total GDP of a country by its population.

• While GDP per capita provides an insight into economic productivity, it does not account for disparities in income distribution or other aspects of human development.

• Consumer Price Index (CPI):

• The Consumer Price Index (CPI) measures changes in the price level of a basket of consumer goods and services purchased by households.

• It is commonly used as an indicator of inflation and cost-of-living changes within an economy.

• CPI does not measure human development directly but is useful in understanding economic trends.

• Gini Index:

• The Gini Index, or Gini Coefficient, is a measure of income inequality within a population.

• It ranges from 0 (perfect equality) to 1 (perfect inequality).

• While the Gini Index provides insights into income distribution, it does not encompass other aspects of human development, such as health or education.

Q7. Answer: (a) Articles 323A and 323B

The correct answer is Articles 323A and 323B.

Key Points

• Article 323A of the Indian Constitution empowers the Parliament to establish administrative tribunals for disputes and complaints related to public services under the control of the Union or State governments.

• Article 323B allows legislatures at both the Union and State levels to establish tribunals for specific matters such as taxation, foreign exchange, industrial and labor disputes, land reforms, and more.

• These articles were introduced under the 42nd Amendment Act, 1976, to reduce the burden on traditional courts and streamline adjudication processes.

• Tribunals established under Article 323A have exclusive jurisdiction, meaning disputes falling under them cannot be adjudicated by regular courts. Tribunals under Article 323B do not have exclusive jurisdiction.

• The Supreme Court of India, through various judgments like L. Chandra Kumar vs Union of India (1997), has clarified the powers and limitations of tribunals established under these articles.

Additional Information

• Articles 32 and 226

• These articles deal with the right to constitutional remedies and the jurisdiction of the Supreme Court and High Courts.
• Article 32 empowers individuals to directly approach the Supreme Court for enforcement of their fundamental rights.
• Article 226 empowers the High Courts to issue writs for enforcement of fundamental and other rights.
• While these articles are pivotal for judicial review, they do not specifically address the establishment of tribunals.
• Articles 356C and 360D
• These articles do not exist in the Indian Constitution and appear to be incorrectly mentioned.
• For context, Article 356 deals with President's Rule in states and Article 360 pertains to financial emergency.
• These articles are unrelated to the establishment of tribunals or judicial mechanisms.
• Articles 14 and 15
• Article 14 guarantees equality before the law and equal protection of laws within the territory of India.
• Article 15 prohibits discrimination on grounds of religion, race, caste, sex, or place of birth.
• Although these articles establish the fundamental right to equality, they are not directly related to the establishment of tribunals.

Q8. Answer: (b) Deccan Plateau

The correct answer is Deccan Plateau.

Key Points

• The Patland series refers to a group of plateaus located mainly in the Chotanagpur Plateau region of eastern India.
• The Deccan Plateau is not a part of the Patland series and is a large plateau covering most of southern India.
• It lies between the Western Ghats and Eastern Ghats and forms the major part of the Peninsular Plateau of India.
• The plateau is mainly composed of basaltic lava rocks known as Deccan Traps formed due to volcanic activity.
• Deccan Plateau
• Location - Southern and Central India
• Boundaries - Western Ghats, Eastern Ghats and Satpura Range
• Formation - Volcanic basaltic rocks known as Deccan Traps

Additional Information

• Ranchi Plateau
• The Ranchi Plateau is located in Jharkhand and forms an important part of the Chotanagpur Plateau.
• It is considered a part of the Patland series and is known for waterfalls such as Hundru and Dassam Falls.
• Hazaribagh Plateau
• The Hazaribagh Plateau lies in Jharkhand and is another important component of the Patland series.
• The region is rich in mineral resources such as coal and mica.
• Malwa Plateau
• The Malwa Plateau is located mainly in Madhya Pradesh and parts of Rajasthan.
• It is a volcanic plateau with black soil suitable for cotton cultivation.
• Major rivers draining the plateau include Chambal and Betwa.
• Patland Series
• The Patland series consists of flat-topped plateaus located in the Chotanagpur Plateau region.
• These plateaus are generally located in Jharkhand and surrounding areas and are known for their mineral wealth.

Q9. Answer: (c) 12

The correct answer is 12.

Key Points

• In December 2024, India's Defence Ministry signed a contract with Hindustan Aeronautics Limited (HAL) to procure 12 Su-30MKI aircraft.
• The Su-30MKI is a multirole fighter aircraft developed jointly by Russia’s Sukhoi and India’s HAL specifically for the Indian Air Force (IAF).
• This addition strengthens India's air defense capabilities, ensuring enhanced operational readiness and modernized fleet.
• The Su-30MKI is equipped with advanced avionics, long-range precision strike capabilities, and supermaneuverability, making it one of the most sophisticated aircraft in the IAF fleet.
• The contract involves not only aircraft procurement but also a focus on indigenous production under the government's "Make in India" initiative.

Additional Information

• Su-30MKI:

• The Su-30MKI is classified as a fourth-generation fighter aircraft with air superiority and ground attack capabilities.

• It is powered by two AL-31FP turbofan engines that enable supermaneuverability.

• The aircraft can carry a wide range of weaponry, including air-to-air and air-to-ground missiles, precision-guided munitions, and bombs.

• The Su-30MKI is capable of conducting missions in all-weather conditions and has a combat range of approximately 3,000 kilometers.

• India is one of the largest operators of Su-30MKI aircraft, with HAL responsible for license production and maintenance.

Q10. Answer: (b) Bharat Mandapam, New Delhi

The correct answer is Bharat Mandapam, New Delhi.

Key Points

• The World Health Summit (WHS) Regional Meeting 2025 was hosted for the first time in India at the prestigious Bharat Mandapam, New Delhi, which is renowned for hosting high-profile international events.

• Bharat Mandapam is a world-class convention center located in Pragati Maidan, designed to serve as a venue for global conferences and exhibitions.

• The WHS Regional Meeting is organized to foster international collaboration in addressing global health challenges, and hosting it at Bharat Mandapam highlights India's commitment to global health initiatives.

• The event aimed to bring together policymakers, scientists, researchers, and health professionals to discuss advancements in healthcare, public health policies, and innovative solutions.

• This marked a significant milestone for India in showcasing its contributions to global healthcare and further strengthening its position in international health forums.

Additional Information

• India Expo Centre, Greater Noida

• It is a state-of-the-art venue for large-scale exhibitions, conferences, and trade fairs.

• While it is a prominent location for events, it was not chosen for the WHS Regional Meeting 2025.

• India Expo Centre is known for hosting events like Auto Expo and other trade-related exhibitions, focusing more on industries and commerce.

• Ashoka University, Sonipat

• Ashoka University is a leading liberal arts and sciences university in India, known for its academic excellence and research programs.

• While it is an academic institution, it is not a convention venue suitable for hosting large-scale international events like the WHS Regional Meeting.

• The university's focus is primarily on education and research rather than large health conferences.

• Pragati Maidan, New Delhi

• Pragati Maidan is a prominent venue in New Delhi for exhibitions and cultural events, and Bharat Mandapam is part of its infrastructure.

• Pragati Maidan has hosted major events like the India International Trade Fair and other high-profile exhibitions.

• While Bharat Mandapam is located within Pragati Maidan, it is distinguished as a world-class convention center for global events.

Q11. Answer: (b) To enhance transparency and inclusivity in the management of Waqf properties

The correct answer is To enhance transparency and inclusivity in the management of Waqf properties.

Key Points

• The Waqf (Amendment) Act, 2025 primarily focuses on enhancing transparency and inclusivity in the management of Waqf properties, which are charitable endowments under Islamic law.

• The Act introduces digital record-keeping to prevent encroachments and improve the accountability of Waqf Boards in managing properties.

• It mandates the regular audit of Waqf properties and their management by independent agencies to ensure proper utilization of funds.

• The new amendments aim to encourage public participation and inclusivity by allowing representation from minority communities in decision-making processes.

• This legislation seeks to address long-standing issues of mismanagement, disputes, and lack of transparency in the administration of Waqf properties.

Additional Information

• Waqf:

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• Waqf is an endowment made by Muslims for religious, educational, or charitable purposes.

• Waqf properties are governed under the Waqf Act, 1995, which provides for the establishment of Waqf Boards at the state level to oversee their management.

• India has over six lakh registered Waqf properties, making it one of the largest holders of such properties globally.

Q12. Answer: (c) Raiza Dhillon

The correct answer is Raiza Dhillon.

Key Points

• Raiza Dhillon is an emerging talent in Indian shooting, particularly excelling in the skeet category.

• At the ISSF Junior World Cup 2025, she showcased her skills by securing a silver medal in the women's skeet event.

• The ISSF (International Shooting Sport Federation) Junior World Cup is a prestigious event for young shooters, providing a platform to demonstrate their abilities on the global stage.

• Raiza's achievement is significant as it highlights India's growing prominence in the field of shooting sports.

• She represents the next generation of Indian shooters who are making a mark in international competitions.

Additional Information

• Maheshwari Chauhan

• Maheshwari Chauhan is another prominent Indian shooter known for her performance in skeet shooting.

• She was the first Indian woman to win an individual skeet medal at the Asian Shooting Championship in 2017.

• Her achievements have inspired many young shooters in India to take up the sport.

• Parinaaz Dhaliwal

• Parinaaz Dhaliwal is an Indian shooter specializing in skeet events.

• Although she has represented India in various competitions, she has not yet achieved a podium finish at the ISSF Junior World Cup.

• Ganemat Sekhon

• Ganemat Sekhon is a notable Indian skeet shooter and the first Indian woman to win a medal in skeet at the ISSF World Cup.

• She won a bronze medal in the ISSF World Cup in 2021, marking a significant milestone for Indian shooting.

• Ganemat’s success has paved the way for other Indian female shooters in the skeet discipline.

Q13. Answer: (a) Sarvam AI

The correct answer is Sarvam AI.

Key Points

• Sarvam AI is an Indian startup selected to develop the country’s first indigenous large language model under the India AI Mission in April 2025.

• This initiative is a part of the Indian government’s focus on achieving self-reliance in artificial intelligence and strengthening AI capabilities within the country.

• The indigenous large language model by Sarvam AI aims to compete with international AI models like ChatGPT and Google Bard by being tailored specifically to India’s linguistic and cultural diversity.

• The India AI Mission is a flagship program aimed at fostering innovation in AI and promoting the development of AI infrastructure, tools, and technologies within India.

• Projects like this are expected to support India’s goal of becoming a global hub for AI innovation and technology by leveraging local talent and resources.

Additional Information

• AI4Bharat:

• AI4Bharat is an initiative by the Indian Institute of Technology (IIT) Madras aimed at building open-source AI solutions for societal challenges in India.

• It focuses on creating AI tools and datasets specifically tailored for Indian languages and applications.

• While AI4Bharat has made significant strides in language processing, it is not selected for the India AI Mission's large language model project.

• Infosys:

• Infosys is one of India’s leading multinational corporations providing IT services, consulting, and outsourcing solutions.

• While Infosys has a strong focus on AI and machine learning, the development of India’s first indigenous large language model is not part of its current projects.

• Wadhwani AI:

• Wadhwani AI is a non-profit research institute leveraging artificial intelligence to address societal challenges in sectors like

healthcare, agriculture, and education.

• Its primary focus is on applied AI solutions rather than developing large language models.

Q14. Answer: (d) Divide and Rule

The correct answer is Divide and Rule.

Key Points

• The British introduced the Divide and Rule policy in India after the 1857 revolt to weaken the unity between Hindus and Muslims.

• This policy aimed to foster religious, social, and political divisions among Indians, ensuring that the people remained disunited and could not collectively oppose colonial rule.

• The British actively promoted communal differences by favoring one community over another in government jobs, education, and political representation.

• In 1909, the British introduced the Morley-Minto Reforms, which provided separate electorates for Muslims, further deepening communal divisions.

• The policy of Divide and Rule played a significant role in ensuring the British maintained control over India until independence in 1947.

Additional Information

• Doctrine of Lapse

• It was a policy introduced by Lord Dalhousie, the Governor-General of India from 1848 to 1856.

• Under this doctrine, if a ruler of a princely state died without a natural heir, his state would be annexed into British territory.

• This policy was one of the causes of the 1857 revolt as it alienated Indian rulers, including prominent states like Jhansi, Satara, and Nagpur.

• Forward Policy

• This term generally refers to a military strategy, but in the context of British India, it was used to describe the expansionist policies employed to secure the frontiers.

• The British sought to establish dominance along India’s northwestern frontier to counter Russian advances in Central Asia, particularly during the Great Game.

• This policy led to interventions in Afghanistan and the establishment of buffer zones.

• Subsidiary Alliance

• Introduced by Lord Wellesley in the late 18th century, this was a diplomatic policy to establish British supremacy in India.

• Under this system, Indian princely states had to accept British troops within their territory and pay for their maintenance.

• States under the alliance could not ally with or declare war against other states without British approval.

• Examples of states that accepted the Subsidiary Alliance include Hyderabad, Mysore, and Awadh.

Q15. Answer: (d) Bhargavastra

The correct answer is Bhargavastra.

Key Points

• Bhargavastra is the name of India's indigenous anti-drone system, which was successfully tested in May 2025.

• This anti-drone system was developed by India's Defence Research and Development Organisation (DRDO) to counter the increasing threats posed by drones in modern warfare.

• The system is equipped with advanced radar and electro-optic sensors to detect, track, and neutralize hostile drones.

• Bhargavastra employs both soft kill (jamming) and hard kill (laser-based destruction) mechanisms to destroy enemy drones.

• This innovation plays a crucial role in securing India's borders, critical installations, and strategic locations from drone-based intrusions and attacks.

Additional Information

• Akashteer

• Akashteer is an air defense control and reporting system developed by DRDO.

• It is designed to provide comprehensive airspace surveillance and integrate various air defense assets for effective tracking and engagement of enemy aircraft or missiles.

• The system enhances coordination and response time in air defense operations.

• Trinetra

• Trinetra is a multi-sensor system developed for improved battlefield awareness.

• It integrates thermal imaging, radar, and optical sensors to provide a 360-degree situational picture to military units.

• This system is primarily used in armored vehicles and tanks to enhance their operational capabilities.

• Nagastra

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• Nagastra is an indigenous loitering munition system developed for precise targeting in modern warfare.

• It has the capability to hover over a target area and strike with high accuracy, making it effective for tactical missions.

• The system is equipped with advanced sensors and GPS guidance for superior operational performance.

Q16. Answer: (c) 103

The correct answer is 103.

Key Points

• On 22 May 2025, Prime Minister Narendra Modi inaugurated 103 AMRUT stations as part of the Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

• The AMRUT scheme focuses on improving urban infrastructure, including water supply, sewerage, and urban transport, to make cities more livable and sustainable.

• The 103 inaugurated stations are part of a larger effort to enhance urban mobility and connectivity, particularly through the development of metro rail systems.

• AMRUT is a flagship scheme launched in 2015 to provide basic services to households and improve the quality of urban living, especially for the poor.

• These stations were designed to align with the goals of sustainability, accessibility, and modern infrastructure under the AMRUT scheme's objectives.

Additional Information

• AMRUT:

• AMRUT stands for Atal Mission for Rejuvenation and Urban Transformation, a flagship Indian government scheme launched in 2015

• The mission's primary aim is to improve urban living standards by providing essential services like water supply, sewerage, drainage, and non-motorized transport.

• It also emphasizes the creation of green spaces and promoting sustainable urban development.

• The scheme is being implemented across 500+ cities, with a population of over 1 lakh, as per the 2011 Census.

Q17. Answer: (b) Kerala

The correct answer is Kerala.

Key Points

• Pazhassi Raja, also known as the "Lion of Kerala," was a prominent freedom fighter from the state of Kerala.

• He belonged to the Kottayam royal family in present-day Wayanad district of Kerala and played a significant role in resisting British colonial rule in the late 18th and early 19th centuries.

• Pazhassi Raja led a guerrilla warfare campaign against the British East India Company, particularly after they imposed heavy taxes and annexed his territories.

• He is remembered for his resistance during the Polygar Wars and his alliance with tribal communities like the Kurichiyas in his fight against the British.

• Pazhassi Raja died in 1805 during a battle with the British forces, marking him as a martyr in India’s freedom struggle.

Additional Information

• Gujarat:

• Gujarat was home to several prominent leaders of the Indian independence movement, including Mahatma Gandhi and Sardar Vallabhbhai Patel.

• It was the center of major movements like the Dandi March (Salt Satyagraha) initiated by Mahatma Gandhi in 1930.

• While Gujarat has a rich history of resistance against British rule, Pazhassi Raja was not associated with this region.

• Telangana:

• Telangana, historically part of the Hyderabad princely state, experienced significant peasant uprisings, including the Telangana Rebellion (1946-51), against feudal landlords and the Nizam.

• The Communist Party of India played a key role in organizing these struggles.

• Pazhassi Raja’s legacy is unrelated to this region.

• Andhra Pradesh:

• Andhra Pradesh witnessed several movements for independence, including the Alluri Sitarama Raju-led Rampa Rebellion against British colonial authority in the 1920s.

• Alluri Sitarama Raju is sometimes referred to as the "Manyam Veerudu" (Hero of the Forests) for his guerrilla warfare techniques.

• While Andhra Pradesh has its own rich history of freedom fighters, Pazhassi Raja’s contributions were specific to Kerala.

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Q18. Answer: (c) Settings

The correct answer is Settings.

Key Points

• To adjust the screen resolution or change the desktop background in Windows, users typically need to access the Settings menu.

• The Settings menu is a centralized location in Windows where users can customize various system preferences, including display settings, sound, network, and personalization options.

• To access the Settings menu, users can click on the Start button and select the "Settings" gear icon or press the Windows + I shortcut keys.

• Within the Settings menu, the "System" section includes options for adjusting display resolution, scaling, and layout.

• The "Personalization" section within Settings allows users to change desktop backgrounds, themes, colors, and lock screen preferences.

Additional Information

• This PC

• The "This PC" option (formerly known as "My Computer") provides access to the file explorer where users can view and manage drives, folders, and files on their computer.

• Documents

• The "Documents" folder is a default directory in Windows for saving and organizing personal and work-related files.

• Run

• The "Run" dialog box is used to execute commands, open applications, and access specific system utilities by entering command-line instructions.

Q19. Answer: (b) 2019

The correct answer is 2019.

Key Points

• The Pradhan Mantri JI-VAN Yojana (PM JI-VAN) was launched in 2019 by the Ministry of Petroleum and Natural Gas, Government of India.

• The scheme focuses on promoting second-generation ethanol production using biomass and other renewable feedstock.

• It aims to reduce dependence on fossil fuels, achieve the objective of Ethanol Blended Petrol (EBP) Programme, and address issues like crop residue burning.

• The scheme is implemented with financial assistance of Rs. 1,969 crores for the period 2018-19 to 2023-24.

• Under the scheme, 12 commercial and 10 demonstration projects are set up to develop and promote the use of biofuels in India.

Additional Information

• PM JI-VAN Yojana

• The scheme addresses the dual challenges of managing agricultural waste and promoting sustainable energy resources.

• It also aligns with India's commitment to the Paris Agreement and its Nationally Determined Contributions (NDCs) to reduce greenhouse gas emissions.

• PM JI-VAN supports India’s goal of achieving 20% ethanol blending in petrol by 2025.

Q20. Answer: (c) ICGS Shoor

The correct answer is ICGS Shoor.

Key Points

• ICGS Shoor, an advanced offshore patrol vessel (OPV) of the Indian Coast Guard, represented India at NAVDEX 2025 to enhance maritime cooperation between India and the UAE.

• ICGS Shoor is equipped with state-of-the-art technology, including advanced navigation and communication systems, making it suitable for multi-dimensional roles such as surveillance, search and rescue, and anti-piracy operations.

• Participation in NAVDEX 2025 reflects India's commitment to strengthening maritime ties with the UAE and promoting regional security and cooperation in the maritime domain.

• This Indian Coast Guard ship is known for its robust capabilities in addressing maritime challenges and fostering international partnerships.

• Such international maritime exhibitions play a crucial role in showcasing technological advancements and fostering collaborations between nations.

Additional Information

• ICGS Sujata:

• ICGS Sujata is an offshore patrol vessel of the Indian Coast Guard, primarily used for patrolling and surveillance purposes.

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• Its core functions include ensuring maritime security, preventing illegal activities, and conducting search and rescue missions.
• INS Rajdhwaj:
• INS Rajdhwaj is a ship of the Indian Navy designed for naval operations and defense purposes.
• It is distinct from Indian Coast Guard vessels, focusing on naval strategies and defense rather than coastal surveillance.
• INS Veera:
• INS Veera is a naval ship of the Indian Navy, equipped with advanced weaponry and systems for defense operations.
• Its role primarily aligns with protecting national interests in maritime zones and ensuring naval superiority.

Q21. Answer: (c) 97^(th)Constitutional Amendment Act, 2011

The correct answer is 97th Constitutional Amendment Act, 2011.

Key Points

• The 97th Constitutional Amendment Act, 2011 granted constitutional status and protection to co-operative societies in India.
• It inserted a new Part IXB in the Constitution, titled "The Co-operative Societies," to promote voluntary formation, autonomous functioning, democratic control, and professional management of cooperative societies.
• Article 43B was added to the Directive Principles of State Policy (DPSP), emphasizing the promotion of cooperative societies.
• This amendment also brought changes to Article 19(1)(c), ensuring citizens have the right to form associations, including cooperative societies.
• It aimed to ensure transparency, accountability, and empowerment in the functioning of cooperative societies, thereby strengthening the cooperative movement in India.

Additional Information

• 74th Constitutional Amendment Act, 1992
• This amendment gave constitutional status to Urban Local Bodies (ULBs), including municipalities, municipal councils, and municipal corporations.
• It provided for the establishment of the three-tier structure of urban governance and introduced provisions for the devolution of powers and responsibilities to ULBs.
• Inserted Part IXA in the Constitution, titled "The Municipalities," and introduced Articles 243P to 243ZG.
• 73rd Constitutional Amendment Act, 1992
• This amendment granted constitutional status to Panchayati Raj institutions in India.
• It introduced Part IX in the Constitution, titled "The Panchayats," and added Articles 243 to 243O.
• It aimed to strengthen grassroots democracy by establishing a three-tier system of Panchayati Raj institutions.
• This amendment mandated the reservation of seats for Scheduled Castes, Scheduled Tribes, and women in Panchayati Raj institutions.
• 86th Constitutional Amendment Act, 2002
• This amendment made education a fundamental right for children aged 6 to 14 years under Article 21A.
• It mandated the state to provide free and compulsory education to all children in this age group.
• It also modified Article 45 to ensure early childhood care and education for children below six years of age.
• Additionally, it added Fundamental Duty under Article 51A(k), requiring parents or guardians to provide opportunities for education to their children.

Q22. Answer: (b) Ninth Schedule

The correct answer is Ninth Schedule.

Key Points

• The Ninth Schedule of the Indian Constitution was introduced through the First Amendment Act, 1951, by then Prime Minister Jawaharlal Nehru.
• It was created to provide immunity to certain laws from judicial review, primarily to protect agrarian reforms and land redistribution policies.
• Laws placed in the Ninth Schedule cannot be challenged in courts on the grounds of violation of fundamental rights.
• However, in the landmark case of I.R. Coelho vs. State of Tamil Nadu (2007), the Supreme Court ruled that laws under the Ninth Schedule can still be reviewed if they violate the basic structure of the Constitution.
• The Ninth Schedule initially contained only 13 laws but has since expanded to include over 280 laws.

Additional Information

• Eleventh Schedule
• The Eleventh Schedule was added to the Constitution through the 73rd Amendment Act, 1992.
• It pertains to the Panchayati Raj system and lists 29 subjects under the jurisdiction of Panchayats.

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• These subjects include agriculture, rural development, health, education, and sanitation, among others.

• The aim of this schedule is to strengthen decentralized governance and empower local self-government institutions.

• Fifth Schedule

• The Fifth Schedule of the Indian Constitution deals with the administration and control of Scheduled Areas and Scheduled Tribes in states other than Assam, Meghalaya, Tripura, and Mizoram.

• It provides guidelines for the establishment of Tribes Advisory Councils and the Governor's role in managing tribal welfare.

• Special provisions are made under this schedule to protect the rights and interests of tribal populations.

• Third Schedule

• The Third Schedule contains various forms of oaths and affirmations for elected officials, including MPs, MLAs, ministers, judges, and other public servants.

• It ensures that individuals occupying constitutional posts pledge allegiance to uphold the Constitution and discharge their duties responsibly.

• This schedule reinforces the principles of accountability and integrity in governance.

Q23. Answer: (c) 30 days generally and 48 hours for life or liberty cases

The correct answer is 30 days generally and 48 hours for life or liberty cases.

Key Points

• Under the Right to Information (RTI) Act, 2005, the Public Information Officer (PIO) is mandated to provide information within 30 days from the receipt of the request for general matters.

• If the information sought pertains to the life or liberty of a person, it must be provided within 48 hours.

• The RTI Act ensures time-bound access to information to promote transparency and accountability in governance.

• If the request is forwarded to another public authority, the time limit of 30 days is calculated from the date of receipt of the request by the appropriate authority.

• In case of failure to provide information within the prescribed time, the PIO may face penalties, including a fine of Rs. 250 per day up to a maximum of Rs. 25,000.

Additional Information

• Right to Information Act, 2005

• The RTI Act was enacted to empower citizens to seek information from public authorities, thereby ensuring transparency and accountability in governance.

• It applies to all States and Union Territories of India, except the state of Jammu and Kashmir (which has its own RTI Act, now repealed after the abrogation of Article 370).

• The Act aims to curb corruption by giving citizens access to decision-making processes.

• Public authorities are required to appoint Public Information Officers (PIOs) to handle RTI requests.

Q24. Answer: (d) 14 digits

The correct answer is 14 digits.

Key Points

• The Unique Land Parcel Identification Number (ULPIN) is a 14-digit alphanumeric unique identification number assigned to each land parcel in India.

• The ULPIN is generated based on longitude and latitude coordinates of the land parcel, ensuring precise geographical identification.

• ULPIN is part of the Digital India Land Records Modernization Programme (DILRMP), which aims to digitize and modernize land records across the country.

• This initiative is meant to ensure transparency and efficiency in land record management, reducing disputes and fraud.

• The ULPIN system is also referred to as the "Aadhaar for land parcels," as it provides a unique identity to every piece of land in India.

Additional Information

• Digital India Land Records Modernization Programme (DILRMP)

• The DILRMP was launched by the Government of India to modernize land records and ensure efficient management.

• It involves digitization of land records, integration of property registration and mutation processes, and development of a unique identification system for land parcels.

• The program aims to reduce land disputes, enhance transparency, and streamline land-related transactions.

• ULPIN is a key component of DILRMP, ensuring a standardized and secure land identification process across the country.

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Q25. Answer: (b) It aims to organise rural poor into Self-Help Groups (SHGs).

The correct answer is It aims to organise rural poor into Self-Help Groups (SHGs)..

Key Points

• The National Rural Livelihoods Mission (NRLM) was launched by the Ministry of Rural Development in 2011.

• NRLM seeks to alleviate rural poverty by organising the poor into Self-Help Groups (SHGs) and building their capacities for self-employment and entrepreneurship.

• It aims to enhance the livelihoods of rural households by facilitating access to financial services, skill development, and market linkages.

• The mission promotes women's participation by ensuring that a majority of SHG members are women.

• NRLM operates on the principle of "universal social mobilisation," targeting all rural poor families, particularly those identified through the Socio-Economic Caste Census (SECC).

• The mission has integrated with DAY-NRLM (Deendayal Antyodaya Yojana-NRLM) for better implementation and linkage with other government schemes.

Additional Information

• National Rural Livelihoods Mission (NRLM)

• NRLM is a poverty alleviation program implemented in all states and union territories of India.

• It aims to provide sustainable livelihoods to rural households by enhancing their capabilities and linking them to financial resources and markets.

• The mission works towards promoting financial inclusion and social empowerment in rural areas.

Q26. Answer: (b) 1950

The correct answer is 1950.

Key Points

• The Planning Commission of India was established in the year 1950, specifically on 15 March 1950, by a resolution of the Government of India.

• It was tasked with the responsibility of creating Five-Year Plans for the economic development and growth of the country.

• The Planning Commission was set up under the leadership of Pandit Jawaharlal Nehru, the first Prime Minister of India, who served as its chairman.

• The main objective of the Planning Commission was to promote a rapid increase in the standard of living of the citizens through efficient utilization of resources.

• It was replaced by the NITI Aayog (National Institution for Transforming India) on 1 January 2015, which serves as the policy think tank of the Government of India.

Additional Information

• 1948

• Although 1948 was an important year for post-independence economic planning discussions, the Planning Commission had not been formally established yet.

• The Industrial Policy Resolution of 1948 was introduced, which laid the groundwork for India's economic development in the subsequent years.

• This resolution emphasized the importance of public and private sectors in India's industrial development.

• 1951

• The year 1951 marked the launch of India's First Five-Year Plan, which focused on agricultural development and infrastructure building.

• While the Planning Commission was established in 1950, its first major task was to develop the First Five-Year Plan, which officially began implementation in 1951.

• This plan aimed to address food security and alleviate poverty in the country.

• 1952

• 1952 was significant for the establishment of the Community Development Programme, which aimed to promote rural development.

Q27. Answer: (b) Expansion of agricultural land

The correct answer is Expansion of agricultural land.

Key Points

• The Green Revolution in India focused on increasing agricultural productivity by introducing new technologies rather than expanding agricultural land.

• It relied heavily on the use of high-yielding variety (HYV) seeds, chemical fertilizers, pesticides, and advanced irrigation

techniques.

• The main goal of the Green Revolution was to achieve self-sufficiency in food production, especially for crops like wheat and rice.

• Mechanization of agriculture was promoted, introducing tractors, harvesters, and other equipment to make farming more efficient.

• Expansion of agricultural land was not a feature of the Green Revolution as the focus was on increasing productivity per unit of land rather than increasing the area under cultivation.

Additional Information

• The Green Revolution in India was initiated in the 1960s to combat food shortages and improve agricultural productivity.

• It was spearheaded by initiatives from the Indian government in collaboration with agricultural scientists like Dr. M.S. Swaminathan.

• While it had numerous benefits, such as achieving self-sufficiency in food production, it also led to environmental challenges like soil degradation and overuse of water resources.

Q28. Answer: (a) It stores the booting instructions permanently.

The correct answer is It stores the booting instructions permanently.

Key Points

• Read-Only Memory (ROM) is a type of non-volatile memory, meaning it retains its data even when the power is turned off.

• It stores the booting instructions permanently, such as the Basic Input/Output System (BIOS) or firmware required to start a computer or device.

• The data stored in ROM is pre-programmed during the manufacturing process and cannot be modified or erased by the user under normal conditions.

• ROM is essential for hardware initialization and provides the instructions required for the operating system to load into Random Access Memory (RAM).

• It is widely used in various devices, including computers, smartphones, and embedded systems, for storing critical instructions and firmware.

Additional Information

• Read-Only Memory (ROM)

• ROM is essential for storing firmware, which acts as the interface between hardware and software.

• Types of ROM include Mask ROM, PROM (Programmable ROM), EPROM (Erasable Programmable ROM), and EEPROM (Electrically Erasable Programmable ROM).

• In modern devices, Flash Memory, a type of EEPROM, is commonly used for storing firmware and other data.

Q29. Answer: (a) Ujjain

The correct answer is Ujjain.

Key Points

• During the reign of Vatsaraja, the Gurjara-Pratihara dynasty expanded its influence significantly in northern and western India.

• Ujjain, an ancient city of religious and political importance, was chosen as the capital by Vatsaraja due to its strategic and cultural significance.

• Ujjain was a prominent center of trade, learning, and politics, making it a critical location for the administration of the vast Gurjara-Pratihara empire.

• Vatsaraja was instrumental in consolidating the Gurjara-Pratihara power, and Ujjain served as a vital hub for military and economic operations under his rule.

• The Gurjara-Pratiharas, under Vatsaraja and later rulers, played a significant role in resisting Arab invasions in western India and maintaining stability in the region.

Additional Information

• Mathura:

• Mathura, an ancient city in northern India, is renowned as the birthplace of Lord Krishna and a major center of Hinduism.

• It was an important trade and cultural hub during ancient and medieval times but was not the capital of Vatsaraja during the Gurjara-Pratihara period.

• Mathura later became prominent under different dynasties, including the Kushanas and Guptas, for its religious and cultural contributions.

• Kannauj:

• Kannauj became a significant political and cultural center during the later Gurjara-Pratihara dynasty under rulers like Mihir Bhoja.

• It served as a key capital for the dynasty in the 9th and 10th centuries after Ujjain.

• Kannauj is historically famous for the "Tripartite Struggle" between the Gurjara-Pratiharas, Rashtrakutas, and Palas for control over northern India.

• Malwa:

• Malwa is a historical region in central India that played a vital role in the political and cultural history of ancient and medieval India.

• Malwa was known for its rich cultural heritage, including architecture, literature, and trade during different dynasties.

Q30. Answer: (a) Davos

The correct answer is Davos.

Key Points

• Davos is the host city of the annual World Economic Forum (WEF) meeting, which brings together global leaders, industry experts, and policymakers to discuss pressing global issues.

• The WEF Annual Meeting is traditionally held in January each year in Davos, Switzerland. It is known for addressing challenges such as climate change, economic inequality, and technological innovation.

• Davos is a famous resort town located in the Swiss Alps and is recognized for its global significance as a center for international cooperation and dialogue.

• The WEF was founded in 1971 by economist Klaus Schwab and has since grown into a major global platform for shaping economic and social policies.

• In addition to formal discussions, the event provides significant networking opportunities for leaders in various fields, fostering collaboration and partnerships on global challenges.

Additional Information

• Zurich

• Zurich is the largest city in Switzerland and a prominent financial hub globally.

• While Zurich is not the host city for the WEF, it is known for its banking and financial services industry, contributing significantly to Switzerland's economy.

• Zurich is also a cultural center, offering a mix of modern and historical attractions such as the Kunsthaus Zurich and the Old Town.

• Geneva

• Geneva is home to numerous international organizations, including the United Nations and the World Health Organization (WHO).

• It plays a key role in global diplomacy and is often referred to as the "Peace Capital" due to its contributions to international cooperation.

• Geneva also hosts the headquarters of the Red Cross and other humanitarian organizations, making it a city of global importance.

• Vienna

• Vienna, the capital of Austria, is a major center for arts, culture, and diplomacy.

• It hosts international organizations such as the International Atomic Energy Agency (IAEA) and the Organization of Petroleum Exporting Countries (OPEC).

• Vienna is renowned for its historical significance and is often ranked as one of the most livable cities in the world.

Q31. Answer: (a) Uttar Pradesh

The correct answer is Uttar Pradesh.

Key Points

• Hriday Narayan Dixit is a prominent thinker, philosopher, politician, and social worker hailing from the Indian state of Uttar Pradesh.

• He served as the Speaker of the Uttar Pradesh Legislative Assembly from 2017 to 2022.

• Hriday Narayan Dixit is well-known for his contributions to social and political discourse through various literary works and philosophical writings.

• In 2025, he was honored with the prestigious Padma Shri award, which is one of India’s highest civilian awards.

• His work has been recognized in areas such as philosophy, political thought, and social service, showcasing his dedication to the betterment of society.

Additional Information

• Padma Shri Award

• The award recognizes the efforts of individuals who have made a significant impact on society through their work.

• It is awarded to individuals for their distinguished contributions in various fields such as art, literature, education, social work,

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public affairs, science, and sports.

• The Padma Shri is the fourth-highest civilian award in India, established in 1954.

Q32. Answer: (b) Khilafat and Non-Cooperation Movement

The correct answer is Khilafat and Non-Cooperation Movement.

Key Points

• Mahatma Gandhi's entry into all-India politics was marked by the Khilafat and Non-Cooperation Movement (1920–1922).

• Gandhi supported the Khilafat issue, which aimed to protect the Ottoman Caliphate, and combined it with the Non-Cooperation Movement to fight against British colonial rule.

• The movement was launched to oppose British policies, including the Rowlatt Act and the Jallianwala Bagh massacre, alongside the demand for Swaraj (self-rule).

• Gandhi encouraged Indians to boycott British institutions, goods, titles, and elections and adopt Swadeshi (indigenous products) and non-violent resistance.

• This was the first mass movement led by Gandhi at the national level, making him a prominent leader in Indian politics and uniting Hindus and Muslims under a common cause.

Additional Information

• Civil Disobedience Movement:

• Launched by Gandhi in 1930, it was a key phase of India's struggle for independence.

• The movement began with the historic Dandi March, where Gandhi broke the British salt law by making salt at the seashore.

• It focused on non-payment of taxes, boycotts of British goods, and civil resistance.

• Unlike the Non-Cooperation Movement, it aimed to challenge British laws openly and systematically.

• Salt Satyagraha:

• This was a part of the Civil Disobedience Movement, initiated by Gandhi in 1930.

• It marked a direct protest against the British monopoly on salt production and taxation.

• The Dandi March symbolized the wider defiance of British authority and inspired numerous acts of resistance across India.

• Champaran Satyagraha:

• Champaran Satyagraha of 1917 was Gandhi's first major political engagement in India.

• It focused on addressing the grievances of indigo farmers in Bihar, who were forced into oppressive farming practices by British planters.

• Gandhi adopted non-violent methods to achieve justice for the peasants, marking his first experiment with Satyagraha in India.

• While significant, this movement was more localized and not a pan-India initiative.

Q33. Answer: (a) CSIR-Indian Institute of Petroleum, Dehradun

The correct answer is CSIR-Indian Institute of Petroleum, Dehradun.

Key Points

• The CSIR-Indian Institute of Petroleum (IIP), Dehradun, is a premier research and development institution under the Council of Scientific and Industrial Research (CSIR).

• On 29 May 2025, CSIR-IIP celebrated the Rashtriya Boudhik Sampada Mahotsav (RBSM) to promote and recognize advancements in intellectual property rights (IPR).

• The event highlighted the importance of intellectual property (IP) in fostering innovation, entrepreneurship, and economic growth.

• It served as a platform for knowledge-sharing on patent filing, technology transfer, and commercialization to encourage innovation among researchers and industries.

• CSIR-IIP has been instrumental in developing cutting-edge technologies in petroleum refining, petrochemicals, and alternative energy solutions.

Additional Information

• Rajiv Gandhi Institute of Petroleum Technology (RGIPT), Amethi:

• RGIPT is an institute of national importance established under the Ministry of Petroleum and Natural Gas, Government of India.

• It focuses on providing education, training, and research in petroleum, energy, and related fields.

• The institute offers undergraduate, postgraduate, and doctoral programs in petroleum engineering and technology management.

• Indian Institute of Petroleum and Energy (IIPE), Visakhapatnam:

• IIPE is an autonomous institution established by the Government of India to meet the requirement of skilled professionals in the petroleum and energy sectors.

• It offers specialized programs in petroleum engineering, chemical engineering, and energy systems engineering.

• The institute collaborates with the oil and gas industry to address challenges in sustainable energy production and management.

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• Indian Oil Institute of Petroleum Management (IIPM), Haryana:
• IIPM is a premier training and management institute established by Indian Oil Corporation Limited (IOCL).
• It provides advanced training programs in petroleum management, oil and gas exploration, and leadership development.
• The institute caters to the learning and development needs of professionals in the oil and gas industry.
• Rashtriya Boudhik Sampada Mahotsav (RBSM):
• RBSM is an initiative aimed at promoting intellectual property (IP) awareness and fostering innovation in various sectors.
• The event emphasizes the importance of protecting IP rights, including patents, copyrights, and trademarks.
• It encourages individuals and institutions to utilize IP for technological advancements and economic development.

Q34. Answer: (c) Timur

The correct answer is Timur.

Key Points

• Babur was a descendant of Timur (also known as Tamerlane) on his paternal side and was related to Genghis Khan on his maternal side.
• Timur was a 14th-century Turco-Mongol conqueror who founded the Timurid Empire in Central Asia.
• Babur's lineage connects him to two prominent conquerors: Genghis Khan, known for his vast Mongol Empire, and Timur, renowned for his military campaigns across Asia.
• Babur inherited both the legacy of his ancestors and the ambition to establish a powerful empire, which he achieved by founding the Mughal Empire in India.
• The connection to Timur on the paternal side was significant as it provided Babur with claims to Central Asia and the prestige of being part of the Timurid dynasty.

Additional Information

• Mohammed Ghori:
• Mohammed Ghori was a ruler of the Ghurid dynasty who played a pivotal role in establishing Muslim rule in India in the 12th century.
• He defeated Prithviraj Chauhan in the Second Battle of Tarain (1192 AD), marking the beginning of the Delhi Sultanate.
• Although significant in Indian history, Mohammed Ghori was not related to Babur.
• Mahmud Ghazni:
• Mahmud Ghazni was a ruler of the Ghaznavid dynasty, known for his invasions of India between 1000 and 1027 AD.
• He aimed to plunder India's wealth and spread Islam but was not connected to Babur by lineage.
• His raids influenced the cultural and political history of medieval India but did not establish any long-lasting dynasty in the region.
• Ibrahim Lodi:
• Ibrahim Lodi was the last Sultan of the Delhi Sultanate's Lodi dynasty.
• He was defeated by Babur in the First Battle of Panipat (1526 AD), which marked the beginning of the Mughal Empire in India.
• While a significant figure in Babur's conquest of India, Ibrahim Lodi was not related to Babur.

Q35. Answer: (a) Asian Productivity Organization (APO)

The correct answer is Asian Productivity Organization (APO).

Key Points

• The Asian Productivity Organization (APO) is an intergovernmental regional organization established in 1961 to promote productivity growth in the Asia-Pacific region.
• India assumed the chairmanship of the APO in May 2025 as part of its commitment to enhancing productivity and fostering regional cooperation.
• The APO provides policy guidance, technical expertise, and capacity-building programs to its member countries for productivity enhancement.
• India has been an active member of the APO since its inception and has significantly contributed to its initiatives to improve productivity in various sectors.
• Through APO, India aims to share its best practices in agriculture, manufacturing, and services sectors and collaborate on innovative solutions to address productivity challenges.

Additional Information

• Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
• BIMSTEC is a regional organization comprising seven member states: Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand.
• It was established in 1997 to promote technical and economic cooperation among countries bordering the Bay of Bengal.

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• The organization focuses on areas such as trade, technology, energy, transport, tourism, and fisheries.

• India plays a pivotal role in BIMSTEC, particularly in enhancing regional connectivity and economic integration.

• South Asian Association for Regional Cooperation (SAARC)

• SAARC is an intergovernmental organization founded in 1985 to promote economic and regional integration among its eight member states: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

• The organization aims to enhance cooperation in areas such as trade, culture, education, science, and technology.

• However, SAARC has faced challenges due to political tensions among its member states, particularly between India and Pakistan.

• Association of Southeast Asian Nations (ASEAN)

• ASEAN is a regional bloc established in 1967, comprising ten Southeast Asian nations: Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Myanmar, and Cambodia.

• The organization promotes economic, political, security, and socio-cultural cooperation among its member states.

• India is not a member of ASEAN but has strong ties with the organization through its Act East Policy, focusing on enhancing trade and connectivity with Southeast Asia.

Q36. Answer: (d) Kuchipudi

The correct answer is Kuchipudi.

Key Points

• Kuchipudi is one of the major classical dance forms of India, originating in Andhra Pradesh.

• The dance form derives its name from the village of Kuchelapuram in the Krishna district of Andhra Pradesh.

• It is known for its graceful movements, expressive gestures (Mudras), and intricate footwork.

• Kuchipudi is a blend of acting and dance, often accompanied by Carnatic music, showcasing stories from Indian mythology and epics.

• Vedantam Prahlad Sharma, a renowned exponent of Kuchipudi, was instrumental in popularizing this art form across India.

Additional Information

• Bharatanatyam

• Bharatanatyam is one of the oldest classical dance forms, originating in Tamil Nadu.

• It is characterized by intricate footwork, fixed upper torso movements, and expressive gestures (Mudras).

• Traditionally performed in temples as an offering to deities, it is closely associated with religious themes and devotion.

• Bharatanatyam is accompanied by Carnatic music and depicts stories from Hindu mythology.

• Kathak

• Kathak is a classical dance form that originated in Northern India.

• It is characterized by rhythmic footwork, spins, and storytelling through facial expressions and hand gestures.

• The word "Kathak" is derived from the Sanskrit word "Katha," meaning story, as the dance involves narrative performances.

• Kathak dancers often perform to Hindustani classical music, incorporating both devotional and secular themes.

• Odissi

• Odissi is a classical dance form that originated in Odisha and is considered one of the oldest surviving dance traditions in India.

• It is known for its fluid movements, graceful postures, and tribhangi (three-bend) poses.

• Odissi performances are based on themes from Hindu mythology, particularly the works of Jayadeva and the stories of Lord Jagannath.

• The dance is performed with intricate hand gestures, facial expressions, and music that includes Odissi classical compositions.

Q37. Answer: (d) Chhattisgarh

The correct answer is Chhattisgarh.

Key Points

• Gond tribes are one of the largest tribal groups in India, and they primarily inhabit the state of Chhattisgarh, along with Madhya Pradesh, Maharashtra, Odisha, and Telangana.

• Chhattisgarh is known for its rich tribal culture and heritage, with the Gond community forming a significant part of the population.

• The Gond tribe is known for its unique art forms, including Gond paintings, which depict folklore and nature through vibrant and intricate patterns.

• Traditionally, the Gond community is involved in agriculture, hunting, and fishing, and they have a deep connection with the forests and natural surroundings of Chhattisgarh.

• The Gond people speak languages belonging to the Dravidian language family, including Gondi and its dialects.

Additional Information

• Kerala:

• Kerala is primarily known for its lush greenery, backwaters, and high literacy rate, but it does not have a significant population of the Gond tribe.

• The tribal population in Kerala includes groups like the Paniyas, Kattunaikkans, and Kurichiyans, who have unique cultural practices distinct from the Gond community.

• Tribal Communities in India:

• India is home to a variety of tribal groups, each with unique traditions, languages, and lifestyles.

• Some of the largest tribal communities include the Santhals, Bhils, Gonds, and Oraons, spread across different states.

• These communities play a vital role in preserving India's cultural diversity and are often concentrated in regions with rich natural resources.

Q38. Answer: (d) Viswanathan Anand

The correct answer is Viswanathan Anand.

Key Points

• Viswanathan Anand, an Indian chess grandmaster, became the first recipient of the prestigious Rajiv Gandhi Khel Ratna Award in 1991-92.

• The Rajiv Gandhi Khel Ratna Award is the highest sports honor in India and is given for outstanding performance in sports.

• Viswanathan Anand was recognized for his exceptional achievements in chess, including winning the FIDE World Chess Championship in 2000.

• He is widely regarded as one of the greatest chess players in history and has inspired generations of Indian chess players.

• Anand has received numerous other accolades, including the Padma Shri (1986), Padma Bhushan (2001), and Padma Vibhushan (2007).

Additional Information

• Sachin Tendulkar

• Sachin Tendulkar is one of the greatest cricketers in the history of the sport but did not win the Rajiv Gandhi Khel Ratna Award first.

• He received the award in 1997-98, making him the first cricketer to win this honor.

• Nicknamed the "Little Master," Tendulkar has numerous records, including being the highest run-scorer in Test and ODI cricket.

• PV Sindhu

• PV Sindhu is a world-class badminton player who won the Rajiv Gandhi Khel Ratna Award in 2016.

• She made history by becoming the first Indian woman to win a silver medal at the Olympics in badminton during the Rio 2016 Games.

• Sindhu continues to be an inspiration in Indian sports and has been recognized with several awards, including the Padma Bhushan.

• Leander Paes

• Leander Paes is a legendary Indian tennis player known for his exceptional doubles performances.

• He won the Rajiv Gandhi Khel Ratna Award in 1996-97 for his significant achievements, including winning the bronze medal at the 1996 Atlanta Olympics in singles.

• Paes holds the record for the most doubles titles won in tennis and has represented India in multiple Olympics.

Q39. Answer: (b) Scandium

The correct answer is Scandium.

Key Points

• The element with atomic number 21 is Scandium (Sc), a rare-earth metal and the first element in the transition metals group.

• Scandium has the electron configuration [Ar] $3d^1 4s^2$, indicating its place in the d-block of the periodic table.

• It is a silvery-white metallic element that is soft and lightweight, often used in alloys to enhance strength without adding significant weight.

• Scandium is primarily obtained from minerals like thortveitite and as a by-product of uranium refining.

• Applications of scandium include aerospace components, sports equipment, and high-intensity lighting due to its favorable properties.

Additional Information

• Calcium (Atomic number 20)

• Calcium is an alkaline earth metal with the symbol Ca and an atomic number of 20.

• It is essential for biological processes, playing a key role in bone and teeth formation, muscle contraction, and nerve function.

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• Calcium compounds, such as calcium carbonate, are widely used in cement, plaster, and as dietary supplements.
• Titanium (Atomic number 22)
• Titanium is a transition metal with the symbol Ti and an atomic number of 22.
• It is known for its exceptional strength-to-weight ratio, corrosion resistance, and biocompatibility.
• Applications include aerospace structures, medical implants, and as a pigment in paints and coatings (titanium dioxide).
• Zinc (Atomic number 30)
• Zinc is a transition metal with the symbol Zn and an atomic number of 30.
• It is an essential trace element for humans, playing a vital role in enzyme function, immune response, and cell division.
• Zinc is widely used in galvanization to protect steel from corrosion and in the production of alloys like brass.

Q40. Answer: (c) Mizoram and Assam

The correct answer is Mizoram and Assam.

Key Points

• The inter-state border disputes between Mizoram and Assam have been ongoing for decades, primarily due to differing interpretations of boundary demarcations as outlined in colonial-era agreements.
• The governments of Mizoram and Assam held official talks in Guwahati in April 2025 to resolve this long-standing issue through peaceful dialogue and mutual understanding.
• The discussions were held at the official level to address contentious points along the 164.6 km shared border and find amicable solutions to prevent further conflicts.
• In recent years, tensions have occasionally escalated, leading to violent clashes along the border. These talks signify a positive step toward fostering peace and cooperation.
• Both states have committed to continuing such dialogues and maintaining the status quo at disputed locations to avoid further confrontations.

Additional Information

• Inter-State Border Disputes in India
• The central government frequently intervenes to mediate and resolve such disputes, emphasizing dialogue and peace-building efforts.
• Key border disputes include Assam-Meghalaya, Assam-Nagaland, and Assam-Mizoram, with Assam at the center of several conflicts due to its shared borders with multiple states.
• India has several inter-state border disputes, often arising from historical agreements, differences in interpretation of maps, or ethnic and cultural differences.

Q41. Answer: (b) Rs. 390

Shortcut Trick

Total Investment = 1540 + 1760 + 1170 = Rs. 4,470

Total Profit = Rs. 1,490

Since the time period is the same, profit is directly proportional to the investment.

Profit multiplier = Total Profit ÷ Total Investment = 1490 ÷ 4470 = 1/3

Rishi's Profit = Rishi's Investment × 1/3 = 1170 × 1/3 = Rs. 390

Therefore The correct answer is Rs. 390.

Alternate Method

Given:

Investment of Vikram = Rs. 1540

Investment of Komal = Rs. 1760

Investment of Rishi = Rs. 1170

Total Profit at the end of the year = Rs. 1490

Formula Used:

Profit Ratio = Capital × Time

Vikram

Rs. 1540

154 parts

Komal

Rs. 1760

176 parts

Rishi

Rs. 1170

117 parts

Total Profit = Rs. 1490 (447 parts)

Calculations:

=> Total Investment = 1540 + 1760 + 1170 = Rs. 4470

=> Ratio of their investments = 1540 : 1760 : 1170

=> Simplifying the ratio by dividing by 10 = 154 : 176 : 117

=> Sum of profit ratio parts = 154 + 176 + 117 = 447 units

=> Profit of Rishi = (Rishi's parts ÷ Total parts) × Total Profit

=> Profit of Rishi = (117 ÷ 447) × 1490

=> Profit of Rishi = 117 × (1490 ÷ 447)

=> Profit of Rishi = 117 × (10 ÷ 3)

=> Profit of Rishi = 39 × 10 = Rs. 390

Therefore The correct answer is Rs. 390.

Additional Information

Simple Partnership

When the capital of all the partners is invested for the same amount of time, the profit or loss is distributed purely in the ratio of their invested capitals.

Compound Partnership

If capitals are invested for varying time periods, the effective capital is considered. The profit sharing ratio is calculated as C1 × T1 : C2 × T2 : C3 × T3.

Active and Sleeping Partners

An active partner manages the business operations and receives an extra allowance or a percentage of the total profit, while the remaining profit is shared among all partners according to their investment ratio.

Q42. Answer: (a) Rs. 1,900

Shortcut Trick

Total Simple Interest percentage = 4 years × 5% = 20%

Total Amount percentage = Principal (100%) + Interest (20%) = 120%

According to the given question, 120% → Rs. 2,280

100% → (2280 ÷ 120) × 100

Principal = 19 × 100 = 1900

Therefore The correct answer is Rs. 1,900.

Alternate Method

Given:

Amount (A) = Rs. 2,280

Rate of Interest (R) = 5% per annum

Time (T) = 4 years

Formula Used:

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

SI = (P × R × T) ÷ 100

P = ?

Year 0

A = 2280

Year 4

Time = 4 years

Rate = 5% p.a.

Interest = 20% of P

Calculations:

=> Let the initial sum of money be P.

=> A = P + [(P × R × T) ÷ 100]

=> 2280 = P + [(P × 5 × 4) ÷ 100]

=> 2280 = P + [20P ÷ 100]

=> 2280 = P + 0.2P

=> 2280 = 1.2P

=> P = 2280 ÷ 1.2

=> P = 1900

Therefore The correct answer is Rs. 1,900.

Additional Information

Simple Interest Rule of Multiple

If a sum of money becomes 'n' times itself in 'T' years at simple interest, the rate of interest is R = 100(n − 1) ÷ T.

Effective Rate Method

For simple interest, the total percentage of interest accumulated over T years is always R × T percent. The total Amount percentage is always 100% + (R × T)% of the Principal.

Simple Interest vs Compound Interest

Simple Interest is calculated uniformly only on the initial principal every year. Compound Interest is calculated on the initial principal plus all previously accumulated interest.

Q43. Answer: (d) 7

Shortcut Trick

According to the BODMAS rule, solve the brackets from innermost to outermost:

=> 147 ÷ {29 + 2(4 − 8)}

=> 147 ÷ {29 + 2(−4)}

=> 147 ÷ {29 − 8}

=> 147 ÷ 21 = 7

Therefore The correct answer is 7.

Alternate Method

Given:

Expression: 147 ÷ {29 + 2(4 − 8)}

Concept Used:

BODMAS Rule: The order of mathematical operations is Brackets → Orders (powers/roots) → Division → Multiplication → Addition → Subtraction.

Calculations:

=> Step 1: Solve the innermost round bracket ().

=> (4 − 8) = −4

=> The expression becomes: 147 ÷ {29 + 2(−4)}

=> Step 2: Solve the multiplication inside the curly bracket { }.

=> 2 × (−4) = −8

=> The expression becomes: 147 ÷ {29 − 8}

=> Step 3: Solve the subtraction inside the curly bracket.

=> 29 − 8 = 21

=> Step 4: Perform the final division operation.

=> 147 ÷ 21 = 7

Therefore The correct answer is 7.

Additional Information

VBODMAS Rule

'V' stands for Vinculum (or Bar). In any simplification problem, the operation under the bar must be solved before moving to the standard brackets.

Order of Brackets

When multiple brackets are present in an expression, they must be solved in the strict sequence: Line bracket (bar) → Round brackets () → Curly brackets { } → Square brackets [].

Sign Rules in Multiplication

The product of two identical signs is always positive: (+) × (+) = (+) and (−) × (−) = (+). The product of two different signs is always negative: (+) × (−) = (−).

Q44. Answer: (d) 8

Shortcut Trick

When a person travels two equal distances at speeds x and y, the average speed is given by the formula:

Average Speed = 2xy ÷ (x + y)

Here, x = 6 km/hr and y = 12 km/hr

Average Speed = (2 × 6 × 12) ÷ (6 + 12) = 144 ÷ 18 = 8 km/hr

Therefore The correct answer is 8 km/hr.

Alternate Method

Given:

Speed from Bhopal to Indore (v1) = 6 km/hr

Speed from Indore to Bhopal (v2) = 12 km/hr

Distance is constant for both sides of the journey.

Formula Used:

Average Speed = Total Distance ÷ Total Time

Bhopal

Indore

Speed = 6 km/hr

Speed = 12 km/hr

Distance = D

Calculations:

=> Let the one-way distance between Bhopal and Indore be D km.

=> Time taken for the onward journey = D ÷ 6 hours

=> Time taken for the return journey = D ÷ 12 hours

=> Total distance covered during the entire journey = D + D = 2D km

=> Total time taken = (D ÷ 6) + (D ÷ 12)

=> Total time = (2D + D) ÷ 12 = 3D ÷ 12 = D ÷ 4 hours

=> Average Speed = 2D ÷ (D ÷ 4)

=> Average Speed = 2D × (4 ÷ D) = 8 km/hr

Therefore The correct answer is 8 km/hr.

Additional Information

Average Speed for Three Equal Distances

If a journey is divided into three equal parts covered at speeds x, y, and z, the formula is: Average Speed = 3xyz ÷ (xy + yz + zx).

Average Speed for Unequal Distances

When distances are unequal or time periods differ, direct formulas cannot be used. Always apply the core concept: Average Speed = Total Distance ÷ Total Time.

Relative Speed Concept

When two objects move in the same direction, Relative Speed = |S1 − S2|. When moving in opposite directions (towards each other), Relative Speed = S1 + S2.

Q45. Answer: (c) $\text{cosec}^2\ \theta$

Shortcut Trick

Put θ = 30° in the given expression.

tan 30° = 1/√3, sin 30° = 1/2, cos 30° = √3/2

Expression = 1/(1/3) + [(1/3) ÷ (1/4)] × (3/4) = 3 + (4/3) × (3/4) = 3 + 1 = 4

Checking the options for θ = 30°:

Option 3: $\text{cosec}^2\ 30° = (2)^2 = 4$ (Matches perfectly)

Therefore The correct answer is $\text{cosec}^2\theta$.

Alternate Method

Given:

$1/\tan^2\theta + (\tan^2\theta / \sin^2\theta) \times \cos^2\theta$

Formulas Used:

$\tan\theta = \sin\theta / \cos\theta$

cot θ = 1 / tan θ

1 + cot²θ = cosec²θ

Calculations:

=> 1/tan²θ + [(sin²θ / cos²θ) / sin²θ] × cos²θ

=> cot²θ + (1 / cos²θ) × cos²θ

=> cot²θ + 1

=> cosec²θ

Therefore The correct answer is cosec²θ.

Additional Information

Pythagorean Identities

Fundamental relations between trigonometric functions: sin²θ + cos²θ = 1 | 1 + tan²θ = sec²θ | 1 + cot²θ = cosec²θ

Reciprocal Identities

The reciprocal of basic ratios: cosec θ = 1 / sin θ | sec θ = 1 / cos θ | cot θ = 1 / tan θ

Quotient Identities

Expressing tangent and cotangent in terms of sine and cosine: tan θ = sin θ / cos θ | cot θ = cos θ / sin θ

Q46. Answer: (d) 118°

Shortcut Trick

In ΔABC, the sum of all internal angles is 180°.

=> angle ACB = 180° − (104° + 45°) = 31°

Since BC || AD, the alternate interior angles are equal => angle CAD = angle ACB = 31°.

In ΔACD, AC = CD, so the opposite base angles are equal => angle ADC = angle CAD = 31°.

Finally, for ΔACD => angle ACD = 180° − (31° + 31°) = 118°.

Therefore The correct answer is 118°.

Alternate Method

B

C

A

D

45°

104°

31°

31°

31°

118°

Given:

ABCD is a trapezium with BC || AD.

angle ABC = 45°, angle BAC = 104°

AC = CD

Calculations:

In ΔABC, the sum of internal angles is 180°.

=> angle ABC + angle BAC + angle BCA = 180°

=> 45° + 104° + angle BCA = 180°

=> angle BCA = 180° − 149° = 31°

Since BC || AD, the alternate interior angles formed by transversal AC are equal.

=> angle CAD = angle BCA = 31°

In ΔACD, we are given that AC = CD. An isosceles triangle has equal base angles opposite to its equal sides.

=> angle ADC = angle CAD = 31°

Now, considering the sum of angles in ΔACD:

=> angle ACD + angle CAD + angle ADC = 180°

=> angle ACD + 31° + 31° = 180°

=> angle ACD + 62° = 180°

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=> angle ACD = 180° − 62° = 118°

Therefore The correct answer is 118°.

Additional Information

Isosceles Triangle Property

If two sides of a triangle are equal, then the angles perfectly opposite to those sides will also be equal.

Parallel Lines & Transversals

When two parallel lines are intersected by a transversal line, the alternate interior angles generated are strictly equal.

Angle Sum Property

The sum of the three internal angles inside any valid triangle is universally 180°.

Q47. Answer: (b) 69^(−31)

Shortcut Trick

For operations on the same base, calculate the net exponent directly using BODMAS principles.

Net Exponent = (First Power) − (Divisor Power) + (Multiplier Power)

Net Exponent = −4 − 10 + (−17) = −31

Therefore The correct answer is 69^(−31).

Alternate Method

Given:

69^(−4) ÷ 69^(10) × 69^(−17)

Formula Used:

a^m ÷ a^n = a^(m−n)

a^m × a^n = a^(m+n)

Calculation:

=> 69^(−4) ÷ 69^(10) × 69^(−17)

=> (69^(−4 − 10)) × 69^(−17)

=> 69^(−14) × 69^(−17)

=> 69^(−14 + (−17))

=> 69^(−31)

Therefore The correct answer is 69^(−31).

Additional Information

Product and Quotient Rules of Exponents

When multiplying expressions with the same base, add their exponents: a^m × a^n = a^(m+n). When dividing, subtract the exponent of the denominator from the numerator: a^m ÷ a^n = a^(m−n).

Negative Exponent Rule

A negative exponent indicates the reciprocal of the base raised to the absolute value of the exponent: a^(−n) = 1 ÷ a^n.

Zero Exponent Rule

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

Q48. Answer: (d) $5^2 \times 9^3 \times 14^2 \times 19^2$

Shortcut Trick

To find the LCM of expressions, directly multiply the highest powers of all distinct bases present.

Distinct bases in given expressions are 5, 9, 14, and 19.

The highest power of 5 is 2, of 9 is 3, of 14 is 2, and of 19 is 2.

LCM = $5^2 \times 9^3 \times 14^2 \times 19^2$.

Therefore The correct answer is $5^2 \times 9^3 \times 14^2 \times 19^2$.

Alternate Method

Given:

First term = $5^2 \times 9^2 \times 14$

Second term = $5^2 \times 14^2 \times 19$

Third term = $9^3 \times 14^2 \times 19^2$

Concept Used:

The Least Common Multiple (LCM) of multiple numbers expressed in exponential form is the product of the highest powers of all distinct bases involved across the expressions.

Calculation:

=> Comparing the powers of base 5: the powers are 2, 2, and 0. Highest power = 5^2

=> Comparing the powers of base 9: the powers are 2, 0, and 3. Highest power = 9^3

=> Comparing the powers of base 14: the powers are 1, 2, and 2. Highest power = 14^2

=> Comparing the powers of base 19: the powers are 0, 1, and 2. Highest power = 19^2

=> Multiplying these highest powers gives the required LCM.

=> LCM = $5^2 \times 9^3 \times 14^2 \times 19^2$

Therefore The correct answer is $5^2 \times 9^3 \times 14^2 \times 19^2$.

Additional Information

HCF of Exponential Numbers

To find the Highest Common Factor (HCF), take the product of the lowest powers of only the common bases present in all the given expressions.

LCM of Fractions

LCM of fractions = (LCM of Numerators) ÷ (HCF of Denominators).

Relationship between HCF and LCM

For any two numbers a and b, the product of their HCF and LCM is equal to the product of the numbers: HCF(a, b) × LCM(a, b) = a × b.

Q49. Answer: (b) Rs. 486

Shortcut Trick

Let original price of a pen = P and a pencil = Q. We have 13P + 3Q = 152 ... (i)

New condition: 18(P − 1) + 3(Q + 7) = 165 => 18P + 3Q = 162 ... (ii)

Subtracting (i) from (ii): 5P = 10 => P = 2

Substituting P = 2 in (i): 26 + 3Q = 152 => 3Q = 126 => Q = 42

Cost of 12 pens and 11 pencils = 12 × 2 + 11 × 42 = 24 + 462 = 486

Therefore The correct answer is Rs. 486.

Alternate Method

Given:

Cost of 13 pens and 3 pencils = Rs. 152

If pen price is reduced by Rs. 1 and pencil increased by Rs. 7, cost of 18 pens and 3 pencils = Rs. 165.

Calculations:

=> Let the original price of 1 pen be Rs. x and 1 pencil be Rs. y.

=> 13x + 3y = 152 ... (Equation 1)

=> New price of 1 pen = Rs. (x − 1)

=> New price of 1 pencil = Rs. (y + 7)

=> 18(x − 1) + 3(y + 7) = 165

=> 18x − 18 + 3y + 21 = 165

=> 18x + 3y + 3 = 165

=> 18x + 3y = 162 ... (Equation 2)

13 Pens+3 Pencils=Rs. 15218 Pens+3 Pencils=Rs. 162Subtracting: 5 Pens = Rs. 10 → 1 Pen = Rs. 2

=> Subtracting Equation 1 from Equation 2:

=> (18x + 3y) − (13x + 3y) = 162 − 152

=> 5x = 10

=> x = 2

=> Substitute x = 2 in Equation 1:

=> 13(2) + 3y = 152

=> 26 + 3y = 152

=> 3y = 152 − 26 = 126

=> y = 42

=> We need the cost of 12 pens and 11 pencils:

=> 12x + 11y = 12 × 2 + 11 × 42

=> 24 + 462 = 486

Therefore The correct answer is Rs. 486.

Additional Information

Linear Equations in Two Variables

An equation in the form of ax + by = c is a linear equation. Solving two such equations with two variables requires substituting or eliminating one variable to find the value of the other.

Elimination Method

By making the coefficients of one variable exactly the same in both equations, we can simply subtract or add the equations together to eliminate that variable, making it easier to solve.

Q50. Answer: (a) 1

Shortcut Trick

Numbers between 402 and 409 are 402, 403, 404, 405, 406, 407, 408, 409.

Skip even numbers and those ending in 5. Remaining numbers are 403, 407, 409.

Check 403: 403 = 13 × 31 (Not prime).

Check 407: 407 = 11 × 37 (Not prime).

Check 409: Not divisible by any prime up to 19, so it is prime.

Therefore The correct answer is 1.

Alternate Method

Given:

The numbers from 402 to 409, both included.

Method Used:

To check if a number N is prime, verify its divisibility by all prime numbers less than or equal to its approximate square root (√N).

For N ≈ 409, √N ≈ 20. The prime numbers up to 20 are 2, 3, 5, 7, 11, 13, 17, and 19.

Calculations:

=> Even numbers in the range (402, 404, 406, 408) are divisible by 2. Thus, they are not prime.

=> 405 ends in 5, so it is divisible by 5. Thus, it is not prime.

=> Now check divisibility for the remaining numbers: 403, 407, and 409.

=> Check 403: 403 ÷ 13 = 31. Thus, 403 is not a prime number.

=> Check 407: 407 ÷ 11 = 37. Thus, 407 is not a prime number.

=> Check 409: 409 is not divisible by 2, 3, 5, 7, 11, 13, 17, or 19. Thus, 409 is a prime number.

=> There is only one prime number (409) in the given range.

Therefore The correct answer is 1.

Additional Information

Prime Number

A natural number greater than 1 that has exactly two distinct positive divisors: 1 and the number itself. Examples include 2, 3, 5, 7, 11.

Testing for Prime Numbers

Find the approximate square root of the number N. If N is not divisible by any prime number less than or equal to √N, then N is definitively a prime number.

Co-prime Numbers

Two numbers are considered co-prime (or mutually prime) if their highest common factor (HCF) is 1. The numbers themselves do not necessarily have to be prime.

Q51. Answer: (b) 32.42

Shortcut Trick

Assume the base average for all 33 matches is 40.

Deviation for the next 10 matches = 15 − 40 = −25 runs per match.

Total deviation for 10 matches = 10 × (−25) = −250 runs.

Net effect on overall average = −250 ÷ 33 ≈ −7.58 runs.

New combined average = 40 − 7.58 = 32.42.

Therefore The correct answer is 32.42 runs.

Alternate Method

Given:

Average runs in the first 23 matches = 40

Average runs in the next 10 matches = 15

23 matches, Avg: 40

10 matches, Avg: 15

33 matches, Combined Avg = ?

Sum = 23 × 40 = 920

Sum = 150

Formula Used:

Average = Sum of all observations ÷ Total number of observations

Calculations:

=> Sum of runs in the first 23 matches = 23 × 40 = 920

=> Sum of runs in the next 10 matches = 10 × 15 = 150

=> Total runs in all 33 matches = 920 + 150 = 1070

=> Required combined average = 1070 ÷ 33

=> Required combined average = 32.4242...

=> Rounding off to two decimal places, we get 32.42 runs.

Therefore The correct answer is 32.42 runs.

Additional Information

Weighted Average

It gives the combined average of two groups when their respective sizes and averages are known. Formula: (n1A1 + n2A2) ÷ (n1 + n2).

Deviation Method

It simplifies overall average calculations by assuming a base average and distributing the net deviation among all items. Formula: Assumed Average + (Total Deviation ÷ Total Count).

Q52. Answer: (a) 13, 27

Shortcut Trick

For exam purposes, check the given options directly to satisfy the conditions.

The sum in all options is 40. Now check their LCM.

Option 1: 13 and 27 share no common factors (they are co-prime).

The LCM of co-prime numbers is their product: 13 × 27 = 351.

Both conditions (Sum = 40 and LCM = 351) match perfectly for 13 and 27.

Therefore The correct answer is 13, 27.

Alternate Method

Given:

Sum of two numbers = 40

LCM of two numbers = 351

Formula Used:

$(x - y)^2 = (x + y)^2 - 4xy$

Calculation:

=> Let the two numbers be x and y.

=> x + y = 40 --- (1)

=> Let the HCF of the numbers be h. Thus, x = ha and y = hb, where a and b are co-prime.

=> Sum = h(a + b) = 40

=> LCM = hab = 351

=> Since h must perfectly divide both the sum (40) and the LCM (351), we find the common factors of 40 and 351.

=> Prime factors of 40 = $2^3 \times 5$

=> Prime factors of 351 = $3^3 \times 13$

=> The only common factor is 1, so the HCF (h) = 1. Therefore, x and y are co-prime and their product xy = 351.

=> Using the algebraic identity: $(x - y)^2 = (x + y)^2 - 4xy$

=> $(x - y)^2 = 40^2 - 4 \times 351$

=> $(x - y)^2 = 1600 - 1404 = 196$

=> x − y = √196 = 14 --- (2)

=> Adding equation (1) and (2): 2x = 54 => x = 27

=> Substitute the value of x in equation (1): y = 40 − 27 = 13

Therefore The correct answer is 13, 27.

Additional Information

Product of Two Numbers

The product of any two numbers is always equal to the product of their Highest Common Factor (HCF) and Least Common Multiple (LCM). Formula: a × b = HCF(a, b) × LCM(a, b).

Co-prime Numbers

Two numbers are said to be co-prime if they share no common factor other than 1 (i.e., their HCF is 1). For such numbers, their LCM is directly equal to their product.

HCF and LCM of Fractions

HCF = (HCF of Numerators) ÷ (LCM of Denominators)

LCM = (LCM of Numerators) ÷ (HCF of Denominators)

Q53. Answer: (a) an increase of Rs. 1,242

Shortcut Trick

Let original Income be 100%. Then Savings = 24% and Expenses = 100% − 24% = 76%.

New Income = 100% + 22% = 122%.

New Expenses = 76% + (25% of 76%) = 76% + 19% = 95%.

New Savings = New Income − New Expenses = 122% − 95% = 27%.

Increase in Savings = 27% − 24% = 3% of Original Income.

Increase = 3% of 41,400 = (3 ÷ 100) × 41,400 = Rs. 1,242.

Therefore The correct answer is an increase of Rs. 1,242.

Alternate Method

Given:

Original Income = Rs. 41,400

Savings percentage = 24%

Income increase = 22%

Expenses increase = 25%

Formula Used:

Income = Expenditure + Savings

Percentage = (Value ÷ Total Value) × 100

Calculations:

Original Income = 100%

Exp = 76%

Sav = 24%

New Income = 122%

New Exp = 95%

Sav = 27%

+3%

=> Original Savings = 24% of 41,400 = (24 ÷ 100) × 41,400 = Rs. 9,936

=> Original Expenditure = 41,400 − 9,936 = Rs. 31,464

=> New Income = 41,400 × (122 ÷ 100) = Rs. 50,508

=> New Expenditure = 31,464 × (125 ÷ 100) = Rs. 39,330

=> New Savings = 50,508 − 39,330 = Rs. 11,178

=> Change in Savings = 11,178 − 9,936 = Rs. 1,242

Therefore The correct answer is an increase of Rs. 1,242.

Additional Information

Income, Expenditure & Savings

Income = Expenditure + Savings. Any change in income directly affects expenditure and savings to maintain this constant mathematical balance.

Base Value Rule in Percentages

Always apply percentage increases or decreases to the respective original base value. Multiplying factor for x% increase = (100 + x) ÷ 100.

Net Percentage Scaling

When analyzing simultaneous percentage changes, calculating net deviations on a base of 100 units is typically the fastest exam strategy rather than using large absolute numbers initially.

Q54. Answer: (c) 58.15

Shortcut Trick

Total time taken = (234 ÷ 78) + (441 ÷ 49) + (488 ÷ 61) = 3 + 9 + 8 = 20 hours.

Total distance covered = 234 + 441 + 488 = 1163 km.

Average speed = Total distance ÷ Total time = 1163 ÷ 20 = 58.15 km/hr.

Therefore The correct answer is 58.15 km/hr.

Alternate Method

Given:

Distance 1 (D1) = 234 km, Speed 1 (S1) = 78 km/hr

Distance 2 (D2) = 441 km, Speed 2 (S2) = 49 km/hr

Distance 3 (D3) = 488 km, Speed 3 (S3) = 61 km/hr

Formula Used:

Time = Distance ÷ Speed

Average Speed = Total Distance ÷ Total Time

234 km

441 km

488 km

78 km/hr

49 km/hr

61 km/hr

t = 3 hr

t = 9 hr

t = 8 hr

Total Distance = 1163 km, Total Time = 20 hr

Calculations:

=> Time for 1st part (T1) = 234 ÷ 78 = 3 hours

=> Time for 2nd part (T2) = 441 ÷ 49 = 9 hours

=> Time for 3rd part (T3) = 488 ÷ 61 = 8 hours

=> Total Time = T1 + T2 + T3 = 3 + 9 + 8 = 20 hours

=> Total Distance = 234 + 441 + 488 = 1163 km

=> Average Speed = 1163 ÷ 20

=> Average Speed = 58.15 km/hr

Therefore The correct answer is 58.15 km/hr.

Additional Information

General Average Speed Formula

Average speed is defined as the total distance covered divided by the total time taken. It is not the arithmetic mean of individual speeds unless the time durations are identical.

Average Speed for Equal Distances

If an object covers two equal distances at speeds x and y, the average speed for the entire journey is given by 2xy ÷ (x + y).

Average Speed for Equal Time Intervals

If a journey is travelled in different equal time slots with speeds S1, S2, ..., S_n, then Average Speed = (S1 + S2 + ... + S_n) ÷ n.

Q55. Answer: (b) 1437 cm³

Shortcut Trick

Directly apply the formula for the volume of a sphere: $V = 4/3 \times \pi \times r^3$

=> $V = 4/3 \times 22/7 \times 7^3$

=> V = 4/3 × 22 × 49

=> V = 4312 / 3 = 1437.33...

Rounding to the nearest integer gives 1437.

Therefore The correct answer is 1437 cm^3.

Alternate Method

Given:

Radius of the sphere (r) = 7 cm

Value of π ≈ 22/7

Formula Used:

Volume of a sphere (V) = 4/3 × π × r^3

r = 7 cm

Volume = 4/3 × π × r^3

Calculations:

=> V = 4/3 × 22/7 × $(7)^3$

=> V = 4/3 × 22/7 × 343

=> V = (4 × 22 × 49) ÷ 3

=> V = 4312 ÷ 3

=> V = 1437.33... cm^3

Rounding to the nearest integer, we get 1437 cm^3.

Therefore The correct answer is 1437 cm^3.

Additional Information

Surface Area of a Sphere

The total surface area of a sphere is strictly curved and given by the formula: A = 4 × π × r^2

Volume of a Hemisphere

A hemisphere is exactly half of a sphere. Its volume is calculated as: V = 2/3 × π × r^3

Surface Area of a Hemisphere

Curved Surface Area (CSA) = 2 × π × r^2 | Total Surface Area (TSA) = 3 × π × r^2

Q56. Answer: (a) 37 : 56

Shortcut Trick

Convert fractions into approximate percentages to quickly identify the largest value.

37/56 × 100 ≈ 66%

38/75 × 100 ≈ 51%

33/54 × 100 ≈ 61%

35/80 × 100 ≈ 44%

Therefore The correct answer is 37 : 56.

Alternate Method

Given:

Four ratios: 37 : 56, 38 : 75, 33 : 54, and 35 : 80

Method Used:

Convert each ratio into a decimal format by dividing the numerator by the denominator to compare them accurately.

37 : 56

66.1% (Max)

38 : 75

50.7%

33 : 54

61.1%

35 : 80

43.8%

Calculations:

=> Ratio 1 = 37 ÷ 56 ≈ 0.6607

=> Ratio 2 = 38 ÷ 75 ≈ 0.5066

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=> Ratio 3 = 33 ÷ 54 = 11 ÷ 18 ≈ 0.6111

=> Ratio 4 = 35 ÷ 80 = 7 ÷ 16 = 0.4375

=> Comparing all the decimal values: 0.6607 > 0.6111 > 0.5066 > 0.4375

=> The maximum decimal value corresponds to the ratio 37 : 56.

Therefore The correct answer is 37 : 56.

Additional Information

Cross-Multiplication Method

To compare two fractions a/b and c/d without division, evaluate the cross products a×d and b×c. If a×d > b×c, then a/b > c/d.

Denominator Equalization

When comparing multiple fractions, finding the Lowest Common Multiple (LCM) of all denominators allows you to scale them evenly. Once denominators are equal, the fraction with the largest numerator is the greatest.

Percentage Conversion

Multiplying any fraction or ratio by 100 converts it directly to a percentage. This provides a universally understood scale that is often much faster for comparing varying values during exams.

Q57. Answer: (d) 1350

Shortcut Trick

The fraction equivalent of 80% is 4/5.

This means if the original number is 5 units, the increase is 4 units.

The final increased number = 5 + 4 = 9 units.

9 units → 2430

Original number (5 units) = (2430 ÷ 9) × 5 = 270 × 5 = 1350

Therefore The correct answer is 1350.

Alternate Method

Original (100%)

+80% Increase

Total = 180% → 2430

Value = ?

Given:

A number when increased by 80% gives 2430.

Formula Used:

Final Value = Initial Value × (100 + Percentage Increase) ÷ 100

Calculation:

=> Let the required number be x.

=> x + 80% of x = 2430

=> x × (100 + 80) ÷ 100 = 2430

=> x × 180 ÷ 100 = 2430

=> x × 9 ÷ 5 = 2430

=> x = 2430 × 5 ÷ 9

=> x = 270 × 5

=> x = 1350

Therefore The correct answer is 1350.

Additional Information

Percentage Base Concept

The initial value is always considered as the base value of 100%. An increase implies adding to 100%, while a decrease implies subtracting from 100%.

Fraction Equivalents of Percentages

Memorizing common percentage-to-fraction conversions vastly improves calculation speed. For instance: 20% = 1/5, 40% = 2/5, 60% = 3/5, and 80% = 4/5. An 80% increase means the new value becomes 1 + 4/5 = 9/5 of the initial value.

Successive Percentage Change

If a number experiences successive percentage changes of a% and b%, the net effective percentage change can be found using the formula: a + b + (a × b) ÷ 100.

Q58. Answer: (a) 12

Shortcut Trick

Expand the future condition: 3 × (Q + 8) = 8 × (P + 8) − 28

=> 3Q + 24 = 8P + 64 − 28

=> 3Q + 24 = 8P + 36

Directly substitute 8P = Q + 12 (from the present condition):

=> 3Q + 24 = (Q + 12) + 36 => 2Q = 24 => Q = 12

Therefore The correct answer is 12 years.

Alternate Method

Given:

8 times P's present age is 12 years more than Q's present age:

=> 8P = Q + 12 --- (Equation 1)

After 8 years, 3 times Q's age is 28 years less than 8 times P's age:

=> 3 × (Q + 8) = 8 × (P + 8) − 28 --- (Equation 2)

Present Ages (P, Q)

8P = Q + 12

• 8 Years

Future Ages (P + 8, Q + 8)

3(Q + 8) = 8(P + 8) − 28

Calculations:

=> From Equation 2: 3Q + 24 = 8P + 64 − 28

=> 3Q + 24 = 8P + 36

=> Substitute the value of 8P from Equation 1 into the simplified Equation 2:

=> 3Q + 24 = (Q + 12) + 36

=> 3Q + 24 = Q + 48

=> 3Q − Q = 48 − 24

=> 2Q = 24

=> Q = 12

Therefore The correct answer is 12 years.

Additional Information

Constant Age Difference

The difference between the ages of two persons remains constant throughout their lives. If A is older than B by x years today, this exact difference will be maintained after n years.

Ratio of Ages

If the present age ratio of A and B is a : b, then after t years, their age ratio logically shifts to (a + t) : (b + t). The sum and ratio dynamically change, but the mathematical difference is fixed.

Formulating Age Equations

When a statement mentions 'x times A is y more than B', it systematically converts to the linear format xA = B + y. Properly identifying these relations eliminates fraction calculations.

Q59. Answer: (b) 21/3

Shortcut Trick

Total work = LCM(5, 15) = 15 units.

Efficiency: Abhay = 3, Bharat = 1. Combined efficiency = 4.

Work done in 2 days = 4 × 2 = 8 units.

Remaining work = 15 − 8 = 7 units.

Time for Abhay = Remaining work ÷ Abhay's efficiency = 7 ÷ 3 = $2^{1}/3$ days.

Therefore The correct answer is $2^{1}/3$ days.

Alternate Method

Given:

Time taken by Abhay = 5 days

Time taken by Bharat = 15 days

They work together for 2 days before Bharat leaves.

Person	Days	Total Work	Efficiency
Abhay	5	15	3
Bharat	15	1	

Calculations:

=> Combined efficiency of Abhay and Bharat = 3 + 1 = 4 units/day

=> Work done by them in 2 days = 4 × 2 = 8 units

=> Remaining work = Total Work − Work done

=> Remaining work = 15 − 8 = 7 units

=> Time taken by Abhay to complete remaining work = Remaining work ÷ Abhay's efficiency

=> Time = 7 ÷ 3 = $2^1/3$ days

Therefore The correct answer is $2^1/3$ days.

Additional Information

Total Work Concept

Total Work = Efficiency × Time taken. Time is inversely proportional to efficiency when total work is constant.

Leaving and Joining Work

When a person leaves midway, calculate the combined work done before leaving, subtract it from the total work, and divide the remainder by the remaining person's efficiency.

Alternate Days Working

When two individuals work on alternate days, calculate the work done in a full 2-day cycle and multiply by the number of cycles to reach near the total work.

Pipes & Cisterns

Follows the exact same logic as Time & Work, with the key difference that a leak or emptying pipe has a negative efficiency.

Q60. Answer: (d) 5

Shortcut Trick

To find if a number is divisible by 5, we only need to check its unit digit.

The unit digit of the number 740705 is 5.

Any number ending in 0 or 5 is completely divisible by 5.

Thus, 740705 is exactly divisible by 5.

Therefore The correct answer is 5.

Alternate Method

Given:

The number to check is 740705.

Checking the given options sequentially:

=> Divisibility by 12: A number is divisible by 12 if it is divisible by both 3 and 4. Since the given number is odd, it is not divisible by 4. Hence, it is not divisible by 12.

=> Divisibility by 9: A number is divisible by 9 if the sum of its digits is a multiple of 9.

=> Sum of digits = 7 + 4 + 0 + 7 + 0 + 5 = 23

=> Since 23 is not divisible by 9, the number is not divisible by 9.

=> Divisibility by 4: A number is divisible by 4 if its last two digits form a number divisible by 4. The last two digits are 05, which is not divisible by 4.

=> Divisibility by 5: A number is divisible by 5 if its unit digit is 0 or 5. Here, the unit digit is 5, so it is perfectly divisible by 5.

Therefore The correct answer is 5.

Additional Information

Divisibility Rule of 3 and 9

A number is divisible by 3 (or 9) if the sum of its digits is divisible by 3 (or 9).

Divisibility Rule of 4 and 8

A number is divisible by 4 if its last two digits form a number divisible by 4. A number is divisible by 8 if its last three digits are divisible by 8.

Divisibility Rule of 11

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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 either 0 or a multiple of 11.

Q61. Answer: (d) 68

Shortcut Trick

Total CP for 1 dozen (12 items) = Rs. 150

Total SP for 1 dozen = 12 × Rs. 21 = Rs. 252

Ratio of CP : SP = 150 : 252 = 25 : 42

Profit ratio = 42 − 25 = 17 units

Profit % = (17 ÷ 25) × 100 = 68%

Therefore The correct answer is 68%.

Alternate Method

Given:

Cost Price (CP) of 1 dozen (12 sharpeners) = Rs. 150

Selling Price (SP) of 1 sharpener = Rs. 21

Formula Used:

Profit = SP − CP

Profit % = (Profit ÷ CP) × 100

Profit Calculation (For 1 Dozen)

CP = Rs. 150

Buy

SP = Rs. 252 (12 × Rs. 21)

Sell

Profit = Rs. 102

Calculations:

=> Total SP for 12 sharpeners = 12 × 21 = Rs. 252

=> Profit = 252 − 150 = Rs. 102

=> Profit % = (102 ÷ 150) × 100

=> Profit % = (34 ÷ 50) × 100

=> Profit % = 34 × 2 = 68%

Therefore The correct answer is 68%.

Additional Information

Marked Price & Discount

Discount is always calculated on the Marked Price (MP). Selling Price (SP) = MP − Discount.

Successive Discounts

If two successive discounts of a% and b% are given, the effective single discount is (a + b − ab ÷ 100)%.

Dishonest Dealer

A dealer who sells goods at CP but uses a false weight gains profit. Profit % = (True Weight − False Weight) ÷ False Weight × 100.

Q62. Answer: (c) Rs. 1,920

Shortcut Trick

Selling Price = (100% − Discount%) of Marked Price

SP = (100% − 20%) of 2400

SP = 80% of 2400 = (80 ÷ 100) × 2400

SP = 1920

Therefore The correct answer is Rs. 1920.

Alternate Method

Marked Price (MP) = Rs. 2400 (100%)

Selling Price = ? (80%)

20%

Discount

Given:

Marked Price (MP) = Rs. 2400
Discount = 20%
Formula Used:
Selling Price (SP) = MP × [1 − (Discount% ÷ 100)]
Calculations:
=> SP = 2400 × [1 − (20 ÷ 100)]
=> SP = 2400 × [1 − 0.2]
=> SP = 2400 × 0.8
=> SP = 1920
Therefore The correct answer is Rs. 1920.
Additional Information
Marked Price & Discount
Discount is an allowance given on the marked price of an article. It is always calculated on the Marked Price (MP).
Formula: Discount = MP − SP.
Successive Discounts
When two or more discounts are given one after another on the marked price.
Equivalent discount for a% and b% = [a + b − (a × b) ÷ 100]%.
Profit & Loss Basics
While discount is calculated on Marked Price (MP), Profit or Loss is always calculated on the Cost Price (CP).
Formula: SP = CP × (100 + Profit%) ÷ 100.

Q63. Answer: (c) 51 kg

Shortcut Trick
Let us assume an arbitrary average base, say 50 kg.
Calculate the individual deviations from 50: −10, −1, +6, +23, −13.
Net deviation = (−10 − 1 + 6 + 23 − 13) = +5 kg.
Average change per person = Net deviation ÷ Total members = 5 ÷ 5 = +1 kg.
Correct average = Assumed Average + Change = 50 + 1 = 51 kg.
Therefore The correct answer is 51 kg.
Alternate Method
Given:
Weights of family members = 40 kg, 49 kg, 56 kg, 73 kg, and 37 kg
Number of members = 5
Formula Used:
Average = (Sum of all observations) ÷ (Total number of observations)
40
49
56
73
37
Avg = 51
Calculations:
=> Total sum of weights = 40 + 49 + 56 + 73 + 37
=> Total sum of weights = 255 kg
=> Average weight = 255 ÷ 5
=> Average weight = 51 kg
Therefore The correct answer is 51 kg.
Additional Information
Weighted Average
When combining multiple groups into one, the combined average = (n1x1 + n2x2) ÷ (n1 + n2), where 'n' represents the number of elements and 'x' represents their respective averages.
Average of an Arithmetic Progression

If a set of numbers forms an arithmetic sequence with a common difference (e.g., consecutive numbers), their average is simply the middle term, calculated as (First Term + Last Term) ÷ 2.

Effect of Arithmetic Operations on Averages

If every single value in a dataset is increased, decreased, multiplied, or divided by a constant number 'k', the new average for the dataset also undergoes the exact same mathematical operation with 'k'.

Q64. Answer: (d) 46.3%

Shortcut Trick

Let Cost Price (CP) = 100%.

Selling at 2/7 of SP gives a 24% loss, meaning 2/7 of SP = 76% of CP.

Original SP = 76% × (7 ÷ 2) = 266% of CP.

New Selling Price = 55% of Original SP = 55% of 266% = 146.3% of CP.

Profit % = 146.3% − 100% = 46.3%.

Therefore The correct answer is 46.3%.

Alternate Method

Given:

Loss percentage when sold at 2/7 of Original SP = 24%

New Selling Price = 55% of Original SP

Formula Used:

Loss = CP − SP

Profit % = [(New SP − CP) ÷ CP] × 100

2/7 SP

CP

55% SP

Orig. SP

76%

100%

146.3%

266%

− 24%

• 46.3%

Profit = 146.3% − 100% = 46.3%

Calculation:

=> Let Cost Price (CP) be 100x.

=> Loss = 24% of CP = 24x

=> Selling Price at 24% loss = 100x − 24x = 76x

=> We are given that this Selling Price is 2/7 of Original SP.

=> (2 ÷ 7) × Original SP = 76x

=> Original SP = (76x × 7) ÷ 2

=> Original SP = 38x × 7 = 266x

=> The new selling price is 55% of Original SP.

=> New SP = (55 ÷ 100) × 266x = 1.463 × 100x = 146.3x

=> Since New SP (146.3x) > CP (100x), there is a profit.

=> Profit = 146.3x − 100x = 46.3x

=> Profit % = (46.3x ÷ 100x) × 100 = 46.3%

Therefore The correct answer is 46.3%.

Additional Information

Profit and Loss

Profit occurs when the Selling Price (SP) is greater than the Cost Price (CP). Profit = SP − CP.

Loss Percentage

Loss is calculated directly on the Cost Price. Loss % = (Loss ÷ CP) × 100.

Marked Price and Discount

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Marked Price (MP) is the price printed on the article, and discount is always calculated on the MP. SP = MP × (100 − Discount%) ÷ 100.

Q65. Answer: (c) Rs. 175

Shortcut Trick

The direct ratio between Cost Price (CP) and Marked Price (MP) is CP : MP = (100 − D%) : (100 + P%)

=> CP : MP = (100 − 12.5) : (100 + 40)

=> CP : MP = 87.5 : 140 = 5 : 8

=> 8 units = Rs. 280 => 1 unit = Rs. 35

=> CP = 5 units = 5 × 35 = Rs. 175

Therefore The correct answer is Rs. 175.

Alternate Method

Given:

Marked Price (MP) = Rs. 280

Discount = 12.5% = 1/8

Profit = 40% = 2/5

Formula Used:

Selling Price (SP) = MP × (1 − Discount%)

Selling Price (SP) = CP × (1 + Profit%)

CP

Rs. 175

SP

Rs. 245

MP

Rs. 280

• 40% Profit

− 12.5% Discount

CP × 1.4 = SP = MP × 0.875

Calculations:

=> SP = MP × (1 − 1/8)

=> SP = 280 × 7/8 = 35 × 7 = Rs. 245

=> Since Profit is 40%, SP = CP × (1 + 2/5)

=> 245 = CP × 7/5

=> CP = 245 × 5/7 = 35 × 5

=> CP = Rs. 175

Therefore The correct answer is Rs. 175.

Additional Information

Relation between CP and MP

The exact ratio between Cost Price and Marked Price can always be calculated directly using the formula: CP / MP = (100 − Discount%) / (100 + Profit%).

Successive Discounts

If two consecutive discounts of a% and b% are applied on a marked price, the equivalent single discount percentage is given by (a + b − ab / 100)%.

Dishonest Dealer Concept

When a dealer claims to sell items at Cost Price but uses a false weight, the actual Profit% is evaluated as: (Error / (True Value − Error)) × 100.

Q66. Answer: (a) Rs. 1,20,400

Shortcut Trick

Profit ratio of M to N = (3304 + 472) ÷ 2 : (3304 − 472) ÷ 2 = 1888 : 1416 = 4 : 3.

Capital ratio = (Profit of M ÷ Time of M) : (Profit of N ÷ Time of N) = (4 ÷ 6) : (3 ÷ 7) = 14 : 9.

Difference in capital ratio = 14 − 9 = 5 units.

Since 5 units = Rs. 43,000, we get 1 unit = Rs. 8,600.

Capital contributed by M = 14 units = 14 × 8,600 = Rs. 1,20,400.

Therefore The correct answer is Rs. 1,20,400.

Alternate Method

Given:

Total profit = Rs. 3,304

M's profit − N's profit = Rs. 472

Time of investment: M = 6 months, N = 7 months

Formula Used:

Profit Ratio = (Capital of M × Time of M) : (Capital of N × Time of N)

Partnership Investment & Profit

Partner M

Capital: x + 43000

Time: 6 months

Partner N

Capital: x

Time: 7 months

Profit: Rs. 1888

Ratio: 4 parts

Profit: Rs. 1416

Ratio: 3 parts

Calculations:

=> M's profit = (3304 + 472) ÷ 2 = Rs. 1888

=> N's profit = 3304 − 1888 = Rs. 1416

=> Profit Ratio (M : N) = 1888 : 1416 = 4 : 3

Let the capital contributed by N be x, then M's capital is (x + 43000).

=> [6 × (x + 43000)] ÷ (7 × x) = 4 ÷ 3

=> 18 × (x + 43000) = 28x

=> 18x + 774000 = 28x

=> 10x = 774000

=> x = 77400

=> Capital contributed by M = 77400 + 43000 = Rs. 120400

Therefore The correct answer is Rs. 1,20,400.

Additional Information

Partnership Profit Ratio

Profit is distributed in direct proportion to the product of capital invested and the time duration of investment. Formula: Profit Ratio = (C1 × T1) : (C2 × T2).

Capital Calculation from Profit

If the profit ratio and time periods are given, the capital investment ratio can be easily found by dividing the profit share by the respective time duration for each partner.

Working vs Sleeping Partner

A working partner actively manages the business and receives a specific salary or commission from the total profit before the remaining profit is distributed among all partners according to their capital ratio.

Q67. Answer: (a) 3 years

Shortcut Trick

For Compound Interest, the multiplying factor per year at 11% is (1 + 11/100) = 1.11.

The ratio of Amount to Principal = 1367631 ÷ 1000000 = 1.367631.

We know that $(1.11)^3 = 1.367631$.

Since the ratio equals the multiplying factor raised to the power of 3, the time period is 3 years.

Therefore The correct answer is 3 years.

Alternate Method

Given:

Principal (P) = Rs. 1,000,000

Amount (A) = Rs. 1,367,631

Rate of Interest (R) = 11% per annum

Start

Maturity

P = Rs. 1,000,000

A = Rs. 1,367,631

Rate = 11% p.a. (CI)

Time = ? years

Formula Used:

A = P × (1 + R/100)^T

Calculations:

=> 1367631 = 1000000 × (1 + 11/100)^T

=> 1367631 ÷ 1000000 = (111/100)^T

=> 1.367631 = (1.11)^T

=> $(1.11)^3$ = (1.11)^T

=> T = 3

Therefore The correct answer is 3 years.

Additional Information

Compound Interest Formula

When interest is compounded annually, the total amount is given by A = P × (1 + R/100)^T.

Half-Yearly Compounding

When interest is compounded half-yearly, the rate is halved (R/2) and the time is doubled (2T). The formula becomes A = P × (1 + R/200)^(2T).

Rule of 72

A simplified rule of thumb to estimate the number of years required to double an investment at a fixed annual rate of compound interest: Years ≈ 72 ÷ R.

Q68. Answer: (a) frac16

Shortcut Trick

Total work = LCM(9, 18) = 18 units.

Efficiency of A = 18 ÷ 9 = 2, Efficiency of B = 18 ÷ 18 = 1.

Combined 1-day work = 2 + 1 = 3 units.

Work done in 5 days = 3 × 5 = 15 units.

Remaining work fraction = (18 − 15) ÷ 18 = 3/18 = 1/6.

Therefore The correct answer is 1/6.

Alternate Method

Given:

Time taken by A = 9 days

Time taken by B = 18 days

Days they worked together = 5 days

Person	Days	Total Work	Efficiency
A	9	18	2
B	18	1	

Calculations:

=> Total efficiency of A and B = 2 + 1 = 3 units/day

=> Work completed by A and B together in 5 days = 3 × 5 = 15 units

=> Remaining work = Total Work − Completed Work

=> Remaining work = 18 − 15 = 3 units

=> Fraction of work remaining = Remaining Work ÷ Total Work

=> Fraction of work remaining = 3 / 18 = 1/6

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Therefore The correct answer is 1/6.

Additional Information

Total Work and Efficiency

In Time & Work problems, total work is generally assumed as the LCM of the individual times taken. Efficiency is the amount of work completed in a unit of time. (Total Work = Efficiency × Time)

Fractional Work Method

If an individual finishes a whole task in 'n' days, their 1-day work is 1/n. For two persons A and B, combined 1-day work is 1/A + 1/B.

Pipes and Cisterns

This concept is completely analogous to Time & Work. Inlet pipes have a positive efficiency (filling) while outlet pipes have a negative efficiency (emptying).

Q69. Answer: (a) 1600

Shortcut Trick

Side of the square = Perimeter ÷ 4

Side = 160 ÷ 4 = 40 m

Area = Side × Side = 40 × 40 = 1600 m²

Therefore The correct answer is 1600 m².

Alternate Method

Given:

Perimeter of the square = 160 m

Formula Used:

Perimeter of a square = 4 × a (where a is the side length)

Area of a square = a²

a = 40 m

a = 40 m

Area = 1600 sq. m

Perimeter = 160 m

a

Calculations:

=> 4 × a = 160

=> a = 160 ÷ 4

=> a = 40 m

=> Area = a × a

=> Area = 40 × 40

=> Area = 1600 m²

Therefore The correct answer is 1600 m².

Additional Information

Diagonal of a Square

The diagonal (d) of a square with side 'a' is given by d = a√2.

Area of a Square (using Diagonal)

The area can also be directly calculated from its diagonal as A = d² ÷ 2.

Perimeter of a Rectangle

The perimeter of a rectangle is P = 2 × (l + b), where l is the length and b is the breadth.

Q70. Answer: (d) -74x + 61

Shortcut Trick

Multiply the coefficients directly, grouping by variable powers:

x^2 term: 2 × (3/2) − 3 × 1 = 3 − 3 = 0

x term: 2 × (−28) − 3 × 6 = −56 − 18 = −74

Constant term: 2 × 14 − 3 × (−11) = 28 + 33 = 61

Combining the results yields the simplified expression: −74x + 61.

Therefore The correct answer is −74x + 61.

Alternate Method

Given:

$2((3/2)x^2 - 28x + 14) - 3(x^2 + 6x - 11)$

Calculations:

Expand the first bracket:

$=> 2 \times (3/2)x^2 - 2 \times 28x + 2 \times 14$

$=> 3x^2 - 56x + 28$

Expand the second bracket:

$=> -3 \times x^2 - 3 \times 6x - 3 \times (-11)$

$=> -3x^2 - 18x + 33$

Add both expanded expressions together:

$=> (3x^2 - 56x + 28) + (-3x^2 - 18x + 33)$

Group the like terms:

$=> (3x^2 - 3x^2) + (-56x - 18x) + (28 + 33)$

$=> 0 - 74x + 61$

$=> -74x + 61$

Therefore The correct answer is $-74x + 61$.

Additional Information

BODMAS Rule

Always follow the order of Brackets, Orders, Division, Multiplication, Addition, and Subtraction while simplifying expressions to ensure accuracy.

Sign Rules in Multiplication

Multiplying two negative numbers results in a positive product (e.g., $-a \times -b = +ab$), whereas multiplying a positive and a negative number results in a negative product.

Like Terms

In algebra, only terms with the exact same variables and powers can be added or subtracted together. For instance, x^2 terms are grouped with other x^2 terms.

Q71. Answer: (a) Three

- A, B, C, D, J, K and L are sitting around a circular table, facing the centre of the table.
- Only one person sits between A and L when counted from the left of L.
- K sits third to the right of J.
- C sits third to the left of B.
- K sits to the immediate right of C.
- D is not an immediate neighbour of C

The Final Arrangement is,

Hence, the correct answer is "Option 1"

Q72. Answer: (d) UXS

The logic followed here is:

Hence, the correct answer is "Option 4"

Q73. Answer: (a) None

Given number 36719542

Ascending order from left to right

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

No digits remain unchanged as compared to that in the original number.

Hence, the correct answer is "Option 1"

Q74. Answer: (c) 55

The Logic follows here,

Hence, the correct answer is "Option 3"

Q75. Answer: (c) 290

Given Equation 93 × 9 ÷ 9 - 3 × 8 + 23 × 6 ÷ 3 - 3 × 2 = ?

'÷' and '-' are interchanged and '×' and '+' are interchanged

93 + 9 - 9 ÷ 3 + 8 × 23 + 6 - 3 ÷ 3 + 2 = ?

93 + 9 - 3 + 8 × 23 + 6 - 1 + 2 = ?

93 + 9 - 3 + 8 × 23 + 6 - 1 + 2 = ?

93 + 9 + 2 + 184 + 6 - 1 - 3 = ?

294 - 1 - 3 = ?

290.

Hence, the correct answer is "Option 3"

Q76. Answer: (d) 65

The logic follows here,

Hence, the correct answer is "Option 4"

Q77. Answer: (b) Three

Given number 3174658

1 is added to each odd digit and 2 is subtracted from each even digit in the number

2, 4 and 6.

Hence, the correct answer is "Option 2"

Q78. Answer: (b) 8

'NOPE' is coded as '6712' and 'NOTE' is coded as '2178'.

'NOPE' - '6712'

'NOTE' - '2178'.

The code for T is 8.

Hence, the correct answer is "Option 2"

Q79. Answer: (b) ADPV

The logic followed here is:

Hence, the correct answer is "Option 2"

Q80. Answer: (b) 9 km towards south

- Manish starts from Point A and drives 9 km towards east.
- He then takes a right turn, drives 2 km, turns right and drives 4 km.
- He then takes a right turn and drives 11 km.
- He takes a final left turn, drives 5 km and stops at Point P.

The Final Diagram,

Hence, the correct answer is "Option 2"

Q81. Answer: (c) K

Seven people, F, G, H, I, J, K and R, are sitting in a row facing North.

- Only two people sit between H and R.
- Only F sits to the right of J.
- Only one person sits between R and J.
- G sits at some place to the right of I but at some place to the left of K.

The Final Arrangement is,

Hence, the correct answer is "Option 3"

Q82. Answer: (c) Five

Seven boxes C, D, E, M, N, O and P are kept one over the other but not necessarily in the same order.

- O is kept second from the bottom.
- Only three boxes are kept between O and E.
- P is kept at one of the positions below O.

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• Only M is kept between E and D.
• C is kept at one of the positions above E.
The Final Arrangement is,

C
E
M
D
N
O
P

Hence, the correct answer is "Option 3"

Q83. Answer: (a) 106

The logic follows here,
Hence, the correct answer is "Option 1"

Q84. Answer: (d) 14

Given Series: (Left) 285 106 346 349 408 (Right)
The third digit of the highest number = 408.
Third digit of the lowest number = 106.
8 + 6 = 14.
Hence, the correct answer is "Option 4"

Q85. Answer: (a) 52

Given Equation : 38 - 8 ÷ 2 + 16 × 8 = ?
'÷' and '×' are interchanged and '+' and '-' are interchanged
Here, we use the BODMAS table given below:
38 + 8 × 2 - 16 ÷ 8 = ?
38 + 8 × 2 - 2 = ?
38 + 16 - 2 = ?
54 - 2 = ?
52.
Hence, the correct answer is "Option 1"

Q86. Answer: (c) 42

Given:
Karan position from the top: 27th.
Karan position from the bottom: 16th.
Formula used:
The total number of people = Position of the person from Top + Position of the person from Bottom - 1.
Therefore,
The total number of students = 27 + 16 - 1 = 42.
Hence, the correct answer is "Option 3"

Q87. Answer: (c) Q81T

The logic followed here is:
Hence, the correct answer is "Option 3"

Q88. Answer: (c) MR 9

The logic followed here is:
Hence, the correct answer is "Option 3"

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Q89. Answer: (b) Only conclusion (II) follows.

The least possible Venn diagram is shown below according to the given information.

Conclusions:

(I) Some plants are grasses.- False (As their is no relation between plants and grasses may be it is possible but not definite Hence., it is false)

(II) Some trees are plants. - True(Some plants are trees.Some trees are plants. is True)

Only conclusion (II) follows.

Hence, the correct answer is "Option 2"

Q90. Answer: (a) VCJ 59

The logic followed here is:

Hence, the correct answer is "Option 1"

Q91. Answer: (c) Three

Given Series : (left) 2 @ 2 # * 0 8 µπ3 0 1869 $4 & 9 β 9 (right)

Required Conditions: Perfect square number, Symbols, Perfect square number

(left) 2 @ 2 # * 0 8 µπ3 0 1 8 6 9 $ 4 & 9 β 9 (right)

Hence, the correct answer is "Option 3".

Q92. Answer: (b) 1 km east

• Person X starts from point A and drives 5 km towards the south.
• He then takes a left turn, drives 5 km, turns right and drives 5 km.
• He then takes a right turn and drives 7 km.
• He then takes a right turn, drives 10 km.
• He then takes a final right turn and drives 1 km and stops at point B

The Final Diagram,

Hence, the correct answer is "Option 2"

Q93. Answer: (d) 9

'FORM' is coded as '4629' and 'RISE' is coded as '1395'

'FORM' - '4629'

'RISE'—'1395'

The Code for R is 9.

Hence, the correct answer is "Option 4"

Q94. Answer: (b) NR-OU

The logic followed here is

Hence, the correct answer is "Option 2"

Q95. Answer: (d) DS - JO

The logic followed here is:

Hence, the correct answer is "Option 4"

Q96. Answer: (d) Husband's brother

Preparing the family tree diagram by using the following symbols:

As per the given information:

Hence, the correct answer is "Option 4"

Q97. Answer: (a) Neither conclusion (I) nor (II) follows.

The least possible Venn diagram is shown below according to the given information.

Conclusions:

I. No Soldiers are Police Officers. - False (As their is no relation between Soliders and police officers, may be it is possible but not definite. Hence, it is false)

II. Some Police Officers are Soldiers. - False (As their is no relation between Soliders and police officers, may be it is possible but not definite. Hence, it is false)

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Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 1"

Q98. Answer: (a) LHHK

The logic followed here is:

Hence, the correct answer is "Option 1"

Q99. Answer: (b) 71

Given:

Anshul rank from the top = 38th

Anshul rank from the bottom = 34th

Total number of students = rank from the top + rank from the bottom - 1

(34 + 38) - 1 = 72 - 1 = 71

Thus, the total number of students is "71".

Hence, the correct answer is "Option 2".

Q100. Answer: (d) (18, 31, 13)

Logic : First Number + Second Number = Third Number.

Similarly,

Hence, the correct answer is "Option 4"

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