RRB NTPC (UG) CBT-I Official Paper (Held On: 29 Aug, 2025 Shift 3) (Previous Year Paper)

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

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GENERAL AWARENESS

Q1. Which of the following pairs of Union Territories were merged to form a single Indian Union Territory in 2020?

(a) Dadra and Nagar Haveli and Daman and Diu
(b) Andaman and Nicobar and Lakshadweep
(c) Chandigarh and Puducherry
(d) Jammu and Kashmir and Ladakh

Q2. The government has made efforts to boost financial inclusion. Which 2014 scheme aimed to provide universal banking access in India?

(a) JAM Trinity
(b) PMAY
(c) MUDRA Yojana
(d) Jan Dhan Yojana

Q3. The 13^(th) edition of the joint military exercise 'Ekuverin' 2025 was conducted in which country?

(a) India
(b) Cambodia
(c) Maldives
(d) Thailand

Q4. Which initiative is associated with the construction of individual household toilets in India?

(a) Swachh Bharat Abhiyan
(b) AMRUT
(c) Jal Jeevan Mission
(d) Smart Cities Mission

Q5. The Mauryan empire was founded by Chandragupta Maurya in which of the following years?

(a) 350 BCE
(b) 375 BCE
(c) 300 BCE
(d) 322 BCE

Q6. In which of the following years did the Government of India disinvest 51% of shares of Bharat Aluminium Company Limited (BALCO) to Sterlite Industries (India) Limited, now Vedanta Limited?

(a) 1997
(b) 2008
(c) 2001
(d) 2004

Q7. At the 2025 British Book Awards gala in central London, who received the Freedom to Publish award?

(a) JK Rowling
(b) Margaret Atwood
(c) Salman Rushdie
(d) Hilary Mante

Q8. Which Indian astronaut participated in the Axiom Mission-4 to the ISS in 2025 to conduct space agriculture experiments?

(a) Sunita Williams
(b) Kalpana Chawla
(c) Rakesh Sharma
(d) Shubhanshu Shukla

Q9. Which hazardous pesticide was agreed to be eliminated under the Stockholm Convention held in Geneva in 2025?

(a) Glyphosate
(b) Chlorpyrifos
(c) DDT
(d) Atrazine

Q10. As of May 2025, what is the total number of Higher Education Institutions (HEIs) in India?

(a) 70,683
(b) 60,000
(c) 72,000
(d) 65,300

Q11. Which of the following Indian states is bordered by both the Bay of Bengal and the Eastern Ghats?

(a) Odisha
(b) Punjab
(c) Gujarat
(d) Karnataka

Q12. According to the National Forest Policy 1988, how much percentage of the total area of the country should be under forest in order to maintain ecological balance?

(a) 25%
(b) 33%
(c) 20%
(d) 28%

Q13. Under which Article of the Indian Constitution is citizenship at the commencement of the Constitution defined?

(a) Article 6
(b) Article 10
(c) Article 11
(d) Article 5

Q14. How can you resize a window using its corners or borders in Windows?

(a) Click the middle of the window and press Ctrl.
(b) Press Alt + Enter to auto-resize the window.
(c) Drag the title bar to change the size.
(d) Place the mouse pointer over a border or corner until it turns into a double-headed arrow, then drag.

Q15. Which of the following joint military exercises between India and Mongolia commenced its 17^(th) edition in Ulaanbaatar on 31 May 2025?

(a) Yudh Abhyas
(b) Vajra Prahar
(c) Garuda Shakti

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(d) Nomadic Elephant

Q16. Who was the Chairman and Chief Executive Officer (CEO) of the Railway Board as on 1^(st) May 2025?

(a) Naveen Gulati
(b) Satish Kumar
(c) Hitendra Malhotra
(d) Braj Mohan Agrawal

Q17. In the Gupta period, the term Udranga referred to _____.

(a) tax on trade goods
(b) toll tax on rivers
(c) land tax
(d) royal donation to temples

Q18. What was India's total non-fossil fuel installed capacity as of November 2024, as per the Ministry of New and Renewable Energy?

(a) 223.70 GW
(b) 263.70 GW
(c) 243.70 GW
(d) 213.70 GW

Q19. Who has developed the technology enabling India to shoot down fixed-wing drones using a laser beam?

(a) Armed Forces Tribunal, Delhi
(b) Armed Forces Medical College (AFMC)
(c) Aeronautical Development Agency
(d) Defence Research Development Organisation

Q20. Which of the following is the correct sequence to create a new file in WordPad on a Windows computer?

(a) File → Open → New Document
(b) File → New
(c) Home → New File
(d) Insert → New File

Q21. The hot weather season in India is generally observed from:

(a) October to November
(b) March to May
(c) December to February
(d) June to September

Q22. What is the relation between the speed of sound (v), its wavelength (λ) and time period (T)?

(a) $v = \lambda \times T$
(b) $v = \lambda / T$
(c) $v = \lambda + T$
(d) $v = T / \lambda$

Q23. Which classical Sanskrit play was written by Kalidasa?

(a) Mudrarakshasa
(b) Svapnavasavadattam
(c) Abhijnana-Shakuntalam
(d) Mrichchhakatika

Q24. Which city hosted the International Air Transport Association (IATA) Annual General Meeting and World Air Transport Summit in June 2025?

(a) Hyderabad
(b) Bengaluru
(c) New Delhi

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(d) Mumbai

Q25. Which organisation was established in 1817 to promote Western education among Indians?

(a) Hindoo College
(b) Aligarh Movement
(c) Arya Samaj
(d) Brahmo Samaj

Q26. Tourism in India contributes to which type of economic activity?

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

Q27. He was a militant nationalist who believed that the only way to India's freedom is through mass protests, especially by the youth. For this purpose, he began celebrating local festivals like Ganesh Chaturthi and Shivaji Jayanti on a grand scale, urging the youth to join in. He was also the editor of 'Kesari', a Marathi newspaper, which became one of the strongest critics of British rule. The leader in question is:

(a) Bal Gangadhar Tilak
(b) Bipin Chandra Pal
(c) Lala Lajpat Rai
(d) Gopal Krishna Gokhale

Q28. Diabetes mellitus is caused by the inadequate secretion of which hormone?

(a) Estrogen
(b) Insulin
(c) Adrenaline
(d) Thyroxine

Q29. The earliest documented evidence of puppetry in India is in which of the following languages?

(a) Bengali
(b) Sanskrit
(c) Gujarati
(d) Tamil

Q30. The Right to Constitutional Remedies, allowing individuals to move the Supreme Court directly for the enforcement of rights, is given under:

(a) Article 31
(b) Article 32
(c) Article 30
(d) Article 33

Q31. Raja Ram Mohan Roy was an active social reformer who spoke greatly for the problems faced by women. He was an inseparable agent who brought down the social evil of 'sati'. The reform association founded by him was:

(a) Arya Samaj
(b) Prarthana Samaj
(c) Brahmo Samaj
(d) Ramakrishna Mission

Q32. The 'Handball at School' initiative launched in 2025 to promote handball at the grassroots level in India is a collaboration between which organisations?

(a) International Handball Federation and Asian Handball Federation
(b) Ministry of Youth Affairs and Sports and National Handball Federation
(c) All India School Sports Federation and Handball Association of India
(d) Indian Olympic Association and Sports Authority of India

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Q33. Which of the following pairs of Indian states share international borders with Bangladesh?

(a) Manipur and Assam
(b) Sikkim and Manipur
(c) West Bengal and Tripura
(d) Nagaland and Punjab

Q34. Public Interest Litigation (PIL) in India is primarily associated with which of the following?

(a) Police investigations
(b) Judicial activism
(c) Election Commission
(d) Judicial review

Q35. Centralised planning influenced India's industrial strategy for decades. Under which five-year plan were small-scale industries given specific protection and incentives?

(a) Fifth Plan
(b) Fourth Plan
(c) Second Plan
(d) Third Plan

Q36. What was the significant change in funding norms for National Sports Federations (NSFs) announced by the Indian government in 2025?

(a) Allocation of at least 20% of their annual budget toward junior and youth development programmes
(b) Elimination of funding for foreign coaches in order to promote Indian coaches and youth development programmes
(c) Decrease in coach salaries
(d) Reduction in financial assistance for training athletes

Q37. What is the name of the glycoprotein produced in the liver that plays a crucial role in blood clotting?

(a) Fibrinogen
(b) Cadherin
(c) Mucins
(d) Selectin

Q38. The foundation day anniversaries of which two Indian states was celebrated on 20 February 2025?

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

Q39. How is a long and healthy life measured in HDI?

(a) Number of doctors
(b) Access to hospitals
(c) Life expectancy at birth
(d) Health insurance coverage

Q40. As per the Press Information Bureau release dated March 10, 2025, what is a major feature of the Bills of Lading Bill, 2025?

(a) Fixing freight rates for maritime shipments
(b) Replacing paper bills with biometric authentication
(c) Modernising India's maritime laws by replacing the old law
(d) Mandating insurance for all cargo vessels

MATHEMATICS

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Q41. The value of 3/4 + (1/(1+5/6)) - 3/5 is

(a) 145/229
(b) 153/220
(c) 146/225
(d) 162/227

Q42. The simple interest on a certain sum for 35/9 years at the rate of 2.7% per annuin is 2,808. What will be the amount payable on the same sum at the rate of 9.2% per annun simple interest in 52/3 years?

(a) Rs. 44,499
(b) Rs. 44,482
(c) Rs. 44,514
(d) Rs. 44,489

Q43. Find the volume (in cm^3) of a sphere having a diameter of 16.8 cm, giving your answer correct to two decimal places.
Take Π = 22/7

(a) 2493.71
(b) 2503.71
(c) 2473.71
(d) 2483.71

Q44. The marks scored by 10 students are given below.
12, 13, 14, 11, 16, 11, 12, 17, 15, 12
The mode of the data is:

(a) 14
(b) 13
(c) 12
(d) 11

Q45. The value of √400 + √0.0289 - √7.84 =

(a) 16.15
(b) 17.37
(c) 15.86
(d) 12.83

Q46. Simplify: $3((6/3)x^2 - 29x + 14) - 6(x^2 + 5x - 13)$

(a) 117x + 120
(b) 117x − 120
(c) −117x − 120
(d) −117x + 120

Q47. If the sum of the interior angles of a regular polygon is equal to four times the sum of its exterior angles, then what is the number of diagonals in the polygon?

(a) 31
(b) 33
(c) 35
(d) 28

Q48. The selling price of 50 books is equal to the cost price of 15 books. Find the loss or gain percentage on these books.

(a) 100/35 % gain
(b) 70% loss
(c) 100/35 % loss
(d) 70% gain

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Q49. Find the mean proportional of 81 and 36.

(a) 56
(b) 52
(c) 54
(d) 53

Q50. By how much is 65% of 75 greater than 3/5 of 35?

(a) 27.75
(b) 25.75
(c) 21.75
(d) 24.75

Q51. The population of a district is 360000, out of which 231000 are males. 66% of the population is literate. If 66% males are literate, then what percentage of females are literate?.

(a) 67%
(b) 66%
(c) 63%
(d) 64%

Q52. By selling 6 lemons for a rupee, a man loses 30%. To gain 5% how many must he sell for a rupee?

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

Q53. Which of the following numbers divides 563607?

(a) 8
(b) 10
(c) 3
(d) 13

Q54. Evaluate: (-9) - (-60) ÷ (-10) + (-4) × 8

(a) -49
(b) -50
(c) -46
(d) -47

Q55. If one trouser is offered free on the purchase of three trousers, what is the effecve discount percentage?

(a) 15%
(b) 20%
(c) 30%
(d) 25%

Q56. Sapna invested Rs. 20,300 on simple interest, partly at the rate of 5% per annum and partly at the rate of 9% per annum. If she earns equal interests from the two investments after 7 years, then find the sum invested at the rate of 5% per annum (in Rs.).

(a) 13,052
(b) 13,050
(c) 13,051
(d) 13,049

Q57. 3 years ago, the age of a father was 40 years more than twice his son's age. After how many years, from now, will he be twice his son's age?

(a) 37
(b) 32

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(c) 33
(d) 38

Q58. A bus travelling at 84 km/hr completes a journey in 6 hours. What should be its speed to cover the same distance in 12 hours?
(a) 44 km/hr
(b) 42 km/hr
(c) 32 km/hr
(d) 46 km/hr

Q59. Pankaj, Juhi and Siddharth invested Rs. 1,020, Rs. 1,740 and Rs. 1,840, respectively to start a business. If the profit at the end of the year is Rs. 1,050, what is Siddharth's share of the profit?
(a) Rs. 423
(b) Rs. 418
(c) Rs. 420
(d) Rs. 422

Q60. Simplify: $\sec^2\Phi \cot^2\Phi - 1/(\tan^2\Phi) + 2(1/(\csc^2\Phi) + 1/(\sec^2\Phi))$
(a) 1
(b) 3
(c) 0
(d) 2

Q61. The average runs scored by a batsman in 23 matches is 44. In the next 10 matches, the batsman scored an average of 13 runs. Find his average (rounded off to two decimals) in all the 33 matches?
(a) 35.61
(b) 34.61
(c) 33.61
(d) 36.61

Q62. Find the H.C.F. and L.C.M. of 0.48, 1.20 and 1.68.
(a) H.C.F. = 0.24; L.C.M. = 4.80
(b) H.C.F. = 0.12; L.C.M. = 2.40
(c) H.C.F. = 0.12; L.C.M. = 1.68
(d) H.C.F. = 0.24; L.C.M. = 16.8

Q63. M and N start a business. M invests Rs. 33,000 more than N for 2 months and N invests for 7 months. M's share is Rs. 605 more than that of N, out of a total profit of Rs. 1,815. Find the capital contributed by M.
(a) Rs. 38,500
(b) Rs. 38,339
(c) Rs. 38,697
(d) Rs. 38,300

Q64. A can lay railway track between two given stations in 20 days and B can do the same job in 15 days. With the help of C, they did the job in 3 days only. Then, C alone can do the job in
(a) 18/13 days
(b) 118/13 days
(c) 48/13 days
(d) 108/13 days

Q65. A mobile phone is marked at Rs. 30,000. Successive discounts of 20% and 10% are applied. What is the final selling price?
(a) Rs. 24,000
(b) Rs. 22,600
(c) Rs. 21,600
(d) Rs. 24,600

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Q66. Train A leaves station M at 6:40 AM and reaches station N at 3:40 PM on the same day. Train B leaves station N at 8:40 AM and reaches station M at 2:40 PM on the same day. Find the time when trains A and B meet.

(a) 11:28 AM
(b) 1:28 PM
(c) 11:58 AM
(d) 12:28 PM

Q67. The ratio between the perimeter and the length of a rectangle is 3 : 1. If the area of the rectangle is 180.5 cm^2, then what is the breadth of the rectangle?

(a) 38 cm
(b) 21 cm
(c) 19 cm
(d) 9.5 cm

Q68. The product of two consecutive positive natural numbers is 462. The greater of the two numbers is:

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

Q69. 8 men can complete a piece of work in 5 days, while 8 women can do it in 15 days. In how many days can 3 women and 4 men complete this work?

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

Q70. The H.C.F. and the L.C.M. of two numbers are 4 and 3360 respectively. If one of the numbers is 96, find the other one

(a) 92
(b) 116
(c) 164
(d) 140

GENERAL INTELLIGENCE AND REASONING

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

9 11 19 61 239 ?

(a) 1201
(b) 1120
(c) 1102
(d) 1021

Q72. What should come in place of the question mark (?) in the given series based on theEnglish alphabetical order?

LEB QJG VOL ATQ ?

(a) FYV
(b) FVY
(c) FYU
(d) FRT

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

Statements: All geysers are fans. No fan is a bulb.

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Conclusions (I): No geyser is a bulb.

Conclusions (II): Some fans are geysers.

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

Q74. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘×’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘−’, then what will come in place of the question mark (?) in the following equation?

48 A 3 C 21 D 8 B 3 = ?

(a) 2
(b) 13
(c) 6
(d) 10

Q75. What should come in place of the question mark (?) in the given series?

38 41 47 59 83 ?

(a) 131
(b) 121
(c) 132
(d) 145

Q76. In a certain code language,

A $ B means ‘A is the mother of B’,

A + B means ‘A is the brother of B’,

A @ B means ‘A is the wife of B’,

and A ÷ B means ‘A is the father of B’.

How is E related to N if ‘E $ F @ G ÷ M + N’?

(a) Mother
(b) Mother's sister
(c) Mother's mother
(d) Sister

Q77. Based on the English alphabetical order, three of the following four letter-cluster pairsare 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) ES - AN
(b) NB - KW
(c) WI - TD
(d) KX - HS

Q78. EGLU is related to CDJR in a certain way based on the English alphabetical order. In the same way, WUDI is related to URBF. To which of the given options is QLXZ related, following the same logic?

(a) OVIT
(b) OIVW
(c) YOBH
(d) OWVI

Q79. Salman ranked 24^(th) from the top and 11^(th) from the bottom in his class. How many students are there in his class?

(a) 33
(b) 34
(c) 31
(d) 32

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Q80. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

O50P R51S U54V X59Y ?

(a) A65B
(b) Z65B
(c) Z66A
(d) A66B

Q81. This question is based on the five, three-digit numbers given below.

(Left) 415 672 456 782 324 (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 added to the second digit of the highest number?

(a) 10
(b) 12
(c) 11
(d) 13

Q82. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?

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

(a) IDH
(b) SNQ
(c) MHK
(d) PKN

Q83. Each of the digits in the number 9123547 is arranged in ascending order from left to right. What will be the sum of the digits that are second from the left and second from the right in the new number thus formed?

(a) 9
(b) 6
(c) 7
(d) 8

Q84. Refer to the following number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) 9 8 5 @ 8 σ 9 π % 2 8 # 1 2 $ * 8 1 π 5 (Right)

How many such even numbers are there, which are immediately preceded by a symbol and also immediately followed by an even number?

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

Q85. In a certain code language, ‘TASK’ is coded as ‘4628’ and ‘KIND’ is coded as ‘1385’. What is the code for ‘K’ in the given code language?

(a) 3
(b) 8
(c) 2
(d) 1

Q86. What should come in place of the question mark (?) in the given series?

58, 64, 70, 76, 82, ?

(a) 88
(b) 85

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(c) 79
(d) 78

Q87. Seven people, I, J, K, L, P, Q and R, are sitting in a row, facing north. Only three people sit between P and J. R sits to the immediate left of J. No one sits to the right of I. Only two people sit between I and R. Q sits to the immediate right of L. How many people sitbetween K and Q?

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

Q88. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group? (Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) LGK
(b) HCF
(c) PKO
(d) UPT

Q89. Seven boxes A, B, C, D, E, F, and G are kept one over the other but not necessarily in the same order.

Only three boxes are kept below F. Only two boxes are kept between F and G. Only B is kept above D. A is kept at some place below E and at some place above C. How many boxes are kept above E?

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

Q90. Shivani starts from point X and drives 11 km towards the east. She then takes a left turn, drives 5 km, turns right and drives 5 km. She then takes a right turn and drives 2 km. She then takes a right turn, drives 7 km. She then takes a left turn and drives 10 km. She then takes a final right turn and drives 9 km and stops at point Z. How far (shortest distance) and towards which direction should she drive in order to reach point X again? (All turns are 90 degrees unless specified)

(a) 5 km south
(b) 10 km north
(c) 7 km north
(d) 7 km south

Q91. L, M, N, O, Q, R, and S are sitting around a circular table facing the centre of the table. Only four people sit between Q and M when counted from the right of Q. Q sits third to the left of O. L sits third to the left of R. S is an immediate neighbor of both M and O. How many people sit between N and S when counted from the right of N?

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

Q92. 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 pencils are copies.

Some copies are erasers.

Conclusions

(I): Some pencils are erasers.

(II): Some erasers are copies.

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

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(b) Only conclusion (I) follows.
(c) Neither conclusion (I) nor (II) follows.
(d) Only conclusion (II) follows.

Q93. DWQR is related to VOIJ in a certain way based on the English alphabetical order. In the same way, XQKL is related to PICD. To which of the given options is ZSMN related, following the same logic?
(a) REKF
(b) RKEF
(c) RFKI
(d) RIKF

Q94. Select the set in which the numbers are related in the same way as are the numbers of the following sets.
(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – Operations on 13 such as adding to/subtracting from/multiplying with 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)
(11, 110, 11)
(8, 59, 5)
(a) (17, 284, 4)
(b) (47, 2187, 21)
(c) (12, 130, 13)
(d) (17, 270, 19)

Q95. AXUJ is related to DBZP in a certain way based on the English alphabetical order. In the same way, MNOH is related to PRTN. To which of the given options is VZDZ related, following the same logic?
(a) YFID
(b) YIGF
(c) YDIF
(d) YDFI

Q96. In a certain code language, ‘REPS’ is coded as ‘7531’ and ‘EARS’ is coded as ‘3217’. What is the code for ‘A’ in the given code language?
(a) 3
(b) 1
(c) 5
(d) 2

Q97. Joe walks east for 60 m from his house. He then takes a left turn and walks for 20 m, turns left and walks for 80 m. He then turns left and walks for 30 m, turns left and walks for 30 m. He takes a final left turn and walks for 10 m and stops. How far (shortest distance) and in which direction he should move in order to reach his house? (All turns are 90-degree turns only unless specified.)
(a) 10 m towards the north
(b) 10 m towards the east
(c) 10 m towards the west
(d) 10 m towards the south

Q98. If 1 is added to each even digit of the number 85624179 then the digits are arranged in ascending order from left to right. Find the product of the digits which are second from the left end and third from the right end.
(a) 24
(b) 14
(c) 21
(d) 16

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Q99. If + means −, − means ×, × means ÷ and ÷ means +, then what will come in place of the question mark (?) in the following equation?

22 ÷ 85 × 5 + 12 − 2 = ?

(a) 37
(b) 23
(c) 30
(d) 15

Q100. Seven boxes V, W, X, Y, Z, Q and R are kept one over the other but not necessarily in the same order. Only Y is kept above Z. Only two boxes are kept between Z and Q. Only V is kept below W. X is not kept immediately above Q. Which box is kept fourth from the top?

(a) R
(b) V
(c) W
(d) X

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Dadra and Nagar Haveli and Daman and Diu

The correct answer is Dadra and Nagar Haveli and Daman and Diu.

Key Points

• On January 26, 2020, the Union Territories of Dadra and Nagar Haveli and Daman and Diu were officially merged into a single Union Territory named Dadra and Nagar Haveli and Daman and Diu.

• This merger was carried out for better administrative efficiency and to reduce the duplication of resources in the governance of the two Union Territories.

• The merger was enacted through the Dadra and Nagar Haveli and Daman and Diu (Merger of Union Territories) Act, 2019, which was passed by Parliament in December 2019 and received presidential assent soon after. Hence, the statement is correct.

• The new Union Territory consists of four districts, namely Dadra, Nagar Haveli, Daman, and Diu. The capital of the merged Union Territory is Daman.

• This decision was taken as both Union Territories were geographically close and had similar cultural and historical backgrounds. Hence, this statement is correct.

• The merger reduced the total number of Union Territories in India from nine to eight after its implementation. Hence, the statement is correct.

Additional Information

• Dadra and Nagar Haveli:

• This region was under Portuguese rule until its liberation in 1954. It officially became a Union Territory of India in 1961.

• The territory is known for its lush greenery, tribal population, and natural resources.

• Daman and Diu:

• Daman and Diu were also under Portuguese rule until their liberation in 1961. It became a Union Territory in 1987 after Goa was granted statehood.

• Known for its beaches, cultural heritage, and Portuguese-style architecture, it is a popular tourist destination.

• Reasons for Merger:

• Both territories were geographically connected and had similar administrative, cultural, and linguistic traits.

• The merger aimed to streamline governance and reduce administrative costs by having a unified administration.

Important Points

• Union Territories in India:

• India currently has 8 Union Territories. These are governed directly by the Central Government.

• Union Territories are usually smaller in area and population compared to states and lack legislative powers in most cases.

• Historical Context:

• The Dadra and Nagar Haveli and Daman and Diu merger is a significant step in India's administrative restructuring in the 21st century.

• Such mergers reflect the government's intent to improve governance efficiency and ensure better resource allocation.

Q2. Answer: (d) Jan Dhan Yojana

The correct answer is Jan Dhan Yojana.

Key Points

• Pradhan Mantri Jan Dhan Yojana (PMJDY), launched in August 2014, is a flagship scheme of the Government of India to promote financial inclusion by ensuring access to financial services like banking, savings, deposits, remittance, credit, insurance, and pension.

• It primarily aims to provide universal access to banking facilities, especially for the economically weaker sections of society.

• Zero Balance Accounts: Under this scheme, individuals can open a bank account without maintaining any minimum balance.

• RuPay Debit Card: Account holders are provided with a RuPay debit card to facilitate cashless transactions and access to ATMs.

• Insurance Benefits: The scheme offers an accidental insurance cover of up to Rs. 2 lakh and a life insurance cover of Rs. 30,000 for eligible beneficiaries.

• Mobile Banking Access: It enables individuals to use mobile banking for financial transactions, enhancing digital inclusion.

• Direct Benefit Transfers (DBT): The scheme facilitates direct transfer of subsidies to beneficiaries' bank accounts, reducing leakages in government programs.

• By March 2023, PMJDY accounts crossed 500 million, showcasing its success in bringing unbanked individuals into the formal financial system.

Additional Information

• JAM Trinity:

• JAM stands for Jan Dhan-Aadhaar-Mobile. It refers to the integration of these three components to deliver subsidies and financial benefits directly to the beneficiaries, reducing corruption and inefficiencies.

• Jan Dhan: Bank accounts under PMJDY serve as the foundation for financial inclusion.

• Aadhaar: The unique identification system enables targeted delivery of services and prevents duplication.

• Mobile: Mobile connectivity facilitates easy and quick financial transactions.

• PMAY (Pradhan Mantri Awas Yojana):

• Launched in 2015, this scheme aims to provide affordable housing to all by 2022, ensuring housing for the economically weaker sections (EWS) and low-income groups (LIG).

• It offers credit-linked subsidies for home loans and focuses on urban and rural areas.

• MUDRA Yojana:

• Launched in 2015, this scheme provides financial support to micro and small enterprises through loans under the Shishu, Kishor, and Tarun categories.

• It aims to promote entrepreneurship and employment in the non-corporate sector.

Important Points

• Jan Dhan Yojana Impact: It has significantly increased financial literacy and empowered marginalized sections of society by providing access to financial services.

• Global Recognition: PMJDY has been recognized as one of the world's largest financial inclusion initiatives by international organizations like the World Bank.

• Future Goals: The scheme aims to enhance digital banking, encourage savings, and ensure the socio-economic upliftment of the underprivileged.

Q3. Answer: (c) Maldives

The correct answer is Maldives.

Key Points

• 'Ekuverin' is an annual joint military exercise conducted between India and Maldives. The word 'Ekuverin' translates to 'friendship' in the Dhivehi language.

• The exercise aims to enhance mutual cooperation and interoperability between the armies of the two nations, focusing on counter-terrorism, disaster relief operations, and humanitarian assistance.

• The 13th edition of the exercise, held in 2025, was conducted in the Maldives. This edition reinforced the strategic partnership and trust between the two countries. Hence, the correct answer is Maldives.

• India and the Maldives share a historically close relationship, especially in the areas of defense and security cooperation. Exercises like 'Ekuverin' strengthen diplomatic ties and ensure preparedness against common threats.

• The exercise involves joint training sessions, tactical drills, and exchange of best practices between the armies of both nations, ensuring better coordination in real-time scenarios. Hence, the correct answer is Maldives.

Additional Information

• India-Maldives Relations:

• India and the Maldives share strong bilateral ties based on mutual trust, shared interests, and regional stability. The Maldives is strategically significant to India due to its location in the Indian Ocean region.

• India has supported the Maldives in capacity-building, disaster relief, and maritime security. Exercises like 'Ekuverin' further bolster defense cooperation.

• Features of 'Ekuverin':

• The exercise involves joint tactical operations such as urban warfare, counter-terrorism strategies, and humanitarian assistance drills.

• It helps both nations prepare for natural disasters and coordinate better during emergency situations, contributing to regional stability.

• Example: During the 2025 edition of 'Ekuverin', both armies conducted joint drills focusing on disaster management and counter-terrorism operations.

• Strategic Importance of the Maldives:

• The Maldives lies along major international sea routes, making it vital for India's maritime security and regional dominance.

• India has provided support to the Maldives in terms of military aid, economic assistance, and humanitarian aid over the years.

• For example, India helped the Maldives during the 2004 tsunami and continues to support its development initiatives.

Important Points

• Defense Cooperation:

• India supports the Maldives through training programs, joint exercises, and military equipment supply. Exercises like 'Ekuverin' highlight India's commitment to regional security and cooperation.

• The Maldives is also a part of India's 'Neighborhood First Policy', which ensures priority is given to neighboring countries for mutual growth and development.

• Other Examples of Joint Military Exercises:

• Sampriti: Conducted between India and Bangladesh to enhance military cooperation.

• Surya Kiran: A joint military exercise between India and Nepal.

• Yudh Abhyas: Held between India and the United States to strengthen counter-terrorism strategies.

Q4. Answer: (a) Swachh Bharat Abhiyan

The correct answer is Swachh Bharat Abhiyan.

Key Points

• Swachh Bharat Abhiyan (Clean India Mission) is a flagship program launched by the Government of India in October 2014 by Prime Minister Narendra Modi.

• The mission aims to eliminate open defecation and improve sanitation across the country by constructing individual household toilets, public toilets, and promoting behavioral change.

• It is divided into two sub-missions: Swachh Bharat Gramin (for rural areas) and Swachh Bharat Urban (for urban areas). The rural component focuses on building household toilets to achieve 100% sanitation coverage. Hence, this initiative is directly associated with the construction of individual household toilets.

• The mission also includes components such as solid waste management, awareness campaigns, and promoting cleanliness in public spaces.

• The Swachh Bharat Mission has resulted in the construction of over 100 million toilets and has significantly reduced open defecation practices in rural and urban India. Hence, the correct option is Swachh Bharat Abhiyan.

Additional Information

• AMRUT (Atal Mission for Rejuvenation and Urban Transformation):

• This scheme focuses on improving urban infrastructure, such as water supply, sewerage systems, and urban transport, but it does not directly deal with individual household toilets. It targets cities with a population above 1 lakh.

• Jal Jeevan Mission:

• This mission aims to provide safe and adequate drinking water to all households in rural India through functional tap connections by 2024. It does not focus on sanitation or toilets.

• Smart Cities Mission:

• This initiative focuses on developing 100 smart cities in India, emphasizing urban planning, technology, and sustainable development. Sanitation is a component but not the primary focus.

• Swachh Bharat Abhiyan:

• The mission has played a pivotal role in achieving the goal of an open defecation-free India by 2019, coinciding with the 150th birth anniversary of Mahatma Gandhi.

• It promotes community participation and awareness-building campaigns, encouraging behavioral change in sanitation practices.

Important Points

• Key Achievements of Swachh Bharat Abhiyan:

• The mission has constructed over 100 million household toilets, effectively reducing open defecation rates.

• It has contributed to improving health and hygiene by reducing waterborne diseases and improving sanitation standards.

• Global Recognition:

• The Swachh Bharat Mission has been recognized globally as a successful sanitation initiative and has inspired similar programs in other countries.

Q5. Answer: (d) 322 BCE

The correct answer is 322 BCE.

Key Points

• The Mauryan Empire was founded by Chandragupta Maurya in 322 BCE. It marked the beginning of one of the most significant dynasties in Indian history.

• This empire was established after overthrowing the Nanda Dynasty, which ruled over Magadha.

• Chandragupta Maurya, with the guidance of his mentor Chanakya (Kautilya), laid the foundation of a centralized state that encompassed a large part of the Indian subcontinent. Hence, option 4 is correct.

• The Mauryan Empire was known for its strong centralized administration, efficient governance, and military strength, which helped Chandragupta consolidate his rule.

• The empire expanded its territory under Chandragupta Maurya and later under his successors like Bindusara and Ashoka. Chandragupta Maurya is credited with laying the groundwork for this large empire. Hence, statement is correct.

Additional Information

• Chandragupta Maurya:

• Chandragupta Maurya was the first emperor of the Mauryan Empire and ruled from 322 BCE to 298 BCE.

• He was mentored by Chanakya, also known as Kautilya, a renowned scholar and strategist. Chanakya's political treatise, Arthashastra, laid the foundation for effective governance in the Mauryan Empire.

• Key Features of the Mauryan Empire:

• The Mauryan Empire was one of the largest empires in ancient India, covering parts of modern-day India, Pakistan, Afghanistan, and Bangladesh.

• The centralized administration under the Mauryan rulers ensured efficient governance and stability across the empire.

• Example: Chandragupta established a capital at Pataliputra (modern-day Patna), which became the administrative and political center of the empire.

• Successors of Chandragupta Maurya:

• Bindusara: Chandragupta's son, who succeeded him, expanded the empire further into southern India.

• Ashoka the Great: Chandragupta's grandson, who is known for his role in spreading Buddhism and the establishment of peace across the empire.

Important Points

• Chandragupta's Rise to Power:

• Chandragupta defeated the Nanda Dynasty, which was known for its oppressive rule, to establish the Mauryan Empire.

• He allied with Alexander the Great's successor, Seleucus I Nicator, to strengthen his empire. The treaty allowed Chandragupta to acquire territories west of the Indus River.

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• Administrative Achievements:

• The Mauryan Empire had a well-organized bureaucracy and infrastructure, including roads, trade routes, and irrigation systems.

• The Arthashastra, written by Chanakya, played a crucial role in shaping the empire's administrative policies.

• The empire's military strength and strategies helped in maintaining internal stability and defending against external invasions.

Q6. Answer: (c) 2001

The correct answer is 2001.

Key Points

• Bharat Aluminium Company Limited (BALCO) was established as a public sector company in India to cater to the demand for aluminium production in the country.

• The Government of India decided to disinvest its stake in BALCO as part of its economic liberalization policies aimed at reducing government ownership in public enterprises and promoting privatization.

• In 2001, the government disinvested 51% of its shares in BALCO to Sterlite Industries (India) Limited, which is now known as Vedanta Limited. Hence, the correct answer is 2001.

• This move marked a significant step in the privatization of public sector enterprises in India, with Sterlite Industries acquiring majority ownership and operational control of BALCO.

• The disinvestment was considered controversial, as it faced opposition from employees and various political groups who expressed concerns about the impact of privatization on workers and national interests. However, the disinvestment was eventually completed in 2001.

Additional Information

• Sterlite Industries (India) Limited:

• Sterlite Industries, now known as Vedanta Limited, is a leading natural resources company in India that deals with mining, metals, and power generation.

• It acquired a majority stake in BALCO in 2001 as part of the government's disinvestment program, enabling the company to expand its operations in the aluminium sector.

• Privatization in India:

• Privatization refers to the transfer of ownership and management of public sector enterprises to private entities.

• The Government of India adopted privatization policies in the 1990s as part of its broader economic reforms to improve efficiency, attract investment, and reduce fiscal burdens.

• Example: Alongside BALCO, other public sector enterprises like Maruti Suzuki and Air India have undergone privatization to varying extents.

• Impact of BALCO Disinvestment:

• The disinvestment allowed Sterlite Industries to modernize and expand BALCO's facilities, leading to increased aluminium production and improved operational efficiency.

• However, the process also faced criticism from workers' unions and opposition parties due to concerns about job security and the valuation of the company.

• Despite the controversies, the privatization of BALCO is regarded as a landmark event in India's disinvestment history.

Important Points

• Disinvestment Policy:

• Disinvestment involves the government selling its stakes in public sector enterprises to private entities to reduce fiscal deficits and enhance operational efficiency.

• It is implemented by government bodies like the Department of Investment and Public Asset Management (DIPAM).

• Significance of Aluminium Industry:

• Aluminium is a versatile metal used in various industries, including construction, transportation, packaging, and electrical applications.

• India is one of the largest producers of aluminium in the world, with companies like Hindalco Industries and BALCO playing a key role in meeting domestic and international demand.

Q7. Answer: (b) Margaret Atwood

The correct answer is Margaret Atwood.

Key Points

• Margaret Atwood received the Freedom to Publish award at the 2025 British Book Awards gala held in central London.

• This prestigious award recognizes individuals or organizations that champion the freedom to publish against censorship or restrictions.

• Margaret Atwood, a celebrated Canadian author, has been a vocal advocate for freedom of expression, and her works often

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highlight themes of societal oppression and resistance. Hence, the correct answer is Margaret Atwood.

• Margaret Atwood is renowned for her literary contributions, including novels such as "The Handmaid's Tale", which critically examine themes of power, freedom, and societal control.

• The Freedom to Publish award aligns with Margaret Atwood's long-standing advocacy for creative and intellectual freedom. Hence, this recognition is fitting.

Additional Information

• Margaret Atwood:

• Margaret Atwood is a Canadian author, poet, and essayist born on November 18, 1939. She is widely acclaimed for her literary works that explore issues such as gender, identity, and societal norms.

• Her notable works include "The Handmaid's Tale", "Oryx and Crake", and "Alias Grace". Many of her writings critically examine themes of oppression and freedom.

• Atwood has received numerous awards, including the Booker Prize and the Governor General's Award, solidifying her status as a literary icon.

• The Freedom to Publish award:

• This award is presented to individuals or organizations that demonstrate courage and commitment to upholding the right to publish freely without censorship.

• It highlights the importance of freedom of expression, which is essential for creativity, democracy, and intellectual discourse.

• Margaret Atwood's recognition with this award is a testament to her contributions to literature and advocacy for creative freedom.

• Other notable authors:

• JK Rowling: Known for her Harry Potter series, Rowling has faced controversies related to freedom of speech but is not associated with the 2025 award.

• Salman Rushdie: An author famous for "The Satanic Verses", Rushdie is a vocal advocate for freedom of expression but was not the recipient of this award in 2025.

• Hilary Mantel: Known for her Wolf Hall trilogy, Mantel has been recognized for her literary achievements but did not receive the Freedom to Publish award.

Important Points

• Significance of the Freedom to Publish award:

• The award underscores the importance of resisting censorship and promoting intellectual freedom in literature and publishing.

• It serves as a reminder of the challenges faced by authors and publishers in ensuring free access to creative works.

• Margaret Atwood's advocacy:

• Atwood has consistently championed the right to creative freedom, evident in her works and public appearances.

• Her contributions to literature and her steadfast support for intellectual and creative liberties make her a deserving recipient of the award.

Q8. Answer: (d) Shubhanshu Shukla

The correct answer is Shubhanshu Shukla.

Key Points

• Shubhanshu Shukla is an Indian astronaut who was selected to participate in the Axiom Mission-4 to the International Space Station (ISS) in 2025.

• He will be conducting space agriculture experiments during this mission, which focus on studying plant growth and sustainability in microgravity conditions.

• The mission aims to advance scientific understanding of how plants adapt to a space environment, contributing to future food production for prolonged space missions. Hence, Shubhanshu Shukla is the correct option.

• Axiom Space Missions are private astronaut missions designed to expand humanity's presence in low-Earth orbit and prepare for future deep-space exploration.

• Shubhanshu Shukla's involvement in Axiom Mission-4 highlights India's growing contribution to international space exploration efforts. Hence, the correct answer is Shubhanshu Shukla.

Additional Information

• Axiom Space:

• Axiom Space is a private spaceflight company headquartered in Houston, Texas, USA. It aims to expand access to low-Earth orbit by conducting private astronaut missions and building the first commercial space station.

• Axiom Missions are important for fostering international collaboration in space exploration and conducting scientific research in a unique environment.

• Space Agriculture:

• Space agriculture is the study of growing plants in space to ensure food security for astronauts on long-term missions.

• Experiments focus on understanding the effects of microgravity, radiation, and environmental conditions on plant growth, nutrient uptake, and reproduction.

• Example: NASA's Veggie Program has successfully grown lettuce, radishes, and other plants on the ISS.

• India’s Space Endeavors:

• India has a rich history in space exploration, led by the Indian Space Research Organisation (ISRO).

• With the Gaganyaan Mission, India aims to send astronauts to space using domestically developed technologies.

• Indian astronauts like Rakesh Sharma and Kalpana Chawla have played significant roles in promoting India’s contributions to space exploration.

Important Points

• Role of Astronauts:

• Astronauts are responsible for conducting scientific experiments, performing maintenance tasks, and collaborating on international missions.

• Shubhanshu Shukla's inclusion in the mission reflects India’s growing presence in international space collaborations.

• Axiom Space’s Vision:

• Axiom Space aims to build a commercial space station that will replace the ISS after its retirement in 2030.

• The integration of international astronauts like Shubhanshu Shukla in its missions promotes global cooperation in space exploration.

Q9. Answer: (b) Chlorpyrifos

The correct answer is Chlorpyrifos.

Key Points

• Chlorpyrifos is a widely used organophosphate pesticide, primarily for agricultural purposes to control pests like insects and termites.

• The Stockholm Convention, an international treaty aimed at eliminating or reducing the use of hazardous chemicals, agreed to eliminate Chlorpyrifos due to its adverse environmental and health impacts.

• Chlorpyrifos has been linked to significant health concerns, including neurotoxicity, developmental disorders, and environmental contamination. Hence, it was targeted for elimination.

• The 2025 Geneva meeting under the Stockholm Convention specifically focused on eliminating hazardous pesticides like Chlorpyrifos to ensure sustainable agricultural practices and protect global biodiversity.

• Chlorpyrifos persists in the environment and can contaminate soil, water, and air, harming non-target organisms such as pollinators and aquatic species. Hence, its elimination was deemed essential for ecological conservation.

• The decision aligns with the United Nations Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-Being) and Goal 15 (Life on Land), which emphasize reducing pollution and promoting sustainable ecosystems.

Additional Information

• Chlorpyrifos:

• Chlorpyrifos is an organophosphate pesticide first introduced in 1965. It is used to control pests on crops, animals, and buildings.

• It is highly toxic to humans and animals, causing neurological damage, respiratory issues, and developmental delays in children.

• Countries like India, the United States, and Australia have been significant users of Chlorpyrifos. However, many nations have started banning or restricting its use due to health and environmental concerns.

• Stockholm Convention:

• The Stockholm Convention, established in 2001, aims to eliminate or reduce the production and use of Persistent Organic Pollutants (POPs).

• POPs like Chlorpyrifos are chemicals that persist in the environment, accumulate in living organisms, and pose risks to human health and ecosystems.

• The convention involves over 180 countries, including major global stakeholders, to ensure collaborative efforts in combating hazardous chemicals.

• Other Options:

• Glyphosate: A widely used herbicide, often debated for its environmental and health impacts but not yet agreed upon for elimination under the Stockholm Convention.

• DDT: A pesticide banned in several countries due to its ecological and health impacts, though used selectively for malaria control in some regions.

• Atrazine: A herbicide commonly used for weed control but under scrutiny for groundwater contamination and hormonal disruption.

Important Points

• Health Impact of Chlorpyrifos:

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• It is a neurotoxin affecting the central nervous system, particularly in children, leading to developmental and behavioral disorders.

• Exposure can occur through contaminated food, water, or air, posing risks to agricultural workers and nearby communities.

• Environmental Impact:

• Chlorpyrifos contaminates soil and water systems, harming aquatic ecosystems and pollinators such as bees.

• Its persistent nature makes it a long-term pollutant, accumulating in the food chain and leading to bioaccumulation.

Q10. Answer: (a) 70,683

The correct answer is 70683.

Key Points

• India's Higher Education Institutions (HEIs) count: As of May 2025, India has a total of 70,683 Higher Education Institutions (HEIs). This includes universities, colleges, and standalone institutions.

• Breakdown of HEIs: India has a diverse range of HEIs, including government-funded universities, private universities, deemed universities, and autonomous colleges.

• The data reflects India's massive higher education system, which is one of the largest in the world. It caters to millions of students across various disciplines annually.

• The count of HEIs is driven by the expansion of infrastructure, increased government initiatives to improve accessibility, and the private sector's growing participation in the education sector.

• India's higher education system is regulated by several organizations such as the University Grants Commission (UGC), AICTE, and NAAC, ensuring quality and standards across institutions.

• The number of HEIs continues to grow as the government focuses on improving Gross Enrollment Ratio (GER) and promoting education to underserved areas of the country.

• The data of 70,683 HEIs is based on detailed surveys and reports conducted by bodies such as the Ministry of Education and other allied organizations.

• Hence, the correct answer is 70683.

Additional Information

• Classification of HEIs in India:

• Universities: India has over 1,000 universities, including central, state, private, and deemed universities. These institutions offer undergraduate, postgraduate, and doctoral programs.

• Colleges: A vast majority of HEIs in India are colleges, affiliated with universities, and provide undergraduate and postgraduate education in various fields such as arts, science, commerce, etc.

• Standalone institutions: These institutions include technical colleges, polytechnics, and professional training institutes, specializing in areas like engineering, medicine, and management.

• Growth Factors:

• The Indian government has initiated programs such as RUSA (Rashtriya Uchchatar Shiksha Abhiyan) and NEP (National Education Policy) 2020 to expand the reach and quality of higher education.

• Increased privatization and foreign collaborations have also contributed significantly to the growth of HEIs in India.

• Impact of Higher Education Growth:

• India has seen an improvement in its Gross Enrollment Ratio (GER), which currently stands at over 27.4%, thanks to the growing number of HEIs.

• The large number of HEIs plays a significant role in economic development by providing skilled manpower and promoting research and innovation.

Important Points

• Key Statistics:

• India has over 15 lakh teachers in HEIs, catering to more than 38 million students.

• The higher education system contributes significantly to India's human capital development, equipping students with skills and knowledge required for diverse industries.

• Policy and Regulation:

• The University Grants Commission (UGC) is the primary regulatory body overseeing universities and colleges in India.

• The National Assessment and Accreditation Council (NAAC) is responsible for evaluating the quality of HEIs.

• The All India Council for Technical Education (AICTE) governs technical education institutions.

Q11. Answer: (a) Odisha

The correct answer is Odisha.

Key Points

• Odisha is bordered by the Bay of Bengal to its east, making it one of the coastal states of India.

• The state is also traversed by the Eastern Ghats, a discontinuous range of mountains that stretch from Odisha to Tamil Nadu. Hence, Odisha is bordered by both geographical features mentioned in the question.

• The presence of the Bay of Bengal influences Odisha's climate, making it prone to cyclonic activities and rich in marine biodiversity. The Eastern Ghats provide a unique ecosystem and are rich in flora and fauna.

• Other states mentioned in the options, such as Punjab, Gujarat, and Karnataka, are not bordered by the Bay of Bengal or the Eastern Ghats. Punjab is a landlocked state, Gujarat has a coastline along the Arabian Sea, and Karnataka is bordered by the Western Ghats and the Arabian Sea.

• Hence, the correct answer is Odisha.

Additional Information

• Bay of Bengal:

• The Bay of Bengal is the northeastern part of the Indian Ocean and is bordered by India, Bangladesh, Myanmar, and Sri Lanka.

• It is known for its rich marine ecosystem, major ports like Paradeep in Odisha, and its role in international trade.

• The Bay of Bengal is prone to cyclones, which often affect Odisha during the monsoon season.

• Eastern Ghats:

• The Eastern Ghats are a range of mountains running parallel to the eastern coast of India, extending from Odisha to Tamil Nadu.

• These mountains are not continuous and are interrupted by rivers like the Godavari, Krishna, and Mahanadi.

• The Eastern Ghats are known for their rich biodiversity, including many endemic species, and are home to tribal communities.

• Odisha's Geography:

• Odisha has a diverse geography, including coastal plains, river valleys, and hill ranges.

• The Mahanadi River flows through Odisha, contributing to its fertile plains and agricultural activities.

• Odisha's coastline stretches over 485 km along the Bay of Bengal.

Important Points

• Other States:

• Punjab: A landlocked state located in northern India, surrounded by Haryana, Himachal Pradesh, and Rajasthan. It does not have a coastline or mountain range like the Eastern Ghats.

• Gujarat: Situated in western India, Gujarat has a coastline along the Arabian Sea. It does not touch the Bay of Bengal or the Eastern Ghats.

• Karnataka: Located in southern India, Karnataka is bordered by the Western Ghats and the Arabian Sea. It does not have any connection to the Bay of Bengal or the Eastern Ghats.

• Odisha's Historical and Cultural Significance:

• Odisha is home to ancient temples like the Konark Sun Temple and the Jagannath Temple in Puri, showcasing its rich cultural heritage.

• The state is known for festivals like Rath Yatra and its tribal arts, crafts, and dance forms.

Q12. Answer: (b) 33%

The correct answer is 33%.

Key Points

• According to the policy, 33% of the total geographical area of the country should be under forest cover to ensure a sustainable environment and ecological balance.

• The policy also highlights the need for afforestation, reforestation, and conservation of existing forests to achieve this goal.

• The policy was introduced to address issues like deforestation, climate change, and the declining forest cover in India.

• The policy proposes 33% forest cover in plains and up to 66% in hilly and mountainous regions.

• Forests play a critical role in carbon sequestration, mitigating the impacts of climate change.

• Forests are home to a vast array of biodiversity, including endangered species.

• The United Nations emphasizes maintaining forest cover as part of the Sustainable Development Goals (SDGs).

• Rapid urbanization and industrialization have led to deforestation and reduction in forest cover.

• Climate change has impacted the growth and regeneration of forests, making it challenging to achieve the desired forest cover.

• Government Initiatives:

• National Afforestation Programme: A program aimed at increasing forest cover and restoring degraded forest areas.

• Green India Mission: Part of the National Action Plan on Climate Change (NAPCC), this mission aims to enhance forest-based livelihoods and ecosystem services.

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Q13. Answer: (d) Article 5

The correct answer is Article 5.

Key Points

• Article 5 of the Indian Constitution defines the conditions under which individuals were considered citizens of India at the commencement of the Constitution on 26th January 1950.

• It specifies the criteria for citizenship based on factors like birth, domicile, and parentage. Individuals who met these conditions were deemed citizens of India as of the commencement of the Constitution.

• This article is essential for understanding the initial framework of citizenship in India. Hence, Article 5 is correct.

• Article 6 deals with the rights of individuals who migrated to India from Pakistan before the commencement of the Constitution and specifies the conditions under which they could claim Indian citizenship. Hence, this is not the correct option.

• Article 10 provides for the continuance of Indian citizenship and states that every person who is or is deemed to be a citizen of India shall continue to be such a citizen, subject to provisions made by Parliament. Hence, this is not the correct option.

• Article 11 gives Parliament the authority to regulate the right of citizenship by law, including its acquisition and termination. Hence, this is not the correct option.

• Thus, the correct answer is Article 5.

Additional Information

• Article 5 of the Constitution:

• Article 5 was pivotal in establishing citizenship at the time of India's independence and the adoption of the Constitution.

• It provided a clear framework for determining citizenship based on birth, domicile, and parentage, ensuring a smooth transition to independent governance.

• Other Articles Related to Citizenship:

• Article 6: Addresses the citizenship of individuals migrating from Pakistan to India before the commencement of the Constitution.

• Article 10: Ensures the continuance of citizenship for individuals recognized as citizens under Articles 5–9.

• Article 11: Grants Parliament the authority to legislate on matters related to citizenship, including acquisition and termination.

• Indian Citizenship Act, 1955:

• The Citizenship Act of 1955 was enacted by Parliament to provide detailed regulations on acquiring, losing, and determining citizenship.

• This Act was based on the powers granted under Article 11 of the Constitution.

• Subsequent amendments to the Act have addressed issues like dual citizenship, citizenship by registration, and citizenship for individuals of Indian origin.

Important Points

• Historical Context:

• The criteria outlined in Article 5 were crucial for addressing the citizenship status of individuals at the time of Partition and the formation of independent India.

• It helped streamline the process for recognizing individuals as Indian citizens while addressing the complexities arising from migration and displacement.

• Legislative Framework:

• Subsequent laws like the Citizenship Act, 1955 have built upon the foundation laid by Articles 5–11 of the Constitution.

• These laws have evolved to address changing socio-political dynamics, including issues like overseas citizenship and naturalization.

Q14. Answer: (d) Place the mouse pointer over a border or corner until it turns into a double-headed arrow, then drag.

The correct answer is Place the mouse pointer over a border or corner until it turns into a double-headed arrow, then drag.

Key Points

• Resizing a Window in Windows OS: To resize a window in the Windows Operating System, the most common and effective method is using the borders or corners. When you position the mouse pointer over a window's border or corner, it will change to a double-headed arrow. You can then drag the arrow to resize the window to your preferred size.

• This feature allows users to customize the window size for better multitasking and screen management.

• The double-headed arrow indicates that resizing is enabled, and it supports both vertical and horizontal adjustments depending on the border or corner.

• The method provides flexibility in resizing and works with almost all applications in the Windows environment that support resizable windows.

• This feature is supported in most versions of Microsoft Windows, including Windows 10 and Windows 11.

• Hence, the correct answer is to place the mouse pointer over a border or corner until it turns into a double-headed arrow, then drag.

Additional Information

• Other Methods to Resize a Window:

• Some applications allow resizing by dragging the title bar, but this only moves the window and does not resize it. This statement is incorrect.

• Using keyboard shortcuts like Alt + Enter may maximize or minimize the window but does not resize it. This statement is incorrect.

• Clicking the middle of the window or pressing Ctrl does not affect window resizing. This statement is incorrect.

• Applications of Window Resizing:

• Resizing windows is particularly useful for multitasking, as it allows users to adjust applications to fit their screen and work more efficiently.

• For example, resizing a browser window alongside a word processor makes it easier to reference information while working on a document.

• It is also helpful for software developers or designers who need to test applications or websites on different screen sizes.

• Common Issues:

• Some applications, like certain games or utilities, may have fixed sizes and do not support resizing via borders or corners.

• In cases where resizing does not work, users should check the application's settings or ensure that the window is not maximized.

Important Points

• Key Features of Resizing:

• Resizing is supported in most user interfaces that allow for dynamic window adjustments. This includes software like Microsoft Office, web browsers, and file explorers.

• The feature is critical for accessibility, allowing users to customize window sizes for better visibility and usability.

• Resizing is also essential when working on devices with smaller screens, such as laptops or tablets, where screen space is limited.

Q15. Answer: (d) Nomadic Elephant

The correct answer is Nomadic Elephant.

Key Points

• Nomadic Elephant is an annual bilateral military exercise between India and Mongolia. The exercise aims to enhance defense cooperation and strengthen military ties between the two countries.

• The 17th edition of the exercise commenced in Ulaanbaatar, the capital of Mongolia, on 31 May 2025. This statement is correct.

• The exercise focuses on improving interoperability and understanding between the armed forces of both nations in counter-insurgency and counter-terrorism operations under the United Nations mandate.

• Both armies conduct joint training programs during this exercise, including field training, tactical drills, and cultural exchange activities. This helps strengthen mutual trust and cooperation.

• The exercise also symbolizes the growing strategic partnership between India and Mongolia, promoting regional peace and stability. This statement is correct.

• Hence, the correct answer is Nomadic Elephant.

Additional Information

• Nomadic Elephant:

• The Nomadic Elephant exercise has been conducted annually since 2004. It is a testament to the growing defense collaboration between India and Mongolia.

• It focuses on counter-insurgency and counter-terrorism operations in mountainous and semi-urban terrains. This enhances the operational capabilities of both forces.

• Other Military Exercises:

• Yudh Abhyas: A bilateral exercise between India and the USA, focusing on strengthening defense cooperation and joint operational readiness.

• Vajra Prahar: A joint military exercise between India and the USA, emphasizing specialized training for special forces.

• Garuda Shakti: A bilateral military exercise between India and Indonesia, aimed at enhancing counter-terrorism skills and strengthening military ties.

• India-Mongolia Relations:

• India and Mongolia have shared a strong bond of friendship and cultural ties dating back centuries. Their relationship has grown to include defense, trade, and cultural exchanges.

• India has extended assistance to Mongolia in various fields, including defense training, infrastructure development, and humanitarian aid.

Important Points

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• Strategic Importance of Nomadic Elephant:

• The exercise provides a platform for mutual learning, sharing best practices, and enhancing the combat readiness of both forces.

• It also underscores India's Act East Policy, which emphasizes strengthening ties with East and Southeast Asian countries, including Mongolia.

• Other Developments in India-Mongolia Relations:

• India has supported Mongolia in building its first oil refinery, an important step for Mongolia's energy security and economic development.

• Mongolia and India also collaborate in cultural exchanges, reflecting their shared Buddhist heritage and historical connections.

Q16. Answer: (b) Satish Kumar

The correct answer is Satish Kumar.

Key Points

• Chairman and CEO of Railway Board: The Railway Board is the apex body responsible for governance and decision-making in the Indian Railways. The Chairman and CEO is the head of this board and oversees its functioning.

• As of 1st May 2025, the position of Chairman and CEO of the Railway Board was held by Satish Kumar. This information is based on official records and announcements from the Indian Railways.

• Responsibilities of the Chairman: The Chairman and CEO of the Railway Board is responsible for various tasks, including policy formulation, strategic decisions, and monitoring operational efficiency across the Indian Railways. This includes budgeting, infrastructure development, and ensuring safety standards.

• Satish Kumar's Contributions: During his tenure as Chairman and CEO, Satish Kumar focused on modernizing railway infrastructure, implementing digital transformation projects, and enhancing passenger safety and satisfaction.

• Relevance of the Date: The question specifically asks about the position as of 1st May 2025, ensuring accuracy in identifying the correct individual holding the position at that time.

• Other options, such as Naveen Gulati, Hitendra Malhotra, and Braj Mohan Agrawal, are incorrect because these individuals were not serving as Chairman and CEO of the Railway Board during the specified period. Hence, the correct answer is Satish Kumar.

Additional Information

• Role and Functions of the Railway Board:

• The Railway Board was established under the Ministry of Railways to oversee all operations and strategic decisions for the Indian Railways.

• It comprises members from various departments such as finance, traffic, engineering, and personnel, ensuring a multidisciplinary approach to railway management.

• The Chairman and CEO acts as the chief executive and is pivotal in coordinating efforts across these departments.

• Important Initiatives under Satish Kumar:

• Digital Transformation: Implementation of digital systems for ticketing, freight management, and operations monitoring.

• Infrastructure Development: Focus on electrification of rail tracks, high-speed rail projects, and modernization of railway stations.

• Safety Measures: Introduction of AI-based monitoring systems, advanced signaling techniques, and accident prevention protocols.

• Other Key Figures in Indian Railways:

• Naveen Gulati: Known for his contribution in the railway engineering domain but not associated with the Chairman role during May 2025.

• Hitendra Malhotra: Played a significant role in passenger services but was not holding the Chairman position.

• Braj Mohan Agrawal: Associated with administrative functions in Indian Railways but did not serve as Chairman during the specified time.

Important Points

• Indian Railways and Its Governance:

• Indian Railways is one of the largest rail networks in the world, covering over 67,000 kilometers.

• The Railway Board is integral to maintaining efficiency, safety, and innovation within the sector.

• Selection and Appointment of the Chairman:

• The Chairman is appointed by the Government of India, considering experience, leadership skills, and contributions to the railways.

• The tenure is typically fixed, with the possibility of extensions based on performance and administrative requirements.

Q17. Answer: (c) land tax

The correct answer is land tax.

Key Points

• The Gupta Empire, which ruled over a significant part of the Indian subcontinent (approximately from 320 CE to 550 CE), had a well-organized taxation system to support their administration and military.

• The revenue collected through Udranga (land tax) was utilized for purposes like maintaining administrative functions, supporting the military, and building infrastructure like temples and public facilities.

• The Gupta rulers implemented a systematic taxation regime, which included various taxes like Bali (tribute), Bhaga (share of agricultural produce), and Kara (customs duties).

• These taxes enabled the government to maintain stability, manage the empire efficiently, and undertake developmental activities.

• Role of Land Tax:

• The taxes were used for building temples, maintaining public infrastructure, and supporting religious and cultural activities.

• Bali: A tribute paid by subjects to the king, often in the form of agricultural produce.

• Bhaga: A share of the agricultural produce collected as tax.

Important Points

• Gupta Administration:

• The taxation system was structured to promote economic activities like agriculture and trade while ensuring adequate revenue for the state.

• Gupta Economy:

• The rulers encouraged the construction of irrigation systems and promoted agricultural activities, which formed the basis of their economy.

Q18. Answer: (d) 213.70 GW

The correct answer is 213.70 GW.

Key Points

• India's non-fossil fuel installed capacity as of November 2024 was reported to be 213.70 GW by the Ministry of New and Renewable Energy (MNRE). This value is based on official data released by the government and is a significant indicator of India's renewable energy progress.

• The value of 213.70 GW includes the installed capacity from renewable energy sources such as solar energy, wind energy, hydroelectric energy, and other non-fossil fuel sources.

• This capacity contributes to India's commitment towards achieving a sustainable energy mix, and it aligns with the country's goal of increasing reliance on renewable energy.

• The reported data helps track India's progress toward meeting its international commitments, such as the Paris Agreement goals and its Nationally Determined Contributions (NDCs).

• The correct value of 213.70 GW excludes incorrect options like 223.70 GW, 263.70 GW, and 243.70 GW, which do not align with the official MNRE data.

Additional Information

• India's Renewable Energy Goals:

• India has set ambitious targets to achieve 500 GW of non-fossil fuel capacity by 2030 as part of its sustainability commitments.

• The aim is to reduce dependence on fossil fuels and meet at least 50% of its energy requirements from renewable sources.

• Breakdown of Non-Fossil Fuel Capacity:

• Solar energy: A significant contributor to India’s renewable energy portfolio, with large-scale solar parks and rooftop solar installations.

• Wind energy: India is among the top producers of wind energy globally, with wind farms in states like Tamil Nadu, Gujarat, and Maharashtra.

• Hydroelectric power: A traditional source of renewable energy, contributing a steady share to India's energy mix.

• Biomass energy: Utilizes agricultural and organic waste to generate energy, supporting rural electrification.

• Important Reports and Commitments:

• The Paris Agreement: India has committed to reducing its carbon intensity by 45% by 2030 and achieving net-zero emissions by 2070.

• The National Action Plan on Climate Change (NAPCC): Includes missions like the National Solar Mission and the National Wind-Solar Hybrid Policy.

Important Points

• 2030 Renewable Energy Target: India aims to achieve 50% energy requirements from renewable sources by 2030, contributing to global sustainability goals.

• International Cooperation: India’s renewable energy initiatives are supported by international collaborations, such as the International Solar Alliance (ISA), which promotes solar energy deployment across the globe.

• Challenges: While significant progress has been made, challenges such as grid integration, storage solutions, and financing need to be addressed to achieve long-term goals.

Q19. Answer: (d) Defence Research Development Organisation

The correct answer is Defence Research Development Organisation.

Key Points

• Defence Research Development Organisation (DRDO) is the government agency responsible for the development of advanced defence technologies in India.

• It was established in 1958 and operates under the Ministry of Defence, Government of India.

• The DRDO has developed a wide range of defence technologies, including missile systems, aircraft, armaments, and electronic warfare systems.

• To combat aerial threats such as fixed-wing drones, the DRDO has developed laser-based directed energy weapons. These systems use high-energy laser beams to target and neutralize drones and other aerial threats effectively.

• The laser weapon system works by focusing a high-energy laser beam on a target, causing it to heat up and become non-functional. This technology is considered highly effective against small unmanned aerial vehicles (UAVs).

• The development of such technology aligns with India's efforts to strengthen its military capabilities and protect its airspace from potential threats.

• This breakthrough makes India one of the few countries in the world with the ability to deploy such advanced weapon systems. Hence, the correct answer is DRDO.

Additional Information

• About DRDO:

• The Defence Research Development Organisation (DRDO) was formed in 1958 by merging the Technical Development Establishment and the Directorate of Technical Development & Production with the Defence Science Organisation.

• DRDO's headquarters is located in New Delhi, India.

• The organization operates through a network of more than 50 laboratories spread across India, working on various defence technologies.

• Its key focus areas include aeronautics, armaments, electronics, land combat engineering, life sciences, materials, missiles, and naval systems.

• Laser Weapon Systems:

• Laser weapon systems are a type of directed energy weapon that use focused laser beams to damage or destroy targets.

• These systems offer several advantages, such as:

• Precision: High accuracy in targeting specific objects without collateral damage.

• Speed: Laser beams travel at the speed of light, making them effective against fast-moving targets like drones.

• Cost-effectiveness: Once operational, the cost per shot is significantly lower than conventional weapons.

• Some examples of DRDO's laser-based systems include ADITYA, a high-power laser weapon system developed for defence purposes.

• Other Organizations Mentioned in the Question:

• Armed Forces Tribunal (AFT):

• A quasi-judicial body formed under the Armed Forces Tribunal Act, 2007.

• It adjudicates disputes and complaints related to service matters of armed forces personnel.

• It does not develop any defence technology.

• Armed Forces Medical College (AFMC):

• A premier medical institution in Pune, India, established in 1948.

• It trains medical professionals for the armed forces but does not develop weapon systems.

• Aeronautical Development Agency (ADA):

• An autonomous organization under the Ministry of Defence responsible for the design and development of light combat aircraft like Tejas.

• It does not focus on laser weapon systems.

Important Points

• Significance of Laser Weapons:

• Laser-based systems are a crucial component of modern warfare due to their ability to neutralize threats with minimal environmental impact.

• They are effective against low-cost aerial threats, such as drones, which are increasingly being used in asymmetric warfare.

• Such systems reduce dependency on traditional ammunition, ensuring cost savings and operational efficiency.

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• Global Context:

• Countries like the United States, Russia, and China are also developing laser-based directed energy weapons.

• India's progress in this field highlights its capability to develop cutting-edge defence technologies indigenously.

Q20. Answer: (b) File → New

The correct answer is File → New.

Key Points

• WordPad is a basic word-processing application that comes pre-installed with the Windows operating system. It allows users to create, edit, and save text documents with basic formatting options.

• To create a new file in WordPad, the correct sequence is to go to the File menu and select the New option. This ensures that a new blank document opens for the user to start working on.

• The provided Option 1, which suggests "File → Open → New Document," is incorrect because the "Open" option is used to access an already existing document, not to create a new one.

• The provided Option 3, which suggests "Home → New File," is also incorrect. The Home tab in WordPad contains formatting tools such as font styles, alignment, and text formatting, but it does not include the option to create a new file.

• Similarly, Option 4, which mentions "Insert → New File," is incorrect. The Insert menu is used to add objects like pictures, tables, or other elements into the document, not for creating a new file.

• The correct navigation path for creating a new file in WordPad is to click on File in the menu bar and then select New. This is the standard and universally recognized method across versions of WordPad.

• This method is intuitive and aligns with how most text-editing applications function, making it easier for users to create new documents quickly.

Additional Information

• Features of WordPad:

• WordPad offers basic text formatting options like changing font style, size, color, and alignment. It also supports inserting objects like pictures and hyperlinks.

• It is less advanced than full-featured word processors like Microsoft Word, but it is sufficient for creating simple documents, notes, or letters.

• Comparison with Other Tools:

• Notepad: Unlike WordPad, Notepad is a plain text editor that does not support rich formatting or object insertion.

• Microsoft Word: Word offers advanced features like templates, collaboration, and extensive formatting options, making it suitable for professional and complex documents.

• Steps to Create a New File in WordPad:

• 1. Open WordPad from the Start Menu or search bar.

• 2. Click on the File menu located in the top-left corner of the application.

• 3. Select the New option. A blank document will open for creating content.

Important Points

• File menu options:

• The File menu in WordPad also includes other options like Open, Save, Save As, Print, and Exit. These are essential for managing documents efficiently.

• Compatibility:

• WordPad supports saving files in different formats, such as .rtf (Rich Text Format), .txt (Plain Text), and .docx (Word Document).

Q21. Answer: (b) March to May

The correct answer is March to May.

Key Points

• The hot weather season in India typically falls between March and May, marking the pre-monsoon period in the country. This is the time when temperatures rise significantly, particularly in northern and central India.

• During this period, the northern plains of India experience extremely high temperatures, sometimes exceeding 45 degrees Celsius, while the southern regions are relatively moderate but still warm.

• The hot weather season is characterized by the presence of dry and hot winds known as “Loo”, especially in the northern plains. These winds aggravate the heat and make conditions harsh.

• This season also sees the development of localized thunderstorms known as “Nor’westers” or “Kalbaisakhi,” particularly in regions like West Bengal, Odisha, and Assam.

• In peninsular India, the temperatures are comparatively lower due to the moderating influence of the oceans, but it is still considered the hot weather season.

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Additional Information

• Characteristics of Indian Seasons:

• Winter Season (December to February): This is the coldest season in India, with temperatures dropping significantly, especially in the northern regions.

• Summer/Hot Weather Season (March to May): Marked by high temperatures, dry winds, and occasional thunderstorms.

• Monsoon Season (June to September): Characterized by heavy rainfall due to the southwest monsoon winds.

• Post-Monsoon/Autumn Season (October to November): This transitional period sees a reduction in rainfall and an onset of cooler weather.

• Temperature Variations:

• The northern plains experience temperatures above 45°C, while coastal and southern regions are cooler due to proximity to the sea.

• Regions like Rajasthan, Gujarat, and Madhya Pradesh face extreme heat during the hot weather season.

• Importance of Hot Weather Season:

• This season is crucial for the formation of monsoon winds, as the intense heating over the Indian subcontinent creates a low-pressure zone, attracting moist winds from the Indian Ocean.

• It also aids in the ripening of crops such as wheat, pulses, and fruits like mangoes in India.

Important Points

• Impact of “Loo” Winds:

• The hot winds known as “Loo” are a notable feature of this season. They are dry and extremely hot, causing dehydration and heatstrokes.

• These winds are prevalent in states like Punjab, Haryana, Uttar Pradesh, and Rajasthan.

• Weather Patterns:

• Nor’westers are sudden, violent thunderstorms that bring temporary relief from the heat in eastern India, especially in West Bengal, Assam, and Odisha.

• These thunderstorms are also accompanied by strong winds and heavy rainfall, benefiting crops like jute and rice.

Q22. Answer: (b) v = λ/T

The correct answer is v = λ / T.

Key Points

• Relation between speed, wavelength, and time period: The speed of sound (v) in a medium is related to its wavelength (λ) and time period (T) by the formula: v = λ / T. This is a fundamental equation in wave mechanics.

• Wavelength (λ): This is the distance between two consecutive crests or troughs of a wave. It is measured in meters (m).

• Time Period (T): This is the time taken for one complete oscillation or wave cycle. It is measured in seconds (s).

• Speed of sound (v): This is the rate at which sound waves propagate through a medium. It is measured in meters per second (m/s).

• The relationship can also be expressed in terms of frequency (f), as f = 1/T. Substituting f in the above formula gives v = λ × f.

• The formula highlights that the speed of sound is directly proportional to the wavelength and inversely proportional to the time period.

• Hence, the correct answer is v = λ / T.

Additional Information

• Wave Properties:

• Wavelength (λ): It determines the spatial length of a wave and is inversely proportional to frequency for a constant speed of sound.

• Time Period (T): It is inversely related to frequency. A shorter time period corresponds to a higher frequency wave.

• Frequency (f): It is the number of oscillations per second, measured in Hertz (Hz). Frequency is related to time period as f = 1/T.

• Applications of Wave Mechanics:

• Acoustics: Understanding the speed of sound is crucial in designing auditoriums and music halls.

• Sonar Technology: The relation between speed, wavelength, and time period is used in sonar systems for underwater exploration.

• Communication: Wave mechanics principles are applied in designing communication systems like radio and television.

• Factors Affecting Speed of Sound:

• The speed of sound depends on the medium through which it travels. It is faster in solids, slower in liquids, and slowest in gases.

• Temperature, pressure, and density of the medium also influence the speed of sound. For example, sound travels faster in warm air compared to cold air.

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Important Points

• Alternative Representation:

• The speed of sound can also be written as $v = \lambda \times f$, where f is the frequency of the wave.

• This equation highlights the inverse relationship between wavelength and frequency when the speed is constant.

• Practical Examples:

• Example: In musical instruments, the pitch of a note is determined by the frequency of the sound wave, which is indirectly related to its time period.

• Example: In radar systems, the speed of electromagnetic waves is used to calculate distances using similar principles.

Q23. Answer: (c) Abhijnana-Shakuntalam

The correct answer is Abhijnana-Shakuntalam.

Key Points

• Kalidasa, one of the greatest classical Sanskrit playwrights and poets, wrote Abhijnana-Shakuntalam, considered a masterpiece of Sanskrit literature.

• Abhijnana-Shakuntalam, often translated as "The Recognition of Shakuntala," is a play that revolves around the love story of King Dushyanta and Shakuntala, a maiden of extraordinary beauty.

• The play is famous for its rich poetic descriptions, emotional depth, and intricate portrayal of human relationships.

• Kalidasa is also credited with other celebrated works such as Raghuvamsha and Kumarasambhava, but Abhijnana-Shakuntalam stands out as his most renowned play.

• The story of Abhijnana-Shakuntalam is based on an episode from the Mahabharata, specifically the tale of Shakuntala and King Dushyanta from the Adi Parva.

• The work has been widely translated into numerous languages and has had a profound influence on Indian and global literature. It was the first Sanskrit work to be translated into European languages in the 18th century, making Kalidasa internationally recognized.

• Abhijnana-Shakuntalam embodies the classical Sanskrit theatrical tradition, adhering to the rules of dramaturgy outlined in the Natyashastra.

• The correct answer is Abhijnana-Shakuntalam, as it is authored by Kalidasa and widely revered as one of the greatest contributions to Indian classical literature.

Additional Information

• Kalidasa’s Contribution to Literature:

• Kalidasa is renowned for his sophisticated and elegant style of writing, blending nature, emotions, and divine imagery seamlessly.

• He is often regarded as the Shakespeare of India due to his unparalleled contributions to drama and poetry in ancient Sanskrit literature.

• His works, apart from Abhijnana-Shakuntalam, include Meghaduta (The Cloud Messenger), Kumarasambhava (The Birth of Kumara), and Raghuvamsha (The Lineage of Raghu).

• About the Play Abhijnana-Shakuntalam:

• The play is divided into seven acts, depicting the journey of love, separation, and eventual reunion between King Dushyanta and Shakuntala.

• The central theme revolves around the concept of love, memory, and recognition, with a strong emphasis on destiny and divine intervention.

• The title, "Abhijnana," refers to the ring of recognition that plays a pivotal role in reuniting the lovers after a period of separation caused by a curse.

• Other Options Explained:

• Mudrarakshasa: Written by Vishakhadatta, this historical play focuses on the political strategies of Chanakya and the establishment of Chandragupta Maurya’s rule. Not authored by Kalidasa.

• Svapnavasavadattam: Written by Bhasa, this play narrates the story of King Udayana and his queen Vasavadatta. Not authored by Kalidasa.

• Mrichchhakatika: Also known as "The Little Clay Cart," this play was authored by Shudraka and deals with themes of love, morality, and social issues. Not authored by Kalidasa.

Important Points

• Influence of Abhijnana-Shakuntalam:

• International Acclaim: It was one of the first Sanskrit plays to be translated into European languages, introducing Indian literature to the Western world.

• Translation: The German translation by Sir William Jones in 1789 greatly popularized the play in Europe.

• Cultural Significance: The story of Shakuntala is deeply embedded in Indian culture, inspiring numerous art forms, including paintings, music, and dance.

Q24. Answer: (c) New Delhi

The correct answer is New Delhi.

Key Points

• The International Air Transport Association (IATA): IATA is a global trade association for the world's airlines, representing around 290 airlines or 82% of total air traffic. The association plays a key role in formulating industry policies on critical aviation issues.

• IATA Annual General Meeting (AGM): This is a prestigious event in the aviation industry where airline leaders, industry experts, and policymakers discuss the current and future challenges of the industry. It also includes the World Air Transport Summit, a platform for thought leadership and innovation in aviation.

• New Delhi as the host city: In June 2025, New Delhi, the capital city of India, was chosen to host this significant event. This decision highlights India's growing influence in the global aviation sector and New Delhi's infrastructure and capability to host high-profile international events.

• New Delhi has been a preferred location for international conferences and summits due to its connectivity, modern facilities, and cultural significance. Hence, the correct answer is New Delhi.

• Significance of hosting: Hosting the IATA AGM and World Air Transport Summit reflects India's evolving role in the aviation sector, driven by its fast-growing passenger market and increasing global connectivity.

Additional Information

• About New Delhi:

• New Delhi is the capital city of India and serves as the center of government and administration. It is known for its historical landmarks, modern infrastructure, and cultural diversity.

• The city is well-equipped with world-class conference facilities, luxury hotels, and excellent connectivity via the Indira Gandhi International Airport, making it an ideal location for hosting international events.

• India's Aviation Sector:

• India is one of the fastest-growing aviation markets in the world, with a rapidly expanding domestic and international air travel market.

• The government of India has launched initiatives like the UDAN Scheme (Ude Desh ka Aam Naagrik) to improve regional connectivity and make flying affordable for the common citizen.

• Example: Indira Gandhi International Airport in New Delhi is one of the busiest airports in the world and a major hub for international and domestic flights.

• About IATA:

• Founded in 1945, IATA is headquartered in Montreal, Canada. It promotes safe, secure, and sustainable air transport globally.

• IATA works closely with governments, regulators, and airlines to address challenges such as safety standards, environmental sustainability, and digital transformation.

Important Points

• Significance of IATA AGM:

• The IATA AGM is a platform where global aviation leaders address critical challenges and share innovative solutions for the industry.

• It also provides an opportunity for host cities to showcase their infrastructure and capabilities to a global audience, attracting investment and boosting tourism.

• India's role in global aviation:

• India is expected to become the third-largest aviation market by 2025, driven by its large population, economic growth, and government initiatives to improve connectivity.

• Events like the IATA AGM in New Delhi reinforce India's strategic importance in global aviation and its commitment to sustainable and inclusive growth in the sector.

Q25. Answer: (a) Hindoo College

The correct answer is Hindoo College.

Key Points

• Hindoo College was established in 1817 in Kolkata, India. It was an initiative to promote Western education among Indians during the early 19th century.

• The institution was founded by prominent Indian reformers such as David Hare, Raja Ram Mohan Roy, and others, in association with the British.

• The main objective of Hindoo College was to impart modern education in disciplines such as science, literature, and philosophy, which were previously unavailable to the Indian population. Hence, this is the correct answer.

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• Hindoo College became the foundation of Presidency College in 1855, which later evolved into Presidency University.

• The establishment of Hindoo College marked the beginning of Western-style institutional education in India, making it a key milestone in the Indian education system.

Additional Information

• Aligarh Movement:

• The Aligarh Movement was started by Sir Syed Ahmed Khan in the late 19th century to modernize Muslim education in India. It led to the establishment of the Aligarh Muslim University in 1875.

• The movement focused on providing education aligned with Western principles while preserving Islamic traditions. However, it was initiated much later than Hindoo College and focused specifically on the Muslim community.

• Arya Samaj:

• Arya Samaj was a Hindu reform movement founded by Swami Dayanand Saraswati in 1875. It aimed to promote Vedic education and opposed Western influence on Indian culture.

• It primarily focused on religious and cultural reforms rather than establishing institutions for Western education.

• Brahmo Samaj:

• Brahmo Samaj was a socio-religious movement founded by Raja Ram Mohan Roy in 1828. It aimed at reforming Hindu society by abolishing practices like sati and promoting education.

• Although it contributed to educational reforms, its primary objective was social and religious reform, unlike Hindoo College, which directly focused on Western education.

• Important Points:

• The Hindoo College was one of the first institutions in India to introduce modern Western education, playing a pioneering role in the educational and intellectual awakening of the country.

• It served as a model for subsequent educational institutions, such as Presidency College, and influenced the spread of Western education across India.

Q26. Answer: (b) Tertiary

The correct answer is Tertiary.

Key Points

• Tourism is a part of the tertiary sector of the economy. It involves providing services such as accommodation, transportation, entertainment, and guidance to tourists.

• The tertiary sector, also known as the service sector, focuses on delivering services rather than goods. Examples include healthcare, education, financial services, and tourism.

• Tourism in India supports economic growth by contributing to GDP, generating employment, and promoting regional development. Hence, the correct option is Tertiary.

• The Indian tourism industry also attracts foreign investments and enhances cultural exchange, making it a critical component of the service economy.

Additional Information

• Economic Sectors:

• Primary sector: Involves extraction of natural resources, such as agriculture, fishing, and mining.

• Secondary sector: Includes industries that process raw materials and manufacture goods, such as factories and construction.

• Tertiary sector: Focuses on services like tourism, healthcare, education, banking, and entertainment.

• Quinary sector: Involves high-level decision-making and research, typically by government officials or top executives.

• Tourism in India:

• India is a popular destination for cultural, historical, and nature tourism, with sites such as Taj Mahal, Jaipur, Kerala backwaters, Goa beaches, and Himalayan treks.

• The tourism industry contributes around 9.2% of India's GDP (as per World Travel and Tourism Council data).

• It provides employment to millions, directly and indirectly, supporting sectors like transportation, hospitality, and retail.

Important Points

• Government Initiatives:

• Schemes like Swadesh Darshan and Incredible India aim to promote Indian tourism globally and improve infrastructure.

• e-Visa: India offers e-Visa facilities to tourists from multiple countries, simplifying travel processes.

• Environmental and Cultural Benefits:

• Tourism promotes awareness of India's diverse culture, heritage, and traditions.

• It encourages conservation efforts for historical monuments, wildlife, and natural resources.

Q27. Answer: (a) Bal Gangadhar Tilak

The correct answer is Bal Gangadhar Tilak.

Key Points

• Bal Gangadhar Tilak was a prominent figure in India's struggle for independence, known as the "Father of Indian Unrest." He was a militant nationalist who believed in mass protests and active participation of the youth to achieve India's freedom. This statement is correct.

• Tilak initiated the celebration of festivals like Ganesh Chaturthi and Shivaji Jayanti on a grand scale to unite people and inspire nationalistic fervor among the youth. He used these festivals as a platform for spreading awareness and promoting the freedom movement. This statement is correct.

• He was the editor of the Marathi newspaper 'Kesari', which became a leading voice against British rule. Through this publication, Tilak expressed his views, criticized the British government, and inspired Indians to fight for their rights. This statement is correct.

• Hence, the correct answer is Bal Gangadhar Tilak.

Additional Information

• Bal Gangadhar Tilak:

• He was one of the first leaders of the Indian Independence Movement and a member of the Lal-Bal-Pal trio, which included Lala Lajpat Rai and Bipin Chandra Pal.

• Tilak was a strong proponent of Swaraj (self-rule) and famously declared, "Swaraj is my birthright, and I shall have it."

• He played a significant role in the Swadeshi Movement and encouraged Indians to boycott British goods and promote indigenous products.

• Ganesh Chaturthi and Shivaji Jayanti Celebrations:

• Tilak transformed Ganesh Chaturthi from a private religious event to a public celebration to foster unity and patriotism among Indians.

• Shivaji Jayanti was celebrated to honor the Maratha ruler Chhatrapati Shivaji, presenting him as a symbol of resistance against foreign rule.

• Keshari Newspaper:

• Tilak used Kesari to voice his criticisms of British policies and to advocate for India's independence.

• The newspaper became a crucial medium for spreading nationalist ideas and rallying people against colonial oppression.

Important Points

• Lal-Bal-Pal Trio:

• Lala Lajpat Rai: Known as the "Lion of Punjab," he was a leader in the Indian Nationalist Movement and contributed to the Swadeshi Movement.

• Bipin Chandra Pal: A staunch nationalist who actively participated in the Swadeshi Movement and promoted self-reliance.

• Tilak's Legacy:

• Tilak's efforts inspired future leaders like Mahatma Gandhi and Jawaharlal Nehru in their fight for independence.

• He remains a symbol of India's struggle for freedom and a pioneer of militant nationalism.

Q28. Answer: (b) Insulin

The correct answer is Insulin.

Key Points

• Insulin is a hormone secreted by the pancreas, specifically by the beta cells of the Islets of Langerhans. It plays a critical role in regulating blood sugar levels in the body.

• The primary function of insulin is to help glucose, obtained from food, enter the cells of the body where it is used for energy. If the secretion of insulin is inadequate, glucose cannot be absorbed by the cells effectively, leading to a condition known as hyperglycemia (high blood sugar levels).

• This inadequate secretion or function of insulin is the primary cause of Diabetes Mellitus, a chronic metabolic disorder. Hence, insulin is the correct answer.

• In individuals with diabetes, either the pancreas does not produce enough insulin (Type 1 Diabetes) or the body's cells do not respond effectively to insulin (Type 2 Diabetes).

• Proper management of diabetes involves the administration of insulin (for Type 1 Diabetes), medications, lifestyle changes, and dietary adjustments to maintain normal blood sugar levels.

Additional Information

• Functions of Insulin:

• Insulin facilitates the uptake of glucose by cells, especially muscle and fat cells, for energy production.

• It helps in the storage of excess glucose in the liver in the form of glycogen for future energy requirements.

• Insulin also plays a role in fat metabolism by promoting the storage of fats in adipose tissues and suppressing the breakdown of

fat stores.

• Symptoms of Diabetes Mellitus:

• Frequent urination (polyuria), excessive thirst (polydipsia), and extreme hunger (polyphagia).

• Fatigue, blurred vision, slow wound healing, and unexplained weight loss are other common symptoms.

• Importance of Hormones Listed in Options:

• Estrogen: A female sex hormone responsible for regulating the reproductive system and secondary sexual characteristics in females. It is not involved in blood sugar regulation.

• Adrenaline: A hormone produced by the adrenal glands during stress, which increases heart rate and blood flow, but does not regulate glucose levels.

• Thyroxine: A hormone produced by the thyroid gland that regulates metabolism, but it does not have a direct role in blood sugar control.

Important Points

• Management of Diabetes:

• Type 1 Diabetes is managed by administering insulin injections since the pancreas produces little to no insulin.

• Type 2 Diabetes is managed through a combination of oral medications, dietary changes, physical activity, and sometimes insulin if required.

• Prevention of Diabetes:

• Adopting a healthy lifestyle, including a balanced diet, regular exercise, and maintaining a healthy weight, can reduce the risk of developing Type 2 Diabetes.

• Regular health checkups and monitoring of blood glucose levels are crucial for early detection and management of diabetes.

Q29. Answer: (d) Tamil

The correct answer is Tamil.

Key Points

• Puppetry is one of the oldest forms of entertainment and storytelling, deeply rooted in Indian traditions.

• The earliest documented evidence of puppetry in India is found in the Tamil language, particularly in ancient texts and folk traditions.

• Puppetry in Tamil Nadu: Traditional puppetry in Tamil Nadu, such as Bommalattam (a form of string puppetry), has been practiced since ancient times. Hence, Tamil is the correct answer.

• Tamil literature, including classical texts like the Sangam literature, contains references to various art forms, including puppetry.

• The use of puppetry in Tamil culture was not only for entertainment but also for conveying religious and moral stories, making it a significant cultural practice. Hence, Tamil is the earliest documented language for puppetry.

Additional Information

• Significance of Puppetry in India:

• Puppetry is an ancient art form in India, used for storytelling, entertainment, and spreading cultural values.

• Traditional puppetry includes various forms like string puppetry (Bommalattam), shadow puppetry (Tholu Bommalata), and rod puppetry (Yampuri).

• Regional Puppetry in India:

• Different regions in India have their own distinct puppetry traditions. For example, Rajasthan is known for Kathputli, a form of string puppetry.

• In Kerala, puppetry is associated with religious performances like Tholpavakoothu, which narrates stories from the Ramayana.

• Tamil Nadu: Bommalattam is a famous form of puppetry that combines elements of string and rod puppetry, showcasing the region’s unique cultural heritage.

• Importance of Tamil Literature:

• Tamil literature, including Sangam texts and later works, has preserved the cultural practices of ancient Tamil Nadu, including puppetry.

• The inclusion of puppetry in Tamil literature highlights its historical significance as a medium of storytelling and cultural expression.

Important Points

• Other Languages and Puppetry:

• Sanskrit: Puppetry is mentioned in Sanskrit texts like the Natyashastra, which discusses various art forms, including puppetry.

• Bengali: Puppetry in Bengal is traditionally associated with folk performances like Putul Nach, but it does not have documented evidence as early as Tamil.

• Gujarati: Puppetry is practiced in Gujarat, especially for narrating stories from the Puranas, but Tamil holds the distinction of having the earliest documented evidence.

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• Historical Context:

• The origins of puppetry in India can be traced back to ancient times, with Tamil Nadu playing a significant role in preserving this art form.

• The use of puppetry in Tamil culture extends to temple performances, where it served as a medium for religious education and storytelling.

Q30. Answer: (b) Article 32

The correct answer is Article 32.

Key Points

• Article 32 of the Indian Constitution provides the Right to Constitutional Remedies. This article empowers citizens to directly approach the Supreme Court for the enforcement of their fundamental rights.

• It is referred to as the 'heart and soul of the Constitution', as described by Dr. B.R. Ambedkar, because it ensures that the fundamental rights are not just theoretical but are enforceable in a court of law.

• The Supreme Court is empowered to issue writs under Article 32 to enforce fundamental rights. These writs include Habeas Corpus, Mandamus, Prohibition, Certiorari, and Quo Warranto.

• The right to move the Supreme Court under Article 32 is itself a fundamental right. This ensures that citizens have direct access to the apex court for the protection of their rights.

• This provision ensures that the judiciary acts as a guardian of fundamental rights and provides a mechanism for their enforcement. Hence, Article 32 is correct.

• Article 31, as per the original Constitution, dealt with the Right to Property. However, this right was removed as a fundamental right through the 44th Constitutional Amendment Act, 1978, and is now a legal right under Article 300A. Hence, this is incorrect.

• Article 30 provides the right of minorities to establish and administer educational institutions of their choice. Hence, this is not the correct answer.

• Article 33 deals with the power of Parliament to modify the application of fundamental rights to the armed forces or forces charged with maintaining public order. Hence, this is not the correct answer.

• Hence, the correct answer is Article 32.

Additional Information

• Writs under Article 32:

• Habeas Corpus: A writ that is issued to produce a person who has been detained unlawfully before the court and justify the detention.

• Mandamus: A writ issued to a public official or body to perform a duty they are legally obligated to perform but have failed to do so.

• Prohibition: A writ issued to lower courts or tribunals to stop them from exceeding their jurisdiction.

• Certiorari: A writ issued to transfer a case from a lower court to a higher court or to quash the order of a lower court due to a lack of jurisdiction or error of law.

• Quo Warranto: A writ issued to challenge the authority of a person holding a public office.

• Significance of Article 32:

• It acts as a safeguard for citizens, ensuring the protection of their fundamental rights.

• It empowers the judiciary to check the legislative and executive branches, maintaining the balance of power.

• It underlines the concept of judicial review in India, which is a cornerstone of the Indian democracy.

• Comparison with Article 226:

• Article 226 of the Constitution empowers the High Courts to issue writs for the enforcement of not only fundamental rights but also for any other purpose.

• While Article 32 is restricted to fundamental rights, Article 226 has a wider scope, as it can deal with cases of legal rights as well.

• However, Article 32 is a fundamental right itself, whereas Article 226 is a constitutional right.

Important Points

• Judicial Interpretation:

• The Supreme Court has emphasized that the right to approach the court under Article 32 cannot be suspended except during an emergency as per Article 359.

• The court has also ruled that even if alternative remedies are available, a person can directly approach the Supreme Court under Article 32 for enforcement of fundamental rights.

• Role of Dr. B.R. Ambedkar:

• Dr. Ambedkar referred to Article 32 as the most important article in the Indian Constitution, asserting that it was the very heart and soul of the document.

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Q31. Answer: (c) Brahmo Samaj

The correct answer is Brahmo Samaj.

Key Points

• Raja Ram Mohan Roy was a prominent social reformer who worked against various social evils, including the practice of Sati. He was instrumental in influencing the abolition of Sati through his persistent efforts and petitions to the British government. Hence, the statement about him speaking greatly for women's problems and being an agent in abolishing Sati is correct.

• He founded the Brahmo Samaj in 1828, which became a platform for advocating for social reforms such as equality, abolition of caste discrimination, and improvement of women's conditions in India. Hence, the statement about the reform association founded by him is correct.

• The Brahmo Samaj was established with the aim of purifying Hinduism and promoting monotheism, rejecting idolatry, and encouraging rationalism and scientific temper.

• The other options, such as Arya Samaj (founded by Swami Dayanand Saraswati in 1875), Prarthana Samaj (founded by Atmaram Pandurang in 1867), and Ramakrishna Mission (founded by Swami Vivekananda in 1897), were all founded by different leaders and served distinct purposes. These were not related to Raja Ram Mohan Roy's initiatives. Hence, these options are incorrect.

• Hence, the correct answer is Brahmo Samaj.

Additional Information

• Brahmo Samaj:

• The Brahmo Samaj, founded in 1828, aimed to reform Indian society and eliminate harmful practices such as Sati, child marriage, and caste discrimination.

• It promoted monotheism, rejected idol worship, and encouraged rational thinking and social progress.

• The Brahmo Samaj played a significant role in spreading awareness about education and women's rights during the colonial period.

• Other Reform Movements:

• Arya Samaj: Founded by Swami Dayanand Saraswati in 1875, it focused on Vedic teachings, abolition of caste, and promotion of education.

• Prarthana Samaj: Established by Atmaram Pandurang in 1867, it aimed at social reform through religious practices, focusing on equality and women's rights.

• Ramakrishna Mission: Founded by Swami Vivekananda in 1897, it promoted spiritual development, education, and welfare activities.

• Raja Ram Mohan Roy's Legacy:

• Known as the Father of Indian Renaissance, Raja Ram Mohan Roy's contributions include the abolition of Sati (achieved through the Regulation XVII in 1829) and efforts toward women's education.

• His advocacy for social reforms laid the foundation for modern Indian society, including reforms in religion, women's rights, and education.

Important Points

• Key Legal Developments:

• The abolition of Sati was achieved through Regulation XVII passed by Lord William Bentinck in 1829, influenced by Raja Ram Mohan Roy's advocacy.

• Raja Ram Mohan Roy's efforts were pivotal in initiating reforms in colonial India, and his legacy continues to inspire movements for equality and social justice.

Q32. Answer: (a) International Handball Federation and Asian Handball Federation

The correct answer is International Handball Federation and Asian Handball Federation.

Key Points

• 'Handball at School' initiative was launched in 2025 to promote the sport of handball at the grassroots level in India.

• The initiative is a joint collaboration between the International Handball Federation (IHF) and the Asian Handball Federation (AHF). Both organizations have been actively working to promote handball globally and regionally.

• The program emphasizes introducing handball to school children, providing training to coaches and physical education teachers, and supporting infrastructure development. Hence, the correct answer is International Handball Federation and Asian Handball Federation.

• The Asian Handball Federation is the governing body for handball in Asia and works under the umbrella of the International Handball Federation to strengthen the sport across the continent.

• The initiative aligns with the global vision of promoting handball as an inclusive and accessible sport for young people.

• Through this collaboration, the program aims to improve handball's popularity in India, which has immense potential in sports development at the school and community levels.

Additional Information

• International Handball Federation (IHF):

• Established in 1946, the IHF is the global governing body for the sport of handball.

• It oversees handball competitions worldwide, including the World Handball Championships and other international tournaments.

• The IHF also provides funding and technical support to member federations to promote the sport.

• Asian Handball Federation (AHF):

• The AHF is the regional governing body for handball in Asia, established in 1974.

• It works to promote handball in Asian countries, organize regional tournaments, and support the development of handball infrastructure.

• The AHF collaborates with the IHF on initiatives like 'Handball at School' to ensure the sport reaches a broader audience.

• Handball in India:

• Handball is an emerging sport in India, with efforts being made to popularize it among the youth.

• Programs like the 'Handball at School' initiative aim to identify and nurture young talent in schools and communities.

• The Handball Federation of India works closely with international and regional organizations to promote the sport nationally.

Important Points

• Objectives of the 'Handball at School' Initiative:

• To introduce handball as a sport to children at an early age and encourage participation in schools.

• To train physical education teachers and coaches in schools with the help of resources provided by the IHF and AHF.

• To develop handball infrastructure such as courts and equipment in schools and communities.

• Global Impact:

• The 'Handball at School' initiative is a part of the IHF's global strategy to make handball one of the most widely played sports worldwide.

• Similar programs have been implemented in other countries, leading to increased participation in international tournaments.

Q33. Answer: (c) West Bengal and Tripura

The correct answer is West Bengal and Tripura.

Key Points

• India-Bangladesh Border: India shares a long international border with Bangladesh, which spans over 4,096 km. This is India's longest international border.

• States Sharing Borders: The Indian states that share borders with Bangladesh are West Bengal, Assam, Meghalaya, Tripura, and Mizoram.

• West Bengal: West Bengal has the longest border with Bangladesh, stretching over 2,217 km. It is significant due to its geographical location and cultural ties.

• Tripura: Tripura shares a border of approximately 856 km with Bangladesh. It is a vital state for trade and cultural exchanges between the two nations.

• The pair mentioned in the correct option, West Bengal and Tripura, accurately represent states that share boundaries with Bangladesh. Hence, the correct answer is West Bengal and Tripura.

• Incorrect Options: The states mentioned in other options do not share borders with Bangladesh:

• Manipur: Shares borders with Myanmar, not Bangladesh.

• Sikkim: Shares borders with Bhutan, Nepal, and China, but not Bangladesh.

• Nagaland: Shares borders with Myanmar, not Bangladesh.

• Punjab: Shares borders with Pakistan, not Bangladesh.

Additional Information

• Geography of Bangladesh Border:

• Bangladesh is located to the east of India and shares boundaries with five Indian states: West Bengal, Assam, Meghalaya, Tripura, and Mizoram.

• The border is characterized by riverine terrain, plains, and hills, making it geographically diverse.

• Historical Context:

• India and Bangladesh share strong historical ties dating back to the partition of India in 1947, when East Bengal (now Bangladesh) became part of Pakistan.

• In 1971, Bangladesh gained independence from Pakistan, and its borders with India became prominent in terms of trade, migration, and cultural exchanges.

• Economic and Strategic Importance:

• The borders between India and Bangladesh are crucial for trade and connectivity. Several border checkpoints facilitate economic

exchanges.

• The Agartala-Akhaura route in Tripura is a significant trade corridor. Similarly, West Bengal serves as the gateway for cross-border trade with Bangladesh.

• Border Management:

• The India-Bangladesh Land Boundary Agreement, signed in 2015, resolved longstanding border disputes and facilitated better border management.

• Strict measures, including fencing, have been implemented to regulate illegal migration and enhance security along the border.

Important Points

• India-Bangladesh Relations:

• India and Bangladesh share strong cultural, linguistic, and historical ties. The relationship has strengthened over the years through cooperation in trade, connectivity, and defense.

• The Bangladesh Liberation War of 1971 is a pivotal event that highlights India's role in Bangladesh's independence.

• Border Issues:

• Illegal migration, smuggling, and border security are key challenges along the India-Bangladesh border.

• Efforts like the Land Boundary Agreement have helped address several issues, but vigilance remains critical.

Q34. Answer: (b) Judicial activism

The correct answer is Judicial activism.

Key Points

• Public Interest Litigation (PIL) refers to the legal mechanism through which individuals or groups can approach the judiciary to address issues of public interest rather than private disputes.

• It is an important aspect of Judicial Activism in India, allowing courts to take up cases that aim to protect the rights of underprivileged sections of society or address significant public concerns.

• PILs in India can be filed by any citizen or organization, even if they are not directly impacted, to advocate for the welfare of the general public. This broad scope promotes inclusivity and justice.

• Judicial activism plays a crucial role in PIL as it enables the judiciary to interpret laws dynamically and take proactive measures to address societal and constitutional issues effectively.

• The concept of PIL was introduced in India by Justice P.N. Bhagwati and Justice V.R. Krishna Iyer in the late 1970s and early 1980s, aiming to make justice accessible to marginalized groups.

• Examples of PIL include cases addressing environmental issues, human rights, corruption, and ensuring accountability of government authorities.

• Judicial activism through PILs has led to landmark judgments in India, such as the Vishaka Guidelines for preventing sexual harassment and the enforcement of environmental protection measures.

• Hence, the correct answer is Judicial activism.

Additional Information

• Public Interest Litigation (PIL):

• PIL is a mechanism in Indian judicial system that enables people to seek justice for issues affecting the larger public rather than individual disputes.

• It is a tool for enhancing social justice by addressing grievances of marginalized sections and resolving matters of public importance.

• Judicial Activism:

• Judicial activism refers to a proactive approach by the judiciary, where courts interpret laws dynamically to address societal changes and pressing issues.

• It is instrumental in protecting fundamental rights, ensuring government accountability, and promoting justice.

• Example: The Supreme Court has used judicial activism in cases like environmental protection, regulating corruption, and promoting gender equality.

• Key Characteristics of PIL:

• PILs can be filed in the Supreme Court under Article 32 or in the High Courts under Article 226 of the Constitution.

• They address a wide range of issues such as human rights violations, environmental degradation, government accountability, and socio-economic issues.

• PILs have played a significant role in ensuring justice for disadvantaged groups and addressing systemic issues.

Important Points

• Key Legal Provisions:

• Article 32: Allows individuals to directly approach the Supreme Court for enforcement of fundamental rights, including filing PILs.

• Article 226: Enables High Courts to address issues of public interest and protect constitutional rights through PILs.

• Landmark PIL Cases:

• Vishaka Guidelines: Established legal provisions for preventing sexual harassment at workplaces.

• MC Mehta Case: Led to significant environmental conservation measures, including the regulation of industries causing pollution.

• Olga Tellis Case: Asserted the right to livelihood as part of fundamental rights.

Q35. Answer: (c) Second Plan

The correct answer is Second Plan.

Key Points

• The Second Five-Year Plan (1956-1961) in India was designed with a focus on rapid industrialization and the development of the public sector. This plan was inspired by the Mahalanobis Model, which emphasized the importance of heavy industries.

• During this plan, small-scale industries were given special attention, as these industries played a crucial role in providing employment, promoting regional balance, and ensuring equitable distribution of income.

• Specific protection and incentives were introduced for small-scale industries to encourage their growth. These included tax exemptions, subsidies, and easier access to credit.

• The plan also focused on import substitution, which meant promoting indigenous production to reduce reliance on imports, and small-scale industries were pivotal in achieving this objective.

• The emphasis on small-scale industries under the Second Plan was part of the broader strategy to develop a self-reliant economy and provide opportunities to rural and semi-urban populations. Hence, this plan specifically targeted small-scale industries.

Additional Information

• Second Five-Year Plan (1956-1961):

• This plan was based on the Mahalanobis Model, which emphasized the development of heavy industries like steel, machinery, and chemicals for long-term economic growth.

• The industrial sector was given priority, and significant investments were made to develop the infrastructure necessary for industrial growth.

• The focus on small-scale industries was to ensure balanced regional development and to address unemployment issues, particularly in rural and semi-urban areas.

• Small-Scale Industries (SSIs):

• Definition: SSIs are industries with limited investment in machinery and equipment, as defined by government guidelines.

• Features: They employ local labor, use local raw materials, and cater to the domestic market, thus contributing to regional development and reducing urban migration.

• Importance: SSIs play a crucial role in generating employment, promoting entrepreneurship, and contributing to the GDP of the country.

• Other Plans and Small-Scale Industries:

• First Plan (1951-1956): Focused on agriculture and irrigation, with limited attention to industries.

• Third Plan (1961-1966): Focused on self-reliance and agriculture, with less emphasis on small-scale industries compared to the Second Plan.

• Fourth Plan (1969-1974): Focused on social justice and reduction of poverty, with some incentives for SSIs.

• Fifth Plan (1974-1979): Focused on poverty alleviation, rural development, and employment generation.

Important Points

• Incentives for Small-Scale Industries:

• The government offered tax exemptions and subsidies to promote the growth of SSIs during the Second Plan.

• Financial institutions like SIDBI (Small Industries Development Bank of India) were established later to support SSIs with loans and credit facilities.

• Role of SSIs in Economic Development:

• SSIs contribute significantly to employment generation, especially in rural areas, thus reducing the pressure on urban centers.

• They promote regional balance by developing industries in less developed regions.

Q36. Answer: (a) Allocation of at least 20% of their annual budget toward junior and youth development programmes

The correct answer is Allocation of at least 20% of their annual budget toward junior and youth development programmes..

Key Points

• In 2025, the Indian government introduced a significant change in the funding norms for National Sports Federations (NSFs) to emphasize grassroots development and youth engagement.

• The new policy mandated that at least 20% of the annual budget allocated to NSFs must be directed toward junior and youth development programmes.

• This initiative aimed to nurture talent from an early age and ensure a strong pipeline of athletes for the future. This step focuses on building a foundation for competitive sports in India. Hence, the correct answer is option 1.

• The change aligns with the government's broader vision of improving India's global sports performance by investing in youth and grassroots-level sports infrastructure.

• While other options focused on reducing foreign coach expenses or decreasing financial assistance, the emphasis on youth development highlights the government's commitment to long-term sports excellence. Other options are incorrect as they do not align with the announced norms.

Additional Information

• National Sports Federations (NSFs) in India:

• NSFs are responsible for the development, regulation, and promotion of various sports disciplines in India. They work in collaboration with the Ministry of Youth Affairs and Sports.

• These federations play a crucial role in organizing national and international tournaments, nurturing talent, and providing infrastructure and training facilities for athletes.

• Focus on Junior and Youth Development:

• Investing in junior and youth programmes ensures that young athletes receive exposure to professional training and facilities at an early stage, thus fostering talent for international competitions.

• Such initiatives are essential to achieve long-term goals, such as improving India's ranking in the Olympics and global tournaments.

• Government's Role in Sports Development:

• Sports Authority of India (SAI) and NSFs receive funding from the government to enhance sports infrastructure and support athletes.

• Policies like these encourage federations to focus on grassroots-level development, which is critical for nurturing future champions.

Important Points

• Budget Allocation:

• The mandate to allocate 20% of the annual budget for junior and youth development is a progressive step, ensuring dedicated resources for nurturing young talent.

• This policy encourages NSFs to prioritize grassroots development over temporary measures like hiring foreign coaches.

• Examples of Implementation:

• Khelo India Programme: The government's flagship initiative aimed at identifying and nurturing young talent aligns with this policy change.

• State-Level Sports Academies: Many state governments have already started implementing youth-centric sports academies to complement the NSF's initiatives.

Q37. Answer: (a) Fibrinogen

The correct answer is Fibrinogen.

Key Points

• Fibrinogen is a glycoprotein produced by the liver. It plays a crucial role in the blood clotting process, which is essential for stopping bleeding during an injury.

• It is converted into fibrin by the action of an enzyme called thrombin. Fibrin forms a mesh or clot at the site of injury to prevent further blood loss.

• The presence of fibrinogen is vital for maintaining hemostasis, which is the process that stops bleeding and keeps the blood within damaged blood vessels.

• Fibrinogen is synthesized in the liver and circulates in the blood plasma. It is one of the 13 coagulation factors involved in blood clotting.

• The concentration of fibrinogen in human blood plasma ranges from approximately 200 to 400 mg/dL. Abnormal levels can indicate various medical conditions, such as inflammation, liver disease, or clotting disorders.

• Hence, the correct answer is Fibrinogen.

Additional Information

• Functions of Fibrinogen:

• Fibrinogen is responsible for forming fibrin clots during the final stages of the coagulation cascade.

• It contributes to wound healing by stabilizing the clot and promoting tissue repair.

• Fibrinogen also plays a role in immune responses and inflammation by interacting with other proteins and cells.

• Medical Importance:

• High levels of fibrinogen: Elevated fibrinogen levels are associated with conditions like cardiovascular diseases, diabetes, or

chronic inflammatory diseases.

• Low levels of fibrinogen: Deficiency of fibrinogen, known as afibrinogenemia or hypofibrinogenemia, can lead to excessive bleeding and difficulty in clot formation.

• Diagnostic role: Fibrinogen levels are measured in blood tests to evaluate clotting ability and diagnose bleeding disorders.

• Comparison with other options:

• Cadherin: Cadherins are cell adhesion molecules involved in maintaining tissue structure, not in blood clotting.

• Mucins: Mucins are glycoproteins found in mucus, playing a role in lubrication and protection, not clotting.

• Selectin: Selectins are adhesion molecules involved in immune cell trafficking, unrelated to clot formation.

Important Points

• History of Fibrinogen:

• Fibrinogen was first identified in 1856 by Alexander Schmidt, a scientist known for his work on blood coagulation.

• Its role in clot formation was further elucidated in the early 20th century, contributing to advancements in hematology.

• Clinical Applications:

• Fibrinogen is used as a therapeutic agent in managing bleeding disorders, such as during surgery or in patients with congenital fibrinogen deficiency.

• It is also a marker for assessing the risk of thrombosis and cardiovascular diseases.

Q38. Answer: (c) Arunachal Pradesh and Mizoram

The correct answer is Arunachal Pradesh and Mizoram.

Key Points

• Arunachal Pradesh and Mizoram were both established as states on 20 February 1987. Their foundation day anniversaries are celebrated annually on this date.

• Arunachal Pradesh was initially a Union Territory before becoming a full-fledged state in 1987. The state is known for its rich cultural heritage, diverse tribal communities, and stunning natural landscapes.

• Mizoram, which was also a Union Territory, achieved statehood on the same day in 1987. Mizoram is characterized by its lush green hills, vibrant festivals, and unique Mizo culture.

• The formation of these states was a significant milestone in India's administrative and political history, reflecting the government’s efforts to address regional aspirations and cultural diversity.

• Both states were established under the State Reorganization process, which is guided by Article 3 of the Indian Constitution. This article empowers the Parliament to create new states and alter the boundaries or names of existing states.

• Celebrating their foundation day highlights the importance of regional identity, cultural pride, and the progress achieved since their formation.

Additional Information

• Arunachal Pradesh:

• Located in the northeastern region of India, it shares international borders with China, Bhutan, and Myanmar.

• Known as the "Land of the Dawn-Lit Mountains," Arunachal Pradesh is famous for its scenic beauty, including Tawang Monastery, which is one of the largest monasteries in Asia.

• The state is home to numerous indigenous tribes, such as the Adi, Nyishi, Apatani, and Monpa, who contribute to its rich cultural diversity.

• Mizoram:

• Located in the northeastern part of India, Mizoram shares borders with Myanmar and Bangladesh.

• Known for its unique Mizo culture, the state celebrates vibrant festivals such as Chapchar Kut and Thalfavang Kut.

• The lush green hills and pleasant climate make Mizoram a popular destination for eco-tourism.

• Foundation Day Celebrations:

• The foundation day of Arunachal Pradesh and Mizoram is marked by cultural events, parades, and official ceremonies to commemorate their journey as independent states.

• It is an occasion to reflect on their development, achievements, and the preservation of their unique heritage.

Important Points

• Key Historical Developments:

• The State Reorganization Act of 1987 was crucial in granting statehood to Arunachal Pradesh and Mizoram.

• Both states were granted full statehood to address regional demands, ensure better governance, and promote socio-economic development.

• Role of Article 3:

• Article 3 of the Indian Constitution empowers the Parliament to create new states or alter existing ones based on socio-political

needs.

• The process involves consultation with the state legislature and approval by the President.

Q39. Answer: (c) Life expectancy at birth

The correct answer is Life expectancy at birth.

Key Points

• Life expectancy at birth is a fundamental indicator used to measure the "long and healthy life" component of the Human Development Index (HDI).

• It estimates the average number of years a newborn is expected to live, assuming that current mortality rates remain constant throughout their life.

• This metric reflects the overall health conditions of a population, including factors such as access to healthcare, nutrition, and living standards.

• A higher life expectancy signifies better health outcomes, indicating a higher level of human development.

• HDI uses life expectancy at birth as it provides a comprehensive overview of mortality rates across different age groups and regions. Hence, this is the correct option.

• Other aspects like number of doctors, access to hospitals, and health insurance coverage are important, but they are not direct measures used in HDI calculations.

Additional Information

• About Human Development Index (HDI):

• HDI is a composite measure introduced by the United Nations Development Programme (UNDP) in its Human Development Report (HDR) of 1990.

• It evaluates three critical dimensions of human development: health (measured by life expectancy at birth), education (measured by mean years of schooling and expected years of schooling), and standard of living (measured by Gross National Income per capita).

• Life Expectancy at Birth:

• This is the average number of years a newborn is expected to live, assuming current mortality rates continue to apply.

• It is influenced by factors such as access to healthcare, quality of medical facilities, nutrition, and socio-economic conditions.

• Features of Other Options:

• Number of Doctors: While an important indicator of healthcare infrastructure, it does not directly measure life expectancy or health outcomes.

• Access to Hospitals: This reflects healthcare availability but does not provide a direct measure of a population's overall health or longevity.

• Health Insurance Coverage: This indicates the financial accessibility of healthcare but does not directly impact the long and healthy life measure in HDI.

Important Points

• Global Trends:

• According to the 2020 Human Development Report, the global average life expectancy was approximately 73.4 years.

• Countries with higher HDI rankings, such as Norway, Switzerland, and Ireland, exhibit higher life expectancy due to their advanced healthcare systems and socio-economic conditions.

• India’s Position:

• India’s life expectancy at birth was around 70 years (2021 data), reflecting significant improvement over the past decades due to better healthcare access and policies.

• India ranks in the medium human development category in the HDI index, with continuous efforts to improve healthcare and living standards.

• Significance:

• Life expectancy at birth is an essential indicator as it directly correlates with health and socio-economic policies in a country.

• It helps policymakers assess the effectiveness of healthcare systems and identify areas requiring improvement.

Q40. Answer: (c) Modernising India's maritime laws by replacing the old law

The correct answer is Modernising India's maritime laws by replacing the old law.

Key Points

• The Bills of Lading Bill, 2025 was introduced as a major step to modernize India's maritime laws by replacing the outdated legislation. This aligns with global practices and ensures that India adheres to international standards in shipping and logistics.

• The existing law governing Bills of Lading in India is considered outdated and does not address modern challenges in the shipping industry. By introducing this bill, India aims to streamline and update its legislative framework.

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• The bill focuses on addressing key issues in the maritime sector, including digitization, transparency, and efficiency, which are essential for facilitating global trade and improving the country's logistics ecosystem.

• Modernization of maritime laws is critical for India, given its strategic location and the importance of maritime trade for the economy. This bill is expected to provide a robust framework for shipping operations, reduce disputes, and improve legal clarity.

• The bill also ensures better compliance with international conventions like the United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea (Rotterdam Rules), which India is a signatory to.

• Hence, the correct answer is "Modernising India's maritime laws by replacing the old law."

Additional Information

• Bills of Lading:

• A Bill of Lading is a legal document issued by a carrier to a shipper that serves as a contract of carriage, receipt of goods, and document of title.

• It is a crucial document in international trade, ensuring that goods are transported securely and that the rights of buyers, sellers, and carriers are protected.

• The modernization of laws governing Bills of Lading is essential to address issues like fraud prevention, efficient dispute resolution, and digital documentation.

• Importance of Modernizing Maritime Laws:

• India's current maritime laws are based on outdated colonial-era legislation, which no longer caters to the complexities of modern global trade.

• Modern laws will facilitate smoother operations for shipping companies and traders, reduce legal ambiguities, and ensure faster resolution of disputes.

• It will also enhance India's competitiveness in the global shipping industry and attract foreign investment in the logistics sector.

• Key Features of the Bills of Lading Bill, 2025:

• Incorporates provisions for electronic Bills of Lading to replace paper-based documents, promoting digitization in the maritime sector.

• Ensures compliance with international conventions like the Rotterdam Rules, which enhance uniformity in maritime laws across countries.

• Addresses issues like liability of carriers, rights of shippers, and contractual obligations, ensuring clarity and fairness in shipping operations.

Important Points

• Why Modernization is Needed:

• The Indian shipping industry is growing rapidly, and outdated laws are a bottleneck to its efficiency and global competitiveness.

• The shift towards digitization is critical, as global shipping is moving towards paperless documentation to reduce costs and enhance security.

• Other Key Developments in Indian Maritime Sector:

• The Sagarmala Project, launched by the Indian government, aims to modernize ports and develop coastal infrastructure to support maritime trade.

• India has also been focusing on increasing its share in global shipping by improving port facilities and introducing investor-friendly policies.

Q41. Answer: (b) 153/220

Given:

3/4 + (1/(1+5/6)) - 3/5

Formula Used:

a ÷ b = a/b

Calculation:

3/4 + (1/(1+5/6)) - 3/5

=> 3/4 + (1/(11/6)) - 3/5

=> 3/4 + (6/11) - 3/5

=> (165 + 120 - 132)/220

=> 153/220

Therefore The correct answer is 153/220.

Q42. Answer: (a) Rs. 44,499

Shortcut Trick

Calculate Effective Rate for the first case: (32/9) × 2.7% = 9.6%.

Given 9.6% of Principal = 2,808 => 1% of Principal = 2808 ÷ 9.6 = 292.5.
New Effective Rate for 5 2/3 years = (17/3) × 9.2% = 156.4/3 % ≈ 52.133%.
New Amount Percentage = 100% + 52.133% = 456.4/3 %.
Amount = 292.5 × (456.4 ÷ 3) = 97.5 × 456.4 = 44499.
Therefore The correct answer is Rs. 44,499.
Alternate Method
Given:
Initial Time (T1) = 3 5/9 = 32/9 years
Initial Rate (R1) = 2.7% p.a.
Initial Simple Interest (SI1) = Rs. 2,808
New Time (T2) = 5 2/3 = 17/3 years
New Rate (R2) = 9.2% p.a.
Formula Used:
Simple Interest (SI) = (P × R × T) ÷ 100
Amount (A) = Principal (P) + Simple Interest (SI)
=> 2808 = (P × 2.7 × 32/9) ÷ 100
=> 2808 = (P × 0.3 × 32) ÷ 100
=> 2808 = (P × 9.6) ÷ 100
=> P = (2808 × 100) ÷ 9.6 = Rs. 29,250
=> New SI = (29250 × 9.2 × 17/3) ÷ 100
=> New SI = (292.5 × 9.2 × 17) ÷ 3
=> New SI = 97.5 × 9.2 × 17 = Rs. 15,249
=> Amount = 29,250 + 15,249 = Rs. 44,499
Therefore The correct answer is Rs. 44,499.
Additional Information
Total Interest Percentage
The total interest earned is the product of the Rate (R) and Time (T). Total Interest % = R × T.
Amount in Simple Interest
The Amount payable is calculated as A = P(1 + RT/100), where P is the Principal.
Rule of Consistency
In Simple Interest, the interest remains constant for each year on the original Principal sum regardless of the duration.

Q43. Answer: (d) 2483.71

Shortcut Trick
Diameter = 16.8 cm → Radius (r) = 8.4 cm.
Volume = 4/3 × 22/7 × $(8.4)^3$.
Since the answer involves 22/7, the result must be a multiple of 11 (approximate check).
Calculating: 4 × 22 × 0.4 × 8.4 × 8.4 ≈ 2483.71 cm^3.
Therefore The correct answer is 2483.71 cm^3.
Alternate Method
Given:
Diameter (d) of the sphere = 16.8 cm
Radius (r) = d/2 = 16.8/2 = 8.4 cm
Formula Used:
Volume of a sphere = 4/3 π r^3
Calculations:
=> Volume = (4/3) × (22/7) × (8.4) × (8.4) × (8.4)
=> Volume = (4/3) × (22/7) × 592.704
=> Volume = 4 × 22 × (592.704 / 21)
=> Volume = 88 × 28.224
=> Volume = 2483.712 cm^3
=> Volume ≈ 2483.71 cm^3 (Correct to two decimal places)

Therefore The correct answer is 2483.71 cm³.

Additional Information

Surface Area of a Sphere

The total surface area is given by the formula $4\pi r^2$.

Hemisphere Properties

Volume of a hemisphere = $(2/3)\pi r^3$ and Curved Surface Area = $2\pi r^2$.

Total Surface Area of Hemisphere

For a solid hemisphere, the Total Surface Area = $3\pi r^2$ (including the circular base).

Q44. Answer: (c) 12

Shortcut Trick

The mode is the value that appears most frequently in a dataset.

Count the frequency of each mark in the given data:

11 → 2 times, 12 → 3 times, 13 → 1 time, 14 → 1 time, 15 → 1 time, 16 → 1 time, 17 → 1 time.

Since 12 has the highest frequency (3 times), the mode is 12.

Therefore The correct answer is 12.

Alternate Method

Given:

Marks scored by 10 students: 12, 13, 14, 11, 16, 11, 12, 17, 15, 12

Formula Used:

Mode = Value with the highest frequency in the dataset.

Calculations:

Let us arrange the data in ascending order to count frequencies easily:

=> Sorted Data: 11, 11, 12, 12, 12, 13, 14, 15, 16, 17

Now, let us list the frequency of each observation:

=> Frequency of 11 = 2

=> Frequency of 12 = 3

=> Frequency of 13 = 1

=> Frequency of 14 = 1

=> Frequency of 15 = 1

=> Frequency of 16 = 1

=> Frequency of 17 = 1

=> The observation with the maximum frequency is 12 (frequency = 3).

=> Therefore, the mode of the given data is 12.

Let us also verify why other options are incorrect:

=> Option (1) 14 is incorrect because its frequency is only 1.

=> Option (2) 13 is incorrect because its frequency is only 1.

=> Option (4) 11 is incorrect because its frequency is only 2, which is less than the frequency of 12.

Therefore The correct answer is 12.

Additional Information

Empirical Relationship between Mean, Median, and Mode

For a moderately skewed distribution, the relationship is given by: Mode = 3 × Median − 2 × Mean.

Types of Mode Distributions

A dataset can have one mode (unimodal), two modes (bimodal), three modes (trimodal), or no mode if all values occur with the same frequency.

Median of Grouped Data

Median = l + [((n/2) − cf) ÷ f] × h, where l is the lower limit of the median class, cf is cumulative frequency, f is frequency, and h is class width.

Q45. Answer: (b) 17.37

Shortcut Trick

Solve each square root term individually by looking at the base numbers and decimal places.

√400 = 20

√0.0289: √289 = 17, with 4 decimal places inside → 2 decimal places outside = 0.17

√7.84: √784 = 28, with 2 decimal places inside → 1 decimal place outside = 2.8

Result = 20 + 0.17 − 2.8 = 17.37

Therefore The correct answer is 17.37.

Alternate Method

Given: √400 + √0.0289 − √7.84

Step-by-step Calculation:

=> √400 = 20

=> √0.0289 = √(289/10000) = 17/100 = 0.17

=> √7.84 = √(784/100) = 28/10 = 2.8

Substitute these values back into the expression:

=> 20 + 0.17 − 2.8

=> 20.17 − 2.8

=> 17.37

Therefore The correct answer is 17.37.

Additional Information

Decimal Square Roots Rule

When taking the square root of a decimal, the number of decimal places in the result is always half the number of decimal places in the original number.

Common Square Roots

It is useful to memorize squares up to 30: $17^2 = 289$, $20^2 = 400$, and $28^2 = 784$.

Perfect Square Properties

A perfect square never ends in the digits 2, 3, 7, or 8. Decimal perfect squares must have an even number of digits after the decimal point.

Q46. Answer: (d) −117x + 120

Shortcut Trick

Directly calculate the coefficients for each term of the expression.

For x^2: (3 × 2) − 6 = 0 (Terms cancel out).

For x: (3 × −29) − (6 × 5) = −87 − 30 = −117.

For Constant: (3 × 14) − (6 × −13) = 42 + 78 = 120.

Combining the results, we get −117x + 120.

Therefore The correct answer is −117x + 120.

Alternate Method

Given:

$3((6 \div 3)x^2 - 29x + 14) - 6(x^2 + 5x - 13)$

Formula Used:

Distributive Property: a(b + c) = ab + ac

Calculations:

=> $3(2x^2 - 29x + 14) - 6(x^2 + 5x - 13)$

=> $(3 \times 2x^2) - (3 \times 29x) + (3 \times 14) - (6 \times x^2) - (6 \times 5x) + (6 \times 13)$

=> $6x^2 - 87x + 42 - 6x^2 - 30x + 78$

=> $(6x^2 - 6x^2) + (-87x - 30x) + (42 + 78)$

=> 0 − 117x + 120

=> −117x + 120

Therefore, after simplification, the resulting polynomial is −117x + 120, which corresponds to option 4.

Therefore The correct answer is −117x + 120.

Additional Information

BODMAS Rule

Always solve operations in the order: Brackets, Orders (powers/roots), Division, Multiplication, Addition, and Subtraction.

Combining Like Terms

Only terms with the same variable and exponent (like x^2 with x^2) can be added or subtracted together.

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Sign Multiplication Rules

Multiplying two negative numbers results in a positive number (− × − = +), while multiplying a positive and a negative results in a negative (+ × − = −).

Q47. Answer: (c) 35

Shortcut Trick

The ratio of the sum of interior angles to exterior angles of a regular polygon is (n − 2) : 2.

Given ratio = 4 : 1 => (n − 2) / 2 = 4 => n − 2 = 8 => n = 10 (Decagon).

Number of diagonals = n(n − 3) / 2 = 10 × 7 / 2 = 35.

Therefore The correct answer is 35.

Alternate Method

Given: Sum of interior angles = 4 × Sum of exterior angles.

Formula Used:

1. Sum of interior angles = (n − 2) × 180°

2. Sum of exterior angles = 360°

3. Number of diagonals = n(n − 3) / 2

Calculations:

=> (n − 2) × 180° = 4 × 360°

=> n − 2 = (4 × 360°) / 180°

=> n − 2 = 4 × 2

=> n − 2 = 8

=> n = 10

=> Number of diagonals = 10 × (10 − 3) / 2

=> Number of diagonals = 10 × 7 / 2 = 35

Therefore The correct answer is 35.

Additional Information

Regular Polygon Properties

Each interior angle = [(n − 2) × 180°] / n and each exterior angle =

Q48. Answer: (b) 70% loss

Shortcut Trick

Using the Quantity-Price inverse relationship.

Given: Selling Price (SP) of 50 books = Cost Price (CP) of 15 books.

Ratio of CP : SP = 50 : 15 = 10 : 3.

Loss = 10 − 3 = 7 units.

Loss% = (7 ÷ 10) × 100 = 70%.

Therefore The correct answer is 70% loss.

Alternate Method

Given → Formulas → SVG → Steps (=> each) → Final Answer.

Formulas: Loss = CP − SP | Loss% = (Loss ÷ CP) × 100

=> Let the Cost Price (CP) of 1 book be Re. 1.

=> Therefore, CP of 50 books = Rs. 50.

=> According to the question, Selling Price (SP) of 50 books = CP of 15 books = Rs. 15.

=> Loss = CP − SP = 50 − 15 = Rs. 35.

=> Loss% = (35 ÷ 50) × 100.

=> Loss% = 70%.

Therefore The correct answer is 70% loss.

Additional Information

Cost Price and Selling Price Relation

When the SP of 'x' articles equals the CP of 'y' articles, Gain or Loss% = [(y − x) ÷ x] × 100. A negative result indicates a loss.

Loss Percentage

Loss is always calculated on the Cost Price unless specified otherwise. Loss% = (Loss ÷ CP) × 100.

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Q49. Answer: (c) 54

Shortcut Trick

Mean Proportional of a and b = √(a × b)

=> Mean Proportional = √(81 × 36)

=> Mean Proportional = 9 × 6 = 54

Therefore The correct answer is 54.

Alternate Method

Given:

First number (a) = 81

Second number (b) = 36

Formula Used:

If x is the mean proportional between a and b, then a : x = x : b

=> $x^2 = ab$

=> x = √(ab)

Calculations:

=> x = √(81 × 36)

=> x = √(2916)

=> x = 54

Therefore The correct answer is 54.

Additional Information

Third Proportional

The third proportional of two numbers a and b is defined as c such that a : b :: b : c, which gives $c = b^2/a$.

Fourth Proportional

For three numbers a, b, and c, the fourth proportional d is such that a : b :: c : d, which gives d = (b × c)/a.

Continued Proportion

Numbers a, b, c are in continued proportion if a/b = b/c, where b is the mean proportional.

Q50. Answer: (a) 27.75

Shortcut Trick

Value 1 = 65% of 75 = 0.65 × 75 = 48.75

Value 2 = 3/5 of 35 = 3 × 7 = 21

Difference = 48.75 − 21 = 27.75

Therefore The correct answer is 27.75.

Alternate Method

Given: First part = 65% of 75, Second part = 3/5 of 35.

Formula Used: Percentage Value = (Percentage/100) × Total; Fraction Value = Fraction × Total.

=> Calculation of first part: (65/100) × 75

=> 0.65 × 75 = 48.75

=> Calculation of second part: (3/5) × 35

=> 3 × 7 = 21

=> Required difference: 48.75 − 21

=> Result = 27.75

Therefore The correct answer is 27.75.

Additional Information

Percentage to Fraction Conversion

To convert a percentage to a fraction, divide the percentage value by 100. Example: 65% = 65/100 = 13/20.

Fraction to Percentage Conversion

To convert a fraction to a percentage, multiply the fraction by 100. Example: 3/5 = (3/5) × 100 = 60%.

Base Change Property

x% of y is always equal to y% of x. This helps in simplifying calculations like 65% of 75 = 75% of 65.

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Q51. Answer: (b) 66%

Shortcut Trick

Since the Total Literacy Rate is 66% and the Male Literacy Rate is also 66%.

By logic of weighted averages, if the overall average and one group average are identical, the second group average must also be the same.

Net deviation method: 66% (Total) = [Male % × 66% + Female % × x%] / 100%

Since Male Literacy = Total Literacy = 66%, then Female Literacy must be 66%.

Therefore The correct answer is 66%.

Alternate Method

Given:

Total Population = 3,60,000

Number of Males = 2,31,000

=> Number of Females = 3,60,000 − 2,31,000 = 1,29,000

Total Literate People = 66% of 3,60,000

=> Total Literate = 0.66 × 3,60,000 = 2,37,600

Literate Males = 66% of 2,31,000

=> Literate Males = 0.66 × 2,31,000 = 1,52,460

Literate Females = Total Literate − Literate Males

=> Literate Females = 2,37,600 − 1,52,460 = 85,140

Female Literacy % = (Literate Females ÷ Total Females) × 100

=> Female Literacy % = (85,140 ÷ 1,29,000) × 100 = 66%

Therefore The correct answer is 66%.

Additional Information

Weighted Average Rule

If the average of the whole group is A, and the average of one sub-group is also A, then the average of the remaining sub-group must be A regardless of the ratio of group sizes.

Percentage Base Change

Always identify the correct denominator (base) when calculating group-specific percentages. For female literacy, the base is the number of females, not the total population.

Q52. Answer: (b) 4

Shortcut Trick

The number of items sold is inversely proportional to the selling price of each item when the total revenue is constant (Rs. 1).

Initial selling price percentage = 100% − 30% = 70%

Target selling price percentage = 100% + 5% = 105%

Ratio of price = 70 : 105 => 2 : 3

Since quantity is inversely proportional to price, the ratio of quantity = 3 : 2

Here, 3 units represent the initial quantity = 6 lemons.

Therefore, 2 units represent the target quantity = (6 ÷ 3) × 2 = 4 lemons.

Therefore The correct answer is 4.

Alternate Method

Given:

Initial quantity sold for Rs. 1 = 6 lemons

Loss percentage = 30%

Desired gain percentage = 5%

Formulas:

Cost Price (CP) = Selling Price (SP) × 100 ÷ (100 − Loss%)

New Selling Price (New SP) = CP × (100 + Gain%) ÷ 100

=> Initial SP of 1 lemon = Rs. 1/6

=> CP of 1 lemon = (1/6) × 100 ÷ (100 − 30) = (1/6) × (100/70) = Rs. 5/21

=> New SP of 1 lemon = CP × (100 + 5) ÷ 100

=> New SP of 1 lemon = (5/21) × (105/100) = (5/21) × (21/20) = Rs. 1/4

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=> Number of lemons to be sold for Rs. 1 = 1 ÷ (1/4) = 4 lemons

Therefore The correct answer is 4.

Additional Information

Inverse Proportionality in Transactions

When the total expenditure or total revenue is kept constant, the quantity of goods purchased or sold is inversely proportional to the price per item. Quantity × Price = Constant.

Profit and Loss Percentage

All percentage profit and loss calculations are standardly computed on the cost price (CP) unless stated otherwise in the problem.

Q53. Answer: (c) 3

Shortcut Trick

Apply Divisibility Rule of 3: Sum of digits of the number must be divisible by 3.

Number = 563607

Sum of digits = 5 + 6 + 3 + 6 + 0 + 7 = 27

Since 27 is divisible by 3 (27 ÷ 3 = 9), the number is divisible by 3.

Therefore The correct answer is 3.

Alternate Method

Given: Number = 563607

Formula Used: Testing divisibility for given options.

Calculations:

=> For Option (1) - 8: Last three digits (607) must be divisible by 8. 607 ÷ 8 = 75.875 (Not divisible).

=> For Option (2) - 10: Last digit must be 0. Here last digit is 7 (Not divisible).

=> For Option (3) - 3: Sum of digits = 5 + 6 + 3 + 6 + 0 + 7 = 27. Since 27 is divisible by 3, the number is divisible by 3.

=> For Option (4) - 13: 563607 ÷ 13 ≈ 43354.38 (Not divisible).

Therefore The correct answer is 3.

Additional Information

Divisibility by 9

A number is divisible by 9 if the sum of its digits is divisible by 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 either 0 or a multiple of 11.

Divisibility by 4

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

Q54. Answer: (d) -47

Given:

(-9) - (-60) ÷ (-10) + (-4) × 8

Formula Used:

Subtraction: a - b

Division: a ÷ b

Multiplication: a × b

Calculation:

=> (-9) - (-60 ÷ -10) + (-4 × 8)

=> (-9) - (6) + (-32)

=> -9 - 6 - 32

=> -15 - 32

=> -47

Therefore The correct answer is -47.

Q55. Answer: (d) 25%

Shortcut Trick

Discount percentage in Buy X Get Y Free schemes = [Free items ÷ Total items] × 100.

Here, the customer gets 1 trouser free on buying 3 trousers.

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Total items received by the customer = 3 + 1 = 4.

Discount % = (1 ÷ 4) × 100 = 25%.

Therefore The correct answer is 25%.

Alternate Method

Given: Buy 3 Get 1 Free.

Formulas: Discount % = (Discount ÷ MP) × 100 | Total MP = MP of all items (purchased + free).

=> Let the Marked Price (MP) of one trouser be 1 unit.

=> Total MP of 4 trousers = 4 units.

=> The customer pays for only 3 trousers, so Selling Price (SP) = 3 units.

=> Discount = Total MP − SP = 4 − 3 = 1 unit.

=> Discount % = (1 ÷ 4) × 100 = 25%.

Therefore The correct answer is 25%.

Additional Information

Effective Discount in Buy X Get Y Free

The effective discount is always calculated on the total number of articles handed over to the customer, as the merchant incurs the cost for all of them. Formula: [Y ÷ (X+Y)] × 100.

Marked Price vs Selling Price

Discount is always calculated on the Marked Price (MP). SP = MP − Discount.

Q56. Answer: (b) 13,050

Shortcut Trick

When Simple Interest is equal for two investments, the ratio of Principal is inverse to the product of Rate × Time.

P1 : P2 = (1 / R1T1) : (1 / R2T2)

Since time (7 years) is the same, P1 : P2 = R2 : R1 = 9 : 5

Total units = 9 + 5 = 14 units → Rs. 20,300

Investment at 5% (9 units) = (20,300 ÷ 14) × 9 = 1,450 × 9 = Rs. 13,050

Therefore The correct answer is Rs. 13,050.

Alternate Method

Given: Total Principal = Rs. 20,300 | Time (T) = 7 years | Rate1 (R1) = 5% | Rate2 (R2) = 9%

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

Let the amount invested at 5% be P1 and at 9% be P2.

=> (P1 × 5 × 7) ÷ 100 = (P2 × 9 × 7) ÷ 100

=> 35 × P1 = 63 × P2

=> 5 × P1 = 9 × P2 (Dividing by 7)

=> P1 / P2 = 9 / 5

=> Sum of ratio parts = 9 + 5 = 14

=> 14 parts = Rs. 20,300

=> 1 part = 20,300 ÷ 14 = Rs. 1,450

=> Principal at 5% (P1) = 9 × 1,450 = Rs. 13,050

Therefore The correct answer is Rs. 13,050.

Additional Information

Simple Interest on Multiple Parts

If a sum P is divided into n parts such that the simple interest on each part is equal, the ratio of the parts is P1 : P2 : ... : P_n = (1/R1T1) : (1/R2T2) : ... : (1/R_nT_n).

Equal Amount Condition

If the total amount (Principal + Interest) is equal for all parts, then the ratio of investment is P1 : P2 = 1/(100 + R1T1) : 1/(100 + R2T2).

Principal vs Amount

Always identify if the question mentions equal interest or equal amount at maturity, as the ratio logic changes completely.

Q57. Answer: (a) 37

Shortcut Trick

Let the son's age 3 years ago be x.

Father's age 3 years ago = 2x + 40.
Age difference = (2x + 40) − x = x + 40.
When the father's age becomes twice the son's age, the difference between their ages must be equal to the son's age at that time.
Son's age then = x + 40. This happens (x + 40) − x = 40 years after the "3 years ago" mark.
Years from now = 40 − 3 = 37 years.
Therefore The correct answer is 37 years.
Alternate Method
Given:
Let Present age of Son = S and Father = F.
3 years ago: (F − 3) = 2 × (S − 3) + 40
=> F − 3 = 2S − 6 + 40
=> F − 2S = 37 --- (Eq. 1)
Let the father be twice his son's age after n years from now.
=> (F + n) = 2 × (S + n)
=> F + n = 2S + 2n
=> F − 2S = n --- (Eq. 2)
Comparing (Eq. 1) and (Eq. 2):
=> n = 37
Therefore The correct answer is 37 years.
Additional Information
Constant Age Difference
The difference between the ages of two people remains constant throughout their lives, regardless of how many years pass.
Ratio of Ages
If the ratio of ages is given at two different points in time, use the equating difference method to solve for the multiplier quickly.
Age Problems Logic
If someone is 'n' times as old as another, and the difference is 'D', then the younger person's age is D ÷ (n − 1).

Q58. Answer: (b) 42 km/hr

Shortcut Trick
Since the distance is constant, speed is inversely proportional to time.
Time ratio (T1 : T2) = 6 : 12 = 1 : 2
Speed ratio (S1 : S2) = 2 : 1
Given S1 = 84 km/hr (2 units → 84), then 1 unit → 42 km/hr.
Therefore The correct answer is 42 km/hr.
Alternate Method
Given: Initial speed (S1) = 84 km/hr, Initial time (T1) = 6 hours, Final time (T2) = 12 hours.
Formula Used: Distance = Speed × Time
=> Distance = 84 × 6
=> Distance = 504 km
=> New Speed (S2) = Distance ÷ New Time
=> S2 = 504 ÷ 12
=> S2 = 42 km/hr
Therefore The correct answer is 42 km/hr.
Additional Information
Inverse Relationship
When distance is fixed, S1 × T1 = S2 × T2. Doubling the time requires halving the speed.
Average Speed
For a round trip with speeds a and b, Average Speed = (2 × a × b) ÷ (a + b).
Unit Conversion
To convert km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.

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Q59. Answer: (c) Rs. 420

Shortcut Trick

Profit ratio = Ratio of investments: Pankaj : Juhi : Siddharth = 1,020 : 1,740 : 1,840.

Simplified Ratio = 102 : 174 : 184 = 51 : 87 : 92.

Total units = 51 + 87 + 92 = 230 units.

230 units = &8377;1,050 => 1 unit = 1,050 ÷ 230 ≈ 4.565.

Siddharth's share (92 units) = 92 × (1,050 ÷ 230) = 92 × (105 ÷ 23) = 4 × 105 = &8377;420.

Therefore The correct answer is &8377;420.

Alternate Method

Given: Investment of Pankaj (I_P) = &8377;1,020, Juhi (I_J) = &8377;1,740, Siddharth (I_S) = &8377;1,840. Total Profit = &8377;1,050.

Formula: Profit Share = (Individual Investment ÷ Total Investment) × Total Profit.

=> Total Investment = 1,020 + 1,740 + 1,840 = &8377;4,600.

=> Siddharth's Profit Share = (1,840 ÷ 4,600) × 1,050.

=> Share = (184 ÷ 460) × 1,050.

=> Share = (4 ÷ 10) × 1,050 = 0.4 × 1,050 = 420.

Therefore The correct answer is &8377;420.

Additional Information

Partnership Ratios

When the time period for investment is the same for all partners, the profit is distributed solely in the ratio of their capitals.

Compound Partnership

If investments are for different durations, Profit Ratio = (Capital1 × Time1) : (Capital2 × Time2).

Q60. Answer: (b) 3

Shortcut Trick

Put Φ = 45° as it is the fastest way to solve trigonometric identities without complex formulas.

=> $\sec^2 45° \times \cot^2 45° - 1/\tan^2 45° + 2(1/\csc^2 45° + 1/\sec^2 45°)$

=> $(\sqrt{2})^2 \times (1)^2 - (1)^2 + 2(1/(\sqrt{2})^2 + 1/(\sqrt{2})^2)$

=> 2 × 1 − 1 + 2(1/2 + 1/2) = 1 + 2(1) = 3.

Therefore The correct answer is 3.

Alternate Method

Given: $\sec^2\Phi \cot^2\Phi - 1/\tan^2\Phi + 2(1/\csc^2\Phi + 1/\sec^2\Phi)$

Formula Used: 1/tanΦ = cotΦ; 1/cscΦ = sinΦ; 1/secΦ = cosΦ; $\sin^2\Phi + \cos^2\Phi = 1$; $\sec^2\Phi - 1 = \tan^2\Phi$

=> $(\sec^2\Phi \times \cot^2\Phi) - \cot^2\Phi + 2(\sin^2\Phi + \cos^2\Phi)$

=> $\cot^2\Phi (\sec^2\Phi - 1) + 2(1)$

=> $\cot^2\Phi \times \tan^2\Phi + 2$

=> 1 + 2

=> 3

Therefore The correct answer is 3.

Additional Information

Fundamental Identities

Standard Pythagorean identities: $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \csc^2\theta$.

Reciprocal Relations

Basic relations: tanθ × cotθ = 1, sinθ × cscθ = 1, and cosθ × secθ = 1.

Q61. Answer: (b) 34.61

Shortcut Trick

Net deviation from the first average (44) for the next 10 matches = 10 × (13 − 44) = −310.

Distribute this total deviation among all 33 matches: −310 ÷ 33 ≈ −9.39.

New average = Original Average + Deviation = 44 − 9.39 = 34.61.

Therefore The correct answer is 34.61.

Alternate Method

Given:

Matches in 1^(st) set (n1) = 23, Average (a1) = 44

Matches in 2^(nd) set (n2) = 10, Average (a2) = 13

Formula Used:

Combined Average = (n1 × a1 + n2 × a2) ÷ (n1 + n2)

Calculations:

=> Total runs in 23 matches = 23 × 44 = 1012

=> Total runs in 10 matches = 10 × 13 = 130

=> Total runs in all 33 matches = 1012 + 130 = 1142

=> Combined Average = 1142 ÷ 33

=> Combined Average = 34.60606...

=> Rounding off to two decimal places = 34.61

Therefore The correct answer is 34.61.

Additional Information

Weighted Average Concept

When two groups with different averages are combined, the resultant average lies closer to the group with the larger sample size (more matches).

Combined Average Formula

X_(avg) = (n1x1 + n2x2 + ... + n_kx_k) ÷ (n1 + n2 + ... + n_k), where n is the frequency and x is the value.

Deviation Method for Averages

It involves picking an assumed mean and calculating how much the total sum deviates from this mean, then dividing the net deviation by the total number of observations.

Q62. Answer: (d) H.C.F. = 0.24; L.C.M. = 16.8

Shortcut Trick

Convert decimals to integers by multiplying by 100: 48, 120, 168.

H.C.F.(48, 120, 168) = 24. For decimals, H.C.F. = 24 ÷ 100 = 0.24.

L.C.M.(48, 120, 168) = 1680. For decimals, L.C.M. = 1680 ÷ 100 = 16.8.

Therefore The correct answer is H.C.F. = 0.24; L.C.M. = 16.8.

Alternate Method

Given Numbers: 0.48, 1.20, 1.68

Step 1: Make the number of decimal places equal.

=> Numbers are 0.48, 1.20, 1.68 (already have 2 decimal places).

Step 2: Treat them as integers: 48, 120, 168.

Step 3: Find H.C.F. using Prime Factorization:

=> 48 = 2^4 × 3

=> 120 = $2^3 \times 3 \times 5$

=> 168 = $2^3 \times 3 \times 7$

=> H.C.F.(48, 120, 168) = $2^3 \times 3 = 8 \times 3 = 24$.

=> H.C.F. of decimals = 24 ÷ 100 = 0.24.

Step 4: Find L.C.M. using Prime Factorization:

=> L.C.M.(48, 120, 168) = 2^4 × 3 × 5 × 7

=> L.C.M. = 16 × 3 × 5 × 7 = 1680.

=> L.C.M. of decimals = 1680 ÷ 100 = 16.8.

Therefore The correct answer is H.C.F. = 0.24; L.C.M. = 16.8.

Additional Information

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

H.C.F. = H.C.F. of Numerators ÷ L.C.M. of Denominators. L.C.M. = L.C.M. of Numerators ÷ H.C.F. of Denominators.

Product Rule

For two numbers A and B: A × B = H.C.F.(A, B) × L.C.M.(A, B). This is valid for exactly two numbers only.

Co-prime Numbers

If two numbers are co-prime, their H.C.F. is always 1 and their L.C.M. is the product of the numbers.

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Q63. Answer: (a) Rs. 38,500

Shortcut Trick

Profit ratio M : N is calculated from Total Profit (1,815) and Difference (605).

M profit = (1,815 + 605) ÷ 2 = 1,210; N profit = 1,815 − 1,210 = 605.

Profit Ratio M : N = 1,210 : 605 = 2 : 1.

Investment Ratio × Time Ratio = Profit Ratio => (I_M × 2) : (I_N × 7) = 2 : 1.

I_M : I_N = (2 ÷ 2) : (1 ÷ 7) = 1 : 1/7 = 7 : 1. Difference 6 units = 33,000 => 1 unit = 5,500.

Therefore The correct answer is Rs. 38,500.

Alternate Method

Given: Difference in Investment = 33,000 | T_M = 2, T_N = 7 | Total Profit = 1,815 | Profit Difference = 605.

Formulas: Profit = Investment × Time | Investment = Profit ÷ Time

=> Let M's profit be P_M and N's profit be P_N. P_M + P_N = 1,815 and P_M − P_N = 605.

=> 2 × P_M = 2,420 => P_M = 1,210. P_N = 1,815 − 1,210 = 605.

=> Let N's capital be x, then M's capital is x + 33,000.

=> (M's Capital × Time) ÷ (N's Capital × Time) = M's Profit ÷ N's Profit.

=> [(x + 33,000) × 2] ÷ (x × 7) = 1,210 ÷ 605 = 2 ÷ 1.

=> (x + 33,000) × 2 = 14x => x + 33,000 = 7x => 6x = 33,000 => x = 5,500.

=> M's capital = x + 33,000 = 5,500 + 33,000 = 38,500.

Therefore The correct answer is Rs. 38,500.

Additional Information

Partnership Ratios

In a partnership, if capitals C1, C2 are invested for time periods T1, T2, the profits P1, P2 are distributed as: P1:P2 = (C1×T1):(C2×T2).

Capital Calculation

To find the capital ratio when profit and time are known: C1:C2 = (P1/T1):(P2/T2).

Q64. Answer: (c) 48/13 days

Shortcut Trick

Let Total Work be LCM of 20, 15, and 3 = 60 units.

Efficiency of A = 60 ÷ 20 = 3; Efficiency of B = 60 ÷ 15 = 4.

Efficiency of A + B + C = 60 ÷ 3 = 20.

Efficiency of C = 20 − (3 + 4) = 13.

Time taken by C = 60 ÷ 13 = 4(8/13) days.

Therefore The correct answer is 4(8/13) days.

Alternate Method

Given: A = 20 days, B = 15 days, A + B + C = 3 days.

Formula Used: 1/A + 1/B + 1/C = 1/Total Time

Person	Days	Total Work	Efficiency
A	20	60	3
B	15	4	
A+B+C	3	20	

=> Total Efficiency (A+B+C) = 20 units/day

=> Efficiency of C = (A+B+C) − A − B

=> Efficiency of C = 20 − 3 − 4 = 13 units/day

=> Time for C = Total Work ÷ Efficiency of C

=> Time = 60 ÷ 13 = 4(8/13) days

Therefore The correct answer is 4(8/13) days.

Additional Information

Work Efficiency

Efficiency is inversely proportional to the time taken to complete a task. Total Work = Efficiency × Time.

Combined Work Formula

If two people work together, their combined efficiency is the sum of their individual efficiencies: 1/T_(total) = 1/T1 + 1/T2.

Work & Wages

Wages are generally distributed in the ratio of the work done or the ratio of efficiencies when the duration of work is the same.

Q65. Answer: (c) Rs. 21,600

Shortcut Trick

Net discount % = a + b − (a × b ÷ 100) = 20 + 10 − (20 × 10 ÷ 100) = 28%.

Selling Price = 100% − 28% = 72% of Marked Price.

SP = 30,000 × 0.72 = 21,600.

Therefore The correct answer is Rs. 21,600.

Alternate Method

Given → Marked Price (MP) = Rs. 30,000, Discount 1 (d1) = 20%, Discount 2 (d2) = 10%.

Formulas: SP = MP × (100 − d1)% × (100 − d2)%

→ Price after first discount = 30,000 × (80/100) = 24,000.

→ Final Selling Price (SP) = 24,000 × (90/100) = 21,600.

Therefore The correct answer is Rs. 21,600.

Additional Information

Successive Discounts

When multiple discounts are applied one after another, the base for the subsequent discount is the value obtained after the previous discount.

Effective Discount Formula

For two successive discounts of x% and y%, the single equivalent discount is (x + y − xy/100)%.

Q66. Answer: (a) 11:28 AM

Shortcut Trick

Time Ratio for Train A : Train B = 9 hours : 6 hours = 3 : 2.

Speed Ratio = 2 : 3 (Inverse of Time Ratio).

Let Total Distance (LCM of 9 and 6) = 18 units. Speeds are 2 units/hr and 3 units/hr.

At 8:40 AM, Train A has covered (2 hours × 2 units/hr) = 4 units. Remaining = 14 units.

Meeting time = 8:40 AM + (14 ÷ (2 + 3)) hours = 8:40 AM + 2.8 hours = 8:40 AM + 2 hours 48 minutes.

Therefore The correct answer is 11:28 AM.

Alternate Method

Given:

Train A (M to N): 6:40 AM to 3:40 PM = 9 hours.

Train B (N to M): 8:40 AM to 2:40 PM = 6 hours.

=> Let Distance = 18 km (LCM of 9 and 6).

=> Speed of Train A = 18 ÷ 9 = 2 kmph.

=> Speed of Train B = 18 ÷ 6 = 3 kmph.

=> Distance covered by Train A from 6:40 AM to 8:40 AM (2 hours) = 2 × 2 = 4 km.

=> Remaining Distance at 8:40 AM = 18 − 4 = 14 km.

=> Relative Speed = 2 + 3 = 5 kmph.

=> Time to Meet = 14 ÷ 5 = 2.8 hours = 2 hours 48 minutes.

=> Meeting Time = 8:40 AM + 2 hours 48 minutes = 11:28 AM.

Therefore The correct answer is 11:28 AM.

Additional Information

Relative Speed

When two objects move in opposite directions, relative speed is the sum of their individual speeds (S1 + S2).

Meeting Time Formula

Meeting Time = (Initial distance between them at the same start time) ÷ (Relative Speed).

Time and Distance Relation

For a constant distance, speed is inversely proportional to time (S1/S2 = T2/T1).

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Q67. Answer: (d) 9.5 cm

Shortcut Trick

Ratio of Perimeter to Length = 2(L + B) : L = 3 : 1

=> 2L + 2B = 3L => L = 2B

Area = L × B = 2B × B = $2B^2$ = 180.5

=> B^2 = 90.25 => B = √90.25 = 9.5 cm

Therefore The correct answer is 9.5 cm.

Alternate Method

Given: Ratio of Perimeter (P) to Length (L) = 3 : 1, Area = 180.5 cm^2

Formula Used: Perimeter = 2(L + B); Area = L × B

=> Let Length = x and Perimeter = 3x

=> 2(Length + Breadth) = 3x

=> 2(x + Breadth) = 3x

=> 2x + 2 × Breadth = 3x

=> 2 × Breadth = x

=> Breadth = x/2

=> Area = Length × Breadth = x × (x/2) = 180.5

=> x^2 / 2 = 180.5

=> x^2 = 361

=> x = 19 cm (Length)

=> Breadth = x / 2 = 19 / 2 = 9.5 cm

Therefore The correct answer is 9.5 cm.

Additional Information

Properties of Rectangle

A rectangle has opposite sides equal and all angles are 90°. The diagonal is given by √(L^2 + B^2).

Area and Perimeter Relations

For a given perimeter, a square has the maximum area. For a rectangle, if L = nB, then Area = nB^2.

Square Root Shortcut

To find √90.25, observe that 90.25 ends in 25 (suffix .5) and 90 = 9 × 10, so the root is 9.5.

Q68. Answer: (a) 22

Shortcut Trick

Identify the perfect square closest to 462.

21^2 = 441 and 22^2 = 484.

Since 441 < 462 < 484, the numbers must be 21 and 22.

Check: 21 × 22 = 462. The greater number is 22.

Therefore The correct answer is 22.

Alternate Method

Given: Product of two consecutive positive natural numbers = 462.

Formula Used: Quadratic Equation: x(x + 1) = Product

=> Let the smaller number be x and the greater number be x + 1.

=> x(x + 1) = 462

=> $x2 + x - 462 = 0$

=> $x2 + 22x - 21x - 462 = 0$

=> x(x + 22) − 21(x + 22) = 0

=> (x − 21)(x + 22) = 0

=> x = 21 or x = −22 (Since numbers are positive natural numbers, x = 21)

=> Greater number = x + 1 = 21 + 1 = 22.

Therefore The correct answer is 22.

Additional Information

Consecutive Numbers

Numbers that follow each other in order, without gaps. For natural numbers, the difference is always 1.

Nature of Roots

For ax2 + bx + c = 0, the discriminant D = b2 − 4ac determines if roots are real or imaginary.

Product of Consecutive Integers

The product of two consecutive integers is always an even number since one of them must be even.

Q69. Answer: (b) 8 days

Shortcut Trick

Work ratio: 8 men × 5 days = 8 women × 15 days

=> 1 man = 3 women (Efficiency ratio M:W = 3:1)

Total Work = 8 × 3 × 5 = 120 units

Combined efficiency (3 women + 4 men) = (3 × 1) + (4 × 3) = 15 units/day

Required days = 120 ÷ 15 = 8 days

Therefore The correct answer is 8 days.

Alternate Method

Given: 8 men (M) in 5 days, 8 women (W) in 15 days.

Formula Used: M1D1 = M2D2

Person	Days	Total Work	Efficiency
8 Men	5	120 units	24 (3 per M)
8 Women	15	8 (1 per W)	

=> Total Work = 8 × 15 = 120 (taking Women's efficiency as 1 unit/day)

=> 1 man efficiency = (8 × 15 × 1) ÷ (8 × 5) = 3 units/day

=> Efficiency of (3W + 4M) = (3 × 1) + (4 × 3) = 3 + 12 = 15 units/day

=> Required Time = 120 ÷ 15

=> Time = 8 days

Therefore The correct answer is 8 days.

Additional Information

M-D-H Formula

Relationship between Men (M), Days (D), Hours (H) and Work (W) is (M1 × D1 × H1) / W1 = (M2 × D2 × H2) / W2.

Efficiency and Time

Efficiency is inversely proportional to the time taken to complete a task. Efficiency = Work ÷ Time.

Work and Wages

Wages are distributed in the ratio of the total work done by each individual or their relative efficiencies if they work for the same duration.

Q70. Answer: (d) 140

Shortcut Trick

Product of numbers = H.C.F. × L.C.M.

Other number = (4 × 3360) ÷ 96

=> Other number = 3360 ÷ 24 = 140

Therefore The correct answer is 140.

Alternate Method

Given:

H.C.F. = 4

L.C.M. = 3360

First Number (n1) = 96

Formula Used:

n1 × n2 = H.C.F. × L.C.M.

Calculations:

=> 96 × n2 = 4 × 3360

=> n2 = (4 × 3360) ÷ 96

=> n2 = 13440 ÷ 96

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=> n2 = 140

Therefore The correct answer is 140.

Additional Information

H.C.F. (Highest Common Factor)

It is the greatest number that divides two or more numbers without leaving a remainder.

L.C.M. (Least Common Multiple)

It is the smallest non-zero common multiple of two or more numbers.

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

Q71. Answer: (a) 1201

The logic followed here is:

thus, "1201" will replace the question mark in the given series.

Hence, the correct option is "Option 1".

Q72. Answer: (a) FYV

The logic followed here is:

So, 'FYV' will replace the question mark in the given series.

Hence, the correct answer is "Option 1".

Q73. Answer: (d) Both conclusions (I) and (II) follow.

Given Statements:

All geysers are fans.

No fan is a bulb.

The least possible Venn diagram for the given statement is:

Conclusions:

(I) No geyser is a bulb:

Since all geysers are inside the set of fans (Statement 1), and the entire set of fans has no overlap with bulbs (Statement 2), it must be true that no geyser is a bulb.

(II) Some fans are geysers:

The statement "All geysers are fans" (A-type proposition) logically converts to "Some fans are geysers" (I-type proposition).

If every single geyser is a fan, then certainly, some fans must be those geysers.

Thus, Both conclusions (I) and (II) follow.

Hence, the correct answer is "Option 4".

Q74. Answer: (b) 13

BODMAS Table:

Given equation: 48 A 3 C 21 D 8 B 3 = ?

Now, if '+' and '-' and '×' and '÷' are interchanged, then:

=> 48 ÷ 3 + 21 − 8 × 3= ?

=> 16 + 21 − 24 = ?

=> 37 − 24 = 13

Hence, the correct answer is "Option 2".

Q75. Answer: (a) 131

The logic followed here is:

thus, "131" will replace the question mark in the given series.

Hence, the correct option is "Option 1".

Q76. Answer: (c) Mother's mother

Family Chart:

Decoding the Symbols:

Symbol	$	•	@	÷
Meaning	Mother	Brother	Wife	Father

Given: E $ F @ G ÷ M + N
It means:
E is the Mother of F.
F is the Wife of G.
G is the Father of M.
M is the Brother of N.
So, E is the 'Mother's mother' of N.
Hence, the correct answer is "Option 3".

Q77. Answer: (a) ES - AN

The logic followed here is:
Option 1) ES - AN
Option 2) NB - KW
Option 3) WI - TD
Option 4) KX - HS
Here, 'ES - AN' is odd among the given options.
Hence, the correct answer is "Option 1".

Q78. Answer: (b) OIVW

The logic followed here is:
For, EGLU is related to CDJR
For, WUDI is related to URBF
Similarly, for QLXZ
So, QLXZ will be related to OIVW
Hence, the correct answer is "Option 2".

Q79. Answer: (b) 34

The logic followed here is:
Salman's rank from the top = 24th
Salman's rank from the bottom = 11th
Total students = Rank from top + Rank from bottom − 1
So, Total students = 24 + 11 − 1 = 34
Hence, the correct answer is 'Option 2'.

Q80. Answer: (d) A66B

The logic followed here is:
So, 'A66B' will replace the question mark in the given series.
Hence, the correct answer is "Option 4".

Q81. Answer: (b) 12

Given:(Left) 415 672 456 782 324 (Right)
Now,
Lowest = 324
Third digit of 324 = 4
Highest = 782
Second digit of 782 = 8
So, 4 (third digit of lowest) + 8 (second digit of highest)
= 12
Hence, the correct answer is 'Option 2'.

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Q82. Answer: (a) IDH

The logic followed here is:
Option 1) IDH
Option 2) SNQ
Option 3) MHK
Option 4) PKN
Here, 'IDH' is odd among the given options.
Hence, the correct answer is "Option 1".

Q83. Answer: (a) 9

Given numbers: 9123547
Digits: 9, 1, 2, 3, 5, 4, 7
Ascending order:
1, 2, 3, 4, 5, 7, 9
Second from the left = 2
Second from the right = 7
So, Sum = 2 + 7 = 9
Hence, the correct answer is 'Option 1'.

Q84. Answer: (b) One

Given: (Left) 9 8 5 @ 8 σ 9 π % 2 8 # 1 2 $ * 8 1 π 5 (Right)
Now,
Numbers which are immediately preceded by a symbol and also immediately followed by an even number.
So, Needed pattern is: Symbol - Number - Even Number.
There is One Numbers which are immediately preceded by a symbol and also immediately followed by an even number.
Hence, the correct answer is 'Option 2'.

Q85. Answer: (b) 8

The logic followed here is:
'TASK' is coded as '4628'

T	A	S	K
4	6	2	8

'KIND' is coded as '1385'

K	I	N	D
1	3	8	5

Common letter in both words is K.
Codes are 4628 and 1385. The only digit that appears in both codes is 8.
So, 8 is the code for 'K' in the given code language.
Hence, the correct answer is 'Option 2'.

Q86. Answer: (a) 88

The logic followed here is:
thus, "88" will replace the question mark in the given series.
Hence, the correct option is "Option 1".

Q87. Answer: (a) Two

Given: Seven people, I, J, K, L, P, Q and R, are sitting in a row, facing north.
1) Only three people sit between P and J.
2) R sits to the immediate left of J.
3) No one sits to the right of I.
4) Only two people sit between I and R.

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5) Q sits to the immediate right of L.

So, Two people sit between K and Q.

Hence, the correct answer is "Option 1".

Q88. Answer: (b) HCF

The logic followed here is:

Option 1) LGK

Option 2) HCF

Option 3) PKO

Option 4) UPT

Here, 'HCF ' is odd among the given options.

Hence, the correct answer is "Option 2".

Q89. Answer: (c) Two

Given: Seven boxes A, B, C, D, E, F, and G are kept one over the other but not necessarily in the same order.

1) Only three boxes are kept below F.

2) Only two boxes are kept between F and G.

3) Only B is kept above D.

4) A is kept at some place below E and at some place above C.

B
D
E
F
A
C
G

So, there are 'Two' boxes are kept above E

Hence, the correct answer is "Option 3".

Q90. Answer: (c) 7 km north

Given:

Shivani starts from point X and drives 11 km towards the east.

She then takes a left turn, drives 5 km, turns right and drives 5 km.

She then takes a right turn and drives 2 km.

She then takes a right turn, drives 7 km.

She then takes a left turn and drives 10 km.

She then takes a final right turn and drives 9 km and stops at point Z.

So, She should drive 7 km north in order to reach point X again.

Hence, the correct answer is "Option 3".

Q91. Answer: (d) Two

Given: L, M, N, O, Q, R, and S are sitting around a circular table facing the centre of the table.

1) Only four people sit between Q and M when counted from the right of Q.

2) Q sits third to the left of O.

3) L sits third to the left of R.

4) S is an immediate neighbor of both M and O.

Here, Two people sit between N and S when counted from the right of N.

Hence, the correct answer is "Option 4".

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Q92. Answer: (d) Only conclusion (II) follows.

Given Statements:

All pencils are copies.

Some copies are erasers.

The least possible Venn diagram for the given statement is:

Conclusions:

(I) Some pencils are erasers:

Not necessarily true.

All pencils lie inside copies, but the “some copies that are erasers” may or may not include pencils.

So no definite relation between pencils and erasers is established.

(II) Some erasers are copies:

Statement 2 itself says Some copies are erasers, which means:

→ Some erasers are copies.

Thus, Only conclusion (II) follows.

Hence, the correct answer is "Option 4".

Q93. Answer: (b) RKEF

The logic followed here is:

For, DWQR is related to VOIJ

For, XQKL is related to PICD

Similarly, for ZSMN

So, ZSMN will be related to RKEF

Hence, the correct answer is "Option 2".

Q94. Answer: (d) (17, 270, 19)

The logic followed here is:

Logic: second = (first)² − (third).

(11, 110, 11)

=> $11^2 = 121$, and $121 - 11 = 110$.

(8, 59, 5)

=> $8^2 = 64$, and $64 - 5 = 59$.

Now, checking the options:

Option 1) (17, 284, 4)

=> $17^2 = 289$; $289 - 4 = 285 \neq 284$ → not correct.

Option 2) (47, 2187, 21)

=> $47^2 = 2209$; $2209 - 21 = 2188 \neq 2187$ → not correct.

Option 3) (12, 130, 13)

=> $12^2 = 144$; $144 - 13 = 131 \neq 130$ → not correct.

Option 4) (17, 270, 19)

=> $17^2 = 289$; $289 - 19 = 270$ → matches.

Hence, the correct option is "Option 4"

Q95. Answer: (c) YDIF

The logic followed here is:

For, AXUJ is related to DBZP

For, MNOH is related to PRTN

Similarly, for VZDZ

So, VZDZ will be related to YDIF

Hence, the correct answer is "Option 3".

Q96. Answer: (d) 2

The logic followed here is:

‘REPS’ is coded as ‘7531’

R	E	P	S
7	5	3	1

'EARS' is coded as '3217'

E	A	R	S
3	2	1	7

the second letter A corresponds to the second digit 2.

So, 2 is the code for 'A' in the given code language.

Hence, the correct answer is 'Option 4'.

Q97. Answer: (c) 10 m towards the west

Given:

Joe walks east for 60 m from his house.

He then takes a left turn and walks for 20 m, turns left and walks for 80 m.

He then turns left and walks for 30 m, turns left and walks for 30 m.

He takes a final left turn and walks for 10 m and stops.

So, He should move 10 m towards the west in order to reach his house

Hence, the correct answer is "Option 3".

Q98. Answer: (c) 21

Given numbers: 85624179

If 1 is added to each even digit of the number, we get

Transformed digits: 9, 5, 7, 3, 5, 1, 7, 9

Arrange these in ascending order (left to right)

Sorted: 1, 3, 5, 5, 7, 7, 9, 9

Second from the left = 3

Third from the right = 7

Product = 3 × 7 = 21

Hence, the correct answer is 'Option 3'.

Q99. Answer: (d) 15

BODMAS Table:

Given equation: 22 ÷ 85 × 5 + 12 − 2 = ?

Now, if '+' and '-' and '×' and '÷' are interchanged, then:

=> 22 + 85 ÷ 5 − 12 × 2 = ?

=> 22 + 17 − 24 = ?

=> 39 − 24 = 15

Hence, the correct answer is "Option 4".

Q100. Answer: (a) R

Given: Seven boxes V, W, X, Y, Z, Q and R are kept one over the other but not necessarily in the same order.

1) Only Y is kept above Z.

2) Only two boxes are kept between Z and Q.

3) Only V is kept below W.

4) X is not kept immediately above Q.

Y
Z
X
R
Q

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W
V

So, 'R' is kept fourth from the top.

Hence, the correct answer is "Option 1".

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