RRB NTPC (UG) CBT-I Official Paper (Held On: 28 Aug, 2025 Shift 2) (Previous Year Paper)

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

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GENERAL AWARENESS

Q1. Who among the following was the runner-up defeated by Viktor Axelsen in his third India Open victory in the 2025 India Open Badminton Tournament in January 2025?

(a) Anthony Sinisuka Ginng
(b) Lakshay Sen
(c) Lee Cheuk Yiu
(d) Chou Tien Chen

Q2. In which of the following years was Delhi Metro Rail Corporation established?

(a) 1992
(b) 1995
(c) 1999
(d) 1997

Q3. What is the full name of MNREGA in the Indian policy context?

(a) Modern National Rural Employment Growth Act
(b) Mahatma Gandhi National Rural Employment Guarantee Act
(c) Ministry for National Rural Employment Growth Agenda
(d) Mainstream National Rural Education Guarantee Act

Q4. Which of the following constitutional mechanisms ensures political representation for Scheduled Castes and Scheduled Tribes in the Indian Parliament?

(a) Article 15 and 16
(b) Article 341 and 342
(c) Article 330 and 332
(d) Article 338 and 339

Q5. The DBT-funded project that first produced a GMP-grade viral vector for Indian CAR-T research was supported under which flagship scheme?

(a) Biotechnology Ignition Grant
(b) PACE
(c) National Biopharma Mission
(d) Atal Jai Anusandhan

Q6. Which of the following rivers flows through a small part of the Great Indian Desert?

(a) Ravi
(b) Mahanadi
(c) Satluj
(d) Luni

Q7. In which of the following years did Vasco da Gama land in Calicut on the Malabar Coast for the second time?

(a) 1509
(b) 1502
(c) 1505
(d) 1511

Q8. The Pochampad Dam is also known as _____.

(a) Hirakud Project
(b) Sri Rama Sagar Project
(c) Bhakra Nangal Project
(d) Nagarjuna Sagar Project

Q9. Which of the following Bengali writers composed the famous novel Anandamath?

(a) Sarat Chandra Chattopadhyay
(b) Rabindranath Tagore
(c) Kazi Nazrul Islam
(d) Bankim Chandra Chattopadhyay

Q10. At what age did Gautama Buddha attain Enlightenment (Nirvana) at Bodh Gaya in Bihar?

(a) 49 years
(b) 42 years
(c) 35 years
(d) 29 years

Q11. After a hundred years of conquest and administration, the English East India Company faced a massive uprising that took place in _____.

(a) 1856
(b) 1857
(c) 1854
(d) 1855

Q12. How many facial bones are there in the face skeleton, each with its own anatomical landmarks and stage of development?

(a) 14
(b) 18
(c) 11
(d) 21

Q13. What was the theme for National Safety Day, observed on 4 March 2025?

(a) Safety & Well-being Crucial for Viksit Bharat
(b) Safety Awareness: A National Priority
(c) Safety First: Every Day
(d) Secure India: Secure Future

Q14. In the first phase of the Green Revolution (approximately mid 1960s upto mid 1970s), the use of HYV seeds was restricted to the more affluent states such as _____.

(a) Rajasthan, Gujarat and Kerala
(b) Bihar, Odisha and West Bengal
(c) Maharashtra, Uttar Pradesh and Assam
(d) Punjab, Andhra Pradesh and Tamil Nadu

Q15. During the Later Vedic period, which of the following animals was specifically mentioned as useful for ploughing swampy land?

(a) Cow
(b) Buffalo

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(c) Horse
(d) Elephant

Q16. According to the Climate Risk Index 2025, what is India's long-term rank (1993–2022) among the most affected countries by extreme weather events?
(a) 12th
(b) 9th
(c) 3rd
(d) 6th

Q17. Andhra Pradesh was formed in 1953 by separating Telugu-speaking areas from which of the following states?
(a) Madras
(b) Kerala
(c) Karnataka
(d) Tamil Nadu

Q18. The Koyna Project is constructed on a tributary of the River Krishna in which state?
(a) Karnataka
(b) Tamil Nadu
(c) Maharashtra
(d) Andhra Pradesh

Q19. Which advanced radar systems are being deployed under a Rs. 5,700-crore contract signed in March 2024 and operational from April 2025 to strengthen India's air defence network?
(a) Over-the-horizon radars
(b) Synthetic aperture radars
(c) Passive electronically scanned array radars
(d) High-Power Radars (HPR)

Q20. Which Fundamental Right was removed from the Indian Constitution by the 44th Amendment Act, 1978?
(a) Right to Property
(b) Right to Freedom
(c) Right to Education
(d) Right to Equality

Q21. Who is the Governor of the Reserve Bank of India as of May 2025?
(a) Shaktikanta Das
(b) Sanjay Malhotra
(c) Raghuram Rajan
(d) Urjit Patel

Q22. The UK–India Free Trade Agreement that concluded on 6 May 2025, primarily aims to reduce barriers to which sector listed first in its conclusion summary?
(a) Agricultural commodities
(b) Medicinal products
(c) Digital trade and e-comm
(d) Legal services

Q23. Which of the following is the correct method to rename a file or folder using the left mouse button?
(a) Click and drag the file → Rename it in the pop-up window
(b) Double-click the file name → Type the new name → Press Esc
(c) Select the file → Press F2 or click once on the name → Type new name → Press Enter
(d) Select the file → Press F1 → Type new name → Press Enter

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Q24. In which event, at The Ten 2025 athletics meet in San Juan Capistrano, USA, did Gulveer Singh break his own national record in March 2025?

(a) Marathon
(b) 5,000m race
(c) 3,000m steeplechase
(d) 10,000m race

Q25. Which theory suggests that planets were formed out of a cloud of material surrounding a young Sun?

(a) Collision Theory
(b) Binary Star Hypothesis
(c) Nebular Hypothesis
(d) Big Bang Theory

Q26. Which of the following statements about the Right to Property in India is correct?

(a) It is a fundamental right under Article 31 (now omitted)
(b) It was completely abolished by the Forty-Second Amendment (1976).
(c) It is a fundamental right under Article 32 of the Constitution.
(d) It is no longer a fundamental right.

Q27. In 2025, who launched 'Srjanam', India's first indigenous automated bio medical waste treatment plant?

(a) HD Kumaraswamy
(b) Dr. Jitendra Singh
(c) Nitin Jairam Gadkari
(d) Manohar Lal

Q28. The first human gene therapy experiment, which began in September 1990, used a retroviral vector against which deficiency?

(a) X-Linked Adrenoleukodystrophy
(b) Mitochondrial encephalopathy
(c) 3-Methylglutaconic Aciduria
(d) Adenosine deaminase

Q29. In which year was the 2030 Agenda for Sustainable Development adopted by the United Nations Member States?

(a) 2017
(b) 2015
(c) 2016
(d) 2014

Q30. As of December 2024, what is the age eligibility of player to avail facility of Retired Sportsperson Empowerment Training (RESET) Programme?

(a) 18-40 years
(b) 20-45 years
(c) 20-50 years
(d) 25-55 years

Q31. For a spontaneous process at constant temperature and pressure, the Gibbs free energy change is _____.

(a) $\Delta G = 0$
(b) $\Delta G > 0$
(c) $\Delta G < 0$
(d) $\Delta G = \Delta H + T\Delta S$

Q32. As per the Ministry of Defence's Year End Review 2024 (PIB), what is the number of C295 aircraft to be indigenously built by TASL in India?

(a) 72
(b) 56

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(c) 40
(d) 65

Q33. Which part of the Indian Constitution deals with special provisions for Scheduled Castes, Scheduled Tribes, and other backwards classes?
(a) Part III
(b) Part IX
(c) Part XVI
(d) Part IV

Q34. Which of the following correctly differentiates between RAM and ROM?
(a) ROM performs all logical operations, while RAM controls input devices
(b) RAM is permanent memory while ROM is volatile
(c) RAM loses its content when the computer is turned off, while ROM retains its data
(d) ROM is used to store data temporarily during program execution

Q35. What minimum legal practice experience did the Supreme Court mandate on 20 May 2025 for applicants to the Civil Judge (Junior Division) post?
(a) Three years of legal practice experience
(b) Four years of legal practice experience
(c) One year of legal practice experience
(d) Two years of legal practice experience

Q36. Which country ranked 10th in the Climate Change Performance Index (CCPI) 2025 report released at the annual UN climate conference in Baku?
(a) Brazil
(b) China
(c) South Africa
(d) India

Q37. The _____ developed 32-bit microprocessors for space applications named VIKRAM3201 and KALPANA3201.
(a) Indian Space Research Organization
(b) European Space Agency
(c) National Aeronautics and Space Administration
(d) Japan Aerospace Exploration Agency

Q38. In which of the following years was the Bharatmala Pariyojana approved by the Government of India covering a length of 34,800 km to improve connectivity and reduce logistics cost in the country?
(a) 2014
(b) 2017
(c) 2024
(d) 2022

Q39. Which of the following sectors contributed significantly to India’s GDP growth after the 1991 reforms?
(a) Agriculture
(b) Public sector enterprises
(c) Services sector
(d) Cottage industries

Q40. Sharing borders with the states of Kerala and Karnataka, Mudumalai National Park of Tamil Nadu is a part of which biosphere reserve of India?
(a) Nilgiri Biosphere Reserve
(b) Kangchendzonga Biosphere Reserve
(c) Agasthyamalai Biosphere Reserve
(d) Nokrek Biosphere Reserve

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MATHEMATICS

Q41. The average weight of Gopal, Akshay and Atul is 45 kg. If the average weight of Gopal and Akshay is 44 kg and that of Akshay and Atul is 46 kg, then the weight of Akshay (in kg) is:

(a) 65
(b) 55
(c) 60
(d) 45

Q42. What smallest number should be added to 74978 so that the sum is completely divisible by 24?

(a) 22
(b) 17
(c) 20
(d) 26

Q43. The value of $8^2+\sqrt{(9^2)}-4\sqrt{25}-14$ is

(a) 39
(b) 45
(c) 49
(d) 48

Q44. A number, when increased by 80%, gives 2520. The number is:

(a) 4200
(b) 1400
(c) 2800
(d) 700

Q45. The LCM of $4^3\times 6^2\times 15$, $4^2\times 15^2\times 19$ and $6^3\times 15^2\times 19^2$ is:

(a) 2^8× 3^4× $5^2\times 19^2$
(b) 2^8× 3^5× $5^3\times 19^2$
(c) 2^8× 3^5× $5^2\times 19^2$
(d) 2^9× 3^5× $5^2\times 19^2$

Q46. If one interior angle of a regular polygon is greater than its exterior angle by 144°, how many sides does the polygon have?

(a) 21
(b) 19
(c) 18
(d) 20

Q47. Pipe P can fill 5/7 part of a tank in 30 hours, and pipe Q can fill 4/7 part of the same tank in 12 hours. Both P and Q were kept open for 7 hours, then both were closed. Pipe R alone was then opened and it emptied the water in the tank in 9 hours. Pipes P, Q and R together can fill the empty tank in:

(a) 56 hours
(b) 82 hours
(c) 78 hours
(d) 63 hours

Q48. Anshuman and Kunal together invested Rs. 48,300 in a business. At the end of the year, out of a total profit of Rs. 14,000, Kunal's share was Rs. 6,000. What was the difference between their investments?

(a) Rs. 5,940
(b) Rs. 6,500
(c) Rs. 7,640
(d) Rs. 6,900

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Q49. Simplify: $x(8x - 7) + 7(x^2 - 5) + 14$

(a) $-15\ x^2 - 7x + 21$
(b) $15\ x^2 - 7x - 21$
(c) $-15\ x^2 - 7x - 21$
(d) $15\ x^2 - 7x + 21$

Q50. Yash travels 152 km at 38 km/hr, the next 189 km at 63 km/hr and the next 375 km at 75 km/hr. What is his average speed (in km/hr) for the whole journey? (Round off your answer to two decimal places)

(a) 59.67
(b) 51.83
(c) 58.22
(d) 70.03

Q51. The cost of 9 pens and 9 pencils is Rs. 252. If the cost of a pen decreases by Rs. 1 and the cost of a pencil increases by Rs. 3, then the cost of 13 pens and 3 pencils is Rs. 100. What is the original cost of 10 pens and 19 pencils?

(a) Rs. 513
(b) Rs. 517
(c) Rs. 514
(d) Rs. 516

Q52. Find the value of: $[428 \div \{17 + 8 \times (5 - 7)\}]$.

(a) 428
(b) 429
(c) 427
(d) 426

Q53. The sum of two numbers is 121 and their L.C.M. is 264. What are the two numbers?

(a) 81, 40
(b) 86, 35
(c) 88, 33
(d) 93, 28

Q54. If the interest earned during the 2nd year on a certain sum is Rs. 1,760, and the rate of interest is 10% per annum compounded annually, then the sum is:

(a) Rs. 16,405
(b) Rs. 15,495
(c) Rs. 16,000
(d) Rs. 15,990

Q55. A dealer wants to make a 20% profit on a smart watch that costs him Rs. 1,575. To attract customers, he plans to offer a 10% discount on the listed price. At what price should he list the smart watch to achieve his desired profit?

(a) Rs. 2,100
(b) Rs. 1,918
(c) Rs. 1,654
(d) Rs. 1,890

Q56. Find the simple interest (in Rs.) if a sum of Rs. 400 is borrowed for 4.5 years at 20% per annum rate of interest.

(a) 460
(b) 360
(c) 410
(d) 340

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Q57. 6 years ago, the age of a father was 34 years more than twice his son's age. After how many years, from now, will he be twice his son's age?

(a) 23
(b) 28
(c) 26
(d) 24

Q58. What is the value of the given expression?

(sin ^4A-cos ^4A+1)/(1+1/(tan²A))

(a) 2sin ^4A
(b) (sin A· cos A)/(tan²A)
(c) 2sin²A+tan²A
(d)
[Figure: see this question online]
2sin A· cos A

Q59. Pipe A can fill a tank in 16 hours, pipe B can fill the same tank in 21 hours and pipe C can fill the same tank in 15 hours. The time taken by them to fill the same tank if they operate together is::

(a) 765/99 hours
(b) 565/99 hours
(c) 865/99 hours
(d) 665/99 hours

Q60. Five solid cubes, each of volume 512000 cm³, are joined end to end to form a cuboid. What is the lateral surface area (in cm²) of the cuboid?

(a) 76949
(b) 76903
(c) 76800
(d) 76820

Q61. The marks scored by 10 students are given below.

19, 15, 10, 14, 13, 18, 19, 19, 11, 11

The mode of the data is:

(a) 19
(b) 20
(c) 15
(d) 10

Q62. A shopkeeper lists the price of a fan at 50% above its cost price and offers a 30% discount on its list price. If he earns a profit of Rs. 91, then what is the list price (in Rs.) of the fan?

(a) 2,774
(b) 2,697
(c) 2,730
(d) 3,025

Q63. Which of the following numbers divides 245015?

(a) 2
(b) 11
(c) 15
(d) 5

Q64. If the third proportional of 9 and 51 be x, then what is the value of x?

(a) 287
(b) 288
(c) 291

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(d) 289

Q65. The marked price of an article is Rs. 4,500. It is sold at successive discounts of 25% and 20%. Find the selling price of the article (in Rs.).

(a) 2,700
(b) 2,800
(c) 2,750
(d) 2,900

Q66. Mahesh bought some pens at the rate of Rs. 150 a dozen. He sold them for Rs. 44 each. His profit percentage is _____%.

(a) 256
(b) 250
(c) 254
(d) 252

Q67. A toy designer is making a spherical ball with a radius of 6 cm. What is the surface area of the ball? (Use π = 3.14)

(a) 678.24 cm^2
(b) 301.44 cm^2
(c) 452.16 cm^2
(d) 282.74 cm^2

Q68. The population of a district is 374000, out of which 170000 are males. 78% of the population is literate. If 72% males are literate, then what percentage of females are literate?

(a) 85%
(b) 83%
(c) 81%
(d) 80%

Q69. Arjun and Malaika have to travel from Delhi to Kanpur in their respective cars. Arjun is driving at 140 km/hr while Malaika is driving at 65 km/hr. Find the time taken by Malaika to reach Kanpur if Arjun takes 13 hours.

(a) 25 hours
(b) 34 hours
(c) 26 hours
(d) 28 hours

Q70. Anand, Preeti and Dev invested Rs. 1,310, Rs. 1,350 and Rs. 1,140, respectively to start a business. If the profit at the end of the year is Rs. 1,630, what is Dev's share of the profit?

(a) Rs. 488
(b) Rs. 487
(c) Rs. 489
(d) Rs. 490

GENERAL INTELLIGENCE AND REASONING

Q71. What should come in place of the question mark (?) in the given series?

27 31 40 56 81 ?

(a) 121
(b) 120
(c) 118
(d) 117

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Q72. In a certain code language,

A $ B means ‘A is the son of B’

A + B means ‘A is the brother of B’

A @ B means ‘A is the wife of B’

A ÷ B means ‘A is the father of B’

Based on the above, how is E related to N if ‘E @ F $ G ÷ M + N’?

(a) Brother's daughter
(b) Brother's wife
(c) Wife
(d) Daughter

Q73. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

WVH BAM GFR LKW ?

(a) QPB
(b) QBP
(c) QWE
(d) QEW

Q74. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group?

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

(a) PT-KQ
(b) JN-EK
(c) MQ-HN
(d) SW-NU

Q75. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:

All letters are mails.

All schedules are mails.

Conclusions:

(I) Some letters are schedules.

(II) Some mails are schedules.

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

Q76. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(16, 63, 16)

(36, 111, 4)

(a) (47, 144, 4)
(b) (48, 162, 15)
(c) (44, 155, 20)
(d) (1, 12, 6)

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Q77. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘x’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘–’, what will come in place of the question mark (?) in the following equation?

48 D 14 B 3 C 27 A 3 = ?

(a) 24
(b) 31
(c) 15
(d) 37

Q78. 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 one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) RXCJ
(b) OUZG
(c) KQVC
(d) NTYE

Q79. BGLY is related to DJNB in a certain way based on the English alphabetical order. In the same way, JSTK is related to LVVN. To which of the given options is PBZT related, following the same logic?

(a) RWBY
(b) REWB
(c) REBW
(d) RWYI

Q80. Seven people, I, J, K, L, M, N and O, are sitting in a row, facing north. Only J sits to the left of O. Only four people sit between J and I. Only K sits between M and N, and M is not an immediate neighbor of I. Who sits at the extreme right of the line?

(a) M
(b) L
(c) O
(d) I

Q81. Refer to the following number and symbol series and answer the question that follows.

Counting to be done from left to right only.

(Left) 8 & % 1 @ 2 3 $ 9 & 6 Ω 4 # 5 * £ 7 (Right)

If all the symbols are dropped from the series, which of the following will be fourth from the right?

(a) 4
(b) 2
(c) 6
(d) 9

Q82. Rahul starts from Point Y and drives 14 km towards the north. He then takes a right turn, drives 6 km, then he turns right and drives 20 km. He then takes a right turn and drives 12 km. He takes a final right turn, drives 6 km and stops at Point Z. How far (shortest distance) and towards which direction should he drive in order to reach Point Y again? (All turns are 90-degree turns only unless specified.)

(a) 4 km towards the east
(b) 6 km towards the north
(c) 6 km towards the east
(d) 4 km towards the north

Q83. RUWU is related to YBDB in a certain way based on the English alphabetical order. In the same way, JMOM is related to QTVT. To which of the given options is TWYW related, following the same logic?

(a) ADED
(b) ACED
(c) ADFD

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(d) AEEL

Q84. In a certain code language, ‘reading is important’ is written as ‘pb mk lo’ and ‘is it raining’ is coded as ‘jo mt pb’. How is ‘is’ coded in the given language?

(a) lo
(b) mk
(c) jo
(d) pb

Q85. Seven boxes V, W, X, Y, Z, Q and R are kept one over the other but not necessarily in the same order. Only two boxes are kept below Z. Only one box is kept above W. Only one box is kept between W and Q.V is kept immediately above Y. R is kept at some place below X. How many boxes are kept between X and V?

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

Q86. Seven people, I, J, K, L, P, Q and R are sitting in a row, facing north. Only J sits to the left of P. Only four people sit between J and I. Only K sits between R and Q. R is not an immediate neighbour of I. Who sits at the extreme right end of the line?

(a) R
(b) L
(c) K
(d) I

Q87. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

JMR11 KNS20 LOT29 MPU38 ?

(a) NQU42
(b) NQV47
(c) NQU46
(d) NQV56

Q88. If 1 is added to each odd digit and 2 is subtracted from each even digit in the number 7453186, how many digits will appear more than once in the new number thus formed?

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

Q89. What will come in the place of the question mark (?) in the following equation, if ‘+’ and ‘−’ are interchanged and ‘×’ and ‘÷’ are interchanged?

57 × 3 − 11 ÷ 7 + 42 = ?

(a) 54
(b) 50
(c) 52
(d) 56

Q90. In a certain code language, ‘BLUE’ is coded as ‘7524’ and ‘UNIT’ is coded as ‘1356’. What is the code for ‘U’ in the given code language?

(a) 1
(b) 2
(c) 5
(d) 6

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Q91. Refer to the following number and symbol series and answer the question that follows.

Counting to be done from left to right only.

(Left) 3 4 7 # # # 5 * £ 8 2 £ & € 2 $ £ @ 3 # 7 & (Right)

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

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

Q92. If 2 is added to each even digit and 1 is subtracted from each odd digit in the number 91526374, what will be the sum of second digit from left and third digit from right in the new number thus formed?

(a) 10
(b) 14
(c) 6
(d) 2

Q93. In the following triads, each group of letters is related to the subsequent one following a certain logic. Select from the given options, the one which follows the same logic.

TOWN - NWTO - TWON

CLAW - WACL - CALW

(a) PICK - KCPI - PCIK
(b) ROSE - RSOE - ESOR
(c) FUME - UMFE - UMEF
(d) HALF - FLHA - ALHF

Q94. Seven boxes L, M, N, O, P, Q and R are kept one over the other but not necessarily in the same order. M is kept fourth from the bottom. O is placed immediately below M. Q is placed immediately above R. P is the topmost box. M is placed immediately below L. Which box is placed at the bottom?

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

Q95. Rishabh starts from Point A and drives 9 km towards west. He then takes a left turn, drives 8 km, turns left and drives 15 km. He then takes a right turn and drives 6 km. He takes a final right turn, drives 6 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) 16 km towards east
(b) 14 km towards north
(c) 16 km towards west
(d) 14 km towards south

Q96. What should come in place of the question mark (?) in the given series?

85 86 88 92 100 ?

(a) 118
(b) 117
(c) 116
(d) 115

Q97. Mr. Into ranked 49th from the bottom and 56th from the top in his class. How many students are there in his class?

(a) 105
(b) 103
(c) 104

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(d) 107

Q98. Based on the English alphabetical order, three of the following four letter cluster pairs are alike in a certain way and thus form a group. Which is the one that DOES NOT belong to that group? (NOTE: The odd one out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) TM-WR
(b) OH-RN
(c) NG-QL
(d) JC-MH

Q99. 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 notes are books. All books are tables.

Conclusion (I): Some notes are tables.

Conclusions (II): All tables are books.

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

Q100. What should come in place of the question mark (?) in the given series?

3 12 30 57 93 ?

(a) 130
(b) 138
(c) 135
(d) 140

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) Lee Cheuk Yiu

The correct answer is Lee Cheuk Yiu.

Key Points

- Viktor Axelsen secured his third India Open title in January 2025 by defeating Lee Cheuk Yiu in the final.
- The India Open is a prestigious Super 750 Badminton World Federation (BWF) tournament held annually in India.
- Lee Cheuk Yiu is a prominent badminton player from Hong Kong, known for his exceptional agility and tactical gameplay.
- Viktor Axelsen, the reigning world champion and Olympic gold medalist, showcased dominant form throughout the tournament.
- Axelsen's win at the India Open 2025 further solidified his position as one of the greatest badminton players of his era.

Additional Information

• Viktor Axelsen

• He is a Danish badminton player and one of the most dominant figures in the sport.

• Axelsen won the 2020 Olympic gold medal in men's singles and several world championships.

• His playing style combines strong offensive techniques with excellent court coverage and consistency.

• He has been ranked as the world number one in men's singles multiple times by the Badminton World Federation (BWF).

• India Open Badminton Tournament

• It is part of the HSBC BWF World Tour and classified as a Super 750 event.

• The tournament attracts top badminton players from around the globe.

• It was first held in 2008 and has since become a key event in the badminton calendar.

• Winners of the India Open earn crucial points toward their BWF world rankings.

• Badminton World Federation (BWF)

• BWF is the international governing body for the sport of badminton, founded in 1934.

• It oversees major tournaments like the World Championships, Thomas and Uber Cups, and the BWF World Tour.

• The BWF headquarters is located in Kuala Lumpur, Malaysia.

• Lee Cheuk Yiu

• Lee Cheuk Yiu is a professional badminton player from Hong Kong who has competed in several major tournaments.

• He is known for his impressive speed and shot precision.

• Lee has won significant matches in international tournaments, showcasing his skills on the global stage.

Q2. Answer: (b) 1995

The correct answer is 1995.

Key Points

• The Delhi Metro Rail Corporation (DMRC) was established on 3rd May 1995 as a joint venture between the Government of India and the Government of the National Capital Territory of Delhi.

• The DMRC was set up to plan, design, implement, and operate a world-class metro system in Delhi and its surrounding regions.

• The primary objective of DMRC was to address traffic congestion and pollution issues in Delhi by providing a reliable, efficient, and eco-friendly urban transport system.

• Dr. E. Sreedharan, often referred to as the "Metro Man of India," played a pivotal role in shaping the Delhi Metro project and ensuring its timely execution.

• The Delhi Metro's first phase began operations in December 2002, with the Red Line being the first operational line.

Additional Information

• Delhi Metro Features and Expansion:

• The Delhi Metro is India's first modern rapid transit system, known for its punctuality, safety, and cleanliness.

• It has expanded to include multiple color-coded lines covering Delhi, Noida, Ghaziabad, Gurgaon, and Faridabad.

• As of 2023, the Delhi Metro network spans over 390 kilometers with more than 285 stations.

• Advanced technologies such as automated train operations, regenerative braking systems, and eco-friendly measures have been implemented.

• Environmental and Social Impact:

• Delhi Metro has significantly reduced vehicular traffic and air pollution in the National Capital Region (NCR).

• It has been certified as the first metro rail system in the world to receive a carbon credits certification for reducing greenhouse gas emissions.

• With the introduction of feeder bus services and bicycle-sharing facilities, Delhi Metro promotes last-mile connectivity.

• Economic Benefits:

• The metro system has boosted real estate development and commercial activities around metro stations.

• By providing a cost-effective and time-efficient mode of transportation, it has improved the quality of life for millions of daily commuters.

• Technological Advancements:

• Delhi Metro has adopted advanced signaling systems, such as the Communication-Based Train Control (CBTC) system, for better frequency and efficiency.

• It is one of the few metro systems globally to achieve Platinum rating by the Indian Green Building Council (IGBC).

Q3. Answer: (b) Mahatma Gandhi National Rural Employment Guarantee Act

The correct answer is Mahatma Gandhi National Rural Employment Guarantee Act.

Key Points

• The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is an Indian labor law and social security measure enacted in 2005.

• It aims to guarantee the "right to work" by providing at least 100 days of wage employment in a financial year to every rural household whose adult members volunteer to do unskilled manual work.

• The scheme was launched by the Ministry of Rural Development of the Government of India.

• MGNREGA is a demand-driven scheme, meaning employment is provided based on the demand from rural households.

• The Act also promotes sustainable development by focusing on water conservation, drought proofing, afforestation, and other works that enhance rural livelihoods.

Additional Information

• Features of MGNREGA:

• The wages for the work are paid according to the Minimum Wages Act, 1948, ensuring fair compensation for workers.

• Focus is placed on women participation, with a target of at least 33% of the beneficiaries being women.

• The scheme ensures transparency and accountability through social audits and the use of IT systems.

• Funding:

• MGNREGA is centrally sponsored, with funding shared between the central and state governments.

• The Central Government funds 100% of the wages for unskilled workers and 75% of the cost of materials.

• Impact:

• MGNREGA has contributed significantly to poverty alleviation and rural infrastructure development in India.

• It has also played a crucial role in reducing rural migration to urban areas by creating local employment opportunities.

• Challenges:

• Despite its success, MGNREGA faces issues such as delayed payments, lack of adequate awareness among beneficiaries, and corruption in its implementation.

Q4. Answer: (c) Article 330 and 332

The correct answer is Article 330 and 332.

Key Points

• Article 330 of the Indian Constitution provides for the reservation of seats for Scheduled Castes (SCs) and Scheduled Tribes (STs) in the Lok Sabha.

• Article 332 ensures the reservation of seats for Scheduled Castes and Scheduled Tribes in the Legislative Assemblies of the states.

• The representation for SCs and STs is designed to ensure their political participation and address historical social inequalities.

• These provisions are part of India's constitutional safeguards to promote inclusivity and equality in governance.

• The reservation is based on the proportion of population of SCs and STs in each state or union territory.

Additional Information

• Article 15 and 16: These articles prohibit discrimination on grounds of religion, race, caste, sex, or place of birth and ensure equality in public employment, but they do not directly deal with reservation in Parliament.

• Article 341 and 342: These articles define Scheduled Castes and Scheduled Tribes, providing the framework for their identification but do not outline political representation mechanisms.

• Article 338 and 339: These articles establish special commissions for the welfare of SCs and STs and directives for their development, focusing on their socio-economic progress rather than direct political representation.

• The reservation of seats in Parliament and state legislatures for SCs and STs is reviewed periodically, and provisions are extended by constitutional amendments as required.

• India's democracy ensures that marginalized communities have a voice in governance by providing these constitutional safeguards.

Q5. Answer: (c) National Biopharma Mission

The correct answer is National Biopharma Mission.

Key Points

• The National Biopharma Mission is a flagship initiative of the Department of Biotechnology (DBT), implemented through the Biotechnology Industry Research Assistance Council (BIRAC).

• This mission aims to accelerate the discovery, research, and early development of biopharmaceuticals in India.

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• The program is supported by the Government of India and co-funded by the World Bank.

• It focuses on building an ecosystem to nurture innovation in biopharma and making India a hub for cutting-edge R&D in this sector.

• Under this mission, the first GMP-grade viral vector for Indian CAR-T research was successfully developed, a significant milestone in cancer immunotherapy research.

Additional Information

• CAR-T Therapy

• Chimeric Antigen Receptor T-cell (CAR-T) therapy is an advanced form of immunotherapy used in treating certain types of cancers.

• It involves genetically engineering T-cells to attack cancer cells more effectively.

• The development of indigenous CAR-T therapy in India is a significant step towards affordable cancer treatment.

• Biotechnology Industry Research Assistance Council (BIRAC)

• BIRAC is a not-for-profit Public Sector Enterprise set up by DBT to strengthen and empower emerging biotech enterprises in India.

• It provides funding, mentoring, and infrastructure support to accelerate biotech innovations.

• GMP-Grade Viral Vector

• GMP (Good Manufacturing Practice) grade viral vectors are essential tools in gene therapy and CAR-T cell therapy.

• They are used to deliver genetic material into cells and must meet stringent quality and safety standards.

• National Biopharma Mission Goals

• Promote development of affordable vaccines, biotherapeutics, and diagnostics.

• Establish shared infrastructure for biopharma R&D, such as bio-incubators and testing facilities.

• Facilitate skill development and training for researchers and entrepreneurs in the biopharma industry.

Q6. Answer: (d) Luni

The correct answer is Luni.

Key Points

• Luni is the only major river that flows through the arid region of the Great Indian Desert, also known as the Thar Desert.

• The river originates in the Aravalli Range, near Ajmer in Rajasthan, and flows towards the southwest.

• Luni is an ephemeral river, meaning it carries water only during the monsoon season, eventually disappearing into marshy lands near the Rann of Kutch.

• The river is saline in its lower course due to the high salt content of the desert soil.

• Luni serves as a crucial water source for irrigation and other needs in the arid regions of Rajasthan.

Additional Information

• The Great Indian Desert (Thar Desert):

• The Thar Desert is located in northwestern India, primarily in the state of Rajasthan, and extends into Pakistan.

• It is the 17th largest desert in the world and the 9th largest subtropical desert.

• The desert is characterized by extreme temperatures, arid conditions, and sparse vegetation.

• Aravalli Range:

• The Aravalli Range is one of the oldest fold mountain ranges in the world, spanning Rajasthan, Haryana, and Gujarat.

• It plays a critical role in blocking the monsoon winds, contributing to the aridity of the Thar Desert.

• Ephemeral Rivers:

• An ephemeral river carries water only during certain seasons, usually during heavy rains.

• These rivers are vital for regions with low annual rainfall as they support agriculture and provide water for domestic use during the monsoon season.

• Salinity of Luni River:

• The river's water becomes increasingly saline as it moves downstream, primarily due to the high salt content in the soil and the arid environment.

• Despite its salinity, the water of Luni is used for irrigation in its upper reaches where it is relatively less saline.

Q7. Answer: (b) 1502

The correct answer is 1502.

Key Points

• Vasco da Gama first landed in Calicut (now Kozhikode) on the Malabar Coast in 1498, marking the beginning of European exploration in India.

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• His second voyage to India occurred in 1502, under the orders of the Portuguese crown, to strengthen Portuguese influence in the region.
• During this expedition, Vasco da Gama attacked Arab trading ships and established Portuguese dominance over the Indian Ocean trade routes.
• He also set up a Portuguese trading post in Calicut and signed a treaty with the local ruler, the Zamorin of Calicut.
• This voyage further intensified European colonization and maritime trade in Asia, particularly in spices.

Additional Information

• Vasco da Gama's First Voyage (1497-1499):
• It marked the discovery of a sea route from Europe to India via the Cape of Good Hope.
• He reached Calicut on 20 May 1498 and was warmly received by the Zamorin (local ruler).
• This voyage paved the way for the Portuguese colonial empire in Asia.
• Zamorin of Calicut:
• The Zamorins were the hereditary rulers of Calicut, known for their support of international trade, particularly spices.
• They played a crucial role in the early interactions between Europeans and Indian merchants.
• Impact of Vasco da Gama's Voyages:
• His expeditions led to the establishment of Portuguese colonies in India, including Goa.
• It resulted in a shift in global trade routes and economic power towards Europe.
• These voyages also initiated centuries of European colonial rule in various parts of Asia.
• Portuguese Influence in India:
• They introduced European architecture, religion (Christianity), and cultural practices.
• They dominated maritime trade routes in the Indian Ocean for over a century.
• The Portuguese influence waned with the arrival of other European powers like the Dutch, British, and French.

Q8. Answer: (b) Sri Rama Sagar Project

The correct answer is Sri Rama Sagar Project.

Key Points

• The Pochampad Dam is officially known as the Sri Rama Sagar Project and is a significant irrigation project in Telangana, India.
• It is constructed across the Godavari River, one of India's major rivers.
• The dam primarily serves the purpose of irrigation and drinking water supply for districts in Telangana.
• The construction of the dam was initiated in the 1960s to address water shortages in the region.
• Sri Rama Sagar Project plays a vital role in improving the agricultural output and livelihoods in the surrounding areas.

Additional Information

• Godavari River
• The Godavari River is the second longest river in India, spanning 1,465 kilometers.
• It originates in the Western Ghats at Trimbakeshwar, Maharashtra, and flows into the Bay of Bengal.
• Major tributaries include the Pravara, Purna, Manjira, and Sabari rivers.
• Irrigation Benefits
• Sri Rama Sagar Project provides irrigation facilities for over 1.8 million acres of farmland.
• The dam has significantly enhanced agricultural productivity in Telangana and Andhra Pradesh.
• Hydroelectric Power Generation
• The dam is equipped to generate hydroelectric power, contributing to the region's energy needs.
• It helps in reducing dependency on non-renewable energy sources.
• Environmental Impact
• While irrigation projects like the Sri Rama Sagar Project boost agriculture, they also alter river ecosystems.
• Efforts are ongoing to balance irrigation needs with ecological preservation.

Q9. Answer: (d) Bankim Chandra Chattopadhyay

The correct answer is Bankim Chandra Chattopadhyay.

Key Points

• Bankim Chandra Chattopadhyay was a prominent Bengali writer, poet, and journalist.
• He authored the iconic novel Anandamath, which was first published in 1882.
• The novel contains the famous song "Vande Mataram", which later became a symbol of India's freedom movement.
• Anandamath is set in the backdrop of the Sannyasi Rebellion against British rule in the late 18th century.

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• Bankim Chandra Chattopadhyay is often referred to as the "Sahitya Samrat" (Emperor of Literature) in Bengal.

Additional Information

• Vande Mataram

• The song "Vande Mataram" was later adopted as the national song of India.

• It was composed in Sanskrit and Bengali and symbolizes the motherland as a goddess.

• The song played a significant role in uniting people during India's struggle for independence.

• Sannyasi Rebellion

• The Sannyasi Rebellion was a series of uprisings by ascetics and monks against the British East India Company in Bengal during the late 18th century.

• The rebellion was caused by oppressive taxation policies and economic hardships imposed by the British.

• Bankim Chandra's Literary Contributions

• Besides Anandamath, Bankim Chandra Chattopadhyay wrote several other notable works, including Kapalkundala and Durgeshnandini.

• He was one of the first graduates of the University of Calcutta and served as a deputy magistrate under British rule.

• Legacy

• Bankim Chandra Chattopadhyay is credited with shaping modern Bengali prose and literature.

• His works continue to inspire and influence Indian literature and culture.

Q10. Answer: (c) 35 years

The correct answer is 35 years.

Key Points

• Gautama Buddha attained Enlightenment, also known as Nirvana, at the age of 35 years.

• He attained Enlightenment under the Bodhi Tree in Bodh Gaya, located in the present-day state of Bihar, India.

• After years of meditation and ascetic practices, he realized the Four Noble Truths, which became the foundation of Buddhism.

• The event of Enlightenment is considered one of the most significant moments in Buddhist tradition and marks the beginning of his journey as the Buddha (the Enlightened One).

• The date of his Enlightenment is celebrated as Buddha Purnima, observed annually by Buddhists worldwide.

Additional Information

• Four Noble Truths

• The Four Noble Truths are the essence of Buddha's teachings: the truth of suffering, the truth of the origin of suffering, the truth of the cessation of suffering, and the truth of the path leading to the cessation of suffering.

• These truths explain the cycle of birth, death, and rebirth (samsara) and how one can escape it.

• Bodhi Tree

• The Bodhi Tree under which Gautama Buddha attained Enlightenment is a sacred fig tree (Ficus religiosa).

• It is considered a major pilgrimage site for Buddhists and is located in the Mahabodhi Temple complex in Bodh Gaya.

• Nirvana

• Nirvana is a state of liberation and freedom from the cycle of birth and rebirth.

• It is achieved by understanding the true nature of reality, breaking free from desires, and following the Eightfold Path.

• Eightfold Path

• The Eightfold Path is a set of practices that lead to liberation, including right view, right intention, right speech, right action, right livelihood, right effort, right mindfulness, and right concentration.

• It serves as the practical guide for ethical conduct, mental discipline, and wisdom in Buddhism.

Q11. Answer: (b) 1857

The correct answer is 1857.

Key Points

• The uprising of 1857, also known as the First War of Indian Independence, was a major rebellion against the British East India Company.

• The revolt began on 10 May 1857 in Meerut and quickly spread across northern and central India.

• It was fueled by widespread resentment against British policies, including the Doctrine of Lapse and exploitation of Indian resources.

• Key leaders of the revolt included Rani Lakshmibai, Bahadur Shah II, Tantia Tope, and Nana Sahib.

• The rebellion ended in 1858 with the British re-establishing control, marking the end of the East India Company's rule and the beginning of direct British governance under the Crown.

Additional Information

• Doctrine of Lapse:

• Introduced by Lord Dalhousie, it allowed the British to annex states where rulers died without a male heir.

• It led to the annexation of several princely states, including Satara, Jhansi, and Nagpur, causing widespread resentment.

• Causes of the Revolt:

• Economic exploitation and heavy taxation by the British.

• Religious and cultural interference, including the introduction of laws like the abolition of Sati.

• The introduction of the Enfield rifle, which required soldiers to bite cartridges greased with cow and pig fat, offending both Hindu and Muslim religious sentiments.

• Key Events:

• The rebellion started in Meerut and spread to major cities such as Delhi, Kanpur, and Lucknow.

• The siege of Delhi and the capture of Bahadur Shah II marked significant moments during the revolt.

• Impact of the Revolt:

• The British Crown took over direct control of India from the East India Company in 1858.

• The Government of India Act 1858 established the office of the Secretary of State for India.

• It marked the beginning of organized resistance against British rule in India, eventually leading to independence movements.

Q12. Answer: (a) 14

The correct answer is 14.

Key Points

• The human face skeleton is composed of 14 facial bones that form the structure of the face.

• These bones include the paired bones (maxillae, palatine, zygomatic, nasal, lacrimal, and inferior nasal conchae) and the unpaired bones (vomer and mandible).

• The mandible (lower jaw) is the only movable facial bone, while the others are fused together by sutures.

• The facial bones contribute to the formation of the eye sockets, nasal cavity, and oral cavity, playing a key role in protection and support of sensory organs.

• Facial bones begin developing during early embryonic stages and undergo ossification processes until maturity.

Additional Information

• Types of Facial Bones:

• Paired bones: Maxilla, zygomatic, nasal, lacrimal, palatine, inferior nasal conchae.

• Unpaired bones: Mandible and vomer.

• Functions of Facial Bones:

• Provide structural support for the face.

• Protect key sensory organs such as the eyes, nose, and tongue.

• Facilitate functions like breathing, chewing, and speaking.

• Ossification of Facial Bones:

• Most facial bones are formed through intramembranous ossification, except for the mandible, which also involves endochondral ossification.

• The development of facial bones continues until late adolescence or early adulthood.

• Common Disorders Associated with Facial Bones:

• Fractures due to trauma, affecting structures like the mandible or zygomatic bone.

• Congenital anomalies such as cleft palate or craniofacial syndromes.

Q13. Answer: (a) Safety & Well-being Crucial for Viksit Bharat

The correct answer is Safety & Well-being Crucial for Viksit Bharat.

Key Points

• The theme for National Safety Day 2025, observed on 4th March 2025, was "Safety & Well-being Crucial for Viksit Bharat."

• The theme emphasizes the importance of safety and well-being as foundational pillars for building a developed and prosperous India.

• National Safety Day is organized annually by the National Safety Council (NSC) of India, established in 1966 by the Ministry of Labour and Employment.

• The day aims to raise awareness regarding workplace safety, road safety, and environmental protection among the Indian public.

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• It serves as a platform to engage industries, organizations, and individuals in adopting best practices for safety and health.

Additional Information

• National Safety Council (NSC)

• The National Safety Council was established in 1966 as a non-profit, autonomous body under the Ministry of Labour and Employment.

• The council works to promote voluntary compliance with safety, health, and environmental standards in industries.

• It provides training, consultancy, and resources to enhance workplace safety and health.

• Purpose of National Safety Day

• The day focuses on creating awareness about safety measures for reducing accidents and injuries across different sectors.

• It encourages organizations to adopt robust safety systems and inculcate a safety-first culture among employees.

• Workplace Safety in India

• Industries such as construction, manufacturing, and chemicals are particularly vulnerable to workplace accidents.

• Regulations like the Factories Act, 1948, and the Occupational Safety, Health, and Working Conditions Code, 2020, play a key role in ensuring safety standards.

• Road Safety in India

• India ranks among the highest in the world for road accidents, with over 1.5 lakh fatalities annually.

• Initiatives like the Motor Vehicles (Amendment) Act, 2019, aim to reduce accidents by implementing stricter penalties and enforcement measures.

Q14. Answer: (d) Punjab, Andhra Pradesh and Tamil Nadu

The correct answer is Punjab, Andhra Pradesh and Tamil Nadu.

Key Points

• The Green Revolution in India began in the mid-1960s to address food security through the introduction of High Yielding Variety (HYV) seeds.

• In its first phase, the use of HYV seeds was concentrated in states with favorable irrigation facilities and financial resources, such as Punjab, Andhra Pradesh, and Tamil Nadu.

• Punjab emerged as the epicenter of the Green Revolution due to its advanced irrigation systems and agricultural infrastructure.

• States like Tamil Nadu and Andhra Pradesh also adopted HYV seeds, leveraging their fertile lands and irrigation networks.

• The success of the Green Revolution in these states significantly increased food grain production, contributing to India's self-sufficiency in food.

Additional Information

• High Yielding Variety (HYV) Seeds:

• HYV seeds are genetically modified to increase crop yield and are resistant to pests and diseases.

• The introduction of HYV seeds during the Green Revolution focused on crops like wheat, rice, and maize.

• Impact of the Green Revolution:

• India transitioned from a food-deficient country to one of the largest producers of food grains globally.

• The revolution led to increased use of chemical fertilizers, pesticides, and improved irrigation techniques.

• Challenges of the Green Revolution:

• It caused environmental issues such as soil degradation and water depletion due to excessive use of fertilizers and irrigation.

• Regional disparities emerged as states with better resources benefited more than others.

• Second Phase of Green Revolution:

• The second phase focused on spreading the benefits to other regions, including Eastern India.

• Efforts were made to diversify crops and introduce sustainable farming practices.

Q15. Answer: (b) Buffalo

The correct answer is Buffalo.

Key Points

• During the Later Vedic period, agricultural practices became more advanced, and specific animals were used for specialized tasks like ploughing land.

• The buffalo was particularly mentioned in texts as the preferred animal for ploughing swampy or marshy lands due to its strength and adaptability to wet conditions.

• Buffaloes were favored over cows or horses for such tasks because of their ability to navigate and work effectively in muddy terrains.

• References to buffaloes in agricultural contexts can be found in texts like the Satapatha Brahmana and other Later Vedic

literature.

Additional Information

• Later Vedic Period:

• The Later Vedic period spans from approximately 1000 BCE to 600 BCE.

• This period saw advancements in agriculture, trade, and the use of iron tools.

• Texts such as the Satapatha Brahmana and the Taittiriya Brahmana provide insights into agricultural practices during this era.

• Role of Animals in Agriculture:

• Animals like buffaloes, cows, and oxen were integral to agricultural activities in ancient India.

• Buffaloes were specifically used for ploughing swampy or wet lands due to their ability to thrive in muddy conditions.

• Cows and oxen were more commonly used for regular ploughing and transportation.

• Satapatha Brahmana:

• The Satapatha Brahmana is one of the significant texts of the Later Vedic period.

• It provides detailed descriptions of rituals, agriculture, and the socio-economic practices of the time.

• References to buffaloes being used in agriculture highlight their importance in swampy land cultivation.

• Iron Tools in Agriculture:

• The use of iron tools during the Later Vedic period enhanced agricultural efficiency.

• Iron ploughshares were particularly effective in turning soil for cultivation.

• These tools complemented the use of animals like buffaloes in agricultural tasks.

Q16. Answer: (d) 6th

The correct answer is 6th.

Key Points

• India ranks 6th globally in the Climate Risk Index 2025 for long-term impacts (1993–2022) caused by extreme weather events.

• The Climate Risk Index is published annually by Germanwatch, analyzing countries most affected by weather-related events such as storms, floods, and heatwaves.

• India has faced significant climate-induced challenges, including extreme monsoons, heatwaves, cyclones, and floods, impacting millions of lives and livelihoods.

• Countries are ranked based on metrics like fatalities, economic losses (in PPP terms), and the frequency of extreme weather events.

• India's vulnerability is heightened due to its geographical diversity and dependence on climate-sensitive sectors like agriculture.

Additional Information

• Climate Risk Index (CRI):

• The CRI evaluates and ranks countries based on their exposure and vulnerability to extreme weather events over time.

• It considers indicators such as fatalities, economic losses (absolute and relative), and the number of events.

• The report emphasizes the need for climate adaptation measures and disaster preparedness to minimize risks.

• India's Climate Challenges:

• India experiences recurrent heatwaves, floods, and cyclones, leading to loss of life and economic damage.

• The country is particularly vulnerable due to its dependence on monsoon rains for agriculture and water resources.

• Recent events such as Cyclone Fani (2019) and extreme rainfall in Uttarakhand highlight the urgency of climate resilience.

• Global Climate Risks:

• Developing nations, especially island states and countries in South Asia, are disproportionately affected by climate change.

• Wealthier nations often have better infrastructure and resources to mitigate the impacts of extreme weather.

• India's Climate Action:

• India is committed to its Nationally Determined Contributions (NDCs) under the Paris Agreement to reduce greenhouse gas emissions.

• Initiatives like the National Action Plan on Climate Change (NAPCC) focus on promoting renewable energy and sustainable development.

• Programs such as State Action Plans on Climate Change aim to address region-specific vulnerabilities.

Q17. Answer: (a) Madras

The correct answer is Madras.

Key Points

• Andhra Pradesh was formed on 1 October 1953, becoming the first state in India to be created on a linguistic basis.

• The state was carved out from the Madras State (now Tamil Nadu), with Kurnool as its capital at the time.

• The demand for a separate Telugu-speaking state arose due to cultural and linguistic differences between Telugu and Tamil speakers in the Madras State.

• The creation of Andhra Pradesh was based on the recommendations of the States Reorganization Commission (SRC), set up in 1953.

• Prominent leaders like Potti Sriramulu played a crucial role in the formation of Andhra Pradesh, even sacrificing his life through a hunger strike to achieve the cause.

Additional Information

• States Reorganization Act, 1956:

• This act was passed to reorganize India's states and territories based on linguistic and cultural lines.

• It came into effect on 1 November 1956 and played a significant role in reshaping the political map of India.

• Potti Sriramulu's Contribution:

• Potti Sriramulu, a Gandhian, protested for the formation of a separate Andhra state by undertaking a hunger strike.

• He died after fasting for 58 days in 1952, which intensified the demand for Andhra Pradesh.

• Madras State:

• The Madras State, created after independence, included Tamil, Telugu, Kannada, and Malayalam-speaking regions.

• After Andhra Pradesh was carved out, the remaining part of Madras State was renamed Tamil Nadu in 1969.

• Creation of Linguistic States:

• The success of Andhra Pradesh's formation on linguistic grounds paved the way for other linguistic states in India.

• States like Karnataka, Kerala, and Maharashtra were also reorganized subsequently.

Q18. Answer: (c) Maharashtra

The correct answer is Maharashtra.

Key Points

• The Koyna Project is constructed on the Koyna River, which is a major tributary of the Krishna River.

• The project is located in the state of Maharashtra, India.

• The Koyna Dam, a part of this project, is one of the largest dams in Maharashtra and plays a significant role in hydroelectric power generation.

• The hydroelectric project has a total installed capacity of 1,960 MW, making it a crucial source of renewable energy in the state.

• The Koyna River originates in the Western Ghats near Mahabaleshwar in Maharashtra.

Additional Information

• Koyna River:

• The Koyna River is a key tributary of the Krishna River, which is one of the largest rivers in peninsular India.

• It originates in the Western Ghats and flows through Maharashtra before joining the Krishna River.

• Koyna Dam:

• The Koyna Dam is a rubble-concrete dam constructed on the Koyna River in Satara district, Maharashtra.

• It was constructed in 1964 and is designed primarily for hydroelectric power generation and irrigation.

• The dam has been instrumental in mitigating floods and supporting agriculture in the region.

• Krishna River:

• The Krishna River is the fourth-largest river in India, flowing through Maharashtra, Karnataka, Telangana, and Andhra Pradesh.

• It is a lifeline for agriculture and drinking water supply in these states.

• Western Ghats:

• The Western Ghats, a UNESCO World Heritage site, are a mountain range that runs parallel to the western coast of India.

• The range is known for its rich biodiversity and is the origin of many rivers, including the Koyna.

Q19. Answer: (d) High-Power Radars (HPR)

The correct answer is High-Power Radars (HPR).

Key Points

• The Rs. 5,700-crore contract signed in March 2024 involves deploying advanced High-Power Radars (HPR) to bolster India's air defence capabilities.

• HPR systems are designed to detect and track aerial threats at long ranges, including aircraft, missiles, and drones, ensuring early warning and response capabilities.

• The radars feature advanced technologies like phased array antennas and adaptive signal processing to enhance detection

accuracy and reliability.

• High-Power Radars play a critical role in modern air defence systems by integrating with command and control centres for real-time situational awareness.

• India’s defence modernization program emphasizes indigenization, and the HPR systems are expected to include significant contributions from domestic manufacturers under the "Make in India" initiative.

Additional Information

• Phased Array Radar Technology:

• Phased array radars use multiple antennas to steer the radar beam electronically rather than mechanically.

• This technology enables faster tracking and detection of multiple targets simultaneously.

• Adaptive Signal Processing:

• Adaptive signal processing reduces interference and enhances the ability to distinguish between genuine targets and false alarms.

• This is particularly important in environments with high electromagnetic interference.

• Role in Air Defence:

• High-Power Radars serve as the backbone of air defence networks, providing early warning against aerial threats.

• They are integrated with missile systems and fighter aircraft for coordinated responses to hostile actions.

• India’s Defence Indigenization Efforts:

• Under the "Make in India" initiative, India aims to reduce reliance on imports and promote domestic production of high-tech defence equipment.

• Several radar systems for the Indian armed forces are being developed and manufactured by DRDO and Indian private companies.

Q20. Answer: (a) Right to Property

The correct answer is Right to Property.

Key Points

• The 44th Amendment Act of 1978 removed the Right to Property from the list of Fundamental Rights in the Indian Constitution.

• Before the amendment, the Right to Property was enshrined under Article 19(1)(f) and Article 31.

• Post the amendment, the Right to Property was made a legal right under Article 300A of the Constitution.

• The change was implemented to address challenges related to land acquisition for developmental purposes and to reduce litigation.

• The Right to Property is no longer enforceable through writ petitions, unlike Fundamental Rights.

Additional Information

• Fundamental Rights:

• Fundamental Rights are enshrined in Part III of the Indian Constitution, providing essential rights to citizens.

• They include rights such as Equality, Freedom, Protection against exploitation, Freedom of religion, Cultural and educational rights, and Constitutional remedies.

• These rights are enforceable by courts and protect citizens against arbitrary actions by the state.

• Article 300A:

• It states that no person shall be deprived of their property except by authority of law.

• Article 300A falls under Part XII of the Indian Constitution.

• The Right to Property is now a statutory right, meaning it can be regulated by legislation.

• 44th Amendment Act, 1978:

• This amendment was introduced under the leadership of Prime Minister Morarji Desai.

• It aimed to balance individual rights with public welfare and economic development.

• Alongside the removal of the Right to Property, it also introduced safeguards against misuse of emergency powers.

• Comparison with Fundamental Rights:

• Unlike Fundamental Rights, legal rights like the Right to Property cannot be challenged directly in the Supreme Court through writ petitions.

• Legal rights are subject to regulation and limitation by the legislature.

Q21. Answer: (b) Sanjay Malhotra

The correct answer is Sanjay Malhotra.

Key Points

• Sanjay Malhotra (born 14 February 1968) is an Indian bureaucrat and IAS officer who is serving as the current and 26th

Governor of the Reserve Bank of India since 11 December 2024.

• He is an IAS Officer of the 1990 Batch Rajasthan Cadre, and has served in various positions throughout his career.

• In February 2022, he was appointed Secretary of Financial Services in the Ministry of Finance and during his time in the position, he launched the initial public offering of the Life Insurance Corporation and was also a member of the board of the Reserve Bank of India (RBI).

Additional Information

• Sanjay Malhotra:

• Shaktikanta Das has served as the Governor of the Reserve Bank of India (RBI) since December 12, 2018.

• He is a retired Indian Administrative Service (IAS) officer of the 1980 batch from the Tamil Nadu cadre.

• Shaktikanta Das has played a pivotal role in steering India's monetary policy and ensuring financial stability in the country.

• He has previously served as the Secretary of the Department of Economic Affairs, where he was instrumental in implementing key economic reforms such as the Goods and Services Tax (GST).

• Under his leadership, RBI has adopted policies focused on inflation targeting, digital banking expansion, and ensuring adequate liquidity in the financial system.

• He was reappointed for a second term, reflecting the confidence of policymakers in his leadership and contributions to the Indian economy.

• Raghuram Rajan:

• Raghuram Rajan served as the 23rd Governor of the Reserve Bank of India from September 2013 to September 2016.

• He is a renowned economist and former Chief Economist at the International Monetary Fund (IMF).

• Rajan is well-known for his warnings about the 2008 financial crisis and his contributions to India's banking reforms during his tenure.

• He is currently a professor at the University of Chicago Booth School of Business.

• Urjit Patel:

• Urjit Patel served as the 24th Governor of the Reserve Bank of India from September 2016 to December 2018.

• He succeeded Raghuram Rajan and was known for his emphasis on inflation targeting and monetary policy reforms.

• Patel resigned from his post citing personal reasons, and his tenure was marked by significant challenges, including demonetization and liquidity management.

• Reserve Bank of India (RBI):

• The RBI is the central bank of India, established on April 1, 1935, under the Reserve Bank of India Act, 1934.

• It regulates the issuance and supply of the Indian rupee and ensures the stability of the financial system.

• The RBI is responsible for monetary policy formulation, foreign exchange management, and oversight of banking operations in India.

• The Governor of the RBI is the chief executive of the central bank and plays a key role in shaping economic policies.

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Q22. Answer: (c) Digital trade and e-comm

The correct answer is Digital trade and e-comm.

Key Points

• The UK–India Free Trade Agreement (FTA) signed on 6 May 2025 focuses on boosting bilateral trade and investments in key sectors, including digital trade and e-commerce.

• The agreement aims to reduce barriers to digital trade, enabling smoother cross-border data flows and improved regulatory cooperation.

• The inclusion of e-commerce provisions highlights the growing importance of online platforms and digital services in global trade.

• This FTA marks a significant step in strengthening economic ties between the UK and India, particularly in technology-driven sectors.

• By prioritizing digital trade, the agreement seeks to promote innovation, create job opportunities, and enhance digital connectivity between the two countries.

Additional Information

• Digital Trade

• Refers to trade in goods and services that are digitally ordered and/or delivered.

• It includes areas such as cross-border data flows, e-commerce, cybersecurity, intellectual property, and consumer protection in the digital space.

• E-commerce

• E-commerce refers to the buying and selling of goods and services via electronic networks, primarily the internet.

• The FTA provisions aim to reduce barriers such as tariffs, customs delays, and data localization requirements in the e-commerce sector.
• Data Localization
• The practice of storing data within the borders of the country where it is generated.
• Data localization policies often impact digital trade, and FTAs may negotiate terms to ensure freer cross-border data flows.
• Impact of UK–India FTA
• The agreement is expected to boost bilateral trade, which stood at approximately $36 billion in 2023, by reducing trade barriers and fostering collaboration in key sectors.
• It is anticipated to create new business opportunities and strengthen economic ties between the two nations.

Q23. Answer: (c) Select the file → Press F2 or click once on the name → Type new name → Press Enter

The correct answer is Select the file → Press F2 or click once on the name → Type new name → Press Enter.

Key Points

• Renaming a file or folder using the left mouse button is a straightforward process on most operating systems like Windows.
• The correct method involves selecting the file, pressing F2 or clicking once on the file name, typing the new name, and pressing Enter.
• Using the F2 key is a universal shortcut in Windows for renaming files, offering a quick alternative to mouse-based actions.
• Clicking once on the file name allows users to edit it directly without requiring additional tools or applications.
• This method avoids unnecessary steps and ensures a user-friendly approach to file management.

Additional Information

• File Management Shortcuts:
• Ctrl + C: Copy selected file or folder.
• Ctrl + X: Cut selected file or folder.
• Ctrl + V: Paste the copied or cut file or folder.
• Ctrl + Z: Undo the last action.
• Delete: Move file or folder to the Recycle Bin.
• Common Naming Rules:
• File names should not exceed 255 characters in most operating systems.
• Reserved characters such as / \ : * ? " < > | cannot be used in file names.
• File names are case-insensitive in Windows but case-sensitive in Linux.
• Renaming Files in Bulk:
• Bulk renaming tools such as PowerToys or Bulk Rename Utility can rename multiple files simultaneously.
• These tools allow users to apply patterns, add prefixes or suffixes, and much more.
• Keyboard Accessibility:
• Keyboard shortcuts like F2 are crucial for users with limited mobility or those who prefer not to use a mouse.
• They improve productivity and offer a faster way of performing tasks.

Q24. Answer: (d) 10,000m race

The correct answer is 10,000m race.

Key Points

• Gulveer Singh broke his own national record in the 10,000m race at The Ten 2025 athletics meet held in San Juan Capistrano, USA.
• He clocked an impressive time of 27 minutes and 50.28 seconds, surpassing his previous best.
• The 10,000m race is a long-distance track event, consisting of 25 laps on a standard 400m track.
• Gulveer Singh is one of India's promising long-distance runners, known for his consistent performance on the global stage.
• This achievement further cements his place as a key figure in Indian athletics, inspiring future athletes.

Additional Information

• 10,000m race:
• It is a long-distance running event that is part of both the Olympic Games and World Championships.
• Competitors need exceptional endurance, pacing strategies, and mental strength to excel in this event.
• The world record for men is held by Joshua Cheptegei of Uganda with a time of 26:11.00 (as of October 2023).
• Gulveer Singh:
• An emerging Indian long-distance runner specializing in 5,000m and 10,000m events.

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• He has been representing India in various international athletics competitions, showcasing consistent improvement.
• San Juan Capistrano:
• A city located in California, USA, known for hosting major athletics meets like "The Ten."
• The Ten is a prestigious meet that attracts elite long-distance runners from across the world.
• Training for Long-Distance Running:
• Focuses on building aerobic endurance, speed work, and strength training to enhance performance.
• Proper nutrition, hydration, and recovery are essential for success in long-distance events.

Q25. Answer: (c) Nebular Hypothesis

The correct answer is Nebular Hypothesis.

Key Points

• The Nebular Hypothesis was first proposed by Immanuel Kant in 1755 and further developed by Pierre-Simon Laplace in 1796.
• This theory suggests that planets formed from a rotating cloud of gas and dust, called a solar nebula, around the young Sun.
• Gravity caused the nebula to collapse and spin faster, forming a central protostar (the Sun) and a surrounding disk where planets formed.
• It explains the flat, disk-like structure of the solar system and the uniform direction of planetary orbits.
• Modern evidence supporting the Nebular Hypothesis includes observations of protoplanetary disks around young stars.

Additional Information

• Solar Nebula:
• The solar nebula is a vast rotating cloud of gas and dust from which the Sun and planets formed.
• It primarily consisted of hydrogen, helium, and trace elements, which later condensed into planetary bodies.
• Protoplanetary Disk:
• This is the flat, rotating disk of material surrounding a protostar where planets and other celestial bodies form.
• Such disks are often observed around young stars, supporting the Nebular Hypothesis.
• Accretion:
• Accretion refers to the process by which particles in the protoplanetary disk collide and stick together, forming larger bodies like planets.
• Over time, gravity pulls these bodies together to form fully-fledged planets.
• Modern Observations:
• Telescopes like the Hubble Space Telescope have captured images of protoplanetary disks around young stars.
• These observations provide direct evidence of the processes described by the Nebular Hypothesis.

Q26. Answer: (d) It is no longer a fundamental right.

The correct answer is It is no longer a fundamental right..

Key Points

• The Right to Property was initially a fundamental right under Article 31 of the Indian Constitution.
• It was removed as a fundamental right by the 44th Constitutional Amendment Act, 1978 and is now a legal right under Article 300A.
• Article 300A states that no person shall be deprived of his property except by authority of law.
• This change was made to balance individual rights with the State's authority to implement social and economic reforms.
• Hence, the Right to Property is no longer a fundamental right but a constitutional/legal right in India.

Additional Information

• 44th Constitutional Amendment Act:
• This amendment was enacted in 1978 during the Janata Party government to revise the changes made during the Emergency period.
• It abolished the Right to Property as a fundamental right and moved it to Part XII of the Constitution under Article 300A.
• Distinction Between Fundamental Rights and Legal Rights:
• Fundamental rights are enforceable by the courts, while legal rights are protected by ordinary laws of the land.
• Violation of fundamental rights allows individuals to directly approach the Supreme Court, but legal rights are enforced through regular judicial processes.
• Objective of the Change:
• The removal of the Right to Property from fundamental rights ensured that the government could acquire land for public purposes without facing major legal hurdles.

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• This allowed the State to implement land reforms and promote social justice.

• Current Status of the Right to Property:

• It is now a constitutional right under Article 300A and provides protection against arbitrary deprivation of property by the State.

• The State can acquire private property only by following due process and paying fair compensation.

Q27. Answer: (b) Dr. Jitendra Singh

The correct answer is Dr. Jitendra Singh.

Key Points

• In 2025, Dr. Jitendra Singh, the Union Minister of State (Independent Charge) for Science & Technology, launched 'Srjanam', India's first indigenous automated biomedical waste treatment plant.

• The plant was designed to manage and dispose of biomedical waste efficiently, in compliance with environmental standards.

• 'Srjanam' integrates cutting-edge technology to ensure safe and eco-friendly waste disposal processes, reducing the risk of contamination and pollution.

• Developed under the "Make in India" initiative, it highlights India's capability in innovating sustainable solutions for healthcare waste management.

• This automated plant is expected to contribute significantly to addressing the growing challenge of biomedical waste disposal in hospitals and healthcare facilities across India.

Additional Information

• Biomedical Waste Management:

• Biomedical waste refers to any waste that is generated during the diagnosis, treatment, or immunization of humans or animals.

• Improper disposal of biomedical waste can lead to severe environmental and health hazards, including the spread of infections and diseases.

• India's Biomedical Waste Management Rules, 2016, mandate proper segregation, collection, and disposal of biomedical waste.

• Make in India Initiative:

• Launched in 2014, this initiative aims to encourage companies to manufacture their products in India and boost domestic innovation.

• It focuses on 25 sectors, including healthcare, to transform India into a global manufacturing hub.

• Environmental Impact of Biomedical Waste:

• Improper handling of biomedical waste can lead to contamination of water, soil, and air.

• Automated waste treatment plants like 'Srjanam' ensure proper disposal and minimize environmental impact.

• Technological Advancements in Waste Management:

• Automated waste treatment plants use advanced technologies such as incineration, autoclaving, and microwave treatment to manage waste effectively.

• These technologies reduce manual intervention, thereby lowering the risk of human exposure to hazardous waste.

Q28. Answer: (d) Adenosine deaminase

The correct answer is Adenosine deaminase.

Key Points

• The first human gene therapy experiment in September 1990 targeted Adenosine deaminase (ADA) deficiency, a rare genetic disorder that affects the immune system.

• ADA deficiency leads to Severe Combined Immunodeficiency (SCID), where patients are highly vulnerable to infections due to an impaired immune system.

• The therapy involved the use of a retroviral vector to introduce a functional ADA gene into the patient's T-cells.

• This pioneering procedure was conducted at the National Institutes of Health (NIH), marking a significant milestone in genetic medicine.

• The treatment aimed to restore partial immune function by enabling the production of the ADA enzyme in the modified cells.

Additional Information

• Severe Combined Immunodeficiency (SCID):

• SCID is a group of rare genetic disorders characterized by the absence of functional T and B lymphocytes, making the body unable to fight infections.

• ADA deficiency is one of the causes of SCID, resulting from mutations in the ADA gene.

• Without treatment, SCID is fatal in infancy due to severe infections.

• Retroviral Vectors:

• Retroviral vectors are tools used in gene therapy to deliver genetic material into host cells.

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• They are derived from retroviruses and modified to remove pathogenic elements while retaining their ability to integrate genes into the host genome.
• Gene Therapy:
• Gene therapy is a technique that modifies or replaces defective genes to treat or prevent diseases.
• It holds promise for curing genetic disorders, cancers, and certain chronic conditions.
• Adenosine Deaminase:
• ADA is an enzyme involved in purine metabolism, crucial for the survival and function of lymphocytes.
• A deficiency of ADA leads to the accumulation of toxic metabolites, causing immune system failure.

Q29. Answer: (b) 2015

The correct answer is 2015.

Key Points

• The 2030 Agenda for Sustainable Development was adopted by all United Nations Member States on 25 September 2015.
• It provides a shared blueprint for peace and prosperity for people and the planet, now and into the future.
• This agenda includes 17 Sustainable Development Goals (SDGs), which are an urgent call to action for all countries.
• The SDGs aim to address global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice.
• Implementation of the agenda is a collective responsibility, emphasizing partnerships between governments, businesses, civil society, and individuals.

Additional Information

• Sustainable Development Goals (SDGs):
• The SDGs consist of 17 goals and 169 targets, addressing issues such as poverty eradication, quality education, gender equality, and climate action.
• They replace the Millennium Development Goals (MDGs), which were operational from 2000 to 2015.
• Key Principles of the 2030 Agenda:
• The agenda emphasizes universality, integration, and leaving no one behind.
• It aims to balance the three dimensions of sustainable development: economic, social, and environmental.
• Partnerships for the Goals:
• SDG 17 focuses on strengthening partnerships globally to achieve the goals.
• It includes commitments to financial, technological, and capacity-building support for developing nations.
• Monitoring and Reporting:
• Each country is encouraged to conduct regular reviews of progress toward the SDGs, known as Voluntary National Reviews (VNRs).
• The United Nations High-Level Political Forum (HLPF) serves as the central platform for reviewing the agenda's implementation.

Q30. Answer: (c) 20-50 years

The correct answer is 20-50 years.

Key Points

• The Retired Sportsperson Empowerment Training (RESET) Programme is designed to assist retired athletes in transitioning to new career opportunities.
• As of December 2024, eligible participants must be between 20-50 years of age.
• The programme focuses on providing training and skill development to retired sportspersons across various domains.
• RESET aims to ensure retired athletes receive adequate support for financial stability and professional growth post their sports career.
• Eligibility criteria also include proof of retirement status and records of active participation in sports at recognized levels.

Additional Information

• Skill Development Programmes:
• These programmes aim to equip individuals with vocational and technical skills for enhancing employability.
• RESET is one of the initiatives focusing on sportspersons to help them adapt to non-sports careers.
• Support for Retired Athletes:
• Globally, retired athletes often face challenges in transitioning to post-retirement life.
• Programmes like RESET ensure they receive psychological and career counselling alongside skill development.
• Age Criteria in Programmes:

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• Age eligibility in empowerment programmes is often designed to cater to individuals in their most productive years.
• The RESET programme's age range of 20-50 years aligns with the working age group recognized internationally.
• Career Transition Models:
• Such models are employed globally to enable athletes to shift their focus from sports to professional careers.
• RESET's focus is on providing structured support systems for retired sportspersons.

Q31. Answer: (c) ΔG < 0

The correct answer is ΔG < 0.

Key Points

• For a spontaneous process at constant temperature and pressure, the Gibbs free energy change (ΔG) must be negative (ΔG < 0).
• A negative ΔG indicates that the process releases free energy, making it thermodynamically favorable.
• Spontaneity depends on the balance of enthalpy change (ΔH) and entropy change (ΔS) as described by the equation: ΔG = ΔH - TΔS.
• When ΔG is zero (ΔG = 0), the system is at equilibrium, and no net change occurs.
• If ΔG is positive (ΔG > 0), the process is non-spontaneous and requires external energy to proceed.

Additional Information

• Gibbs Free Energy (ΔG):
• It is a thermodynamic potential that predicts whether a process will occur spontaneously under constant temperature and pressure.
• The formula is: ΔG = ΔH - TΔS, where T is the absolute temperature in Kelvin.
• Spontaneous Process:
• A process that occurs naturally without needing external energy input.
• Examples include ice melting at room temperature and diffusion of gases.
• Entropy (ΔS):
• It measures the disorder or randomness of a system.
• An increase in entropy (ΔS > 0) generally favors spontaneity.
• Enthalpy (ΔH):
• It represents the heat content of a system.
• A negative enthalpy change (ΔH < 0) suggests an exothermic reaction, which often supports spontaneity.
• Temperature and Spontaneity:
• Temperature plays a crucial role in determining spontaneity, as seen in the ΔG equation.
• Processes with positive ΔH and ΔS might become spontaneous at higher temperatures.

Q32. Answer: (c) 40

The correct answer is 56.

Key Points

• The C295 aircraft is a tactical transport aircraft designed for military operations and humanitarian missions.
• The agreement for manufacturing 56 C295 aircraft in India was signed between the Ministry of Defence and Airbus Defence and Space.
• Out of the 56 aircraft, 16 will be delivered in a flyaway condition by Airbus, while the remaining 40 will be manufactured indigenously by Tata Advanced Systems Limited (TASL).
• This project is a significant step towards the government's "Make in India" initiative in the defence sector.
• The C295 aircraft will replace the aging fleet of Indian Air Force's Avro aircraft and strengthen India's airlift capabilities.

Additional Information

• C295 Aircraft Specifications:
• The aircraft has a payload capacity of up to 9.25 tonnes and can accommodate 71 troops or 50 paratroopers.
• It is equipped with modern avionics and efficient engines for high performance in varied operational conditions.
• It can perform multi-role operations, including tactical transport, maritime patrol, and medical evacuation.
• Indigenous Manufacturing:
• The manufacturing facility set up by TASL will include assembly lines, structural assembly, and testing facilities.
• This marks the first time a private company will manufacture military aircraft in India.
• It is expected to generate thousands of jobs and bolster the Indian aerospace and defence ecosystem.

• Make in India Initiative:
• This program encourages investment in manufacturing and innovation within India.
• It aims to transform India into a global manufacturing hub.
• In the defence sector, it focuses on reducing dependence on imports and achieving self-reliance.
• Indian Air Force Modernization:
• The induction of C295 is part of broader modernization efforts by the IAF to replace outdated equipment.
• Other recent acquisitions include Rafale fighter jets and Apache helicopters.
• These developments aim to enhance operational readiness and strategic capabilities.

Q33. Answer: (c) Part XVI

The correct answer is Part XVI.

Key Points

• Part XVI of the Indian Constitution deals with special provisions for Scheduled Castes (SCs), Scheduled Tribes (STs), and other backward classes.
• The provisions ensure social justice and representation of these groups in legislative assemblies and parliamentary institutions.
• Articles 330 to 342 fall under Part XVI and include provisions for reservation of seats, special representation, and safeguards.
• This part also enables the President to specify the Scheduled Castes and Scheduled Tribes in different states and union territories.
• It aims to uplift marginalized communities and promote equality as enshrined in the Constitution.

Additional Information

• Article 330 and 332: These articles provide reservation of seats for Scheduled Castes and Scheduled Tribes in the Lok Sabha and State Legislative Assemblies respectively.
• Article 338: Establishes the National Commission for Scheduled Castes to investigate and monitor safeguards for SCs.
• Article 339: Empowers the Union Government to issue directives to states regarding the welfare of Scheduled Tribes.
• Article 342: Allows the President to specify the list of Scheduled Tribes for each state and union territory.
• Concept of Affirmative Action: Part XVI reflects India's commitment to affirmative action to ensure equitable representation and opportunities for historically disadvantaged communities.

Q34. Answer: (c) RAM loses its content when the computer is turned off, while ROM retains its data

The correct answer is RAM loses its content when the computer is turned off, while ROM retains its data.

Key Points

• RAM (Random Access Memory) is a volatile memory, which means it loses all stored data when the power is turned off.
• ROM (Read-Only Memory) is non-volatile memory, meaning it retains data even when the computer is powered off.
• RAM is used to store data that the CPU needs during program execution, providing fast and temporary access to data.
• ROM is used to store firmware or permanent instructions needed for the basic functioning of a computer, such as the system boot process.
• RAM is writable and can be overwritten as needed, while ROM is generally read-only or requires special processes to modify.

Additional Information

• Volatile Memory: Memory that requires power to retain stored data. RAM is an example of volatile memory.
• Non-Volatile Memory: Memory that retains data even when power is turned off. ROM, hard drives, and SSDs are examples of non-volatile memory.
• Firmware: A type of software permanently stored in ROM or similar non-volatile memory that provides low-level control for a device's hardware.
• Types of RAM: RAM can be further classified into DRAM (Dynamic RAM) and SRAM (Static RAM). DRAM is slower but cheaper, while SRAM is faster but more expensive.
• EPROM and EEPROM: Variants of ROM that can be erased and reprogrammed. EPROM uses ultraviolet light for erasure, while EEPROM is electrically erasable.

Q35. Answer: (a) Three years of legal practice experience

The correct answer is Three years of legal practice experience.

Key Points

• On 20 May 2025, the Supreme Court of India mandated a minimum of three years of legal practice experience for applicants aspiring to become Civil Judges (Junior Division).
• The decision aimed to ensure that candidates have sufficient exposure to practical legal proceedings and courtroom experience before assuming judicial responsibilities.

• This ruling aligns with the broader vision of enhancing judicial competence and accountability within the Indian judicial system.

• The court emphasized the importance of practical knowledge in addition to theoretical understanding for individuals entering the judicial services.

• This mandate addresses concerns regarding the readiness of young law graduates to handle the complexities of judicial work without prior field experience.

Additional Information

• Eligibility Criteria for Civil Judge (Junior Division):

• In addition to the legal practice experience, candidates must hold a degree in law (LLB) from a recognized university.

• They must also meet the age criteria, typically ranging from 21 to 35 years, subject to relaxation for reserved categories.

• Judicial Service Examination:

• The Civil Judge (Junior Division) post is typically filled through state-level judicial service examinations conducted by respective High Courts or Public Service Commissions.

• The exam generally includes three stages: Preliminary Examination, Mains Examination, and Personal Interview.

• Significance of Legal Practice Experience:

• Practical legal experience enhances a candidate's understanding of courtroom procedures, legal drafting, and case management.

• It prepares candidates to handle real-world legal challenges effectively, ensuring better delivery of justice.

• Supreme Court's Role in Judicial Reforms:

• The Supreme Court of India often plays a pivotal role in implementing reforms to ensure transparency, efficiency, and accountability in the judiciary.

• This decision is part of broader efforts to strengthen the judicial system and promote competent judicial officers.

Q36. Answer: (d) India

The correct answer is India.

Key Points

• India ranked 10th in the Climate Change Performance Index (CCPI) 2025, reflecting its efforts towards mitigating climate change.

• The report was released at the annual UN Climate Conference held in Baku, Azerbaijan.

• The Climate Change Performance Index evaluates 60 countries and the EU, which together account for more than 90% of global greenhouse gas emissions.

• India has been praised for its renewable energy policies, particularly its ambitious targets for solar and wind energy development.

• The ranking highlights India's commitment to international climate agreements like the Paris Accord and its efforts to transition toward a sustainable energy future.

Additional Information

• About the Climate Change Performance Index (CCPI):

• The CCPI is published annually by Germanwatch, NewClimate Institute, and the Climate Action Network.

• It assesses countries based on four categories: Greenhouse Gas Emissions, Renewable Energy, Energy Use, and Climate Policy.

• The index helps increase transparency in international climate politics and encourages nations to take stronger measures to combat climate change.

• India's Renewable Energy Initiatives:

• India has set a target of achieving 500 GW of non-fossil fuel-based capacity by 2030.

• The country is a global leader in solar energy production, with initiatives like the International Solar Alliance (ISA).

• Programs such as the National Solar Mission and wind energy projects have significantly contributed to renewable energy growth.

• UN Climate Conferences:

• The United Nations Framework Convention on Climate Change (UNFCCC) organizes annual conferences, also known as COP (Conference of Parties).

• The conferences aim to review the implementation of climate agreements and facilitate negotiations among member countries.

• Paris Agreement and India's Role:

• India is a signatory to the Paris Agreement, which aims to limit global warming to well below 2°C above pre-industrial levels.

• India has committed to reducing its emissions intensity by 33-35% by 2030 from 2005 levels.

Q37. Answer: (a) Indian Space Research Organization

The correct answer is Indian Space Research Organization (ISRO).

Key Points

• Indian Space Research Organization (ISRO) developed the 32-bit microprocessors named VIKRAM3201 and KALPANA3201 specifically for space applications.

• The microprocessors were designed to enhance computational capabilities for spacecraft systems, ensuring better reliability and performance during missions.

• These innovations align with ISRO's focus on indigenization and self-reliance in space technology development.

• ISRO has been at the forefront of developing cutting-edge technologies to support India's space exploration and satellite deployment programs.

• Both VIKRAM3201 and KALPANA3201 highlight India's progress in creating advanced microprocessors for critical applications.

Additional Information

• ISRO

• ISRO, established in 1969, is India’s national space agency under the Department of Space.

• Its headquarters is located in Bengaluru, Karnataka.

• ISRO is globally recognized for its cost-effective and innovative space missions, including Chandrayaan and Mangalyaan.

• It focuses on advancements in satellite technology, launch vehicles, and space exploration.

• Spacecraft Microprocessors

• Microprocessors are crucial for onboard computing in spacecraft to handle navigation, communication, and data processing.

• Indigenously developed microprocessors reduce dependency on foreign technologies and increase mission reliability.

• They are designed to withstand extreme space conditions like radiation and temperature variations.

• Notable ISRO Missions

• Chandrayaan-3: India’s third lunar exploration mission, launched in 2023, successfully landed on the Moon’s south pole.

• Mangalyaan (Mars Orbiter Mission): Launched in 2013, it made India the first country to reach Mars in its maiden attempt.

• PSLV: ISRO’s Polar Satellite Launch Vehicle is renowned for its versatility and success in deploying satellites.

• Indigenization in Space Technology

• Indigenization ensures self-reliance and reduces costs in developing technology for space missions.

• ISRO has developed indigenous components like navigation systems, satellites, and launch vehicles.

• It emphasizes collaboration with local industries and academic institutions for research and development.

Q38. Answer: (b) 2017

The correct answer is 2017.

Key Points

• The Bharatmala Pariyojana was approved by the Government of India in October 2017 to enhance road infrastructure across the country.

• The scheme aims to improve connectivity for economic corridors, border and international connectivity roads, coastal and port connectivity roads, and expressways.

• A total road network of approximately 34,800 km has been proposed under this ambitious project.

• The Bharatmala Pariyojana is expected to reduce logistics costs, boost freight transportation, and improve travel efficiency.

• It is being implemented by the Ministry of Road Transport and Highways and is regarded as India’s largest road development initiative after the Golden Quadrilateral project.

Additional Information

• Objective: Bharatmala Pariyojana is focused on optimizing the efficiency of freight and passenger movement by bridging critical infrastructure gaps through the construction of highways and expressways.

• Key Features: The project includes the construction of economic corridors, feeder routes, national corridors, and coastal roads to ensure comprehensive connectivity.

• Funding: The Bharatmala Pariyojana is estimated to cost Rs. 5.35 lakh crore, with funding sourced from budgetary allocation, toll collections, market borrowing, and private investments.

• Implementation: The project is being executed in phases. Phase I aims to develop 24,800 km of road infrastructure by 2022.

• Impact: The scheme is expected to reduce travel time, enhance economic development, improve national integration, and create job opportunities in the construction and transport sectors.

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Q39. Answer: (c) Services sector

The correct answer is Services sector.

Key Points

• The services sector emerged as the key driver of India's GDP growth after the economic reforms of 1991, contributing significantly to national income.

• Key areas of growth within the services sector included IT and software services, telecommunications, banking, and financial services.

• The liberalization policies, including reduced government control, foreign investment encouragement, and privatization, catalyzed growth in this sector.

• As per government reports, the services sector accounted for more than 50% of India's GDP by the early 2000s and continues to dominate India's economic structure.

• India became a global hub for IT outsourcing and software services, with companies like Infosys, TCS, and Wipro leading the charge in international markets.

Additional Information

• Economic Reforms of 1991:

• India's economic liberalization in 1991 included measures like reducing trade barriers, deregulation, and privatization of public sector enterprises.

• The reforms aimed to address the balance-of-payments crisis and to integrate India into the global economy.

• Contribution of IT Sector:

• The IT industry became a significant contributor to India's GDP, exports, and employment post-1991.

• Indian IT companies capitalized on cost advantages, skilled manpower, and English proficiency to become global leaders.

• Impact of Foreign Direct Investment (FDI):

• FDI inflow increased significantly after the reforms, especially in sectors like telecommunications, retail, and IT services.

• FDI played a crucial role in infrastructure development and boosting service industries.

• Services Sector Overview:

• The services sector encompasses industries such as IT, healthcare, education, banking, finance, and entertainment.

• It is characterized by high value addition, lower resource dependency compared to agriculture and manufacturing, and global competitiveness.

Q40. Answer: (a) Nilgiri Biosphere Reserve

The correct answer is Nilgiri Biosphere Reserve.

Key Points

• The Mudumalai National Park is located in the state of Tamil Nadu and shares borders with Kerala and Karnataka.

• It is part of the Nilgiri Biosphere Reserve, which is the first biosphere reserve in India, established in 1986.

• The Nilgiri Biosphere Reserve spans across Tamil Nadu, Kerala, and Karnataka and covers an area of 5,520 square kilometers.

• It is recognized under the UNESCO Man and Biosphere (MAB) Programme for its rich biodiversity and conservation efforts.

• Key species found in the Mudumalai National Park include Bengal tigers, Indian elephants, leopards, and gaur (Indian bison).

Additional Information

• Biosphere Reserves

• Biosphere reserves are areas designated to promote the conservation of biodiversity, sustainable development, and research.

• India has 19 biosphere reserves, of which 11 are part of the UNESCO MAB Programme.

• Nilgiri Biosphere Reserve

• It is home to diverse ecosystems including tropical forests, montane forests, and grasslands.

• The reserve supports numerous endangered species such as the Nilgiri tahr and lion-tailed macaque.

• UNESCO MAB Programme

• Launched in 1971, it focuses on the sustainable use and conservation of natural resources.

• Biosphere reserves under the programme aim to harmonize biodiversity conservation with human activity.

• Geographical Importance

• The Nilgiri Biosphere Reserve is situated in the Western Ghats, a globally recognized biodiversity hotspot.

• It plays a crucial role in regulating the climate and water cycles of southern India.

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Q41. Answer: (d) 45

Shortcut Trick

Total weight of all 3 persons = 45 × 3 = 135 kg

Sum of the weights of the two pairs = (44 × 2) + (46 × 2) = 88 + 92 = 180 kg

Since Akshay is counted twice in the two pairs, his weight is the overlap amount.

Weight of Akshay = Sum of pairs − Total weight of all three

Weight of Akshay = 180 − 135 = 45 kg

Therefore The correct answer is 45 kg.

Alternate Method

Given:

Average weight of Gopal, Akshay, and Atul = 45 kg

Average weight of Gopal and Akshay = 44 kg

Average weight of Akshay and Atul = 46 kg

Gopal + Akshay = 88 kg

Akshay + Atul = 92 kg

Gopal

Akshay

Atul

Total Weight = 135 kg

Formula Used:

Total Sum = Average × Number of items

Calculations:

=> Total weight of all 3 = 45 × 3 = 135 kg ... (Equation 1)

=> Total weight of Gopal + Akshay = 44 × 2 = 88 kg ... (Equation 2)

=> Total weight of Akshay + Atul = 46 × 2 = 92 kg ... (Equation 3)

Adding Equation 2 and Equation 3 gives the combined sum where Akshay is counted twice:

=> (Gopal + Akshay) + (Akshay + Atul) = 88 + 92

=> Gopal + 2 × Akshay + Atul = 180 kg

Subtract Equation 1 from this combined sum to find Akshay's weight:

=> Akshay = (Gopal + 2 × Akshay + Atul) − (Gopal + Akshay + Atul)

=> Akshay = 180 − 135 = 45 kg

Therefore The correct answer is 45 kg.

Additional Information

Basic Average Formula

The average of a set of values is the sum of the values divided by the total number of values. Hence, Total Sum = Average × Number of items.

Overlapping Groups Rule

If the combined sum of items in sub-groups is calculated and an item is counted more than once, the overlapping value can be found by subtracting the true total sum from the combined sum.

Net Deviation Method

The sum of the deviations of all individual items from their average is always exactly zero. This property can be used to quickly find missing or replaced values without doing large sum calculations.

Q42. Answer: (a) 22

Shortcut Trick

Find the remainders when 74978 is divided by the co-prime factors of 24 (which are 3 and 8).

74978 ÷ 8 (check last 3 digits: 978 ÷ 8) leaves a remainder of 2.

74978 ÷ 3 (check sum of digits: 35 ÷ 3) leaves a remainder of 2.

Since both remainders are identical, dividing the number by 24 will also leave a remainder of 2.

Required number to add = Divisor − Remainder = 24 − 2 = 22.

Therefore The correct answer is 22.

Alternate Method

Given:

Number = 74978

Divisor = 24

Formula Used:

Smallest number to be added = Divisor − Remainder

Calculation:

=> Let us perform the standard long division of 74978 by 24.

=> 74978 = 24 × 3124 + 2

=> Here, the quotient is 3124 and the remainder is 2.

=> The smallest number to be added = 24 − 2 = 22.

=> Checking the sum: 74978 + 22 = 75000, which is perfectly divisible by 24 (75000 ÷ 24 = 3125).

Therefore The correct answer is 22.

Additional Information

Number to be Subtracted

If asked for the smallest number to be subtracted so the result is completely divisible by a divisor, the answer is directly the Remainder itself.

Divisibility Rule of 24

For a number to be completely divisible by 24, it must be divisible by both 3 and 8, as they are co-prime factors of 24.

Divisibility Rule of 8

A number is divisible by 8 if the number formed by its last three digits is completely divisible by 8.

Divisibility Rule of 3

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

Q43. Answer: (a) 39

Shortcut Trick

=> $8^2 + \sqrt{(9^2)} - 4\sqrt{25} - 14$

=> 64 + 9 − (4 × 5) − 14

=> 73 − 20 − 14

=> 39

Therefore The correct answer is 39.

Alternate Method

Given:

Expression: $8^2 + \sqrt{(9^2)} - 4\sqrt{25} - 14$

Concept Used:

BODMAS Rule → Evaluate powers and roots (Orders), then Multiplication, Addition, and Subtraction sequentially.

Calculations:

=> Evaluate the powers and roots first:

=> $8^2 = 8 \times 8 = 64$

=> $\sqrt{(9^2)} = 9$

=> $\sqrt{25} = 5$

=> Substituting these values back into the given expression:

=> 64 + 9 − 4 × 5 − 14

=> According to BODMAS, solve multiplication next:

=> 64 + 9 − 20 − 14

=> Solve addition and subtraction from left to right:

=> 73 − 20 − 14

=> 53 − 14

=> 39

Therefore The correct answer is 39.

Additional Information

BODMAS Rule

BODMAS is an acronym that stands for Brackets, Orders (powers and roots), Division, Multiplication, Addition, and Subtraction. It

sets the standard precedence of operations.

Square Roots

The square root of a square number undoes the square operation. For example, $\sqrt{(a^2)} = a$ for any positive integer a.

Left-to-Right Execution

Multiplication and Division hold the same priority, as do Addition and Subtraction. When solving an expression with operators of the same priority, always proceed sequentially from left to right.

Q44. Answer: (b) 1400

Shortcut Trick

After an 80% increase, the number becomes 100% + 80% = 180% of itself.

=> 180% of the number = 2520

=> 1% of the number = 2520 ÷ 180 = 14

=> 100% (Original Number) = 14 × 100 = 1400

Therefore The correct answer is 1400.

Alternate Method

Given:

A number when increased by 80% gives 2520.

Formula Used:

Final Value = Original Value + (Percentage Increase × Original Value)

100% (x)

• 80% (0.8x)

Total = 180% = 2520

Percentage Increase Concept

Calculations:

Let the original number be x.

=> x + 80% of x = 2520

=> x + (80 ÷ 100) × x = 2520

=> x + 0.8x = 2520

=> 1.8x = 2520

=> x = 2520 ÷ 1.8

=> x = 25200 ÷ 18

=> x = 1400

Therefore The correct answer is 1400.

Additional Information

Percentage Decrease

If a number is decreased by P%, the new value is obtained by multiplying the original number by (100 − P) ÷ 100.

Percentage Change

The formula to find the percentage change is: (Final Value − Initial Value) ÷ Initial Value × 100.

Successive Percentage Change

When a value is changed successively by a% and b%, the effective percentage change is given by: a + b + (a × b) ÷ 100.

Q45. Answer: (c) 2^8× 3^5× 5²× 19²

Shortcut Trick

To find the LCM, prime factorize each term completely and take the highest power of each prime base.

First term = $2^8 \times 3^3 \times 5^1$

Second term = $2^4 \times 3^2 \times 5^2 \times 19^1$

Third term = $2^3 \times 3^5 \times 5^2 \times 19^2$

LCM = Max powers of primes = $2^8 \times 3^5 \times 5^2 \times 19^2$

Therefore The correct answer is $2^8 \times 3^5 \times 5^2 \times 19^2$.

Alternate Method

Given:

First number = $4^3 \times 6^2 \times 15$

Second number = $4^2 \times 15^2 \times 19$

Third number = $6^3 \times 15^2 \times 19^2$

Method Used:

Express each number in its lowest prime factorization form. The LCM is calculated by multiplying the highest powers of all prime factors present in the given numbers.

Calculations:

=> First number = $(2^2)^3 \times (2 \times 3)^2 \times (3 \times 5)$

=> First number = $2^6 \times 2^2 \times 3^2 \times 3^1 \times 5^1$

=> First number = $2^8 \times 3^3 \times 5^1$

=> Second number = $(2^2)^2 \times (3 \times 5)^2 \times 19$

=> Second number = $2^4 \times 3^2 \times 5^2 \times 19^1$

=> Third number = $(2 \times 3)^3 \times (3 \times 5)^2 \times 19^2$

=> Third number = $2^3 \times 3^3 \times 3^2 \times 5^2 \times 19^2$

=> Third number = $2^3 \times 3^5 \times 5^2 \times 19^2$

Now, finding the maximum power of each distinct prime factor present across all numbers:

=> Maximum power of the prime factor 2 is 8.

=> Maximum power of the prime factor 3 is 5.

=> Maximum power of the prime factor 5 is 2.

=> Maximum power of the prime factor 19 is 2.

=> LCM = $2^8 \times 3^5 \times 5^2 \times 19^2$

Therefore The correct answer is $2^8 \times 3^5 \times 5^2 \times 19^2$.

Additional Information

HCF of Numbers in Exponent Form

To find the Highest Common Factor (HCF), express the numbers in prime factorized form and take the lowest power of each common prime factor.

LCM and HCF of Fractions

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

Product of Two Numbers

For any two given numerical values, the product of the two numbers is always mathematically equal to the product of their HCF and LCM.

Q46. Answer: (d) 20

Shortcut Trick

The sum of interior and exterior angles of a regular polygon is always 180°.

Given the difference between the interior and exterior angle is 144°.

Exterior Angle = (Sum − Difference) ÷ 2 = (180° − 144°) ÷ 2 = 18°

Number of sides (n) = 360° ÷ Exterior Angle

=> n = 360° ÷ 18° = 20

Therefore The correct answer is 20 sides.

Alternate Method

I

E

I + E = 180°

I − E = 144°

Polygon Side

Extended Side

Given:

Let the interior angle be I and the exterior angle be E.

We know that for a regular polygon, the sum of an interior angle and an exterior angle is always 180°.

=> I + E = 180° --- (Equation 1)

According to the given question, the interior angle is greater than the exterior angle by 144°.

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=> I − E = 144° --- (Equation 2)

Calculation:

Subtracting Equation 2 from Equation 1:

=> (I + E) − (I − E) = 180° − 144°

=> 2E = 36°

=> E = 18°

The total number of sides (n) of a regular polygon is given by the formula:

=> n = 360° ÷ E

=> n = 360° ÷ 18°

=> n = 20

Therefore The correct answer is 20 sides.

Additional Information

Sum of Interior & Exterior Angles

The sum of all interior angles of an n-sided polygon is given by (n − 2) × 180°. Conversely, the sum of all exterior angles is always exactly 360°, regardless of the number of sides the polygon has.

Interior and Exterior Angle Relation

For any regular polygon, the sum of one interior angle and its corresponding exterior angle is exactly 180° because they always form a linear pair on a straight line.

Number of Diagonals

The total number of diagonals that can be drawn within any polygon having n sides can be calculated using the mathematical formula: n(n − 3) ÷ 2.

Q47. Answer: (d) 63 hours

Shortcut Trick

Time for P to fill tank = 30 × (7/5) = 42 hr, Time for Q = 12 × (7/4) = 21 hr.

Part filled by P and Q in 7 hours = 7 × (1/42 + 1/21) = 7 × (3/42) = 1/2 tank.

Pipe R empties 1/2 tank in 9 hr → Time for R to empty full tank = 18 hr.

Combined 1-hour work of P, Q, and R = 1/42 + 1/21 − 1/18 = 3/126 + 6/126 − 7/126 = 2/126 = 1/63.

Therefore The correct answer is 63 hours.

Alternate Method

Given:

=> Time taken by P to fill the tank = 30 × (7/5) = 42 hours

=> Time taken by Q to fill the tank = 12 × (7/4) = 21 hours

=> P and Q operate for 7 hours, then R empties the filled part in 9 hours.

Formula Used:

=> Total Work = Time × Efficiency

Calculations:

=> Part of tank filled by P and Q in 7 hours = 7 × (1/42 + 1/21) = 7 × (3/42) = 1/2

=> Since R empties 1/2 of the tank in 9 hours, R can empty the full tank in 9 × 2 = 18 hours.

Pipe	Hours	Total Work	Efficiency
P	42	126	3
Q	21	6	
R	18	−7	

=> Total combined efficiency of P, Q, and R = 3 + 6 − 7 = 2 units/hour.

=> Time taken by P, Q, and R together to fill the empty tank = Total Work ÷ Combined Efficiency

=> Required Time = 126 ÷ 2 = 63 hours.

Therefore The correct answer is 63 hours.

Additional Information

Pipes & Cisterns Net Work

If an inlet pipe fills in x hours and an outlet pipe empties in y hours, the net part filled in 1 hour is (1/x − 1/y). If the result is negative, the tank is being emptied instead of filled.

Time & Work Equivalence

Pipes filling a tank act like regular workers doing positive work. A pipe emptying a tank acts like a worker destroying the work, which is represented by assigning a negative efficiency to that pipe in the LCM method.

Q48. Answer: (d) Rs. 6,900

Shortcut Trick

Anshuman's profit = Total Profit − Kunal's profit = 14000 − 6000 = Rs. 8,000.

Ratio of their profits (Anshuman : Kunal) = 8000 : 6000 = 4 : 3.

Since the time duration is identical, the investment ratio equals the profit ratio (4 : 3).

Difference in investment = Total Investment × [(4 − 3) ÷ (4 + 3)].

Difference = 48300 × (1 ÷ 7) = Rs. 6,900.

Therefore The correct answer is Rs. 6,900.

Alternate Method

Given:

Total Investment = Rs. 48,300

Total Profit = Rs. 14,000

Kunal's share in profit = Rs. 6,000

Formula Used:

Profit Ratio = Investment Ratio (when the time period is identical for all partners)

Total Investment = Rs. 48,300 (7 parts)

Anshuman (4 parts)

Kunal (3 parts)

Profit: Rs. 8,000

Profit: Rs. 6,000

Difference (1 part) = 48300 ÷ 7 = Rs. 6,900

Calculations:

=> Anshuman's profit = Total Profit − Kunal's profit

=> Anshuman's profit = 14000 − 6000 = Rs. 8,000

=> Ratio of their profits (Anshuman : Kunal) = 8000 : 6000 = 4 : 3

=> Let Anshuman's investment be 4x and Kunal's investment be 3x.

=> Total Investment = 4x + 3x = 7x

=> 7x = 48300

=> x = 48300 ÷ 7 = 6900

=> Difference in their investments = 4x − 3x = x

=> Difference = Rs. 6,900

Therefore The correct answer is Rs. 6,900.

Additional Information

Simple Partnership

When investments are made for the same time period, the profit is distributed exactly in the ratio of the invested capital.

Compound Partnership

When investments are made for different time periods, the profit ratio is equal to the ratio of the product of Capital × Time for each partner.

Working vs Sleeping Partner

A working partner receives a fixed salary or percentage of the profit for managing the business. The remaining profit is then divided among all partners based on their capital and time ratio.

Q49. Answer: (b) 15 x^2 − 7x − 21

Shortcut Trick

Directly extract and sum the coefficients of corresponding powers of x.

Coefficient of x^2: 8 + 7 = 15

Coefficient of x: −7

Constant term: 7 × (−5) + 14 = −35 + 14 = −21

Combining them together gives: $15x^2 − 7x − 21$

Therefore The correct answer is $15x^2 - 7x - 21$.

Alternate Method

Given:

The algebraic expression is: $x(8x - 7) + 7(x^2 - 5) + 14$

Method Used:

Apply the distributive property to expand the brackets and combine the like terms.

Calculations:

=> Expand the first term: $x \times (8x - 7) = 8x^2 - 7x$

=> Expand the second term: $7 \times (x^2 - 5) = 7x^2 - 35$

=> Substitute the expanded terms back into the main expression:

=> $8x^2 - 7x + 7x^2 - 35 + 14$

=> Group the like terms together:

=> $(8x^2 + 7x^2) - 7x + (-35 + 14)$

=> $15x^2 - 7x - 21$

Therefore The correct answer is $15x^2 - 7x - 21$.

Additional Information

Distributive Property

Multiplying a sum by a number gives the same result as multiplying each addend by the number and then adding the products together. Rule: $A(B + C) = AB + AC$.

Like Terms

Terms that contain the same variables raised to the exact same powers. Only like terms can be added or subtracted to simplify algebraic expressions.

BODMAS Rule

A standard order of operations: Brackets, Orders (powers/roots), Division/Multiplication, and Addition/Subtraction are strictly followed left to right to solve mathematical expressions accurately.

Q50. Answer: (a) 59.67

Shortcut Trick

Total Distance = 152 + 189 + 375 = 716 km

Total Time = (152 ÷ 38) + (189 ÷ 63) + (375 ÷ 75) = 4 + 3 + 5 = 12 hrs

Average Speed = Total Distance ÷ Total Time

Average Speed = 716 ÷ 12 ≈ 59.67 km/hr

Therefore The correct answer is 59.67 km/hr.

Alternate Method

Given:

Distance 1 (D1) = 152 km, Speed 1 (S1) = 38 km/hr

Distance 2 (D2) = 189 km, Speed 2 (S2) = 63 km/hr

Distance 3 (D3) = 375 km, Speed 3 (S3) = 75 km/hr

Formula Used:

Time = Distance ÷ Speed

Average Speed = Total Distance ÷ Total Time

152 km

38 km/hr

4 hr

189 km

63 km/hr

3 hr

375 km

75 km/hr

5 hr

Total Dist: 716 km | Total Time: 12 hr

Calculations:

=> Total Distance = D1 + D2 + D3
=> Total Distance = 152 + 189 + 375 = 716 km
=> Time for 1st part (T1) = 152 ÷ 38 = 4 hrs
=> Time for 2nd part (T2) = 189 ÷ 63 = 3 hrs
=> Time for 3rd part (T3) = 375 ÷ 75 = 5 hrs
=> Total Time = 4 + 3 + 5 = 12 hrs
=> Average Speed = 716 ÷ 12
=> Average Speed = 59.666... ≈ 59.67 km/hr
Therefore The correct answer is 59.67 km/hr.
Additional Information
Average Speed for Two Equal Distances
When a person travels two equal distances at speeds x and y, the average speed is given by (2 × x × y) ÷ (x + y).
Average Speed for Three Equal Distances
When a person travels three equal distances at speeds x, y and z, the average speed is (3 × x × y × z) ÷ (xy + yz + zx).
Conversion of Speed Units
To convert km/hr to m/s, multiply the speed by 5/18. To convert m/s to km/hr, multiply by 18/5.

Q51. Answer: (c) Rs. 514

Shortcut Trick
From Case 1: 9 pens + 9 pencils = 252 => 1 pen + 1 pencil = 28.
From Case 2: 13(pen − 1) + 3(pencil + 3) = 100 => 13 pens + 3 pencils = 104.
Equating both: 13(pen) + 3(28 − pen) = 104 => 10 pens = 20 => 1 pen = Rs. 2.
Cost of 1 pencil = 28 − 2 = Rs. 26.
Required cost of 10 pens and 19 pencils = 10(2) + 19(26) = 20 + 494 = Rs. 514.
Therefore The correct answer is Rs. 514.
Alternate Method
Case 1: 9 Pens + 9 Pencils = Rs. 252
1 Pen + 1 Pencil = Rs. 28
Case 2: 13(Pen - 1) + 3(Pencil + 3) = Rs. 100
13 Pens + 3 Pencils = Rs. 104
Given:
Original cost of 9 pens and 9 pencils = Rs. 252
Let original cost of 1 pen = x
Let original cost of 1 pencil = y
Calculations:
=> 9x + 9y = 252
=> x + y = 28 ..... (Equation 1)
According to the second condition:
=> 13(x − 1) + 3(y + 3) = 100
=> 13x − 13 + 3y + 9 = 100
=> 13x + 3y − 4 = 100
=> 13x + 3y = 104 ..... (Equation 2)
Multiplying Equation 1 by 3:
=> 3x + 3y = 84 ..... (Equation 3)
Subtracting Equation 3 from Equation 2:
=> (13x + 3y) − (3x + 3y) = 104 − 84
=> 10x = 20
=> x = 2
Substituting x = 2 in Equation 1:
=> 2 + y = 28
=> y = 26
Original cost of 1 pen = Rs. 2

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Original cost of 1 pencil = Rs. 26

We need the original cost of 10 pens and 19 pencils:

=> Cost = 10x + 19y

=> Cost = 10(2) + 19(26)

=> Cost = 20 + 494

=> Cost = 514

Therefore The correct answer is Rs. 514.

Additional Information

Linear Equations in Two Variables

A system of linear equations a1x + b1y = c1 and a2x + b2y = c2 represents two straight lines. They have a unique solution intersecting at a single point if a1 ÷ a2 ≠ b1 ÷ b2.

Substitution Method

An algebraic method to solve simultaneous equations by expressing one unknown variable in terms of the other and substituting it into the second equation.

Net Impact of Price Changes

When individual component prices increase or decrease, the new total cost is calculated as: New Total Cost = Original Cost + (Number of items × Change in individual price).

Q52. Answer: (a) 428

Shortcut Trick

Solve the expression using the BODMAS rule from the innermost bracket:

Inner bracket and multiply: 8 × (5 − 7) = 8 × (−2) = −16

Curly bracket: {17 − 16} = 1

Final division: 428 ÷ 1 = 428

Therefore The correct answer is 428.

Alternate Method

Given:

Expression: [428 ÷ {17 + 8 × (5 − 7)}]

Formula Used:

BODMAS Rule: Brackets → Orders → Division → Multiplication → Addition → Subtraction

Calculations:

=> 428 ÷ {17 + 8 × (5 − 7)}

=> 428 ÷ {17 + 8 × (−2)}

=> 428 ÷ {17 − 16}

=> 428 ÷ 1

=> 428

Therefore The correct answer is 428.

Additional Information

BODMAS Rule

It defines the correct sequence to solve mathematical expressions: Brackets ((), {}, []), Order (Powers, Roots, Of), Division, Multiplication, Addition, and Subtraction.

Sign Rules in Multiplication

When a positive number is multiplied by a negative number, the result is always negative (+ × − = −).

Division by One

Any number divided by 1 yields the number itself (a ÷ 1 = a).

Q53. Answer: (c) 88, 33

Shortcut Trick

Check the given options for the sum and LCM conditions.

The sum in all options is 121, so evaluate the LCM for each pair.

Option 3 gives 88 and 33. We can factor these as 88 = 11 × 8 and 33 = 11 × 3.

Their LCM is 11 × 8 × 3 = 264, which matches the given condition perfectly.

Therefore The correct answer is 88, 33.

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Alternate Method

Given:

Sum of the two numbers = 121

LCM of the two numbers = 264

Concept Used:

The Highest Common Factor (HCF) of two numbers also exactly divides their sum and their LCM.

If H is the HCF, the numbers can be written as Hx and Hy, where x and y are co-prime.

Calculation:

=> The HCF of the numbers is equal to the HCF of their sum (121) and LCM (264).

=> 121 = 11 × 11

=> 264 = 11 × 24

=> Hence, the HCF (H) = 11.

=> Let the two numbers be 11x and 11y, where x and y are co-prime.

=> Sum = 11x + 11y = 121 => x + y = 11

=> LCM = 11xy = 264 => xy = 24

=> We need two co-prime numbers whose sum is 11 and product is 24.

=> Solving for x and y, we get 8 and 3 (Since 8 + 3 = 11 and 8 × 3 = 24).

=> First number = 11 × 8 = 88

=> Second number = 11 × 3 = 33

Therefore The correct answer is 88, 33.

Additional Information

Product of Two Numbers

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

Co-prime Numbers Rule

Two numbers are co-prime if their HCF is 1. When two numbers are expressed as Hx and Hy (where H is the HCF), the parts x and y must be co-prime to ensure H is exactly the highest common factor.

HCF of Sum and LCM

The HCF of any two positive integers a and b is exactly equal to the HCF of their Sum (a + b) and their LCM. This allows finding the HCF quickly when only the sum and LCM are given.

Q54. Answer: (c) Rs. 16,000

Shortcut Trick

Effective interest rate for the 2nd year alone = R% + (R% of R%) = 10% + 1% = 11%.

11% of the Principal = Rs. 1,760

1% of the Principal = 1760 ÷ 11 = Rs. 160

100% of the Principal = 160 × 100 = Rs. 16,000

Therefore The correct answer is Rs. 16,000.

Alternate Method

Given:

Rate of interest (R) = 10% per annum

Interest earned during the 2nd year = Rs. 1,760

Formula Used:

Amount after n years = $P \times (1 + R/100)^n$

Interest for the n-th year = Amount after (n−1) years × (R/100)

Principal

100%

• 10%

Amount Yr 1

110%

10% of A

2nd Yr Int.

11% = 1760

11% → Rs. 1760 Therefore 100% → Rs. 16000

Calculations:

=> Let the principal sum be P.

=> Amount after the 1st year = P × (1 + 10/100) = 1.1P

=> Interest for the 2nd year = 10% of Amount after 1st year

=> 1760 = (10/100) × 1.1P

=> 1760 = 0.11P

=> P = 1760 ÷ 0.11

=> P = 16000

Therefore The correct answer is Rs. 16,000.

Additional Information

Compound Interest Formula

Amount $A = P(1 + R/100)^n$, where P is the principal, R is the rate of interest, and n is the time period. The total compound interest is CI = A − P.

Effective Rate of Interest

For a given rate of R% compounded annually, the effective compound interest rate for 2 years is calculated as $(2R + R^2/100)\%$.

CI vs SI Difference

The difference between compound interest and simple interest for a period of 2 years on a certain sum is calculated using: $D = P \times (R/100)^2$.

Q55. Answer: (a) Rs. 2,100

Shortcut Trick

Using the direct ratio formula between Marked Price (MP) and Cost Price (CP):

MP ÷ CP = (100 + Profit%) ÷ (100 − Discount%)

MP ÷ 1575 = (100 + 20) ÷ (100 − 10)

MP ÷ 1575 = 120 ÷ 90 = 4 ÷ 3

MP = 1575 × 4 ÷ 3 = 525 × 4 = 2100

Therefore The correct answer is Rs. 2,100.

Alternate Method

Given:

=> Cost Price (CP) = Rs. 1,575

=> Profit = 20%

=> Discount = 10%

Formula Used:

=> Selling Price (SP) = CP × (100 + Profit%) ÷ 100

=> Marked Price (MP) = SP × 100 ÷ (100 − Discount%)

CP = 1575

SP = 1890

MP = 2100

+20% Profit

-10% Discount

Marked Price = Rs. 2100

Calculations:

=> SP = 1575 × (100 + 20) ÷ 100

=> SP = 1575 × 1.2 = Rs. 1,890

=> MP = 1890 × 100 ÷ (100 − 10)

=> MP = 1890 × 100 ÷ 90

=> MP = 1890 × 10 ÷ 9

=> MP = 210 × 10 = Rs. 2,100

Therefore The correct answer is Rs. 2,100.

Additional Information

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Direct MP to CP Ratio

The most efficient way to link Marked Price and Cost Price without calculating Selling Price is: MP ÷ CP = (100 + Profit%) ÷ (100 − Discount%).

Successive Discounts

When two consecutive discounts of a% and b% are offered, the effective single discount is calculated as: a + b − (a × b) ÷ 100.

Markup Percentage

Markup indicates how much above the cost price the product is listed. Markup % = ((MP − CP) ÷ CP) × 100.

Q56. Answer: (b) 360

Shortcut Trick

Effective Rate of Interest = Rate × Time

Effective Rate = 20% × 4.5 = 90%

Simple Interest = Effective Rate × Principal

SI = 90% of Rs. 400 = (90 ÷ 100) × 400 = Rs. 360

Therefore The correct answer is Rs. 360.

Alternate Method

Given:

Principal (P) = Rs. 400

Rate of Interest (R) = 20% per annum

Time Period (T) = 4.5 years

Formula Used:

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

Year 0

P = Rs. 400

Year 4.5

SI = ?

T = 4.5 years

R = 20% p.a.

Total Interest Rate = 4.5 × 20% = 90%

Calculations:

=> SI = (400 × 20 × 4.5) ÷ 100

=> SI = 4 × 20 × 4.5

=> SI = 80 × 4.5

=> SI = 360

Therefore The correct answer is Rs. 360.

Additional Information

Total Amount Formula

The total amount to be paid at the end of the time period is the sum of the original Principal and the Simple Interest earned: Amount = Principal + Simple Interest.

Rearranging the SI Formula

To find Principal: P = (SI × 100) ÷ (R × T) | To find Rate: R = (SI × 100) ÷ (P × T) | To find Time: T = (SI × 100) ÷ (P × R).

Simple vs Compound Interest

In Simple Interest, the interest is calculated only on the original principal throughout the entire period. In Compound Interest, the interest generated in each period is added to the principal to form the new base for the next period.

Q57. Answer: (b) 28

Shortcut Trick

Let father's age be F and son's age be S. We need years 'x' when F + x = 2 × (S + x).

Solving for x directly gives: x = F − 2S.

From 6 years ago: (F − 6) = 2 × (S − 6) + 34

=> F − 6 = 2S − 12 + 34

=> F − 2S = 28

Since x = F − 2S, we immediately get x = 28 directly without finding individual ages.

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Therefore The correct answer is 28 years.

Alternate Method

Given:

6 years ago, father's age was 34 years more than twice his son's age.

Let the present age of the Father be F and the Son be S.

6 Years Ago

F − 6 = 2(S − 6) + 34

Present

Father = F, Son = S

After x Years

F + x = 2(S + x)

• 6 years

• x years

Target: Find x = F − 2S

Calculations:

=> Father's age 6 years ago = F − 6

=> Son's age 6 years ago = S − 6

According to the given condition:

=> (F − 6) = 2 × (S − 6) + 34

=> F − 6 = 2S − 12 + 34

=> F − 6 = 2S + 22

=> F = 2S + 28

Let the father be twice his son's age after 'x' years from now.

=> F + x = 2 × (S + x)

=> F + x = 2S + 2x

Substitute F = 2S + 28 in the above equation:

=> 2S + 28 + x = 2S + 2x

=> x = 28

Therefore The correct answer is 28 years.

Additional Information

Problem on Ages - Timeline Equations

Equations are formed based on past, present, and future time periods. If present age is A, age 'n' years ago is (A − n) and 'n' years hence will be (A + n).

Age Differences

The absolute difference between the ages of two people always remains constant over time, even though the ratio of their ages changes continuously.

Linear Equations

Most age-related word problems can be converted into a system of linear equations with two variables. Using the substitution method is usually the fastest way to find the unknown efficiently without knowing the exact variables.

Q58. Answer: (a) 2sin ^4A

Shortcut Trick

Put A = 30° in the given expression to easily find the value.

Numerator = (sin30°)^4 − (cos30°)^4 + 1 = (1/2)^4 − (√3/2)^4 + 1 = 1/16 − 9/16 + 1 = 1/2.

Denominator = 1 + 1/tan²30° = 1 + 1/(1/√3)² = 1 + 3 = 4.

Value of expression = Numerator ÷ Denominator = (1/2) ÷ 4 = 1/8.

Checking Option 1: 2sin^430° = 2 × (1/2)^4 = 2 × 1/16 = 1/8 (Matches the expression value).

Therefore The correct answer is 2sin^4A.

Alternate Method

Given:

Expression = (sin^4A − cos^4A + 1) / (1 + 1/tan²A)

Formula Used:

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

$\sin^2A + \cos^2A = 1$

$1 + \cot^2A = \text{cosec}^2A$

$1/\tan A = \cot A$ and $1/\text{cosec}A = \sin A$

Calculation:

=> Numerator = sin^4A − cos^4A + 1

=> Numerator = $(\sin^2A - \cos^2A)(\sin^2A + \cos^2A) + 1$

=> As $\sin^2A + \cos^2A = 1$, substituting it in the equation:

=> Numerator = $(\sin^2A - \cos^2A)(1) + 1$

=> Numerator = $\sin^2A + (1 - \cos^2A)$

=> Numerator = $\sin^2A + \sin^2A = 2\sin^2A$

=> Denominator = $1 + 1/\tan^2A$

=> Denominator = $1 + \cot^2A = \text{cosec}^2A$

=> Value of Expression = Numerator / Denominator

=> Value of Expression = $2\sin^2A / \text{cosec}^2A$

=> Value of Expression = $2\sin^2A \times \sin^2A = 2\sin^4A$

Therefore The correct answer is 2sin^4A.

Additional Information

Pythagorean Trigonometric Identities

$\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \text{cosec}^2\theta$.

Reciprocal Identities

$\sin\theta = 1/\text{cosec}\theta$, $\cos\theta = 1/\sec\theta$, and $\tan\theta = 1/\cot\theta$.

Double Angle Formulas

$\sin(2\theta) = 2\sin\theta \times \cos\theta$ and $\cos(2\theta) = \cos^2\theta - \sin^2\theta$.

Q59. Answer: (b) 565/99 hours

Shortcut Trick

Total Capacity (LCM of 16, 21, and 15) = 1680 units.

Combined efficiency = (1680 ÷ 16) + (1680 ÷ 21) + (1680 ÷ 15) = 105 + 80 + 112 = 297 units/hour.

Time Taken = Total Capacity ÷ Total Efficiency = 1680 ÷ 297 = 560/99 hours.

560/99 converts to a mixed fraction as 5 ^(65)/99 hours.

Therefore The correct answer is 5 ^(65)/99 hours.

Alternate Method

Given:

Pipe A fills the tank in 16 hours.

Pipe B fills the tank in 21 hours.

Pipe C fills the tank in 15 hours.

Calculation:

Let the total capacity of the tank be the LCM of 16, 21, and 15.

Pipe	Hours	Total Work	Efficiency
Pipe A	16	1680	105
Pipe B	21	80	
Pipe C	15	112	

=> Total efficiency of pipes A, B, and C together = 105 + 80 + 112 = 297 units/hour.

=> Total time taken = Total Work ÷ Total Efficiency = 1680 ÷ 297.

=> Dividing numerator and denominator by 3, we get = 560 ÷ 99.

=> Converting the improper fraction to a mixed fraction = 5 ^(65)/99 hours.

Therefore The correct answer is 5 ^(65)/99 hours.

Additional Information

Pipes & Cisterns Concept

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It operates on the exact same principle as Time and Work problems. The total capacity of the cistern is considered as the Total Work, usually taken as the LCM of all given times.

Inlet vs Outlet Pipes

An inlet pipe fills the tank and is assigned a positive efficiency. An outlet pipe empties the tank and must always be assigned a negative efficiency.

Combined Rate Formula

If pipes A, B, and C fill a tank in x, y, and z hours respectively, their combined working rate is 1/T = 1/x + 1/y + 1/z.

Q60. Answer: (c) 76800

Shortcut Trick

Side of one cube (a) = (512000)^(1/3) = 80 cm.

When 5 cubes are joined in a row, the lateral surface comprises exactly 12 square faces (5 front, 5 back, 1 left, 1 right).

Area of 1 square face = $a^2 = 80 \times 80 = 6400$ cm².

Lateral Surface Area = $12 \times 6400 = 76800$ cm².

Therefore The correct answer is 76800 cm².

Alternate Method

Given:

Volume of each solid cube = 512000 cm³

Number of cubes joined end-to-end = 5

Formula Used:

Volume of cube = a^3

Lateral Surface Area of cuboid = $2 \times h \times (l + b)$

L = 400 cm

H = 80 cm

B = 80 cm

Cuboid formed by 5 Cubes

Lateral Surface Area = $12 \times a^2 = 76800$ cm²

Calculations:

=> $a^3 = 512000$

=> a = (512000)^(1/3) = 80 cm

=> For the new cuboid formed:

=> Length (l) = $5 \times 80 = 400$ cm

=> Breadth (b) = 80 cm

=> Height (h) = 80 cm

=> Lateral Surface Area = $2 \times 80 \times (400 + 80)$

=> Lateral Surface Area = $160 \times 480 = 76800$ cm²

Therefore The correct answer is 76800 cm².

Additional Information

Total Surface Area of Resulting Cuboid

When 'n' identical cubes of side 'a' are joined end-to-end, TSA = $2(n + n + 1)a^2 = (4n + 2)a^2$.

Volume of Resulting Cuboid

The total volume remains the sum of the volumes of the individual cubes: $V = n \times a^3$.

Diagonal of the Resulting Cuboid

Diagonal = $\sqrt{(l^2 + b^2 + h^2)} = \sqrt{((na)^2 + a^2 + a^2)} = a\sqrt{(n^2 + 2)}$.

Q61. Answer: (a) 19

Shortcut Trick

The mode of a set of data is simply the value that appears most frequently.

Scanning the given values, we can observe that the number 19 appears 3 times, which is more than any other observation in the data set.

Therefore, the mode is 19.

Therefore The correct answer is 19 marks.

Alternate Method

Given:

Data set of marks: 19, 15, 10, 14, 13, 18, 19, 19, 11, 11

Formula Used:

Mode = The value having the highest frequency in the given data set.

0

1

2

3

Freq

10

11

13

14

15

18

19

Mode (Freq = 3)

Calculations:

=> Let us arrange the data points in ascending order to easily track and count the frequency of each number.

=> Sorted Data: 10, 11, 11, 13, 14, 15, 18, 19, 19, 19

=> Frequency of 10 = 1

=> Frequency of 11 = 2

=> Frequency of 13 = 1

=> Frequency of 14 = 1

=> Frequency of 15 = 1

=> Frequency of 18 = 1

=> Frequency of 19 = 3

=> The number 19 appears the maximum number of times (3 times) in the given data set.

Therefore The correct answer is 19 marks.

Additional Information

Mean

The mean is the arithmetic average of a data set. It is calculated by dividing the sum of all observations by the total number of observations.

Median

The median is the middlemost value of a sorted data set. For an odd number of terms, it is the exact middle term. For an even number of terms, it is the average of the two middle terms.

Empirical Relationship

For a moderately skewed frequency distribution, the relationship between Mean, Median, and Mode is given by the statistical formula: Mode ≈ 3 × Median − 2 × Mean.

Q62. Answer: (c) 2,730

Shortcut Trick

Let Cost Price (CP) = 100 units.

List Price (MP) = 100 + 50% = 150 units.

Selling Price (SP) = 150 − 30% of 150 = 105 units.

Profit = SP − CP = 105 − 100 = 5 units.

5 units = Rs. 91 => List Price (150 units) = (91 ÷ 5) × 150 = Rs. 2730.

Therefore The correct answer is Rs. 2730.

Alternate Method

CP = 100x

SP = 105x

MP = 150x

Markup +50%

Discount −30%

Profit = 5x = Rs. 91

Given:

Profit = Rs. 91

Markup = 50% above Cost Price

Discount = 30% on List Price (MP)

Calculations:

=> Let Cost Price (CP) = 100x

=> Marked Price (MP) = 100x + 50% of 100x = 150x

=> Selling Price (SP) = 150x − (30/100) × 150x

=> SP = 150x − 45x = 105x

=> Profit = SP − CP = 105x − 100x = 5x

=> Since Profit is given as Rs. 91, we get 5x = 91

=> List Price (MP) = 150x = 30 × 5x

=> MP = 30 × 91 = 2730

Therefore The correct answer is Rs. 2730.

Additional Information

Marked Price (MP) & Discount

Discount is always calculated as a percentage of the Marked Price. Formula: SP = MP × (100 − D%) ÷ 100.

Profit & Loss

Profit or Loss is always calculated on the base Cost Price. Formula: SP = CP × (100 + P%) ÷ 100.

Direct Relation between CP and MP

When Profit % and Discount % are given, the direct ratio is: CP/MP = (100 − D%) / (100 + P%).

Q63. Answer: (d) 5

Shortcut Trick

Check the unit digit of the given number 245015.

The unit digit is 5, which means the number is directly divisible by 5.

Since the unit digit is not an even number, it is not divisible by 2.

The sum of the digits is 17 (not divisible by 3), so it cannot be divisible by 15.

Therefore The correct answer is 5.

Alternate Method

Given:

The number to be divided = 245015

Method Used:

We check the divisibility rules for each given option sequentially.

=> Divisibility by 2: The last digit of 245015 is 5, which is not an even number. Thus, it is not divisible by 2.

=> Divisibility by 11: The difference between the sum of digits at odd places and the sum of digits at even places must be 0 or a multiple of 11.

=> Sum of odd place digits = 5 + 0 + 4 = 9

=> Sum of even place digits = 1 + 5 + 2 = 8

=> Difference = 9 − 8 = 1. Since 1 is not divisible by 11, the number is not divisible by 11.

=> Divisibility by 15: A number must be divisible by both 3 and 5 to be divisible by 15.

=> Sum of all digits = 2 + 4 + 5 + 0 + 1 + 5 = 17. Since 17 is not divisible by 3, the number is not divisible by 15.

=> Divisibility by 5: Any number ending with the digit 0 or 5 is completely divisible by 5.

=> The last digit of 245015 is 5, so it is perfectly divisible by 5.

Therefore The correct answer is 5.

Additional Information

Divisibility Rule of 3

A number is completely divisible by 3 if the sum of its digits is a multiple of 3.

Divisibility Rule of 4

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

Divisibility Rule of 9

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

Q64. Answer: (d) 289

Shortcut Trick

If x is the third proportional to a and b, then x = (b × b) ÷ a.

Given a = 9, b = 51

=> x = (51 × 51) ÷ 9

=> x = 2601 ÷ 9 = 289

Therefore The correct answer is 289.

Alternate Method

Given:

First term (a) = 9

Second term (b) = 51

Third Proportional Representation

9

:

51

::

51

:

x

Product of Means = 51 × 51

Product of Extremes = 9 × x

Formula Used:

When terms are in proportion (a : b :: c : d), the product of the extremes equals the product of the means.

=> a × d = b × c

For a third proportional x of a and b, the continued proportion is a : b :: b : x.

Calculation:

=> 9 : 51 :: 51 : x

=> 9 × x = 51 × 51

=> 9x = 2601

=> x = 2601 ÷ 9

=> x = 289

Therefore The correct answer is 289.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is given by √(a × b). It acts as the central equivalent term when linking three numbers in proportion.

Fourth Proportional

If four numbers a, b, c, and d are in proportion such that a : b :: c : d, then d is the fourth proportional, which is calculated as d = (b × c) ÷ a.

Continued Proportion

Three non-zero numbers a, b, and c are strictly in a continued proportion when the ratio of the first to the second matches the ratio of the second to the third (a ÷ b = b ÷ c).

Q65. Answer: (a) 2,700

Shortcut Trick

Effective single discount = 25% + 20% − (25 × 20) ÷ 100 = 45% − 5% = 40%

Selling Price (SP) = (100% − 40%) of Marked Price

SP = 60% of Rs. 4,500 = (60 ÷ 100) × 4500

SP = 60 × 45 = Rs. 2,700

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Therefore The correct answer is Rs. 2,700.

Alternate Method

Given:

Marked Price (MP) = Rs. 4,500

First discount (D1) = 25%

Second discount (D2) = 20%

Formula Used:

Selling Price (SP) = MP × (1 − D1 ÷ 100) × (1 − D2 ÷ 100)

Successive Discounts Calculation

MP: Rs. 4500

−25%

Rs. 3375

−20%

SP: Rs. 2700

Calculations:

=> SP = 4500 × (1 − 25 ÷ 100) × (1 − 20 ÷ 100)

=> SP = 4500 × (75 ÷ 100) × (80 ÷ 100)

=> SP = 4500 × (3 ÷ 4) × (4 ÷ 5)

=> SP = 4500 × (12 ÷ 20)

=> SP = 4500 × (3 ÷ 5)

=> SP = 900 × 3

=> SP = 2700

Therefore The correct answer is Rs. 2,700.

Additional Information

Equivalent Successive Discount

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

Marked Price (MP) vs Cost Price (CP)

Discount is strictly calculated on the Marked Price (also known as Tag Price), whereas Profit or Loss is strictly calculated on the Cost Price.

Multiplier Strategy

To rapidly apply a decrease of R%, directly multiply the base value by the fraction (100 − R) ÷ 100. This method stacks multiplicatively for any number of successive changes.

Q66. Answer: (d) 252

Shortcut Trick

Equate the quantities to directly compare the Cost Price and Selling Price.

Cost Price of 1 dozen (12 pens) = Rs. 150

Selling Price of 1 dozen (12 pens) = 12 × 44 = Rs. 528

Total Profit = 528 − 150 = Rs. 378

Profit % = (378 ÷ 150) × 100 = 2.52 × 100 = 252%

Therefore The correct answer is 252%.

Alternate Method

Given:

Cost Price (CP) of 1 dozen (12 pens) = Rs. 150

Selling Price (SP) of 1 pen = Rs. 44

Formula Used:

Profit = SP − CP

Profit % = (Profit ÷ CP) × 100

CP = Rs. 12.5

Profit = Rs. 31.5

Total SP = Rs. 44

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Profit Distribution for 1 Pen

Calculations:

=> CP of 1 pen = 150 ÷ 12 = Rs. 12.5

=> Profit per pen = 44 − 12.5 = Rs. 31.5

=> Profit % = (31.5 ÷ 12.5) × 100

=> Profit % = (315 ÷ 125) × 100

=> Profit % = 2.52 × 100 = 252%

Therefore The correct answer is 252%.

Additional Information

Cost Price & Selling Price

The price at which goods are bought is the Cost Price (CP). The price at which they are sold is the Selling Price (SP).

Base of Calculation

Profit and Loss percentages are fundamentally always calculated on the Cost Price (CP) unless explicitly specified otherwise in the question.

Marked Price & Discount

Discount is an amount deduced from the Marked Price (MP) to attract buyers. Selling Price = Marked Price − Discount.

Q67. Answer: (c) 452.16 cm²

Shortcut Trick

Surface Area of a Sphere = 4 × π × r²

=> Surface Area = 4 × 3.14 × 6²

=> Surface Area = 12.56 × 36

=> Surface Area = 452.16

Therefore The correct answer is 452.16 cm².

Alternate Method

r = 6 cm

Spherical Ball

Given:

Radius of the spherical ball (r) = 6 cm

Value of π = 3.14

Formula Used:

Surface Area of a Sphere = 4 × π × r²

Calculation:

=> Surface Area = 4 × 3.14 × (6)²

=> Surface Area = 4 × 3.14 × 36

=> Surface Area = 12.56 × 36

=> Surface Area = 452.16 cm²

Therefore The correct answer is 452.16 cm².

Additional Information

Volume of a Sphere

The volume of a sphere is given by the formula V = (4 ÷ 3) × π × r³.

Curved Surface Area of a Hemisphere

A hemisphere is exactly half of a sphere. Its curved surface area is CSA = 2 × π × r².

Total Surface Area of a Hemisphere

The total surface area includes the curved surface and the flat circular base, given by TSA = 3 × π × r².

Q68. Answer: (b) 83%

Shortcut Trick

Ratio of Males to Females = 170000 : (374000 − 170000) = 170000 : 204000 = 5 : 6

Total population ratio = 5 + 6 = 11

Applying the weighted average concept directly:

Female Literacy % = (Total Ratio × Total Literacy % − Male Ratio × Male Literacy %) ÷ Female Ratio

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Female Literacy % = (11 × 78% − 5 × 72%) ÷ 6 = (858% − 360%) ÷ 6 = 498% ÷ 6 = 83%

Therefore The correct answer is 83%.

Alternate Method

Given:

Total population = 374000

Number of males = 170000

Literate percentage of population = 78%

Literate percentage of males = 72%

Total Population: 374000

Literate: 78%

Males: 170000

Literate: 72%

Females: 204000

Literate: x%

Ratio = 5

Ratio = 6

Total Ratio = 11

Calculations:

=> Number of females = Total population − Number of males

=> Number of females = 374000 − 170000 = 204000

=> Total literate population = 78% of 374000

=> Total literate = (78 ÷ 100) × 374000 = 291720

=> Total literate males = 72% of 170000

=> Literate males = (72 ÷ 100) × 170000 = 122400

=> Number of literate females = Total literate − Literate males

=> Literate females = 291720 − 122400 = 169320

=> Percentage of literate females = (Literate females ÷ Total females) × 100

=> Percentage = (169320 ÷ 204000) × 100 = 83%

Therefore The correct answer is 83%.

Additional Information

Weighted Average Method

When a group is divided into multiple components, the combined average is calculated as: A = (n1A1 + n2A2) ÷ (n1 + n2).

Rule of Alligation

Alligation is a fast technique to find the ratio in which two quantities must be mixed to produce a resultant average: Ratio = (Total% − Part2%) / (Part1% − Total%).

Percentage Change and Base

Percentage is fundamentally a ratio expressed as a fraction of 100. Always ensure the calculation base is correct. For females, the base is the total female population.

Q69. Answer: (d) 28 hours

Shortcut Trick

Ratio of speeds of Arjun and Malaika = 140 : 65 = 28 : 13

Since the distance is constant, speed is inversely proportional to time.

Ratio of time taken = 13 : 28

Time taken by Arjun (13 parts) = 13 hours

Time taken by Malaika (28 parts) = 28 hours

Therefore The correct answer is 28 hours.

Alternate Method

Given:

Speed of Arjun = 140 km/hr

Time taken by Arjun = 13 hours

Speed of Malaika = 65 km/hr

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Delhi
Kanpur
Distance = Constant
Arjun: 140 km/hr
Time = 13 hrs
Malaika: 65 km/hr
Time = ? hrs
Formula Used:
Distance = Speed × Time
Time = Distance ÷ Speed
Calculations:
=> Total distance from Delhi to Kanpur = 140 × 13 = 1820 km
=> Time taken by Malaika = 1820 ÷ 65
=> Time taken by Malaika = 28 hours
Therefore The correct answer is 28 hours.
Additional Information
Speed and Time Relationship
When distance is constant, speed is inversely proportional to time (S1 ÷ S2 = T2 ÷ T1).
Average Speed
It is the total distance traveled divided by the total time taken. For equal distances traveled at speeds a and b, Average Speed = 2ab ÷ (a + b).
Relative Speed
When two bodies move in the same direction, relative speed is the difference of their speeds. In opposite directions, it is the sum of their speeds.

Q70. Answer: (c) Rs. 489

Shortcut Trick
Since the investment time period is the same for all (1 year), the profit is distributed exactly in the ratio of their investments.
Profit Ratio = 1310 : 1350 : 1140 = 131 : 135 : 114
Total ratio parts = 131 + 135 + 114 = 380 parts
Dev's share = (114 ÷ 380) × 1630 = (3 ÷ 10) × 1630 = Rs. 489
Therefore The correct answer is Rs. 489.
Alternate Method
Given:
Investment of Anand = Rs. 1,310
Investment of Preeti = Rs. 1,350
Investment of Dev = Rs. 1,140
Total profit at the end of the year = Rs. 1,630
Formula Used:
Profit Ratio = Ratio of (Capital × Time Period)
Anand
Preeti
Dev
Rs. 1310
Rs. 1350
Rs. 1140
131 parts
135 parts
114 parts
Ratio = 131 : 135 : 114
Calculations:
=> Since the time period is 1 year for all investors, the profit ratio simplifies to the ratio of their original investments.

=> Profit ratio of Anand : Preeti : Dev = 1310 : 1350 : 1140

=> Simplifying the ratio by canceling out the common zero = 131 : 135 : 114

=> Total profit ratio parts = 131 + 135 + 114 = 380

=> Dev's share = (Dev's ratio ÷ Total ratio) × Total profit

=> Dev's share = (114 ÷ 380) × 1630

=> Dev's share = (3 ÷ 10) × 1630

=> Dev's share = 3 × 163 = 489

Therefore The correct answer is Rs. 489.

Additional Information

Simple Partnership

When all partners invest their capital for the exact same duration, the profit or loss generated is distributed solely based on the ratio of their invested amounts.

Compound Partnership

When partners invest capital for varying time periods, equivalent capitals are derived. The final profit ratio is strictly calculated as the product of capital and the time period invested (Capital × Time).

Working vs Sleeping Partner

A working partner manages the day-to-day operations of the business and usually receives a fixed salary or a specific percentage of the total profit upfront. A sleeping partner contributes only capital. The remainder of the profit is then shared among all partners based on their respective investment ratios.

Q71. Answer: (d) 117

The logic follows here,

Hence, the correct answer is "Option 4"

Q72. Answer: (b) Brother's wife

Preparing the family tree diagram by using the following symbols:

As per the given information:

Hence, the correct answer is "Option 2"

Q73. Answer: (a) QPB

Logic followed here is,

Hence, the correct answer is "Option 1"

Q74. Answer: (d) SW-NU

Logic followed here is,

Hence, the correct answer is "Option 4"

Q75. Answer: (b) Only conclusion (II) follows

The least possible diagram for the given statements is as follows:

Conclusions:

(I) Some letters are schedules. - False (As their is no relation between letters and schedules. Some letters and schedules may be possible but not definite. Hence, it is false)

(II) Some mails are schedules. - True (All schedules are mails. Some Schedule are mails and Some mails are schedules True).

Only conclusion (II) follows

Hence, the correct answer is "Option 2"

Q76. Answer: (a) (47, 144, 4)

Logic : Second Number = (First Number x 3) + (Third Number - 1)

The logic follows here,

Similarly,

Hence, the correct answer is "Option 1"

Q77. Answer: (c) 15

Given: 48 D 14 B 3 C 27 A 3 = ?

If ‘A’ stands for ‘÷’, ‘B’ stands for ‘x’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘–’,

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BODMAS Table:
48 - 14 x 3 + 27 ÷3 = ?
48 - 14 x 3 + 9 = ?
48 - 42 + 9 = ?
6 +9 = ?
15.
Hence, the correct answer is "Option 3"

Q78. Answer: (d) NTYE

Logic followed here is,
Hence, the correct answer is "Option 4"

Q79. Answer: (c) REBW

Logic followed here is,
Hence, the correct answer is "Option 3"

Q80. Answer: (b) L

Seven people, I, J, K, L, M, N and O, are sitting in a row, facing north.
• Only J sits to the left of O.
• Only four people sit between J and I.
• Only K sits between M and N, and M is not an immediate neighbor of I
The Final Arrangement is,
Hence, the correct answer is "Option 2"

Q81. Answer: (c) 6

Given :(Left) 8 & % 1 @ 2 3 $ 9 & 6 Ω 4 # 5 * £ 7 (Right)
Required Conditions: All the symbols are dropped
(Left) 8 1 2 3 9 6 4 5 7 (Right)
Hence, the correct answer is "Option 3"

Q82. Answer: (c) 6 km towards the east

Rahul starts from Point Y and drives 14 km towards the north.
• He then takes a right turn, drives 6 km, then he turns right and drives 20 km.
• He then takes a right turn and drives 12 km.
• He takes a final right turn, drives 6 km and stops at Point Z
The Final Diagram,
Hence, the correct answer is "Option 3"

Q83. Answer: (c) ADFD

Logic followed here is,
Hence, the correct answer is "Option 3"

Q84. Answer: (d) pb

‘reading is important’ is written as ‘pb mk lo’
‘is it raining’ is coded as ‘jo mt pb’
The Code for is - pb
Hence, the correct answer is "Option 4"

Q85. Answer: (b) Four

Seven boxes V, W, X, Y, Z, Q and R are kept one over the other but not necessarily in the same order.
• Only two boxes are kept below Z.
• Only one box is kept above W.
• Only one box is kept between W and Q.
• V is kept immediately above Y.
• R is kept at some place below X

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The Final Arrangement is,

X
W
R
Q
Z
V
Y

Hence, the correct answer is "Option 2"

Q86. Answer: (b) L

Seven people, I, J, K, L, P, Q, and R, are sitting in a row, facing north.

• Only J sits to the left of P.

• Only four people sit between J and I.

• Only K sits between R and Q.

• R is not an immediate neighbour of I.

The Final Arrangement is,

Hence, the correct answer is "Option 2"

Q87. Answer: (b) NQV47

The pattern followed here is

Hence, the correct answer is "Option 2"

Q88. Answer: (b) Three

Given number 7453186

1 is added to each odd digit, and 2 is subtracted from each even digit.

Hence, the correct answer is "Option 2"

Q89. Answer: (a) 54

Given Equation : 57 × 3 − 11 ÷ 7 + 42 = ?

'+' and '−' are interchanged, and '×' and '÷' are interchanged.

Here, we use the BODMAS table given below:

57 ÷ 3 + 11 × 7 − 42 = ?

19 + 11 × 7 − 42 = ?

19 + 77 − 42 = ?

96 − 42 = ?

54.

Hence, the correct answer is "Option 1"

Q90. Answer: (c) 5

'BLUE' is coded as '7524.'

'UNIT' is coded as '1356.'

The code for 'U' is 5.

Hence, the correct answer is "Option 3"

Q91. Answer: (d) 4

Given : (Left) 3 4 7 # # # 5 * £ 8 2 £ & € 2 $ £ @ 3 # 7 & (Right)

Required Condition : Number - Symbol - Symbol.

(Left) 3 4 7 # # # 5 * £ 8 2 £ & € 2 $ £ @ 3 # 7 & (Right)

Hence, the correct answer is "Option 4"

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Q92. Answer: (d) 2

Given number: 91526374

2 is added to each even digit, and 1 is subtracted from each odd digit.

The sum of second digit from the left and the third digit from the right in the new number = 0 + 2.

2.

Hence, the correct answer is "Option 4"

Q93. Answer: (a) PICK - KCPI - PCIK

The pattern followed here is

Similarly,

Hence, the correct answer is "Option 1"

Q94. Answer: (b) R

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

• M is kept fourth from the bottom.

• O is placed immediately below M.

• Q is placed immediately above R.

• P is the topmost box.

• M is placed immediately below L

The Final Arrangement is,

P
N
L
M
O
Q
R

Hence, the correct answer is "Option 2"

Q95. Answer: (b) 14 km towards north

• Rishabh starts from Point A and drives 9 km towards west.

• He then takes a left turn, drives 8 km, turns left and drives 15 km.

• He then takes a right turn and drives 6 km.

• He takes a final right turn, drives 6 km and stops at Point P.

The Final Diagram,

Hence, the correct answer is "Option 2"

Q96. Answer: (c) 116

The logic follows here,

Hence, the correct answer is "Option 3"

Q97. Answer: (c) 104

Mr. Into's rank from the top = 56

Mr. Into's rank from the bottom = 49

So, Total students = Rank from top + Rank from bottom - 1.

= 56 + 49 - 1.

= 104.

Hence, the correct answer is "Option 3"

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Q98. Answer: (b) OH-RN

The pattern followed here is

Hence, the correct answer is "Option 2"

Q99. Answer: (d) Only conclusion (I) follows.

The least possible Venn diagram for the given statements is as shown below :

Conclusion (I): Some notes are tables. - True (Some notes are books. All books are tables. Some notes are tables is true).

Conclusions (II): All tables are books. - False (All books are tables. but all tables are books is may be possible but not definte. Hence, it is false.

Only conclusion (I) follows.

Hence, the correct answer is "Option 4"

Q100. Answer: (b) 138

The logic follows here,

Hence, the correct answer is "Option 2"

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