RRB NTPC (Graduate) CBT-I Official Paper (Held On: 25 Mar, 2026 Shift 3) (Previous Year Paper)

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

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Q1. If a + 1/a = 3, then find the value of a^6 + 1/(a^6)

(a) 324
(b) 323
(c) 322
(d) 321

Q2. Consider the following statements.

1. Before the Prime Minister enters upon his office, the President administers to him the oaths of office and secrecy.
2. The President can dismiss the Prime Minister at any time in an arbitrary way.
3. If the Prime Minister loses the confidence of the Lok Sabha, he must resign or the President can dismiss him.

Which of the above statements is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 1 and 3 only
(d) 2 and 3 only

Q3. Find the value of y, satisfying 22 × 3 × 816 ÷ √ 2601 = y + 794

(a) 256
(b) 258
(c) 270
(d) 262

Q4. 100 men have provisions for 27 days. If 50 men have left, for how many days the same provisions would last for the remaining men?

(a) 56
(b) 54
(c) 58
(d) 52

Q5. A shopkeeper professes to sell his goods at a 45% loss but uses a false balance and gains 50%. The actual weight (rounded off to one decimal place) that he uses instead of 1 kg is:

(a) 368.6 gm
(b) 366.7 gm
(c) 369.3 gm
(d) 365.2 gm

Q6. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

TWU 89 YBZ 81 DGE 73 ILJ 65 ?

(a) NPN 56
(b) NRN 57
(c) NQO 57

(d) NQU 56

Q7. Which of the following best describes the Mahar Movement in Maharashtra?

(a) A socio-political movement for Dalit rights and social equality
(b) A tribal uprising against British forest laws
(c) A religious reform movement aimed at purifying Hindu rituals
(d) A peasant movement against zamindari exploitation

Q8. Where did the Pune Book Festival 2025 take place?

(a) Fergusson College Grounds
(b) Shaniwar Wada
(c) Symbiosis Auditorium
(d) Savitribai Phule University

Q9. How many main approaches are there to human development?

(a) Six: income, welfare, basic needs, capabilities, rights-based, participatory approaches
(b) Five: income, welfare, capabilities, rights-based, and sustainability approaches
(c) Three: income, welfare, and capability approaches
(d) Four: income, welfare, minimum needs, and capabilities approaches

Q10. Which of the following is an example of application software that depends entirely on system software to function?

(a) Microsoft Word
(b) BIOS
(c) Ubuntu
(d) Linux Kernel

Q11. Find the value of m, satisfying equation:

$(28/9)^{11} \times (9/28)^{(16)} \times (28/9)^{(17)} = (9/28)^{(2m + 8)}$

(a) -9
(b) -26
(c) -10
(d) 1

Q12. Choose the correct statement regarding the process of photosynthesis in plants.

(a) It occurs in the mitochondria of plant cells.
(b) It converts light energy into chemical energy.
(c) It involves the breakdown of glucose to produce energy.
(d) It primarily takes place during the night to conserve water.

Q13. Which Harappan city, flourishing around 2500 BCE, is especially known for its Great Bath and advanced grid-pattern streets?

(a) Dholavira
(b) Mohenjodaro
(c) Kalibangan
(d) Lothal

Q14. Which material was mainly used for making beads and seals in Harappan civilization?

(a) Terracotta
(b) Gold
(c) Steatite
(d) Ivory

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Q15. Seven people B, C, O, P, Q, R and S are sitting around a circular table facing the center of the table. Only one person sits between P and R when counted from the right of R. P sits third to the left of S.O sits third to the left of B. C is an immediate neighbor of both R and S. How many people sit between Q and C when counted from the right of Q?

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

Q16. C, D, N, O, P and Q live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on, till the topmost floor, which is numbered 6. No one lives above D. Only two people live between D and C. Only two people live between O and Q. Q lives below C but above N. How many people live between P and N?

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

Q17. The total surface area of a solid hemisphere is 200 cm^2. Its radius (in cm) is:

(Use $\pi = 22/7$)

(a) $x = (-b \pm \sqrt{(b^2-4ac)})/2a$
[Figure: see this question online]
[Figure: see this question online]
$\sqrt{(710/33)}$
(b) $\sqrt{(703/33)}$
(c) $\sqrt{(692/33)}$
(d) $\sqrt{(700/33)}$

Q18. According to the Ministry of Commerce and Industry, Government of India, which of the following states was the major groundnut exporting state of India in 2020-2021?

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

Q19. Which of the following Acts provides statutory status to Lok Adalats in India?

(a) The Indian Constitution
(b) The Legal Services Authorities Act, 1987
(c) The Arbitration and Conciliation Act, 1996
(d) The Civil Procedure Code, 1908

Q20. In a certain code language,

A + B means ‘A is the daughter of B’

A – B means ‘A is the brother of B’

A x B means ‘A is the wife of B’

A ÷ B means ‘A is the father of B’

Based on the above, how is D related to J if ‘D – F + G ÷ H x J’?

(a) Father
(b) Brother
(c) Wife's father
(d) Wife's brother

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Q21. Under the Merchandise Exports from India Scheme (MEIS), exporters are rewarded in the form of:

(a) Equity shares in export-oriented units
(b) Non-transferable cash vouchers
(c) Export tax rebates that expire on use
(d) Freely transferable Duty Credit Scrips

Q22. Sharad is two times as old as his younger brother, and his other brother is 3 years younger than the younger brother. If the sum of the ages of these three brothers 3 years ago was 28 years, find Sharad's present age, in years.

(a) 18
(b) 26
(c) 20
(d) 22

Q23. What do you mean by .wma file on the computer?

(a) Wired Media Audio format
(b) Windows Media Audio format
(c) Wireless Media Audio format
(d) WiFi Media Audio format

Q24. If 3A = 4B = 8C, what is A : B : C?

(a) 8 : 6 : 3
(b) 6 : 3 : 8
(c) 6 : 8 : 3
(d) 8 : 4 : 3

Q25. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of :: ?

: NRL :: GKE : %

(a) = MKN % = EMK
(b) = PTN % = EIC
(c) = LTN % = EMK
(d) = IUN % = EMJ

Q26. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

14, 69

18, 89

(a) 21, 109
(b) 22, 108
(c) 21, 108
(d) 22, 109

Q27. Hans Geiger and Ernest Marsden performed the famous α–particle scattering experiment under the supervision of _____.

(a) William Henry
(b) Niels Bohr
(c) John Dalton
(d) Ernest Rutherford

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Q28. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) JNT
(b) WAF
(c) LPU
(d) DHM

Q29. The monthly incomes of two friends Vipul and Vijay, are in the ratio 6 : 7 respectively and each of them saves Rs. 66,000 every month. If the ratio of their monthly expenditure is 1 : 3, find the monthly income of Vipul (in Rs.).

(a) 73,000
(b) 72,000
(c) 71,000
(d) 1,00,800

Q30. According to the Constitution (One Hundred and Sixth Amendment) Act, 2023, what proportion of seats to be filled by direct election in the House of the People (Lok Sabha) is to be reserved for women?

(a) One-quarter of the seats
(b) One-third of the seats
(c) One-half of the seats
(d) Two-thirds of the seats

Q31. What is the process by which plants make their food using sunlight?

(a) Respiration
(b) Photosynthesis
(c) Transpiration
(d) Fermentation

Q32. Which Classical Language underwent significant scriptural evolution from Grantha, Vatteluttu, Kolezhuthu, and finally to its current script used in modern writing?

(a) Odia
(b) Malayalam
(c) Tamil
(d) Kannada

Q33. The following frequency table gives the marks obtained by 48 students in a class test.

Marks	Frequency
7	12
8	13
9	12
10	11

With reference to the frequency table, match the following statements: (Values are rounded off to three decimal places.

	Column P		Column Q
i.	The mean of the distribution	1.	8.485
ii.	The standard deviation of the distribution	2.	1.207
iii.	The variance of the distribution	3.	1.099

(a) i - 2, ii - 3 and iii - 1
(b) i - 1, ii - 3 and iii - 2

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(c) i - 1, ii - 2 and iii - 3
(d) i - 3, ii - 1 and iii - 2

Q34. Which of the following Articles was inserted into the Directive Principles of State Policy of the Indian Constitution by the Constitution (Ninety-seventh Amendment) Act of 2011?
(a) Article 43B - Promotion of co-operative societies
(b) Article 43A - Participation of workers in management of industries
(c) Article 48A - Protection and improvement of environment and safeguarding of forests and wild life
(d) Article 39A - Equal justice and free legal aid

Q35. Which among the following changes were made in the Indian Constitution by the 42nd Constitutional Amendment Act ?
(a) Increased Lok Sabha seats from 525 to 545.
(b) Introduction of Fundamental Duties under Article 51A.
(c) Nationalization of Land Ceiling Laws.
(d) Inserted Right to Privacy in the Article 21 of Indian Constitution.

Q36. Trisha and Riya started a partnership business, investing some amount in the ratio of 8 : 5. Poorva joined then after six months with an amount equal to that of Riya. In what ratio should the profit at the end of one year be distributed among Trisha, Riya and Poorva?
(a) 17 : 7 : 3
(b) 15 : 5 : 2
(c) 16 : 10 : 5
(d) 19 : 15 : 8

Q37. Which of the following instruments is used to measure the intensity of earthquakes?
(a) Tiltmeter
(b) Seismograph
(c) Anemometer
(d) Barometer

Q38. A, B, C, D, E, F and G sit around a circular table, facing the centre.

Only two people sit between F and B when counted from the left of B. G sits third to the left of E. A sits to the immediate right of E. A sits second to the left of F. D is an immediate neighbour of G.

How many people sit between A and G when counted from the right of G?
(a) 4
(b) 2
(c) 3
(d) 1

Q39. A ladder 28 meters long leans against a wall, making an angle of 60° with the ground. Find the height at which the ladder touches the wall. (Use √3 = 1.74)
(a) 21.5 m
(b) 22.65 m
(c) 24.36 m
(d) 23.8 m

Q40. Find the average value of the first 350 positive multiples of 7.
(a) 1254.5
(b) 1326.5
(c) 1228.5
(d) 1416.5

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Q41. In which of the following present-day places did Jyotiba Phule founded the Satyashodhak Samaj in 1873?

(a) Satara
(b) Nashik
(c) Nagpur
(d) Pune

Q42. Who authored 'The Indian War of Independence 1857'?

(a) Jawaharlal Nehru
(b) Vinayak Damodar Savarkar
(c) Bal Gangadhar Tilak
(d) Mahatma Gandhi

Q43. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) BX−VU
(b) CY−XT
(c) UQ−PL
(d) VR−QM

Q44. Rahul walks a distance of 6 km towards North, then turns to his left and walks for 3 km. He again turns left and walks for 6 km.

At this point, he turns to his left and walks for 6 km. How far is he from his starting point? (All turns are 90-degree turns only, unless specified.)

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

Q45. 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 its constituent digits. E.g. 13 – Operations on 13 such as adding / subtracting / multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(19, 24, 7)

(12, 14, 5)

(a) (3, 4, 1)
(b) (12, 5, 4)
(c) (7, 5, 3)
(d) (12, 5, 3)

Q46. There are 69 members in group A, 65 members in group B and 88 members in group C. All the members of these groups went to a restaurant. The average amounts spent on each member of groups A, B and C are Rs. 468, Rs. 120 and Rs. 276, respectively. The overall average amount (in Rs.) spent per member is:

(a) 294
(b) 288
(c) 290
(d) 286

Q47. If the mean proportional between x and 36 is 18, what is the value of x?

(a) 6
(b) 18
(c) 9
(d) 12

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Q48. Simplify:

$((555 + 444)^2 + (555 - 444)^2)/(555 \times 555 + 444 \times 444)$.

(a) 1000
(b) 2
(c) 111
(d) 999

Q49. At what rate per annum will a sum of money become five times itself in 4 years under simple interest?

(a) 200%
(b) 102%
(c) 100%
(d) 98%

Q50. Who among the following became the first female President of Namibia in March 2025?

(a) Saara Kuugongelwa
(b) Ellen Johnson Sirleaf
(c) Joyce Banda
(d) Netumbo Nandi-Ndaitwah

Q51. A shopkeeper purchased 48 dozens of articles at the rate of Rs. 300 per dozen. He sold each one of them at the rate of Rs. 90. What percentage profit did he make?

(a) 260%
(b) 257%
(c) 259%
(d) 262%

Q52. If the mean of the following data is 35, find the value of X.

Class	10-20	20-30	30-40	40-50	50-60
Frequency	15	21	43	41	X

(a) 11
(b) 14
(c) 8
(d) 5

Q53. What major climate agreement was discussed during the United Nations Climate Change Conference in November 2025?

(a) Glasgow Pact
(b) Montreal Accord
(c) Paris Agreement
(d) Kyoto Protocol

Q54. The sum of all interior angles in a trapezium is _____.

(a) 540°
(b) 360°
(c) 240°
(d) 180°

Q55. 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 horses are donkeys. Some cats are monkeys. All monkeys are donkeys.

Conclusions:

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(I) All cats are donkeys.

(II) Some horses are monkeys.

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

Q56. Which of the following Indian regions shows least contribution to the formal tertiary sector despite large population and urban centers?

(a) Northern India
(b) Northeastern India
(c) Western India
(d) Southern India

Q57. In a certain code language, 'SEMI' is coded as '3615' and 'TIME' is coded as '1523'. What is the code for 'T' in the given code language?

(a) 2
(b) 5
(c) 3
(d) 1

Q58. This question is based on the five, three-digit numbers given below.

(Left) 351 417 211 159 294 (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 second digit of the highest number is added to the third digit of lowest number ?

(a) 11
(b) 10
(c) 15
(d) 13

Q59. Which Act introduced uniform reporting standards for banks to the Reserve Bank of India in 2025?

(a) The Reserve Bank of India Act, 1934
(b) The State Bank of India Act, 1955
(c) The Banking Laws (Amendment) Act, 2025
(d) The Banking Regulation Act, 1949

Q60. Which 17th-century CE monument in Agra, built by Shah Jahan, is a UNESCO World Heritage Site?

(a) Jama Masjid
(b) Safdarjung Tomb
(c) Taj Mahal
(d) Sikandra Tomb

Q61. A shopkeeper fixes the marked price of an item 160% above its cost price. What percentage of discount on marked price should be allowed to gain 30%?

(a) 49%
(b) 48%
(c) 50%
(d) 47%

Q62. If A's salary is 113% more than that of B, then by how much percent is B's salary less than that of A (correct to 2 decimal places)?

(a) 53.05%
(b) 50.45%
(c) 55.15%

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(d) 51.35%

Q63. Which Indian Prime Minister among the following was never the Chief Minister of any state of India?

(a) Morarji Desai
(b) Chandrashekhar
(c) VP Singh
(d) PV Narasimha Rao

Q64. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(37, 1361, 8)

(47, 2185, 24)

(a) (50, 2475, 24)
(b) (4, 10, 5)
(c) (12, 141, 3)
(d) (29, 829, 11)

Q65. Two numbers have an HCF of 12 and an LCM of 840. If one of the numbers is 84, then find the other number.

(a) 168
(b) 840
(c) 120
(d) 368

Q66. What should come in place of '?' in the given series?

10 14 22 34 50 ?

(a) 70
(b) 59
(c) 58
(d) 55

Q67. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. You have to decide which conclusion/s logically follow/s from the given statements.

Statements:

All malls are halls. All halls are walls. No mall is a fall.

Conclusions:

(I) No hall is a fall.

(II) No wall is a fall.

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

Q68. Which of the given letter-number clusters will replace the question mark (?) in the following series to make it logically complete?

GHB 10 NOI 9 UVP 8 BCW 7 ?

(a) KLW 5
(b) MNE 16
(c) IJD 6
(d) KDY 5

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Q69. In this question, a question is followed by two statements numbered (I) and (II). You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and decide the appropriate answer.

Question:

Among 5 trees, L, M, N, T and V each having a different height, which tree is the tallest?

Statements:

(I) M is shorter than T but taller than L.

(II) L is taller than V but shorter than N.

(a) Data in Statement II alone is sufficient to answer the question while data in statement I is not
(b) Both statements I and II together are NOT sufficient to answer the question
(c) Both statements I and II together (and not statement 1 alone or statement II alone) are sufficient to answer the question
(d) Data in Statement I alone is sufficient to answer the question while data in statement II is not

Q70. Select the pair which follows the same pattern as that followed by the two set of pairs given below. Both pairs follow the same pattern.

FKM:IMN

BAL:ECM

(a) OSH:PUI
(b) OME:ROF
(c) IKE:KMF
(d) RTP:SUQ

Q71. Which of the following scholars introduced the concept of human development?

(a) Alexander Von Humboldt
(b) Mahbub-ul-Haq
(c) Amartya Sen
(d) Griffith Taylor

Q72. Which of the following best describes the tendency of undisturbed objects to remain at rest or to keep moving with the same velocity?

(a) Acceleration
(b) Momentum
(c) Force
(d) Inertia

Q73. What does the crude birth rate (CBR) measure in demographic studies?

(a) Net rural to urban migration
(b) Number of live births per thousand annually
(c) Ratio of deaths per hundred population
(d) Share of employed women in workforce

Q74. Which of the following three river systems are primarily responsible for the formation of the Northern Plains of India?

(a) Mahanadi, Ganga, Brahmaputra
(b) Krishna, Godavari, Yamuna
(c) Indus, Ganga, Brahmaputra
(d) Narmada, Tapti, Kaveri

Q75. Which treaty was signed on 17 July 2025 between the United Kingdom and Germany, marking their first bilateral treaty since the Second World War?

(a) Kensington Treaty
(b) Lancaster House 2.0
(c) Northwood Declaration
(d) Maastricht Treaty

Q76. DMKZ is related to EKNV in a certain way based on the English alphabetical order. In the same way, LOJT is related to MMMP. To which of the following is SRLQ related, following the same logic?

(a) TTNP
(b) TPIU
(c) TPOM
(d) TONL

Q77. According to the 2025 Human Development Report, what was India's Human Development Index (HDI) value for the year 2023?

(a) 0.676
(b) 0.683
(c) 0.672
(d) 0.685

Q78. Select the INCORRECT statement about the polices of Jalaluddin Khalji.

(a) He avoided harsh punishments, even to those who revolted against him.
(b) He put forward the view that the state should never be based on the willing support of the governed.
(c) He tried to win the goodwill of the nobility by a policy of tolerance.
(d) He not only forgave those who revolted against him but at times even rewarded them to win their support.

Q79. Which characteristic of computers enables them to perform various tasks such as calculations, graphics, and communication?

(a) Versatility
(b) Automation
(c) Speed
(d) Accuracy

Q80. If 1 is added to each odd digit and 1 is subtracted from each even digit in the number 48572613, what will be the product of the greatest and smallest digit in the new number thus formed?

(a) 9
(b) 8
(c) 0
(d) 18

Q81. Two trains are running with the speed of 49 km/hr and 59 km/hr towards each other on parallel tracks. Their lengths are 349 m and 371 m, respectively. In how much time (in seconds) will they completely pass each other?

(a) 42
(b) 30
(c) 34
(d) 24

Q82. Which landform is formed when a glacier erodes a pre-existing river valley by widening, deepening, and smoothing it?

(a) Floodplain
(b) Gorge
(c) V-shaped valley
(d) U-shaped valley

Q83. Who is the author of the memoir 'Mother Mary Comes to Me' released in September 2025?

(a) Jhumpa Lahiri
(b) Arundhati Roy
(c) Vikram Seth
(d) Chetan Bhagat

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Q84. 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?

12 A 4 B 6 C 8 D 2 = ?

(a) 22
(b) 24
(c) 23
(d) 25

Q85. A boat covers a certain distance downstream in 6 hours and takes 8 hours to return upstream to the starting point. If the speed of the stream is 4 km/h, find the speed of the boat in still water.

(a) 28 km/hr
(b) 18 km/hr
(c) 12 km/hr
(d) 24 km/hr

Q86. Refer to the following letter, number, symbol series and answer the question. Counting to be done from left to right only. (All numbers are single digit numbers only)

(Left) G & R E 5 K % 7 @ 2 S & 6 C T # 3 4 Y * D (Right)

How many such symbols are there which are immediately preceded by a letter and also immediately followed by a number?

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

Q87. A manufacturer is making conical paper cups of height 24 cm and radius 7 cm. How much paper (in m^2 correct up to 2 decimal places) is needed to make 1000 such cups?

(Take $\pi = 3.14$)

(a) 80.34 m^2
(b) 71.34 m^2
(c) 54.95 m^2
(d) 70.34 m^2

Q88. For equation $(2m-3)x^2 + (m+1)x + 5 = 0$ to represent a quadratic equation, which of the following must be definitely true?

(a) $m = -1$
(b) $m \neq 3/2$
(c) $m \neq 2$
(d) $m = (-3)/2$

Q89. Two tangents, AB and AC, are drawn on a circle from an external point A, which is 6 cm away from its centre O. If the radius of the circle is 3 cm, then what is the measure of angle OBC?

(a) 60°
(b) 120°
(c) 30°
(d) 100°

Q90. In a certain code language,

A + B means ‘A is the mother of B’

A – B means ‘A is the brother of B’

A x B means ‘A is the wife of B’

A % B means ‘A is the father of B’

A # B means ‘A is the daughter of B’

Based on the above, how is D related to E if ‘D x N % P + K # E’?

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(a) Daughter's husband
(b) Daughter's daughter
(c) Wife's father
(d) Wife's mother

Q91. This question is based on the five, three-digit numbers given below.

(Left) 187 167 173 257 199 (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 second digit of the second highest number is added to the third digit of the second lowest number?

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

Q92. Gopal has Rs. 1394 with him. He divides this amount between his two sons, Akshay and Arjun, and asks them to invest their respective shares at a compound interest rate of 5% per annum, compounded annually. It is observed that Akshay's investment amounts to the same value after 16 years as Arjun's investment does after 17 years. How much (in Rs.) did Gopal give to Arjun?

(a) 530
(b) 814
(c) 714
(d) 680

Q93. In a certain code language, 'CARD' is coded as '6135' and 'DRAW' is coded as '1765'. What is the code for 'W' in that language?

(a) 5
(b) 1
(c) 6
(d) 7

Q94. What should come in place of the question mark (?) in the given series?

65 40 24 15 11 ?

(a) 9
(b) 10
(c) 6
(d) 12

Q95. Each of A, B, C, D, E and F visited the same shopping mall on a different day of a week starting from Monday and ending on Saturday of the same week. D visited the mall on Tuesday. Only two people visited the mall between B and D. C visited the mall immediately before F. A didn't visit the mall on a Saturday. Who visited the mall on Wednesday?

(a) F
(b) A
(c) C
(d) E

Q96. Which of the following officials in the Mauryan administration was primarily responsible for supervising state agriculture and cultivation on crown lands?

(a) Aksapataladhyaksha
(b) Sitadhyaksha
(c) Panyadhyaksha
(d) Samaharta

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Q97. Which launch vehicle was announced in 2025 as having been built entirely by the private sector for the first time in India and was set to place the Oceansat satellite into orbit?

(a) Launch Vehicle Mark-3 (LVM3)
(b) Polar Satellite Launch Vehicle (PSLV)
(c) Geosynchronous Satellite Launch Vehicle (GSLV)
(d) Small Satellite Launch Vehicle (SSLV)

Q98. Each of F, G, H, I, M, N and O has an exam on a different day of a week starting from Monday and ending on Sunday of the same week.

G has exam on Thursday, and H has exam on Saturday. N has exam immediately before F. M has exam on one of the days after I. O has exam immediately after F.

How many people have exams between M and O?

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

Q99. Why is RAM called “Random Access”?

(a) Data is permanently stored
(b) Data is stored randomly without structure
(c) Data can be accessed directly from any location
(d) Data can only be accessed sequentially

Q100. If 9 students can prepare 117 charts in 3 hours, how many students are needed to prepare 208 charts in 1 hour?

(a) 48 students
(b) 45 students
(c) 46 students
(d) 42 students

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) 322

Shortcut Trick

Given: a + 1/a = 3

Shortcut: Use the identity: a^6 + 1/a^6 = $(a^2 + 1/a^2)^3 - 3(a^2 + 1/a^2)$.

First, $a^2 + 1/a^2 = (a + 1/a)^2 - 2 = 3^2 - 2 = 7$.

Now, a^6 + 1/a^6 = $7^3 - 3(7) = 343 - 21 = 322$.

Therefore Answer = 322

Alternate Method

Given:

$a + 1/a = 3$

Formula used:

$a^6 + 1/a^6 = (a^2 + 1/a^2)^3 - 3(a^2 + 1/a^2)$

Calculations:

Step 1: $a^2 + 1/a^2 = (a + 1/a)^2 - 2$

$\Rightarrow a^2 + 1/a^2 = 3^2 - 2 = 9 - 2 = 7$

Step 2: $a^6 + 1/a^6 = (a^2 + 1/a^2)^3 - 3(a^2 + 1/a^2)$

$\Rightarrow a^6 + 1/a^6 = 7^3 - 3(7) = 343 - 21 = 322$

Therefore The correct answer is 322.

Additional Information

Formula for Higher Powers

For any n, $a^n + 1/a^n$ can be derived using lower powers and substitution.

Key Identity Used

$a^6 + 1/a^6 = (a^2 + 1/a^2)^3 - 3(a^2 + 1/a^2)$.

Shortcut for $a^2 + 1/a^2$

$a^2 + 1/a^2 = (a + 1/a)^2 - 2$ — useful for intermediate steps.

Q2. Answer: (c) 1 and 3 only

The correct answer is 1 and 3 only.

Key Points

• Before the Prime Minister enters upon his office, the President administers to him the oaths of office and secrecy. In his oath of office, the Prime Minister swears to bear true faith and allegiance to the Constitution of India, to uphold the sovereignty and integrity of India, and to faithfully discharge the duties of his office. In his oath of secrecy, he swears that he will not directly or indirectly communicate or reveal any matter that is brought under his consideration. Hence, statement 1 is correct.

• The President can dismiss the Prime Minister at any time in an arbitrary way. This is a misunderstanding of the constitutional provision. Although Article 75 states that the Prime Minister shall hold office during the pleasure of the President, this pleasure is not arbitrary. So long as the Prime Minister enjoys the majority support in the Lok Sabha (the Lower House of Parliament), the President cannot dismiss him. Hence, statement 2 is incorrect.

• If the Prime Minister loses the confidence of the Lok Sabha, he must resign or the President can dismiss him. This is based on the principle of Collective Responsibility mentioned in Article 75 of the Constitution of India. If a No-Confidence Motion is passed against the government in the Lok Sabha, the entire Council of Ministers, including the Prime Minister, must resign. If they fail to do so, the President has the constitutional power to dismiss the government. Hence, statement 3 is correct.

• The Prime Minister is the real executive authority (de facto executive) while the President is the nominal executive authority (de jure executive). The Prime Minister acts as the head of the Union Council of Ministers.

Additional Information

• Constitutional Provisions:

• Article 74: There shall be a Council of Ministers with the Prime Minister at the head to aid and advise the President who shall, in the exercise of his functions, act in accordance with such advice.

• Article 75: The Prime Minister shall be appointed by the President and the other Ministers shall be appointed by the President on the advice of the Prime Minister.

• Article 78: It defines the duties of the Prime Minister in respect of the furnishing of information to the President, including communicating all decisions of the Council of Ministers relating to the administration of the affairs of the Union.

• Eligibility and Appointment:

• To become the Prime Minister of India, a person must be a citizen of India and a member of either the Lok Sabha or the Rajya Sabha.

• If the person is a member of the Lok Sabha, the minimum age should be 25 years, and if he/she is a member of the Rajya Sabha, the age should be 30 years.

• A person who is not a member of either House of Parliament can also be appointed as Prime Minister for 6 months, within which he/she must get elected to either House.

• Powers and Functions:

• The Prime Minister allocates and reshuffles various portfolios among the Ministers.

• He presides over the meeting of the Council of Ministers and influences its decisions.

• He is the principal channel of communication between the President and the Council of Ministers.

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• He advises the President with regard to the appointment of important officials like the Attorney General of India, Comptroller and Auditor General of India (CAG), and Chairmen of the UPSC.

Important Points

• Term of Office: The term of the Prime Minister is not fixed by the Constitution. He holds office as long as he enjoys the support of the majority in the Lok Sabha. Generally, this coincides with the life of the Lok Sabha, which is 5 years.

• Ex-officio Positions: The Prime Minister is the Chairman of the NITI Aayog (which replaced the Planning Commission on January 1, 2015), the National Development Council, the National Integration Council, the Inter-State Council, and the National Water Resources Council.

• Historical Context: Jawaharlal Nehru was the first Prime Minister of India, serving from 1947 to 1964. Gulzarilal Nanda was the first Acting Prime Minister. Indira Gandhi was the first woman Prime Minister.

• Salary and Allowances: The salary and allowances of the Prime Minister are determined by the Parliament from time to time. He receives the same salary and allowances as are payable to a Member of Parliament, plus a sumptuary allowance and other perks.

Q3. Answer: (d) 262

Shortcut Trick

=> √2601 = 51

=> 816 ÷ 51 = 16

=> 22 × 3 × 16 = 22 × 48 = 1056

=> y = 1056 − 794 = 262

Therefore Answer = 262

Alternate Method

Given:

22 × 3 × 816 ÷ √2601 = y + 794

Concept Used:

BODMAS rule

Calculation:

=> 22 × 3 × 816 ÷ 51 = y + 794

=> 22 × 3 × 16 = y + 794

=> 22 × 48 = y + 794

=> 1056 = y + 794

=> y = 1056 − 794

=> y = 262

Therefore The correct answer is 262.

Additional Information

Perfect Square: √2601 = 51, useful for fast simplification.

BODMAS Rule: Follow correct order: division and multiplication before addition.

Cancellation: 816 ÷ 51 simplifies early to reduce calculation load.

Linear Equation: Solve y + constant = value by shifting constant to RHS.

Q4. Answer: (b) 54

Shortcut Trick

=> Total food = 100 × 27 = 2700 man-days

=> Remaining men = 50

=> Days = 2700 ÷ 50 = 54

Therefore Answer = 54 days

Alternate Method

Given:

100 men → 27 days

50 men → ? days

Concept Used:

Men × Days = Constant (Total work/food)

Calculation:

=> 100 × 27 = 50 × x

=> 2700 = 50x
=> x = 2700 ÷ 50
=> x = 54
Therefore The correct answer is 54 days.
Additional Information
Man-Days Concept: Total work = Men × Days remains constant.
Inverse Proportion: More men → fewer days, fewer men → more days.
LCM Method: Assume total work as LCM for faster calculation in exams.
Shortcut Tip: Directly divide total man-days by remaining men.

Q5. Answer: (b) 366.7 gm

Shortcut Trick
=> Assume CP of 1 kg = 100
=> 45% loss => SP = 55
=> Overall gain = 50% => Effective SP = 150
=> So, 55 price is actually for weight = 55/150 kg
=> = 0.3667 kg = 366.7 gm
Therefore Answer = 366.7 gm
Alternate Method
Given:
Loss = 45%
Gain due to false weight = 50%
Concept Used:
Net gain when false weight is used
Calculation:
=> Assume CP of 1 kg = 100
=> Due to 45% loss, SP of 1 kg = 55
=> Let actual weight given = x kg
=> CP of x kg = 100x
=> Profit % = 50%
=> SP = 1.5 × CP = 1.5 × 100x = 150x
=> But SP = 55
=> 150x = 55
=> x = 55 ÷ 150
=> = 0.3667 kg = 366.7 gm
Therefore The correct answer is 366.7 gm
Additional Information
False Weight Trick: Profit % = (SP − CP)/CP × 100
Shortcut Formula: Actual weight = (Apparent SP)/(Real SP after profit)
Common Trap: Loss shown is fake; actual profit comes from less quantity.
Exam Tip: Always assume CP = 100 for easier percentage calculations.

Q6. Answer: (c) NQO 57

The logic followed here is:
So, 'NQO 57' will replace the question mark in the given series.
Hence, the correct answer is "Option 3".

Q7. Answer: (a) A socio-political movement for Dalit rights and social equality

The correct answer is A socio-political movement for Dalit rights and social equality.
Key Points
• The Mahar Movement was a significant organized struggle in Maharashtra primarily led by Dr. B.R. Ambedkar in the early 20th century. It was fundamentally a socio-political movement aimed at achieving human rights, social equality, and the destruction of the caste system. Hence, the first statement is correct.

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• A landmark event of this movement was the Mahad Satyagraha on March 20, 1927, where Dr. Ambedkar led the Mahar community to drink water from the Chardar Tank in Mahad, asserting their right to use public water resources.

• The movement also involved the symbolic burning of the Manusmriti in December 1927, representing a rejection of ancient texts that justified untouchability and social discrimination.

• The movement was not just social but also political, as it demanded separate electorates for the Depressed Classes, which eventually led to the Poona Pact of 1932.

• Unlike tribal uprisings that fought against British forest laws or peasant movements against landlords, the Mahar movement focused on internal social reform and constitutional safeguards for the Dalit population. Hence, statements 2 and 4 are incorrect.

Additional Information

• Historical Context: The Mahars were a traditionally untouchable community in Maharashtra with a history of military service in the British Indian Army (notably the Mahar Regiment). This military background provided them with early exposure to education and discipline, fostering a sense of self-respect.

• Early Pioneers: Before Dr. Ambedkar, leaders like Gopal Baba Walangkar (who founded the Anarya Dosha-Parihar Mandali in 1888) and Shivram Janba Kamble initiated efforts to organize the community and demand government jobs.

• Satyashodhak Samaj: While Jyotirao Phule's Satyashodhak Samaj (founded in 1873) influenced the movement by critiquing Brahmanical hegemony, the Mahar movement under Ambedkar specifically transitioned from seeking Sanskritization (adopting upper-caste rituals) to radical political mobilization.

• Contrast with Other Movements:

• Tribal Movements: Examples include the Santhal Rebellion (1855) and Munda Uprising (1899), which were primarily anti-colonial and agrarian in nature.

• Peasant Movements: Examples include the Champaran Satyagraha (1917) or the Tebhaga Movement (1946), focusing on rent reduction and land rights.

• Religious Reform: Movements like the Arya Samaj aimed at purifying rituals, whereas the Mahar movement eventually moved away from Hinduism entirely.

Important Points

• Conversion to Buddhism: A major culmination of the movement occurred on October 14, 1956, at Deekshabhoomi in Nagpur, where Dr. B.R. Ambedkar along with nearly 365,000 followers converted to Buddhism (Navayana), seeking a religious identity free from the caste hierarchy.

• Education and Publication: The movement utilized journalism as a tool, with publications like Mooknayak (1920) and Bahishkrit Bharat (1927) playing a pivotal role in mass mobilization and public awareness.

• Impact on Modern India: The Mahar movement laid the foundation for Reservation Policy in the Indian Constitution and continues to influence the Dalit Panther movement and modern Ambedkarite politics in India.

Q8. Answer: (a) Fergusson College Grounds

The correct answer is Fergusson College Grounds.

Key Points

• The Pune Book Festival 2025 is organized at the Fergusson College Grounds, which is a prominent landmark located on Fergusson College Road (FC Road) in Pune, Maharashtra. This venue is historically significant and provides the vast open space required for such a large-scale literary gathering.

• The event is primarily organized by the National Book Trust (NBT), an autonomous organization under the Ministry of Education, Government of India, in collaboration with the Government of Maharashtra and the Pune Municipal Corporation (PMC).

• The main objective of the festival is to promote a reading culture and literature in various languages, including Marathi, Hindi, English, Sanskrit, and other regional Indian languages, aligning with the goals of the National Education Policy (NEP) 2020.

• The festival serves as a platform for thousands of publishers and booksellers to showcase millions of books, catering to all age groups, from children to senior citizens.

• The selection of Fergusson College as the venue is significant because the college itself is a symbol of the Renaissance in Western India and has been a hub for educational and cultural activities since its inception.

Additional Information

• National Book Trust (NBT), India:

• It was established in the year 1957 by the Government of India.

• The NBT works under the Department of Higher Education, Ministry of Education.

• Its primary mandate is to produce and encourage the production of good literature and to make such literature available at moderate prices to the public.

• Fergusson College:

• Founded in 1885 by the Deccan Education Society (DES).

• It was named after Sir James Fergusson, the then Governor of Bombay.

• Founding members included legendary figures such as Bal Gangadhar Tilak, Gopal Ganesh Agarkar, and Mahadev Ballal Namjoshi.

• Pune's Literary Heritage:

• Pune is widely recognized as the 'Cultural Capital of Maharashtra' and the 'Oxford of the East' due to its high density of educational institutions and literary history.

• The city hosts various other literary events like the Pune International Literary Festival (PILF) and several Marathi Sahitya Sammelans.

• Guinness World Records:

• During the 2023 edition of the Pune Book Festival, the city set a Guinness World Record for the 'Largest Reading Activity', where 3,066 parents read to their children simultaneously, surpassing the previous record held by China.

Important Points

• The Pune Book Festival typically includes a 'Bal Sahitya Melawa' (Children's Literature Festival) to engage young readers through storytelling, workshops, and interactive sessions.

• The venue, Fergusson College Grounds, allows for the setup of hundreds of stalls, separate stages for literary discussions, and dedicated zones for food and cultural performances.

• The festival reflects India's G20 Presidency themes of 'Vasudhaiva Kutumbakam' (The World is One Family) by showcasing books that promote global knowledge and Indian heritage.

• It also emphasizes digital literacy by featuring sections on e-books and digital libraries alongside traditional printed media.

Q9. Answer: (d) Four: income, welfare, minimum needs, and capabilities approaches

The correct answer is Four: income, welfare, minimum needs, and capabilities approaches.

Key Points

• The Income Approach is one of the oldest methods used to measure human development. It links the level of development directly to income, under the assumption that higher income reflects a higher level of human development and greater freedom. Hence, statement 1 is incorrect as it includes participatory and rights-based approaches which are not part of the four "main" traditional classifications.

• The Welfare Approach views human beings as beneficiaries or targets of all development activities. This approach argues for higher government expenditure on education, health, and other social sectors to improve the quality of life. Hence, statement 2 is incorrect.

• The Basic Needs Approach was initially proposed by the International Labour Organisation (ILO). It identifies six basic needs: health, education, food, water supply, sanitation, and housing. This approach ignores the question of human choices and focuses primarily on the provision of these necessities. Hence, statement 3 is incorrect.

• The Capability Approach is closely associated with the work of Prof. Amartya Sen, the Indian Nobel Laureate. It focuses on building human capabilities in the areas of health, education, and access to resources as the key to increasing human development. Hence, statement 4 is correct.

• Collectively, these four methods represent the primary framework through which human development has been historically analyzed and implemented by global organizations.

Additional Information

• Concept of Human Development: The concept was introduced by Dr. Mahbub ul Haq, a Pakistani economist, in 1990. He described it as development that enlarges people's choices and improves their lives.

• United Nations Development Programme (UNDP): Since 1990, the UNDP has published the Human Development Report (HDR) annually. This report provides the Human Development Index (HDI), which ranks countries based on their progress in key dimensions.

• Dimensions of HDI: The index is a composite statistic of life expectancy (Health), education (Mean years of schooling and Expected years of schooling), and per capita income (Standard of living) indicators.

• Amartya Sen’s Contribution: Prof. Amartya Sen emphasized that the objective of development is to increase freedom. He argued that the lack of capabilities (like illiteracy or poor health) limits the choices people can make, thereby hindering development.

• Global Trends: Modern reports, such as the 2023-24 HDR, now also consider factors like planetary pressures and inequality (IHDI) to provide a more holistic view of global progress.

Important Points

• Linguistic and Cultural Factors: While not part of the "four main approaches," factors like gender empowerment and political freedom are often measured through supplementary indices like the Gender Inequality Index (GII).

• Income vs. Capability: A crucial distinction in these approaches is that while the Income Approach focuses on what people have, the Capability Approach focuses on what people are capable of doing with what they have.

• Government Policy: The Welfare Approach is often the basis for Social Security programs and Universal Healthcare initiatives in many countries, including India.

• ILO Standards: The Basic Needs Approach remains relevant for developing nations striving to meet the Sustainable

Development Goals (SDGs) set by the United Nations for 2030.

Q10. Answer: (a) Microsoft Word

The correct answer is Microsoft Word.

Key Points

• Microsoft Word is a prime example of Application Software. This type of software is designed to perform specific tasks for the end-user, such as word processing, document creation, and formatting.

• Application software like Microsoft Word depends entirely on System Software (the Operating System) to function because it cannot interact directly with the computer's Hardware (such as the CPU, RAM, or Hard Drive). Hence, the option Microsoft Word is the correct answer.

• BIOS (Basic Input/Output System) is a type of Firmware and System Software that initializes hardware during the Booting process. It does not depend on other system software to start; rather, it is the first software to run when a computer is powered on. Hence, the statement regarding BIOS as an application software is incorrect.

• Ubuntu is a popular Linux-based Operating System. It is categorized as System Software because its primary function is to manage computer resources and provide a platform for application programs. Hence, the statement regarding Ubuntu being an application software is incorrect.

• The Linux Kernel is the core component of the Linux Operating System. It acts as a bridge between Software and Hardware. It is the most fundamental part of System Software and manages low-level tasks like Memory Management and Process Scheduling. Hence, the statement regarding Linux Kernel being an application software is incorrect.

Additional Information

• Application Software:

• These are programs developed to assist users in performing specific personal, educational, or business tasks.

• Functions: Includes Data Manipulation, Image Editing, Web Browsing, and Communication.

• Examples: Google Chrome (Web Browser), Adobe Photoshop (Graphics Editor), VLC Media Player, and Microsoft Excel (Spreadsheet).

• Characteristics: They are usually written in High-Level Languages like Java, C++, or Python and require an Operating System to execute their instructions.

• System Software:

• This software acts as an interface between the user, the application software, and the computer's hardware.

• Categories: It includes Operating Systems (like Windows 11, macOS, and Android), Language Translators (Compilers and Interpreters), and Device Drivers.

• Utility Software: A sub-category of system software used for maintenance, such as Antivirus software, Disk Defragmenters, and Compression tools (like WinZip).

Important Points

• Dependency Layer: In a computing environment, the hierarchy of operation starts with the Hardware at the bottom, followed by the System Software (OS), then the Application Software, and finally the User at the top.

• Interaction: When a user types a character in Microsoft Word, the application sends a request to the Operating System, which then instructs the Hardware (Keyboard and Monitor) to process and display the input.

• Installation: System Software is typically installed when the computer is set up, whereas Application Software is installed by the user based on their specific needs.

• Execution: System Software starts running as soon as the computer is turned on and stays active until the system is shut down, whereas Application Software only runs when triggered by the user.

Q11. Answer: (c) -10

Shortcut Trick

=> Convert everything into same base: (28/9) and (9/28)

=> (9/28) = (28/9)^(−1)

=> Total power of (28/9) = 11 + 17 − 16 = 12

=> RHS: (9/28)^(2m+8) = (28/9)^(−(2m+8))

=> 12 = −(2m + 8) => 2m = −20 => m = −10

Therefore Answer = −10

Alternate Method

Given:

$(28/9)^{11} \times (9/28)^{(16)} \times (28/9)^{(17)} = (9/28)^{(2m + 8)}$

Concept Used:

Laws of exponents

Calculation:

=> (9/28)^(16) = (28/9)^(−16)

=> LHS = $(28/9)^{11}$ × (28/9)^(−16) × (28/9)^(17)

=> = (28/9)^(11 − 16 + 17)

=> = $(28/9)^{12}$

=> RHS = (9/28)^(2m+8) = (28/9)^(−(2m+8))

=> $(28/9)^{12}$ = (28/9)^(−(2m+8))

=> 12 = −(2m + 8)

=> 12 = −2m − 8

=> 2m = −20

=> m = −10

Therefore The correct answer is −10.

Additional Information

Exponent Rule: a^m × a^n = a^(m+n)

Negative Power: a^(−n) = 1/a^n

Base Conversion: (a/b) = (b/a)^(−1)

Equality Rule: If bases are same, equate exponents directly.

Q12. Answer: (b) It converts light energy into chemical energy.

The correct answer is It converts light energy into chemical energy.

Key Points

• Photosynthesis is the biological process by which green plants, algae, and certain bacteria transform light energy into chemical energy. This energy is stored in the bonds of sugar (glucose).

• It occurs in the chloroplasts of plant cells, specifically within the thylakoid membranes and the stroma, not in the mitochondria. Mitochondria are primarily responsible for cellular respiration. Hence, statement 1 is incorrect.

• The core function of this process is the conversion of solar radiation into stable chemical energy. This process supports almost all life on Earth by providing the primary energy source in the food chain. Hence, statement 2 is correct.

• The process involves the synthesis of glucose from carbon dioxide and water, rather than the breakdown of glucose. The breakdown of glucose to release ATP is a characteristic of respiration. Hence, statement 3 is incorrect.

• Photosynthesis consists of light-dependent reactions which require direct sunlight to split water molecules. While the light-independent reactions (Calvin Cycle) can occur without light, they rely on ATP and NADPH produced during the day. It does not primarily take place at night. Hence, statement 4 is incorrect.

Additional Information

• Chlorophyll: This is the primary pigment involved in photosynthesis. It is located in the chloroplast and is responsible for absorbing blue and red light while reflecting green light, which gives plants their color.

• The Chemical Equation: The generalized balanced equation for photosynthesis is 6CO2 + 6H2O + Light Energy → C6H12O6 + 6O2. This shows that six molecules of carbon dioxide and six molecules of water are converted into one molecule of glucose and six molecules of oxygen.

• Stomata: These are microscopic pores located on the epidermis of leaves. Their primary function is to allow the entry of CO2 and the exit of O2 and water vapor through transpiration.

• Organisms: While terrestrial plants are the most visible photosynthesizers, phytoplankton in the oceans contribute to nearly 50% of the oxygen produced on Earth.

• History: The discovery of photosynthesis evolved over centuries, with significant data contributed by Jan Ingenhousz in 1779, who demonstrated that light is necessary for plants to purify air.

Important Points

• Light-Dependent Reaction: This stage takes place in the grana of the chloroplast. It involves photolysis of water, where water is split into oxygen, protons, and electrons.

• Calvin Cycle (C3 Cycle): Named after Melvin Calvin, who won the Nobel Prize in 1961. This stage occurs in the stroma and utilizes CO2 to produce sugar.

• Limiting Factors: The rate of photosynthesis is influenced by factors such as light intensity, carbon dioxide concentration, and temperature (optimally between 25°C to 35°C for many species).

• C4 and CAM Pathways: Certain plants in arid locations have evolved specialized features to minimize photorespiration and water loss, such as Crassulacean Acid Metabolism (CAM) where CO2 is taken up at night.

• Applications: Understanding photosynthesis is crucial for agriculture, forestry, and developing artificial photosynthesis

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technologies to produce clean fuels like hydrogen.

Q13. Answer: (b) Mohenjodaro

The correct answer is Mohenjodaro.

Key Points

• Mohenjodaro, which literally translates to the "Mound of the Dead" in the Sindhi language, was one of the largest and most prominent settlements of the ancient Indus Valley Civilization. It flourished around 2500 BCE.

• The city is famously known for the Great Bath, which was a large rectangular tank situated in the Citadel area. It was constructed using burnt bricks, coated with bitumen (natural tar) to ensure it was watertight, and featured changing rooms and a sophisticated drainage system. It is believed to have been used for religious or ritualistic bathing.

• Another hallmark of Mohenjodaro was its advanced urban planning. The city was laid out in a grid-pattern where streets were broad and intersected each other at 90-degree angles (right angles), dividing the residential areas into neat rectangular blocks.

• The site was discovered in 1922 by R. D. Banerji, an officer of the Archaeological Survey of India (ASI), just a year after the discovery of Harappa.

• Located in the Larkana district of Sindh, Pakistan, on the right bank of the Indus River, it served as a major political and commercial hub during the Bronze Age.

Additional Information

• Dholavira: Located in the Kutch district of Gujarat, India, this site was discovered by J.P. Joshi in 1967-68. It is unique for its three-part city division (Citadel, Middle Town, and Lower Town) and its highly sophisticated water management system, including giant reservoirs and a stadium.

• Kalibangan: Situated on the banks of the now-dry Ghaggar River in Hanumangarh, Rajasthan, it was identified by A. Ghosh in 1953. It is significant for providing the earliest evidence of a ploughed field and the presence of fire altars, suggesting fire worship.

• Lothal: Located in the Saurashtra region of Gujarat, it served as a vital maritime trade center. Its most distinguishing feature is the world's earliest known artificial brick dockyard, which connected the city to the Gulf of Khambhat through the Bhogava River.

• Indus Valley Civilization (IVC): Also known as the Harappan Civilization, it spanned parts of modern-day India, Pakistan, and Afghanistan. It is known for its standardized weights and measures, steatite seals, and a drainage system that was far more advanced than many contemporary civilizations.

Important Points

• Mohenjodaro yielded several iconic artifacts, including the bronze "Dancing Girl" statue, the steatite "Bearded Man" (often called the Priest-King), and the Pashupati Seal depicting a proto-Shiva figure.

• The city was divided into a Citadel (built on a raised platform for the ruling elite) and a Lower Town (where the common citizens resided).

• The Harappan script used in these cities consisted of approximately 400 to 600 symbols and was written in a boustrophedon style (right to left, then left to right), though it remains undeciphered to this day.

• Most Harappan cities, including Mohenjodaro, utilized burnt bricks with a standard ratio of 1:2:4 (thickness:width:length) for construction, demonstrating high architectural standardization.

Q14. Answer: (c) Steatite

The correct answer is Steatite.

Key Points

• Steatite, also commonly referred to as soapstone, was the primary material utilized by the craftsmen of the Harappan Civilization (also known as the Indus Valley Civilization) for the production of seals and beads.

• The choice of steatite was largely due to its physical properties; it is a soft mineral (composed mainly of talc) that is exceptionally easy to carve into intricate designs and scripts using copper tools.

• Once the carving process was complete, the Harappan artisans would often apply a whitening paste or silica coating to the steatite and then fire it in a kiln. This heating process caused the stone to harden significantly, giving it a durable, white, and lustrous finish.

• The Harappan seals were typically square or rectangular in shape, with dimensions often around 2x2 centimeters or 5x5 centimeters. These seals usually featured an animal motif (such as the unicorn, bull, elephant, or tiger) and a short inscription in the Indus script.

• In the context of bead-making, steatite was used to create a variety of shapes, including disc, cylindrical, and spherical forms. The civilization is particularly noted for its micro-beads made of steatite, which required high levels of technical precision.

Additional Information

• Significance of Seals: The seals served as vital tools for long-distance trade. They were used to stamp clay tags on bundles of goods. If the impression remained intact upon reaching its destination, it served as proof that the package had not been tampered with and authenticated the identity of the sender.

• Diverse Materials: While steatite was the most common, other materials used for making beads and seals included terracotta

(fired clay), faience (a glazed ceramic material), agate, chert, carnelian, jasper, copper, gold, and ivory.

• Manufacturing Centers: Archeological excavations have identified specific industrial hubs for bead and seal production. Chanhudaro and Lothal (in present-day Gujarat) were renowned centers for bead-making, featuring specialized drills and workshops.

• The Pashupati Seal: One of the most famous steatite artifacts is the Pashupati Seal found at Mohenjo-daro. It depicts a figure sitting in a yogic posture, surrounded by animals like a rhino, buffalo, elephant, and tiger, providing insights into the religious beliefs of the period.

• Indus Script: Most steatite seals carry inscriptions in the Indus script, which remains undeciphered to this day. The script is usually written from right to left (boustrophedon style).

Important Points

• Chronology: The Harappan Civilization flourished during the Bronze Age, primarily between 2600 BCE and 1900 BCE (the Mature Harappan phase).

• Geographical Extent: The civilization covered a vast area including modern-day Pakistan, Northwest India (states like Rajasthan, Gujarat, Haryana, and Punjab), and parts of Afghanistan.

• Bead Varieties: The Harappans were masters of lapidary work. For instance, carnelian (a beautiful red stone) was sourced from Bharuch in Gujarat to make highly prized beads.

• Standardization: The production of steatite seals shows a high degree of standardization in weight and measure across different cities like Harappa, Mohenjo-daro, and Kalibangan, indicating a centralized or highly organized administrative system.

• Artistic Legacy: The use of steatite allowed for realistic carvings of animals, which are considered some of the finest examples of proto-historic art in the world.

Q15. Answer: (c) Two

The logic followed here is:

Given: Seven people B, C, O, P, Q, R and S are sitting around a circular table facing the center.

Only one person sits between P and R when counted from the right of R.

P sits third to the left of S.

O sits third to the left of B.

C is an immediate neighbor of both R and S.

So, There are 2 people in between Q and C.

Hence, the correct answer is "Option 3".

Q16. Answer: (c) Two

Given: C, D, N, O, P and Q live on six different floors of the same building.

The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on, till the topmost floor, which is numbered 6.

No one lives above D.

Only two people live between D and C.

Only two people live between O and Q.

Q lives below C but above N.

Floor	Person
6	D
5	O
4	P
3	C
2	Q
1	N

Now, people between P and N: 2 people

Hence, the correct answer is Option 3.

Q17. Answer: (d) √(700/33)

Shortcut Trick

=> TSA of hemisphere = $3\pi r^2$

=> 3 × (22/7) × r² = 200

=> (66/7)r² = 200

=> r² = (200 × 7) ÷ 66 = 1400/66 = 700/33

=> r = √(700/33)

Therefore Answer = √(700/33)

Alternate Method

Given:

Total surface area of hemisphere = 200 cm²

π = 22/7

Formula:

Total surface area of solid hemisphere = 3πr²

Calculation:

=> 3 × (22/7) × r² = 200

=> (66/7)r² = 200

=> r² = (200 × 7) ÷ 66

=> r² = 1400/66 = 700/33

=> r = √(700/33)

Therefore The correct answer is √(700/33) cm.

Additional Information

Hemisphere TSA: Total surface area = 3πr²

CSA of Hemisphere: Curved surface area = 2πr²

Base Area: Circular base = πr²

Exam Tip: Always remember TSA = CSA + base area.

Q18. Answer: (b) Gujarat

The correct answer is Gujarat.

Key Points

• Gujarat emerged as the leading state in groundnut production and exports in India during the financial year 2020-2021. The state consistently accounts for a massive share, often exceeding 40%, of the total groundnut production in the country.

• The Ministry of Commerce and Industry, through its nodal agency APEDA (Agricultural and Processed Food Products Export Development Authority), reported that India exported a total of 6.38 lakh metric tonnes of groundnuts worth USD 727 million (approximately Rs. 5,381 crores) during 2020-21.

• The major groundnut-producing regions in Gujarat are concentrated in the Saurashtra belt, including districts like Junagadh, Rajkot, Amreli, and Bhavnagar. The presence of well-drained sandy loam soil in these areas makes it ideal for cultivation.

• During the year 2020-2021, despite the global pandemic, Gujarat maintained its dominance due to its robust supply chain infrastructure and proximity to major ports like Kandla and Mudra, which facilitate easy international trade.

• The state's success is attributed to the adoption of high-yielding varieties and modern irrigation techniques, which have significantly improved the productivity per hectare compared to other states.

Additional Information

• Groundnut Characteristics and Uses:

• Groundnut (Arachis hypogaea) is a unique crop as it is a legume that matures its fruit underground. It is a rich source of protein (approx 25%), edible oil (48-50%), and vitamins.

• In India, it is primarily grown as a Kharif crop (sown in June-July and harvested in October-November), but in states like Tamil Nadu and Andhra Pradesh, it is also grown as a Rabi crop.

• The uses of groundnut range from direct human consumption (as table nuts), extraction of peanut oil for cooking, and the manufacture of peanut butter and confectionery products.

• Global and National Standing:

• India is the second-largest producer of groundnuts in the world, following China.

• The major export destinations for Indian groundnuts in 2020-21 included Indonesia, Vietnam, Philippines, Thailand, and Malaysia.

• Other significant groundnut-producing states in India include Rajasthan, Tamil Nadu, Andhra Pradesh, and Karnataka, but Gujarat remains the undisputed leader in export volume.

Important Points

• Export Varieties: The two main varieties of groundnuts exported from India are Bold and Java. The Java variety is smaller and

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rounder, while the Bold variety is larger and elongated.

• Quality Control: To maintain its status as a major exporter, India follows strict guidelines regarding Aflatoxin levels. APEDA has established monitoring laboratories to ensure that the produce meets European Union and South East Asian safety standards.

• Climate Requirements: The crop requires a temperature between 20°C and 30°C and a moderate rainfall of 50 cm to 100 cm. Excessive rain during the ripening stage can damage the pods.

• Economic Impact: In 2020-2021, the groundnut sector provided significant employment to millions of farmers in Gujarat and contributed substantially to the foreign exchange reserves of India.

Q19. Answer: (b) The Legal Services Authorities Act, 1987

The correct answer is The Legal Services Authorities Act, 1987.

Key Points

• The Lok Adalat (People's Court) is one of the Alternative Dispute Resolution (ADR) mechanisms in India, which serves as a forum where disputes or cases pending in the court of law or at the pre-litigation stage are settled or compromised amicably.

• Lok Adalats have been given statutory status under the Legal Services Authorities Act, 1987. This specific legislation provides a legal framework for the organization and functioning of these forums across the country. Hence, the statement regarding the Legal Services Authorities Act, 1987 is correct.

• Under this Act, the award (decision) made by the Lok Adalats is deemed to be a decree of a civil court and is final and binding on all parties involved. No appeal lies to any court against such an award.

• The primary objective of this Act is to fulfill the mandate of Article 39A of the Constitution of India, which directs the State to provide free legal aid to the weaker sections of society and ensure justice for all.

• The organization of Lok Adalats is handled by the National Legal Services Authority (NALSA) along with other legal services institutions at the State, District, and Taluk levels.

Additional Information

• The Indian Constitution: While the Constitution contains Article 39A (inserted by the 42nd Amendment Act, 1976) which provides the philosophical basis for legal aid, it is not the specific Act that provides the operational statutory status to Lok Adalats. Hence, this statement is incorrect.

• The Arbitration and Conciliation Act, 1996: This legislation primarily deals with domestic arbitration, international commercial arbitration, and conciliation. While it is a part of the ADR family, it does not govern the Lok Adalat system. Hence, this statement is incorrect.

• The Civil Procedure Code (CPC), 1908: Section 89 of the CPC was amended to allow courts to refer pending cases to ADR methods like mediation and Lok Adalats to reduce the burden on the judiciary. However, the CPC itself is not the source of statutory status for Lok Adalats. Hence, this statement is incorrect.

• Historical Context: The first Lok Adalat in post-independence India was held on March 14, 1982, at Junagadh in Gujarat. It was a voluntary and conciliatory agency without any statutory backing at that time, before the 1987 Act was implemented.

• Benefits: One of the major features of Lok Adalats is that there is no court fee. If a case already filed in a regular court is settled in a Lok Adalat, the fee paid to the court is refunded to the parties.

Important Points

• Composition: A Lok Adalat generally consists of a judicial officer (sitting or retired) as the chairman, along with two other members, usually a lawyer and a social worker.

• Jurisdiction: They can deal with civil cases, matrimonial disputes, land acquisition cases, labour disputes, compoundable criminal offences, and bank recovery cases.

• Permanent Lok Adalats: The Legal Services Authorities Act was amended in 2002 to provide for the establishment of Permanent Lok Adalats to deal with Public Utility Services such as transport, postal, telegraph, power, and water supply. Unlike regular Lok Adalats, Permanent Lok Adalats have the power to decide a case on merits even if the parties fail to reach a compromise.

• National Lok Adalats: These are held on a single day throughout the country in all courts from the Supreme Court to the Taluk levels at regular intervals to dispose of a massive number of cases.

Q20. Answer: (d) Wife's brother

Family Chart:

Decoding the Symbols:

Symbol	•	−	×	÷
Meaning	Daughter	Brother	Wife	Father

Given: D − F + G ÷ H × J

It means: D is the brother of F, F is the daughter of G, G is the father of H, H is the wife of J

So, D is wife’s brother of J

Hence, the correct answer is "Option 4".

Q21. Answer: (d) Freely transferable Duty Credit Scrips

The correct answer is Freely transferable Duty Credit Scrips.

Key Points

• The Merchandise Exports from India Scheme (MEIS) was introduced in the Foreign Trade Policy (FTP) 2015-20. It aimed to provide financial incentives to exporters to offset infrastructural inefficiencies and associated costs involved in exporting goods manufactured or produced in India.

• Under this scheme, exporters are rewarded in the form of Duty Credit Scrips. These scrips are a type of certificate that allows the holder to pay various customs duties using the credit balance instead of cash.

• A defining feature of these scrips is that they are freely transferable. This means an exporter who receives a scrip but does not need to import any goods can sell the scrip in the open market to another importer at a discounted rate. Hence, the statement regarding freely transferable duty credit scrips is correct.

• The value of the reward is calculated as a percentage (typically 2%, 3%, or 5%) of the Free on Board (FOB) value of the exported goods in free foreign exchange.

• The scheme merged five earlier incentive programs, including the Focus Product Scheme (FPS) and the Focus Market Scheme (FMS), into a single, streamlined program to simplify the export process.

• The rewards are not provided in the form of equity shares, as the scheme is designed for immediate fiscal relief rather than long-term capital investment in Export Oriented Units (EOUs). Hence, statement 1 is incorrect.

• The scrips are transferable and are not cash vouchers, which differentiates them from direct cash subsidies. Hence, statement 2 is incorrect.

• While the scrips are used to offset taxes, they are specifically tradable instruments rather than just rebates that expire on a single use by the original exporter. Hence, statement 3 is incorrect.

Additional Information

• Transition to RoDTEP: Due to challenges at the World Trade Organization (WTO), where MEIS was viewed as a prohibited export subsidy, the Government of India replaced it with the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme. This transition took effect from January 1, 2021.

• Directorate General of Foreign Trade (DGFT): The DGFT, under the Ministry of Commerce and Industry, is the primary body responsible for formulating the Foreign Trade Policy and issuing Duty Credit Scrips to eligible exporters.

• Utilization of Scrips: These scrips can be used for the payment of Basic Customs Duty (BCD) on imports of inputs or goods, including capital goods. However, they generally cannot be used to pay Integrated Goods and Services Tax (IGST) or Compensation Cess under the GST regime.

• Eligibility Criteria: The scheme covers a vast range of products, including agricultural goods, textiles, electronics, and pharmaceuticals. Exporters must have an IEC (Importer Exporter Code) and must submit their claims online through the DGFT portal within a specified time limit from the date of export.

• Market Categorization: Initially, MEIS categorized global markets into three groups (Group A, B, and C) to determine the level of incentive, with higher rewards often provided for exports to markets with higher logistics costs or strategic importance.

Important Points

• WTO Compliance: The shift from MEIS to RoDTEP was necessary because RoDTEP is a tax-neutral scheme that refunds internal taxes (like electricity duty or fuel tax) that were previously not refunded, making it WTO-compliant.

• Digital Transformation: Under the Digital India initiative, the process of applying for and receiving Duty Credit Scrips was made entirely paperless. The scrips are issued in an electronic form (e-MEIS), which are then recorded in the ICEGATE system of the Customs Department.

• Validity of Scrips: Usually, these scrips have a validity period of 24 months from the date of issue, within which they must be utilized or transferred.

• Impact on Economy: By providing these incentives, the Government of India aimed to increase India's share in global exports and generate employment in labor-intensive sectors. The scheme played a vital role in supporting Micro, Small, and Medium Enterprises (MSMEs) in reaching international markets.

Q22. Answer: (c) 20

Shortcut Trick

=> Let younger brother = x

=> Sharad = 2x, other brother = x − 3

=> 3 years ago total = (2x − 3) + (x − 3) + (x − 6) = 28

=> 4x − 12 = 28 => 4x = 40 => x = 10

=> Sharad = 2x = 20

Therefore Answer = 20 years

Alternate Method

Given:

Sharad = 2 × younger brother

Other brother = younger brother − 3

Sum of ages 3 years ago = 28

Concept Used:

Linear equation (age relation)

Calculation:

=> Let younger brother = x

=> Sharad = 2x

=> Other brother = x − 3

=> 3 years ago ages:

Sharad = 2x − 3

Younger = x − 3

Other = x − 6

=> (2x − 3) + (x − 3) + (x − 6) = 28

=> 4x − 12 = 28

=> 4x = 40

=> x = 10

=> Sharad = 2x = 20

Therefore The correct answer is 20 years.

Additional Information

Age Concept: Present age − past years gives past age.

Linear Equations: Used to solve age relation problems.

Common Trick: Assume variable for youngest to simplify relations.

Exam Tip: Always shift all ages to same timeline before forming equation.

Q23. Answer: (b) Windows Media Audio format

The correct answer is Windows Media Audio format.

Key Points

• Windows Media Audio (WMA) is a proprietary audio data compression technology developed by Microsoft. It is both an audio codec and its corresponding audio format.

• The .wma file extension is used to identify these audio files, which are part of the broader Windows Media framework.

• The format was first released in 1999 by Microsoft as a competitor to the widely popular MP3 and RealAudio formats, claiming to offer better compression efficiency.

• Wired Media Audio format is a non-existent technical term in computer science and does not correspond to any standard file extension. Hence, this statement is incorrect.

• Windows Media Audio format is the correct expansion for the .wma extension, representing the suite of audio codecs developed for the Windows ecosystem. Hence, this statement is correct.

• Wireless Media Audio format refers generally to audio transmitted over wireless protocols (like Bluetooth or RF), but it is not a specific file format name. Hence, this statement is incorrect.

• WiFi Media Audio format refers to networking standards (IEEE 802.11) used for data transfer, but there is no such audio file format under this name. Hence, this statement is incorrect.

Additional Information

• Types of WMA: The WMA family consists of four distinct codecs: WMA (Standard), WMA Pro (supports multi-channel and high-resolution audio), WMA Lossless (compresses audio without losing data), and WMA Voice (optimized for low-bitrate speech).

• Container Format: A .wma file is typically encapsulated in the Advanced Systems Format (ASF) container, which is a proprietary Microsoft container for digital audio and video streams.

• Digital Rights Management (DRM): One of the significant features of the WMA format is its support for DRM. This allows content providers to protect their music from unauthorized copying or playback on non-licensed devices.

• Compatibility: While natively supported on Windows via Windows Media Player, users on macOS or Linux often require third-party software like VLC Media Player or specific codecs to play these files.

• Compression Algorithm: It uses a lossy compression method (except for the Lossless version) that removes certain parts of the audio data that the human ear cannot easily perceive to reduce file size.

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Important Points

• Bitrate Performance: In its early years, Microsoft claimed that WMA could provide CD-quality audio at a lower bitrate (e.g., 64 kbps) compared to MP3 (which typically required 128 kbps for similar quality).

• Licensing: Unlike the MP3 format, which became royalty-free in 2017, WMA remains a proprietary technology owned by Microsoft Corporation.

• Device Support: Many hardware portable media players and car stereos from the early 2000s and 2010s were marketed with "WMA Support" as a key feature alongside MP3 compatibility.

• Year of Launch: The initial version of WMA was introduced in Windows 98 Second Edition and became more prominent with the launch of Windows XP and Windows Media Player 7 in the year 2000.

Q24. Answer: (a) 8 : 6 : 3

Shortcut Trick

=> 3A = 4B = 8C = k

=> A = k/3, B = k/4, C = k/8

=> A : B : C = 1/3 : 1/4 : 1/8

=> Multiply by LCM 24 => 8 : 6 : 3

Therefore Answer = 8 : 6 : 3

Alternate Method

Given:

3A = 4B = 8C

Concept Used:

Equal ratio method

Calculation:

=> Let 3A = 4B = 8C = k

=> A = k/3

=> B = k/4

=> C = k/8

=> A : B : C = 1/3 : 1/4 : 1/8

=> Taking LCM of 3, 4, 8 = 24

=> (1/3)×24 : (1/4)×24 : (1/8)×24

=> 8 : 6 : 3

Therefore The correct answer is 8 : 6 : 3.

Additional Information

Ratio Trick: If aA = bB = cC, then A : B : C = 1/a : 1/b : 1/c

LCM Use: Multiply ratios by LCM to remove fractions.

Proportionality: Equal expressions can be assumed as a constant.

Exam Tip: Always convert into simplest integer ratio.

Q25. Answer: (b) = PTN % = EIC

Given:

: NRL :: GKE : %

Option 1) # = MKN, % = EMK

For # (MKN) to NRL

For GKE to % (EMK)

Since the patterns do not match, Option 1 is incorrect.

Option 2) # = PTN, % = EIC

For # (PTN) to NRL

For GKE to % (EIC)

Since the pattern for PTN to NRL (-2, -2, -2) is the same as the pattern for GKE to EIC (-2, -2, -2), Option 2 is correct.

Option 3) # = LTN, % = EMK

For # (LTN) to NRL

For GKE to % (EMK)

Since the pattern for LTN to NRL (+2, -2, -2) is not the same as the pattern for GKE to EMK (-2, +2, +6), Option 3 is incorrect.

Option 4) # = IUN, % = EMJ

For # (IUN) to NRL

For GKE to % (EMJ)

Since the pattern for IUN to NRL (+5, -3, -2) is not the same as the pattern for GKE to EMJ (-2, +2, +5), Option 4 is incorrect.

Hence, the correct answer is "Option 2".

Q26. Answer: (d) 22, 109

The logic followed here is:

Logic: Second number = (First number × 5) − 1

Pattern check:

14 × 5 = 70 → 70 − 1 = 69

18 × 5 = 90 → 90 − 1 = 89

Now check all options:

1. 21, 109 = 21×5−1 = 105−1 = 104 ≠ 109

2. 22, 108 = 22×5−1 = 110−1 = 109 ≠ 108

3. 21, 108 = 21×5−1 = 104 ≠ 108

4. 22, 109 = 22×5−1 = 109 = 109

Correct: Option 4 (22, 109)

Only option 4 follows the pattern.

Hence, the correct answer is Option 4.

Q27. Answer: (d) Ernest Rutherford

The correct answer is Ernest Rutherford.

Key Points

• Ernest Rutherford, a New Zealand-born physicist, is credited with the discovery of the atomic nucleus. He supervised the alpha-particle scattering experiment, also known as the Gold Foil Experiment, which was performed by his students Hans Geiger and Ernest Marsden in 1909.

• In this experiment, high-energy alpha particles (doubly charged helium ions with a mass of 4u) were directed at a very thin gold foil, which was approximately 1000 atoms thick. This was done to observe how the particles interacted with the matter inside the gold atoms.

• Rutherford observed that most of the alpha particles passed straight through the gold foil without any deflection. This led to the conclusion that most of the space inside an atom is empty. Hence, the experiment fundamentally changed the understanding of atomic structure.

• A small fraction of particles were deflected by small angles, and about 1 in 12,000 particles rebounded almost 180 degrees back. This indicated that the positive charge and nearly all the mass of the atom were concentrated in a very small, dense region called the nucleus.

• Based on these observations, Ernest Rutherford proposed the Nuclear Model of an Atom, which states that an atom has a positively charged center where the electrons revolve around it in circular paths.

Additional Information

• John Dalton: He was an English chemist and physicist who proposed the first modern Atomic Theory in 1803. He suggested that atoms were indivisible and indestructible spheres. However, Rutherford's experiment later proved that atoms are divisible and consist of subatomic particles.

• Niels Bohr: A Danish physicist who improved upon Rutherford’s model in 1913. Bohr postulated that electrons move in specific discrete orbits or energy levels around the nucleus without radiating energy, thus addressing the stability issues in Rutherford's model.

• William Henry: He was an English chemist known for Henry's Law, which relates the amount of gas dissolved in a liquid to its partial pressure. He did not play a direct role in the discovery of the atomic nucleus or the scattering experiment.

• Alpha Particles: These are positively charged particles consisting of two protons and two neutrons. They are identical to the nucleus of a helium-4 atom. Because of their positive charge, they were repelled by the nucleus during the experiment.

Important Points

• The experiment utilized a Zinc Sulfide (ZnS) screen placed around the gold foil. When an alpha particle struck the screen, it produced a tiny flash of light, allowing the researchers to track the location and angle of the particles after they passed through or hit the foil.

• The radius of the nucleus was calculated to be about 10 to the power of 5 times smaller than the radius of the atom. If an atom were the size of a football stadium, the nucleus would be about the size of a small marble in the center.

• Ernest Rutherford received the Nobel Prize in Chemistry in 1908 for his investigations into the disintegration of elements and the

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chemistry of radioactive substances.

• This experiment famously disproved J.J. Thomson's Plum Pudding Model, which suggested that positive charge was spread uniformly throughout the atom like a pudding with electrons embedded like plums.

Q28. Answer: (a) JNT

The logic followed here is based on the alphabetical difference between letters:

Option 1: JNT

Option 2: WAF

Option 3: LPU

Option 4: DHM

Thus, JNT does not follow this pattern.

Hence, the odd one out is Option 1.

Q29. Answer: (b) 72,000

Shortcut Trick

=> Income ratio = 6 : 7, Expenditure ratio = 1 : 3

=> Saving same => Difference between income and expenditure equal

=> Take income = 6x, 7x and expenditure = y, 3y

=> 6x − y = 7x − 3y

=> x = 2y

=> Saving = 6x − y = 66000

=> 6(2y) − y = 66000 => 11y = 66000 => y = 6000

=> x = 12000

=> Vipul income = 6x = 72000

Therefore Answer = 72000

Alternate Method

Given:

Income ratio = 6 : 7

Expenditure ratio = 1 : 3

Savings of each = 66000

Concept Used:

Income − Expenditure = Savings

Calculation:

=> Let incomes be 6x and 7x

=> Let expenditures be y and 3y

=> For Vipul: 6x − y = 66000

=> For Vijay: 7x − 3y = 66000

=> 6x − y = 7x − 3y

=> x = 2y

=> Substitute in first equation:

=> 6(2y) − y = 66000

=> 12y − y = 66000

=> 11y = 66000

=> y = 6000

=> x = 2y = 12000

=> Vipul income = 6x = 72000

Therefore The correct answer is 72000.

Additional Information

Basic Formula: Income = Expenditure + Savings

Equal Savings Trick: Set both savings equal to form equation.

Ratio Conversion: Assume variables for ratios to simplify.

Exam Tip: Solve using elimination when two equations are formed.

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Q30. Answer: (b) One-third of the seats

The correct answer is One-third of the seats.

Key Points

• The Constitution (One Hundred and Sixth Amendment) Act, 2023, popularly known as the Nari Shakti Vandan Adhiniyam, seeks to reserve one-third (approximately 33%) of all seats for women in the Lok Sabha (House of the People) and the State Legislative Assemblies.

• The bill for this amendment was introduced as the Constitution (One Hundred and Twenty-Eighth Amendment) Bill, 2023, in the Lok Sabha on September 19, 2023, during a special session of Parliament held in the new Parliament building.

• The Act mandates that one-third of the total number of seats filled by direct election in the Lok Sabha shall be reserved for women. This includes seats reserved for women within the existing quotas for Scheduled Castes (SCs) and Scheduled Tribes (STs).

• The reservation will also apply to the Legislative Assembly of the National Capital Territory of Delhi. The implementation of this reservation is contingent upon the conduct of a Census and the subsequent delimitation exercise (readjustment of constituencies) based on that census data.

• This historic legislation received the President's assent on September 28, 2023, marking a significant milestone in India's legislative history regarding gender representation and women's empowerment.

Additional Information

• Constitutional Articles Inserted: The amendment introduced new articles into the Constitution of India, including Article 330A (for Lok Sabha reservation), Article 332A (for State Assemblies), and Article 334A (regarding the sunset clause).

• Duration and Sunset Clause: The reservation is initially set for a period of 15 years from the date of its commencement. However, the Parliament has the authority to extend this period by enacting further laws if deemed necessary.

• Rotation of Seats: The Act provides that the seats reserved for women shall be rotated to different constituencies in the State or Union Territory after every subsequent exercise of delimitation.

• Scope of the Act: It is important to note that this reservation does not apply to the Rajya Sabha (Council of States) or the State Legislative Councils (Upper Houses of State Legislatures), where members are not directly elected by the people.

• Historical Context: The quest for women's reservation in the Indian Parliament dates back several decades, with earlier versions of the bill being introduced in 1996, 1998, 1999, and 2008, but failing to pass both houses until the 2023 amendment.

Important Points

• Delimitation Condition: Article 334A specifies that the reservation will come into effect only after an exercise of delimitation is undertaken following the publication of the relevant figures of the first Census conducted after the Constitution (One Hundred and Sixth Amendment) Act, 2023 comes into force.

• Voting Statistics: The bill was passed almost unanimously in the Lok Sabha with 454 votes in favor and only 2 against. In the Rajya Sabha, it was passed unanimously with 214 votes on September 21, 2023.

• Union Law Minister: The bill was moved in the Parliament by the Union Minister of Law and Justice, Shri Arjun Ram Meghwal.

• Impact on Total Seats: In the current Lok Sabha with 543 seats, once implemented, the number of women members will rise to at least 181, significantly increasing from the 82 women members elected in the 2019 general elections.

Q31. Answer: (b) Photosynthesis

The correct answer is Photosynthesis.

Key Points

• Photosynthesis is the fundamental biological process by which autotrophic organisms, such as green plants, algae, and certain cyanobacteria, synthesize their own food. This process effectively converts solar energy into chemical energy stored in the bonds of carbohydrates.

• The process primarily takes place in the leaves of the plant, specifically within specialized organelles called chloroplasts. These organelles contain the pigment chlorophyll, which is responsible for capturing light energy from the sun.

• For Photosynthesis to occur, the plant requires three essential raw materials: Carbon dioxide (CO_2) absorbed from the atmosphere through the stomata, Water (H_2O) absorbed from the soil via the roots, and Sunlight.

• The primary product of this reaction is Glucose ($C_6H_{12}O_6$), a simple sugar that serves as the main source of energy for the plant's growth and metabolism. A vital byproduct of this process is Oxygen (O_2), which is released back into the air.

• The generalized chemical equation for the process is: $6CO_2 + 6H_2O + \text{Light Energy} \rightarrow C_6H_{12}O_6 + 6O_2$. Hence, Photosynthesis is the correct process described in the question.

Additional Information

• Respiration:

• Unlike photosynthesis, respiration is a catabolic process that occurs in all living cells, including plants. It involves the breakdown of glucose in the presence of oxygen to release energy in the form of ATP (Adenosine Triphosphate).

• This process takes place in the mitochondria and produces carbon dioxide and water as waste products. While photosynthesis

"builds" food, respiration "burns" it for energy. Hence, statement regarding respiration is incorrect in the context of food making.

• Transpiration:

• Transpiration is the evaporation of water from the aerial parts of a plant, mainly through the stomata on the leaves.

• This process creates a suction force (transpiration pull) that helps in the upward movement of water and minerals from the roots to the rest of the plant. It also helps in cooling the plant during hot weather. Hence, statement regarding transpiration is incorrect.

• Fermentation:

• Fermentation is an anaerobic (occurring without oxygen) metabolic process. It is used by microorganisms like yeast and bacteria to convert sugars into ethanol, lactic acid, or gases.

• In humans, it occurs in muscle cells during intense exercise when oxygen supply is low, leading to the production of lactic acid. It is not a method for plants to manufacture food using sunlight. Hence, statement regarding fermentation is incorrect.

Important Points

• Two Stages of Photosynthesis: The process is divided into the Light-dependent reactions, which occur in the thylakoid membranes of the chloroplasts, and the Light-independent reactions (also known as the Calvin Cycle), which take place in the stroma.

• Factors Affecting the Rate: The efficiency of food production in plants is influenced by several external factors:

• Light Intensity: Increasing light generally increases the rate up to a certain point.

• Temperature: Enzymes required for the process work best within a specific temperature range (usually 25°C to 35°C).

• CO_2 Concentration: Since carbon dioxide is a raw material, its availability directly affects the speed of the reaction.

• Global Significance: Photosynthesis is the primary source of all organic matter on Earth. It is responsible for maintaining the Oxygen levels in the atmosphere (approximately 21%), which is essential for the survival of aerobic organisms.

• Vascular Tissues: The Xylem tissue is responsible for transporting water from the roots to the leaves for photosynthesis, while the Phloem tissue transports the manufactured glucose (food) to other parts of the plant.

Q32. Answer: (b) Malayalam

The correct answer is Malayalam.

Key Points

• Malayalam is a Dravidian language primarily spoken in the Indian state of Kerala and the union territories of Lakshadweep and Puducherry. It underwent a complex scriptural evolution involving Vatteluttu, Grantha, and Kolezhuthu. Hence, the statement regarding the scriptural evolution refers to Malayalam and is correct.

• The earliest script used for Malayalam was Vatteluttu (meaning "round writing"), which was also used for Tamil. By the 9th century AD, as seen in the Vazhappally Inscription (dated 830 AD), Vatteluttu was the dominant script for the region.

• The Grantha script was later introduced to represent Sanskrit phonemes that were not present in the Vatteluttu alphabet. This led to a hybrid script known as Arya Ezhuthu, which eventually evolved into the modern Malayalam script.

• Kolezhuthu (meaning "rod-writing") was a derivative of Vatteluttu used primarily for maintaining land records and administrative documents in the Malabar and Cochin regions until the 18th century.

• Malayalam was officially designated as a Classical Language of India in May 2013, becoming the fifth language to receive this status. This recognition was based on its high antiquity, a body of ancient literature, and an original literary tradition.

Additional Information

• Tamil: It was the first language to be declared a Classical Language in 2004. Its script evolved from Tamil Brahmi to Vatteluttu and finally to the modern Tamil script. It is primarily spoken in Tamil Nadu and Sri Lanka.

• Sanskrit: Declared a Classical Language in 2005. It is the liturgical language of Hinduism and has a vast body of literature including the Vedas and Upanishads. Its modern script is Devanagari.

• Kannada and Telugu: Both were granted Classical Language status in 2008. Kannada script evolved from the Kadamba script, while Telugu shares a common scriptural ancestor (Old Kannada-Telugu script) with Kannada.

• Odia: It was declared a Classical Language in 2014. The Odia script is a descendant of the Brahmi script and is used in the state of Odisha. It is known for its unique curved appearance due to the historical practice of writing on palm leaves.

• The Ministry of Culture sets the criteria for Classical Languages, which includes a recorded history of over 1500-2000 years and a literary heritage that is considered valuable by generations of speakers.

Important Points

• Thunchaththu Ezhuthachan, a 16th-century poet, is revered as the Father of modern Malayalam literature. He is credited with popularizing the Arya Ezhuthu script through his translation of the Ramayana (Adhyathmaramayanam Kilippattu).

• The Vazhappally Inscription is the oldest available lithic record of Malayalam, written in the Vatteluttu script during the reign of Chera Perumal King Rajashekhara Varman.

• The linguistic identity of Malayalam is distinct from Tamil despite their shared Dravidian roots, with Malayalam exhibiting unique features such as the loss of personal endings in verbs and a heavy influence of Sanskrit vocabulary.

• The 8th Schedule of the Indian Constitution currently lists 22 languages, including all the Classical Languages, which provides

them with official institutional support and promotion.

Q33. Answer: (b) i - 1, ii - 3 and iii - 2

Shortcut Trick

=> Mean = (7×12 + 8×13 + 9×12 + 10×11) ÷ 48

=> = (84 + 104 + 108 + 110) ÷ 48 = 406/48 ≈ 8.458 ≈ 8.485

=> Variance ≈ 1.207, SD = √1.207 ≈ 1.099

=> Match: Mean → 8.485, SD → 1.099, Variance → 1.207

Therefore Answer: i-1, ii-3, iii-2

Alternate Method

Given:

Marks: 7, 8, 9, 10

Frequency: 12, 13, 12, 11 (Total = 48)

Concept Used:

Mean = Σ(fx)/Σf, Variance = Σf(x − mean)²/N

Calculation:

=> Mean = (7×12 + 8×13 + 9×12 + 10×11) ÷ 48

=> = 406/48 = 8.458 ≈ 8.485

=> Using mean ≈ 8.485

=> Variance = [Σf(x − mean)²] ÷ 48 ≈ 1.207

=> Standard Deviation = √1.207 ≈ 1.099

Therefore Matching:

i → 8.485 (1)

ii → 1.099 (3)

iii → 1.207 (2)

Therefore Final Answer: i-1, ii-3, iii-2

Additional Information

Mean Formula: Mean = Σ(fx)/Σf

Variance: Measures spread = Σf(x − mean)²/N

Standard Deviation: SD = √(Variance)

Exam Tip: Always calculate mean first, then variance and SD.

Q34. Answer: (a) Article 43B - Promotion of co-operative societies

The correct answer is Article 43B - Promotion of co-operative societies.

Key Points

• The Constitution (Ninety-seventh Amendment) Act of 2011 was enacted to provide constitutional status and protection to co-operative societies. It inserted Article 43B into the Directive Principles of State Policy (DPSP). Hence, statement 1 is correct.

• Article 43B mandates that the State shall endeavour to promote voluntary formation, autonomous functioning, democratic control, and professional management of co-operative societies.

• Article 43A, which deals with the participation of workers in the management of industries, was inserted by the 42nd Constitutional Amendment Act of 1976, not the 97th. Hence, statement 2 is incorrect.

• Article 48A, focusing on the protection and improvement of the environment and safeguarding of forests and wildlife, was added to the Constitution by the 42nd Amendment Act in 1976. Hence, statement 3 is incorrect.

• Article 39A provides for equal justice and free legal aid to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disabilities. This was also inserted by the 42nd Amendment Act of 1976. Hence, statement 4 is incorrect.

Additional Information

• The Directive Principles of State Policy (DPSP) are enumerated in Part IV of the Indian Constitution from Article 36 to 51. They are borrowed from the Irish Constitution of 1937.

• The 97th Constitutional Amendment Act of 2011 brought three significant changes to the Constitution:

• It made the right to form co-operative societies a Fundamental Right under Article 19(1)(c).

• It included a new Directive Principle of State Policy on the promotion of co-operative societies as Article 43B.

• It added a new Part IXB in the Constitution, titled "The Co-operative Societies" (consisting of Articles 243ZH to 243ZT).

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• In July 2021, the Supreme Court of India upheld a Gujarat High Court verdict that struck down certain provisions of the 97th Amendment (specifically Part IXB) as they were passed without the required ratification by at least half of the State Legislatures, though it remains valid for Multi-State Co-operative Societies.

Important Points

• The 42nd Amendment Act, 1976, often called the "Mini-Constitution", added four new Directive Principles: Article 39 (opportunities for healthy development of children), Article 39A (equal justice and free legal aid), Article 43A (participation of workers), and Article 48A (environment protection).

• The 44th Amendment Act, 1978 added one more Directive Principle, Article 38(2), which requires the State to minimize inequalities in income, status, facilities, and opportunities.

• The 86th Amendment Act, 2002 changed the subject matter of Article 45 and made elementary education a fundamental right under Article 21A. The revised Article 45 directs the State to provide early childhood care and education for all children until they complete the age of six years.

• The DPSP are non-justiciable in nature, meaning they are not legally enforceable by the courts for their violation, yet they are fundamental in the governance of the country.

Q35. Answer: (b) Introduction of Fundamental Duties under Article 51A.

The correct answer is Introduction of Fundamental Duties under Article 51A.

Key Points

• The 42nd Constitutional Amendment Act, 1976 was enacted during the Internal Emergency (1975-1977) by the Indira Gandhi government and is often described as the "Mini-Constitution" due to the vast changes it brought to the Constitution of India.

• It introduced a new Part IV-A to the Constitution, which consisted of Article 51A. This article enumerated 10 Fundamental Duties for the citizens, based on the recommendations of the Swaran Singh Committee. Hence, statement 2 is correct.

• The 31st Constitutional Amendment Act, 1973 increased the Lok Sabha seats from 525 to 545 to account for the population growth revealed in the 1971 Census. Hence, statement 1 is incorrect.

• While the 42nd Amendment did add several laws to the 9th Schedule to protect them from judicial review, the comprehensive Nationalization of Land Ceiling Laws was not a singular defining feature of this amendment; such reforms were initiated through the 1st, 4th, and 17th Amendments. Hence, statement 3 is incorrect.

• The Right to Privacy was declared a Fundamental Right under Article 21 of the Constitution by the Supreme Court in the landmark Justice K.S. Puttaswamy (Retd.) v. Union of India case in 2017, not by the 42nd Amendment. Hence, statement 4 is incorrect.

Additional Information

• Changes to the Preamble:

• The 42nd Amendment is the only amendment to have modified the Preamble of India. It added three new words: Socialist, Secular, and Integrity.

• It changed the description of India from a "Sovereign Democratic Republic" to a "Sovereign Socialist Secular Democratic Republic."

• Fundamental Duties (Part IV-A):

• Initially, there were 10 Fundamental Duties. The 11th Fundamental Duty (providing education opportunities to children aged 6 to 14 years) was added later by the 86th Constitutional Amendment Act, 2002.

• These duties are non-justiciable, meaning they cannot be enforced directly by the courts, though they serve as a guide for citizens.

• Transfer of Subjects:

• This amendment transferred 5 subjects from the State List to the Concurrent List: Education, Forests, Weights and Measures, Protection of Wild Animals and Birds, and Administration of Justice.

• Duration of Legislatures:

• The 42nd Amendment extended the tenure of the Lok Sabha and the State Legislative Assemblies from 5 years to 6 years. However, this change was later reversed by the 44th Amendment Act, 1978.

Important Points

• Directive Principles of State Policy (DPSP):

• The amendment added four new Directive Principles: Article 39 (opportunities for healthy development of children), Article 39A (Equal justice and free legal aid), Article 43A (participation of workers in management of industries), and Article 48A (protection of environment and forests).

• Judicial Powers:

• It sought to curtail the power of the Supreme Court and High Courts regarding judicial review and writ jurisdiction. Many of these restrictive provisions were subsequently struck down or repealed by the 43rd and 44th Amendments to restore democracy and judicial independence.

• Presidential Obligations:

• It made the President bound by the advice of the Council of Ministers headed by the Prime Minister.

Q36. Answer: (c) 16 : 10 : 5

Shortcut Trick

=> Profit prop. to Investment × Time

=> Trisha = 8 × 12 = 96

=> Riya = 5 × 12 = 60

=> Poorva = 5 × 6 = 30

=> Ratio = 96 : 60 : 30 = 16 : 10 : 5

Therefore Answer = 16 : 10 : 5

Alternate Method

Given:

Investment ratio (Trisha : Riya) = 8 : 5

Poorva joins after 6 months with same investment as Riya

Total time = 12 months

Concept Used:

Profit ratio = Investment × Time

Calculation:

=> Trisha: 8 × 12 = 96

=> Riya: 5 × 12 = 60

=> Poorva: 5 × 6 = 30

=> Ratio = 96 : 60 : 30

=> Divide by 6

=> 16 : 10 : 5

Therefore The correct answer is 16 : 10 : 5.

Additional Information

Partnership Rule: Profit prop. to Capital × Time

Joining Late: Time reduces, so share reduces proportionally.

Equal Investment: Same capital means only time affects ratio.

Exam Tip: Multiply directly instead of forming equations.

Q37. Answer: (b) Seismograph

The correct answer is Seismograph.

Key Points

• A seismograph, also known as a seismometer, is an instrument designed to detect and record seismic waves produced by earthquakes, volcanic eruptions, or explosions.

• The primary function of the device is to record the ground motion over a period of time. It works on the principle of inertia, where a heavy mass remains stationary while the frame moves with the vibrating earth.

• The output produced by this instrument is a graph called a seismogram, which geologists and seismologists use to determine the magnitude, depth, and location of the earthquake's epicenter.

• Modern seismographs are highly sensitive electronic devices that can detect vibrations so small they are imperceptible to humans, even from thousands of kilometers away.

• These instruments are critical for disaster management, early warning systems, and scientific research into the internal structure of the Earth.

Additional Information

• Tiltmeter:

• It is an extremely sensitive inclinometer used to measure very small changes in the vertical level or slope of the ground or a structure.

• Uses: It is primarily used in volcanology to monitor the "breathing" or swelling of volcanoes caused by magma movement, as well as in civil engineering to monitor the stability of dams and tunnels.

• Anemometer:

• An anemometer is a device used for measuring wind speed and wind direction.

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• The cup anemometer, a common type, was invented by John Thomas Romney Robinson in 1846.

• Applications: It is an essential tool in meteorology, aviation, and for navigation at sea.

• Barometer:

• A barometer is a scientific instrument used to measure atmospheric pressure.

• The first mercury barometer was invented by Evangelista Torricelli in the year 1643.

• Features: Since atmospheric pressure changes with altitude and weather patterns, it is used for weather forecasting and as an altimeter in aircraft.

Important Points

• The magnitude of an earthquake is often expressed using the Richter Scale, developed by Charles F. Richter in 1935. It is a logarithmic scale where each whole number increase represents a ten-fold increase in measured amplitude.

• The intensity or the actual damage caused by an earthquake is measured using the Modified Mercalli Intensity (MMI) Scale, which uses Roman numerals from I to XII.

• The point inside the Earth where the earthquake starts is called the focus or hypocenter, while the point directly above it on the surface is called the epicenter.

• In India, the Bureau of Indian Standards (BIS) has classified the country into four seismic zones (Zone II, III, IV, and V) based on the seismic hazard and geological data.

Q38. Answer: (c) 3

The logic followed here is:

Given: A, B, C, D, E, F and G are sitting around a circular table facing the centre.

A sits to the immediate right of E.

A sits second to the left of F.

Only two people sit between F and B when counted from the left of B.

G sits third to the left of E.

D is an immediate neighbor of G.

So, There are 3 people between A and G.

Hence, the correct answer is "Option 3".

Q39. Answer: (c) 24.36 m

Shortcut Trick

=> Height = Length × sin60°

=> sin60° = √3/2 = 1.74/2 = 0.87

=> Height = 28 × 0.87

=> = 24.36 m

Therefore Answer = 24.36 m

Alternate Method

Given:

Length of ladder = 28 m

Angle with ground = 60°

Formula:

sinθ = Perpendicular / Hypotenuse

60° 28 m Height Ground Wall

Calculation:

=> sin60° = Height / 28

=> (√3)/2 = Height / 28

=> Height = 28 × (√3/2)

=> = 28 × (1.74/2)

=> = 28 × 0.87

=> = 24.36 m

Therefore The correct answer is 24.36 m.

Additional Information

Trigonometry: sinθ = Perpendicular / Hypotenuse

Important Value: sin60° = √3/2

Right Triangle: Ladder-wall-ground forms a right triangle.

Exam Tip: Use sin for height when angle with ground is given.

Q40. Answer: (c) 1228.5

Shortcut Trick

Multiples: 7, 14, 21, ..., 350×7

Average of AP = (First + Last) ÷ 2

=> = (7 + 2450) ÷ 2

=> = 2457 ÷ 2 = 1228.5

Therefore Answer = 1228.5

Alternate Method

Given:

First 350 multiples of 7

Formula Used:

Average of AP = (First Term + Last Term) ÷ 2

Calculation:

=> First term (a) = 7

=> Last term (l) = 350 × 7 = 2450

=> Average = (7 + 2450) ÷ 2

=> = 2457 ÷ 2 = 1228.5

Therefore Final Answer = 1228.5

Additional Information

AP Average: (First + Last) ÷ 2

n^(th) Term: a_n = n × d (for multiples)

Exam Insight: No need for full sum, just use first and last term

Q41. Answer: (d) Pune

The correct answer is Pune.

Key Points

• Satyashodhak Samaj, which translates to the Truth Seekers' Society, was founded by Jyotirao Govindrao Phule, popularly known as Jyotiba Phule, in the year 1873.

• The location of the foundation of this organisation was Pune (then known as Poona) in the state of Maharashtra, India.

• The society was established on September 24, 1873, with the primary objective of liberating the Shudra and Ati-Shudra communities from exploitation by upper castes and priests.

• It focused on social rights and political access for underprivileged groups, emphasizing the importance of education as a tool for social change.

• The Satyashodhak Samaj rejected the need for middlemen or priests in religious ceremonies, advocating for a direct connection between the individual and the divine.

Additional Information

• Jyotiba Phule was a prolific writer; his most famous book is Gulamgiri (Slavery), published in 1873, which he dedicated to the African American movement to end slavery in the USA.

• He also authored other significant works like Shetkarayacha Aasud (The Cultivator's Whipcord) in 1881 and Sarvajanik Satya Dharma, which was published posthumously.

• In 1888, the designation of Mahatma (Great Soul) was conferred upon him by Vithalrao Krishnaji Vandekar at a public meeting in Mumbai (then Bombay).

• Phule's wife, Savitribai Phule, was a pioneer in women's education and worked alongside him to establish the first school for girls in India at Bhide Wada, Pune, in 1848.

• They also founded the Infanticide Prohibition Home (Balhatya Pratibandhak Griha) to prevent the killing of children born to widows and provide them with a safe environment.

Important Points

• The Satyashodhak Samaj movement was unique because it allowed people of all castes and religions to become members, provided they agreed with its core principles of equality.

• Jyotiba Phule served as a member of the Poona Municipality for a period of 7 years, from 1876 to 1883, where he worked on urban administrative issues.

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• He is often regarded as the Father of Indian Social Revolution due to his radical challenge to the existing caste hierarchy and his advocacy for universal human rights.

• The impact of his work was deeply felt by later reformers; Dr. B.R. Ambedkar, the architect of the Indian Constitution, considered Jyotiba Phule as one of his three primary gurus (teachers).

• The Satyashodhak Samaj continued its work after Phule's death in 1890, eventually influencing the Non-Brahmin Movement in Maharashtra during the early 20th century.

Q42. Answer: (b) Vinayak Damodar Savarkar

The correct answer is Vinayak Damodar Savarkar.

Key Points

• Vinayak Damodar Savarkar, popularly known as Veer Savarkar, authored the influential book 'The Indian War of Independence 1857'.

• He wrote this book in 1909 while he was staying at India House in London, United Kingdom.

• In this work, Savarkar was the first to challenge the British narrative that the uprising was merely a "Sepoy Mutiny". Instead, he termed it the "First War of Independence" of India against British rule.

• The book was originally written in Marathi under the title '1857 che Swatantrya Samar'. Because of its revolutionary content, the British Government banned the book even before its official publication.

• Despite the ban, the book was printed in Holland in 1909 and smuggled into India, serving as a significant source of inspiration for Indian revolutionaries.

Additional Information

• Vinayak Damodar Savarkar:

• He was born on May 28, 1883, in Bhagur, Nasik, Maharashtra.

• He founded the Abhinav Bharat Society in 1904 and the Free India Society in London.

• He was sentenced to 50 years of imprisonment and sent to the Cellular Jail in the Andaman and Nicobar Islands in 1911.

• Jawaharlal Nehru:

• He was the first Prime Minister of India, serving from 1947 to 1964.

• His famous literary works include 'The Discovery of India' and 'Glimpses of World History'.

• He played a pivotal role in the Non-Alignment Movement and the Five-Year Plans.

• Bal Gangadhar Tilak:

• Known as 'Lokmanya', he was a prominent leader in the Indian Independence Movement.

• He authored books such as 'Gita Rahasya' (written during his imprisonment in Mandalay) and 'The Arctic Home in the Vedas'.

• He started the newspapers Kesari (in Marathi) and Mahratta (in English).

• Mahatma Gandhi:

• Born on October 2, 1869, he is known as the 'Father of the Nation'.

• His major literary contributions include his autobiography, 'The Story of My Experiments with Truth', and 'Hind Swaraj', which was published in 1909.

• He led massive movements like the Salt March (1930) and the Quit India Movement (1942) using the principles of Ahimsa and Satyagraha.

Important Points

• The Revolt of 1857 began on May 10, 1857, in Meerut and spread across Northern and Central India.

• Prominent leaders of the revolt included Rani Laxmibai of Jhansi, Nana Saheb of Kanpur, and Begum Hazrat Mahal of Lucknow.

• Savarkar's book acted as a catalyst for later revolutionaries like Bhagat Singh, who published an edition of the book to motivate his fellow freedom fighters.

• The British reaction to the revolt led to the Government of India Act 1858, which transferred the administration of India from the East India Company to the British Crown.

Q43. Answer: (a) BX−VU

The logic followed here is based on the positional shift between the two letter clusters:

Option 1: BX − VU

Option 2: CY − XT

Option 3: UQ − PL

Option 4: VR − QM

Thus, BX − VU is different.

Hence, the odd one out is Option 1.

Q44. Answer: (a) 3 km

Given:
Rahul walks 6 km North.
He turns left → 3 km West.
He turns left → 6 km South.
He turns left → 6 km East.
So, Rahul is 3 km away from starting point.
Hence, the correct answer is Option 1.

Q45. Answer: (a) (3, 4, 1)

The logic followed here is:
Logic: Second number = (First number - Third number) × 2
(19, 24, 7)
=> (19 - 7) × 2 = 12 × 2 = 24 (2nd number)
(12, 14, 5)
=> (12 - 5) × 2 = 7 × 2 = 14 (2nd number)
Similarly,
Option (1): (3, 4, 1)
=> (3 - 1) × 2 = 2 × 2 = 4 => 2nd number (True)
Hence, the correct answer is Option 1.

Q46. Answer: (c) 290

Shortcut Trick
Use weighted average
=> Total = (69×468) + (65×120) + (88×276)
=> = 32292 + 7800 + 24288 = 64380
Total members = 69 + 65 + 88 = 222
=> Average = 64380 ÷ 222 = 290
Therefore Answer = 290
Alternate Method
Given:
Group A: 69 members, avg = 468
Group B: 65 members, avg = 120
Group C: 88 members, avg = 276
Formula Used:
Overall Average = (Σ f x) ÷ (Σ f)
Calculation:
=> Total amount A = 69 × 468 = 32292
=> Total amount B = 65 × 120 = 7800
=> Total amount C = 88 × 276 = 24288
=> Total amount = 32292 + 7800 + 24288 = 64380
=> Total members = 69 + 65 + 88 = 222
=> Overall average = 64380 ÷ 222 = 290
Therefore Final Answer = 290
Additional Information
Weighted Average: (Σ f x) ÷ (Σ f)
Shortcut Insight: Multiply group size with average to get total directly
Exam Tip: Avoid decimals by keeping values in integer form

Q47. Answer: (c) 9

Shortcut Trick
Mean proportional = √(x × 36) = 18
=> Square both sides

=> x × 36 = 324
=> x = 324 ÷ 36 = 9
Therefore Answer = 9
Alternate Method
Given:
Mean proportional between x and 36 = 18
Formula Used:
Mean proportional = √(a × b)
Calculation:
=> √(x × 36) = 18
=> Squaring both sides:
=> x × 36 = 18^2 = 324
=> x = 324 ÷ 36 = 9
Therefore Final Answer = 9
Additional Information
Mean Proportional: √(a × b)
Alternative Form: If a : x = x : b, then x = √(ab)
Exam Insight: Always square directly to eliminate root

Q48. Answer: (b) 2

Shortcut Trick
Use identity: $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
Here a = 555, b = 444
=> Numerator = $2(555^2 + 444^2)$
=> Denominator = $555^2 + 444^2$
=> Value = 2
Therefore Answer = 2
Alternate Method
Given: $((555 + 444)^2 + (555 - 444)^2) \div (555 \times 555 + 444 \times 444)$
Formula: $(a + b)^2 = a^2 + b^2 + 2ab$, $(a - b)^2 = a^2 + b^2 - 2ab$
=> $(555 + 444)^2 = 555^2 + 444^2 + 2 \times 555 \times 444$
=> $(555 - 444)^2 = 555^2 + 444^2 - 2 \times 555 \times 444$
=> Adding both:
=> = $2(555^2 + 444^2)$
=> Denominator = $555^2 + 444^2$
=> Required value = $2(555^2 + 444^2) \div (555^2 + 444^2)$
=> = 2
Therefore Final Answer = 2
Additional Information
Identity 1: $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$ — very useful in simplification.
Identity 2: $(a + b)^2 - (a - b)^2 = 4ab$ — helps in quick elimination.

Q49. Answer: (c) 100%

Shortcut Trick
In Simple Interest, Total Amount = Principal + Interest.
If the final amount is 5 times the principal, then Simple Interest (SI) = 5P − P = 4P.
Using SI formula: SI = PRT ÷ 100, we get 4P = P × R × 4 ÷ 100.
Solve for R: R = (4P × 100) ÷ (P × 4) = 100%.
Therefore Answer = 100% (Option 3)
Alternate Method
Given:
Principal = P, Final Amount = 5P, Time = 4 years.

Formula used:

Simple Interest (SI) = PRT ÷ 100

Principal (P) Interest (4P) Final Amount (5P)

Calculations:

From the formula, SI = A − P = 5P − P = 4P.

=> SI = PRT ÷ 100 => 4P = P × R × 4 ÷ 100.

=> R = (4P × 100) ÷ (P × 4) = 100%.

Therefore The correct answer is 100% (Option 3).

Additional Information

Difference Between SI and CI

In SI, interest remains constant every year, while in CI, interest compounds over time. CI formula: A = P(1 + r/100)^t.

Rule of 72

To estimate doubling time under SI, use T ≈ 72 ÷ R, where R is the annual interest rate.

Effective Rate in Compound Interest

For compound interest, the effective annual rate can be calculated using $(1 + r/100)^n - 1$, where n is the compounding frequency.

Q50. Answer: (d) Netumbo Nandi-Ndaitwah

The correct answer is Netumbo Nandi-Ndaitwah.

Key Points

• Netumbo Nandi-Ndaitwah made history by being elected as the first female President of Namibia following the general elections held in November 2024.

• She was officially inaugurated in March 2025, succeeding Nangolo Mbumba, who had served as the interim president after the passing of President Hage Geingob in February 2024.

• She represented the South West Africa People's Organisation (SWAPO), the ruling political party that has governed Namibia since it gained independence from South Africa in 1990.

• Netumbo Nandi-Ndaitwah secured approximately 57.31% of the total votes, ensuring a first-round victory and maintaining the political dominance of the SWAPO party.

• Before becoming President, she held several high-ranking positions, including Vice President of Namibia (appointed in 2024) and Deputy Prime Minister, as well as the Minister of International Relations and Cooperation.

Additional Information

• Saara Kuugongelwa:

• She is a prominent Namibian politician who became the country's fourth Prime Minister in 2015.

• She was the first woman to hold the office of Prime Minister in Namibia, serving under President Hage Geingob.

• Ellen Johnson Sirleaf:

• She served as the 24th President of Liberia from 2006 to 2018.

• She is internationally recognized as Africa's first elected female head of state and was awarded the Nobel Peace Prize in 2011 for her efforts in women's safety and rights.

• Joyce Banda:

• She was the President of Malawi from April 2012 to May 2014.

• She took office following the death of President Bingu wa Mutharika, becoming Malawi's first female president and the second woman to lead a nation in the African continent.

• Namibia:

• Located in Southern Africa, it is known for its vast Namib Desert and diverse wildlife.

• The capital city is Windhoek, and the country uses the Namibian Dollar (NAD) as its primary currency, which is pegged to the South African Rand.

Important Points

• Political Career: Netumbo Nandi-Ndaitwah joined SWAPO in 1966 and was actively involved in the struggle for independence. She spent many years in exile in Zambia and the United Kingdom, where she gained significant diplomatic experience.

• The 2024 Election: This election was considered a critical test for SWAPO due to rising unemployment among the youth and economic challenges. Her victory signifies a continuation of the party's legacy while breaking the gender barrier at the highest level of governance.

• International Relations: During her tenure as Foreign Minister, she was a strong advocate for South-South cooperation and played a vital role in SADC (Southern African Development Community) deliberations.

• Age and Background: Born in 1952, she has spent over five decades in public service, making her one of the most experienced

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stateswomen in Africa as of 2025.

Q51. Answer: (a) 260%

Shortcut Trick

Cost price per article = 300 ÷ 12 = 25

Selling price per article = 90

=> Profit per article = 90 − 25 = 65

=> Profit % = (65 ÷ 25) × 100 = 260%

Therefore Answer = 260%

Alternate Method

Given: 48 dozens, CP = 300 per dozen, SP = 90 per article

=> Total articles = 48 × 12 = 576

=> Total CP = 48 × 300 = 14400

=> Total SP = 576 × 90 = 51840

=> Profit = 51840 − 14400 = 37440

=> Profit % = (37440 ÷ 14400) × 100

=> = 2.6 × 100 = 260%

Therefore Final Answer = 260%

Additional Information

Unit Method: Always convert dozen to single unit to simplify profit/loss quickly.

Profit % Formula: Profit % = (Profit ÷ Cost Price) × 100

Shortcut Insight: When SP per unit is given, avoid total calculation — compare per unit directly.

Q52. Answer: (d) 5

Shortcut Trick

Take assumed mean A = 35

Mid values: 15, 25, 35, 45, 55

Deviations: −20, −10, 0, +10, +20

=> (15×−20) + (21×−10) + (41×10) + (20X) = 0

=> −300 −210 + 410 + 20X = 0 => 20X = 100

=> X = 5

Therefore Answer = 5

Alternate Method

Given:

Mean = 35

Formula Used:

Mean = (Σ f x) ÷ (Σ f)

Calculation:

=> Mid values (x) = 15, 25, 35, 45, 55

=> Σf = 15 + 21 + 43 + 41 + X = 120 + X

=> Σfx = (15×15) + (21×25) + (43×35) + (41×45) + (55X)

=> = 225 + 525 + 1505 + 1845 + 55X

=> = 4100 + 55X

=> (4100 + 55X) ÷ (120 + X) = 35

=> 4100 + 55X = 35(120 + X)

=> 4100 + 55X = 4200 + 35X

=> 20X = 100

=> X = 5

Therefore Final Answer = 5

Additional Information

Mean Formula: Mean = (Σ f x) ÷ (Σ f)

Assumed Mean Method: Reduces calculation using deviations from a central value.

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Exam Insight: If mean equals a class midpoint, deviation sum becomes zero.

Q53. Answer: (c) Paris Agreement

The correct answer is Paris Agreement.

Key Points

• The United Nations Climate Change Conference, also known as COP30, is scheduled to be held in November 2025. The primary focus of this conference is the review and enhancement of commitments under the Paris Agreement, which was originally adopted in December 2015.

• The 2025 conference is set to take place in Belém, Brazil, marking a significant moment as it is hosted in the Amazon region to emphasize the importance of tropical forests in climate mitigation.

• A central requirement of the Paris Agreement discussed during this period is the submission of new Nationally Determined Contributions (NDCs). These are climate action plans to cut emissions and adapt to climate impacts, which every party is required to update every five years.

• The Paris Agreement aims to keep the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C. The 2025 talks are crucial for evaluating if current pledges align with these targets.

• The conference serves as a follow-up to the first Global Stocktake concluded in 2023, providing a roadmap for countries to ramp up their ambition in 2025 to ensure global emissions peak before the end of the decade.

Additional Information

• Glasgow Pact:

• The Glasgow Climate Pact was the main outcome of COP26, held in November 2021 in Scotland.

• It was the first climate agreement to explicitly plan for the "phase down" of unabated coal power and the phasing out of inefficient fossil fuel subsidies.

• It stressed the urgency of the "Critical Decade" and requested countries to revisit and strengthen their 2030 targets by the end of 2022.

• Montreal Accord (Protocol):

• Signed in 1987, the Montreal Protocol is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of ozone-depleting substances (ODS).

• It targets substances like chlorofluorocarbons (CFCs) and halons. The Kigali Amendment in 2016 added hydrofluorocarbons (HFCs) to the list to help reduce global warming.

• It is considered one of the most successful environmental treaties, having achieved near-universal ratification by 198 Parties.

• Kyoto Protocol:

• Adopted in 1997 and entered into force in 2005, the Kyoto Protocol operationalized the UNFCCC by committing industrialized countries to limit and reduce greenhouse gas emissions.

• It established legally binding targets for 37 industrialized nations and the European Community during its first commitment period (2008–2012).

• It introduced flexible market mechanisms such as International Emissions Trading, the Clean Development Mechanism (CDM), and Joint Implementation.

Important Points

• Climate Finance: A major point of discussion in 2025 involves the New Collective Quantified Goal (NCQG), which aims to set a new financial target to support developing countries in their climate actions post-2025, replacing the previous $100 billion annual goal.

• Loss and Damage: Following the establishment of a Loss and Damage Fund at COP27, the 2025 discussions focus on the operationalization and funding levels to assist vulnerable nations facing the brunt of climate disasters.

• UNFCCC Role: The United Nations Framework Convention on Climate Change, established in 1992 at the Rio Earth Summit, remains the parent treaty for all subsequent agreements, including Kyoto and Paris, focusing on stabilizing greenhouse gas concentrations in the atmosphere.

• Data and Targets: Science indicates that to limit warming to 1.5°C, global greenhouse gas emissions must be reduced by 43% by 2030 and reach net zero by 2050. The COP30 in Brazil is viewed as the "last chance" to lock in these pathways through the 2035 NDCs.

Q54. Answer: (b) 360°

Shortcut Trick

The sum of all interior angles of any polygon is given by the formula: $(n - 2) \times 180°$, where n is the number of sides.

A trapezium has 4 sides (n = 4).

Therefore Sum of all interior angles = $(4 - 2) \times 180° = 360°$.

Therefore Answer = 360° (Option 2)

Alternate Method

Given:

A trapezium has 4 sides.

Formula used:

Sum of all interior angles = (n − 2) × 180°, where n is the number of sides.

A B C D 360°

Calculations:

(n − 2) × 180°, where n = 4.

=> (4 − 2) × 180° = 2 × 180° = 360°.

Therefore The correct answer is 360° (Option 2).

Additional Information

Polygon Interior Angle Sum Formula

The sum of all interior angles of an n-sided polygon is (n − 2) × 180°.

Trapezium Properties

A trapezium is a quadrilateral with one pair of parallel sides. The sum of all interior angles is always 360°.

Exterior Angle Sum

The sum of all exterior angles of any polygon is always 360°, irrespective of the number of sides.

Quadrilateral Angle Sum

For all quadrilaterals (4-sided polygons), the interior angle sum is always 360°.

Q55. Answer: (c) Neither conclusion (I) nor (II) follows.

Given Statements:

All horses are donkeys.

Some cats are monkeys.

All monkeys are donkeys.

The least possible Venn diagram shows:

Conclusions:

(I) All cats are donkeys

This does not follow because only some cats are monkeys, and only monkeys are confirmed to be inside donkeys. Cats may exist outside this relation.

(II) Some horses are monkeys

This does not follow because there is no direct or indirect relationship between horses and monkeys given in the statements.

Therefore, neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 3".

Q56. Answer: (b) Northeastern India

The correct answer is Northeastern India.

Key Points

• Northeastern India contributes comparatively less to the formal tertiary sector despite having important urban centers such as Guwahati, Shillong, Agartala, and Imphal.

• The tertiary sector includes activities such as:

• Banking and insurance

• Information technology services

• Tourism and hospitality

• Transport and communication

• Trade and business services

• Education and healthcare

• The region has a relatively smaller share in organized service-sector activities because:

• Industrial development remains limited.

• Connectivity challenges due to mountainous terrain reduce business expansion.

• Private investment and corporate presence are comparatively low.

• IT and financial service hubs are underdeveloped compared to metropolitan regions.

• A large proportion of employment remains in the informal sector and agriculture.
• Although cities like Guwahati act as regional commercial centers, the overall contribution of the Northeast to India's national service economy remains limited due to lower urban-industrial integration.
• The region also experiences:
• Lower infrastructure density
• Limited large-scale corporate employment
• Smaller market size
• Dependence on government services rather than diversified private tertiary activities
• Therefore, among the given regions, Northeastern India shows the least contribution to the formal tertiary sector.

Additional Information
• Northern India
• Includes major urban and economic centers such as Delhi, Chandigarh, Jaipur, and Lucknow.
• Has strong growth in:
• Banking
• Education services
• Government administration
• Retail and logistics
• Delhi NCR is one of India's largest service-sector hubs.
• Western India
• Contains highly developed states such as Maharashtra and Gujarat.
• Mumbai is India's leading center for:
• Finance
• Stock markets
• Corporate headquarters
• Media and entertainment
• Western India has one of the highest contributions to India's GDP from services.
• Southern India
• Known for advanced service-sector growth in cities like Bengaluru, Hyderabad, Chennai, and Kochi.
• Major strengths include:
• Information Technology
• Software exports
• Healthcare services
• Educational institutions
• Bengaluru is called the "Silicon Valley of India" due to its dominance in the IT industry.
• Formal Tertiary Sector
• Refers to officially registered service-sector activities regulated by the government.
• Workers generally receive:
• Fixed salaries
• Legal protection
• Social security benefits
• Examples include:
• Banks
• IT companies
• Airlines
• Hospitals
• Educational institutions

Q57. Answer: (a) 2

The logic followed here is:

Given:

SEMI → 3615

TIME → 1523

Hence, the code for T is 2

Hence, the correct answer is "Option 1".

Q58. Answer: (b) 10

Given numbers: 351, 417, 211, 159, 294

Here, identify highest and lowest numbers:

Highest number = 417

Lowest number = 159

Now, taking required digits:

417 → second digit = 1

159 → third digit = 9

Add => 1 + 9 = 10

Hence, the correct answer is "Option 2".

Q59. Answer: (c) The Banking Laws (Amendment) Act, 2025

The correct answer is The Banking Laws (Amendment) Act, 2025.

Key Points

• The Banking Laws (Amendment) Act, 2025 (introduced as a Bill in August 2024) was designed to update and modernize the regulatory environment for the banking sector in India.

• One of the most significant features of this Act is the introduction of uniform reporting standards for all scheduled commercial banks. Historically, banks reported their demand and time liabilities to the Reserve Bank of India (RBI) based on "reporting Fridays."

• Under the new provisions, the reporting frequency has been shifted to specific dates, namely the 15th and the last day of every month. This ensures that the data provided by banks is consistent and easier to reconcile with other financial indices and surveys. Hence, the statement regarding the introduction of uniform reporting standards via this Act is correct.

• This Act amends several existing laws, including the Reserve Bank of India Act, 1934 and the Banking Regulation Act, 1949, to give the RBI greater functions in supervising the liquidity and statutory reserves of banks.

• The move to uniform reporting aims to reduce data discrepancies that occurred due to the variations in the number of Fridays in different months or years.

Additional Information

• Reserve Bank of India Act, 1934:

• This Act provided the legal framework for the establishment of the Reserve Bank of India on April 1, 1935.

• It defines the functions of the RBI as the country’s central bank, including the issuance of currency notes and the regulation of the monetary system to maintain stability in India.

• It also contains provisions for the Cash Reserve Ratio (CRR) that banks must maintain with the RBI.

• Banking Regulation Act, 1949:

• Originally passed as the Banking Companies Act, 1949, it was later renamed in 1966.

• This Act gives the RBI the power to license banks, regulate their shareholding, and supervise the appointment of boards and management.

• It applies to both commercial and cooperative banks across the country, ensuring a safe banking environment for depositors.

• State Bank of India Act, 1955:

• This Act led to the formation of the State Bank of India (SBI) on July 1, 1955, by taking over the Imperial Bank of India.

• Its primary application was to expand banking facilities in rural areas and serve the government's financial needs.

Important Points

• Nomination Updates: The Banking Laws (Amendment) Act, 2025 increased the number of permitted nominees per account from one to four, allowing for simultaneous or successive nominations.

• Substantial Interest: The Act revised the numerical value defining "substantial interest" for directors, increasing it from Rs. 5 lakhs to Rs. 2 crores, which reflects current economic data and market valuations.

• Director Tenures: In the context of Cooperative Banks, the Act extends the tenure of directors to align with other government guidelines and laws, specifically moving the limit from eight years to ten years in certain organizations.

• Regulatory Reporting: By shifting to a fixed-date reporting system (the 15th and 30th/31st), the RBI can better calculate the Statutory Liquidity Ratio (SLR) and Cash Reserve Ratio (CRR) for the entire banking sector simultaneously.

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Q60. Answer: (c) Taj Mahal

The correct answer is Taj Mahal.

Key Points

• The Taj Mahal is an ivory-white marble mausoleum located on the southern bank of the Yamuna River in Agra, Uttar Pradesh, India. It was commissioned in 1632 by the Mughal Emperor Shah Jahan to house the tomb of his beloved wife, Mumtaz Mahal. Hence, this is the correct option.

• The monument was designated as a UNESCO World Heritage Site in 1983 for being "the jewel of Muslim art in India and one of the universally admired masterpieces of the world's heritage." It is also considered one of the New Seven Wonders of the World.

• Jama Masjid (Agra) was built by Shah Jahan in 1648 and dedicated to his daughter, Jahanara Begum. While it is a significant 17th-century structure in Agra, it is not individually listed as a UNESCO World Heritage Site in the same capacity as the Taj Mahal. Hence, this statement is incorrect.

• Safdarjung Tomb is located in New Delhi and was built in 1754 for Nawab Safdarjung during the late Mughal Empire era. Since it was built in the 18th century and is not located in Agra, it does not fit the criteria. Hence, this statement is incorrect.

• Sikandra Tomb is the final resting place of the Mughal Emperor Akbar. It is located in Agra, but its construction was completed by his son, Emperor Jahangir, in 1613. It was not built by Shah Jahan. Hence, this statement is incorrect.

Additional Information

• Architectural Style: The Taj Mahal is the pinnacle of Mughal Architecture, which is a unique blend of Indian, Persian, and Islamic styles. The construction project involved approximately 20,000 artisans under the guidance of a board of architects led by Ustad Ahmad Lahauri.

• Materials and Decoration: The main structure is constructed of white marble sourced from the quarries of Makrana in Rajasthan. It is famous for its Pietra Dura work, which involves inlaying precious and semi-precious stones like lapis lazuli, jade, crystal, and turquoise into the marble to create floral and geometric patterns.

• Timeline: The construction of the mausoleum was essentially completed in 1643, but work continued on other phases of the project for another 10 years. The entire complex is believed to have been completed in its entirety in 1653 at a cost estimated at the time to be around 32 million rupees.

• The Garden (Charbagh): The complex is set around a large 300-metre square Charbagh (Mughal garden). The garden uses raised pathways that divide each of the four quarters of the garden into 16 sunken parterres or flowerbeds.

Important Points

• Shah Jahan's Reign: Known as the Golden Age of Mughal Architecture, Shah Jahan (the fifth Mughal Emperor) commissioned several famous monuments including the Red Fort (Lal Qila) in Delhi, the Jama Masjid in Delhi, and the city of Shahjahanabad.

• UNESCO Sites in Agra: There are three UNESCO World Heritage Sites located in or near Agra: the Taj Mahal (1983), the Agra Fort (1983), and Fatehpur Sikri (1986).

• Conservation: To protect the monument from environmental pollution and the yellowing of marble caused by industrial emissions, the Government of India established the Taj Trapezium Zone (TTZ). This is a defined area of 10,400 sq km around the Taj Mahal where strict pollution control standards are enforced.

• Mumtaz Mahal: She was the second wife of Shah Jahan. She died in 1631 in Burhanpur while giving birth to their 14th child, Gauhara Begum. Her body was eventually moved to the Taj Mahal complex once it was ready.

Q61. Answer: (c) 50%

Shortcut Trick

Let CP = 100

MP = 100 + 160% = 260

Required SP for 30% profit = 130

=> Discount = 260 − 130 = 130

=> Discount % = (130 ÷ 260) × 100 = 50%

Therefore Answer = 50%

Alternate Method

Given:

Markup = 160%, Profit = 30%

Formula Used:

Profit % = (SP − CP) ÷ CP × 100

Calculation:

=> Let CP = 100

=> MP = 100 + 160% of 100 = 260

=> SP = 100 + 30% of 100 = 130

=> Discount = MP − SP = 260 − 130 = 130

=> Discount % = (130 ÷ 260) × 100

=> = 50%

Therefore Final Answer = 50%

Additional Information

Markup Concept: MP = CP × (1 + Markup%)

Discount Formula: Discount % = (Discount ÷ MP) × 100

Exam Insight: Taking CP = 100 simplifies all percentage-based problems.

Q62. Answer: (a) 53.05%

Shortcut Trick

Let B = 100

A = 100 + 113% = 213

=> Difference = 213 − 100 = 113

=> % less of B w.r.t A = (113 ÷ 213) × 100

=> = 53.05%

Therefore Answer = 53.05%

Alternate Method

Given:

A is 113% more than B

Formula Used:

Percentage = (Difference ÷ Base) × 100

Calculation:

=> Let B = 100

=> A = 100 + 113% of 100 = 213

=> Difference = A − B = 213 − 100 = 113

=> Required % = (113 ÷ 213) × 100

=> = 53.05%

Therefore Final Answer = 53.05%

Additional Information

Key Concept: When comparing A to B, base changes — always divide by the reference value.

Reverse % Trick: If A is x% more than B, then B is less than A by x ÷ (100 + x) × 100

Exam Insight: Direct formula saves time: Required % = 113 ÷ 213 × 100

Q63. Answer: (b) Chandrashekhar

The correct answer is Chandrashekhar.

Key Points

• Chandrashekhar served as the 8th Prime Minister of India from 10 November 1990 to 21 June 1991. He is the only person among the given options who never held the post of Chief Minister of any Indian State before becoming the Prime Minister. Hence, this option is correct.

• Morarji Desai was the 4th Prime Minister of India (1977–1979). Prior to this, he served as the Chief Minister of the erstwhile Bombay State from 1952 to 1956. Hence, this option is incorrect.

• V.P. Singh (Vishwanath Pratap Singh) served as the 7th Prime Minister of India from 1989 to 1990. He had previously served as the Chief Minister of Uttar Pradesh between 1980 and 1982. Hence, this option is incorrect.

• P.V. Narasimha Rao was the 9th Prime Minister of India, serving from 1991 to 1996. He held the office of the Chief Minister of Andhra Pradesh from 1971 to 1973. Hence, this option is incorrect.

• Chandrashekhar was also known for the unique distinction of becoming the Prime Minister without ever holding any prior Ministerial portfolio at the Central or State level.

Additional Information

• Chandrashekhar's Political Career:

• He was popularly known as the "Young Turk" for his fiery conviction and opposition to the established Congress leadership during the 1960s.

• He hailed from the Ibrahimpatti village in the Ballia district of Uttar Pradesh and was a prominent leader of the Janata Dal (Socialist).

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• His government was a minority government supported by the Indian National Congress from the outside, which lasted for only 223 days.

• Prime Ministers who were Chief Ministers:

• A total of 6 individuals have served as both Chief Minister and Prime Minister of India.

• These include Morarji Desai (Bombay State), Charan Singh (Uttar Pradesh), V.P. Singh (Uttar Pradesh), P.V. Narasimha Rao (Andhra Pradesh), H.D. Deve Gowda (Karnataka), and Narendra Modi (Gujarat).

• Narendra Modi is the 14th and current Prime Minister, having served as the Chief Minister of Gujarat for four terms from 2001 to 2014.

• Prime Ministers who were never Chief Ministers:

• Several prominent leaders moved directly to the Union Cabinet or the Prime Minister's Office without being a Chief Minister.

• This list includes Jawaharlal Nehru, Lal Bahadur Shastri, Indira Gandhi, Rajiv Gandhi, Atal Bihari Vajpayee, I.K. Gujral, and Manmohan Singh.

Important Points

• Morarji Desai: He was the first non-Congress Prime Minister of India and is the only person to receive the highest civilian awards from both India (Bharat Ratna) and Pakistan (Nishan-e-Pakistan).

• V.P. Singh: His tenure is most remembered for the implementation of the Mandal Commission report in 1990, which provided 27% reservation for Other Backward Classes (OBCs) in central government jobs.

• P.V. Narasimha Rao: He is often called the "Father of Indian Economic Reforms" for initiating the Liberalization, Privatization, and Globalization (LPG) policies in 1991 alongside then-Finance Minister Manmohan Singh.

• Constitutional Provision: According to Article 75 of the Constitution of India, the Prime Minister is appointed by the President, and there is no legal requirement for them to have served as a Chief Minister or even a Minister previously.

Q64. Answer: (c) (12, 141, 3)

The logic followed here is:

Logic: Second number = (First number)² − (Third number)

37, 1361, 8

=> 37 × 37 = 1369

=> 1369 − 8 = 1361

47, 2185, 24

=> 47 × 47 = 2209

=> 2209 − 24 = 2185

Now, checking the options:

Option 1) (50, 2475, 24)

=> $50^2 = 2500$

=> 2500 − 24 = 2476 (not 2475)

Option 2) (4, 10, 5)

=> $4^2 = 16$

=> 16 − 5 = 11 (not 10)

Option 3) (12, 141, 3)

=> $12^2 = 144$

=> 144 − 3 = 141

Option 4) (29, 829, 11)

=> $29^2 = 841$

=> 841 − 11 = 830

Hence, the correct answer is Option 3.

Q65. Answer: (c) 120

Shortcut Trick

The product of two numbers = HCF × LCM.

=> Other number = Product ÷ Given number.

=> Other number = (12 × 840) ÷ 84 = 120.

Therefore Answer = 120

Alternate Method

Given:

HCF = 12, LCM = 840, One number = 84
Formula used:
Product of two numbers = HCF × LCM
Other number = Product ÷ Given number
Calculations:
Product of numbers = 12 × 840 = 10080
=> Other number = 10080 ÷ 84 = 120
Therefore The correct answer is 120.
Additional Information
Relation Between HCF and LCM
The product of HCF and LCM of two numbers equals the product of the two numbers.
LCM Formula
LCM = (Product of numbers) ÷ HCF
Finding One Number
If HCF, LCM, and one number are given, the other number = (HCF × LCM) ÷ Given number.

Q66. Answer: (a) 70

The logic followed here is:
thus, "70" will replace the question mark in the given series.
Hence, the correct option is "Option 1".

Q67. Answer: (a) Neither conclusion I nor II follows.

Given Statements:
All malls are halls.
All halls are walls.
No mall is a fall.
The least possible Venn diagram shows:
Conclusions:
(I) No hall is a fall
This does not necessarily follow because only malls are stated to have no relation with falls. Halls (other than malls) may or may not be fall. So this conclusion does not follow.
(II) No wall is a fall
This also does not follow because we have no information restricting relation between walls and falls. Only malls are restricted.
Therefore, neither conclusion I nor II follows.
Hence, the correct answer is "Option 1".

Q68. Answer: (c) IJD 6

The logic followed here is:
So, 'IJD 6' will replace the question mark in the given series.
Hence, the correct answer is "Option 3".

Q69. Answer: (b) Both statements I and II together are NOT sufficient to answer the question

Given Question:
Among 5 trees L, M, N, T and V each having different heights
Now,
Statement (I):
M is shorter than T but taller than L
=> L < M < T
But relation with N and V is not given
=> Not sufficient to identify tallest tree
Statement (II):
L is taller than V but shorter than N
=> V < L < N

But relation with M and T is not given

=> Not sufficient to identify tallest tree

Now combining both statements:

From (I): L < M < T

From (II): V < L < N

V < L < M < T and V < L < N

But comparison between N and T is not given

=> Tallest tree cannot be uniquely identified

Here, both statements together are NOT sufficient to answer the question.

Hence, the correct answer is "Option 2".

Q70. Answer: (b) OME:ROF

The logic followed here is:

For, FKM → IMN

For, BAL → ECM

Now, checking the options:

Option 1) OSH → PUI

Option 2) OME → ROF

Option 3) IKE → KMF

Option 4) RTP → SUQ

Hence, the correct answer is Option 2.

Q71. Answer: (b) Mahbub-ul-Haq

The correct answer is Mahbub-ul-Haq.

Key Points

• The concept of human development was introduced by Dr. Mahbub-ul-Haq, a Pakistani economist, in the year 1990. He described human development as development that enlarges people's choices and improves their lives.

• Dr. Mahbub-ul-Haq and Indian Nobel laureate Dr. Amartya Sen worked together to establish the theoretical underpinnings of the Human Development Index (HDI). While Dr. Haq emphasized the expansion of choices, Dr. Sen introduced the "Capability Approach", focusing on what people are effectively able to do and be.

• According to the concept, the basic goal of development is to create an environment where people can enjoy long, healthy, and creative lives. This shifted the focus of development from purely economic growth (measured by GDP) to a people-centric approach.

• The first Human Development Report (HDR) was published by the United Nations Development Programme (UNDP) in 1990, based on the framework provided by these scholars.

• The concept highlights that income is not the end-goal of development; rather, it is a means to achieve human development. The real wealth of a nation is its people.

Additional Information

• Alexander Von Humboldt: He was a Prussian polymath, geographer, and naturalist who lived from 1769 to 1859. He is widely recognized as the "Father of Modern Geography". His work, "Cosmos", attempted to unify various branches of scientific knowledge and culture.

• Amartya Sen: An Indian economist and philosopher who was awarded the Nobel Memorial Prize in Economic Sciences in 1998. His contribution to welfare economics and social choice theory has been monumental, particularly his work on famines and the human development framework.

• Griffith Taylor: An Australian geographer who introduced the concept of Neo-determinism, also known as "Stop and Go Determinism". This theory suggests that humans can accelerate, slow, or stop the speed of a country's development, but they should not depart from the main trends set by the environment.

• United Nations Development Programme (UNDP): Established in 1965, it is the UN's global development network. It helps countries eliminate poverty and achieve sustainable human development. It has been publishing the Human Development Report annually since 1990.

Important Points

• The Human Development Index (HDI) is a composite index that measures average achievement in three basic dimensions of human development:

• Health: Measured by Life Expectancy at Birth.

• Education: Measured by Mean Years of Schooling for adults aged 25 years and more and Expected Years of Schooling for

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children of school-entering age.

• Standard of Living: Measured by Gross National Income (GNI) per capita (at Purchasing Power Parity in US Dollars).

• The HDI value ranges from 0 to 1. Countries are categorized into four tiers: Very High, High, Medium, and Low human development.

• In recent reports, Norway, Switzerland, and Iceland often rank at the top of the HDI list, reflecting high investment in social infrastructure and public health.

• Other indices related to human development include the Inequality-adjusted HDI (IHDI), the Gender Development Index (GDI), and the Multidimensional Poverty Index (MPI).

Q72. Answer: (d) Inertia

The correct answer is Inertia.

Key Points

• Inertia is defined as the inherent property of a body by virtue of which it resists any change in its state of rest or of uniform motion in a straight line. It is the natural tendency of objects to resist changes in their state of motion. Hence, the correct answer is Inertia.

• Acceleration is the rate of change of velocity of an object with respect to time. It occurs only when an external unbalanced force acts on an object. It describes how the motion changes rather than the tendency to remain undisturbed. Hence, this statement is incorrect.

• Momentum is a vector quantity defined as the product of the mass and velocity of an object ($p = mv$). It represents the "quantity of motion" possessed by a moving body and depends on how much stuff is moving and how fast it is moving. Hence, this statement is incorrect.

• Force is an external agent (push or pull) capable of changing the state of rest or motion of a particular body. It has a magnitude and a direction, making it a vector quantity. While force causes motion, Inertia is the resistance to that motion. Hence, this statement is incorrect.

• The relationship between these concepts is governed by Newton’s Laws of Motion, where Inertia relates to the first law, and Force, Mass, and Acceleration relate to the second law ($F = ma$).

Additional Information

• Newton's First Law of Motion: Also known as the Law of Inertia, it states that an object will remain at rest or move in a straight line with constant velocity unless it is acted upon by an external force. This law was built upon the earlier ideas of Galileo Galilei.

• Measurement of Inertia: The mass of an object is a quantitative measure of its inertia. The larger the mass of a body, the greater is its inertia. For example, a heavy stone has more inertia than a small ball, meaning it requires more force to change its state. The SI unit of mass is the kilogram (kg).

• Types of Inertia:

• Inertia of Rest: The inability of a body to change its state of rest by itself. Example: When a bus starts suddenly, the passengers lean backwards.

• Inertia of Motion: The inability of a body to change its state of uniform motion by itself. Example: An athlete runs some distance before taking a long jump to gain momentum.

• Inertia of Direction: The inability of a body to change its direction of motion by itself. Example: When a car takes a sharp turn, passengers are thrown to the outer side.

• Historical Context: Before the 17th century, it was believed that the "natural state" of objects was to be at rest. It was Galileo who first suggested that in the absence of friction, an object would keep moving forever, a concept Isaac Newton later formalized in 1687 in his work "Philosophiæ Naturalis Principia Mathematica".

Important Points

• Relationship with Gravity: While Inertia depends solely on mass, weight depends on the gravitational pull. An object has the same inertia on the Earth as it does on the Moon, even though its weight changes.

• Applications: Inertia is the reason why seatbelts are mandatory in vehicles. When a car stops abruptly due to brakes, the passenger's body continues to move forward due to the Inertia of Motion. The seatbelt provides the external force to stop the body safely.

• Mathematical Representation: Though Inertia doesn't have a specific formula like Force, it is proportional to Mass (I prop. to m). In rotational mechanics, this concept is called the Moment of Inertia, which depends on the distribution of mass relative to the axis of rotation.

Q73. Answer: (b) Number of live births per thousand annually

The correct answer is Number of live births per thousand annually.

Key Points

• The Crude Birth Rate (CBR) is defined as the number of live births occurring among the population of a given geographical area during a given year, per 1,000 mid-year total population of the given area during the same year.

• It is called "crude" because it does not take into account the age or gender composition of the population, specifically the

proportion of women in the reproductive age group.

• Statement 1: Net rural to urban migration refers to the movement of people from countryside areas to cities to seek better employment or living conditions, which is a measure of urbanization. Hence, statement 1 is incorrect.

• Statement 2: The Crude Birth Rate specifically measures the frequency of live births in a population per 1,000 individuals annually. Hence, statement 2 is correct.

• Statement 3: The ratio of deaths per population is measured by the Crude Death Rate (CDR), which is also calculated per 1,000 individuals, not per hundred. Hence, statement 3 is incorrect.

• Statement 4: The share of employed women in the workforce is a socio-economic indicator known as the Female Labour Force Participation Rate (FLFPR). Hence, statement 4 is incorrect.

Additional Information

• Global and National Context: The Crude Birth Rate varies significantly across different countries. Developing nations, particularly in Sub-Saharan Africa, often exhibit high CBRs (frequently above 30 per 1,000), while developed countries in Europe and East Asia (like Japan and Germany) have CBRs below 10 per 1,000.

• Indian Demographic Data: In India, the Sample Registration System (SRS) is the primary source of CBR data. As per recent reports, the CBR in India has seen a steady decline due to increased literacy, urbanization, and family planning initiatives. For example, states like Bihar have historically recorded higher birth rates, whereas Kerala and Tamil Nadu record much lower rates.

• Significance: CBR is a crucial metric for demographers and policymakers as it helps in population projections and the planning of maternal and child health services. It is one of the primary components used to calculate the Natural Increase of a population (CBR minus CDR).

• Applications: Governments use this data to allocate resources for education, healthcare, and infrastructure. A high CBR suggests a younger population structure, while a low CBR indicates an ageing population.

Important Points

• Calculation Formula: The CBR is calculated as (Total Number of Live Births / Total Mid-year Population) × 1,000. The mid-year population is used to represent the average population over the year.

• Difference from Fertility Rates: Unlike the General Fertility Rate (GFR) or Total Fertility Rate (TFR), which focus specifically on women in the childbearing age (usually 15–49 years), the CBR includes the entire population (men, children, and the elderly) in its denominator.

• Influencing Factors: Factors that affect the CBR include the average age of marriage, availability of contraception, cultural norms regarding family size, and the level of economic development.

• Relation to SDGs: Monitoring birth rates and reproductive health is integral to achieving United Nations Sustainable Development Goal 3 (Good Health and Well-being) and Goal 5 (Gender Equality).

Q74. Answer: (c) Indus, Ganga, Brahmaputra

The correct answer is Indus, Ganga, and Brahmaputra.

Key Points

• The Northern Plains of India are formed by the interplay of three major river systems: the Indus, the Ganga, and the Brahmaputra, along with their numerous tributaries.

• This vast plain is composed of alluvial soil, which was deposited over millions of years in a large basin located at the foothills of the Himalayas.

• Geographically, the plains extend over an area of approximately 7 lakh square kilometers. The plain is about 2,400 km long and ranges between 240 to 320 km in width.

• It is a densely populated physiographic division due to the combination of a rich soil cover, adequate water supply, and a favorable climate, making it the most agriculturally productive part of India.

• The rivers flowing from the northern mountains are involved in depositional work. In their lower courses, due to a gentle slope, the velocity of the river decreases, leading to the formation of riverine islands and distributaries.

Additional Information

• Indus River System:

• The Indus originates in Tibet near Lake Mansarovar. It flows west and enters India in the Ladakh district.

• Its main tributaries in India are the Zanskar, Nubra, Shyok, and Hunza. In the Punjab region, the Jhelum, Chenab, Ravi, Beas, and Satluj join the Indus.

• The western part of the Northern Plain is referred to as the Punjab Plains, dominated by doabs (land between two rivers).

• Ganga River System:

• The Ganga is formed by the confluence of the Alaknanda and Bhagirathi at Devprayag. It has a total length of 2,525 km.

• The Ganga Plain extends between the Ghaggar and Teesta rivers. It spreads over the states of Haryana, Delhi, Uttar Pradesh, Bihar, and parts of Jharkhand and West Bengal.

• Major tributaries include the Yamuna, Ghaghara, Gandak, and Kosi.

• Brahmaputra River System:

• The Brahmaputra rises in Tibet (where it is known as the Tsangpo), east of Mansarovar lake.

• It enters India through a gorge in Arunachal Pradesh (as the Dihang) and flows through Assam, where it forms the Brahmaputra Valley.

• It is known for having the world's largest riverine island, Majuli, located in the state of Assam.

Important Points

• The Northern Plains are generally divided into four regions based on relief features:

• Bhabar: A narrow belt of 8 to 16 km in width consisting of pebbles where rivers disappear underground.

• Terai: A marshy and swampy region south of the Bhabar, characterized by thick forests and wildlife.

• Bhangar: The older alluvium of the plains, forming a terrace-like feature above the floodplains, often containing calcareous deposits known as Kankar.

• Khadar: The newer, younger deposits of the floodplains that are renewed almost every year, making them ideal for intensive agriculture.

• The Ganga-Brahmaputra Delta, also known as the Sundarbans, is the largest delta in the world and is famous for Royal Bengal Tigers and mangrove forests.

Q75. Answer: (a) Kensington Treaty

The correct answer is Kensington Treaty.

Key Points

• The United Kingdom and Germany signed the Kensington Treaty on 17 July 2025.

• This agreement marked the first bilateral treaty between the two countries since the end of the Second World War.

• The treaty focused on strengthening cooperation in areas such as:

• Defence and security

• Trade and investment

• Technology and innovation

• Climate and energy cooperation

• The agreement symbolized a major step toward enhancing strategic relations between the UK and Germany in the post-Brexit period.

• Option-wise Analysis:

• Kensington Treaty – UK-Germany bilateral treaty signed in 2025. Correct.

• Lancaster House 2.0 – Related to defence cooperation terminology, not this treaty.

• Northwood Declaration – Not associated with the 2025 UK-Germany treaty.

• Maastricht Treaty – Signed in 1992, establishing the European Union (EU).

• Hence, the correct answer is Kensington Treaty.

Additional Information

• Second World War lasted from 1939 to 1945 and significantly shaped European diplomatic relations.

• Germany is Europe’s largest economy, while the United Kingdom remains a major global financial and military power.

• Brexit refers to the withdrawal of the United Kingdom from the European Union on 31 January 2020.

• Maastricht Treaty was signed in 1992 in the Netherlands and formally created the European Union.

• Modern bilateral treaties often include cooperation in emerging sectors such as cybersecurity, artificial intelligence, renewable energy, and defence technology.

Important Points

• The Kensington Treaty reflects the growing importance of bilateral partnerships in Europe after Brexit.

• Questions related to international treaties, global diplomacy, European affairs, and current international developments are frequently asked in competitive examinations.

Q76. Answer: (c) TPOM

The logic followed here is:

For, DMKZ → EKNV

Now, LOJT → MMMP

Now, applying the same logic for SRLQ:

So, SRLQ → TPOM

Hence, the correct answer is Option 3.

Q77. Answer: (d) 0.685

The correct answer is 0.644.

Key Points

• According to the Human Development Report 2023-24 (released in March 2024), which provides the latest data for the 2022-2023 period, India's Human Development Index (HDI) value increased to 0.644.

• India's global rank stands at 134th out of 193 countries and territories surveyed in the latest report.

• The report indicates a significant recovery from the COVID-19 pandemic period, as India's HDI value was 0.633 in 2021 and 0.642 in 2020.

• India is classified under the Medium Human Development category, showing consistent progress in life expectancy and education metrics over the past decade.

• The HDI is a composite index that measures average achievement in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living.

Additional Information

• Dimensions and Indicators:

• Life Expectancy: India's life expectancy at birth improved to 67.7 years in 2022, up from 67.2 years in 2021.

• Education: The Expected Years of Schooling (EYS) for India is 12.6 years, while the Mean Years of Schooling (MYS) is 6.57 years.

• Economic Standard: India's Gross National Income (GNI) per capita (at 2017 PPP prices) is reported at $6,951.

• Global Context:

• The United Nations Development Programme (UNDP) has been publishing the Human Development Report (HDR) annually since 1990.

• The concept of HDI was developed by Pakistani economist Mahbub ul Haq and Indian Nobel laureate Amartya Sen.

• Switzerland, Norway, and Iceland consistently rank at the top of the global HDI list.

Important Points

• Comparison with Neighbors: In the 2023-24 report, India's neighbors showed varying ranks: Sri Lanka (78th), China (75th), Bhutan (125th), Bangladesh (129th), and Pakistan (164th).

• Gender Inequality Index (GII): India has also shown improvement in the GII, ranking 108th out of 193 countries with a value of 0.437, which is better than the global average.

• Inequality-adjusted HDI (IHDI): When adjusted for inequality, India's HDI value falls, highlighting the disparity in the distribution of development across the population. India's IHDI value for 2022 was approximately 0.434.

• Planetary Pressures: Recent reports also include the Planetary pressures-adjusted HDI (PHDI), which accounts for carbon dioxide emissions and material footprint per capita to reflect sustainable development.

Q78. Answer: (b) He put forward the view that the state should never be based on the willing support of the governed.

The correct answer is He put forward the view that the state should never be based on the willing support of the governed.

Key Points

• Jalaluddin Khalji, who ascended the throne in 1290 AD, was the first sultan of the Delhi Sultanate to clearly put forward the view that the state should be based on the willing support of the governed. He believed that since the large majority of the people in India were Hindus, the state in India could not be a truly Islamic state. Hence, the statement that he believed the state should "never" be based on willing support is incorrect.

• He was known for his policy of clemency and avoided harsh punishments, even toward those who conspired against him. He famously stated that he was an "old Muslim" and was not accustomed to shedding the blood of Muslims. Hence, statement 1 is correct.

• Upon his accession, Jalaluddin Khalji did not eliminate the existing nobility. Instead, he tried to win their goodwill by allowing many of the old Balbani nobles to retain their posts and status, aiming for a peaceful transition of power. Hence, statement 3 is correct.

• A significant example of his tolerance was his reaction to the revolt of Malik Chajju (a nephew of Balban) in Kara. After the revolt was suppressed, Jalaluddin not only forgave the rebels but also hosted a feast for them, praising their loyalty to their former master's family. Hence, statement 4 is correct.

• His reign marked the beginning of the Khalji Dynasty and a shift in the nature of the Delhi Sultanate's administration toward a more liberal and less exclusionary approach compared to the previous Ilbari Turks.

Additional Information

• Background and Accession: Jalaluddin Firuz Khalji came to power at the age of 70 after the downfall of the Mamluk Dynasty. His rise to the throne is often called the "Khalji Revolution" because it ended the monopoly of the Turkish nobility and opened high offices to Indian Muslims and Khaljis.

• The Sidi Maula Incident: While he was generally merciful, the execution of the Sufi saint Sidi Maula remains a rare instance of

harshness during his reign. Sidi Maula was accused of plotting a rebellion and was eventually trampled by an elephant.

• Mongol Invasion: In 1292 AD, a Mongol army led by Abdullah (grandson of Hulagu Khan) invaded India. Jalaluddin successfully repelled the invasion. He allowed many Mongols to settle near Delhi after they converted to Islam; these settlers became known as "New Muslims".

• Internal Challenges: His mild policies were often criticized by the younger Khalji officers, including his nephew Alauddin Khalji, who viewed his tolerance as a sign of weakness that encouraged lawlessness.

• End of Reign: His reign ended in July 1296 when he was assassinated by his nephew and son-in-law, Alauddin Khalji, during a meeting at Kara-Manikpur. This act led to Alauddin Khalji becoming the next Sultan, who shifted the state back to a policy of harsh discipline and centralization.

Important Points

• Administrative Philosophy: Unlike Balban, who believed in the "Theory of Divine Right" and maintained a rigid distance from the common people, Jalaluddin sought to humanize the monarchy.

• Geographical Reach: During his short reign, he attempted expeditions to Ranthambore in 1291 AD but retreated to avoid the loss of Muslim lives, further demonstrating his non-violent inclinations toward his co-religionists.

• Legacy: Though his lenient approach was short-lived, it set a precedent for secular considerations in Indian governance, emphasizing that a ruler must account for the demographics and sentiments of the population.

Q79. Answer: (a) Versatility

The correct answer is Versatility.

Key Points

• Versatility is one of the most significant characteristics of a computer, referring to its capacity to perform completely different types of work at the same time or in rapid succession. This allows a single machine to transition from complex mathematical calculations to multimedia processing, graphic design, or global communication effortlessly.

• This characteristic is fundamentally rooted in the programmability of the computer. Unlike a calculator or a dedicated machine that can only perform specific functions, a computer's hardware is designed to follow any set of logical instructions provided via software applications.

• In a professional environment, Versatility enables a user to use a computer for preparing a spreadsheet, then switch to editing a high-resolution video, and simultaneously manage emails or web browsing. This multi-functional nature makes it an essential tool in every modern industry.

• The versatile nature of computers is categorized by the ability to handle both numerical data and non-numerical data (like text, sound, and images), making them universal machines. Hence, the statement that versatility allows for various tasks is correct.

Additional Information

• Speed: Computers are high-speed electronic devices capable of performing millions of calculations per second. The speed of a Central Processing Unit (CPU) is typically measured in Hertz (Hz), with modern processors operating in the Gigahertz (GHz) range. This allows tasks that would take humans years to be completed in microseconds or nanoseconds.

• Accuracy: Computers are known for their extreme precision. As long as the input data and the program instructions are correct, the computer will produce error-free results. Errors in computing are usually the result of human error, often referred to as GIGO (Garbage In, Garbage Out).

• Automation: Once a program or a set of instructions is loaded into the computer memory, the machine can execute the task automatically without human intervention. This feature is critical in manufacturing, robotics, and large-scale data processing.

• Diligence: Unlike human beings, a computer is free from tiredness, monotony, and lack of concentration. It can work for hours or even days performing the exact same repetitive task with the same speed and accuracy as the first time.

• Storage Capacity: Computers have the ability to store enormous amounts of information in very small physical spaces. Data can be stored in Primary Memory (RAM) for immediate use or in Secondary Storage like Hard Disk Drives (HDD), Solid State Drives (SSD), and Cloud Storage for long-term retrieval.

Important Points

• History and Evolution: The concept of a versatile computer was first envisioned by Charles Babbage with his Analytical Engine in the 19th Century. Since then, the transition from vacuum tubes to transistors and finally to Integrated Circuits (ICs) has exponentially increased the functional range of computers.

• Modern Applications: Today, the versatility of computers is seen in Artificial Intelligence (AI), Machine Learning, and Internet of Things (IoT), where computers are integrated into smart homes, autonomous vehicles, and medical diagnostic tools.

• Logical Power: A computer is a logical machine. Its Arithmetic Logic Unit (ALU) allows it to make comparisons and decisions based on binary logic (0s and 1s), which is the foundation of all its complex operations.

Q80. Answer: (b) 8

Given number: 48572613

Logic:

Add 1 to each odd digit

Subtract 1 from each even digit

Original number: 4 8 5 7 2 6 1 3

Digit	Type	Operation	New Digit
4	Even	4 − 1	3
8	Even	8 − 1	7
5	Odd	5 + 1	6
7	Odd	7 + 1	8
2	Even	2 − 1	1
6	Even	6 − 1	5
1	Odd	1 + 1	2
3	Odd	3 + 1	4

New number: 3 7 6 8 1 5 2 4

Greatest digit = 8

Smallest digit = 1

Product = 8 × 1 = 8

Hence, the correct answer is Option 2.

Q81. Answer: (d) 24

Shortcut Trick

Opposite direction => Relative speed = 49 + 59 = 108 km/hr

=> Convert to m/s: 108 × 5/18 = 30 m/s

Total distance = 349 + 371 = 720 m

=> Time = 720 ÷ 30 = 24 sec

Therefore Answer = 24 seconds

Alternate Method

Given:

Speed of trains = 49 km/hr and 59 km/hr

Lengths = 349 m and 371 m

Formula Used:

Time = Total Distance ÷ Relative Speed

Calculation:

=> Relative speed = 49 + 59 = 108 km/hr

=> Convert into m/s = 108 × 5/18 = 30 m/s

=> Total length = 349 + 371 = 720 m

=> Time = 720 ÷ 30 = 24 sec

Therefore Final Answer = 24 seconds

Additional Information

Relative Speed: Opposite direction => add speeds, Same direction => subtract speeds

Conversion Trick: km/hr to m/s => multiply by 5/18

Train Crossing: Always add lengths when two trains cross each other

Q82. Answer: (d) U-shaped valley

The correct answer is U-shaped valley.

Key Points

• A U-shaped valley, also known as a glacial trough, is formed when a glacier travels across and down a slope, carving the valley through the action of scouring.

• Glaciers typically follow the path of pre-existing river valleys. While rivers create V-shaped valleys through vertical erosion, glaciers transform them by widening, deepening, and smoothing the landscape.

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• The process involves massive ice sheets or alpine glaciers that exert immense pressure on the valley floor and walls. This leads to the removal of interlocking spurs, resulting in a straightened and broadened valley.

• These valleys are characterized by steep, nearly vertical side walls and a wide, flat valley floor. When these valleys are filled with seawater after the glacier melts, they are referred to as fjords. Hence, the statement regarding the U-shaped valley is correct.

Additional Information

• V-shaped valley:

• These are formed by the erosional action of rivers in their youthful stage.

• The river cuts downward into the bedrock more rapidly than the valley sides are eroded, resulting in a narrow and deep shape resembling the letter 'V'. Hence, this option is incorrect as it relates to river erosion, not glacial.

• Gorge:

• A gorge is a narrow valley with steep, rocky walls located between hills or mountains.

• It is often formed by rivers or geological shifts over millions of years. A famous example is the Grand Canyon in the United States. Hence, this option is incorrect as it describes a narrow, deep river-cut feature.

• Floodplain:

• A floodplain is a flat area of land next to a river or stream.

• It stretches from the banks of the river to the outer edges of the valley. It is a depositional landform composed of alluvium (silt, sand, and clay) deposited during floods. Hence, this option is incorrect as it is a depositional river landform.

Important Points

• Mechanisms of Glacial Erosion:

• Plucking: This occurs when meltwater freezes into cracks in the rock; as the glacier moves, it pulls out large chunks of stone.

• Abrasion: The debris frozen into the ice acts like sandpaper, grinding and polishing the valley floor and walls as the glacier slides.

• Geological Timeline: Most prominent U-shaped valleys were formed during the Pleistocene Epoch (approximately 2.6 million to 11,700 years ago) when glaciation was widespread across the Northern Hemisphere.

• Global Examples:

• Yosemite Valley in California, USA, is a world-renowned U-shaped valley.

• The Lauterbrunnen Valley in Switzerland features 72 waterfalls plunging over vertical glacial walls.

• In India, the Leh-Ladakh region and parts of the Himalayas exhibit classic glacial topography.

• Associated Features: Often found with hanging valleys (smaller valleys left high above the main floor), cirques (bowl-shaped depressions), and moraines (accumulations of dirt and rocks).

Q83. Answer: (b) Arundhati Roy

The correct answer is Arundhati Roy.

Key Points

• Arundhati Roy is the author of the memoir 'Mother Mary Comes to Me'.

• The memoir was released in September 2025 and reflects her deeply personal experiences and perspectives.

• The book explores themes of family, memory, identity, and introspection.

• It marks a significant addition to her body of non-fiction and reflective writing.

• Arundhati Roy is widely known for blending literary expression with socio-political insights in her works.

Additional Information

• Jhumpa Lahiri:

• She is a Pulitzer Prize-winning author known for works like Interpreter of Maladies and The Namesake.

• Her writing often explores themes of immigration, identity, and cultural displacement.

• Vikram Seth:

• A renowned Indian novelist and poet, best known for A Suitable Boy.

• His works span across genres including poetry, fiction, and travel writing.

• Chetan Bhagat:

• A popular Indian author known for his contemporary fiction novels.

• His notable works include Five Point Someone and 2 States.

Important Points

• Arundhati Roy won the Man Booker Prize in 1997 for her novel The God of Small Things.

• She is also known for her strong voice in political activism and social issues.

• Her non-fiction works include The Algebra of Infinite Justice and Capitalism: A Ghost Story.

• This memoir adds to her legacy as a writer who combines literary depth with personal and political reflection.

Q84. Answer: (b) 24

BODMAS Table:

Given equation: 12 A 4 B 6 C 8 D 2 = ?

Now, replacing the symbols with their meanings ‘A = ÷’, ‘B = ×’, ‘C = +’, ‘D = −’, then:

=> 12 ÷ 4 × 6 + 8 − 2

=> (12 ÷ 4) × 6 + 8 − 2

=> 3 × 6 + 8 − 2

=> 18 + 8 − 2

=> 26 − 2

=> 24

Hence, the correct answer is "Option 2".

Q85. Answer: (a) 28 km/hr

Shortcut Trick

Let boat speed = x

Downstream speed = x + 4, Upstream speed = x − 4

Same distance => ratio of speeds = inverse of time

=> (x + 4) : (x − 4) = 8 : 6 = 4 : 3

=> 3(x + 4) = 4(x − 4)

=> 3x + 12 = 4x − 16 => x = 28

Therefore Answer = 28 km/h

Alternate Method

Given:

Downstream time = 6 hr, Upstream time = 8 hr

Speed of stream = 4 km/hr

Formula Used:

Speed = Distance ÷ Time

Calculation:

=> Let distance = D

=> Downstream speed = D ÷ 6

=> Upstream speed = D ÷ 8

=> Boat speed = (Downstream + Upstream) ÷ 2

=> = (D/6 + D/8) ÷ 2

=> = (4D + 3D) ÷ 24 × 1/2

=> = 7D ÷ 48

=> Stream speed = (Downstream − Upstream) ÷ 2

=> 4 = (D/6 − D/8) ÷ 2

=> 4 = (4D − 3D) ÷ 24 × 1/2

=> 4 = D ÷ 48

=> D = 192

=> Boat speed = 7D ÷ 48 = 7 × 192 ÷ 48 = 28 km/hr

Therefore Final Answer = 28 km/h

Additional Information

Boat Formula: Boat speed = (Downstream + Upstream) ÷ 2

Stream Formula: Stream speed = (Downstream − Upstream) ÷ 2

Exam Insight: Use ratio method when time is given for same distance

Q86. Answer: (a) Three

The logic followed here is:

Given: (Left) G & R E 5 K % 7 @ 2 S & 6 C T # 3 4 Y * D (Right)

Now, we need symbols which are immediately preceded by a letter and also immediately followed by a number.

So, Needed pattern is: Letter - Symbol - Number
(Left) G & R E 5 K % 7 @ 2 S & 6 C T # 3 4 Y * D (Right)
So, only three symbols satisfy the condition.
Hence, the correct answer is Option 1.

Q87. Answer: (c) 54.95 m²

Shortcut Trick
Slant height l = √(24² + 7²) = √625 = 25
CSA of cone = πrl = 3.14 × 7 × 25
=> = 3.14 × 175 = 549.5 cm²
=> For 1000 cups = 549500 cm²
=> Convert to m² = 549500 ÷ 10000 = 54.95
Therefore Answer = 54.95 m²
Alternate Method
Given:
Height = 24 cm, Radius = 7 cm, Number of cups = 1000
Formula Used:
Curved Surface Area of cone = πrl
Calculation:
=> l = √(h² + r²) = √(24² + 7²)
=> = √(576 + 49) = √625 = 25 cm
=> CSA = 3.14 × 7 × 25 = 549.5 cm²
=> Total area for 1000 cups = 549.5 × 1000 = 549500 cm²
=> Convert into m² = 549500 ÷ 10000 = 54.95 m²
Therefore Final Answer = 54.95 m²
Additional Information
Slant Height: l = √(h² + r²)
CSA of Cone: πrl (base not included in paper cups)
Unit Conversion: 1 m² = 10000 cm²

Q88. Answer: (b) m ≠ 3/2

Shortcut Trick
Quadratic condition: coefficient of x² ≠ 0
=> 2m − 3 ≠ 0
=> m ≠ 3/2
Therefore Answer = m ≠ 3/2
Alternate Method
Given:
(2m − 3)x² + (m + 1)x + 5 = 0
Concept Used:
A quadratic equation must have coefficient of x² ≠ 0
Calculation:
=> Coefficient of x² = 2m − 3
=> For quadratic: 2m − 3 ≠ 0
=> 2m ≠ 3
=> m ≠ 3/2
Therefore Final Answer = m ≠ 3/2
Additional Information
Quadratic Form: ax² + bx + c = 0 where a ≠ 0
Linear Case: If a = 0, equation reduces to linear
Exam Insight: Always check leading coefficient first

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Q89. Answer: (c) 30°

Shortcut Trick

In right ΔOBA, sin(angle OAB) = OB/OA = 3/6 = 1/2 => angle OAB = 30°.

In ΔOBA, angle AOB = 90° − 30° = 60°.

Since OA bisects angle BOC, angle BOC = 2 × 60° = 120°.

In isosceles ΔOBC (OB=OC), angle OBC = (180° − 120°) ÷ 2 = 30°.

Therefore The correct answer is 30°.

Alternate Method

Given:

Radius (OB = OC) = 3 cm

Distance from centre (OA) = 6 cm

Tangents AB and AC from point A.

Formula Used:

Tangent is perpendicular to the radius at the point of contact (angle OBA = 90°).

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

O

A

B

C

3 cm

6 cm

Calculations:

=> In right-angled ΔOBA, angle OBA = 90°.

=> cos(angle AOB) = OB / OA = 3 / 6 = 1/2.

=> angle AOB = cos^(−1)(1/2) = 60°.

=> Similarly, in ΔOCA, angle AOC = 60°.

=> Total angle BOC = angle AOB + angle AOC = 60° + 60° = 120°.

=> In ΔOBC, OB = OC (radii), so it is an isosceles triangle.

=> angle OBC + angle OCB + angle BOC = 180°.

=> 2 × angle OBC + 120° = 180°.

=> 2 × angle OBC = 60°.

=> angle OBC = 30°.

Therefore The correct answer is 30°.

Additional Information

Tangent-Radius Property

A tangent at any point of a circle is perpendicular to the radius through the point of contact.

Length of Tangents

The lengths of tangents drawn from an external point to a circle are equal (AB = AC).

Angle Relation

The angle between two tangents from an external point is supplementary to the angle subtended by the radii at the centre (angle BAC + angle BOC = 180°).

Q90. Answer: (d) Wife’s mother

Family Chart:

Decoding the Symbols:

Symbol	•	–	×	%	#
Meaning	Mother	Brother	Wife	Father	Daughter

Given: D × N % P + K # E

It means: D is the wife of N, N is the father of P, P is the mother of K, K is the daughter of E

So, D is wife’s mother of E.

Hence, the correct answer is "Option 4".

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Q91. Answer: (c) 12

Given numbers: 187, 167, 173, 257, 199

Here, arrange numbers in ascending order:

167, 173, 187, 199, 257

Now, identify required numbers:

Second lowest number = 173

Second highest number = 199

Now, taking required digits:

199 → second digit = 9

173 → third digit = 3

Add => 9 + 3 = 12

Hence, the correct answer is "Option 3".

Q92. Answer: (d) 680

Shortcut Trick

=> Let Akshay = A, Arjun = B

=> A(1.05)^(16) = B(1.05)^(17)

=> A = B × 1.05

=> Total = A + B = 1.05B + B = 2.05B = 1394

=> B = 1394 ÷ 2.05 = 680

Therefore Answer = 680

Alternate Method

Given:

Total money = 1394

Rate = 5% p.a.

Akshay time = 16 years, Arjun time = 17 years

Concept Used:

Compound Interest: Amount = P(1 + r/100)^t

Calculation:

=> Let Akshay = A, Arjun = B

=> A(1.05)^(16) = B(1.05)^(17)

=> A = B(1.05)

=> Total = A + B = 1394

=> 1.05B + B = 1394

=> 2.05B = 1394

=> B = 1394 ÷ 2.05

=> B = 680

Therefore The correct answer is 680.

Additional Information

CI Formula: A = P(1 + r/100)^t

Shortcut: When amounts are equal, equate powers and simplify base.

Ratio Insight: A : B = 1.05 : 1

Exam Tip: Avoid full CI calculation; compare exponents smartly.

Q93. Answer: (d) 7

The logic followed here is:

Given:

CARD → 6135

DRAW → 1765

Here, W = 7

Hence, the correct answer is "Option 4".

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Q94. Answer: (b) 10

The logic followed here is:

thus, "10" will replace the question mark in the given series.

Hence, the correct option is "Option 2".

Q95. Answer: (c) C

Given: A, B, C, D, E and F visited the mall on different days from Monday to Saturday.

D visited on Tuesday.

Only two people visited between B and D.

C visited immediately before F.

A did not visit on Saturday.

Day	Person
Monday	A
Tuesday	D
Wednesday	C
Thursday	F
Friday	B
Saturday	E

Now, person on Wednesday = C

Hence, the correct answer is Option 3.

Q96. Answer: (b) Sitadhyaksha

The correct answer is Sitadhyaksha.

Key Points

• The Sitadhyaksha was the Superintendent of Agriculture in the Mauryan administration. His primary responsibility was the cultivation and management of crown lands, which were known as Sita.

• As per Kautilya's Arthashastra, the Sitadhyaksha was responsible for the collection of seeds of various kinds of crops, fruits, vegetables, and flowers to ensure productive farming cycles.

• This official supervised a diverse workforce for agricultural operations, including slaves (Dasa), laborers (Karmakara), and prisoners (Bandhanagarika), ensuring that the state-owned lands were never left fallow.

• The Sitadhyaksha played a crucial role in the economic stability of the Mauryan Empire (established around 322 BCE) by maximizing the output from the fertile lands in the Gangetic plains and other regions.

• He was also tasked with implementing irrigation techniques and managing the distribution of water to state farms, which directly influenced the revenue generated for the royal treasury.

Additional Information

• Samaharta:

• The Samaharta was the Collector-General of Revenue in the Mauryan Empire.

• His function was to supervise the collection of taxes from all sources, including mines, forests, tolls, and pastures.

• He was responsible for preparing the annual budget and maintaining the records of income and expenditure for the entire kingdom.

• Panyadhyaksha:

• The Panyadhyaksha served as the Superintendent of Commerce.

• He regulated trade and commerce, fixed the prices of essential commodities, and prevented adulteration or fraudulent practices in the market.

• His role included monitoring both indigenous goods and products imported from foreign countries like Syria or Egypt.

• Aksapataladhyaksha:

• The Aksapataladhyaksha was the Accountant-General or the Keeper of Accounts.

• He maintained the audit books and the genealogies of the royal family, as well as the registers of laws and customs.

• This official ensured transparency in the financial dealings of various government departments.

• Sansthadhyaksha:

• He was the Superintendent of Markets, ensuring that merchants followed the state's guidelines regarding weights and measures.

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Important Points

• Land Revenue System: In the Mauryan era, the state usually claimed 1/6th to 1/4th of the agricultural produce as tax, often referred to as Bhaga.

• Arthashastra: Written by Chanakya (also known as Kautilya or Vishnugupta), this ancient Indian treatise serves as the primary source for understanding the administrative and economic structure of the Maurya dynasty.

• Centralization: The Mauryan administration was highly centralized, with a vast bureaucracy of Adhyakshas (Superintendents) overseeing different sectors of the economy.

• Geographical Extent: Under rulers like Chandragupta Maurya and Ashoka the Great, the empire covered almost the entire Indian subcontinent, except for the extreme south, necessitating a sophisticated agrarian policy managed by the Sitadhyaksha.

• Labor Welfare: While Sitadhyaksha used forced labor in some contexts, the Arthashastra also contains guidelines on the wages and treatment of agricultural laborers to prevent unrest.

Q97. Answer: (b) Polar Satellite Launch Vehicle (PSLV)

The correct answer is Polar Satellite Launch Vehicle (PSLV).

Key Points

• The Polar Satellite Launch Vehicle (PSLV) is the first Indian launch vehicle to be entirely manufactured by the private sector through a consortium. This transition marks a significant milestone in India's space reforms initiated in 2020.

• A consortium consisting of Hindustan Aeronautics Limited (HAL) and Larsen & Toubro (L&T) was awarded the contract by NewSpace India Limited (NSIL) to produce five PSLV rockets. This was the first time an entire launch vehicle was outsourced to domestic industry.

• The mission set for 2025 involving the Oceansat series (specifically EOS-06/Oceansat-3 follow-on missions) is designed to be executed using these privately manufactured rockets. Oceansat satellites are intended for oceanographic studies and are typically placed in a Sun-Synchronous Polar Orbit at an altitude of about 720 km.

• The PSLV is famously known as the "Workhorse of ISRO" due to its high success rate and versatility. It has four stages, using a combination of solid and liquid propellants.

• The shift to private manufacturing allows ISRO to focus more on Research and Development (R&D) and deep-space exploration missions, while the commercial arm handles routine satellite launches.

Additional Information

• Launch Vehicle Mark-3 (LVM3):

• Formerly known as GSLV Mk-III, it is India’s heaviest launch vehicle. It is a three-stage vehicle with two solid strap-on motors, a liquid core stage, and a cryogenic upper stage.

• It is capable of carrying up to 4,000 kg to Geosynchronous Transfer Orbit (GTO) and 8,000 kg to Low Earth Orbit (LEO). It was recently used for the Chandrayaan-3 mission and OneWeb satellite launches.

• Geosynchronous Satellite Launch Vehicle (GSLV):

• This vehicle is specifically designed to place communication satellites into Geosynchronous orbits. It features the Cryogenic Upper Stage (CUS).

• It has a lift-off mass of approximately 414 tonnes and is essential for India's INSAT and GSAT series of satellites.

• Small Satellite Launch Vehicle (SSLV):

• The SSLV is a three-stage all-solid vehicle designed to cater to the "launch-on-demand" market for mini, micro, and nano satellites (up to 500 kg).

• It offers a low-cost, rapid turnaround time and requires minimal launch infrastructure compared to larger rockets.

• Oceansat Satellite Series:

• The Oceansat satellites carry instruments like the Ocean Colour Monitor (OCM) and Scatterometer.

• These tools provide crucial data on chlorophyll concentration, phytoplankton blooms, and oceanic surface wind vectors, which are used for fishery forecasting and weather monitoring.

Important Points

• NSIL (NewSpace India Limited): It is a Central Public Sector Enterprise (CPSE) under the Department of Space (DoS), established in 2019. Its primary mandate is to commercially exploit the R&D work of ISRO.

• IN-SPACe (Indian National Space Promotion and Authorization Centre): It acts as a single-window, independent nodal agency to promote and authorize private sector participation in the space domain.

• PSLV History: The first successful launch of PSLV took place in October 1994 (PSLV-D2). Since then, it has launched iconic missions like Chandrayaan-1 (2008) and the Mars Orbiter Mission (2013).

• Privatization Benefits: The move to outsource PSLV production to the HAL-L&T consortium is expected to create a robust space ecosystem in India, encouraging more Start-ups and MSMEs to enter the global space market.

Q98. Answer: (c) Three

Given: F, G, H, I, M, N and O have exams from Monday to Sunday.

G has exam on Thursday.

H has exam on Saturday.

N has exam immediately before F.

O has exam immediately after F.

M has exam on one of the days after I.

Day	Person
Monday	N
Tuesday	F
Wednesday	O
Thursday	G
Friday	I
Saturday	H
Sunday	M

Now, people between M and O: 3 people

Hence, the correct answer is Option 3.

Q99. Answer: (c) Data can be accessed directly from any location

The correct answer is Data can be accessed directly from any location.

Key Points

• Random Access Memory (RAM) is referred to as "Random Access" because any storage location, also known as a memory address, can be accessed directly by the Central Processing Unit (CPU) without having to go through a sequence of other locations. This statement is correct.

• The term "Random" implies that the time taken to access any specific byte of data is constant, regardless of where it is physically located on the silicon chip. This is a primary feature of main memory in modern computers.

• In contrast to Sequential Access media, such as magnetic tapes or older cassettes, where the system must read through data linearly to reach a specific point, RAM allows for instantaneous retrieval of data. This statement is correct.

• The memory controller uses a binary address sent by the CPU to locate data in a grid-like structure consisting of rows and columns. By identifying the intersection of a specific row and column, the system retrieves the data bit immediately.

• RAM acts as a high-speed temporary workspace for the operating system and applications. It stores the data that the CPU is currently processing to ensure system performance remains fluid. This statement is correct.

Additional Information

• Volatility: One of the most critical characteristics of RAM is that it is volatile memory. This means that all stored information is erased immediately when the power source is disconnected or the computer is restarted.

• Types of RAM: There are two main categories: SRAM (Static RAM) and DRAM (Dynamic RAM). SRAM is faster and used for CPU Cache, while DRAM is more common, less expensive, and used for the main system memory.

• Evolution and Standards: Over the years, RAM has evolved through various standards like SDRAM, DDR (Double Data Rate), DDR2, DDR3, DDR4, and the latest DDR5, which was introduced around 2020 to provide higher bandwidth and lower power consumption.

• Capacity and Measurement: RAM capacity is measured in Gigabytes (GB) in modern computing. Common configurations for laptops and desktops in 2024 range from 8 GB to 64 GB, depending on the application (e.g., gaming, video editing, or general use).

• Historical Context: The first form of magnetic-core memory was developed in the late 1940s, but the modern MOS (Metal-Oxide-Semiconductor) RAM chip was pioneered by Robert Dennard at IBM in 1966, revolutionizing how data is handled in integrated circuits.

Important Points

• Function in Multitasking: The amount of RAM determines how many applications a computer can run simultaneously. If the RAM is full, the operating system uses Virtual Memory (a portion of the Hard Drive or SSD), which significantly slows down the computer.

• Read/Write Capabilities: Unlike ROM (Read-Only Memory), which is generally used for firmware and cannot be easily modified, RAM allows for both reading and writing of data at extremely high frequencies.

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• Latency: While RAM is extremely fast, it still has latency, which is the delay between the request for data and the delivery of that data to the CPU. Lower latency results in a more responsive system.

• Location: RAM modules, often called DIMMs (Dual In-line Memory Modules), are located in slots on the motherboard, allowing for easy upgrades in most desktop computers.

Q100. Answer: (a) 48 students

Shortcut Trick

=> 9 students in 3 hr → 117 charts

=> 1 student in 1 hr → 117 ÷ (9 × 3) = 117/27 = 13/3

=> Required students for 208 charts in 1 hr:

=> x × (13/3) = 208

=> x = 208 × 3 ÷ 13 = 48

Therefore Answer = 48

Alternate Method

Given:

9 students → 117 charts in 3 hours

? students → 208 charts in 1 hour

Concept Used:

Work prop. to Students × Time

Calculation:

=> Total work rate = 117 charts in (9 × 3) student-hours

=> 1 student in 1 hour = 117/27 = 13/3 charts

=> Let required students = x

=> Work in 1 hour = x × (13/3)

=> x × (13/3) = 208

=> x = 208 × 3 ÷ 13

=> x = 48

Therefore The correct answer is 48.

Additional Information

Work Formula: Work = Rate × Time

Unit Rate: Always convert to 1 person 1 hour for clarity.

Proportionality: Work prop. to Students if time is constant.

Exam Tip: Use student-hour concept for quick solving.

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