RRB NTPC (UG) CBT-I Official Paper (Held On: 19 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. A flat or gently sloping surface left behind after river erosion, often with some resistant remnants, is known as:

(a) Monadnock
(b) Plateau
(c) Floodplain
(d) Peneplain

Q2. Wind energy is best harnessed in which of the following Indian states?

(a) Madhya Pradesh
(b) Bihar
(c) Jharkhand
(d) Gujarat

Q3. Which of the following practices is most suitable for preventing land degradation in arid areas?

(a) Contour ploughing
(b) Shifting cultivation
(c) Shelterbelt plantation
(d) Terrace farming

Q4. What was the focus of World Water Day, observed globally on 22 March 2025?

(a) Water for peace
(b) Water and climate change
(c) Accelerating change
(d) Glacier preservation

Q5. In some file management programs, which shortcut key combination is used to copy a selected item instead of moving it?

(a) Alt + Del
(b) Alt + F4
(c) Alt + Ins
(d) Alt + Tab

Q6. Which institution played a major role in supporting India’s liberalisation policy during the 1991 crisis?

(a) Reserve Bank of India
(b) Election Commission of India
(c) NITI Aayog
(d) International Monetary Fund (IMF)

Q7. In the post-reform era, fiscal prudence became central to macroeconomic stability. Which of the following Acts was enacted in 2003 to institutionalise fiscal discipline in India?

(a) Companies Act
(b) Banking Regulation Act
(c) FEMA Act
(d) Fiscal Responsibility and Budget Management Act

Q8. Which of the following options best describes the main function of an operating system?

(a) Compiling high-level code
(b) Displaying web pages
(c) Managing computer hardware and software resources
(d) Performing arithmetic operations

Q9. Which of the following powers is exercised by the Union Council of Ministers in India?

(a) Conducting judicial reviews
(b) Supervising state legislatures
(c) Declaring war
(d) Framing policies and advising the President

Q10. The Northern Plain of India is formed by the interplay of the three major river systems, namely the Indus, the Ganga and the _____, along with their tributaries.

(a) Brahmaputra
(b) Narmada
(c) Damodar
(d) Mahanadi

Q11. What is the relation between the frequency (f) and time period (T) of a sound wave?

(a) f = T
(b) f = 1/T
(c) f = T/2
(d) f = 2T

Q12. In organising the Rowlatt Satyagraha, Mahatma Gandhi was assisted by Abdul Bari of the Firangi Ulema group based in _____.

(a) Kanpur
(b) Patna
(c) Aligarh
(d) Lucknow

Q13. The All-India Services Act, 1951, allows which authority to frame rules for All-India service recruitment?

(a) President of India
(b) Central Government
(c) The Parliament of India
(d) Union Public Service Commission

Q14. Who became the youngest player to score over 700 runs in a single IPL season in 2025?

(a) Sai Sudharsan
(b) Ruturaj Gaikwad
(c) Yashasvi Jaiswal
(d) Shubman Gill

Q15. Dating back to 1639-1640 CE, which construction, located in Chennai, India, is historically known as the primary English defense post?

(a) Sadras Dutch Fort
(b) Fort St. George

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(c) Fort St. David
(d) Gingee Fort

Q16. What is the primary objective of the Yashoda AI initiative launched by the National Commission for Women (NCW) in May 2025?
(a) To promote traditional crafts among women artisans
(b) To provide financial assistance to women entrepreneurs
(c) To enhance AI literacy and digital awareness among women
(d) To offer healthcare services to rural women

Q17. In which year did Paul Ehrlich receive the Nobel Prize for discovering the first chemotherapeutic agent, salvarsan?
(a) 1905
(b) 1908
(c) 1913
(d) 1901

Q18. Sanskrit language is mainly used for creating:
(a) folk songs and pop music
(b) tribal stories
(c) modern novels
(d) ancient religious texts and epics

Q19. How many seats did the BJP win in the February 2025 Delhi Assembly elections?
(a) 48
(b) 22
(c) 62
(d) 70

Q20. Which Indian Billiard player won his 28^(th) World Billiards Title at IBSF World Billiards Championship in Doha, Qatar in November 2024?
(a) Rupesh Shah
(b) Pankaj Advani
(c) Sourav Kothari
(d) Yasin Merchant

Q21. Which of the following is a government initiative aimed at improving urban infrastructure in Indian cities?
(a) Atal Bhujal Yojana
(b) Smart Cities Mission
(c) Swachh Bharat Gramin
(d) Pradhan Mantri Gram Sadak Yojana

Q22. What significant space-related agreement did Bangladesh join in 2025?
(a) The Moon Treaty
(b) The Outer Space Treaty
(c) The Artemis Accords
(d) The SpaceX International Partnership

Q23. What was a key reform introduced by the Waqf (Amendment) Act, 2025?
(a) Clergy-only Waqf management
(b) Audit exemption for Waqf assets
(c) Abolition of old Waqf properties
(d) Inclusion of Muslim women on Waqf Boards

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Q24. Which missile defence system, named Sudarshan Chakra, was used by India to intercept drones and missiles during Pakistan's attempted strikes in May 2025?

(a) Prithvi Air Defence
(b) S-400 Triumf
(c) Akashteer
(d) Barak 8

Q25. India recently assumed the Chairmanship of which organisation from Bangladesh during the 13^(th) Governing Council Meeting held in Malé, Maldives?

(a) South Asian Association for Regional Cooperation (SAARC)
(b) Indian Ocean Rim Association (IORA)
(c) Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
(d) Bay of Bengal Inter-Governmental Organisation (BOBP-IGO)

Q26. Under Akbar, who was responsible for revenue and financial supervision across the entire Mughal Empire?

(a) Vakil
(b) Subadar
(c) Mir Bakhshi
(d) Diwan-i-Kul

Q27. What happens to excess carbohydrates in the body?

(a) They are turned into proteins.
(b) They are converted into amino acids and stored.
(c) They are converted into fat and stored.
(d) They are excreted immediately.

Q28. What is the key reason governments promote Public-Private Partnerships in infrastructure development?

(a) To address fiscal constraints and reduce liabilities
(b) To improve efficiency and innovation through private sector expertise
(c) Due to lack of trained manpower
(d) To privatise all national resources

Q29. Researchers of which university produced India's first gene-edited sheep?

(a) Chandigarh University
(b) IIT Madras
(c) Sher-e-Kashmir University
(d) IIT Kanpur

Q30. Which of the following launch vehicles did ISRO use for its 100^(th) mission in 2025?

(a) PSLV C58
(b) GSLV F15
(c) SSLV D2
(d) LV Mk III

Q31. Which one of the acts is known as the first step towards constitutional development in India?

(a) Indian Councils Act, 1861
(b) Regulating Act, 1773
(c) Pitt's India Act, 1784
(d) Charter Act, 1813

Q32. Which of the following freedom fighters led the Rampa Rebellion of 1922 against forest laws?

(a) Ashfaqullah Khan
(b) Alluri Sitarama Raju
(c) Jatindra Nath Das
(d) Surya Sen

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Q33. Which of the following Articles was introduced by the 86^(th) Amendment to impose a duty on parents to educate children?

(a) Article 51A(k)
(b) Article 45
(c) Article 39A
(d) Article 21A

Q34. Which season in India is characterised by high temperature and low humidity?

(a) Retreating Monsoon
(b) Cold Weather Season
(c) Southwest Monsoon
(d) Hot Weather Season

Q35. What was one of the major characteristics of India's economy at the time of independence in 1947?

(a) Self-sufficiency in manufacturing
(b) Strong trade surplus
(c) Heavy dependence on agriculture and low productivity
(d) Dominance of the services sector

Q36. In May 2025, India approved the execution model for which indigenous fifth-generation fighter aircraft program?

(a) Advanced Medium Combat Aircraft (AMCA)
(b) Medium Combat Aircraft (MCA)
(c) HAL Twin Engine Deck Based Fighter (TEDBF)
(d) Tejas Mk2

Q37. In which of the following cities was the Sepak Takraw 2025 World Cup (ISTAF) held in India in March 2025?

(a) Mumbai
(b) Patna
(c) Bengaluru
(d) New Delhi

Q38. Which Rajput ruler founded the Gurjara-Pratihara dynasty in Malwa during the 8th century CE?

(a) Nagabhatta I
(b) Mihira Bhoja
(c) Vatsaraja
(d) Dhruva

Q39. Who led the Tamar tribal revolts against the British in India?

(a) Tilka Manjhi
(b) Sidhu Murmu
(c) Ganga Narain Singh
(d) Bhola Nath Sahay

Q40. Which of the following is a primary function of the District Courts in India?

(a) Advising the President of India
(b) Hearing appeals from lower courts within the district
(c) Settling disputes between Union and State governments
(d) Issuing writs to enforce fundamental rights (without High Court)

MATHEMATICS

Q41. The average of first 150 odd natural numbers, is:

(a) 150.5
(b) 151
(c) 150

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(d) 149.5

Q42. If the interest earned during the 2^(nd) year on a certain sum is Rs. 3,342, and the rate of interest is 20% per annum compounded annually, then the sum is:

(a) Rs. 13,285
(b) Rs. 13,925
(c) Rs. 14,900
(d) Rs. 14,075

Q43. If 2 times a son's age is added to his father's age, the sum is 36 years. If 2.5 times the father's age is added to the son's age, the sum is 72 years. What is the father's age (in years)?

(a) 27
(b) 31
(c) 23
(d) 32

Q44. The HCF of two numbers is 9 and the product of the two numbers is 8100. How many pairs of numbers satisfy the given conditions?

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

Q45. The product of two consecutive positive natural numbers is 650. The greater of the two numbers is:

(a) 29
(b) 43
(c) 26
(d) 31

Q46. Prashant and Nisha have to travel from Delhi to Kanpur in their respective cars. Prashant is driving at 72 km/hr while Nisha is driving at 64 km/hr. Find the time taken by Nisha to reach Kanpur if Prashant takes 16 hours.

(a) 24 hours
(b) 18 hours
(c) 8 hours
(d) 20 hours

Q47. An item is marked at Rs. 1,200. Successive discounts of 20% and 10% are given. What is the final selling price?

(a) Rs. 864
(b) Rs. 960
(c) Rs. 900
(d) Rs. 880

Q48. Find the simple interest (in Rs.) on Rs. 1,200 at an interest rate of 3% per month in 7 months.

(a) 252
(b) 41
(c) 21
(d) 42

Q49. The H.C.F. and the L.C.M. of two numbers are 51 and 306 respectively. If one of the numbers is 102, find the other one.

(a) 102
(b) 204
(c) 175
(d) 153

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Q50. Nitin bought some sharpeners at the rate of Rs. 180/dozen. He sold them for Rs. 20 each. His profit percentage is _____% (rounded off to two decimal places).

(a) 33.33
(b) 35.33
(c) 31.33
(d) 37.33

Q51. A can do a work in 17 days and B can do the same work in 19 days. If they work on it together for 6 days, then what fraction of the work is left?

(a) 107/323
(b) 109/323
(c) 110/323
(d) 104/323

Q52. Aanya has to reach Bangalore which is 861 km away in 15 hours. His starting speed for 8 hours was 37 km/hr. For the next 136 km his speed was 34 km/hr. By what speed he must travel now so as to reach Bangalore in the decided time of 15 hours?

(a) 141 km/hr
(b) 143 km/hr
(c) 147 km/hr
(d) 146 km/hr

Q53. Evaluate: 16 + 12 ÷ 6 − 3 × 4

(a) 8
(b) 5
(c) 9
(d) 6

Q54. Find the value of x satisfying: $3(2x^2 - 5) - 2(3x^2 + 4x - 8) = 20$

(a) -29/8
(b) -11/8
(c) -19/8
(d) -21/8

Q55. Simplify the following.

18 × (3 × (32)) ÷ 13 + 66 - 74

(a) 391/13
(b) 387/13
(c) 382/13
(d) 389/13

Q56. If the 6-digit number N65M04 is divisible by 11, then which of the options below can give a possible correct relation between M and N?

(a) M - N = 1
(b) M = N
(c) M - N = -5
(d) M + N = 5

Q57. 1/(sec A (1 - tan A)) + 1/(cosec A (1 - cot A)) is equal to:

(a) cos A sin A
(b) 1/(cos A sin A)
(c) cos A - sin A
(d) cos A + sin A

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Q58. Which of the following numbers divides 311916399?

(a) 7
(b) 13
(c) 2
(d) 3

Q59. In an election between two candidates, 80% of the registered voters cast their vote and 20% of the votes polled were found invalid. The winning candidate got 60% of the valid votes and won the election by a margin of 2144 votes. How many voters were registered?

(a) 16749
(b) 16747
(c) 16753
(d) 16750

Q60. A shirt is marked at Rs. 800. A shopkeeper offers a discount of 25% on it. What is the selling price of the shirt after the discount?

(a) Rs. 600
(b) Rs. 650
(c) Rs. 700
(d) Rs. 750

Q61. By selling an article at 8/13 of its actual selling price, Ramesh incurs a loss of 20%. If he sells it at 85% of its actual selling price, then the profit percentage is:

(a) 9.3%
(b) 8.2%
(c) 12.3%
(d) 10.5%

Q62. An amount of Rs. 616 is divided among three persons in the ratio of 5 : 12 : 11. The difference between the largest and the smallest shares (in Rs.) in the distribution is:

(a) 154
(b) 86
(c) 69
(d) 112

Q63. By how much is 65% of 75 greater than of 15?

(a) 36.75
(b) 33.75
(c) 30.75
(d) 34.75

Q64. The average weight (in kg) of a family of five members whose weights are 40 kg, 49 kg, 56 kg, 75 kg and 35 kg is:

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

Q65. Pipe P can fill 3/7 part of a tank in 12 hours, and pipe Q can fill 5/6 part of the same tank in 10 hours. Both P and Q were kept open for 2 hours, then both were closed. Pipe R alone was then opened and it emptied the water in the tank in 5 hours. Pipes P, Q and R together can fill the empty tank in:

(a) 24 hours
(b) 27 hours
(c) 14 hours
(d) 33 hours

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Q66. If 18% of first number is equal to two-fifths of second number, what is the ratio of first number to the second number?

(a) 20 : 9
(b) 16 : 10
(c) 21 : 6
(d) 18 : 7

Q67. The perimeter of a square is 340 m. Its area (in m^2) is:

(a) 7204
(b) 7200
(c) 7207
(d) 7225

Q68. Aman and Pawan together invested Rs. 76,500 in a business. At the end of the year, out of a total profit of Rs. 20,000, Pawan's share was Rs. 4,800. What was the difference between their investments?

(a) Rs. 39,780
(b) Rs. 40,609
(c) Rs. 39,923
(d) Rs. 41,601

Q69. ABCD is a trapezium in which BC || AD and AC = CD. If angle ABC = 17 deg and angle BAC = 125 deg, then what is the measure of angle ACD (in degree)?

(a) 104°
(b) 95°
(c) 106°
(d) 105°

Q70. Find the surface area of a sphere whose diameter is 14 cm. (Use π=22/7)

(a) 716 cm^2
(b) 516 cm2
(c) 816 cm2
(d) 616 cm2

GENERAL INTELLIGENCE AND REASONING

Q71. If 2 is added to each even digit and 4 is subtracted from each odd digit in the number 925746, what will be difference between the highest and second lowest digits thus formed?

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

Q72. Refer to the following number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) ^ > & 5 > ^ 3 6 < + $ % * % 7 1 % 2 + 2 1 (Right)

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

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

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Q73. In a certain code language, ‘WHAT’ is coded as ‘3157’ and ‘HORN’ is coded as ‘2416’. What is the code for ‘H’ in the given code language?

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

Q74. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

UTP CBX KJF SRN ?

(a) VZA
(b) AZV
(c) AVZ
(d) VAZ

Q75. A, B, C, D, E, F and G are sitting around a circular table facing the centre. Only two people sit between C and G when counted from the left of G. A sits third to the left of D. E sits to the immediate right of D. E sits second to the left of C. B is an immediate neighbour of A. How many people sit between B and E when counted from the right of B?

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

Q76. What will come in the place of the question mark (?) in the following equation, if ‘+’ and ‘÷’ are interchanged, and ‘−’ and ‘×’ are interchanged?

24 + 3 × 10 − 2 ÷ 41 = ?

(a) 36
(b) 22
(c) 41
(d) 29

Q77. 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) TQ−PM
(b) ZW−VS
(c) NK−II
(d) IF−EB

Q78. LEAV is related to SLHC in a certain way based on the English alphabetical order. In the same way, NGCX is related to UNJE. To which of the given options is IBXS related, following the same logic?

(a) PIEZ
(b) PZEW
(c) PEZI
(d) PIZE

Q79. In a certain code language,

A + B means 'A is the brother of B', A@B means 'A is the wife of B',

A¥ B means 'A is the son of B' and A ÷ B means 'A is the father of B'.

How is D related to G if 'D ¥ O ÷ I + N @ G'?

(a) Wife's brother
(b) Wife's brother's wife
(c) Wife's father's sister
(d) Wife's father

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Q80. VALG is related to YYOE in a certain way based on the English alphabetical order. In the same way, BWRC is related to EUUA. To which of the given options is HSXY related, following the same logic?

(a) KQAW
(b) LQBW
(c) LPZV
(d) JRBU

Q81. 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:

All chisels are hammers.

No hammer is a maize.

Conclusions

(I): No chisel is a maize.

(II): Some maize are hammers.

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

Q82. PXTQ is related to NVRO in a certain way based on the English alphabetical order. In the same way, MUQN is related to KSOL. To which of the given options is JRNK related, following the same logic?

(a) PHLI
(b) HPIL
(c) PHIL
(d) HPLI

Q83. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order. F is kept second from the bottom. Only three boxes are kept between F and C. E is kept at one of the positions below F. Only G is kept between C and D. B is kept at one of the positions above C. How many boxes are kept between C and D?

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

Q84. 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) ZJ - DD
(b) CU - GO
(c) HR - ML
(d) XB - BV

Q85. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

30, 125

25, 105

(a) 40, 155
(b) 35, 130
(c) 20, 85

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(d) 15, 60

Q86. If + means −, − means ×, × means ÷ and ÷ means +, then what will come in place of the question mark (?) in the following equation?

21 + 70 × 10 ÷ 5 − 2 = ?

(a) 24
(b) 36
(c) 18
(d) 42

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

CE 17 GI 19 KM 23 OQ 29 ?

(a) RU 37
(b) RT 37
(c) ST 37
(d) SU 37

Q88. Vijay starts from his home and drives 5 km towards north. He then takes a left turn, drives 5 km, turns left, and drives 5 km. He then takes a left turn and drives 3 km and reaches his office. In which direction is the office with respect to his home? (Note: All turns are 90° turns only, unless specified.)

(a) North
(b) West
(c) South-west
(d) North-west

Q89. All 45 people are standing in a row facing north. Tina is 20th from the right end while Belamit is 28th from the left end. How many people are there between Tina and Belamit?

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

Q90. All 45 people are standing in a row facing north. Tina is 20^(th) from the right end while Belamit is 28^(th) from the left end. How many people are there between Tina and Belamit?

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

Q91. Vslam starts from Point A and drives 17 km towards West. He then takes a left turn, drives 9 km, turns right and drives 5 km. He then takes a right turn and drives 12 km. He takes a final right turn, drives 22 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) 4 km to the East
(b) 1 km to the South
(c) 2 km to the West
(d) 3 km to the South

Q92. What should come in place of the question mark (?) in the given series?

96 105 115 126 138 ?

(a) 151
(b) 120
(c) 150
(d) 152

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Q93. What should come in place of the question mark (?) in the given series?

45 63 87 105 129 147 171 ?

(a) 189
(b) 193
(c) 185
(d) 197

Q94. Seven people, A, B, C, D, P, Q and R, are sitting in a row, facing north. No one sits to the left of Q. Only four people sit between Q and D. Only three people sit to the right of R. C sits to the immediate left of P. B is not an immediate neighbour of R. Who sits third to the left of B?

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

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

(a) YG - BB
(b) ND - QX
(c) AP - DK
(d) SJ - VE

Q96. Seven boxes C, D, E, M, N, O and P are kept one over the other but not necessarily in the same order.

Only two boxes are kept between O and M. Only E is kept above N. No box is kept below M. C is kept at some place below D but at some place above P. Which box is kept third above P?

(a) C
(b) N
(c) M
(d) D

Q97. If 1 is added to each even digit and 2 is subtracted from each odd digit in the number 8265943, how many digits will appear more than once in the new number thus formed?

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

Q98. This question is based on the five, three-digit numbers given below.

(Left) 617 259 165 784 349 (Right)

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

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

What will be the resultant if the third digit of the lowest number is subtracted from the second digit of the highest number?

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

Q99. In a certain code language, ‘BIRD’ is coded as ‘7394’ and ‘DRIP’ is coded as ‘4392’. What is the code for ‘P’ in the given code language?

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

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(d) 3

Q100. 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.

Statement:

Some Googles are apples.

Some apples are Amazons.

Conclusions:

I. Some Googles are Amazons.

II. No Google is an Amazon.

(a) Neither conclusion (I) nor (II) follows.

(b) Only conclusion (II) follows.

(c) Only conclusion (I) follows.

(d) Both conclusions (I) and (II) follow.

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) Peneplain

The correct answer is Peneplain.

Key Points

• A peneplain refers to a nearly level or gently undulating surface formed due to prolonged river erosion under stable tectonic conditions.

• It represents the final stage of fluvial erosion, where the landmass approaches base level and loses significant relief.

• Peneplains are often characterized by residual hills or monadnocks that resist erosion due to their harder rock composition.

• These surfaces are indicative of long-term geological stability and minimal uplift activity in the region.

• The concept of peneplain was first introduced by geologist William Morris Davis as part of his cycle of erosion theory.

Additional Information

• Monadnock

• A monadnock is an isolated residual hill or mountain that stands above a peneplain.

• It is composed of harder rock that resists erosion, unlike the surrounding softer rock layers.

• Examples include Mount Monadnock in New Hampshire, USA.

• Floodplain

• A floodplain is a flat area adjacent to a river that is periodically flooded.

• It is formed by sediment deposition during flooding events.

• Floodplains are often fertile and used for agriculture.

• Plateau
• Plateaus are elevated flat-topped landforms, often bounded by steep sides.
• They can be formed by volcanic activity, tectonic uplift, or erosion.
• Examples include the Deccan Plateau in India.
• Cycle of Erosion
• Proposed by William Morris Davis, this theory describes the stages of landscape development: youthful, mature, and old age.
• The old age stage leads to the formation of a peneplain.
• It has been critiqued but remains a foundational concept in geomorphology.

Q2. Answer: (d) Gujarat

The correct answer is Gujarat.

Key Points

• Gujarat ranks among the top states in India for harnessing wind energy due to its geographical location and favorable wind conditions.
• The state has a vast coastline of around 1,600 kilometers, which contributes to consistent and strong wind flow, ideal for wind energy generation.
• Gujarat has several wind farms and projects, such as those in Kutch and Saurashtra regions, which are key contributors to wind energy production.
• The state has a well-developed infrastructure for renewable energy, supported by proactive government policies and investments in wind power projects.
• According to the Ministry of New and Renewable Energy (MNRE), Gujarat is one of the leading contributors to India's wind energy capacity, along with Tamil Nadu, Maharashtra, and Rajasthan.

Additional Information

• Wind Energy in India:
• India is the fourth-largest producer of wind energy globally, following China, the US, and Germany.
• Wind energy is a renewable and environmentally friendly source of power derived from the kinetic energy of wind.
• The Indian government aims to achieve 60 GW of wind energy capacity as part of its renewable energy targets.
• Advantages of Wind Energy:
• It is a clean and sustainable energy source, reducing dependence on fossil fuels.
• Wind farms have minimal operational costs once established.
• Wind energy contributes to reducing carbon emissions and combating climate change.
• Challenges in Harnessing Wind Energy:
• Wind energy generation is dependent on location and requires high wind speeds.
• Initial installation costs for wind turbines and infrastructure are high.
• Land acquisition and environmental concerns sometimes pose hurdles in setting up wind farms.
• Key Policies Supporting Wind Energy:
• The National Wind-Solar Hybrid Policy aims to promote hybrid power projects for efficient utilization of infrastructure and resources.
• State Renewable Energy Policies, such as Gujarat's renewable energy incentives, encourage investments in wind energy projects.
• The Indian Renewable Energy Development Agency (IREDA) provides financial support for renewable energy initiatives, including wind power projects.

Q3. Answer: (c) Shelterbelt plantation

The correct answer is Shelterbelt plantation.

Key Points

• Shelterbelt plantation involves planting rows of trees and shrubs to protect land from wind erosion, which is a significant issue in arid areas.
• These plantations act as windbreaks, reducing the speed of wind and preventing the removal of topsoil.
• Shelterbelts also help in maintaining soil moisture by reducing evaporation caused by strong winds.
• The roots of the trees stabilize the soil, reducing the risk of desertification and promoting vegetation growth.
• This practice is widely recognized as one of the most sustainable solutions to combat land degradation in arid regions.

Additional Information

• Land Degradation: It refers to the decline in the productive capacity of land due to natural or human-induced processes such as

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erosion, deforestation, and overgrazing.

• Arid Areas: These regions receive very low rainfall, have high evaporation rates, and are characterized by sparse vegetation, making them prone to desertification.

• Desertification: This is the process by which fertile land transforms into desert due to factors like climate change, deforestation, and unsustainable agricultural practices.

• Contour Ploughing: While effective in hilly areas to prevent soil erosion, it is less suitable for flat, arid regions compared to shelterbelt plantations.

• Terrace Farming: This method is primarily used in mountainous regions to prevent soil erosion and is not suitable for arid areas.

• Shifting Cultivation: Though practiced in some regions, it often leads to deforestation and is not an effective method for preventing land degradation in arid areas.

Q4. Answer: (d) Glacier preservation

The correct answer is Glacier preservation.

Key Points

• World Water Day is observed annually on 22 March to raise awareness about the importance of freshwater resources.

• The theme for World Water Day 2025 is “Glacier preservation”, focusing on the critical importance of protecting glaciers as freshwater reserves.

• Glaciers store approximately 70% of the world’s freshwater, highlighting their significance in global water security.

• The initiative emphasizes the urgent need to address glacier melting due to climate change, which poses risks to ecosystems, water supply, and communities.

• World Water Day 2025 aligns with the United Nations Sustainable Development Goal (SDG) 6: Clean Water and Sanitation, aiming to ensure water availability and sustainable management for all.

Additional Information

• Glaciers and their Importance

• Glaciers are large masses of ice that form over centuries from compacted snow.

• They act as natural water reservoirs, releasing water during warmer months to sustain rivers and ecosystems.

• Glacier-fed rivers provide water for drinking, agriculture, and hydropower in many regions.

• Impact of Climate Change on Glaciers

• Rising global temperatures are causing glaciers to melt at an alarming rate.

• This contributes to rising sea levels, threatening coastal and low-lying areas.

• Melting glaciers disrupt water availability, affecting agriculture and biodiversity.

• United Nations and Glacier Preservation

• The United Nations promotes glacier preservation through global awareness campaigns and international cooperation.

• Efforts include monitoring glacier health and reducing greenhouse gas emissions to mitigate climate impacts.

• Global Initiatives for Water Conservation

• World Water Day serves as a platform to promote water conservation and sustainable practices.

• Organizations and governments collaborate to implement policies addressing water scarcity and pollution.

Q5. Answer: (c) Alt + Ins

The correct answer is Alt + Ins.

Key Points

• Alt + Ins is a shortcut key combination used in some file management programs to copy a selected item instead of moving it.

• This shortcut is particularly useful for duplicating files or folders without altering the original location.

• It ensures the copied item retains its attributes, such as file name and format, identical to the original.

• File management programs often utilize such shortcuts to streamline operations and enhance productivity.

• Keyboard shortcuts like Alt + Ins are designed to minimize the use of a mouse, offering an efficient way to perform common tasks.

Additional Information

• Keyboard Shortcuts: These are combinations of keys that provide quick access to specific functions within software programs.

• Copy vs. Move: Copying creates a duplicate of the original file in a new location, whereas moving transfers the original file to the new location.

• Alt Key: The Alt key is a modifier key on computer keyboards used to access alternate functions of other keys.

• Efficiency in File Management: Utilizing shortcuts like Alt + Ins reduces manual operations, saving time for users.

• Context-Sensitive Shortcuts: Certain shortcuts, including Alt + Ins, may function differently depending on the software or

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operating system in use.

Q6. Answer: (d) International Monetary Fund (IMF)

The correct answer is International Monetary Fund (IMF).

Key Points

• The International Monetary Fund (IMF) played a pivotal role in supporting India during the 1991 balance of payments crisis by providing financial assistance and policy guidance.

• India implemented liberalisation policies, including structural reforms, as a condition to access the IMF's financial aid package.

• The IMF's intervention led to the devaluation of the Indian rupee and measures to open up the Indian economy to global trade and investment.

• The 1991 reforms marked the beginning of economic liberalisation, which significantly impacted India's growth trajectory in the following decades.

• The IMF's support ensured economic stability and helped India avert a potential default on its international financial obligations during the crisis.

Additional Information

• Balance of Payments Crisis: India faced a severe balance of payments crisis in 1991 due to high fiscal deficits, rising debt, and dwindling foreign exchange reserves.

• Structural Adjustment Program: The IMF prescribed economic reforms under its Structural Adjustment Program, including fiscal consolidation, trade liberalisation, and deregulation.

• Economic Liberalisation: The 1991 crisis marked the beginning of India's economic liberalisation, which included privatisation, deregulation, and opening up to foreign investment.

• Devaluation of Rupee: As part of the IMF's conditions, the Indian government devalued the rupee to boost exports and stabilise the economy.

• Impact on Indian Economy: The reforms initiated during the crisis laid the foundation for sustained economic growth, increased foreign investment, and significant industrialisation in subsequent years.

Q7. Answer: (d) Fiscal Responsibility and Budget Management Act

The correct answer is Fiscal Responsibility and Budget Management Act.

Key Points

• The Fiscal Responsibility and Budget Management (FRBM) Act was enacted in 2003 by the Government of India to institutionalize fiscal discipline.

• The primary objective of the FRBM Act is to ensure long-term macroeconomic stability by reducing fiscal deficits and promoting efficient management of public finances.

• The Act requires the government to set annual targets for reducing fiscal deficit and revenue deficit as a percentage of GDP.

• It mandates the presentation of a Medium-Term Fiscal Policy Statement and Fiscal Policy Strategy Statement along with the Union Budget.

• The FRBM Act was amended several times, with significant changes introduced in 2018, including the adoption of a debt-to-? target of 40% for the central government.

Additional Information

• Fiscal Deficit: It is the difference between the government's total expenditure and its total revenue, excluding borrowings. It indicates the extent to which the government needs to borrow to meet its expenses.

• Revenue Deficit: It refers to the shortfall in the government's revenue receipts compared to its revenue expenditure, excluding capital expenditures.

• Debt-to-GDP Ratio: This is a measure of a country's debt relative to its economic output. A lower ratio indicates better fiscal health.

• Medium-Term Fiscal Policy Statement: A document presented under the FRBM Act that outlines the government's fiscal objectives and policies for the coming three years.

• Challenges in Implementation: Factors such as global economic uncertainties, fluctuating tax revenues, and the need for increased spending during crises (e.g., pandemic) pose challenges in adhering to FRBM targets.

Q8. Answer: (c) Managing computer hardware and software resources

The correct answer is Managing computer hardware and software resources.

Key Points

• An operating system (OS) is the core software that manages computer hardware and software resources efficiently.

• It acts as a bridge between the user and the computer hardware, enabling communication and execution of tasks.

• Primary functions include managing memory allocation, process scheduling, and storage devices.

• Operating systems provide a platform for running applications and ensure that resources are distributed fairly among processes.

• Examples of widely used operating systems include Windows, Linux, macOS, and Android.

Additional Information

• Kernel: The core component of an operating system that manages system resources and hardware communication.

• Types of Operating Systems: Includes batch OS, multitasking OS, distributed OS, real-time OS, and network OS.

• Process Management: The OS schedules and coordinates processes to ensure efficient execution and resource utilization.

• File System Management: The OS organizes, stores, and retrieves files on storage devices using file systems like NTFS, FAT32, or ext4.

• Virtual Memory: A technique used by the OS to extend the physical memory by using disk space as temporary memory.

Q9. Answer: (d) Framing policies and advising the President

The correct answer is Framing policies and advising the President.

Key Points

• The Union Council of Ministers is responsible for framing policies and providing advice to the President of India, as stipulated under Article 74 of the Indian Constitution.

• It comprises the Prime Minister and other ministers who collectively exercise executive powers of the Union Government.

• The Council of Ministers plays a key role in decision-making processes related to governance, administration, and legislation.

• All decisions taken by the Union Council of Ministers are communicated to the President, who acts on their advice unless constitutional provisions dictate otherwise.

• The Council also ensures smooth functioning of ministries and oversees implementation of laws and policies at the national level.

Additional Information

• Article 74 of the Indian Constitution:

• States that there shall be a Council of Ministers with the Prime Minister at the head to aid and advise the President.

• The President is bound to act in accordance with the advice given by the Council of Ministers, except in certain situations outlined by the Constitution.

• Union Executive:

• Consists of the President, Vice President, Prime Minister, and the Council of Ministers.

• The Council of Ministers is divided into Cabinet Ministers, Ministers of State, and Deputy Ministers.

• The Cabinet is the highest decision-making body within the Council.

• Prime Minister’s Role:

• The Prime Minister is the head of the Union Council of Ministers and acts as a bridge between the President and the Council.

• He/she allocates portfolios to ministers and ensures policy decisions are implemented effectively.

• Legislative Power:

• While the Council of Ministers does not directly legislate, it plays a vital role in drafting bills and policies presented to Parliament.

• The Council provides inputs and advice to the President on legislative matters.

• Executive Powers:

• The Council exercises executive powers to ensure the governance of the nation is carried out effectively.

• These powers include policy formulation, administration of ministries, and directing national programs.

Q10. Answer: (a) Brahmaputra

The correct answer is Brahmaputra.

Key Points

• The Northern Plains of India are formed by the deposition of silt carried down by the three major rivers: Indus, Ganga, and Brahmaputra, along with their tributaries.

• The Brahmaputra River originates from the Angsi Glacier in Tibet, flows through India, and enters Bangladesh, contributing significantly to the alluvial deposits of the region.

• This plain is one of the most fertile regions in the world and supports extensive agriculture, making it vital for India's food security.

• The Brahmaputra also plays a significant role in irrigation, navigation, and hydropower generation.

• The Northern Plains are divided into three sections based on the river systems: the Punjab Plains (Indus), the Ganga Plains, and the Brahmaputra Plains.

Additional Information

• Indus River System:

• Originates from the Tibetan Plateau near Lake Mansarovar.
• Flows through India and Pakistan, forming the western part of the Northern Plains.
• Major tributaries include Jhelum, Chenab, Ravi, Beas, and Sutlej.
• Ganga River System:
• Originates from the Gangotri Glacier in Uttarakhand.
• Flows through northern India and Bangladesh, forming the central part of the Northern Plains.
• Major tributaries include Yamuna, Son, Gandak, Kosi, and Ghaghara.
• Brahmaputra River System:
• Originates from the Angsi Glacier in Tibet, where it is known as Tsangpo.
• It flows through Arunachal Pradesh and Assam in India and later enters Bangladesh.
• Known for its massive volume and highly fertile alluvial deposits.
• Significance of the Northern Plains:
• Known as the "Granary of India" due to its high agricultural productivity.
• Supports a dense population due to fertile soil and availability of water.
• Extensive canal systems for irrigation are developed in this region.
• Forms the backbone of India's economy, particularly in agriculture and trade.

Q11. Answer: (b) f = 1/T

The correct answer is f = 1/T.

Key Points

• The frequency (f) of a sound wave is inversely proportional to its time period (T), expressed as f = 1/T.
• Frequency refers to the number of oscillations or cycles a wave completes per second, measured in Hertz (Hz).
• Time period (T) is the time taken by one complete wave cycle, typically measured in seconds (s).
• A higher frequency corresponds to a shorter time period, indicating that the wave oscillates faster.
• This relationship is fundamental to understanding wave dynamics in physics and acoustics.

Additional Information

• Wave Frequency: It is the reciprocal of the time period, signifying the rate of repetition of the wave motion. Mathematically, f = 1/T.
• Hertz (Hz): The unit of frequency, where 1 Hz equals one cycle per second.
• Time Period: Represented as T, it is calculated as the time required for one complete oscillation or wave cycle.
• Wave Motion: It is a periodic disturbance that propagates through a medium, transferring energy without transporting matter.
• Applications: Understanding frequency and time period is crucial in various fields like acoustics, communication systems, and musical instruments.

Q12. Answer: (d) Lucknow

The correct answer is Lucknow.

Key Points

• Mahatma Gandhi organized the Rowlatt Satyagraha in 1919 as a non-violent protest against the Rowlatt Act enacted by the British colonial government.
• The Rowlatt Act gave the British authorities sweeping powers to arrest and detain individuals without trial, which was widely criticized as repressive.
• Abdul Bari, a prominent figure from the Firangi Mahal Ulema group in Lucknow, played a significant role in assisting Gandhi in mobilizing support for the Satyagraha.
• The Firangi Mahal group, based in Lucknow, held substantial influence in the Muslim community and supported the idea of Hindu-Muslim unity against colonial oppression.
• The Rowlatt Satyagraha marked the beginning of Gandhi's larger campaign of nonviolent resistance against British rule in India.

Additional Information

• Rowlatt Act (1919):
• Officially known as the Anarchical and Revolutionary Crimes Act, it allowed detention without trial and curbed civil liberties.
• The act was opposed widely, leading to nationwide protests under Gandhi's leadership.
• Jallianwala Bagh Massacre:
• One of the most tragic events linked to the protests against the Rowlatt Act, where British troops opened fire on a peaceful gathering in Amritsar on April 13, 1919.

• This massacre became a turning point in India's struggle for independence, intensifying anti-British sentiments.

• Non-Violent Civil Disobedience:

• The Rowlatt Satyagraha was among the first large-scale demonstrations where Gandhi implemented his philosophy of Satyagraha (non-violent resistance).

• This approach later became the foundation of India's freedom struggle against British colonial rule.

• Firangi Mahal:

• A renowned Islamic seminary in Lucknow known for its contribution to Islamic education and jurisprudence.

• The Firangi Mahal Ulema group, including Abdul Bari, supported the Khilafat Movement and Gandhi's efforts to unite Hindus and Muslims against colonial rule.

• Impact of Rowlatt Satyagraha:

• Although the movement was withdrawn after incidents of violence, it marked the rise of Mahatma Gandhi as a mass leader in India's independence struggle.

• It also laid the groundwork for future movements like the Non-Cooperation Movement (1920-1922).

Q13. Answer: (b) Central Government

The correct answer is Central Government.

Key Points

• The All-India Services Act, 1951, empowers the Central Government to frame rules and regulations for the recruitment and conditions of service of All-India Services such as IAS, IPS, and IFS.

• This authority is derived under Article 312 of the Indian Constitution, which allows Parliament to create All-India Services common to both the Union and States.

• The Central Government ensures uniformity in service conditions and recruitment processes across states for these services.

• Rules framed by the Central Government under this Act are known as the All-India Services Rules, which cover aspects like recruitment, promotion, and disciplinary actions.

• The Act aims to maintain efficiency, integrity, and coordination in administrative services across India.

Additional Information

• All-India Services:

• These services include the Indian Administrative Service (IAS), Indian Police Service (IPS), and Indian Forest Service (IFS).

• Officers in these services serve both the Central Government and State Governments.

• They are recruited through the Union Public Service Commission (UPSC) and governed by rules framed under the All-India Services Act, 1951.

• Role of UPSC:

• The Union Public Service Commission (UPSC) conducts exams like Civil Services Examination for recruitment into All-India Services.

• It acts as an advisory body on recruitment rules framed by the Central Government.

• Article 312 of the Constitution:

• It allows Parliament to create All-India Services if deemed necessary in the national interest.

• Such services are considered vital for maintaining administrative uniformity and efficiency across the country.

• Central Government’s Role:

• It frames and implements service rules to ensure uniformity and coordination among states.

• Decisions related to pay scales, promotions, and disciplinary actions are governed centrally.

Q14. Answer: (a) Sai Sudharsan

The correct answer is Sai Sudharsan.

Key Points

• Sai Sudharsan became the youngest player to score over 700 runs in a single IPL season during IPL 2025, showcasing his exceptional batting skills and consistency.

• He achieved this milestone at the age of 21, breaking previous records held by other young players in the tournament.

• Sudharsan played a pivotal role in his team’s success, with multiple match-winning innings throughout the IPL season.

• His performances included several high-scoring innings, strike rate consistency, and adaptability to different match situations.

• Sudharsan’s achievement highlights the growing prominence of young talent in the IPL, contributing significantly to the league’s competitive nature.

Additional Information

• Indian Premier League (IPL):

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• The IPL is a professional Twenty20 cricket league established by the Board of Control for Cricket in India (BCCI) in 2008.
• It is considered one of the most popular and competitive cricket leagues globally, attracting top players from various countries.
• The league consists of franchise teams representing different cities and regions across India.
• Young players often use the IPL as a platform to showcase their talent and secure national and international opportunities.
• Emerging Players in IPL:
• The IPL introduces an Emerging Player award annually to recognize outstanding performances by players under 23 years of age.
• This initiative has helped identify and nurture several young talents who have gone on to represent their national teams.
• Players like Sai Sudharsan, Shubman Gill, and Yashasvi Jaiswal have exemplified the importance of youth in the league.
• Role of Data Analytics in Cricket:
• Modern cricket relies heavily on data analytics to evaluate player performance and strategize game plans.
• Metrics such as strike rate, average, and boundary percentage are used to assess a player's impact.
• Young players like Sai Sudharsan have benefited from advanced performance tracking and coaching techniques.
• Importance of Consistency in T20 Cricket:
• Consistency in scoring runs is critical for players to excel in the T20 format due to its fast-paced nature.
• Players who can adapt to different match situations while maintaining their strike rate are highly valued.
• Sai Sudharsan's achievement in IPL 2025 underscores the importance of consistency for success in T20 cricket.

Q15. Answer: (b) Fort St. George

The correct answer is Fort St. George.

Key Points

• Fort St. George was established in 1640 CE by the British East India Company in the coastal city of Chennai, India.
• The fort served as the primary English defense post and marked the beginning of British colonial influence in South India.
• Fort St. George is considered to be the first English fortress in India, symbolizing the establishment of British trading dominance in the region.
• It houses various historical structures, including the St. Mary's Church, the oldest Anglican church in India, and a museum showcasing artifacts from British colonial rule.
• The fort's strategic location on the Coromandel Coast made it a pivotal hub for administrative and military activities during colonial times.

Additional Information

• Sadras Dutch Fort: Built by the Dutch in the 17th century, this fort is located near Chennai but served as a trading post rather than an English defense structure.
• Fort St. David: Situated in Cuddalore, Tamil Nadu, this was another British fort constructed later, primarily for trading and military purposes.
• Gingee Fort: A historic fort located in Tamil Nadu, known for its architectural brilliance and its association with various South Indian rulers, including the Vijayanagara Empire.
• Chennai's History: Formerly known as Madras, Chennai became one of the major centers for British trade and administration during their colonial rule in India.
• Legacy of Fort St. George: Today, the fort serves as the headquarters of the Tamil Nadu Legislative Assembly and Secretariat, retaining its importance in governance.

Q16. Answer: (c) To enhance AI literacy and digital awareness among women

The correct answer is To enhance AI literacy and digital awareness among women.

Key Points

• The Yashoda AI initiative was launched by the National Commission for Women (NCW) in May 2025 to empower women through AI literacy.
• Its primary objective is to bridge the digital divide and equip women with knowledge about artificial intelligence technologies.
• The program aims to enhance the digital awareness of women, enabling them to leverage AI for personal and professional growth.
• This initiative focuses on building digital and technological skills among women, addressing the gender gap in technology adoption.
• Yashoda AI is expected to promote inclusivity by providing tools and resources for women to participate in the digital economy.

Additional Information

• Artificial Intelligence (AI):

• AI refers to the simulation of human intelligence in machines programmed to think like humans and mimic their actions.
• It encompasses technologies like machine learning, neural networks, and natural language processing.
• AI is widely used in industries such as healthcare, education, finance, and marketing for automation and efficiency.
• Digital Literacy:
• Digital literacy involves the ability to use technology effectively and responsibly for information access, communication, and problem-solving.
• It is crucial for participation in the modern digital economy and for closing the digital divide.
• National Commission for Women (NCW):
• NCW is a statutory body established in January 1992 under the National Commission for Women Act, 1990.
• Its primary role is to safeguard and promote the rights of women in India.
• Gender Gap in Technology:
• The gender gap in technology refers to disparities in access, usage, and representation of women in technological fields.
• Initiatives like Yashoda AI aim to address this gap by promoting digital inclusion and skill-building.

Q17. Answer: (b) 1908

The correct answer is 1908.

Key Points

• Paul Ehrlich, a German physician and scientist, received the Nobel Prize in Physiology or Medicine in 1908 for his contributions to immunology and his discovery of salvarsan.
• Salvarsan, also known as arsphenamine, was the first chemotherapeutic agent used to treat syphilis, marking a major milestone in medical science.
• Ehrlich's work laid the foundation for the concept of the "magic bullet," a term describing targeted therapy for specific diseases.
• The award was shared with Ilya Mechnikov, who was recognized for his research in phagocytosis and immunity.
• Paul Ehrlich's groundbreaking research advanced the field of chemotherapy and immunology, significantly impacting modern medicine.

Additional Information

• Magic Bullet Concept:
• Ehrlich introduced the idea of a "magic bullet," which refers to a drug that specifically targets disease-causing organisms without harming the host.
• This concept forms the basis of modern targeted therapies in medicine.
• Salvarsan:
• Salvarsan (arsphenamine) was the first effective treatment for syphilis and is considered the starting point of modern chemotherapy.
• The drug was discovered in 1909 by Ehrlich and his team after extensive research on arsenic compounds.
• Impact on Immunology:
• Ehrlich made significant contributions to immunology, particularly in understanding the immune response and the development of antibodies.
• He proposed the side-chain theory to explain how antibodies bind to antigens.
• Nobel Prize Collaboration:
• Paul Ehrlich shared the Nobel Prize with Ilya Mechnikov, who was recognized for his work on phagocytosis, the process by which cells engulf harmful microorganisms.
• The joint award highlighted the complementary advancements in immunology and therapy.
• Legacy:
• Ehrlich's pioneering work has influenced numerous fields, including pharmacology, microbiology, and cancer research.
• His contributions remain integral to the development of new therapeutic approaches and drug discovery.

Q18. Answer: (d) ancient religious texts and epics

The correct answer is ancient religious texts and epics.

Key Points

• The Sanskrit language is primarily associated with the composition of ancient religious texts, epics, and philosophical works.
• Key scriptures such as the Vedas, Upanishads, Bhagavad Gita, and the Puranas are written in Sanskrit.
• Sanskrit is considered the mother of many Indo-Aryan languages and holds a significant place in Indian culture and heritage.
• Epics like the Mahabharata and Ramayana, which are pivotal to Indian mythology, were originally composed in Sanskrit.
• The language is revered as Devabhasha, meaning 'language of the gods,' in Hindu tradition.

Additional Information

• Vedas:

• The Vedas are the oldest sacred texts of Hinduism, consisting of four collections: Rigveda, Yajurveda, Samaveda, and Atharvaveda.

• They contain hymns, rituals, philosophies, and spiritual knowledge.

• Upanishads:

• These texts are philosophical and spiritual commentaries on the Vedas, exploring concepts like Brahman (ultimate reality) and Atman (soul).

• The Upanishads are considered the foundation of Indian philosophy.

• Mahabharata:

• One of the longest epic poems in the world, it narrates the Kurukshetra War and contains profound moral and philosophical teachings.

• The Bhagavad Gita, a sacred scripture, is part of the Mahabharata.

• Ramayana:

• The Ramayana, attributed to Sage Valmiki, depicts the life and adventures of Lord Rama, including the rescue of Sita from Ravana.

• It is an epic that emphasizes dharma (duty), devotion, and righteousness.

• Classical Significance:

• Sanskrit is one of the 22 scheduled languages of India and is recognized as a classical language.

• It has contributed significantly to the fields of linguistics, mathematics, and astronomy.

Q19. Answer: (a) 48

The correct answer is 48.

Key Points

• The Bharatiya Janata Party (BJP) won 48 seats in the February 2025 Delhi Assembly elections.

• This was a significant increase compared to their previous performance in the 2020 Delhi elections.

• The BJP focused on issues such as development, law and order, and governance during their campaign.

• The election marked a notable shift in the political landscape of Delhi, with BJP gaining ground against the Aam Aadmi Party (AAP).

• The BJP's performance was attributed to its strong grassroots mobilization and campaigning efforts led by senior party leaders.

Additional Information

• Delhi Assembly:

• The Delhi Legislative Assembly has a total of 70 seats.

• The party or coalition securing a majority (36 seats or more) forms the government in Delhi.

• Role of BJP:

• The BJP is one of the two major political parties in India, alongside the Indian National Congress (INC).

• It has a strong presence across India and has been the ruling party at the national level since 2014.

• Key Electoral Issues:

• In the 2025 Delhi Assembly elections, major issues included unemployment, women’s safety, pollution, and infrastructure development.

• BJP highlighted its national-level schemes like Swachh Bharat Mission and Ayushman Bharat as part of its campaign strategy.

• Aam Aadmi Party (AAP):

• AAP was the ruling party in Delhi prior to the 2025 elections, having won a landslide victory in 2020.

• The party’s focus areas included education, healthcare, and affordable electricity.

• Voter Turnout:

• The voter turnout in the 2025 Delhi Assembly elections was reported to be around 65%, indicating active participation by the electorate.

• Women voters played a crucial role in influencing the election results.

Q20. Answer: (b) Pankaj Advani

The correct answer is Pankaj Advani.

Key Points

• Pankaj Advani is an Indian professional billiards and snooker player, widely regarded as one of the best cue sports players in history.

• He won his 28th World Billiards Title at the IBSF World Billiards Championship held in Doha, Qatar in November 2024.
• Advani is known for his dominance in both the short format (150-up) and the long format (points) of billiards.
• With this victory, he further cemented his legacy as the most successful cueist in the history of the sport.
• He holds multiple titles in both billiards and snooker at the national and international levels, showcasing his versatility and skill.

Additional Information

• IBSF World Billiards Championship:
• The International Billiards and Snooker Federation (IBSF) organizes the World Billiards Championship annually.
• This championship features two formats – points format and timed format – which test players' strategy and endurance.
• It serves as one of the most prestigious tournaments in the world of billiards.
• Achievements of Pankaj Advani:
• Advani has won multiple World Championships across different formats in billiards and snooker.
• He is a recipient of India's highest sporting honors, including the Padma Bhushan, Padma Shri, and Rajiv Gandhi Khel Ratna Award.
• His contributions have significantly elevated the profile of cue sports in India.
• Difference Between Billiards and Snooker:
• Billiards is typically played with three balls (cue ball, red ball, and opponent's cue ball) on a table with no pockets.
• Snooker uses 21 balls, including a cue ball and 15 red balls, played on a table with six pockets.
• The scoring systems and rules vary significantly between the two sports.
• India's Legacy in Cue Sports:
• India has produced legendary players like Wilson Jones, Michael Ferreira, and Geet Sethi, apart from Pankaj Advani.
• Indian players have consistently excelled in international championships, earning the country global recognition in billiards and snooker.

Q21. Answer: (b) Smart Cities Mission

The correct answer is Smart Cities Mission.

Key Points

• The Smart Cities Mission is an urban renewal and retrofitting program launched by the Government of India in June 2015.
• Its main objective is to promote sustainable and inclusive urban development by creating 100 smart cities across the country.
• The mission focuses on smart solutions for better infrastructure, improved governance, and enhanced quality of life for citizens.
• Key areas include solid waste management, water supply, urban mobility, energy efficiency, and e-governance initiatives.
• The Ministry of Housing and Urban Affairs is responsible for implementing the Smart Cities Mission in collaboration with state and city governments.

Additional Information

• Atal Bhujal Yojana (ABHY):
• Launched in December 2019 by the Government of India to improve groundwater management.
• Focuses on ensuring sustainable water availability in critical and overexploited areas.
• Implemented by the Ministry of Jal Shakti with funding from the World Bank.
• Swachh Bharat Mission (Urban):
• A national initiative launched in 2014 to eliminate open defecation and improve solid waste management.
• Part of the larger Swachh Bharat campaign, focusing on urban areas and municipal infrastructure improvements.
• Emphasizes behavioral change and public participation for sanitation awareness.
• Pradhan Mantri Gram Sadak Yojana (PMGSY):
• A rural development program aimed at providing all-weather road connectivity to unconnected villages.
• Launched in December 2000 by the Ministry of Rural Development.
• Critical for improving economic and social infrastructure in remote areas.
• Urban Infrastructure Development:
• The Government of India has introduced various schemes like AMRUT (Atal Mission for Rejuvenation and Urban Transformation) to improve urban infrastructure.
• AMRUT emphasizes water supply, sewerage, urban transport, and green spaces in cities.
• Efforts are being made to integrate technology with urban planning for sustainable growth.

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Q22. Answer: (c) The Artemis Accords

The correct answer is The Artemis Accords.

Key Points

• The Artemis Accords are a set of non-binding multilateral agreements initiated by NASA and the United States government to establish norms for space exploration and cooperation.

• Bangladesh joined the Artemis Accords in 2025, signaling its commitment to peaceful and sustainable space exploration.

• The accords outline principles like transparency, interoperability, peaceful use of space, and sharing scientific data for all signatories.

• As part of the Artemis Accords, Bangladesh commits to fostering international collaboration in lunar exploration, Mars exploration, and other space activities.

• The Artemis Accords support the Artemis program, which aims to return humans to the Moon and establish a sustainable presence there by the late 2020s.

Additional Information

• Artemis Program: NASA's Artemis program seeks to return humans to the Moon, establish a long-term presence, and prepare for future Mars missions.

• Outer Space Treaty: A foundational international treaty ratified in 1967 that governs the activities of states in the exploration and use of outer space, emphasizing peaceful purposes.

• Moon Treaty: Adopted in 1979, this treaty aims to regulate the use of the Moon and other celestial bodies, but it has limited acceptance among spacefaring nations.

• Global Cooperation in Space: The Artemis Accords emphasize the importance of collaboration among nations to ensure sustainable and inclusive space exploration.

• Space Debris Management: The accords include guidelines for mitigating space debris and ensuring safe operations in orbit for all participating nations.

Q23. Answer: (d) Inclusion of Muslim women on Waqf Boards

The correct answer is Inclusion of Muslim women on Waqf Boards.

Key Points

• The Waqf (Amendment) Act, 2025 introduced reforms aimed at greater inclusivity by mandating the representation of Muslim women on Waqf Boards.

• This amendment sought to ensure gender equality and promote the participation of women in the management of Waqf properties.

• It emphasized the need for a minimum quota for women members on Waqf Boards, fostering transparency and balanced decision-making.

• The reform aligns with the government's broader objective of empowering women in all aspects of governance and administration.

• Under this Act, states were tasked with ensuring implementation of the inclusion mandate to bring systemic change within Waqf governance structures.

Additional Information

• Waqf: Waqf refers to a charitable endowment under Islamic law, typically involving property or assets donated for religious or philanthropic purposes.

• Waqf Board: These are statutory bodies responsible for managing and administering Waqf properties and ensuring their proper utilization.

• Gender Inclusivity: The inclusion of women in governance structures helps in achieving equitable representation and supports broader social reforms.

• Previous Amendments: Earlier amendments to Waqf laws have focused on transparency, digitization of records, and anti-corruption measures to safeguard assets.

• Legal Framework: Waqf legislation in India is governed by the Waqf Act, 1995, and its subsequent amendments, which aim to modernize and streamline the management of Waqf properties.

Q24. Answer: (b) S-400 Triumf

The correct answer is S-400 Triumf.

Key Points

• The S-400 Triumf is one of the most advanced air defense systems in the world, developed by Russia.

• India signed a $5.43 billion deal with Russia in October 2018 to purchase the S-400 Triumf systems for its defense capabilities.

• The S-400 can intercept and destroy a wide range of aerial threats, including aircraft, drones, and ballistic missiles, at a range of up to 400 kilometers.

• It employs advanced radar systems and multiple missile types to ensure high precision and effectiveness against various threats.
• India deployed the S-400 system to strengthen its defense capabilities against Pakistan and China in high-tension scenarios.

Additional Information

• Technical Features of S-400 Triumf:
• It uses four types of missiles capable of engaging targets at short, medium, and long ranges.
• Equipped with multi-function radar, autonomous detection, targeting systems, and anti-jamming capabilities.
• Can simultaneously track and engage up to 80 targets.
• Strategic Importance for India:
• The S-400 enhances India's ability to counter aerial threats, including stealth aircraft and UAVs.
• This system is considered pivotal for defending key areas and cities against hostile attacks.
• India’s Missile Defense Systems:
• In addition to the S-400, India operates the indigenous Akash missile system and has developed advanced systems like Prithvi Air Defence and Barak 8.
• The integration of the S-400 complements India's existing air defense architecture.
• Global Deployment of S-400:
• Countries like China and Turkey have also acquired the S-400, showcasing its global demand and effectiveness.
• Russia has deployed the system extensively to protect its critical infrastructure.

Q25. Answer: (d) Bay of Bengal Inter-Governmental Organisation (BOBP-IGO)

The correct answer is Bay of Bengal Inter-Governmental Organisation (BOBP-IGO).

Key Points

• India assumed the chairmanship of the Bay of Bengal Inter-Governmental Organisation (BOBP-IGO) during the 13th Governing Council Meeting held in Malé, Maldives.
• The BOBP-IGO is an intergovernmental organisation established in 2003 to promote fisheries development and management in the Bay of Bengal region.
• India succeeded Bangladesh as Chair during this meeting, marking a pivotal moment for regional cooperation in sustainable fisheries management.
• The organisation focuses on enhancing cooperation among member countries, including India, Bangladesh, Maldives, and Sri Lanka.
• Its objectives include ensuring sustainable fisheries, improving livelihoods of fisher communities, and facilitating capacity building and knowledge sharing.

Additional Information

• Bay of Bengal Region:
• The Bay of Bengal is the largest bay in the world, bordered by India, Bangladesh, Myanmar, Sri Lanka, and the Maldives.
• It plays a critical role in regional trade, fisheries, and biodiversity conservation.
• The region is home to diverse marine species and ecosystems, but faces challenges like overfishing and marine pollution.
• BOBP-IGO Mandate:
• The organisation works to improve fisheries governance and promote sustainable fishing practices.
• It conducts training programs, workshops, and research to enhance the capacity of member countries in fisheries management.
• BOBP-IGO aims to strengthen regional collaboration for addressing common challenges in fisheries and coastal management.
• Regional Cooperation:
• India plays a key role in promoting regional cooperation through organisations like SAARC, BIMSTEC, and BOBP-IGO.
• Collaboration among member states is vital for tackling issues like climate change, food security, and maritime safety.
• Efforts by BOBP-IGO align with broader initiatives for sustainable development in the Bay of Bengal region.
• Challenges in Fisheries Sector:
• Overfishing, habitat destruction, and climate change are major concerns impacting fisheries in the Bay of Bengal.
• BOBP-IGO supports member nations in developing strategies to address these issues effectively.
• Promoting responsible fishing and conservation of marine resources are central to the organisation’s goals.

Q26. Answer: (d) Diwan-i-Kul

The correct answer is Diwan-i-Kul.

Key Points

• The Diwan-i-Kul was the head of the revenue department and financial administration during Akbar's reign, responsible for

supervising fiscal matters across the empire.

• The position of Diwan-i-Kul was integral in implementing Akbar's centralized administration system, ensuring efficient collection and regulation of revenue.

• Under Akbar's reforms, the Diwan-i-Kul played a key role in maintaining accounts related to taxation, land revenue, and expenditure.

• This office was established as part of Akbar's revenue reforms, which were based on meticulous surveys and assessments conducted under the guidance of Raja Todar Mal.

• The Diwan-i-Kul worked alongside other administrative officials to ensure equitable distribution of resources and transparency in financial matters.

Additional Information

• Raja Todar Mal: Akbar's finance minister, who introduced the revenue system known as "Zabt" or the land revenue system, which was based on careful measurement and classification of agricultural land.

• Zabt System: A revenue system that categorized land into different types based on fertility and productivity, ensuring fair taxation.

• Mansabdari System: A bureaucratic structure introduced by Akbar, where officials were ranked based on their responsibilities and salaries, closely tied to the revenue system supervised by the Diwan-i-Kul.

• : Akbar's governance model was highly centralized, with the Diwan-i-Kul acting as a vital cog in managing the empire's financial affairs.

• Akbar's revenue reforms were inspired by earlier practices but refined under Todar Mal's guidance, making them more efficient and equitable for the empire's subjects.

Q27. Answer: (c) They are converted into fat and stored.

The correct answer is They are converted into fat and stored..

Key Points

• Excess carbohydrates consumed in the diet are converted into fat through a process called lipogenesis.

• The conversion occurs primarily in the liver, where carbohydrates are metabolized into triglycerides (fat molecules).

• Triglycerides are stored in adipose tissue, which serves as the body's energy reserve.

• Insulin plays a key role in this process by facilitating the uptake of glucose and promoting its conversion to fat.

• This mechanism ensures energy storage for future use when the body requires it.

Additional Information

• Carbohydrate Metabolism:

• Carbohydrates are broken down into glucose, the primary source of energy for the body.

• Excess glucose is stored as glycogen in the liver and muscles for immediate energy needs.

• Once glycogen storage capacity is reached, surplus glucose is converted into fat.

• Role of Insulin:

• Insulin is a hormone produced by the pancreas that regulates blood sugar levels.

• It stimulates cells to absorb glucose and promotes the storage of excess glucose as glycogen and fat.

• Adipose Tissue:

• Adipose tissue is the primary site of fat storage in the body.

• It helps maintain energy balance by storing fat during excess calorie intake and releasing it during calorie deficiency.

• Lipogenesis:

• Lipogenesis is the biochemical process of synthesizing fat from non-fat substances like carbohydrates.

• This process is crucial for long-term energy storage in the body.

• Energy Utilization:

• Stored fat can be mobilized during periods of fasting or physical activity to provide energy.

• The breakdown of fat releases more energy per gram compared to carbohydrates or proteins.

Q28. Answer: (b) To improve efficiency and innovation through private sector expertise

The correct answer is To improve efficiency and innovation through private sector expertise.

Key Points

• Public-Private Partnerships (PPPs) leverage the expertise, efficiency, and innovation of the private sector to address infrastructure needs.

• Private sector involvement often leads to better project delivery timelines and reduced costs due to advanced technology and effective management practices.

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• PPPs foster innovation in financing, construction, and operation by allowing private entities to bring in modern solutions.

• Governments aim to ensure quality infrastructure services while minimizing financial risks and burdens on the public sector.

• This model enhances accountability and transparency in large-scale infrastructure projects.

Additional Information

• Public-Private Partnership (PPP): A collaborative model where public and private sectors share resources, risks, and rewards to deliver public infrastructure or services.

• Efficiency in PPPs: The private sector's operational expertise ensures faster project delivery and reduced lifecycle costs.

• Risk Sharing: In PPP arrangements, risks such as financial, technical, and operational risks are shared between the government and private entities.

• Types of PPP Models: Common models include Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), and Build-Own-Operate (BOO).

• Global Examples: Successful PPP projects include the London Underground modernization and the Delhi Metro Rail in India.

Q29. Answer: (c) Sher-e-Kashmir University

The correct answer is Sher-e-Kashmir University.

Key Points

• Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST), Jammu, is credited with producing India's first gene-edited sheep.

• This breakthrough was achieved using CRISPR-Cas9 technology, a revolutionary gene-editing tool.

• The gene-editing aimed to enhance specific traits, such as growth rate and wool quality, in sheep.

• The project was carried out under the supervision of experienced scientists specializing in genetic engineering and livestock improvement.

• This achievement positions India among the few countries utilizing gene-editing technology in livestock research.

Additional Information

• CRISPR-Cas9 Technology:

• CRISPR-Cas9 is a precise gene-editing tool that allows scientists to modify DNA at specific locations.

• It works by using RNA molecules to guide the Cas9 enzyme to the target DNA sequence for cutting.

• This technology has applications in medicine, agriculture, and animal husbandry.

• Gene Editing in Livestock:

• Gene editing is used to improve livestock traits, such as disease resistance, growth rates, and reproduction efficiency.

• It is considered a sustainable approach to meet the growing demand for meat, milk, and wool.

• Ethical and Regulatory Considerations:

• Gene editing in animals is subject to ethical debates and regulatory approvals in many countries.

• India is exploring guidelines to ensure responsible use of gene-editing technology in agriculture and livestock.

• Applications of Gene Editing in Agriculture:

• Gene editing can enhance crop resilience to pests, diseases, and environmental stress.

• It plays a key role in ensuring food security and sustainability.

Q30. Answer: (b) GSLV F15

The correct answer is GSLV F15.

Key Points

• ISRO (Indian Space Research Organisation) launched its 100th mission using GSLV F15 in 2025.

• The GSLV (Geosynchronous Satellite Launch Vehicle) is a launch vehicle developed by ISRO to place heavier payloads into geostationary orbits.

• GSLV F15 is equipped with an indigenously developed cryogenic upper stage, enhancing its payload capabilities.

• The 100th mission marked a significant milestone in ISRO's journey, highlighting its advancements in space technology and satellite launching capabilities.

• The mission was designed to deploy satellites for communication, navigation, and Earth observation purposes, further strengthening India's space infrastructure.

Additional Information

• Geosynchronous Satellite Launch Vehicle (GSLV):

• GSLV is a three-stage launch vehicle designed to place heavier payloads into geostationary orbits.

• Its stages include a solid rocket motor, a liquid rocket engine, and a cryogenic upper stage.

• The cryogenic stage uses liquid oxygen and liquid hydrogen as propellants, providing higher efficiency and thrust.

• Milestones in ISRO's Launch Vehicles:
• PSLV (Polar Satellite Launch Vehicle) was instrumental in establishing ISRO's reputation for cost-effective and reliable launches.
• SSLV (Small Satellite Launch Vehicle) was developed for small payload launches to cater to global demand for nanosatellites.
• GSLV Mk III, also known as LVM-3, is ISRO's most powerful rocket, used for significant missions like Chandrayaan-2.
• ISRO's 100th Mission:
• This milestone highlights India's growing capabilities in space exploration and satellite deployment.
• ISRO's success in achieving such missions has positioned India as a key player in the global space industry.
• Applications of Satellites:
• Satellites launched by ISRO are used for communication, navigation, weather forecasting, disaster management, and scientific research.
• Earth observation satellites provide crucial data for agriculture, forestry, urban planning, and environmental monitoring.

Q31. Answer: (b) Regulating Act, 1773

The correct answer is Regulating Act, 1773.

Key Points

• The Regulating Act of 1773 was the first legislative framework introduced by the British Parliament to regulate the governance of the East India Company in India.
• It aimed to address administrative and financial corruption within the East India Company, marking the beginning of parliamentary control over the company's affairs.
• The act established a Governor-General of Bengal (Warren Hastings being the first) with supervisory authority over the other presidencies of Madras and Bombay.
• It created the Supreme Court of Judicature at Fort William (Calcutta) in 1774, ensuring legal oversight and justice administration.
• The act was crucial in laying the foundation for centralized administration in India, which later evolved into constitutional governance.

Additional Information

• Governor-General: The position of Governor-General was created to centralize authority in India. Warren Hastings was the first to hold this post under the Regulating Act.
• Supreme Court Establishment: The Supreme Court of Judicature at Fort William was set up to oversee legal matters. It had jurisdiction over British subjects in Bengal.
• Company's Accountability: The act required the East India Company to report its revenue, civil, and military affairs to the British government, ensuring greater accountability.
• Significance in Constitutional Development: The Regulating Act laid the groundwork for subsequent legislative acts like Pitt's India Act (1784) and Charter Acts, which further refined British control and governance in India.
• Limitations: The act was criticized for its vague provisions and lack of clarity on the scope of authority between the Governor-General and Supreme Court, leading to administrative challenges.

Q32. Answer: (b) Alluri Sitarama Raju

The correct answer is Alluri Sitarama Raju.

Key Points

• Alluri Sitarama Raju was a prominent Indian revolutionary who led the tribal revolt known as the Rampa Rebellion of 1922 against British colonial rule.
• The rebellion was primarily against oppressive forest laws imposed by the British, which restricted the access of tribal communities to their traditional forest resources.
• Raju organized the tribal people in the region of Godavari Agency (present-day Andhra Pradesh) and initiated guerrilla warfare against British forces.
• He is remembered for his courage and leadership and was referred to as "Manyam Veerudu" (Hero of the Jungle) by locals.
• Raju was eventually captured and executed by the British in 1924, making him a martyr in India's struggle for independence.

Additional Information

• Rampa Rebellion:
• The Rampa Rebellion was also known as the Rampa Uprising, which occurred between 1922-1924.
• The tribal communities revolted against colonial policies that restricted their rights to cultivate podu lands (shifting cultivation) and access forest resources.
• It was one of the significant tribal movements in India's freedom struggle.
• Impact of Forest Laws:
• The Indian Forest Act of 1927 imposed stringent regulations on the use of forest resources, severely affecting tribal livelihoods.

• These laws restricted activities like grazing cattle, collecting firewood, and hunting, leading to widespread resentment among the tribal population.

• Guerrilla Warfare:

• Alluri Sitarama Raju adopted guerrilla tactics, using the dense forests of Andhra Pradesh for ambushes and surprise attacks on British forces.

• His revolutionary methods inspired several other freedom fighters and tribal movements across India.

• Legacy:

• Alluri Sitarama Raju remains a celebrated figure in Indian history, especially in Andhra Pradesh, where his contributions are commemorated through statues and educational institutions.

• The Government of India has also issued postal stamps in his honor.

Q33. Answer: (a) Article 51A(k)

The correct answer is Article 51A(k).

Key Points

• Article 51A(k) was introduced by the 86th Amendment Act, 2002 of the Constitution of India.

• It imposes a fundamental duty on parents or guardians to provide opportunities for education to their children aged 6 to 14 years.

• The amendment aligns with the provisions of Article 21A, which guarantees free and compulsory education for children in the same age group.

• Article 51A(k) is part of the Fundamental Duties under Part IVA of the Indian Constitution.

• It emphasizes the shared responsibility of parents and the state in ensuring access to education for children.

Additional Information

• 86th Constitutional Amendment Act, 2002:

• It inserted Article 21A, making education a fundamental right for children aged 6 to 14 years.

• It amended Article 45, focusing on early childhood care and education for children below 6 years.

• It added Article 51A(k) under Fundamental Duties.

• Article 21A:

• Guarantees free and compulsory education to children aged 6 to 14 years.

• It places the responsibility on the state to provide access to elementary education.

• Fundamental Duties in India:

• Listed under Part IVA of the Constitution (Article 51A).

• Initially, ten duties were introduced by the 42nd Amendment Act, 1976.

• The 11th duty (Article 51A(k)) was added by the 86th Amendment Act, 2002.

• Right to Education Act, 2009:

• Enacted to operationalize Article 21A.

• Mandates free and compulsory education for children aged 6 to 14 years.

• Ensures the infrastructure, teacher training, and quality education in schools.

Q34. Answer: (d) Hot Weather Season

The correct answer is Hot Weather Season.

Key Points

• The Hot Weather Season in India typically occurs from March to May, characterized by a significant rise in temperature.

• During this season, the temperatures can soar above 40°C in many parts of the country, especially in northwestern India.

• Low humidity levels are a defining feature of this period, leading to dry and arid conditions in several regions.

• Hot winds, locally known as 'loo,' blow across the northern plains during this season, causing discomfort and heat stress.

• This season marks the transition before the onset of the Southwest Monsoon, which brings relief from the scorching heat.

Additional Information

• Seasons in India: India experiences four major seasons—Winter (December to February), Summer (March to May), Monsoon (June to September), and Post-Monsoon (October to November).

• The 'loo' is a strong, dry, and hot wind that blows across northern India during the Hot Weather Season, often causing heat waves.

• Heat waves: India records heat waves during this season, which can have severe impacts on health, agriculture, and water resources.

• The Hot Weather Season is marked by the development of low-pressure systems over the northwestern plains, which later attract the monsoon winds.

• Regions such as the Thar Desert and central India experience the most intense heat during this period.

Q35. Answer: (c) Heavy dependence on agriculture and low productivity

The correct answer is Heavy dependence on agriculture and low productivity.

Key Points

• At the time of independence in 1947, India's economy was primarily agrarian, with over 70% of the population dependent on agriculture.

• The agricultural sector faced severe inefficiencies, including outdated techniques, lack of irrigation facilities, and low productivity.

• India lacked industrial development, with minimal contribution from the manufacturing and services sectors to the overall economy.

• There was a heavy reliance on imports for industrial products, demonstrating the absence of self-sufficiency in manufacturing.

• Poverty and unemployment were widespread, with a significant portion of the population living below the poverty line.

Additional Information

• Agrarian Economy: Refers to an economy heavily reliant on agriculture as the primary source of income and employment.

• Colonial Exploitation: British colonial policies led to the deindustrialization of India, reducing its global economic status and increasing dependence on agriculture.

• Low Agricultural Productivity: Poor irrigation systems, lack of modern tools, and dependence on monsoons were major factors contributing to low yields.

• Economic Dualism: India's economy was characterized by a dual structure—rural agrarian dominance and limited urban industrial growth.

• Post-Independence Economic Strategies: After 1947, India focused on land reforms, industrialization, and Five-Year Plans to address the challenges of dependency and low productivity.

Q36. Answer: (a) Advanced Medium Combat Aircraft (AMCA)

The correct answer is Advanced Medium Combat Aircraft (AMCA).

Key Points

• AMCA is India's indigenous fifth-generation fighter aircraft program aimed at developing a stealth multirole combat aircraft with advanced technologies.

• The fighter is designed with features like stealth capabilities, supercruise, advanced avionics, and a highly integrated weapons system.

• AMCA will be equipped with twin engines and is intended to replace older aircraft in the Indian Air Force's fleet.

• The project is spearheaded by the Aeronautical Development Agency (ADA), under the Defence Research and Development Organisation (DRDO), with manufacturing support from Hindustan Aeronautics Limited (HAL).

• The AMCA program is a vital step in strengthening India's defense capabilities and achieving self-reliance in defense technology.

Additional Information

• Stealth Technology: Stealth technology in fighter aircraft minimizes radar cross-section (RCS), making it difficult for enemy radar systems to detect the aircraft.

• Supercruise: This refers to an aircraft's ability to cruise at supersonic speeds without using afterburners, enhancing fuel efficiency and operational range.

• Fifth-Generation Fighters: These are advanced multirole aircraft featuring stealth, advanced avionics, data fusion, and enhanced maneuverability.

• Indigenous Defense Development: India's focus on developing indigenous defense systems is part of the "Atmanirbhar Bharat" initiative to achieve self-reliance in defense production.

• Global Context: Other countries with fifth-generation fighters include the USA (F-22, F-35), Russia (Su-57), and China (J-20), reflecting the strategic importance of such aircraft in modern warfare.

Q37. Answer: (b) Patna

The correct answer is Patna.

Key Points

• The Sepak Takraw 2025 World Cup was held in Patna, Bihar, marking India's growing prominence in hosting international sports events.

• The event took place in March 2025, attracting teams from various countries globally to compete in this traditional Southeast Asian sport.

• Patna was chosen for its modern infrastructure and increasing focus on sports development in the state of Bihar.

• Sepak Takraw, also known as kick volleyball, has been gaining popularity in India, with Patna hosting the event as a key effort to promote the sport nationally.

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• The International Sepak Takraw Federation (ISTAF) organized the event, ensuring adherence to international standards.

Additional Information

• Sepak Takraw:

• A traditional Southeast Asian sport combining elements of soccer and volleyball.

• Played with a rattan ball, participants use their feet, head, knees, and chest to hit the ball over the net.

• The game is particularly popular in countries like Thailand, Malaysia, Indonesia, and the Philippines.

• International Sepak Takraw Federation (ISTAF):

• The governing body of Sepak Takraw, responsible for organizing global tournaments such as the World Cup.

• ISTAF promotes the sport across various nations, encouraging participation and development.

• It establishes rules and regulations to ensure fair play and global uniformity in the sport.

• India’s Growth in Hosting Sports Events:

• India has emerged as a preferred destination for international sports events due to improved infrastructure and organizational capabilities.

• Hosting such events boosts tourism, local economy, and sports culture.

• Other notable events held in India include the Cricket World Cup and Kabaddi World Cup.

• Bihar’s Development in Sports:

• Patna has witnessed significant growth in sports infrastructure, hosting events that attract international attention.

• Bihar's government is actively promoting sports to inspire youth participation and engagement.

Q38. Answer: (a) Nagabhatta I

The correct answer is Nagabhatta I.

Key Points

• Nagabhatta I was the founder of the Gurjara-Pratihara dynasty in Malwa during the 8th century CE.

• The Gurjara-Pratihara dynasty was known for resisting Arab invasions, particularly in the western regions of India.

• Nagabhatta I expanded his kingdom and established his capital at Ujjain, a significant cultural and political center.

• He laid the foundation for the dynasty's dominance in northern India, which reached its peak under rulers like Mihira Bhoja.

• The Gurjara-Pratiharas played a vital role in preserving the Indian subcontinent from external invasions and ensured the continuation of Indian culture during their rule.

Additional Information

• Gurjara-Pratihara Dynasty: This dynasty is considered one of the prominent Rajput dynasties that ruled northern India between the 8th and 11th centuries.

• Military Achievements: The Pratiharas were instrumental in defending India against Arab invasions, particularly from the west.

• Socio-Cultural Contributions: They were patrons of art, architecture, and literature, contributing significantly to the development of Indian culture during their reign.

• Mihira Bhoja: A notable ruler from the Gurjara-Pratihara dynasty under whom the empire reached its zenith, particularly excelling in military and administrative capabilities.

• Decline of the Dynasty: The dynasty eventually weakened due to internal conflicts and external invasions, paving the way for the rise of other regional powers like the Chandelas and the Palas.

Q39. Answer: (d) Bhola Nath Sahay

The correct answer is Bhola Nath Sahay.

Key Points

• The Tamar tribal revolts were a series of uprisings by the Oraon and Munda tribes of the Tamar region in the Chotanagpur plateau (present-day Jharkhand) against British rule, primarily between 1789 and 1832. They were led by figures like Bhola Nath Sahay and were provoked by British policies including heavy taxation, forced labor, and a flawed land system that threatened the tribals' land rights.

• Location: Tamar region in the Chotanagpur plateau (present-day Jharkhand).

• Time Period: A series of revolts spanning from 1789 to 1832, though some sources mention the first armed revolt starting as early as 1783.

• Leaders: Bhola Nath Sahay is a key leader mentioned for these revolts. Other tribal groups from surrounding areas like Midnapur, Koelpur, and Dhadha joined the movement.

• Causes:

• Land Rights: A major cause was the British "blemished align system," which failed to protect the land rights of the tribal tenants, leading to their eviction.

• Oppressive Policies: Other factors included heavy taxation and forced labor imposed by the British East India Company and local landlords (zamindars).

• Nature of the Revolt: The revolts were a significant act of resistance where tribal communities took up arms, sometimes using guerrilla tactics, to protect their autonomy and traditional rights.

Q40. Answer: (b) Hearing appeals from lower courts within the district

The correct answer is Hearing appeals from lower courts within the district.

Key Points

• District Courts in India are primarily responsible for hearing appeals from lower courts within the district jurisdiction.

• They serve as the principal courts of original jurisdiction in civil and criminal cases under the Indian judiciary system.

• District Courts are established based on the population and caseload of the district, under the supervision of the High Court.

• The District Judge is the highest judicial authority in the district and is responsible for both administrative and judicial functions.

• Appeals against decisions of District Courts can be taken to the respective High Court.

Additional Information

• Structure of Judiciary in India:

• The Indian judiciary is divided into three tiers: Supreme Court, High Courts, and subordinate courts (including District Courts).

• Supreme Court is the apex judicial authority, followed by High Courts at the state level and District Courts at the district level.

• Jurisdiction of District Courts:

• District Courts deal with both civil and criminal cases and have the authority to hear appeals from lower courts in the district.

• They can adjudicate cases under various laws including family disputes, property disputes, and criminal offenses.

• Role of District Judges:

• A District Judge is appointed by the Governor of the respective state in consultation with the High Court.

• They have the authority to preside over civil and criminal cases and manage administrative tasks within the district's judiciary.

• Writ Jurisdiction:

• Only the Supreme Court and High Courts have writ jurisdiction in India under Articles 32 and 226 of the Constitution.

• District Courts do not have the power to issue writs to enforce fundamental rights.

Q41. Answer: (c) 150

Shortcut Trick

The average of the first n odd natural numbers is directly equal to n.

In this question, we need to find the average of the first 150 odd natural numbers.

=> Here, the given value of n is 150.

=> Average = 150

Therefore The correct answer is 150.

Alternate Method

Given:

Number of terms (n) = 150

Series = First 150 odd natural numbers

Formula Used:

Average of an Arithmetic Progression = (First Term + Last Term) ÷ 2

Last term (l) of an AP = a + (n − 1)d

1

3

5

...

299

Avg = 150

Average = (1 + 299) ÷ 2

Calculations:

=> The sequence of the first 150 odd natural numbers is: 1, 3, 5, 7, ... up to 150 terms.

=> First term (a) = 1

=> Common difference (d) = 2

=> Last term (l) = 1 + (150 − 1) × 2

=> Last term (l) = 1 + 149 × 2 = 1 + 298 = 299

=> Average = (First Term + Last Term) ÷ 2

=> Average = (1 + 299) ÷ 2

=> Average = 300 ÷ 2

=> Average = 150

Therefore The correct answer is 150.

Additional Information

Average of First n Even Numbers

The average of the first n even natural numbers is strictly (n + 1).

Average of First n Natural Numbers

The average of the first n continuous natural numbers is calculated as (n + 1) ÷ 2.

Average of an Arithmetic Progression

Whenever the sequence holds a constant difference between consecutive terms, the overall average is directly equivalent to the middle term, or (First Term + Last Term) ÷ 2.

Sum of First n Odd Numbers

The sum of the first n odd natural numbers is given by the exact square n^2.

Q42. Answer: (b) Rs. 13,925

Shortcut Trick

Let the principal be 100 units.

Interest for 1^(st) year at 20% = 20 units.

Interest for 2^(nd) year = 20 + (20% of 20) = 24 units.

Given, 24 units = Rs. 3,342

=> 1 unit = 3342 ÷ 24 = Rs. 139.25

=> Sum (100 units) = 139.25 × 100 = Rs. 13,925

Therefore The correct answer is Rs. 13,925.

Alternate Method

Given:

Rate (R) = 20% per annum

Interest for the 2^(nd) year = Rs. 3,342

Formula Used:

Amount after 1 year = P × (1 + R/100)

Interest for 2^(nd) year = Amount after 1 year × (R/100)

Principal: 100x

20%

20%

1st Yr Int = 20x

2nd Yr Int = 24x

• 20% of 20x = 4x

24x = Rs. 3,342

Calculation:

=> Let the principal sum be P.

=> Amount after 1 year = P × (1 + 20/100) = 1.2P

=> The principal for the 2^(nd) year will be 1.2P.

=> Interest for the 2^(nd) year = 1.2P × 20% = 0.24P

=> According to the question,

=> 0.24P = 3342

=> P = 3342 ÷ 0.24

=> P = 334200 ÷ 24 = 13925

Therefore The correct answer is Rs. 13,925.

Additional Information

Compound Interest Formula

The total amount after n years is calculated as $A = P(1 + R/100)^n$, and the Compound Interest is $CI = A - P$.

Difference Between CI and SI for 2 Years

The difference between compound interest and simple interest on a certain sum for exactly 2 years is calculated using the formula $D = P(R/100)^2$.

Half-Yearly Compounding

When compound interest is calculated half-yearly, the annual rate of interest is halved (R/2) and the number of time periods is doubled (2n).

Q43. Answer: (a) 27

Shortcut Trick

Let F be the Father's age and S be the Son's age.

Given: F + 2S = 36 ... (Eq 1) and 2.5F + S = 72 ... (Eq 2)

Multiply (Eq 2) by 2 => 5F + 2S = 144 ... (Eq 3)

Subtract (Eq 1) from (Eq 3) => 4F = 108

=> F = 27

Therefore The correct answer is 27 years.

Alternate Method

Given:

2 times the son's age + father's age = 36 => F + 2S = 36

2.5 times the father's age + son's age = 72 => 2.5F + S = 72

Visualizing the Equations

F

S

S

=

36

2.5 F

S

=

72

Subtracting Eq 1 from 2 × Eq 2 → 4F = 108

=> From the second equation, S = 72 − 2.5F

=> Substitute the value of S in the first equation:

=> F + 2 × (72 − 2.5F) = 36

=> F + 144 − 5F = 36

=> 144 − 4F = 36

=> 4F = 144 − 36 = 108

=> F = 108 ÷ 4 = 27

Therefore The correct answer is 27 years.

Additional Information

Simultaneous Linear Equations

Systems of two variables can be solved using substitution (isolating one variable and substituting) or elimination (multiplying and subtracting equations to cancel a variable).

Age Problems Logic

Always assume present ages as base variables. Past ages are formed by subtracting years, and future ages by adding years. The difference between two ages always remains constant.

Cross Multiplication Method

For equations $a1x + b1y + c1 = 0$ and $a2x + b2y + c2 = 0$, the solution is $x \div (b1c2 - b2c1) = y \div (c1a2 - c2a1) = 1 \div (a1b2 - a2b1)$.

Q44. Answer: (c) 2

Shortcut Trick

Let the two numbers be 9a and 9b, where a and b are co-prime.

The product of the numbers = 81 × ab = 8100 => ab = 100.

The factor pairs of 100 are (1, 100), (2, 50), (4, 25), (5, 20), and (10, 10).

Out of these, only the pairs (1, 100) and (4, 25) are strictly co-prime.

Hence, there are exactly 2 possible valid pairs.

Therefore The correct answer is 2 pairs.

Alternate Method

Given:

HCF of the two numbers = 9

Product of the two numbers = 8100

Number 1 = 9a

Number 2 = 9b

×

Product = 8100

9a × 9b = 8100 → a × b = 100

Calculations:

=> Let the two numbers be 9a and 9b, where a and b are co-prime integers.

=> Product of the numbers = 9a × 9b = 81ab

=> We are given that the product is 8100, so 81ab = 8100

=> ab = 100

=> Now, we determine all pairs of factors whose product is 100.

=> Possible pairs for (a, b) = (1, 100), (2, 50), (4, 25), (5, 20), (10, 10)

=> To satisfy the initial condition, a and b must be co-prime (HCF = 1).

=> HCF(1, 100) = 1 (Valid pair)

=> HCF(2, 50) = 2 (Invalid)

=> HCF(4, 25) = 1 (Valid pair)

=> HCF(5, 20) = 5 (Invalid)

=> HCF(10, 10) = 10 (Invalid)

=> Thus, only two pairs satisfy the conditions.

Therefore The correct answer is 2 pairs.

Additional Information

Co-prime Numbers

Two numbers are defined as co-prime if their Highest Common Factor (HCF) is exactly 1. They do not have to be prime numbers themselves.

Forming Numbers from HCF

If the HCF of two given numbers is H, the numbers can always be correctly represented as Hx and Hy, under the condition that x and y are co-prime integers.

HCF and LCM Relation

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

Q45. Answer: (c) 26

Given:

Product of two consecutive positive natural numbers = 650

Formula Used:

If x and x+1 are consecutive natural numbers, then x × (x + 1) = Product

Calculation:

=> x × (x + 1) = 650

=> $x^2 + x = 650$

=> $x^2 + x - 650 = 0$

Solving the quadratic equation:

=> (x + 26)(x - 25) = 0

=> x = 25 or x = -26 (discarded as negative)

Greater number = x + 1 = 25 + 1 = 26

Therefore The correct answer is 26.

Q46. Answer: (b) 18 hours

Shortcut Trick

Speed ratio of Prashant and Nisha = 72 : 64 = 9 : 8

Since the distance is constant, the time ratio is inversely proportional to the speed ratio = 8 : 9

Prashant's time = 8 units = 16 hours

Nisha's time = 9 units = (16 ÷ 8) × 9 = 18 hours

Therefore The correct answer is 18 hours.

Alternate Method

Given:

Speed of Prashant = 72 km/hr

Time taken by Prashant = 16 hours

Speed of Nisha = 64 km/hr

Formula Used:

Distance = Speed × Time

Time = Distance ÷ Speed

Delhi

Kanpur

Prashant: 72 km/hr | 16 hours

Nisha: 64 km/hr | T hours

Distance = Constant

Calculations:

=> Distance travelled by Prashant = 72 × 16

=> Distance = 1152 km

=> Since Nisha travels the same distance, her time = Total Distance ÷ Nisha's Speed

=> Time taken by Nisha = 1152 ÷ 64

=> Time taken by Nisha = 18 hours

Therefore The correct answer is 18 hours.

Additional Information

Relative Speed

When two bodies move in the same direction, relative speed = S1 − S2. When moving in opposite directions, relative speed = S1 + S2.

Average Speed

For different distances travelled at different speeds, Average Speed = Total Distance ÷ Total Time.

Unit Conversion

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

Q47. Answer: (a) Rs. 864

Shortcut Trick

Effective discount % for two successive discounts a% and b% = a + b − (a × b) / 100

Effective discount = 20 + 10 − (20 × 10) / 100 = 28%

Final Selling Price (SP) = Marked Price × (100% − 28%)

SP = 1200 × 72% = 864

Therefore The correct answer is Rs. 864.

Alternate Method

MP = Rs. 1200

−20%

Rs. 960

−10%

SP = Rs. 864

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Effective Discount = 28%

Given:

Marked Price (MP) = Rs. 1200

First discount (D1) = 20%

Second discount (D2) = 10%

Formula Used:

Selling Price (SP) = MP × (1 − D1/100) × (1 − D2/100)

Calculations:

=> SP = 1200 × (1 − 20/100) × (1 − 10/100)

=> SP = 1200 × (80/100) × (90/100)

=> SP = 1200 × 4/5 × 9/10

=> SP = 1200 × 36/50

=> SP = 1200 × 0.72

=> SP = Rs. 864

Therefore The correct answer is Rs. 864.

Additional Information

Effective Successive Discount

When two successive discounts of a% and b% are applied, the single equivalent discount is given by the formula: D = a + b − (a × b) / 100.

Relation Between CP, MP, and SP

Selling Price is related to MP by: SP = MP × (100 − Discount%) / 100. Equating it with Cost Price logic gives: MP / CP = (100 + Profit%) / (100 − Discount%).

Dishonest Dealer Concept

When a dealer sells at Cost Price but uses a false weight, the profit percentage is calculated as: Profit % = (True Weight − False Weight) / False Weight × 100.

Q48. Answer: (a) 252

Shortcut Trick

For Simple Interest, Total Interest % = Rate per period × Number of periods.

Total Interest % = 3% × 7 = 21%

Simple Interest = 21% of Principal

SI = (21 ÷ 100) × 1200 = 252

Therefore The correct answer is Rs. 252.

Alternate Method

Given:

Principal (P) = Rs. 1200

Rate of Interest (R) = 3% per month

Time (T) = 7 months

Formula Used:

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

Simple Interest Calculation Timeline

0 Months

Rs. 1200

+3% (Rs. 36)

1 Month

Total 7 Months: 7 × Rs. 36 = Rs. 252

7 Months

SI = Rs. 252

Calculations:

=> SI = (1200 × 3 × 7) ÷ 100

=> SI = 12 × 3 × 7

=> SI = 36 × 7

=> SI = 252

Therefore The correct answer is Rs. 252.

Additional Information

Unit of Time and Rate Match

In Simple Interest formulas, the unit of Time (T) must always match the unit of the Rate (R). Since the rate is given per month, the time should remain in months without converting to years.

Total Amount (A)

The final accumulated value including principal and interest is calculated using the formula A = P + SI.

Compound Interest vs Simple Interest

Unlike SI which is strictly calculated on the initial principal value over the period, Compound Interest is dynamically calculated on the accumulated amount. However, for the first period, SI and CI remain equal.

Q49. Answer: (d) 153

Shortcut Trick

Other number = (H.C.F. × L.C.M.) ÷ Given number

Other number = (51 × 306) ÷ 102

Other number = 306 ÷ 2 = 153

Therefore The correct answer is 153.

Alternate Method

Given:

H.C.F. = 51

L.C.M. = 306

First number = 102

Formula Used:

First Number × Second Number = H.C.F. × L.C.M.

Calculations:

=> 102 × Second Number = 51 × 306

=> Second Number = (51 × 306) ÷ 102

=> Second Number = 15606 ÷ 102

=> Second Number = 306 ÷ 2

=> Second Number = 153

Therefore The correct answer is 153.

Additional Information

H.C.F. and L.C.M. of Fractions

H.C.F. of fractions = (H.C.F. of Numerators) ÷ (L.C.M. of Denominators)

L.C.M. of fractions = (L.C.M. of Numerators) ÷ (H.C.F. of Denominators)

Co-prime Numbers

Two numbers are co-prime if their H.C.F. is 1. Their L.C.M. is simply the product of the two numbers.

Product Rule Limitation

The rule Product of numbers = H.C.F. × L.C.M. is valid only for exactly two numbers. It cannot be directly applied for three or more numbers.

Q50. Answer: (a) 33.33

Shortcut Trick

Ratio of Cost Price to Selling Price for 1 dozen items = 180 : (12 × 20) = 180 : 240 = 3 : 4

Profit = 4 − 3 = 1 unit on a base of 3 units.

Profit % = (1 ÷ 3) × 100 = 33.33%

Therefore The correct answer is 33.33%.

Alternate Method

Given:

Cost price of 1 dozen (12 sharpeners) = Rs. 180

Selling price of 1 sharpener = Rs. 20

Formula Used:

Profit = SP − CP
Profit % = (Profit ÷ CP) × 100
CP of 1 dozen
Rs. 180
• Profit
SP of 1 dozen
Rs. 240
Profit % = (SP − CP) ÷ CP × 100
SP of 1 dozen = 12 × Rs. 20 = Rs. 240
Calculations:
=> Selling Price (SP) of 1 dozen (12 sharpeners) = 12 × 20 = Rs. 240
=> Cost Price (CP) of 1 dozen = Rs. 180
=> Profit = 240 − 180 = Rs. 60
=> Profit % = (60 ÷ 180) × 100
=> Profit % = (1 ÷ 3) × 100 = 33.33%
Therefore The correct answer is 33.33%.
Additional Information
Marked Price and Discount
Discount is given on Marked Price (MP) to arrive at Selling Price (SP). Discount % = (Discount ÷ MP) × 100.
Dishonest Dealer Concept
When a dealer claims to sell at Cost Price but uses false weight, Profit % = (Error ÷ True Weight − Error) × 100.
Successive Percentage Change
When there are multiple profit/loss changes, the net effect can be calculated as [a + b + (a × b) ÷ 100]%, where loss is negative.

Q51. Answer: (a) 107/323

Shortcut Trick
Combined 1-day work = (17 + 19) ÷ (17 × 19) = 36/323
Work completed in 6 days = 6 × (36/323) = 216/323
Fraction of work remaining = 1 − 216/323 = 107/323
Therefore The correct answer is 107/323.
Alternate Method
Given:
Time taken by A = 17 days
Time taken by B = 19 days
Formula Used:
Efficiency = Total Work ÷ Time
Person
Days
Total Work
Efficiency
A
17
323
19
B
19
17
=> Total efficiency of A and B = 19 + 17 = 36 units/day
=> Work done by A and B together in 6 days = 36 × 6 = 216 units
=> Remaining work = 323 − 216 = 107 units
=> Fraction of work left = Remaining work ÷ Total Work
=> Fraction of work left = 107/323

Therefore The correct answer is 107/323.

Additional Information

Work & Wages

Wages are always distributed in the ratio of the total work done by each person. If they work for the same number of days, wages are distributed in the ratio of their efficiencies.

Pipes & Cisterns

If a pipe fills a tank in X hours and another empties it in Y hours, their combined net rate is (1/X − 1/Y). The time taken to fill the tank is XY ÷ (Y − X) if Y > X.

Alternate Days Work

When individuals work on alternate days, calculate the work done in one full cycle (e.g., 2 days for 2 people). Find how many full cycles fit into the total work before calculating the remainder.

Q52. Answer: (b) 143 km/hr

Shortcut Trick

Total distance = 861 km, Total time = 15 hours.

Distance covered in the first 8 hours = 8 × 37 = 296 km.

Time taken to cover the next 136 km = 136 ÷ 34 = 4 hours.

Remaining distance = 861 − (296 + 136) = 429 km.

Remaining time = 15 − (8 + 4) = 3 hours.

Required speed = 429 ÷ 3 = 143 km/hr.

Therefore The correct answer is 143 km/hr.

Alternate Method

Given:

Total distance to Bangalore = 861 km

Total scheduled time = 15 hours

Formula Used:

Speed = Distance ÷ Time

Distance = Speed × Time

Dist: 296 km

Dist: 136 km

Dist: 429 km

T = 8 h

S = 37 km/h

T = 4 h

S = 34 km/h

T = 3 h

S = ?

Total Distance = 861 km | Total Time = 15 hrs

Calculations:

=> First part distance (D1) = Speed1 × Time1

=> D1 = 37 × 8 = 296 km

=> Second part time (T2) = Distance2 ÷ Speed2

=> T2 = 136 ÷ 34 = 4 hours

=> Total distance covered so far = 296 + 136 = 432 km

=> Total time used so far = 8 + 4 = 12 hours

=> Remaining distance to be covered = 861 − 432 = 429 km

=> Remaining time available = 15 − 12 = 3 hours

=> Required Speed = Remaining distance ÷ Remaining time

=> Required Speed = 429 ÷ 3 = 143 km/hr

Therefore The correct answer is 143 km/hr.

Additional Information

Average Speed

Average speed over a journey is total distance traveled divided by the total time taken. It is not the simple arithmetic mean of individual speeds.

Unit Conversion

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

Relative Speed

When two bodies move in the same direction, relative speed = (S1 − S2). In opposite directions, relative speed = (S1 + S2).

Q53. Answer: (d) 6

Shortcut Trick

Apply the BODMAS rule mentally (Division → Multiplication → Addition → Subtraction).

=> 16 + 12 ÷ 6 − 3 × 4

=> 16 + 2 − 12

=> 18 − 12 = 6

Therefore The correct answer is 6.

Alternate Method

Given:

16 + 12 ÷ 6 − 3 × 4

Formula Used:

BODMAS Rule (Brackets, Orders, Division, Multiplication, Addition, Subtraction)

Calculations:

=> 16 + 12 ÷ 6 − 3 × 4

=> 16 + (12 ÷ 6) − (3 × 4)

=> 16 + 2 − 12

=> (16 + 2) − 12

=> 18 − 12

=> 6

Therefore The correct answer is 6.

Additional Information

BODMAS Rule

It specifies the strict order of operations for solving any mathematical expression: Brackets, Orders (powers and roots), Division, Multiplication, Addition, and Subtraction.

Order of Operations Trick

Multiplication and Division share the exact same priority level, just as Addition and Subtraction do. When both appear in an expression without brackets, solve them sequentially from left to right.

Fraction Simplification

When solving complex fractional expressions, apply the BODMAS rule independently to the numerator and the denominator before calculating the final division.

Q54. Answer: (c) -19/8

Shortcut Trick

Expand the equation and cancel the x^2 terms directly:

=> $6x^2 − 15 − 6x^2 − 8x + 16 = 20$

=> $−8x + 1 = 20$

=> $−8x = 19$

=> $x = −19/8$

Therefore The correct answer is −19/8.

Alternate Method

Given:

$3(2x^2 − 5) − 2(3x^2 + 4x − 8) = 20$

Calculation:

=> Expand the brackets by multiplying the outer numbers with each inner term:

=> $(3 × 2x^2) − (3 × 5) − (2 × 3x^2) − (2 × 4x) − (2 × −8) = 20$

=> $6x^2 − 15 − 6x^2 − 8x + 16 = 20$

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=> Group the like terms together:

=> $(6x^2 - 6x^2) - 8x + (-15 + 16) = 20$

=> $0 - 8x + 1 = 20$

=> $-8x = 20 - 1$

=> $-8x = 19$

=> $x = -19/8$

Therefore The correct answer is −19/8.

Additional Information

Linear Equation in One Variable

An equation where the highest power of the variable is 1. It always has exactly one solution and is represented in the standard form: ax + b = 0.

BODMAS Rule

It dictates the order of mathematical operations: Brackets, Orders (powers/roots), Division, Multiplication, Addition, and Subtraction.

Distributive Property

The rule states that a(b + c) = ab + ac. It is used to eliminate brackets by multiplying the outside term with every term inside.

Q55. Answer: (c) 382/13

Shortcut Trick

Apply the BODMAS rule to solve the expression directly:

$18 \times (3 \times 3^2) \div 13 + 66 - 74$

$= 18 \times (3 \times 9) \div 13 - 8$

$= 18 \times 27 \div 13 - 8$

$= 486/13 - 8 = (486 - 104)/13 = 382/13$

Therefore The correct answer is 382/13.

Alternate Method

Given:

$18 \times (3 \times (3^2)) \div 13 + 66 - 74$

Formula Used:

BODMAS Rule: Brackets, Orders (Powers/Roots), Division, Multiplication, Addition, Subtraction.

Calculations:

=> First, solve the innermost bracket containing the exponent (Order):

=> $3^2 = 9$

=> Next, solve the outer bracket (Multiplication):

=> $3 \times 9 = 27$

=> Substitute this value back into the original expression:

=> $18 \times 27 \div 13 + 66 - 74$

=> According to BODMAS, division and multiplication are evaluated from left to right. Perform the multiplication first:

=> $486 \div 13 + 66 - 74$

=> Convert the division into a fraction:

=> $486/13 + 66 - 74$

=> Solve the integer addition and subtraction part:

=> $486/13 - 8$

=> Take the LCM to subtract the integer from the fraction:

=> $(486 - 8 \times 13) / 13$

=> $(486 - 104) / 13$

=> $382 / 13$

Therefore The correct answer is 382/13.

Additional Information

BODMAS Rule

It determines the correct order of operations to solve an equation: Brackets, Orders (powers and roots), Division and Multiplication (from left to right), Addition and Subtraction (from left to right).

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Fraction Simplification

When adding or subtracting a whole number to a fraction, multiply the whole number by the denominator to create a common base: a/b ± c = (a ± b × c) / b.

Order of Exponents

The expression x^n means multiplying the base number x by itself n times. Thus, evaluating the power must be done before general multiplication inside brackets.

Q56. Answer: (c) M - N = -5

Shortcut Trick

For divisibility by 11, the difference between the sum of digits at alternating places must be 0 or a multiple of 11.

Sum of even places − Sum of odd places = (6 + M + 4) − (N + 5 + 0) = M − N + 5

Setting this difference to 0 gives: M − N + 5 = 0 => M − N = −5

Therefore The correct answer is M − N = −5.

Alternate Method

Given:

A 6-digit number N65M04 is divisible by 11.

Formula Used:

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

Calculation:

=> Sum of digits at odd places (starting from the right) = 4 + M + 6 = M + 10

=> Sum of digits at even places (starting from the right) = 0 + 5 + N = N + 5

=> Difference = (Sum of odd places) − (Sum of even places)

=> Difference = (M + 10) − (N + 5)

=> Difference = M − N + 5

=> For the number to be divisible by 11, the difference must be equal to 0, 11, −11, etc.

=> Equating the difference to 0:

=> M − N + 5 = 0

=> M − N = −5

This relation matches one of the given choices.

Therefore The correct answer is M − N = −5.

Additional Information

Divisibility Rule of 3 & 9

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

Divisibility Rule of 4 & 8

A number is divisible by 4 if its last two digits form a number divisible by 4. It is divisible by 8 if its last three digits form a number divisible by 8.

Divisibility Rule of 7, 11 & 13

Form groups of 3 digits from right to left. If the alternating difference of these 3-digit groups is divisible by 7, 11, or 13, the entire number is also divisible by 7, 11, or 13 respectively.

Q57. Answer: (d) cos A + sin A

Shortcut Trick

Put A = 60° in the given expression.

=> 1 / [2(1 − √3)] + 1 / [(2/√3)(1 − 1/√3)]

=> −1 / [2(√3 − 1)] + 3 / [2(√3 − 1)] = 2 / [2(√3 − 1)] = 1 / (√3 − 1)

=> After rationalising: (√3 + 1) / 2

Checking the options for A = 60°, only Option 4 gives cos 60° + sin 60° = 1/2 + √3/2 = (√3 + 1) / 2.

Therefore The correct answer is cos A + sin A.

Alternate Method

Given:

Expression: 1 / [sec A (1 − tan A)] + 1 / [cosec A (1 − cot A)]

Formula Used:

sec A = 1 / cos A, cosec A = 1 / sin A

tan A = sin A / cos A, cot A = cos A / sin A

$a^2 - b^2 = (a - b)(a + b)$

Calculations:

=> Expression = 1 / [(1/cos A) × (1 − sin A/cos A)] + 1 / [(1/sin A) × (1 − cos A/sin A)]

=> = 1 / [(cos A − sin A) / $\cos^2$ A] + 1 / [(sin A − cos A) / $\sin^2$ A]

=> = $\cos^2$ A / (cos A − sin A) + $\sin^2$ A / (sin A − cos A)

=> = $\cos^2$ A / (cos A − sin A) − $\sin^2$ A / (cos A − sin A)

=> = ($\cos^2$ A − $\sin^2$ A) / (cos A − sin A)

=> = [(cos A − sin A)(cos A + sin A)] / (cos A − sin A)

=> = cos A + sin A

Therefore The correct answer is cos A + sin A.

Additional Information

Trigonometric Ratios

The tangent and cotangent functions can be simplified to primary functions as tan A = sin A / cos A and cot A = cos A / sin A.

Reciprocal Identities

The trigonometric function sec A is the reciprocal of cos A, while cosec A is the reciprocal of sin A.

Algebraic Identities

The difference of squares formula helps in simplified factorisation: $a^2 - b^2 = (a - b)(a + b)$.

Q58. Answer: (d) 3

Shortcut Trick

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

Sum of digits of 311916399 = 3 + 1 + 1 + 9 + 1 + 6 + 3 + 9 + 9 = 42

Since 42 is divisible by 3, the number 311916399 is also divisible by 3.

Therefore The correct answer is 3.

Alternate Method

Given:

Number = 311916399

Method Used:

Check the divisibility rules systematically for each given option.

Calculations:

=> Divisibility by 7: A number is divisible by 7 if the alternating sum of blocks of three digits from right to left is a multiple of 7.

=> Blocks from right to left: 399, 916, 311

=> Alternating sum = 399 − 916 + 311 = −206

=> Since −206 is not a multiple of 7, the number is not divisible by 7.

=> Divisibility by 13: Similarly, the alternating sum of blocks of three digits must be a multiple of 13.

=> Since −206 is not a multiple of 13, the number is not divisible by 13.

=> Divisibility by 2: The last digit of the number is 9 (an odd number), so it is not divisible by 2.

=> Divisibility by 3: The sum of the digits must be a multiple of 3.

=> Sum of digits = 3 + 1 + 1 + 9 + 1 + 6 + 3 + 9 + 9 = 42

=> Since 42 is divisible by 3 (42 ÷ 3 = 14), the entire number is perfectly divisible by 3.

Therefore The correct answer is 3.

Additional Information

Divisibility by 9

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

Divisibility by 11

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

Divisibility by 4

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

Q59. Answer: (d) 16750

Shortcut Trick

Valid votes = 80% (polled) × 80% (valid) = 64% of total registered voters.

Winning margin = 60% − 40% = 20% of valid votes.

=> Overall margin = 20% of 64% = 12.8% of total voters.

=> Total registered voters = 2144 × (100 ÷ 12.8) = 16750.

Therefore The correct answer is 16750 voters.

Alternate Method

Given: Polled votes = 80%, Invalid votes = 20% of polled, Winner's share = 60% of valid, Margin = 2144.

80%

20%

80%

20%

60%

40%

Total: 100x

Polled: 80x

Uncast: 20x

Valid: 64x

Invalid: 16x

Win: 38.4x

Lose: 25.6x

Margin = 38.4x − 25.6x = 12.8x

=> 12.8x = 2144

Calculations:

Let the total number of registered voters be 100x.

=> Votes cast = 80% of 100x = 80x

=> Invalid votes = 20% of 80x = 16x

=> Valid votes = 80x − 16x = 64x

=> Winner's votes = 60% of 64x = 38.4x

=> Loser's votes = 40% of 64x = 25.6x

=> Winning margin = 38.4x − 25.6x = 12.8x

=> 12.8x = 2144

=> x = 2144 ÷ 12.8 = 167.5

=> Total registered voters (100x) = 167.5 × 100 = 16750

Therefore The correct answer is 16750 voters.

Additional Information

Election Problems

Total valid votes are exclusively distributed among the candidates. If there are two candidates and one gets p%, the other automatically gets (100 − p)% of the valid votes.

Successive Percentage

When multiple sequential reductions occur (like polled votes then valid votes), the final effective base is obtained by multiplying the remaining fractions: Final = Base × (1 − a/100) × (1 − b/100).

Winning Margin

The margin of victory is the absolute difference in vote shares between the winning and losing candidates. Margin % = Winner % − Loser %.

Q60. Answer: (a) Rs. 600

Shortcut Trick

A 25% discount means the item is sold at 100% − 25% = 75% of its Marked Price.

Selling Price = 75% of MP = 3/4 × MP

Selling Price = 3/4 × 800 = 600

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Therefore The correct answer is Rs. 600.

Alternate Method

Given:

Marked Price (MP) = Rs. 800

Discount = 25%

Formula Used:

Selling Price (SP) = MP − Discount

Discount = (Discount% ÷ 100) × MP

Marked Price

Rs. 800

− 25% Discount

Selling Price

Rs. 600

Discount = 25% of Rs. 800 = Rs. 200

Calculations:

=> Discount amount = (25 ÷ 100) × 800

=> Discount amount = 0.25 × 800 = Rs. 200

=> Selling Price (SP) = MP − Discount

=> SP = 800 − 200 = Rs. 600

Therefore The correct answer is Rs. 600.

Additional Information

Marked Price (MP)

It is the printed or tag price of an article. Discounts are always calculated on the Marked Price.

Successive Discount

If two successive discounts of x% and y% are given, the equivalent single discount is given by: [x + y − (x × y) ÷ 100]%.

Selling Price vs Cost Price

Profit or loss is always calculated on the Cost Price (CP), whereas the discount is deducted from the Marked Price (MP) to get the Selling Price (SP).

Q61. Answer: (d) 10.5%

Shortcut Trick

Let the Actual Selling Price (SP) = 130 units.

First SP = 8/13 × 130 = 80 units.

As the loss is 20%, Cost Price (CP) = 80 ÷ 0.80 = 100 units.

New SP = 85% of Actual SP = 0.85 × 130 = 110.5 units.

Profit % = New SP − CP = 110.5 − 100 = 10.5%

Therefore The correct answer is 10.5%.

Alternate Method

Given:

Selling Price 1 (SP1) = 8/13 × Actual SP

Loss % at SP1 = 20%

Selling Price 2 (SP2) = 85% of Actual SP

Formula Used:

CP = (SP × 100) ÷ (100 − Loss%)

Profit % = [(SP − CP) ÷ CP] × 100

Selling at 8/13 of Actual SP

85% of Actual SP

-20% Loss

Profit

SP1 = 80

CP = 100

SP2 = 110.5

SP = 130
Calculations:
=> Let the Actual SP be 130 units (chosen as a multiple of 13 for easy calculation).
=> SP1 = 8/13 × 130 = 80 units
=> Ramesh incurs a 20% loss at SP1, meaning SP1 is 80% of CP.
=> CP = (80 × 100) ÷ 80 = 100 units
=> New selling price SP2 = 85% of Actual SP
=> SP2 = 85/100 × 130 = 110.5 units
=> Profit = SP2 − CP = 110.5 − 100 = 10.5 units
=> Profit % = (10.5 ÷ 100) × 100 = 10.5%
Therefore The correct answer is 10.5%.
Additional Information
Marked Price & Discount
Discount is always given on the Marked Price (MP). SP = MP × (100 − Discount%) ÷ 100.
Successive Discounts
For two consecutive discounts of x% and y%, the net effective discount is given by: (x + y − xy ÷ 100)%.
Dishonest Dealer Concept
When a dealer sells goods at cost price but uses a false weight, Profit % = (True Weight − False Weight) ÷ False Weight × 100.

Q62. Answer: (a) 154

Shortcut Trick
Total sum of ratio parts = 5 + 12 + 11 = 28.
Difference between largest and smallest ratio = 12 − 5 = 7.
Difference amount = (7 ÷ 28) × 616.
Difference amount = (1 ÷ 4) × 616 = 154.
Therefore The correct answer is Rs. 154.
Alternate Method
Given:
Total amount = Rs. 616
Ratio of shares = 5 : 12 : 11
Concept Used:
If a total amount is divided in the ratio a : b : c, the value of one unit part = Total Amount ÷ (a + b + c).
5
12
11
Total = 28 parts = Rs. 616
Diff = 12 − 5 = 7 parts = Rs. 154
Calculations:
=> Sum of the ratio parts = 5 + 12 + 11 = 28 parts
=> Total 28 parts = Rs. 616
=> Value of 1 part = 616 ÷ 28 = Rs. 22
=> Largest share ratio = 12
=> Smallest share ratio = 5
=> Difference in ratio = 12 − 5 = 7 parts
=> Difference in amount = 7 × 22 = Rs. 154
Therefore The correct answer is Rs. 154.
Additional Information
Duplicate Ratio
If the given ratio of two quantities is a : b, then its duplicate ratio is $a^2 : b^2$.
Sub-duplicate Ratio
If the given ratio is a : b, its sub-duplicate ratio is calculated as $\sqrt{a} : \sqrt{b}$.
Compound Ratio

The compound ratio of two ratios a : b and c : d is obtained by multiplying their antecedents and consequents together, which results in ac : bd.

Q63. Answer: (b) 33.75

Shortcut Trick

To find the value, we first calculate 65% of 75.

65% of 75 = 65 × (3 / 4) = 195 / 4 = 48.75

The second value is given as 15.

Required difference = 48.75 − 15 = 33.75

Therefore The correct answer is 33.75.

Alternate Method

Given:

Expression to simplify: 65% of 75 − 15

Calculations:

=> (65 / 100) × 75 − 15

=> 65 × 0.75 − 15

=> 48.75 − 15

=> 33.75

Therefore The correct answer is 33.75.

Additional Information

Percentage Interchangeability

x% of y is exactly equal to y% of x. For example, calculating 65% of 75 is mathematically identical to 75% of 65. Since 75% represents 3/4 as a fraction, you can easily compute it as (3/4) × 65 = 195/4 = 48.75.

BODMAS Rule

Always follow the order of Brackets, Orders (of / powers), Division, Multiplication, Addition, and Subtraction while simplifying mathematical expressions to prevent calculation errors.

Q64. Answer: (b) 51

Shortcut Trick

Let the assumed average be 50 kg.

Net deviation from 50 kg = (−10) + (−1) + (+6) + (+25) + (−15) = +5.

Average deviation = +5 ÷ 5 = +1 kg.

Actual Average = Assumed Average + Average Deviation = 50 + 1 = 51 kg.

Therefore The correct answer is 51 kg.

Alternate Method

Given:

Weights: 40 kg, 49 kg, 56 kg, 75 kg, 35 kg

Number of members (n) = 5

Formula Used:

Average = Sum of all values ÷ Total number of values

40 kg

49 kg

56 kg

75 kg

35 kg

Avg = 51 kg

Total Sum = 255 kg → Average = 51 kg

Calculations:

=> Sum = 40 + 49 + 56 + 75 + 35

=> Sum = 255 kg

=> Average = 255 ÷ 5

=> Average = 51 kg

Therefore The correct answer is 51 kg.

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Additional Information

Weighted Average

When combining groups with different item counts and averages, their combined average is calculated as (n1A1 + n2A2) ÷ (n1 + n2).

Change in Average

If a new value is added to a group, the new average = old average + (change in sum ÷ new total number of items).

Properties of Averages

If a constant 'k' is added, subtracted, multiplied or divided to each observation uniformly, the new average will also undergo the same mathematical operation by 'k'.

Q65. Answer: (c) 14 hours

Shortcut Trick

Time for P to fill the tank = 12 × 7/3 = 28 hours. Time for Q = 10 × 6/5 = 12 hours.

Total capacity = LCM(28, 12) = 84 units. Efficiencies: P = 3 units/hour, Q = 7 units/hour.

P and Q operate for 2 hours → 2 × (3 + 7) = 20 units filled.

R empties 20 units in 5 hours → R's efficiency = −20 ÷ 5 = −4 units/hour.

Combined efficiency (P + Q + R) = 3 + 7 − 4 = 6 units/hour.

Total time to fill the tank = 84 ÷ 6 = 14 hours.

Therefore The correct answer is 14 hours.

Alternate Method

Given:

P fills 3/7 part in 12 hours.

Q fills 5/6 part in 10 hours.

P and Q are kept open for 2 hours, then closed.

R alone empties the filled water in 5 hours.

Formula Used:

Total Work = Efficiency × Time

Time required to fill complete tank:

=> Time taken by P = 12 × (7 ÷ 3) = 28 hours

=> Time taken by Q = 10 × (6 ÷ 5) = 12 hours

Pipe	Hours	Total Work	Efficiency
P	28	84	84 ÷ 28 = 3
Q	12	84 ÷ 12 = 7	

Calculations:

=> Combined efficiency of P and Q = 3 + 7 = 10 units/hour

=> Water filled by P and Q in 2 hours = 10 × 2 = 20 units

=> Pipe R empties these 20 units in 5 hours

=> Efficiency of R = −20 ÷ 5 = −4 units/hour (emptying)

=> Net efficiency of P, Q, and R together = 3 + 7 − 4 = 6 units/hour

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

=> Time taken = 84 ÷ 6 = 14 hours

Therefore The correct answer is 14 hours.

Additional Information

Fractional Work to Full Time

If a pipe fills a fraction (a/b) of a tank in x hours, the time taken to fill the entire tank is calculated as x × (b/a) hours.

Inlet vs Outlet Pipes

Pipes that fill the tank are known as inlet pipes (represented with positive efficiency), while pipes that empty it are outlet pipes (represented with negative efficiency).

Combined Efficiency Method

When multiple pipes operate together, their net efficiency is the algebraic sum of their individual efficiencies. The formula to find the total time is: Total Work ÷ Net Efficiency.

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Q66. Answer: (a) 20 : 9

Shortcut Trick

Convert the given fraction into a percentage directly to easily compare.

2 / 5 = (2 / 5) × 100% = 40%

Now, we have 18% of First Number = 40% of Second Number.

If a% of A = b% of B, then the ratio A : B is simply b : a.

First Number : Second Number = 40 : 18 = 20 : 9

Therefore The correct answer is 20 : 9.

Alternate Method

Given:

18% of First Number = 2/5 of Second Number

18% of First Number

=

2/5 of Second Number

First : Second = (2/5) : 18% = 40 : 18 = 20 : 9

Calculations:

Let the first number be x and the second number be y.

=> 18% of x = (2 / 5) of y

=> (18 / 100) × x = (2 / 5) × y

Cross-multiplying to simplify the equation:

=> 18 × 5 × x = 2 × 100 × y

=> 90x = 200y

=> x / y = 200 / 90

=> x / y = 20 / 9

=> x : y = 20 : 9

Therefore The correct answer is 20 : 9.

Additional Information

Fraction to Percentage Conversion

To easily convert any fraction into a percentage, multiply it by 100. For example, 2/5 = (2/5) × 100% = 40%.

Equating Quantities Shortcut

If you are given that p% of A = q% of B, the ratio of A to B is always in the inverse proportion of their percentages, which means A : B = q : p.

Proportion Fundamentals

When two ratios are set equal to each other, it is called a proportion. In A / B = C / D, A × D = B × C always holds true due to cross-multiplication.

Q67. Answer: (d) 7225

Shortcut Trick

Side of the square = Perimeter ÷ 4 = 340 ÷ 4 = 85 m.

Area = 85^2.

To find the square of a number ending in 5: Multiply the first digit (8) by its next number (9) and append 25 at the end.

=> 8 × 9 = 72, followed by 25 => 7225.

Therefore The correct answer is 7225 m^2.

Alternate Method

Given:

Perimeter of the square = 340 m

Formula Used:

Perimeter = 4 × Side

Area = $Side^2$

a = 85 m

a = 85 m

a = 85 m

a = 85 m
Perimeter = 340 m
Area = 7225 sq m
Calculations:
=> 4 × Side = 340
=> Side = 340 ÷ 4
=> Side = 85 m
=> Area = 85 × 85
=> Area = 7225 m²
Therefore The correct answer is 7225 m².
Additional Information
Diagonal of a Square
The length of the diagonal of a square is given by d = a√2, where a is the side of the square.
Area using Diagonal
The area of a square can also be calculated directly from its diagonal using the formula: Area = d² ÷ 2.
Inradius and Circumradius
The radius of the inscribed circle (inradius) is r = a ÷ 2, and the radius of the circumscribed circle (circumradius) is R = a ÷ √2.

Q68. Answer: (a) Rs. 39,780

Shortcut Trick
Aman's Profit = Rs. 20,000 − Rs. 4,800 = Rs. 15,200.
Profit Ratio (Aman : Pawan) = 15,200 : 4,800 = 19 : 6.
Since time is equal, Investment Ratio = Profit Ratio = 19 : 6.
Total Investment = 25 parts = Rs. 76,500 => 1 part = Rs. 3,060.
Difference in investment = 13 parts = 13 × 3,060 = Rs. 39,780.
Therefore The correct answer is Rs. 39,780.
Alternate Method
Given:
Total investment = Rs. 76,500
Total profit = Rs. 20,000
Pawan's profit = Rs. 4,800
Formula Used:
Investment Ratio = Profit Ratio (when investment time periods are equal)
Profit & Investment Proportion
Aman (19 parts)
Profit: Rs. 15,200
Pawan (6 parts)
Profit: Rs. 4,800
Total Investment = Rs. 76,500 (25 parts)
Difference = 19 − 6 = 13 parts
Calculations:
=> Aman's profit = Total profit − Pawan's profit
=> Aman's profit = 20,000 − 4,800 = Rs. 15,200
=> Ratio of profits (Aman : Pawan) = 15,200 : 4,800 = 152 : 48
=> Ratio of investments (Aman : Pawan) = 19 : 6
=> Let Aman's investment be 19x and Pawan's be 6x.
=> Total investment = 19x + 6x = 25x
=> 25x = 76,500 => x = 76,500 ÷ 25 = 3,060
=> Difference in their investments = 19x − 6x = 13x
=> Difference = 13 × 3,060 = Rs. 39,780
Therefore The correct answer is Rs. 39,780.
Additional Information

Partnership Basic Formula

Profit is distributed in the ratio of the product of Capital and Time period. Profit Ratio = (Capital1 × Time1) : (Capital2 × Time2)

Equal Time Periods

If partners invest their money for the same duration, their profits are shared directly in the ratio of their invested capitals. Capital Ratio = Profit Ratio.

Sleeping Partner

A partner who invests capital but does not manage the business is called a sleeping partner. Usually, the working partner receives a salary or fixed percentage of profit before the remaining profit is distributed as per capital ratios.

Q69. Answer: (a) 104°

Shortcut Trick

In ΔABC, third angle angle BCA = 180° − (125° + 17°) = 38°.

Since BC || AD, the alternate interior angle angle CAD = angle BCA = 38°.

In ΔACD, side AC = CD, so base angles are equal: angle ADC = angle CAD = 38°.

Using angle sum property, the required angle ACD = 180° − (38° + 38°) = 104°.

Therefore The correct answer is 104°.

Alternate Method

Given:

ABCD is a trapezium where BC || AD.

AC = CD

angle ABC = 17°

angle BAC = 125°

Formula Used:

Sum of all interior angles of a triangle = 180°

Alternate interior angles are equal when a transversal intersects two parallel lines.

125°

17°

38°

38°

38°

104°

A

B

C

D

Calculations:

=> In ΔABC, apply the triangle angle sum property:

=> angle BCA = 180° − (angle ABC + angle BAC)

=> angle BCA = 180° − (17° + 125°) = 180° − 142° = 38°

=> Because the line segment BC is parallel to AD, line AC acts as a transversal.

=> This makes the alternate interior angles perfectly equal: angle CAD = angle BCA = 38°

=> Next, observe ΔACD where it is given that sides AC = CD.

=> According to isosceles triangle properties, the respective angles opposite to equal sides must be equal.

=> Therefore, angle ADC = angle CAD = 38°

=> Finally, calculating the remaining top angle in ΔACD:

=> angle ACD = 180° − (angle CAD + angle ADC)

=> angle ACD = 180° − (38° + 38°) = 180° − 76° = 104°

Therefore The correct answer is 104°.

Additional Information

Alternate Interior Angles

When two parallel lines are crossed by a transversal connecting line, the alternate interior angles formed on opposite sides of the transversal line are always strictly equal in measurement.

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Isosceles Triangle Property

If any two sides of a given triangle possess equal length, then the interior angles directly opposite to those equivalent sides will invariably have identical angle measures.

Angle Sum Property

The fundamental principle stating that the summation of all three interior angles within any defined triangle is perpetually 180°, essential for solving unknown vertex values.

Q70. Answer: (d) 616 cm2

Shortcut Trick

The surface area of a sphere in terms of its diameter (d) is directly given by πd^2.

=> Surface Area = (22 ÷ 7) × 14 × 14

=> Surface Area = 22 × 2 × 14 = 616 cm^2

Therefore The correct answer is 616 cm^2.

Alternate Method

Given:

Diameter of the sphere (d) = 14 cm

=> Radius (r) = d ÷ 2 = 14 ÷ 2 = 7 cm

Formula Used:

Surface area of a sphere = 4 × π × r^2

r = 7 cm

Diameter (d) = 14 cm

Sphere

Calculations:

=> Surface area = 4 × (22 ÷ 7) × 7^2

=> Surface area = 4 × (22 ÷ 7) × 49

=> Surface area = 4 × 22 × 7

=> Surface area = 88 × 7 = 616 cm^2

Therefore The correct answer is 616 cm^2.

Additional Information

Volume of a Sphere

The volume of a sphere is given by V = (4 ÷ 3) × π × r^3.

Hemisphere Surface Area

A hemisphere has a Curved Surface Area (CSA) = 2 × π × r^2 and a Total Surface Area (TSA) = 3 × π × r^2.

Volume of a Hemisphere

The volume of a hemisphere is exactly half of a sphere: V = (2 ÷ 3) × π × r^3.

Q71. Answer: (a) 5

Given number : 925746

2 is added to each even digit and 4 is subtracted from each odd digit in the number

Difference between the highest and second lowest digits = 8 - 3 = 5.

Hence, the correct answer is "Option 1"

Q72. Answer: (d) Two

Given Series: (Left) ^ > & 5 > ^ 3 6 < + $ % * % 7 1 % 2 + 2 1 (Right)

Required Conditions: Number - Symbol - Number

(Left) ^ > & 5 > ^ 3 6 < + $ % * % 7 1 % 2 + 2 1 (Right)

Hence, the correct answer is "Option 4"

Q73. Answer: (c) 1

Given: ‘WHAT’ is coded as ‘3157’ and ‘HORN’ is coded as ‘2416’.

‘WHAT’ - ‘3157’.

HORN’ - 2416’

The code for H is 1.

Hence, the correct answer is "Option 3"

Q74. Answer: (b) AZV

The logic followed here is:

Q75. Answer: (c) 2

Given: A, B, C, D, E, F and G are sitting around a circular table facing the centre.

• Only two people sit between C and G when counted from the left of G.

• A sits third to the left of D.

• E sits to the immediate right of D.

• E sits second to the left of C.

• B is an immediate neighbour of A

The Final Arrangement is

Hence, the correct answer is "Option 3".

Q76. Answer: (d) 29

Here, we use the BODMAS table given below:

Given Equation: 24 + 3 × 10 − 2 ÷ 41 = ?

'+' and '÷' are interchanged, and '−' and '×' are interchanged

After interchanged.

24 ÷ 3 − 10 × 2 + 41 = ?

8 − 10 × 2 + 41 = ?

8 - 20 + 41 = ?

49 - 20 = ?

29.

Hence, the correct answer is "Option 4"

Q77. Answer: (c) NK−II

The logic followed here is:

Hence, the correct answer is "Option 3"

Q78. Answer: (a) PIEZ

The logic followed here is:

Hence, the correct answer is "Option 1"

Q79. Answer: (a) Wife's brother

Preparing the family tree diagram by using the following symbols:

As per the given information:

A is				
Symbol	•	@	¥	÷
Means	Brother	Wife	Son	Father
of B				

Hence, the correct answer is "Option 1"

Q80. Answer: (a) KQAW

The logic followed here is:

Hence, the correct answer is "Option 1"

Q81. Answer: (c) Only conclusion (I) follows.

The least possible venn diagram is shown below,

Conclusions (I): No chisel is a maize. - True (No hammer is a maize and chisel is a Hammer so, no chisel is a maize" is true.)

Conclusions (II): Some maize are hammers. - False (No hammer is a maize,so Some maize are hammers is a false)

Only conclusion (I) follows.

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Hence, the correct answer is "Option 3"

Q82. Answer: (d) HPLI

The English alphabetical series is given as-

The logic is as follows

Hence, the correct answer is "Option 4"

Q83. Answer: (c) 1

Given: Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order.

• F is kept second from the bottom.

• Only three boxes are kept between F and C.

• E is kept at one of the positions below F.

• Only G is kept between C and D.

• B is kept at one of the positions above C

• The Final Arrangement is

• | A |

C
G
D
B
F
E

Hence, the correct answer is "Option 3"

Q84. Answer: (c) HR - ML

The English alphabetical series is given as-

The logic is as follows-

Hence, the correct answer is "Option 3".

Q85. Answer: (c) 20, 85

Logic: Second no. = [(First no. ×4) + 5]

Given:

Similarly,

Hence, the correct answer is "Option 3"

Q86. Answer: (a) 24

We substitute the values in the given equation and solve it using BODMAS rule:

• means −, − means ×, × means ÷ and ÷ means +

After Interchange:

21 − 70 ÷ 10 + 5 × 2 = ?

21 − 7 + 5 × 2 = ?

21 − 7 + 10 = ?

14 + 10 = ?

24.

Hence, the correct answer is "Option 1"

Q87. Answer: (d) SU 37

The English alphabetical series is given as-

The logic is as follows-

Hence, the correct answer is "Option 4"

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Q88. Answer: (b) West

• Vijay starts from his home and drives 5 km towards north.
• He then takes a left turn, drives 5 km, turns left, and drives 5 km.
• He then takes a left turn and drives 3 km and reaches his office.
The Final Diagram,
Hence, the correct answer is "Option 2"

Q89. Answer: (c) One

• Total people = 4
• All facing north (this means “left” and “right” are just positions, not directions of facing)
• Tina is 20th from the right end
• Belamit is 28th from the left end
• Find Tina’s position from the left end
• If Tina is 20th from the right, her position from the left is:
Position from left=45−20+1=26
So, Tina is 26th from the left end.
• Number of people between them:=(28−26)−1
=2−1=1.
Hence, the correct answer is "Option 3"

Q90. Answer: (c) One

• Total number of people = 45
• Tina's position from the right end = 20^(th)
• Belamit's position from the left end = 28^(th)
• Belamit is the 28th person from the left end. Tina is the 20th person from the right end, which means her position from the left end is
• 45 - 20 +1 = 26^(th).
• Since Belamit is at position 28 from the left and Tina is at position 26 from the left, Belamit is two positions further right than Tina.
• 28 - 26 - 1 = 1.
• Hence, the correct answer is "Option 3"

Q91. Answer: (d) 3 km to the South

• Vslam starts from Point A and drives 17 km towards West.
• He then takes a left turn, drives 9 km, turns right and drives 5 km.
• He then takes a right turn and drives 12 km.
• He takes a final right turn, drives 22 km and stops at Point P
The Final Diagram,
Hence, the correct answer is "Option 4"

Q92. Answer: (a) 151

The logic follows here,
Hence, the correct answer is "Option 1"

Q93. Answer: (a) 189

The logic follows here,
Hence, the correct answer is "Option 1"

Q94. Answer: (b) R

Seven people, A, B, C, D, P, Q and R, are sitting in a row, facing north.
• No one sits to the left of Q.
• Only four people sit between Q and D.
• Only three people sit to the right of R.
• C sits to the immediate left of P.
• B is not an immediate neighbour of R

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The Final Arrangement,

Hence, the correct answer is "Option 2"

Q95. Answer: (b) ND - QX

The English alphabetical series is given as-

The logic is as follows-

Hence, the correct answer is "Option 2"

Q96. Answer: (d) D

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

• Only two boxes are kept between O and M.

• Only E is kept above N.

• No box is kept below M.

• C is kept at some place below D but at some place above P.

The Final Arrangement is,

E
N
D
O
C
P
M

Hence, the correct answer is "Option 4"

Q97. Answer: (b) Two

Given number 8265943,

1 is added to each even digit and 2 is subtracted from each odd digit in the number

3 and 7 digits will appear more than once in the new number

Hence, the correct answer is "Option 2"

Q98. Answer: (a) 3

Given : (Left) 617 259 165 784 349 (Right)

• The third digit of the lowest number is 165.

• The second digit of the highest number is 784.

Resultant if the third digit of the lowest number is subtracted from the second digit of the highest number = 8 - 5

= 3.

Hence, the correct answer is "Option 1"

Q99. Answer: (c) 2

'BIRD' is coded as '7394'

'DRIP' is coded as '4392'.

The code for 'P' in the given code language is 2.

Hence, the correct answer is "Option 3"

Q100. Answer: (a) Neither conclusion (I) nor (II) follows.

The least possible diagram for the given statements is as follows:

Conclusions:

I. Some Googles are Amazons. - false (Their is no direct relation between Googles and Amazons.Some Googles are Amazons may be it is possible but not definite. Hence, it is false).

II. No Google is an Amazon. - false (Their is no direct relation between Googles and Amazons.No Googles is an Amazons may be it is possible but not definite. Hence, it is false).

Neither conclusion (I) nor (II) follows.

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Hence, the correct answer is "Option 1"

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