RRB NTPC (Graduate) CBT-I Official Paper (Held On: 22 Mar, 2026 Shift 3) (Previous Year Paper)

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

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Q1. 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.

Q. Anuj, Bhavesh, Chirag, Darshan, and Eklavya - each have different height. Who is the tallest?

(I) Chirag is taller than Anuj and Bhavesh but shorter than Darshan.

(II) Eklavya is taller than Chirag but shorter than Darshan.

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

Q2. Find the solution (x, y, z) for the following system of equations:

$x - y + z = 2$;

$2x - y - z = -6$;

$2x + 2y + z = -3$

(a) (−2, 1, 3)
(b) (−2, −1, 3)
(c) (2, −1, 3)
(d) (−2, −1, −3)

Q3. While cooking, if the exterior of the cooking vessel becomes blackened, what does it indicate?

(a) The fuel contains moisture.
(b) The fuel is fully burned.
(c) The combustion of the fuel is incomplete.
(d) The food inside is undercooked.

Q4. Which of the following pairs of leaders were closely associated with the signing of the Lucknow Pact of 1916?

(a) Lala Lajpat Rai and Bipin Chandra Pal
(b) Bal Gangadhar Tilak and Muhammad Ali Jinnah
(c) Gopal Krishna Gokhale and Annie Besant
(d) Dadabhai Naoroji and Surendranath Banerjee

Q5. J, K, L, R, S and T 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 is numbered 6. Only two people live between R and J. Only two people live between T and K. No one lives above T. J lives below K but above S. How many people live below L?

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

Q6. Which of the following is a non-metallic natural resource?

(a) Copper
(b) Limestone
(c) Gold
(d) Iron ore

Q7. Rohit gets double the amount in 6 years when invested at compound interest, compounded annually. In how many years will the amount become sixteen times itself?

(a) 96
(b) 48
(c) 24
(d) 12

Q8. A right circular cone has the ratio of slant height to radius is 29:20. The volume of the cone is 24192/5π cm3.

The curved surface area (in cm^2) of cone is

(a) 832.3π
(b) 823.4π
(c) 835.2π
(d) 829.5π

Q9. 100 men have provisions for 27 days. If 40 men have left, for how many days the same provisions would last for the remaining men?

(a) 49
(b) 47
(c) 43
(d) 45

Q10. Refer to the following letter, symbol series and answer the question. Counting to be done from left to right only

(Left) € A © D R & I % B B V @ A J $ £ * S B £ N L (Right)

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

(a) 0
(b) 3
(c) 1
(d) 2

Q11. Which of the following elements is a gas at room temperature and belongs to Group 17 of the periodic table?

(a) Iodine
(b) Fluorine
(c) Astatine
(d) Bromine

Q12. In an election between two candidates, 90% of the registered voters cast their vote and 20% of the votes polled were found invalid. Winning candidate got 51% of the valid votes and won the election by a margin of 3870 votes. How many voters were registered?

(a) 268730
(b) 268750
(c) 268720
(d) 268760

Q13. In 2025, which city hosted the 3rd Council Meeting of the International Organization for Marine Aids to Navigation (IALA), organised by the Directorate General of Lighthouses and Lightships?

(a) Kolkata
(b) Mumbai
(c) Visakhapatnam

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(d) Chennai

Q14. By selling an article at 5/12 of its actual selling price, Akash incurs a loss of 20%. If he sells it at 80% of its actual selling price, then the profit percentage is

(a) 52.9%
(b) 53.6%
(c) 52.3%
(d) 55.3%

Q15. In what duration (in years) will Rs. 7,200 fetch a simple interest of Rs. 1,080 at 6% per annum rate of interest?

(a) 2.5
(b) 1.5
(c) 5
(d) 3.5

Q16. If sinA = 3/5, then find the value of √(11+3cosecA)/(4-5 sinA)

(a) 3
(b) √2
(c) √3
(d) 4

Q17. Refer to the following letter, symbol series and answer the question. Counting to be done from left to right only.

(Left) R # L ? V ! M S + N - $ O T * P / < Q U (Right)

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

(a) THREE
(b) ONE
(c) TWO
(d) FOUR

Q18. Evaluate: (-9) - (-56) ÷ (-14) + (-3) × 7

(a) -37
(b) -34
(c) -33
(d) -36

Q19. In a certain code language,

A + B means ‘A is the daughter of B’

A - B means ‘A is the mother 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 G related to M if 'G + R - W x D ÷ M’?

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

Q20. What should come in place of the question mark (?) in the given series?

23 24 32 59 123 ?

(a) 168
(b) 198
(c) 248
(d) 218

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Q21. There are 25 members in group A, 26 members in group B and 21 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. 137, Rs. 443 and Rs. 461, respectively. The overall average amount (in Rs.) spent per member is:

(a) 342
(b) 344
(c) 339
(d) 347

Q22. What does the Food for Work Programme aim to provide to the rural poor of backward districts?

(a) Free electricity and water supply
(b) Supplementary wage employment
(c) Access to private healthcare schemes
(d) Free education and training abroad

Q23. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

Some towns are districts. No district is a state. No state is a city.

Conclusions:

(I) No town is a state.

(II) No district is a city.

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

Q24. Which of the given letter-number clusters will replace the question mark (?) in the following series to make it logically complete?

SWD 9 HLS 12 WAH 16 LPW 21 ?

(a) AEL 27
(b) KDT 27
(c) AKM 32
(d) CIK 30

Q25. Evaluate: 16 + 20 ÷ 4 - 3 × 4

(a) 8
(b) 9
(c) 12
(d) 11

Q26. P sells an item to Q at 40% profit. Q sells the same item to R at 50% loss. If R paid Rs. 6895 for the item, then at what price (in Rs.) is the item purchased by P?

(a) 9848
(b) 9849
(c) 9850
(d) 9852

Q27. If 1 is added to each odd digit and 2 is subtracted from each even digit in the number 8634157, which of the following digits will be second from the left?

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

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Q28. In MS-Excel, if cells A1, A2 and A3 contain the values 2, 3 and 2 respectively, what is the result of the formula =A1*A2 + A2/A3?

(a) 6
(b) 8
(c) 9
(d) 7.5

Q29. Five circles are placed adjacent to one another and have lines M1 and M2 as their common tangents. If the radius of the largest circle is 9 units and that of the smallest circle is 4 units, then what is the radius of the middle circle (in units)?

(a) 10
(b) 6
(c) 8
(d) 5

Q30. Line PQ is parallel to line RS and a transversal AB intersects PQ at C and RS at D. If angle ACQ = (6x)°, angle QCD = (5x + y)° and angle BDS = (2x + 3y)°, find the measure of angle QCD.

(a) 93.6°
(b) 102°
(c) 84.5°
(d) 110°

Q31. A person born in India between 26 January 1950 and 1 July 1987 is automatically considered a citizen of India by:

(a) descent
(b) birth
(c) registration
(d) naturalisation

Q32. In which year was the Ranji Trophy first held?

(a) 1926–27
(b) 1947–48
(c) 1934–35
(d) 1950–51

Q33. Which international agreement did India reaffirm its commitment to during the 2025 climate summit?

(a) Kyoto Protocol
(b) Basel Convention
(c) Paris Agreement
(d) Montreal Protocol

Q34. Which of the following is a legislative reform aimed at modernizing India’s aviation sector by re-enacting the Aircraft Act, 1934, in alignment with contemporary needs and global standards?

(a) The Carriage by Air (Amendment) Act, 2022
(b) Protection of Interests in Aircraft Objects Act, 2023
(c) Aircraft (Security) Rules, 2020 & Amendments (2022)
(d) Bharatiya Vayuyan Adhiniyam, 2024

Q35. Consider the following statements.

1. As per Article 167, it is the duty of the Chief Minister to communicate to the Governor all decisions of the Council of Ministers.

2. Article 165 states that the Governor administers the oaths of office and secrecy to ministers.

3. Article 163 provides for a Council of Ministers headed by the Chief Minister to aid and advise the Governor, except in discretionary matters.

Which of the above statements are correct?

(a) 1, 2 and 3

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

Q36. A pharmaceutical research laboratory purchases analytical testing kits priced at Rs. 12,000 each. The supplier offers a scheme of 'Buy 10 kits, get 2 free,' along with a volume discount of 15% on purchases exceeding Rs. 1,00,000, and an additional 5% institutional discount for research facilities. If the laboratory takes advantage of the complete scheme offer, what is the effective discount percentage they receive on the total value of kits? (Rounded off to two decimal places)

(a) 30.25%
(b) 34.18%
(c) 35.42%
(d) 32.71%

Q37. A and B start a business by investing capitals in the ratio 5:7. After 4 months, C joins the business with a capital equal to half of B's capital. After 8 months from the start, A withdraws 40% of his capital, while B continues with the same investment. At the end of one year, the total profit is Rs. 27,675. The share of profit of B (in Rs.) is:

(a) 14,175
(b) 15,175
(c) 16,175
(d) 17,175

Q38. 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 :: ?

: MIN :: RNS : %

(a) = OKP, % = PLQ
(b) = OKP, % = PLR
(c) = OKO, % = PLQ
(d) = OKP, % = PMQ

Q39. Who was the leader of the Paika Rebellion of 1817, a significant early armed resistance against British East India Company rule in Odisha?

(a) Chittu Singh
(b) Alluri Sitarama Raju
(c) Bakshi Jagabandhu
(d) Sidhu Murmu

Q40. Which of the following states/UT in India had the literacy rate above 80% as per Census 2011?

(a) Himachal Pradesh and Haryana
(b) Tamil Nadu and Assam
(c) Sikkim and Odisha
(d) Goa and Tripura

Q41. What is the maximum total duration for which President's Rule can continue in a State under Article 356, subject to parliamentary approvals and constitutional conditions?

(a) Up to three years
(b) Up to two years
(c) Up to four years
(d) Up to one year

Q42. When was the Pradhan Mantri Gram Sadak Yojna launched?

(a) 2000
(b) 2008
(c) 1991
(d) 2014

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Q43. Which of the following best describes an operating system?

(a) A program used to access the internet
(b) A program used to watch videos
(c) A program that manages memory, processes, and devices
(d) A program used for data entry

Q44. Refer to the given letter, symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) K Y C K & A A C P N P Y M R B # + J $ & ^ (Right)

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

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

Q45. Two trains are moving in opposite directions at speeds of 130 km/hr and 70 km/hr. The length of one train is 130 m. The time taken by them to cross each other is 14 seconds. The length (in m) of the other train (rounded off to 2 decimal places) is:

(a) 649.6
(b) 650.67
(c) 647.78
(d) 646.47

Q46. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. Only two boxes are kept between B and G. Only D is kept above E. No box is kept below G. A is kept at some place below F but at some place above C. How many boxes are kept above C?

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

Q47. In a certain code language, ‘food is delicious’ is coded as ‘ga dc vr’ and ‘harry loves food’ is coded as ‘dc hu bw’. How is ‘food’ coded in that language?

(a) ga
(b) bw
(c) vr
(d) dc

Q48. Which of the following is a clear example of potential energy?

(a) A falling rock
(b) A burning candle
(c) A moving car
(d) A stretched rubber band

Q49. In December 2025, enforcement of a statewide prohibition on physical and emotional punishment in schools, in accordance with the provisions of the Right to Education Act, 2009, was carried out by which of the following states?

(a) Punjab
(b) Manipur
(c) Kerala
(d) Maharashtra

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Q50. In which year was Bal Gangadhar Tilak arrested by the British authorities for writing a seditious article in the newspaper 'Kesari'?

(a) 1907
(b) 1908
(c) 1910
(d) 1909

Q51. DUMB is related to FXOE in a certain way based on the English alphabetical order. In the same way, LGUN is related to NJWQ. To which of the following options is RPAW related, following the same logic?

(a) TCDS
(b) TSCZ
(c) TZCS
(d) TCXS

Q52. 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 man out is not based on the number of consonants/vowels or their position in the letter cluster)

(a) DFB
(b) NPL
(c) QSO
(d) SUR

Q53. Which wildlife sanctuary in Madhya Pradesh was announced in October 2025 to be developed as the third cheetah habitat in the state?

(a) Madhav National Park
(b) Nauradehi Wildlife Sanctuary
(c) Gandhi Sagar Wildlife Sanctuary
(d) Kuno National Park

Q54. Which of the following is an example of Application Software?

(a) Windows
(b) MS Excel
(c) BIOS
(d) Linux

Q55. The total surface area of a cube having side 91 cm is:

(a) 49666 cm^2
(b) 49716 cm^2
(c) 49686 cm^2
(d) 49668 cm^2

Q56. Which of the following countries was NOT among the top three in the Global AI Vibrancy Index 2024?

(a) China
(b) India
(c) United Kingdom
(d) United States

Q57. What is the mean of the following distribution ?

Marks	**16**	**21**	**47**	**80**	**99**
No. of Students	24	38	26	32	13

(a) 74
(b) 47
(c) 71
(d) 67

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Q58. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(252, 80, 172)

(170, 55, 115)

(a) (236, 105, 141)
(b) (212, 72, 130)
(c) (180, 53, 137)
(d) (195, 95, 100)

Q59. Siddharth, Lata, and Vivek invest Rs. 1570, Rs. 1760, and Rs. 1620 respectively to start a business. If the profit at the end of the year is Rs. 1540, then what is the share of Vivek in the profit?

(a) Rs. 501
(b) Rs. 503
(c) Rs. 506
(d) Rs. 504

Q60. Seven people B, C, D, O, P, Q and R are sitting around a circular table facing the center of the table.

D sits fourth to the right of O. Only two people sit between D and B when counted from the left of D. B sits third to the right of C. Q is an immediate neighbor of B and R. How many people sit between P and Q when counted from the right of P?

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

Q61. What should come in place of '?' in the given series?

55 56 60 69 85 ?

(a) 104
(b) 110
(c) 108
(d) 112

Q62. Which Bill, assented to by the President of India in 2025, consolidates civil nuclear laws and allows private sector participation?

(a) Atomic Energy Reform and Private Participation in Nuclear Power Bill
(b) Civil Nuclear Governance and Private Sector Participation Framework Bill
(c) Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill
(d) National Policy for Nuclear Energy Expansion with Private Participation Bill

Q63. Below are given two sets of numbers. In each set of numbers, a certain mathematical operation on the first number results in the second number. Similarly, certain mathematical operation on the second number results in the third number and so on. Which of the given options follows the same set of operations as in question?

(NOTE – A two/three-digit number cannot be broken into individual digits for operations, e.g., if 37 is followed by 10, the operation cannot be 3+7 as a two-digit number cannot be broken into individual digits.)

15 - 75 - 80 - 160; 16 - 80 - 85 - 170

(a) 20-100-105-220
(b) 13-75-80-160
(c) 18-80-85-170
(d) 17-85-90-180

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Q64. The appointing authority for the Chairman and members of a State Public Service Commission under Article 316 of the Constitution of India is:

(a) The Chief Minister of the State
(b) The Speaker of the State Assembly
(c) The Governor of the State
(d) The President of India

Q65. Which facility, inaugurated in 2025 by the ISRO Chairman, became India's first private-sector navigation innovation hub aimed at strengthening self-reliance in advanced navigation systems?

(a) National Hub for Advanced Satellite Navigation
(b) Centre for Indigenous Navigation Technologies
(c) Ananth Centre of Excellence for Navigation
(d) Indian Navigation Research and Innovation Centre

Q66. The average of the first 63 even natural numbers is:

(a) 62
(b) 65
(c) 64
(d) 63

Q67. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

IJM 77 PQT 69 WXA 61 DEH 53 ?

(a) KMN 45
(b) KLO 45
(c) KSB 44
(d) KKN 44

Q68. In 2025, India was re-elected to the Council of which organization for the 2026–27 term under Category B?

(a) International Seabed Authority
(b) World Trade Organization
(c) International Civil Aviation Organization
(d) International Maritime Organization (IMO)

Q69. In a certain code language, 'ALIT' is coded as '2159' and 'HILT' is coded as '6912'. What is the code for 'H' in the given code language?

(a) 2
(b) 9
(c) 6
(d) 1

Q70. 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 phones are mobiles. No mobile is a pager. No mobile is a walkie-talkie.

Conclusions:

(I) No phone is a pager.

(II) Some walkie-talkies are pagers.

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

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Q71. 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) Wife's mother's brother's daughter
(b) Wife's mother's brother's wife
(c) Wife's father's brother's daughter
(d) Wife's father's brother's wife

Q72. What will be the maximum value of the quadratic expression $10(x-1) - 5x^2 + 4(2 - x) + 8$?

(a) 6.9
(b) 9.6
(c) 7.8
(d) 8.7

Q73. A, B, C, D, E and F 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.

Only one person lives above D. Only two people live between A and D. F lives immediately above B. E does not live above D.

How many people live below C?

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

Q74. How do subordinate courts support the overall judicial system in India?

(a) By exclusively handling appeals
(b) By centralizing legal power in the higher judiciary
(c) By enacting new legislation
(d) By providing accessible, prompt, and localized justice

Q75. LEKO is related to OIPU in a certain way based on the English alphabetical order. In the same way, CANQ is related to FESW. To which of the following is EIJS related, following the same logic?

(a) MNPZ
(b) NOPA
(c) LLPP
(d) HMOY

Q76. Nikhil starts from Point A and drives 84 km towards North. He then takes a left turn, drives 80 km, turns left and drives 83 km. He then takes a left turn and drives 90 km. He takes a final right turn, drives 1 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only, unless specified.)

(a) 13 km to the east
(b) 11 km to the west
(c) 12 km to the east
(d) 10 km to the west

Q77. Simplify the following expression:

(5/6 of 1.8) + (3/4 ÷ 0.25)

(a) 3.75
(b) 4
(c) 4.5

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(d) 4.25

Q78. Due to a decrease in manpower, production in a factory falls by 52%. By what percentage should the working hours be increased to restore the original level of production?

(a) 108.33%
(b) 104.66%
(c) 52%
(d) 48%

Q79. Which of the following is a correct definition of the word 'tributary'?

(a) A river branching away from another
(b) A river flowing into a larger river
(c) A lake at the rivers mouth
(d) A body of salty water mixing with river water

Q80. If the mean of the following data is 47, find the value of X.

Class	30-40	40-50	50-60	60-70	70-80
Frequency	49	33	24	21	X

(a) 27
(b) 3
(c) 8
(d) 23

Q81. If 1 is added to each odd digit and 2 is subtracted from each even digit in the number 8263451, how many digits will appear more than once in the new number thus formed?

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

Q82. In which Indian state is the percussion instrument Davandi primarily found?

(a) Kerala
(b) Odisha
(c) Tamil Nadu
(d) Punjab

Q83. The liberalization of the Indian economy in 1991 led to which of the following fiscal outcomes?

(a) Elimination of all public debt
(b) Sharp increase in Government control over pricing
(c) Higher import duties
(d) Lowering of direct and indirect tax rates

Q84. Based on the 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 man out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) EAG
(b) HDK
(c) TPW
(d) RNU

Q85. The administration of the Mauryan Empire is described in which ancient text?

(a) Arthashastra
(b) Rigveda
(c) Mahabharata

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(d) Manusmriti

Q86. In a race of 1200 metres, Amit gives Bhushan a head-start of 200 metres. Amit starts 20 seconds after Bhushan. Amit overtakes Bhushan 4 minutes after he (Amit) starts running. Amit finishes the race 10 seconds before Bhushan. What is the running speed (in m/s) of Amit?

(a) 3 4over9
(b) 4 1over3
(c) 3 1over3
(d) 4 4over9

Q87. Seven people, B, C, O, P, Q, R and S, are sitting in a straight line, facing north. Only three people sit to the left of S. Only three people sit between B and O. Only four people sit between Q and O, none of whom sit at the left end. C sits immediately to the left of R. How many people sit between P and R?

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

Q88. In accordance with Article 84 of the Constitution of India, which of the following is the minimum age a person must meet to qualify for membership of the House of the People?

(a) Thirty years
(b) Eighteen years
(c) Twenty-one years
(d) Twenty-five years

Q89. A student finishes typing a paragraph and wants to make a copy of a sentence to use later in the document. She first selects the sentence. Which shortcut should she press next?

(a) Ctrl + S
(b) Ctrl + V
(c) Ctrl + F
(d) Ctrl + C

Q90. Who was the first Indian badminton player to win an Olympic medal?

(a) Saina Nehwal
(b) PT Usha
(c) PV Sindhu
(d) Sania Mirza

Q91. The interference of two identical waves moving in opposite directions produces:

(a) Longitudinal Waves
(b) Incident Waves
(c) Transversal waves
(d) Standing Waves

Q92. The HCF and LCM of two numbers are 5 and 180 respectively. If one number is 45, what is the other number?

(a) 36
(b) 40
(c) 20
(d) 25

Q93. Which of the following best explains the difference between weather and climate?

(a) Weather refers to short-term changes; climate refers to long-term patterns
(b) Weather refers to long-term trends; climate refers to short-term changes
(c) Weather and climate mean exactly the same phenomenon
(d) Weather is permanent in nature; climate is temporary in nature

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Q94. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

16, 62

21, 82

(a) 24, 95
(b) 23, 94
(c) 23, 95
(d) 24, 94

Q95. Which of the following separates the Andaman from Nicobar Islands?

(a) Palk Strait
(b) Nine Degree Channel
(c) Six Degree Channel
(d) Ten Degree Channel

Q96. If a = x + 2/x and b = x - 2/x, then find the value of a^4 + b^4 - 2a²b².

(a) 64
(b) 36
(c) 16
(d) 49

Q97. Kalamkari painting involves the use of which instrument for drawing outlines?

(a) Bamboo pen
(b) Paintbrush
(c) Needle
(d) Stylus

Q98. The prices of articles of types P, Q, and R are Rs. 280, Rs. 180 and Rs. 120, respectively. Tejas buys these articles in the ratio 3 : 2 : 5 for a total of Rs. 12,600. How many articles of type Q did he purchase?

(a) 14
(b) 7
(c) 15
(d) 13

Q99. What was the dominant type of economy in the Harappan heartland?

(a) Spiritual-centric
(b) Hunting-gathering
(c) Trade-based economy
(d) Agro-pastoral

Q100. A typist takes 40 minutes to type 2 pages. How long (in minutes) will he take to type 90 pages?

(a) 1800
(b) 1790
(c) 1810
(d) 1805

ANSWER KEY

1	b	2	b	3	c	4	b	5	b	6	b	7	c	8	c	9	d	10	c
11	b	12	b	13	b	14	b	15	a	16	d	17	c	18	b	19	c	20	c
21	a	22	b	23	c	24	a	25	b	26	c	27	a	28	d	29	b	30	a

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31	b	32	c	33	c	34	d	35	d	36	d	37	a	38	a	39	c	40	d
41	a	42	a	43	c	44	c	45	c	46	b	47	d	48	d	49	d	50	b
51	b	52	d	53	b	54	b	55	c	56	c	57	b	58	d	59	d	60	a
61	b	62	c	63	d	64	c	65	c	66	c	67	b	68	d	69	c	70	d
71	c	72	c	73	c	74	d	75	d	76	d	77	c	78	a	79	b	80	b
81	a	82	c	83	d	84	a	85	a	86	d	87	c	88	d	89	d	90	a
91	d	92	c	93	a	94	d	95	d	96	a	97	a	98	a	99	d	100	a

SOLUTIONS

Q1. Answer: (b) Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answe...

Given Statements:

I. Chirag is taller than Anuj and Bhavesh but shorter than Darshan.

II. Eklavya is taller than Chirag but shorter than Darshan.

Question: Who is the tallest?

Analysis:

From Statement I:

Darshan > Chirag > Anuj, Bhavesh

But Eklavya's position is unknown, so tallest cannot be decided.

So, Statement I alone is not sufficient.

From Statement II:

Darshan > Eklavya > Chirag

But Anuj and Bhavesh's positions are unknown, so tallest cannot be decided.

So, Statement II alone is not sufficient.

Combining I and II:

From I: Darshan > Chirag > Anuj, Bhavesh

From II: Darshan > Eklavya > Chirag

So, overall order becomes:

Darshan > Eklavya > Chirag > Anuj, Bhavesh

Now it is clear that Darshan is the tallest.

Hence, both statements I and II together are sufficient, but neither statement alone is sufficient.

Hence, the correct answer is "Option 2".

Q2. Answer: (b) (−2, −1, 3)

Shortcut Trick

Add (1) and (2): 3x − 2y = −4

Subtract (2) from (3): 3y + 2z = 3

Use (1): x = 2 + y − z

Solve quickly => y = −1, z = 3, x = −2

Therefore Answer: (−2, −1, 3)

Alternate Method

Given:

x − y + z = 2

2x − y − z = −6

2x + 2y + z = −3

Formula used:

Elimination method

Calculation:

=> (1) + (2): x − y + z + 2x − y − z = 2 − 6

=> 3x − 2y = −4 ...(4)

=> (3) − (2): (2x + 2y + z) − (2x − y − z) = −3 − (−6)

=> 3y + 2z = 3 ...(5)

=> From (1): x = 2 + y − z

=> Substitute in (4): 3(2 + y − z) − 2y = −4

=> 6 + 3y − 3z − 2y = −4

=> y − 3z = −10 ...(6)

=> Solve (5) and (6):

=> 3y + 2z = 3

=> y − 3z = −10

=> From (6): y = 3z − 10

=> Substitute: 3(3z − 10) + 2z = 3

=> 9z − 30 + 2z = 3

=> 11z = 33 => z = 3

=> y = 3(3) − 10 = −1

=> x = 2 + (−1) − 3 = −2

Therefore The solution is (−2, −1, 3).

Additional Information

Elimination Method

Add or subtract equations to eliminate variables step-by-step

Substitution Method

Express one variable and substitute into others

Consistency

System has a unique solution when equations intersect at one point

Check

Always verify by substituting values back

Q3. Answer: (c) The combustion of the fuel is incomplete.

The correct answer is The combustion of the fuel is incomplete..

Key Points

• The blackening of the exterior of a cooking vessel is a physical indication that the combustion of the fuel is incomplete. When fuel does not burn completely, it produces unburnt carbon particles (soot) that deposit on the surface of the vessel.

• Fuel, such as LPG (Liquefied Petroleum Gas), kerosene, or wood, consists of hydrocarbons. If there is a sufficient supply of oxygen, these hydrocarbons burn completely to produce Carbon Dioxide (CO_2) and Water (H_2O), resulting in a clean blue flame. Hence, the statement regarding incomplete combustion is correct.

• If the air holes of a gas stove are blocked or restricted, the oxygen supply becomes limited. This leads to a yellow, sooty flame instead of a blue one. Hence, the statement that the fuel is fully burned is incorrect.

• While moisture in the fuel can cause sputtering or difficulty in lighting the stove, it is not the direct cause of the black coating on the vessel. Hence, the statement about fuel containing moisture is incorrect.

• The blackening of the pot is related to the chemical reaction of the fuel with oxygen at the burner and is entirely independent of the state of the food inside the vessel. Hence, the statement that the food is undercooked is incorrect.

Additional Information

• Saturated Hydrocarbons: Compounds like alkanes (e.g., methane, propane, butane) generally burn with a clean blue flame under complete combustion conditions. LPG, which is primarily a mixture of propane and butane, is designed to burn cleanly in household stoves.

• Unsaturated Hydrocarbons: Compounds like alkenes and alkynes (e.g., ethene, ethyne) have a higher carbon-to-hydrogen ratio. They often burn with a yellow sooty flame even in air because the atmospheric oxygen is often insufficient for their complete oxidation.

• Efficiency and Energy: Complete combustion is an exothermic reaction that releases the maximum possible thermal energy from the fuel. Incomplete combustion is less efficient, meaning more fuel is consumed to reach the same cooking temperature.

• Environmental and Health Impact: Incomplete combustion produces Carbon Monoxide (CO), which is a colorless, odorless, and highly toxic gas. It also releases particulate matter (PM), which contributes to indoor air pollution and respiratory issues.

• Maintenance: To fix the issue of a blackened vessel, one should clean the burner holes of the stove to ensure a proper air-fuel mixture. This restores the oxidizing flame (blue) and prevents fuel wastage.

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Important Points

• Oxidizing vs. Reducing Flame: A blue flame is also known as an oxidizing flame because it has an excess of oxygen. A yellow flame is a reducing flame where carbon particles are heated to incandescence, giving the flame its characteristic color and producing soot.

• Chemical Equation: The general equation for complete combustion of methane is $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + Energy$. In contrast, incomplete combustion may follow $2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$ or even produce pure Carbon (C).

• Historical Context: Before the widespread use of LPG, cooking was done on chulhas using biomass or coal. These fuels almost always undergo incomplete combustion due to their complex molecular structure and poor aeration, which is why traditional cooking pots are almost always blackened.

Q4. Answer: (b) Bal Gangadhar Tilak and Muhammad Ali Jinnah

The correct answer is Bal Gangadhar Tilak and Muhammad Ali Jinnah.

Key Points

• The Lucknow Pact was an agreement reached between the Indian National Congress (INC) and the All India Muslim League during their joint session held at Lucknow in December 1916.

• Bal Gangadhar Tilak, representing the Extremist faction of the Congress, and Muhammad Ali Jinnah, who was then a member of both the Congress and the Muslim League, were the primary architects of this historic rapprochement. Hence, the pair in Option B is correct.

• The pact was significant because it marked the reunion of the Moderate and Extremist wings of the Indian National Congress, which had split earlier during the Surat Session in 1907.

• Under the agreement, the Congress agreed to the Muslim League's demand for separate electorates in the provincial councils, while both parties presented a joint set of constitutional demands to the British Government.

• Lala Lajpat Rai and Bipin Chandra Pal were prominent Extremist leaders (part of the Lal-Bal-Pal trio), but they were not the lead negotiators for this specific pact between the two organizations. Hence, Option A is incorrect.

• Gopal Krishna Gokhale, a tall Moderate leader, passed away in 1915, a year before the pact was signed, although Annie Besant played a major role in bringing the factions together through her Home Rule League efforts. Hence, Option C is incorrect.

• Dadabhai Naoroji and Surendranath Banerjee were veteran Moderate leaders of the Congress, but they were not the central figures driving the 1916 negotiations with the Muslim League. Hence, Option D is incorrect.

Additional Information

• President of the Session: The 1916 Lucknow Session of the Indian National Congress was presided over by Ambica Charan Mazumdar, who famously remarked that the split of 1907 had finally been healed.

• Joint Demands: The Congress-League Scheme demanded that the British should declare their intention to confer Self-Government or Dominion Status on India at an early date. They proposed that 80% of the members of Provincial Legislative Councils should be elected.

• Separate Electorates: One of the most debated features of the Lucknow Pact was the formal acceptance of Separate Electorates for Muslims, a system where only Muslim voters could elect Muslim representatives. While this brought temporary unity, many historians argue it sowed the seeds of communalism and the eventual Partition.

• Role of Muhammad Ali Jinnah: At this stage of his career, Jinnah was known as the "Ambassador of Hindu-Muslim Unity," a title bestowed upon him by Sarojini Naidu for his efforts in bridging the gap between the two communities.

• External Factors: The First World War (1914–1918) and the Khilafat issue (discontent among Indian Muslims over the treatment of the Caliph of Turkey by the British) acted as catalysts in bringing the Muslim League closer to the nationalist movement.

Important Points

• Home Rule Leagues: During 1916, Annie Besant and Bal Gangadhar Tilak had launched their respective Home Rule Leagues. These organizations created a massive political awakening in India, pressuring the Congress leadership to unite and take a firm stand against British rule.

• Constitutional Reforms: The Lucknow Pact directly influenced the Montagu-Chelmsford Reforms of 1919 (also known as the Government of India Act 1919), although the British did not grant the degree of self-government demanded by the Indian leaders.

• Seat Sharing: The pact specified the proportion of Muslim representation in various provinces; for example, in Punjab, they were allotted 50% of the elected seats, and in Bengal, 40%. In the Imperial Legislative Council (Central), one-third of the Indian elected members were to be Muslims.

Q5. Answer: (b) Three

Given: J, K, L, R, S and T live on six different floors of a building numbered 1 to 6.

Only two people live between R and J.

Only two people live between T and K.

No one lives above T.

J lives below K but above S.

Floor	Person
6	T
5	R
4	L
3	K
2	J
1	S

Now, people below L are 3 people.

Hence, the correct answer is "Option 2".

Q6. Answer: (b) Limestone

The correct answer is Limestone.

Key Points

• Limestone is a non-metallic mineral because it does not contain any metal elements in its chemical composition. It is primarily composed of calcium carbonate (CaCO3) or the double carbonate of calcium and magnesium.

• Copper is a metallic mineral that belongs to the non-ferrous category. It is a highly ductile and malleable metal used extensively in electrical wiring and electronics.

• Gold is a metallic natural resource classified as a precious metal. It is found in alluvial (placer) deposits or quartz veins and is highly valued for jewelry and investment.

• Iron ore is a metallic mineral and is the primary source of metallic iron. It is categorized as a ferrous mineral because it contains iron. It is the backbone of modern industrial development.

Additional Information

• Classification of Minerals:

• Metallic Minerals: These minerals contain metal in raw form. They are subdivided into Ferrous (containing iron, e.g., Iron Ore, Manganese) and Non-ferrous (not containing iron, e.g., Gold, Copper, Silver).

• Non-metallic Minerals: These do not contain metals. Examples include Limestone, Mica, Gypsum, Coal, and Petroleum.

• Characteristics of Limestone:

• Composition: It is a sedimentary rock composed mainly of skeletal fragments of marine organisms such as coral, forams, and molluscs.

• Uses: It is the essential raw material for the cement industry. It is also used as a flux in smelting iron ore in blast furnaces within the iron and steel industry.

• Global Production: China is the leading producer of limestone globally, followed by the United States and India.

• Metallic Resource Features:

• Copper: Major deposits in India are found in the Balaghat mines in Madhya Pradesh, Khetri mines in Rajasthan, and Singhbhum district of Jharkhand.

• Iron Ore: India is rich in high-grade iron ore. The main types are Magnetite (highest quality with 70% iron content) and Hematite (most important industrial ore).

• Gold: In India, Karnataka is the leading producer, specifically the Kolar Gold Fields (KGF) and Hutti Gold Mines.

Important Points

• Distribution in India: Rajasthan is the largest producer of Limestone in India, contributing approximately 21% of the national output, followed by Madhya Pradesh (11%) and Andhra Pradesh (11%).

• Environmental Impact: Mining of limestone and other minerals is often referred to as a "killer industry" due to the health hazards to miners and the environmental degradation, including deforestation and water pollution.

• Regulatory Framework: In India, the Mines and Minerals (Development and Regulation) Act, 1957 governs the mining sector. Minerals like limestone are classified as major minerals, though some applications are treated as minor minerals under state guidelines.

• Statistical Data: As per the Indian Bureau of Mines (IBM), the total resources of limestone in India are estimated at over 200 billion tonnes, widely distributed across sedimentary basins.

Q7. Answer: (c) 24

Shortcut Trick

Amount doubles in 6 years => factor = 2

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16 = 2^4
So 4 doubling periods needed
Total time = 4 × 6 = 24 years
Therefore Answer = 24 years
Alternate Method
Given:
Amount doubles in 6 years, compounded annually
Formula used:
A = P(1 + r)^t
Calculation:
=> Let rate = r
=> After 6 years: 2P = P(1 + r)^6
=> (1 + r)^6 = 2
=> For 16 times:
=> 16P = P(1 + r)^t
=> (1 + r)^t = 16 = 2^4
=> But (1 + r)^6 = 2
=> => (1 + r)^(24) = 2^4 = 16
=> So t = 24 years
Therefore The correct answer is 24 years.
Additional Information
Compound Growth
Amount grows exponentially: A = P(1 + r)^t
Doubling Concept
If amount doubles in T years, then 2^n growth takes nT years
Exponential Relation
16 = 2^4 helps convert problem into doubling cycles
Shortcut Tip
Convert final amount into powers of 2 when doubling is given

Q8. Answer: (c) 835.2π

Shortcut Trick
l : r = 29 : 20 => take l = 29k, r = 20k
h = √(29² − 20²)k = 21k
Volume = 2800πk³ = (24192/5)π => k³ = 216/125 => k = 6/5
CSA = πrl = π(20k)(29k) = 580πk²
= 580π × (36/25) = (20880/25)π = 835.2π
Therefore Answer = 835.2π cm²
Alternate Method
Given:
l : r = 29 : 20, Volume = (24192/5)π cm³
Formula used:
Volume = (1/3)πr²h, CSA = πrl
Calculation:
=> Let l = 29k, r = 20k
=> h = √(l² − r²) = √(29² − 20²)k = 21k
=> Volume = (1/3)π(20k)²(21k)
=> = 2800πk³
=> 2800πk³ = (24192/5)π
=> k³ = 216/125 => k = 6/5
=> CSA = πrl = π(20k)(29k)
=> = 580πk²

=> = 580π × (36/25)

=> = (20880/25)π = 835.2π

Therefore The correct answer is 835.2π cm^2.

Additional Information

Cone Identity

$l^2 = r^2 + h^2$

CSA Formula

CSA = πrl

Volume Formula

Volume = $(1/3)\pi r^2 h$

Triplet Use

29, 20, 21 forms a Pythagorean triplet

Q9. Answer: (d) 45

Shortcut Trick

Total food = Men × Days = 100 × 27 = 2700

Remaining men = 100 − 40 = 60

Days = 2700 ÷ 60 = 45

Therefore Answer = 45 days

Alternate Method

Given:

100 men → 27 days, 40 men leave

Formula used:

Total work (food) = Men × Days (constant)

Calculation:

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

=> Remaining men = 100 − 40 = 60

=> Required days = 2700 ÷ 60

=> = 45 days

Therefore The correct answer is 45 days.

Additional Information

Man-Days Concept

Total consumption = men × days remains constant

Inverse Relation

Fewer men => more days

Formula

Men1 × Days1 = Men2 × Days2

Quick Tip

Always compute total man-days first

Q10. Answer: (c) 1

Given: (Left) € A © D R & I % B B V @ A J $ £ * S B £ N L (Right)

Now,

We need symbols which are immediately preceded by a letter AND immediately followed by a symbol.

So, Needed pattern is: Letter - Symbol - Symbol

(Left) € A © D R & I % B B V @ A J $ £ * S B £ N L (Right)

So, total = 1

Hence, the correct answer is Option 3.

Q11. Answer: (b) Fluorine

The correct answer is Fluorine.

Key Points

• Fluorine is a chemical element with the symbol F and atomic number 9. It belongs to Group 17 of the periodic table, which is also

known as the Halogen group.

• At room temperature (standard condition of 25°C or 298 K), Fluorine exists as a pale yellow, highly toxic diatomic gas (F2). It is the lightest of all halogens. Hence, the statement regarding Fluorine being a gas is correct.

• Iodine (atomic number 53) also belongs to Group 17, but it is a lustrous, purple-black solid at room temperature due to stronger intermolecular forces. Hence, the statement regarding Iodine being a gas at room temperature is incorrect.

• Bromine (atomic number 35) is the only non-metallic element that is a fuming reddish-brown liquid at room temperature. While it evaporates easily, its primary state is liquid. Hence, the statement regarding Bromine being a gas at room temperature is incorrect.

• Astatine (atomic number 85) is a radioactive member of the halogen group. It is naturally occurring in very small amounts and is a solid at room temperature. Hence, the statement regarding Astatine being a gas at room temperature is incorrect.

Additional Information

• Characteristics of Halogens (Group 17):

• The Halogens consist of five or six chemically related elements: Fluorine, Chlorine, Bromine, Iodine, Astatine, and possibly Tennessine.

• These elements are highly reactive non-metals because they have seven valence electrons and need only one more to achieve a stable noble gas configuration.

• The name "Halogen" comes from Greek words meaning "salt-producing," as they react with metals to form salts like Sodium Chloride (NaCl) and Calcium Fluoride (CaF2).

• Physical State Trends:

• As we move down Group 17, the atomic radius increases and the melting and boiling points also increase.

• This trend results in different physical states at room temperature: Fluorine and Chlorine are gases, Bromine is a liquid, and Iodine and Astatine are solids.

• The increase in mass leads to stronger London dispersion forces (a type of van der Waals force), requiring more energy to change the state.

• Applications and Uses:

• Fluorine: Used in toothpaste (as sodium fluoride) to prevent dental cavities, in the manufacturing of Teflon (non-stick coating), and in uranium enrichment for nuclear power.

• Chlorine: Widely used as a disinfectant for drinking water and swimming pools, and in the production of PVC plastics.

• Bromine: Used in flame retardants, pesticides, and photography (as silver bromide).

• Iodine: Essential for thyroid gland function in humans; used as an antiseptic (Tincture of Iodine) and in iodized salt.

Important Points

• Electronegativity: Fluorine is the most electronegative element in the entire periodic table with a value of 4.0 on the Pauling scale. This means it has the strongest tendency to attract electrons.

• Reactivity: Due to its high electronegativity and small atomic size, Fluorine is so reactive that it can even react with some noble gases like Xenon and Krypton under specific conditions.

• Coloration: Halogens exhibit distinct colors: Fluorine is pale yellow, Chlorine is greenish-yellow, Bromine is reddish-brown, and Iodine vapor is violet.

• Oxidizing Agents: All halogens act as powerful oxidizing agents, with Fluorine being the strongest among them. Their oxidizing power decreases as you move down the group from Fluorine to Iodine.

Q12. Answer: (b) 268750

Shortcut Trick

Let total voters = N

Votes polled = 90% => 0.9N

Valid votes = 80% => 0.72N

Winner margin = (51% − 49%) of valid = 2% of 0.72N

=> 0.02 × 0.72N = 3870 => N = 3870 / 0.0144

=> N = 268750

Therefore Answer = 268750

Alternate Method

Given:

90% voted, 20% invalid, winner got 51% valid votes, margin = 3870

Formula used:

Margin = Difference% × Valid votes

Calculation:

=> Let total voters = N

=> Votes polled = 90% of N = 0.9N

=> Valid votes = 80% of 0.9N = 0.72N

=> Winner margin = (51% − 49%) of valid votes

=> = 2% of 0.72N

=> = 0.02 × 0.72N = 0.0144N

=> 0.0144N = 3870

=> N = 3870 ÷ 0.0144

=> N = 268750

Therefore The correct answer is 268750.

Additional Information

Valid Votes

Valid = Polled − Invalid votes

Margin Concept

Margin = Difference in percentage × total valid votes

Shortcut Tip

Combine percentages stepwise: 90% × 80% = 72%

Key Insight

Use percentage difference (51 − 49) instead of separate calculations

Q13. Answer: (b) Mumbai

The correct answer is Mumbai.

Key Points

• The 3rd Council Meeting of the International Organization for Marine Aids to Navigation (IALA) was hosted in Mumbai, India, in February 2025.

• This significant international event was organized by the Directorate General of Lighthouses and Lightships (DGLL), which operates under the Ministry of Ports, Shipping and Waterways (MoPSW).

• The meeting followed the landmark transition of IALA into an Intergovernmental Organization (IGO), a move formalized after the 2020 Paris Convention to enhance global cooperation in maritime safety.

• India is an elected member of the IALA Council for the 2023-2027 period, reflecting the country's strategic importance in the Indian Ocean Region (IOR) and its commitment to international maritime standards.

• The primary focus of the 2025 meeting included digitalization of navigation, implementation of e-Navigation, and ensuring the safety of sea lanes through advanced Aids to Navigation (AtoN).

Additional Information

• IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities):

• Established in 1957, it is headquartered in Saint-Germain-en-Laye, France.

• It brings together marine aids to navigation authorities, manufacturers, and consultants from across the world to harmonize standards for lighthouses, buoys, and Vessel Traffic Services (VTS).

• Directorate General of Lighthouses and Lightships (DGLL):

• It is a statutory body in India with its head office located in Noida, Uttar Pradesh.

• The DGLL manages over 190 lighthouses along the Indian coastline, providing vital visual and radio aids to mariners.

• Marine Aids to Navigation Act, 2021:

• This act replaced the colonial-era Lighthouse Act, 1927, to provide a modern framework for the development and management of vessel traffic services and aids to navigation in India.

• It empowers the Central Government to designate any aid to navigation as a "heritage lighthouse" to promote tourism.

• Maritime India Vision 2030:

• A decade-long blueprint released by the Government of India to overhaul the maritime sector, aiming to develop world-class ports and transform 75 lighthouses into tourism hubs.

• It focuses on the Blue Economy and increasing the cargo handling capacity of Indian ports.

Important Points

• The hosting of the IALA Council Meeting in Mumbai underscores the city's status as the Maritime Capital of India and its pivotal role in international shipping and logistics.

• During the 2025 summit, discussions emphasized the use of Renewable Energy for powering lighthouses, aligning with India's goals under the International Solar Alliance (ISA).

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• The Union Minister for Ports, Shipping and Waterways, Shri Sarbananda Sonowal, highlighted that India is transitioning from a "Service Provider" to a "Global Leader" in maritime technology and safety protocols.

• Advancements in Automatic Identification Systems (AIS) and Differential Global Positioning Systems (DGPS) were key technical components discussed to prevent maritime accidents in congested waters.

Q14. Answer: (b) 53.6%

Shortcut Trick

Let actual SP = 120 (LCM trick)

SP1 = (5/12)×120 = 50

Loss 20% => SP1 = 80% of CP => CP = 50/0.8 = 62.5

SP2 = 80% of 120 = 96

Profit % = (96 − 62.5)/62.5 × 100 = 53.6%

Therefore Answer = 53.6%

Alternate Method

Given:

Selling at (5/12) of actual SP gives 20% loss

Then selling at 80% of actual SP → find profit %

Formula used:

SP = CP × (1 − loss/100), Profit % = (SP − CP)/CP × 100

Calculation:

=> Let actual SP = 120

=> First SP = (5/12) × 120 = 50

=> 50 = 80% of CP => 50 = 0.8CP

=> CP = 50 / 0.8 = 62.5

=> Second SP = 80% of 120 = 96

=> Profit = 96 − 62.5 = 33.5

=> Profit % = (33.5 / 62.5) × 100

=> = 53.6%

Therefore The correct answer is 53.6%.

Additional Information

Fraction Trick

Take LCM (12) to eliminate fraction easily

Loss Relation

SP = CP × 0.8 for 20% loss

Profit Formula

Profit % = (Profit / CP) × 100

Key Insight

Find CP first, then compute new profit

Q15. Answer: (a) 2.5

Shortcut Trick

SI = (P × R × T) / 100

1080 = (7200 × 6 × T) / 100

=> 1080 = 432T

=> T = 1080 / 432 = 2.5

Therefore Answer = 2.5 years

Alternate Method

Given:

Principal = 7200, SI = 1080, Rate = 6%

Formula used:

SI = (P × R × T) / 100

Calculation:

=> 1080 = (7200 × 6 × T) / 100

=> 1080 = 432T
=> T = 1080 ÷ 432
=> T = 2.5 years
Therefore The correct answer is 2.5 years.
Additional Information
Simple Interest Formula
SI = (P × R × T) / 100
Rearranged Formula
T = (SI × 100) / (P × R)
Units
Time is in years when rate is per annum
Shortcut Tip
Simplify numbers early to avoid large calculations

Q16. Answer: (d) 4

Shortcut Trick
sinA = 3/5 => cosecA = 5/3
Numerator = 11 + 3cosecA = 11 + 5 = 16
Denominator = 4 − 5sinA = 4 − 3 = 1
=> √(16/1) = 4
Therefore Answer = 4
Alternate Method
Given:
sinA = 3/5
Formula used:
cosecA = 1 / sinA
Calculation:
=> cosecA = 5/3
=> Substitute in expression:
=> √[(11 + 3×5/3) / (4 − 5×3/5)]
=> = √[(11 + 5) / (4 − 3)]
=> = √(16/1)
=> = 4
Therefore The correct answer is 4.
Additional Information
Reciprocal Identity
cosecA = 1 / sinA
Substitution Method
Replace trigonometric values directly to simplify
Simplification Tip
Convert fractions early to avoid complexity
Square Root
√16 = 4

Q17. Answer: (c) TWO

Given: (Left) R # L ? V ! M S + N - $ O T * P / < Q U (Right)
Now,
We need symbols which are immediately preceded by a letter and also immediately followed by another symbol.
So, Needed pattern is: Letter - Symbol - Symbol
(Left) R # L ? V ! M S + N - $ O T * P / < Q U (Right)
So, Total = 2
Hence, the correct answer is Option 3.

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Q18. Answer: (b) -34

Shortcut Trick

Apply BODMAS

(-56) ÷ (-14) = 4

(-3) × 7 = -21

=> -9 - 4 - 21 = -34

Therefore Answer = -34

Alternate Method

Given:

(-9) - (-56) ÷ (-14) + (-3) × 7

Formula used:

BODMAS rule

Calculation:

=> (-56) ÷ (-14) = 4

=> (-3) × 7 = -21

=> Substitute:

=> -9 - 4 + (-21)

=> = -9 - 4 - 21

=> = -34

Therefore The correct answer is -34.

Additional Information

BODMAS Rule

Division and multiplication first, then addition/subtraction

Sign Rules

(− ÷ −) = +, (− × +) = −

Simplification

Always reduce expression step by step

Common Mistake

Ignoring order of operations leads to wrong answer

Q19. Answer: (c) Mother's sister

Family Chart:

Decoding the Symbols:

Symbol	•	−	×	÷
Meaning	Daughter	Mother	Wife	Father

Given: G + R − W × D ÷ M

It means: G is the daughter of R, R is the mother of W, W is the wife of D, D is the father of M.

Here, G is Mother’s sister of M.

Hence, the correct answer is "Option 3".

Q20. Answer: (c) 248

The logic followed here is:

thus, "248" will replace the question mark in the given series.

Hence, the correct option is "Option 3".

Q21. Answer: (a) 342

Shortcut Trick

Use weighted average

Total = (25×137 + 26×443 + 21×461)

= 3425 + 11518 + 9681 = 24624

Total members = 25 + 26 + 21 = 72

Average = 24624 ÷ 72 = 342

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Therefore Answer = 342

Alternate Method

Given:

Group A: 25 members, avg = 137

Group B: 26 members, avg = 443

Group C: 21 members, avg = 461

Formula used:

Overall average = (Σ (number × average)) ÷ total members

Calculation:

=> Total A = 25 × 137 = 3425

=> Total B = 26 × 443 = 11518

=> Total C = 21 × 461 = 9681

=> Total amount = 3425 + 11518 + 9681 = 24624

=> Total members = 25 + 26 + 21 = 72

=> Average = 24624 ÷ 72

=> = 342

Therefore The correct answer is 342.

Additional Information

Weighted Average

Use when groups have different sizes

Formula

Average = (Σ wx) ÷ Σ w

Shortcut Tip

Multiply average with group size first, then divide by total

Application

Useful in combining multiple group averages

Q22. Answer: (b) Supplementary wage employment

The correct answer is Supplementary wage employment.

Key Points

• The National Food for Work Programme (NFWP) was launched on 14th November 2004 by the then Prime Minister of India. The primary objective of this scheme is to provide supplementary wage employment to the rural poor who are in need of wage labor and are willing to perform unskilled manual labor.

• This program was specifically targeted at the 150 most backward districts of the country to provide food security through the creation of need-based economic, social, and community assets.

• The scheme is a 100% Centrally Sponsored Scheme, meaning the Union Government provides all funds and resources, including food grains, while the State Governments are responsible for implementation and monitoring.

• Under the program, food grains are provided to the states free of cost. However, the transportation cost, handling charges, and taxes on food grains are the responsibility of the State Government.

• The District Collector is the nodal officer at the district level who has the overall responsibility for planning, implementation, coordination, monitoring, and supervision of the program.

Additional Information

• Transition to MGNREGA: In 2005, the National Food for Work Programme was subsumed into the National Rural Employment Guarantee Act (NREGA), which was later renamed the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). This act provides a legal guarantee for 100 days of employment in every financial year to adult members of any rural household.

• Payment Mechanism: Wages under the NFWP were paid partly in food grains and partly in cash. A minimum of 5 kg of food grains per person-day was generally provided, and at least 25% of the wages were to be paid in cash to meet other essential needs.

• Identification of Districts: The 150 districts were identified by the Planning Commission (now NITI Aayog) based on criteria such as agricultural productivity per worker, average wage rate for agricultural laborers, and the concentration of SC/ST populations.

• Focus Areas: The works undertaken under this scheme primarily focused on water conservation, drought proofing (including afforestation and tree plantation), land development, flood control, and rural connectivity (all-weather roads).

Important Points

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• Asset Creation: The program aimed not just at temporary relief but at creating durable assets in rural areas to improve the socio-economic infrastructure of backward regions.

• Social Audit: To ensure transparency and prevent corruption, the concept of social audit was encouraged, where the Gram Sabha would monitor the execution of works and the distribution of food grains.

• Eligibility: The scheme was open to all rural poor who were prepared to do unskilled manual work at the minimum wage prescribed by the state. No gender discrimination was allowed, and equal wages were mandated for both men and women.

• Implementation Agency: While the Collector is the nodal head, the works could be executed by Panchayati Raj Institutions (PRIs), Line Departments, or other Government Agencies. No private contractors were allowed to be involved in the execution of the program.

Q23. Answer: (c) Neither conclusion (I) nor (II) follows

Given Statements:

Some towns are districts.

No district is a state.

No state is a city.

The least possible Venn diagram shows:

Conclusions:

(I) No town is a state

We only know some towns are districts, and districts are not states.

But towns that are not districts may still overlap with states.

So, this conclusion does not necessarily follow.

(II) No district is a city

Districts are separate from states, and states are separate from cities, but there is no direct restriction between districts and cities.

So, districts may or may not overlap with cities.

Hence, this conclusion also does not necessarily follow.

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

Hence, the correct answer is "Option 3".

Q24. Answer: (a) AEL 27

The logic followed here is:

So, 'AEL 27' will replace the question mark in the given series.

Hence, the correct answer is "Option 1".

Q25. Answer: (b) 9

Shortcut Trick

Apply BODMAS

$20 \div 4 = 5$

$3 \times 4 = 12$

$\Rightarrow 16 + 5 - 12 = 9$

Therefore Answer = 9

Alternate Method

Given:

$16 + 20 \div 4 - 3 \times 4$

Formula used:

BODMAS rule

Calculation:

$\Rightarrow 20 \div 4 = 5$

$\Rightarrow 3 \times 4 = 12$

$\Rightarrow$ Substitute:

$\Rightarrow 16 + 5 - 12$

$\Rightarrow = 21 - 12$

$\Rightarrow = 9$

Therefore The correct answer is 9.

Additional Information

BODMAS Rule
Division and multiplication first, then addition/subtraction
Order Tip
Solve ÷ and × left to right
Simplification
Reduce step by step for accuracy
Common Error
Ignoring order leads to wrong result

Q26. Answer: (c) 9850

Shortcut Trick
Q → R at 50% loss => SP = 0.5 × CP
So CP(Q) = 6895 ÷ 0.5 = 13790
P → Q at 40% profit => SP = 1.4 × CP
So CP(P) = 13790 ÷ 1.4 = 9850
Therefore Answer = 9850
Alternate Method
Given:
P sells to Q at 40% profit, Q sells to R at 50% loss, R pays Rs. 6895
Formula used:
SP = CP × (1 ± percentage/100)
Calculation:
=> Let CP of Q = x
=> Q sells at 50% loss => SP = 0.5x
=> 0.5x = 6895 => x = 13790
=> This is SP of P
=> P sells at 40% profit => SP = 1.4 × CP
=> 1.4 × CP = 13790
=> CP = 13790 ÷ 1.4
=> CP = 9850
Therefore The correct answer is Rs. 9850.
Additional Information
Loss Concept
50% loss => SP = 0.5 × CP
Profit Concept
40% profit => SP = 1.4 × CP
Reverse Calculation
Work backward from final price
Shortcut Tip
Convert percentages into multipliers for faster solving

Q27. Answer: (a) 4

Given number: 8634157
Logic: Add 1 to each odd digit and subtract 2 from each even digit
Original number: 8 6 3 4 1 5 7

Digit	Type	Operation	New Digit
8	Even	8 − 2	6
6	Even	6 − 2	4
3	Odd	3 + 1	4
4	Even	4 − 2	2

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1	Odd	1 + 1	2
5	Odd	5 + 1	6
7	Odd	7 + 1	8

New number: 6 4 4 2 2 6 8

Second from the left = 4

Hence, the correct answer is Option 1.

Q28. Answer: (d) 7.5

The correct answer is 7.5.

Key Points

• In MS-Excel, formulas follow a specific Order of Operations, often referred to as BODMAS (Brackets, Orders, Division/Multiplication, Addition/Subtraction) or PEMDAS.

• According to the question, the values assigned to the cells are A1 = 2, A2 = 3, and A3 = 2. These are numerical constants entered into the Excel Worksheet.

• The formula provided is =A1*A2 + A2/A3. In this expression, MS-Excel identifies two primary arithmetic operations before the final addition: Multiplication (represented by the asterisk *) and Division (represented by the forward slash /).

• Step 1: The Multiplication operation A1*A2 is performed first. Substituting the values, we get 2 * 3, which equals 6.

• Step 2: The Division operation A2/A3 is performed simultaneously or subsequently based on its position. Substituting the values, we get 3 / 2, which equals 1.5.

• Step 3: Finally, the Addition operation is performed by summing the results of the previous steps. This results in 6 + 1.5, which equals 7.5. Hence, the result of the formula is 7.5 and the statement is correct.

Additional Information

• Arithmetic Operators in Excel: MS-Excel uses standard operators for calculations: + for addition, - for subtraction, * for multiplication, / for division, ^ for exponentiation, and % for percentage. All formulas must start with an Equal Sign (=) to be recognized by the software.

• Operator Precedence: If a formula contains multiple operators, Excel evaluates them in the following order:

• Parentheses (): Anything inside brackets is calculated first.

• Exponentials (^): Powers and roots.

• Multiplication and Division (* and /): Evaluated from left to right.

• Addition and Subtraction (+ and -): Evaluated from left to right.

• Cell Referencing: The formula uses Relative Cell References (A1, A2, A3). If this formula were copied to another cell, the references would shift automatically unless Absolute References (using the $ sign, e.g., A1) were used.

• Function vs. Formula: While a Formula is an expression defined by the user (like the one in the question), a Function is a built-in predefined formula in Excel, such as SUM(), AVERAGE(), or PRODUCT().

• Data Types: In MS-Excel 365 or older versions like Excel 2019, the result of a division involving integers can result in a Decimal (Floating point) value, as seen in this example (1.5).

Important Points

• Evaluation Error Prevention: If a cell referenced in the formula (like A3) contained a 0, Excel would return a #DIV/0! error, as division by zero is undefined.

• Displaying Formulas: To view the formula instead of the result (7.5) in the cell, users can press Ctrl + ` (grave accent) or toggle the Show Formulas button in the Formula Auditing group under the Formulas tab.

• Precision: MS-Excel maintains a precision of up to 15 significant digits, ensuring that complex calculations involving multiple divisions and multiplications remain highly accurate for Financial and Scientific data analysis.

• Auto-Update: One of the core features of Excel is that if the value in cell A1 is changed from 2 to 5, the result of the formula will Automatically Recalculate from 7.5 to 16.5 instantly.

Q29. Answer: (b) 6

Shortcut Trick

For circles between two common tangents => radii form a GP

r1 : r2 : r3 : r4 : r5 in GP

Given r1 = 4, r5 = 9

=> r5 = r1 × k^4 => 9 = 4k^4

=> k^4 = 9/4 => $k^2 = 3/2$

Middle circle r3 = r1 × k²
=> r3 = 4 × (3/2) = 6
Therefore Answer = 6
Alternate Method
Given:
5 circles between two common tangents
Smallest radius = 4, Largest radius = 9
Concept Used:
Radii form a geometric progression (GP)
Calculation:
=> Let radii = a, ar, ar², ar³, ar^4
=> a = 4, ar^4 = 9
=> 4r^4 = 9 => r^4 = 9/4
=> r² = √(9/4) = 3/2
=> Middle radius = ar²
=> = 4 × (3/2) = 6
Therefore The correct answer is 6.
Additional Information
Key Concept
Circles between two common tangents form a geometric progression
GP Formula
Last term = First term × r^(n−1)
Middle Term
For odd number of terms, middle = a × r²
Quick Tip
Find common ratio using first and last term directly

Q30. Answer: (a) 93.6°

Shortcut Trick
Linear pair at C: 6x + (5x + y) = 180 => 11x + y = 180
Alternate angles: (5x + y) = (2x + 3y)
=> 3x = 2y => y = 3x/2
Substitute: 11x + 3x/2 = 180 => 25x/2 = 180 => x = 14.4
=> y = 21.6
angle QCD = 5x + y = 72 + 21.6 = 93.6°
Therefore Answer = 93.6°
Alternate Method
Given:
PQ || RS, transversal AB
angle ACQ = 6x, angle QCD = (5x + y), angle BDS = (2x + 3y)
Concept used:
Linear pair and alternate interior angles
Calculation:
=> At point C: angle ACQ + angle QCD = 180°
=> 6x + (5x + y) = 180
=> 11x + y = 180 ...(1)
=> Since lines are parallel:
=> angle QCD = angle BDS
=> 5x + y = 2x + 3y
=> 3x = 2y => y = 3x/2 ...(2)
=> Substitute (2) in (1):
=> 11x + 3x/2 = 180

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=> 25x/2 = 180

=> x = 14.4

=> y = 3x/2 = 21.6

=> angle QCD = 5x + y = 72 + 21.6 = 93.6°

Therefore The correct answer is 93.6°.

Additional Information

Linear Pair

Sum of adjacent angles on a line = 180°

Parallel Lines

Alternate interior angles are equal

Strategy

Form equations using angle properties and solve simultaneously

Tip

Always identify angle relations before forming equations

Q31. Answer: (b) birth

The correct answer is birth.

Key Points

• According to the Citizenship Act, 1955, citizenship by birth is granted to individuals based on their date of birth and location. A person born in India on or after 26 January 1950 but before 1 July 1987 is a citizen of India by birth, irrespective of the nationality of his parents. Hence, the statement is correct.

• This provision reflects the principle of jus soli (right of the soil), where the location of birth is the primary factor for determining citizenship. During this specific period, there were no additional requirements regarding the citizenship status of the parents.

• The Citizenship Act was later amended because this liberal provision was perceived to be prone to misuse, particularly regarding illegal immigration. Consequently, for those born between 1 July 1987 and 3 December 2004, at least one parent must be a citizen of India at the time of the person's birth.

• For persons born in India on or after 3 December 2004, both parents must be citizens of India, or one parent must be a citizen and the other must not be an illegal migrant at the time of birth.

• The Ministry of Home Affairs is the nodal ministry in India responsible for matters related to citizenship and the implementation of the Citizenship Act, 1955.

Additional Information

• Citizenship by Descent:

• A person born outside India on or after 26 January 1950 but before 10 December 1992 is a citizen of India by descent if his father was a citizen of India at the time of his birth.

• From 10 December 1992 onwards, a person born outside India is considered a citizen if either of the parents is a citizen of India at the time of birth.

• Citizenship by Registration:

• The Central Government may, on an application, register any person (not being an illegal migrant) as a citizen of India if they belong to categories such as persons of Indian origin who are ordinarily resident in India for seven years.

• It also applies to persons who are married to citizens of India and are ordinarily resident in India for seven years before making an application.

• Citizenship by Naturalisation:

• A person can acquire Indian citizenship by naturalisation if they have resided in India for a certain period (generally 12 years) and meet specific qualifications mentioned in the Third Schedule of the Act.

• The applicant must have a good character and an adequate knowledge of a language specified in the Eighth Schedule of the Constitution of India.

• Citizenship by Incorporation of Territory:

• If any foreign territory becomes a part of India, the Government of India specifies the persons who among the people of the territory shall be the citizens of India.

• An example is when Pondicherry (now Puducherry) became part of India in 1962, the Government issued the Citizenship (Pondicherry) Order, 1962.

Important Points

• Constitutional Provisions: Articles 5 to 11 under Part II of the Constitution of India deal with citizenship. However, these articles only identified the persons who became citizens of India at the commencement of the Constitution on 26 January 1950.

• Single Citizenship: Unlike the USA, where there is dual citizenship (National and State), India provides for Single Citizenship.

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This concept was borrowed from the British Constitution to promote fraternity and unity among the citizens.

• Termination of Citizenship: The Citizenship Act, 1955 prescribes three ways of losing citizenship: Renunciation (voluntary giving up), Termination (when a citizen voluntarily acquires citizenship of another country), and Deprivation (compulsory termination by the Central Government based on fraud or disloyalty).

• OCI Scheme: The Overseas Citizenship of India (OCI) scheme was introduced by amending the Citizenship Act, 1955 in August 2005 to provide certain rights to the Indian Diaspora, though it does not amount to dual citizenship as OCI holders do not have voting rights.

Q32. Answer: (c) 1934–35

The correct answer is 1934–35.

Key Points

• The Ranji Trophy is India's premier domestic first-class cricket championship, and it was first held in the year 1934–35.

• The first match of the tournament was played on 4 November 1934 between Madras and Mysore at the Chepauk ground in Madras (now Chennai).

• The competition is named after Kumar Shri Ranjitsinhji, the Jam Sahib of Nawanagar, who was the first Indian to play international cricket for England and Sussex.

• The trophy itself was donated by Maharaja Bhupinder Singh of Patiala in memory of Ranjitsinhji, who passed away in 1933.

• The first-ever winner of the Ranji Trophy was Bombay (now Mumbai), who defeated North India in the final match of the 1934–35 season.

Additional Information

• Governance and Format:

• The tournament is organized annually by the Board of Control for Cricket in India (BCCI).

• It follows a round-robin and knockout format, where various regional and state cricket associations compete for the title.

• Currently, the tournament features 38 teams representing different states of India and regional cricket bodies.

• Mumbai’s Dominance:

• The Mumbai cricket team is the most successful team in the history of the Ranji Trophy, having won a record 42 titles as of the 2023–24 season.

• They also hold the record for the most consecutive wins, securing 15 titles in a row from 1958–59 to 1972–73.

• Significance in Indian Cricket:

• The Ranji Trophy serves as the primary breeding ground for selecting players for the Indian National Cricket Team.

• Performances in this first-class format are highly valued by national selectors to gauge a player's temperament and skill for Test cricket.

• Recent Developments:

• In 2020, for the first time since its inception, the Ranji Trophy was cancelled for the 2020–21 season due to the COVID-19 pandemic.

• The 2023–24 edition was won by Mumbai, who defeated Vidarbha in the final to reclaim the championship.

Important Points

• Ranjitsinhji (The Namesake): Although the premier domestic tournament is named after him, Ranjitsinhji never actually played for an Indian team in India; he played his major cricket in England between 1896 and 1902.

• Individual Records:

• The record for the most runs in Ranji Trophy history is held by Wasim Jaffer, who scored over 12,000 runs.

• The record for the most wickets is held by Rajinder Goel, who took 637 wickets during his career, despite never playing for the Indian national team.

• Eligibility: Players are eligible to represent their respective states or associations based on their birthplace or through specific BCCI guidelines regarding residency and professional registration.

Q33. Answer: (c) Paris Agreement

The correct answer is Paris Agreement.

Key Points

• The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015.

• Its primary goal is to limit global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

• India reaffirmed its commitment to the Paris Agreement during the 2025 climate summit, highlighting its progress toward Nationally Determined Contributions (NDCs).

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• India has committed to achieving Net Zero emissions by the year 2070, a target first announced at COP26 in Glasgow.

• The agreement operates on a 5-year cycle of increasingly ambitious climate action carried out by countries. India updated its NDCs in 2022, aiming to reduce the emissions intensity of its GDP by 45 percent by 2030.

Additional Information

• Kyoto Protocol:

• Adopted in 1997 and entered into force in 2005, it was the first international agreement to set binding targets for greenhouse gas emissions.

• It primarily placed a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

• Montreal Protocol:

• Signed in 1987, it is a landmark agreement designed to protect the Ozone Layer by phasing out the production of substances like Chlorofluorocarbons (CFCs).

• It is considered one of the most successful environmental treaties, with universal ratification by all 198 UN Member States.

• Basel Convention:

• Adopted in 1989, this treaty regulates the transboundary movements of hazardous wastes and their disposal.

• It aims to protect human health and the environment against the adverse effects resulting from the generation and management of hazardous and other wastes.

• International Solar Alliance (ISA):

• Launched by India and France in 2015, the ISA is an action-oriented platform to increase the deployment of solar energy technologies.

• It targets "Sunshine Countries" located between the Tropic of Cancer and the Tropic of Capricorn to reduce dependence on fossil fuels.

Important Points

• Panchamrit Targets: India’s five-fold strategy includes reaching 500 GW of non-fossil energy capacity and meeting 50 percent of its energy requirements from renewable energy by 2030.

• LiFE Movement: The Lifestyle for Environment initiative was introduced by the Indian Prime Minister to promote sustainable consumption and production.

• Global Stocktake: Under the Paris Agreement, the Global Stocktake happens every five years to assess the collective progress toward meeting the agreement's long-term goals.

Q34. Answer: (d) Bharatiya Vayuyan Adhiniyam, 2024

The correct answer is Bharatiya Vayuyan Adhiniyam, 2024.

Key Points

• The Bharatiya Vayuyan Adhiniyam, 2024 was introduced in the Lok Sabha to replace the Aircraft Act of 1934, which was a 90-year-old colonial-era legislation. The primary objective is to provide a modern legal framework for the design, manufacture, possession, use, operation, sale, import, and export of aircraft in India.

• The Act aims to empower the Central Government to make rules for the regulation and control of all aviation-related activities, ensuring they align with international standards set by the International Civil Aviation Organization (ICAO).

• One of the most significant features of this legislation is the formal statutory status given to existing regulatory bodies, namely the Directorate General of Civil Aviation (DGCA), the Bureau of Civil Aviation Security (BCAS), and the Aircraft Accident Investigation Bureau (AAIB).

• It introduces provisions for Ease of Doing Business by simplifying the licensing and certification processes, which is expected to boost the Make in India initiative in the aviation manufacturing sector.

• The scope of the Act has been expanded to include unmanned aircraft systems (drones) and advanced air mobility, addressing the technological advancements that were not envisioned in the 1934 Act.

Additional Information

• The Carriage by Air (Amendment) Act, 2022: This legislation primarily deals with the liability of air carriers and the compensation paid to passengers in case of accidents, delays, or loss of baggage. It is based on the Montreal Convention and does not focus on the administrative re-enactment of the 1934 Act.

• Protection of Interests in Aircraft Objects Act, 2023: This Act was designed to implement the Cape Town Convention and Protocol, which provides a legal framework for financing and leasing of aircraft engines and airframes. It protects the rights of lessors and financiers but is specific to financial interests rather than general aviation regulation.

• Aircraft (Security) Rules, 2020 & Amendments (2022): These rules are secondary legislations (subordinate legislation) framed under the Aircraft Act, 1934. They focus specifically on anti-hijacking measures, ground security, and airport protection. While they modernize security protocols, they do not replace the parent Act.

• Regulatory Landscape in India: The Ministry of Civil Aviation (MoCA) is the nodal ministry responsible for the formulation of national policies and programs for the development and regulation of civil aviation. The Bharatiya Vayuyan Adhiniyam, 2024 is a

major step in the National Civil Aviation Policy (NCAP) 2016 vision to make India the third-largest civil aviation market globally.

Important Points

• Decriminalization and Penalties: The Bharatiya Vayuyan Adhiniyam, 2024 seeks to rationalize penalties. It shifts several minor offenses from criminal imprisonment to monetary fines and administrative penalties, which reduces the burden on the judiciary and improves the operational environment for airlines.

• Radio-telegraphy and Licensing: Unlike the 1934 Act, the new law modernizes the requirements for radio-telegraphy apparatus on aircraft and simplifies the process for issuing pilot licenses and certificate of airworthiness.

• Sovereignty and Safety: The Act reaffirms India's sovereignty over its airspace and grants the government emergency powers to prohibit or regulate flight activities in the interest of national security or public safety.

• Historical Context: The Aircraft Act, 1934 was enacted during the British Raj. While it was amended several times (most recently in 2020), it was found inadequate to handle the complexities of a $170 billion aviation industry that India is projected to become.

Q35. Answer: (d) 1 and 3 only

The correct answer is 1 and 3 only.

Key Points

• Article 167 of the Constitution of India defines the duties of the Chief Minister regarding the furnishing of information to the Governor. It states that the Chief Minister must communicate all decisions of the Council of Ministers relating to state administration and legislative proposals to the Governor. Hence, statement 1 is correct.

• Article 165 is specifically related to the appointment and duties of the Advocate-General for the State. The provision where the Governor administers the oaths of office and secrecy to the Ministers is actually contained in Article 164(3). Hence, statement 2 is incorrect.

• Article 163 provides for a Council of Ministers with the Chief Minister at the head to aid and advise the Governor in the exercise of his functions. This article also mentions that this advice is not required in matters where the Governor is mandated to act in his discretion. Hence, statement 3 is correct.

• The Chief Minister acts as the sole link of communication between the Governor and the State Council of Ministers, ensuring that the Constitutional Head is kept informed of all executive actions.

Additional Information

• Article 164 (Other Provisions as to Ministers):

• The Chief Minister is appointed by the Governor, and other Ministers are appointed by the Governor on the Chief Minister's advice.

• The Council of Ministers is collectively responsible to the Legislative Assembly of the State, reflecting the parliamentary form of government.

• The total number of Ministers, including the Chief Minister, in a State shall not exceed 15% of the total strength of the Legislative Assembly, as per the 91st Constitutional Amendment Act, 2003.

• Article 166 (Conduct of Business):

• All executive actions of the Government of a State shall be expressed to be taken in the name of the Governor.

• The Governor makes rules for the more convenient transaction of the business of the Government of the State.

• The State Executive:

• The State Executive consists of the Governor, the Chief Minister, the Council of Ministers, and the Advocate-General of the State.

• While the Governor is the nominal executive authority (de jure head), the Chief Minister is the real executive authority (de facto head).

Important Points

• Advocate-General (Article 165): He is the highest law officer in the state. To be appointed, a person must be qualified to be a Judge of a High Court. He holds office during the pleasure of the Governor.

• Discretionary Power: If any question arises whether a matter falls within the Governor's discretion or not, the decision of the Governor is final, and the validity of anything done by him cannot be called into question.

• Oath and Secrecy: According to Article 164, the Governor administers the oath of office and oath of secrecy to every minister according to the forms set out in the Third Schedule of the Constitution.

• Membership Requirement: A Minister who is not a member of the State Legislature for any period of six consecutive months shall cease to be a Minister at the expiration of that period.

Q36. Answer: (d) 32.71%

Shortcut Trick

Take base: Buy 10 get 2 free => 12 kits

Total MRP = 12 × 12000 = 144000

Pay only for 10 => 120000
Apply discounts:
=> 15% discount => 120000 × 0.85 = 102000
=> Additional 5% => 102000 × 0.95 = 96900
Effective discount:
=> Discount = 144000 − 96900 = 47100
=> % = (47100 / 144000) × 100 ≈ 32.71%
Therefore Answer = 32.71%
Alternate Method
Given:
Price per kit = Rs. 12000
Offer: Buy 10 get 2 free
Volume discount = 15%
Institutional discount = 5%
Formula used:
Effective Discount % = (Total discount ÷ Total MRP) × 100
Calculation:
=> Total kits received = 12
=> Total MRP = 12 × 12000 = 144000
=> Cost for 10 kits = 120000
=> After 15% discount = 120000 × 85/100 = 102000
=> After 5% discount = 102000 × 95/100 = 96900
=> Total discount = 144000 − 96900 = 47100
=> Discount % = (47100 ÷ 144000) × 100
=> = 32.71%
Therefore The correct answer is 32.71%.
Additional Information
Successive Discount
Net factor = (1 − d1)(1 − d2)
Free Item Concept
Buy X get Y free => effective price reduces
Quick Tip
Always compare final payment with total MRP

Q37. Answer: (a) 14,175

Shortcut Trick
Let A : B = 5x : 7x
C joins after 4 months with (7x/2)
A = 5x×8 + 3x×4 = 52x
B = 7x×12 = 84x
C = (7x/2)×8 = 28x
Ratio = 52 : 84 : 28 = 13 : 21 : 7
B's share = (21/41) × 27675 = 14175
Therefore Answer = Rs. 14175
Alternate Method
Given:
A : B = 5 : 7, C joins after 4 months

Partner	Capital	Time (months)	Product
A (first 8 months)	5x	8	40x
A (last 4 months)	3x	4	12x

A Total	•	•	52x
B	7x	12	84x
C	7x/2	8	28x

Profit Ratio:

52 : 84 : 28 = 13 : 21 : 7

Total Ratio = 41

B's Share:

= (21/41) × 27675 = 14175

Therefore The correct answer is Rs. 14175.

Q38. Answer: (a) = OKP, % = PLQ

Given: # : MIN :: RNS : %

Option 1) # = OKP, % = PLQ

For # (OKP) to MIN

For % (PLQ) to RNS

Since, both transformations follow a consistent shift pattern, Option 1 is correct.

Option 2) # = OKP, % = PLR

For # (OKP) to MIN

For % (PLR) to RNS

Since, the patterns do not match, Option 2 is incorrect.

Option 3) # = OKO, % = PLQ

For # (OKO) to MIN

For % (PLQ) to RNS

Since, the patterns do not match, Option 3 is incorrect.

Option 4) # = OKP, % = PMQ

For # (OKP) to MIN

For % (PMQ) to RNS

Since, the patterns do not match, Option 4 is incorrect.

Hence, the correct answer is "Option 1".

Q39. Answer: (c) Bakshi Jagabandhu

The correct answer is Bakshi Jagabandhu.

Key Points

• Bakshi Jagabandhu, whose full name was Bakshi Jagabandhu Bidyadhar Mohapatra Bhramarbar Raya, was the legendary leader of the Paika Rebellion of 1817. He was the Buxi (military chief) of the Raja of Khurda. Hence, the option containing Bakshi Jagabandhu is the correct statement.

• The rebellion was an armed uprising against the British East India Company's rule in Odisha. It is often referred to as the "First War of Independence" by some historians and the Odisha government.

• The Paikas were the traditional landed militia of Odisha who enjoyed rent-free land (Paikan lands) in return for their military service to the Kingdom of Khurda.

• The rebellion was triggered in March 1817 when the British policies led to the takeover of Paikan lands, the introduction of a new currency system, and the heavy Salt Tax, which made life difficult for the local population.

• Under Bakshi Jagabandhu's leadership, the rebels attacked British symbols of authority, such as police stations and treasuries in Banapur and Khurda. The revolt quickly spread to other regions like Puri, Pipili, and Cuttack.

• Despite the bravery of the Paikas, the rebellion was eventually suppressed by the British forces by 1818. However, Bakshi Jagabandhu remained at large and continued guerrilla warfare until he surrendered in 1825. He died in 1829 while in custody at Cuttack.

Additional Information

• Chittu Singh: He was a prominent leader of the Ramosi Rebellion. The Ramosis, who served in the lower ranks of the Maratha army, revolted in 1822 in Satara, Maharashtra, against British rule and heavy land revenue assessments. Hence, statement A is incorrect.

• Alluri Sitarama Raju: He was a revolutionary who led the Rampa Rebellion of 1922 in the Godavari agency of Andhra Pradesh. He fought against the British Madras Forest Act of 1882, which restricted the free movement of tribal people in forests. He is

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celebrated as "Manyam Veerudu" (Hero of the Jungles). Hence, statement B is incorrect.

• Sidhu Murmu: Along with his brother Kanhu Murmu, he led the Santhal Rebellion (also known as the Santhal Hool) in 1855-56. This rebellion took place in the Rajmahal Hills (modern-day Jharkhand) against the oppressive Zamindari system and British colonial policies. Hence, statement D is incorrect.

Important Points

• The British East India Company conquered Odisha in 1803 after defeating the Marathas in the Second Anglo-Maratha War. This conquest led to the dethroning of the Raja of Khurda, which sowed the seeds of discontent.

• One of the major economic causes was the abolition of the Cowrie currency (shells) and the demand for taxes in Silver, which the peasants found nearly impossible to acquire.

• The Paika Rebellion is significant because it was a unified struggle involving tribal communities (like the Konds), the Paika militia, and local Zamindars against foreign rule.

• In 2017, the Government of India released a commemorative coin and a stamp to mark the 200th anniversary of this historic uprising.

Q40. Answer: (d) Goa and Tripura

The correct answer is Goa and Tripura.

Key Points

• According to the Census 2011, the literacy rate of Goa is 88.70%, and the literacy rate of Tripura is 87.22%. Both these states have literacy levels significantly above the 80% mark. Hence, option D is correct.

• In Option A, while Himachal Pradesh recorded a literacy rate of 82.80%, Haryana stood at 75.55%. Since Haryana is below the threshold, this pair does not satisfy the condition. Hence, statement A is incorrect.

• In Option B, Tamil Nadu barely crossed the threshold with 80.09%, but Assam had a literacy rate of 72.19%. Hence, statement B is incorrect.

• In Option C, Sikkim recorded a literacy rate of 81.42%, which is above 80%, but Odisha recorded 72.87%. Hence, statement C is incorrect.

• The Census 2011 data revealed that several States and Union Territories (UTs) like Kerala, Lakshadweep, Mizoram, Goa, and Tripura maintained high literacy standards, contributing to the overall national average.

Additional Information

• Definition of Literacy Rate: As per the Census of India, a person aged 7 years and above who can both read and write with understanding in any language is considered literate. The formula used is (Number of Literate Persons / Population aged 7 and above) multiplied by 100.

• Top Performing States: Kerala retains the top position with a 94.00% literacy rate, followed by the Union Territory of Lakshadweep at 91.85%. Mizoram ranks third with 91.33%. These regions have consistently implemented educational reforms and social awareness campaigns.

• States at the Bottom: Bihar recorded the lowest literacy rate in the country at 61.80%, followed by Arunachal Pradesh at 65.38% and Rajasthan at 66.11% during the 2011 survey.

• Gender Disparity: The Census 2011 highlighted a gap between male and female literacy. The male literacy rate was 80.89%, while the female literacy rate was 64.64%. Reducing this numerical value gap has been a primary goal of government laws like the Right to Education Act (2009).

• National Average: The overall literacy rate in India according to the Census 2011 was 73.00%. This showed a significant increase from the 2001 Census, which was 64.83%.

Important Points

• Administrative Features: The Registrar General and Census Commissioner of India, under the Ministry of Home Affairs, is responsible for conducting the decennial Census. The 2011 Census was the 15th National Census of the country since 1872.

• Literacy in Union Territories: Among UTs, Lakshadweep has the highest literacy (91.85%), while Dadra and Nagar Haveli had the lowest at 76.24% in 2011. High literacy in islands and small states is often attributed to smaller population sizes and localized government focus.

• Socio-Economic Impact: Higher literacy rates in states like Goa and Tripura correlate with better Human Development Index (HDI) rankings, improved healthcare functions, and higher employment applications in the service sector.

• Future Trends: While the official 2021 Census was delayed, reports from the National Statistical Office (NSO) suggest that India's literacy rate has improved further, reaching approximately 77.7% in 2017-18.

Q41. Answer: (a) Up to three years

The correct answer is Up to three years.

Key Points

• Article 356 of the Constitution of India provides for the imposition of President’s Rule in a state if there is a failure of constitutional machinery. This is also popularly known as a State Emergency or Constitutional Emergency.

• A proclamation imposing President's Rule must be approved by both Houses of Parliament (the Lok Sabha and the Rajya Sabha) within two months from the date of its issue. This approval is done through a simple majority.

• Once approved by the Parliament, the President's Rule continues for six months. It can be extended for a maximum period of three years with the approval of the Parliament every six months.

• However, the 44th Amendment Act of 1978 introduced a constraint: the President's Rule cannot be extended beyond one year unless a Proclamation of National Emergency is in operation in the whole of India or in the whole or any part of the state, or the Election Commission certifies that there are difficulties in holding general elections to the Legislative Assembly of the state concerned.

• The ultimate maximum limit for the President's Rule in a state remains three years, after which the constitutional machinery must be restored through fresh elections.

Additional Information

• Grounds of Imposition: President's Rule can be proclaimed under two circumstances. First, under Article 356, if the President is satisfied (based on a report from the Governor of the state or otherwise) that the state government cannot be carried on in accordance with the Constitution. Second, under Article 365, if a state fails to comply with or give effect to any direction from the Union.

• Consequences: Upon the imposition of President's Rule, the President dismisses the State Council of Ministers headed by the Chief Minister. The Governor, on behalf of the President, carries on the state administration with the help of the Chief Secretary or advisors appointed by the President.

• Legislative Powers: The Parliament exercises the power of the State Legislature. Any law made by the Parliament (or the President) during this period continues to be operative even after the President's Rule is revoked, until repealed or amended by the State Legislature.

• Judicial Review: In the landmark S.R. Bommai case (1994), the Supreme Court of India held that the President's proclamation under Article 356 is subject to judicial review. The court can strike down the proclamation if it is found to be mala fide or based on irrelevant grounds.

• Historical Context: President's Rule was first imposed in the state of Punjab in the year 1951. Since then, it has been invoked more than 100 times across various states in India.

Important Points

• Revocation: A proclamation of President's Rule can be revoked by the President at any time by a subsequent proclamation. Such a revocation does not require parliamentary approval.

• Status of State Assembly: During the President's Rule, the State Legislative Assembly is either suspended or dissolved by the President. If suspended, it can be reactivated once the rule is lifted; if dissolved, fresh elections must be held.

• Article 352 vs Article 356: While a National Emergency (Article 352) affects the relationship of the Union with all states and continues the state government and legislature, President's Rule (Article 356) specifically targets one state and results in the suspension/dissolution of the state's executive and legislative powers.

• Financial Impact: Unlike a Financial Emergency (Article 360), President's Rule does not inherently allow the Union to reduce the salaries of state employees, though the Parliament takes over the passage of the State Budget.

Q42. Answer: (a) 2000

The correct answer is 2000.

Key Points

• The Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December 2000. This nationwide plan aims to provide good all-weather road connectivity to unconnected villages.

• It was initiated by the then Prime Minister of India, Atal Bihari Vajpayee, under the Ministry of Rural Development.

• The primary objective is to provide single all-weather road connectivity to eligible unconnected habitations in the rural areas with a population of 500 persons and above in plain areas.

• For Hill States (North-East, Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttarakhand), the Desert Areas, and Tribal (Schedule V) areas, the objective is to connect habitations with a population of 250 persons and above.

• The scheme is a Centrally Sponsored Scheme. Initially, it was 100% funded by the Central Government, but since 2015-16, the funding is shared between the Centre and States.

Additional Information

• Phases of PMGSY:

• PMGSY-I: Launched in 2000 to provide basic connectivity to high-population habitations.

• PMGSY-II: Launched in May 2013, it focused on the consolidation of the existing 50,000 km Rural Road Network to improve its efficiency as a provider of transportation services.

• PMGSY-III: Approved by the Cabinet in July 2019, it involves the consolidation of 1,25,000 km through routes and Major Rural Links that connect habitations to Gramin Agricultural Markets (GrAMs), Higher Secondary Schools, and Hospitals.

• Funding Pattern:

• For most states, the fund sharing ratio is 60:40 between the Central Government and the State Government.

• For 8 North-Eastern states and 3 Himalayan states (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), the ratio is 90:10.

• Digital Governance:

• The OMMAS (Online Management, Monitoring and Accounting System) geographic information system was developed to identify targets and monitor progress.

• The Meri Sadak mobile app was launched in 2015 to enable citizens to register complaints regarding the quality and pace of work of PMGSY roads.

Important Points

• RCPLWEA: The Road Connectivity Project for Left Wing Extremism Affected Areas was launched in 2016 as a separate vertical under PMGSY to provide all-weather road connectivity in 44 districts across 9 states affected by LWE.

• Green Technologies: PMGSY promotes the use of "Green Technologies" and non-conventional materials like Waste Plastic, Cold Mix Technology, Fly Ash, and Geo-textiles in road construction to reduce the carbon footprint.

• Quality Control: A three-tier quality control mechanism is in place to ensure the durability of the roads. Tier 1 is at the Program Implementation Unit level, Tier 2 involves independent State Quality Monitors (SQM), and Tier 3 involves independent National Quality Monitors (NQM).

• Impact: As of recent data, over 7,00,000 km of road length has been completed under various interventions of the scheme, significantly improving rural socio-economic development.

Q43. Answer: (c) A program that manages memory, processes, and devices

The correct answer is A program that manages memory, processes, and devices.

Key Points

• An Operating System (OS) is a system software that acts as an intermediary or interface between a computer user and the computer hardware.

• Its primary function is to manage hardware resources like the Central Processing Unit (CPU), Main Memory (RAM), Storage, and Input/Output (I/O) devices.

• Statement 1: A program used to access the internet refers to a Web Browser, such as Google Chrome or Mozilla Firefox. Hence, statement 1 is incorrect.

• Statement 2: A program used to watch videos is classified as Application Software or a Media Player, such as VLC Media Player. Hence, statement 2 is incorrect.

• Statement 3: An OS performs Memory Management, Processor Management, and Device Management to ensure the system runs smoothly. Hence, statement 3 is correct.

• Statement 4: A program used for data entry is typically a spreadsheet or database application like Microsoft Excel. Hence, statement 4 is incorrect.

Additional Information

• Functions of an Operating System:

• Process Management: It handles the creation, deletion, and scheduling of various processes or tasks.

• Memory Management: It allocates and de-allocates memory space (RAM) as needed by different applications.

• File Management: It manages directories and files for efficient storage and retrieval on Hard Disk Drives (HDD) or Solid State Drives (SSD).

• Security: It provides data security and prevents unauthorized access to the system through passwords and encryption.

• Types of Operating Systems:

• Batch OS: Users do not interact directly with the computer; jobs are processed in batches.

• Real-Time OS (RTOS): Used in environments where time constraints are very strict, such as missile systems or air traffic control.

• Distributed OS: Uses multiple central processors to serve multiple real-time applications and users.

• Mobile OS: Specifically designed for smartphones and tablets, such as Android (developed by Google) and iOS (developed by Apple).

• Common Examples:

• Microsoft Windows: Introduced in 1985, it is the most widely used GUI-based OS for personal computers.

• Linux: An open-source OS created by Linus Torvalds in 1991, known for its stability and security in servers.

• macOS: A proprietary OS developed by Apple Inc. for Macintosh computers.

Important Points

• The Kernel is the core component of an operating system that manages operations of the computer and hardware.

• Booting is the initial set of operations that a computer system performs when electrical power is switched on, loading the OS from secondary storage into the main memory.

• An OS can provide a Command Line Interface (CLI), where users type text commands, or a Graphical User Interface (GUI),

which uses windows, icons, and menus.

• The first operating system, GM-NAA I/O, was produced in 1956 by General Motors for the IBM 704 mainframe computer.

Q44. Answer: (c) One

Given: (Left) K Y C K & A A C P N P Y M R B # + J $ & ^ (Right)

Now,

We need symbols which are immediately preceded by a symbol and also immediately followed by a letter.

So, Needed pattern is: Symbol - Symbol - Letter

(Left) K Y C K & A A C P N P Y M R B # + J $ & ^ (Right)

Here, total = 1

Hence, the correct answer is Option 3.

Q45. Answer: (c) 647.78

Shortcut Trick

Relative speed = 130 + 70 = 200 km/hr

= 200 × (5/18) = 55.56 m/s

Total distance = speed × time = 55.56 × 14 = 777.78 m

Length of other train = 777.78 − 130 = 647.78 m

Therefore Answer = 647.78 m

Alternate Method

Given:

Speeds = 130 km/hr and 70 km/hr

Length of first train = 130 m

Time = 14 sec

Formula used:

Distance = Relative speed × Time

Calculation:

=> Relative speed = 130 + 70 = 200 km/hr

=> Convert to m/s: 200 × (5/18) = 55.56 m/s

=> Total distance covered = 55.56 × 14 = 777.78 m

=> Total distance = sum of lengths

=> Length of second train = 777.78 − 130

=> = 647.78 m

Therefore The correct answer is 647.78 m.

Additional Information

Relative Speed

Opposite direction => speeds add

Unit Conversion

km/hr to m/s => multiply by 5/18

Train Concept

Crossing => total length = sum of both trains

Q46. Answer: (b) 5

Given: Seven boxes A, B, C, D, E, F and G are kept one above another in a single stack (positions 1 bottom to 7 top).

Only two boxes are kept between B and G.

Only D is kept above E.

No box is kept below G.

A is kept below F but above C.

Position	Box
7	D
6	F

5	E
4	B
3	A
2	C
1	G

Now, boxes above C are 5 boxes.

Hence, the correct answer is "Option 2".

Q47. Answer: (d) dc

Given:

“food is delicious” → “ga dc vr”

“harry loves food” → “dc hu bw”

Now,

So, food → dc

Hence, the correct answer is Option 4.

Q48. Answer: (d) A stretched rubber band

The correct answer is A stretched rubber band.

Key Points

• Potential energy is defined as the energy stored in an object due to its position, arrangement, or state. Unlike kinetic energy, which is energy in motion, potential energy is "stored" and has the capacity to do work when released.

• A stretched rubber band is a clear example of Elastic Potential Energy. When work is performed to stretch the band, the energy is stored within the polymer chains of the material. This stored energy is released as kinetic energy once the band is let go. Hence, statement D is correct.

• A falling rock possesses Kinetic Energy because it is in a state of active motion. While the rock had high Gravitational Potential Energy while resting at a height, that energy is actively being converted into motion as it descends. Hence, statement A is incorrect.

• A burning candle is primarily an example of Chemical Energy being converted into Thermal (heat) and Luminous (light) energy. The energy is stored in the chemical bonds of the paraffin wax and is released through an exothermic reaction during combustion. Hence, statement B is incorrect.

• A moving car represents Kinetic Energy. Any object with mass that is traveling at a specific velocity possesses this form of energy, which is calculated based on its speed and weight. Hence, statement C is incorrect.

Additional Information

• Historical Context: The term potential energy was first proposed by the Scottish engineer and physicist William Rankine in the year 1853. It has since become a fundamental concept in classical mechanics.

• Gravitational Potential Energy: This is the most common form of potential energy, which depends on an object's height and mass. The standard formula used to calculate it is PE = mgh, where m is mass, g is the acceleration due to gravity (approximately 9.8 m/s^2 on Earth), and h is the elevation above a reference point.

• Chemical Potential Energy: This is energy stored in the atomic bonds of substances. Common examples include batteries, biomass, petroleum, and natural gas. In the context of India, the Ministry of New and Renewable Energy promotes biogas as a way to utilize chemical potential energy from organic waste.

• Elastic Potential Energy: This occurs when an object is compressed or stretched. It is governed by Hooke’s Law, which states that the force needed to extend or compress a spring by some distance is proportional to that distance. The energy stored is given by $1/2\ kx^2$, where k is the spring constant and x is the displacement.

Important Points

• Law of Conservation of Energy: This law states that energy cannot be created or destroyed, only transformed. In a pendulum, energy constantly shifts between potential (at the highest points) and kinetic (at the lowest point).

• SI Unit: The Standard International unit for measuring all forms of energy, including potential energy, is the Joule (J). This unit is named in honor of the English physicist James Prescott Joule for his work on the nature of heat and its relationship to mechanical work.

• Applications in Infrastructure: Huge amounts of potential energy are utilized in Hydroelectric Dams, such as the Tehri Dam in Uttarakhand. Water stored at a high altitude in the reservoir possesses massive gravitational potential energy, which is used to turn turbines to generate electricity.

• Nuclear Potential Energy: This is the potential energy of the nucleons (protons and neutrons) inside an atomic nucleus. This

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energy is harnessed in nuclear power plants, such as the Kudankulam Nuclear Power Plant in Tamil Nadu, through the process of nuclear fission.

Q49. Answer: (d) Maharashtra

The correct answer is Maharashtra.

Key Points

• The state government of Maharashtra issued a comprehensive notification in December 2025 to ensure the strict enforcement of the prohibition on all forms of physical and emotional punishment in schools.

• This enforcement is rooted in the statutory provisions of the Right of Children to Free and Compulsory Education (RTE) Act, 2009, which mandates a child-friendly and fear-free environment in educational institutions.

• Under the Maharashtra state directives, any instance of Corporal Punishment or Mental Harassment is treated as a major misconduct, leading to immediate disciplinary action against the erring staff or school management.

• The State Education Department of Maharashtra mandated the formation of School Management Committees (SMCs) and special monitoring cells to track and report violations of child rights within school premises.

• The move aims to improve the Learning Outcomes and psychological well-being of students by shifting from punitive measures to Positive Pedagogical approaches in classrooms across the state.

Additional Information

• Right to Education (RTE) Act, 2009:

• The Right of Children to Free and Compulsory Education Act was enacted by the Parliament of India on 4 August 2009.

• It came into legal force on 1 April 2010, making India one of the 135 countries to make education a fundamental right for every child.

• The act provides for the right of children to free and compulsory education in a neighborhood school till the completion of elementary education (classes 1 to 8).

• Constitutional Provision:

• The 86th Amendment Act, 2002 inserted Article 21A into the Constitution of India.

• Article 21A declares that the State shall provide free and compulsory education to all children of the age of 6 to 14 years in such a manner as the State may determine.

• Prohibition of Corporal Punishment:

• Section 17(1) of the RTE Act states that no child shall be subjected to Physical Punishment or Mental Harassment.

• Section 17(2) mandates that any person who contravenes the provisions of sub-section (1) shall be liable to disciplinary action under the service rules applicable to such person.

Important Points

• Role of NCPCR: The National Commission for Protection of Child Rights (NCPCR) is the apex body that monitors the implementation of the RTE Act. It has issued detailed guidelines for the Elimination of Corporal Punishment (ECP) in schools.

• Definition of Corporal Punishment: It includes any physical force intended to cause some degree of pain or discomfort, however light, as well as non-physical forms of punishment that are cruel and degrading, such as verbal abuse, sarcasm, or humiliation.

• Legal Redressal: Apart from the RTE Act, victims of physical abuse in schools can seek protection under the Juvenile Justice (Care and Protection of Children) Act, 2015, specifically Section 75, which deals with punishment for cruelty to a child.

• Impact on Enrollment: Strict enforcement of these laws has historically led to a decrease in Dropout Rates and an increase in Gross Enrolment Ratio (GER) as schools become safer environments for children.

Q50. Answer: (b) 1908

The correct answer is 1908.

Key Points

• Bal Gangadhar Tilak was arrested by the British authorities in the year 1908 on charges of sedition. This followed his articles published in his Marathi newspaper, Kesari, where he defended the actions of young revolutionaries.

• The primary reason for his arrest was an article published in May 1908 concerning the Muzaffarpur bomb incident involving Khudiram Bose and Prafulla Chaki. Tilak argued that the bomb was a response to the oppressive policies of the British Raj.

• The trial took place in Bombay (now Mumbai) in July 1908. Justice Davar presided over the case, and Tilak was represented by Mohammad Ali Jinnah, though the jury eventually found him guilty.

• Following the trial, Tilak was sentenced to six years of rigorous imprisonment. He was deported to the Mandalay prison in Burma (present-day Myanmar), where he remained from 1908 until 1914.

• During his incarceration in Mandalay, he wrote the famous book Gita Rahasya, which is an exposition of Karma Yoga based on the Bhagavad Gita.

Additional Information

• Kesari and Mahratta: Tilak founded two newspapers to spread the message of nationalism. Kesari was published in Marathi to

reach the masses, while Mahratta was published in English for the educated class. These papers were instrumental in criticizing the British administration.

• Lokanmanya Title: Due to his immense popularity and dedication to the cause of Indian independence, the people of India conferred upon him the title Lokanmanya, which means "Accepted by the people as their leader."

• Educational Initiatives: In 1884, Tilak, along with Gopal Ganesh Agarkar and others, founded the Deccan Education Society in Pune to improve the quality of education for Indian youth and instill nationalist ideas. They also established Fergusson College in 1885.

• Home Rule League: After his release from prison in 1914, Tilak launched the Indian Home Rule League in April 1916 at Belgaum. He worked alongside Annie Besant to demand self-government for India within the British Empire.

• Lal-Bal-Pal: Tilak was part of the famous extremist trio of the Indian National Congress known as Lal-Bal-Pal, consisting of Lala Lajpat Rai from Punjab, Bal Gangadhar Tilak from Maharashtra, and Bipin Chandra Pal from Bengal.

Important Points

• Section 124A: Tilak was charged under Section 124A of the Indian Penal Code (IPC), which deals with sedition. This law was used extensively by the British to suppress the Indian National Movement.

• Slogan of Swaraj: Tilak is famously known for his slogan, "Swaraj is my birthright and I shall have it!" which became a battle cry for millions of Indians during the struggle for freedom.

• Social Festivals: To foster a sense of unity and national identity, Tilak transformed the Ganesh Chaturthi festival (starting in 1893) and Shivaji Jayanti (starting in 1895) into public events to organize the people against British rule.

• Personal Details: Born on July 23, 1856, in Ratnagiri, Maharashtra, Tilak was a scholar, mathematician, and philosopher. He passed away on August 1, 1920, the same day the Non-Cooperation Movement was launched by Mahatma Gandhi.

• Valentine Chirol: The British journalist Valentine Chirol described Tilak as the "Father of Indian Unrest" in his book "Indian Unrest," highlighting Tilak's role in instigating the first organized resistance against colonial rule.

Q51. Answer: (b) TSCZ

The logic followed here is:

For, DUMB → FXOE

For, LGUN → NJWQ

Now, applying the same logic to RPAW:

So, RPAW → TSCZ

Hence, the correct answer is Option 2.

Q52. Answer: (d) SUR

The logic followed here is based on the alphabetical position pattern:

Option 1: DFB

Option 2: NPL

Option 3: QSO

Option 4: SUR

Thus, SUR breaks this pattern.

Hence, the odd one out is Option 4.

Q53. Answer: (b) Nauradehi Wildlife Sanctuary

The correct answer is Nauradehi Wildlife Sanctuary.

Key Points

• In October 2025, the Madhya Pradesh government officially announced that Nauradehi Wildlife Sanctuary (now part of the Veerangana Durgavati Tiger Reserve) would be developed as the third permanent home for cheetahs in the state.

• The inclusion of Nauradehi is a strategic move to create a metapopulation—a group of spatially separated populations of the same species that interact at some level. By dispersing the cheetahs across Kuno, Gandhi Sagar, and Nauradehi, the government aims to reduce ecological pressure on Kuno and minimise the risk of a single disease or localized event wiping out the entire Indian population.

Additional Information

• Project Cheetah:

• It is the world’s first intercontinental large wild carnivore translocation project, launched by the Government of India to restore the species after its extinction in the country in 1952.

• The first batch of 8 cheetahs was brought from Namibia on September 17, 2022, and released into Kuno National Park by PM Narendra Modi.

• A second batch of 12 cheetahs was translocated from South Africa in February 2023 to increase genetic diversity and population

size.

• Geographical Significance:

• The Chambal River flows through the sanctuary, and the Gandhi Sagar Dam, one of the four major dams built on the river, is located within its vicinity.

• The presence of the Chambal River provides a perennial water source, supporting diverse flora and fauna including Chinkara, Nilgai, and Mugger Crocodiles.

• Administrative Bodies:

• The project is overseen by the National Tiger Conservation Authority (NTCA) in collaboration with the Wildlife Institute of India (WII) and the Madhya Pradesh Forest Department.

Important Points

• Other Potential Habitats:

• While Gandhi Sagar is the immediate priority, the Nauradehi Wildlife Sanctuary (now part of the Veerangana Durgavati Tiger Reserve) has also been identified as a highly suitable long-term habitat for cheetahs due to its massive landscape of over 1,000 square kilometers.

• Madhav National Park in the Shivpuri district is another site being evaluated for future phases of the reintroduction program.

• Conservation Goals:

• The primary goal of Project Cheetah is not just to reintroduce a species but to conserve India's grasslands and open scrub forests, which are critical for water security and rural livelihoods.

• The successful establishment of a metapopulation across multiple sites like Kuno and Gandhi Sagar reduces the risk of disease or localized disasters wiping out the entire population.

Q54. Answer: (b) MS Excel

The correct answer is MS Excel.

Key Points

• MS Excel is a spreadsheet program developed by Microsoft as part of the Office productivity suite. It is designed to help users perform mathematical calculations, organize data in rows and columns, and create graphical representations of information. Since it is designed for a specific end-user task, it is a classic example of Application Software. Hence, statement B is correct.

• Windows is a graphical Operating System (OS) developed by Microsoft. It acts as the primary interface between the computer user and the hardware, managing resources and providing a platform for other programs to run. Because it manages the system itself, it is classified as System Software. Hence, statement A is incorrect.

• BIOS, which stands for Basic Input/Output System, is a type of firmware stored on a small memory chip on the motherboard. It is the first software that runs when a computer starts, responsible for the Power-On Self-Test (POST) and booting the operating system. It belongs to the category of System Software. Hence, statement C is incorrect.

• Linux is a family of open-source Unix-like operating systems based on the Linux kernel, first released by Linus Torvalds on September 17, 1991. Like Windows, it serves the fundamental purpose of managing hardware and software resources, making it System Software. Hence, statement D is incorrect.

Additional Information

• Application Software: This refers to software that performs specific functional tasks for the end-user. Examples include Word Processors (like MS Word), Web Browsers (like Google Chrome), Media Players (like VLC), and Database Management Systems (like Oracle). These are not essential for the computer's basic functioning but are vital for user productivity.

• System Software: These are programs designed to run a computer's hardware and application programs. If we think of the computer system as a layered architecture, the system software is the interface between the hardware and user applications. It includes the Operating System, Utility Software, and Device Drivers.

• Microsoft Excel Features: Launched initially for Macintosh in 1985 and Windows in 1987, Excel provides powerful features such as Pivot Tables, Macro programming via Visual Basic for Applications (VBA), and data analysis tools. It uses a grid of cells identified by column letters and row numbers.

• Utility Software: This is a sub-type of system software that helps configure, optimize, or maintain a computer. Examples include Antivirus software, disk defragmenters, and file compression tools like WinZip.

• Open Source vs Proprietary: Linux is a prime example of Open Source software where the source code is available for anyone to modify. In contrast, Windows and MS Excel are Proprietary Software owned by Microsoft Corporation, requiring a license for use.

Important Points

• Historical Context: The first spreadsheet program was VisiCalc, released in 1979, which significantly drove the adoption of personal computers in the business world. Later, Lotus 1-2-3 became the industry standard before Microsoft Excel took over the market in the early 1990s.

• Booting Process: The BIOS is gradually being replaced in modern computers by UEFI (Unified Extensible Firmware Interface), which offers faster boot times, secure boot features, and support for larger hard drives (greater than 2.2 Terabytes).

• Operating System Market: As of recent data, Windows remains the most widely used desktop OS globally, while Linux dominates the server and supercomputer markets due to its stability and security features.

• Functionality of Excel: Modern versions of Excel can handle up to 1,048,576 rows and 16,384 columns in a single worksheet, making it a critical tool for data scientists and accountants worldwide.

Q55. Answer: (c) 49686 cm²

Shortcut Trick

Total surface area of cube = $6a^2$

=> 6×91^2

=> 6×8281

=> 49686

Therefore Answer = 49,686 cm^2

Alternate Method

Given:

Side of cube = 91 cm

Formula used:

Total surface area of cube = $6a^2$

91

All 6 faces are squares

Calculation:

=> TSA = $6 \times a^2$

=> = 6×91^2

=> = 6×8281

=> = 49686 cm^2

Therefore The correct answer is 49,686 cm^2.

Additional Information

Cube Formula

Total surface area = $6a^2$

Square Calculation

$91^2 = (90 + 1)^2 = 8100 + 180 + 1 = 8281$

Faces of Cube

A cube has 6 identical square faces

Quick Tip

Use $(a + b)^2$ identity for faster squaring

Q56. Answer: (c) United Kingdom

The correct answer is United Kingdom.

Key Points

• According to Stanford University's Global AI Vibrancy Index 2024 (included in the 2025 AI Index Report), the top three countries in the rankings are:

• United States (Score: 78.6)

• China (Score: 36.95)

• India (Score: 21.59)

• The United Kingdom did not make the top three; it typically ranks in the top five or six depending on the specific pillar being measured, but trailed India, China, and the U.S. in the overall 2024 vibrancy score.

• India's Rise: India made a significant leap from 7th place in 2023 to 3rd place in 2024, primarily driven by its strong AI talent pool and research output.

Additional Information

• Dimensions of the Index: The vibrancy index evaluates countries based on three primary pillars: Research and Development (R&D), Economy, and Infrastructure. This includes 28 indicators such as conference publications, AI startups, and government strategy.

• Private Investment Trends: In 2023, global private investment in AI saw a decline for the second consecutive year, yet investment specifically in Generative AI surged nearly eightfold to US$ 25.2 billion.

• Model Origins: The United States produced 61 notable AI models in 2023, compared to 15 from China and 21 from the European

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Union.

• United Kingdom’s Role: The UK hosted the world's first AI Safety Summit at Bletchley Park in November 2023, reinforcing its position as a global hub for AI Governance and Regulation.

• China’s Strength: Despite regulatory challenges, China accounts for roughly 60% of the world's Industrial Robot installations, indicating a high level of AI Automation in its economy.

Important Points

• India’s Specific Achievements: While not in the top three overall, India ranks 1st globally in the AI Skill Penetration Rate, which is 3.0 times the global average. This reflects the high density of AI-skilled Software Engineers and Data Scientists in the Indian workforce.

• GitHub Contributions: India also holds a significant share of GitHub AI Projects, indicating a strong developer community and growth in Open-Source AI development.

• Global Rankings: Following the United Kingdom, other high-ranking countries in the 2024 report include France, Germany, and Canada. These nations are part of the Global Partnership on Artificial Intelligence (GPAI).

• Responsible AI: The 2024 index highlighted a lack of standardized Safety Evaluations for Large Language Models (LLMs), which remains a critical challenge for all top-ranked countries including the USA and China.

Q57. Answer: (b) 47

Shortcut Trick

Mean = Σ(fx) ÷ Σf

Σf = 24 + 38 + 26 + 32 + 13 = 133

Σ(fx) = (16×24) + (21×38) + (47×26) + (80×32) + (99×13)

= 384 + 798 + 1222 + 2560 + 1287 = 6251

Mean = 6251 ÷ 133 = 47

Therefore Answer = 47

Alternate Method

Given:

Marks: 16, 21, 47, 80, 99

Frequencies: 24, 38, 26, 32, 13

Formula used:

Mean = Σ(fx) ÷ Σf

Calculation:

=> Σf = 24 + 38 + 26 + 32 + 13 = 133

=> Σ(fx) = (16×24) + (21×38) + (47×26) + (80×32) + (99×13)

=> = 384 + 798 + 1222 + 2560 + 1287

=> = 6251

=> Mean = 6251 ÷ 133

=> = 47

Therefore The correct answer is 47.

Additional Information

Mean of Discrete Data

Mean = Σ(fx) ÷ Σf

Frequency (f)

Number of times a value occurs

Shortcut Tip

Multiply first, then add to avoid repeated calculations

Check

Mean must lie within the range of given values

Q58. Answer: (d) (195, 95, 100)

The logic followed here is:

Logic: third number = first number − second number

For, (252, 80, 172)

=> 252 − 80 = 172

For, (170, 55, 115)
=> 170 − 55 = 115
Now, checking the options using the same pattern:
Option 1) (236, 105, 141)
=> 236 − 105 = 131 ≠ 141
Option 2) (212, 72, 130)
=> 212 − 72 = 140 ≠ 130
Option 3) (180, 53, 137)
=> 180 − 53 = 127 ≠ 137
Option 4) (195, 95, 100)
=> 195 − 95 = 100 = 100
Hence, only (195, 95, 100) follows the same pattern.
Hence, the correct answer is Option 4.

Q59. Answer: (d) Rs. 504

Shortcut Trick
Profit ratio = investments = 1570 : 1760 : 1620
Total = 4950
Vivek's share = (1620 / 4950) × 1540
= (18 / 55) × 1540 = 28 × 18 = 504
Therefore Answer = Rs. 504
Alternate Method
Given:
Siddharth = Rs. 1570, Lata = Rs. 1760, Vivek = Rs. 1620
Total profit = Rs. 1540
Formula used:
Profit share prop. to Investment
Calculation:
=> Ratio = 1570 : 1760 : 1620
=> Total investment = 1570 + 1760 + 1620 = 4950
=> Vivek's share = (1620 / 4950) × 1540
=> Simplify => (18 / 55) × 1540
=> = 18 × 28 = 504
Therefore The correct answer is Rs. 504.
Additional Information
Partnership Rule
Profit is divided in ratio of investments (if time is same).
Simplification
Divide ratio by common factor to ease calculation.
Fraction Trick
Convert ratio into fraction of total to find share.
Quick Tip
Always simplify before multiplying.

Q60. Answer: (a) Two

Given: Seven people B, C, D, O, P, Q and R are sitting around a circular table facing the center of the table.
D sits fourth to the right of O.
Only two people sit between D and B when counted from the left of D.
B sits third to the right of C.
Q is an immediate neighbor of B and R.
So, people between P and Q are O and B → 2 people
Hence, the correct answer is "Option 1".

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Q61. Answer: (b) 110

The logic followed here is:

thus, "110" will replace the question mark in the given series.

Hence, the correct option is "Option 2".

Q62. Answer: (c) Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill

The correct answer is Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill.

Key Points

• The Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Bill was conceptualized to overhaul the legal framework governing civil nuclear energy in India, receiving the President's assent in 2025.

• The primary objective of this legislation is to consolidate existing laws, primarily updating the provisions of the Atomic Energy Act, 1962, to align with modern energy security needs and climate goals.

• A landmark feature of the SHANTI Bill is the formal provision for private sector participation in the nuclear power sector, which was previously a government monopoly under the Department of Atomic Energy (DAE).

• The bill facilitates the development of Bharat Small Reactors (BSRs) and Small Modular Reactors (SMRs) through Public-Private Partnerships (PPPs), aiming to increase the share of nuclear energy in India's total energy mix.

• It provides a streamlined regulatory framework for the licensing, operation, and decommissioning of nuclear plants, ensuring that safety standards are maintained by the Atomic Energy Regulatory Board (AERB) while encouraging innovation and investment.

Additional Information

• Bharat Small Reactors (BSRs): These are indigenous small-scale nuclear reactors designed to be safer, cost-effective, and quicker to deploy than traditional large-scale Pressurized Heavy Water Reactors (PHWRs). They are ideal for industrial captive power and decentralized energy grids.

• Atomic Energy Act, 1962: This was the foundational legislation that governed the production, control, and use of atomic energy in India. The SHANTI Bill seeks to address the limitations of this 63-year-old act to allow non-government entities to enter the field of power generation.

• Energy Transition and Net Zero: India has committed to reaching Net Zero emissions by the year 2070. Nuclear energy is considered a clean, baseload power source essential for fulfilling the Panchamrit targets announced at COP26.

• Nuclear Power Corporation of India Limited (NPCIL): As a Public Sector Undertaking (PSU) under the DAE, NPCIL has been the sole operator of commercial nuclear power plants. Under the new bill, NPCIL is expected to play a mentorship and collaborative role with private players.

• Global Context: Many countries like the USA, France, and China have already integrated private investment in their nuclear sectors. India's shift towards this model aims to attract global technology and domestic capital.

Important Points

• Budgetary Foundation: The precursor to this bill was the Union Budget 2024-25, where the Finance Minister announced that the Government of India would partner with the private sector for R&D and the setting up of Bharat Small Reactors.

• Three-Stage Nuclear Program: India continues to follow its three-stage nuclear power program formulated by Dr. Homi J. Bhabha, utilizing Uranium, Plutonium, and eventually Thorium (of which India has the world's largest reserves in monazite sands in Kerala and Odisha).

• Installed Capacity: As of recent data, India's installed nuclear capacity stands at approximately 7,480 MW, with a target to reach 22,480 MW by the year 2031-32 through the addition of several 700 MW PHWR units and VVER units at Kudankulam.

• Civil Liability for Nuclear Damage (CLND) Act, 2010: This act remains a critical component of the legal landscape, defining operator liability and compensation in the rare event of a nuclear incident, which is a key consideration for private investors under the SHANTI Bill.

Q63. Answer: (d) 17-85-90-180

The logic followed here is:

Logic: ×5, then +5, then ×2

For, 15 – 75 – 80 – 160

=> 15 × 5 = 75

=> 75 + 5 = 80

=> 80 × 2 = 160

For, 16 – 80 – 85 – 170

=> 16 × 5 = 80

=> 80 + 5 = 85

=> 85 × 2 = 170

Now, checking the options using the same pattern:

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Option 1) 20 – 100 – 105 – 220

=> 20 × 5 = 100

=> 100 + 5 = 105

=> 105 × 2 = 210 ≠ 220

Option 2) 13 – 75 – 80 – 160

=> 13 × 5 = 65 ≠ 75

Option 3) 18 – 80 – 85 – 170

=> 18 × 5 = 90 ≠ 80

Option 4) 17 – 85 – 90 – 180

=> 17 × 5 = 85

=> 85 + 5 = 90

=> 90 × 2 = 180

Hence, only Option 4 follows the same pattern.

Hence, the correct answer is Option 4.

Q64. Answer: (c) The Governor of the State

The correct answer is The Governor of the State.

Key Points

• According to Article 316 of the Constitution of India, the Chairman and other members of a State Public Service Commission (SPSC) are appointed by the Governor of the state. This power is exercised by the Governor on the advice of the State Council of Ministers.

• The Constitution stipulates that nearly half of the members of every Public Service Commission should be persons who have held office for at least 10 years under the Government of India or the Government of a State.

• A member of the SPSC holds office for a term of 6 years from the date on which they enter the office or until they attain the age of 62 years, whichever is earlier. In contrast, the age limit for UPSC members is 65 years.

• Any member of the State Public Service Commission may resign from their office by submitting a written resignation addressed to the Governor of the state.

• The Governor also has the authority to determine the number of members of the commission and their conditions of service under the provisions of Article 318.

Additional Information

• Article 315: This article provides for the establishment of a Public Service Commission for the Union (UPSC) and a separate Public Service Commission for each State (SPSC). It ensures a merit-based recruitment system for civil services.

• Removal of Members: Although the Governor is the appointing authority, they do not have the power to remove the Chairman or members of the SPSC. Under Article 317, they can only be removed by the President of India on the ground of misbehavior after an inquiry by the Supreme Court.

• Functions (Article 320): The primary function of the SPSC is to conduct examinations for appointments to the services of the State. They are consulted on matters relating to methods of recruitment, principles of making appointments, promotions, and transfers from one service to another.

• Annual Reports (Article 323): It is the duty of the State Commission to present an annual report to the Governor regarding the work done by the commission. The Governor then places this report before the State Legislature.

• Consolidated Fund: The expenses of the State Public Service Commission, including the salaries, allowances, and pensions of members, are charged to the Consolidated Fund of the State, ensuring their financial independence.

Important Points

• Joint State Public Service Commission (JSPSC): Two or more states can have a Joint Public Service Commission if a resolution to that effect is passed by the legislatures of those states and Parliament passes a law for its creation. Unlike the SPSC, the Chairman and members of a JSPSC are appointed by the President of India.

• Independence of SPSC: To ensure impartiality, a member of the SPSC is ineligible for reappointment to that office upon the expiration of their term. Furthermore, the Chairman of an SPSC is eligible for appointment as the Chairman or member of the UPSC or the Chairman of another SPSC, but not for any other employment under the Government of India or a State.

• Prohibition of Holding Office: After retirement, members are generally prohibited from holding any office of profit under the Government of India or the Government of any State to prevent political influence and maintain the integrity of the selection process.

Q65. Answer: (c) Ananth Centre of Excellence for Navigation

The correct answer is Ananth Centre of Excellence for Navigation.

Key Points

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• The Ananth Centre of Excellence for Navigation was officially inaugurated on January 24, 2025, by the Chairman of the Indian Space Research Organisation (ISRO), S. Somanath.

• Located in Thiruvananthapuram, Kerala, this facility marks a significant milestone as India's first private-sector innovation hub dedicated specifically to advanced navigation technologies.

• The primary objective of the centre is to foster indigenization and self-reliance in the field of satellite-based navigation, focusing heavily on NavIC (Navigation with Indian Constellation).

• It is established by Ananth Technologies Ltd (ATL), a premier private aerospace company that has been a long-standing partner of ISRO in various satellite and launch vehicle missions.

• The hub is designed to serve as a collaborative space for startups, researchers, and industry experts to develop cutting-edge navigation solutions, including receivers, antenna systems, and timing modules.

Additional Information

• NavIC (Navigation with Indian Constellation):

• NavIC is an independent stand-alone navigation satellite system developed by ISRO, originally known as IRNSS (Indian Regional Navigation Satellite System).

• It consists of a constellation of 7 satellites and a network of ground stations operating 24/7.

• It provides two types of services: Standard Positioning Service (SPS) for civilian users and Restricted Service (RS) for authorized (strategic) users.

• The system covers the entire Indian landmass and a region extending up to 1,500 km beyond its boundaries.

• Ananth Technologies Limited (ATL):

• Founded in 1992 by Dr. Subba Rao Pavuluri, the company is headquartered in Hyderabad with major facilities in Bengaluru and Thiruvananthapuram.

• ATL has contributed to over 98 satellites and 77 launch vehicles for ISRO, showcasing the growing strength of the private sector in India's space ecosystem.

• IN-SPACe and Space Reforms:

• The Indian National Space Promotion and Authorization Centre (IN-SPACe) was created to act as a single-window agency to promote and authorize private sector participation in space activities.

• The Indian Space Policy 2023 further empowered private entities to undertake end-to-end space activities, leading to the creation of such innovation hubs.

Important Points

• Strategic Significance: The establishment of this hub reduces India's reliance on foreign systems like the Global Positioning System (GPS) from the USA and GLONASS from Russia, ensuring strategic autonomy.

• Technological Applications: The navigation technologies developed here are critical for autonomous vehicles, drones (UAVs), maritime security, disaster management, and precision agriculture.

• Advanced Features: The centre will work on L5 and S-band signals, which are the primary frequencies used by NavIC to provide better accuracy in ionospheric conditions compared to traditional systems.

• Date and Year: The inauguration in 2025 signifies the rapid acceleration of the NewSpace India movement, aiming to increase India's share in the global space economy from 2% to 10% by 2030.

Q66. Answer: (c) 64

Shortcut Trick

First 63 even numbers: 2, 4, ..., 126

Average = (First + Last) ÷ 2

= (2 + 126) ÷ 2

= 128 ÷ 2 = 64

Therefore Answer = 64

Alternate Method

Given:

First 63 even natural numbers

Formula used:

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

Calculation:

=> First term (a) = 2

=> Number of terms (n) = 63

=> Last term = 2 × 63 = 126

=> Average = (2 + 126) ÷ 2

=> = 128 ÷ 2 = 64

Therefore The correct answer is 64.

Additional Information

Even Numbers

Even numbers = 2, 4, 6, ..., 2n

Arithmetic Progression

Even numbers form an AP with common difference 2

Average Trick

Average of equally spaced numbers = middle value

Quick Tip

Last term = 2n for first n even numbers

Q67. Answer: (b) KLO 45

The logic followed here is:

So, 'KLO 45' will replace the question mark in the given series.

Hence, the correct answer is "Option 2".

Q68. Answer: (d) International Maritime Organization (IMO)

The solution is in Hindi. Read it online.

Q69. Answer: (c) 6

Given:

ALIT → 2159

HILT → 6912

Now,

Thus, H = 6

Hence, the correct answer is Option 3.

Q70. Answer: (d) Only conclusion (I) follows.

Given Statements:

All phones are mobiles.

No mobile is a pager.

No mobile is a walkie-talkie.

The least possible Venn diagram shows:

Conclusions:

(I) No phone is a pager

Since, all phones are inside mobiles and no mobile is a pager, phones also cannot be pagers.

So, this conclusion follows.

(II) Some walkie-talkies are pagers

Mobiles are separate from both pagers and walkie-talkies, but there is no relation given between pagers and walkie-talkies.

So, they may or may not overlap.

Hence this conclusion does not follow.

Hence, only conclusion (I) follows.

Hence, the correct answer is "Option 4".

Q71. Answer: (c) Wife's father's brother's daughter

Family Chart:

Decoding the Symbols:

Symbol	•	−	×	÷
Meaning	Daughter	Brother	Wife	Father

Given: D + F − G ÷ H × J

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

Here, D is Wife's father's brother's daughter of J.

Hence, the correct answer is "Option 3".

Q72. Answer: (c) 7.8

Shortcut Trick

Simplify expression:

$10(x - 1) - 5x^2 + 4(2 - x) + 8$

$= 10x - 10 - 5x^2 + 8 - 4x + 8 = -5x^2 + 6x + 6$

For $ax^2 + bx + c$, max at $x = -b/2a = 3/5$

Max value $= -5(3/5)^2 + 6(3/5) + 6 = 39/5$

Therefore Answer $= 39/5 = 7.8$

Alternate Method

Given:

$10(x - 1) - 5x^2 + 4(2 - x) + 8$

Concept Used:

Quadratic expression and vertex formula

Calculation:

=> Expand terms:

=> $10x - 10 - 5x^2 + 8 - 4x + 8$

=> Combine like terms:

=> $-5x^2 + 6x + 6$

=> Here $a = -5$, $b = 6$

=> Vertex $x = -b/(2a) = -6/(-10) = 3/5$

=> Substitute $x = 3/5$:

=> Value $= -5(9/25) + 6(3/5) + 6$

=> $= -9/5 + 18/5 + 6$

=> $= 9/5 + 6 = 39/5 = 7.8$

Therefore The correct answer is 7.8.

Additional Information

Quadratic Form

$ax^2 + bx + c$

Maximum/Minimum

If $a < 0$ => maximum value at $x = -b/2a$

Vertex Formula

$x = -b/(2a)$

Quick Tip

Always simplify expression first before applying formula

Q73. Answer: (c) Five

Given: A, B, C, D, E and F live on six different floors numbered 1 (lowest) to 6 (highest).

Only one person lives above D.

Only two people live between A and D.

F lives immediately above B.

E does not live above D.

Floor	Person
6	C
5	D
4	F
3	B
2	A
1	E

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Now, people below C are 5 people.

Hence, the correct answer is "Option 3".

Q74. Answer: (d) By providing accessible, prompt, and localized justice

The correct answer is By providing accessible, prompt, and localized justice.

Key Points

• Subordinate Courts, also known as lower courts, are the first point of contact for the majority of litigants in India. They are responsible for delivering justice at the grassroots level, ensuring that legal remedies are accessible to the common citizen without the need to travel to the High Court or Supreme Court for every dispute.

• These courts operate at the district level and below, handling both civil and criminal matters. By resolving cases locally, they reduce the burden on the higher judiciary, allowing the High Courts to focus on constitutional matters and complex appeals.

• Option A states that they exclusively handle appeals. This is incorrect because subordinate courts are primarily courts of first instance (trial courts) where cases are initiated, though District Courts do hear appeals from lower Munsiff or Magistrate courts.

• Option B mentions centralizing legal power. This is incorrect as the existence of a tiered system with subordinate courts represents a decentralization of judicial power, making the judiciary present in every district of the country.

• Option C claims they enact new legislation. This is incorrect because the power to enact laws lies with the Legislature (Parliament and State Assemblies), while the judiciary is responsible for interpreting and applying those laws.

• Option D is correct because these courts provide localized justice, which is essential for a diverse and populous nation like India. They ensure that prompt legal action is taken in crimes and civil disputes. Hence, the correct answer is Option D.

Additional Information

• Constitutional Provisions: The organization and jurisdiction of subordinate courts are governed by Articles 233 to 237 of the Constitution of India, located in Part VI. These articles ensure that the High Court maintains administrative and judicial control over them to preserve judicial independence.

• Appointment of Judges: The District Judge is appointed by the Governor of the State in consultation with the High Court. For other judicial services in the State, appointments are made through State Public Service Commissions and High Court examinations.

• Structure of Subordinate Courts: Under the District Court, there is a hierarchy of courts. On the civil side, there are Subordinate Judges' Courts and Munsiff Courts. On the criminal side, there are Chief Judicial Magistrates and Judicial Magistrates.

• Civil and Criminal Jurisdiction: The District Judge acts as the Sessions Judge when presiding over criminal cases. They have the power to impose any sentence authorized by law, including capital punishment (death penalty), though the latter must be confirmed by the High Court.

• Special Courts: To further increase accessibility, the government has established Family Courts, Labour Courts, and Consumer Fora to handle specific categories of disputes efficiently.

Important Points

• Gram Nyayalayas: Under the Gram Nyayalayas Act, 2008, mobile village courts were established at the Panchayat level to provide localized and inexpensive justice to rural citizens, further extending the reach of the subordinate judiciary.

• Lok Adalats: These are "People's Courts" based on Gandhian principles. They are a component of the Alternative Dispute Resolution (ADR) system used by subordinate courts to settle pending cases through mediation and compromise.

• Separation of Judiciary: Article 50 of the Directive Principles of State Policy mandates the separation of the judiciary from the executive. This is strictly implemented at the subordinate level to ensure that Judicial Magistrates are not under the influence of executive officials like the District Collector.

• Data and Facts: As of recent judicial reports, there are over 20,000 functional subordinate courts in India, handling more than 4 crore pending cases, highlighting their critical role in the national judicial infrastructure.

Q75. Answer: (d) HMOY

The logic followed here is:

For, LEKO → OIPU

For, CANQ → FESW

Now, applying the same logic to EIJS:

So, EIJS → HMOY

Hence, the correct answer is Option 4.

Q76. Answer: (d) 10 km to the west

Given:

Nikhil starts from A and drives 84 km North.

He turns left → 80 km West.

He turns left → 83 km South.
He turns left → 90 km East.
He turns right → 1 km South and reaches P.
To reach A from P → move 10 km West.
Hence, the correct answer is Option 4.

Q77. Answer: (c) 4.5

Shortcut Trick
1.8 = 9/5 => (5/6 × 9/5) = 9/6 = 3/2
0.25 = 1/4 => (3/4 ÷ 1/4) = 3
Total = 3/2 + 3 = 3/2 + 6/2 = 9/2 = 4.5
Therefore Answer = 4.5
Alternate Method
Given:
(5/6 of 1.8) + (3/4 ÷ 0.25)
Concept Used:
BODMAS rule
Calculation:
=> (5/6 × 1.8) + (3/4 ÷ 0.25)
=> (5/6 × 9/5) + (3/4 ÷ 1/4)
=> (9/6) + (3/4 × 4)
=> (3/2) + 3
=> (3/2) + (6/2)
=> 9/2= 4.5
Therefore The correct answer is 4.5.
Additional Information
Decimal to Fraction
1.8 = 9/5, 0.25 = 1/4
Division Rule
a ÷ b = a × (1/b)
BODMAS
Solve multiplication and division before addition
Quick Tip
Convert decimals to fractions for accuracy

Q78. Answer: (a) 108.33%

Shortcut Trick
Production reduced by 52% => remaining = 48%
To reach 100%, multiply by 100/48
Increase % = [(100/48) − 1] × 100
= (52/48) × 100 = 108.33%
Therefore Answer = 108.33%
Alternate Method
Given:
Decrease in production = 52%
Formula used:
Required increase % = (Increase ÷ Reduced value) × 100
Calculation:
=> Let original production = 100 units
=> After decrease = 100 − 52 = 48 units
=> Increase needed = 100 − 48 = 52 units
=> Increase % = (52 ÷ 48) × 100

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=> = 108.33%

Therefore The correct answer is 108.33%.

Additional Information

Successive Percentage

Increase after decrease is not same percentage.

Base Change

Increase is calculated on reduced value, not original.

Quick Formula

If decrease = x%, required increase = x/(100 − x) × 100

Exam Tip

Always convert to base 100 for clarity

Q79. Answer: (b) A river flowing into a larger river

The correct answer is A river flowing into a larger river.

Key Points

• A tributary is defined as a freshwater stream or river that feeds into a larger stream, main-stem river, or lake.

• A tributary does not flow directly into the ocean or sea; instead, its water is collected and carried by the parent river toward a larger body of water.

• Statement A: A river branching away from another is known as a distributary, which is the opposite of a tributary and typically occurs in river deltas. Hence, statement A is incorrect.

• Statement B: A river flowing into a larger river accurately describes the function of a tributary, which contributes its discharge to the main river. Hence, statement B is correct.

• Statement C: A lake at a river's mouth is usually referred to as a lagoon or a deltaic lake, which is a geographical feature formed by sediment deposition. Hence, statement C is incorrect.

• Statement D: A body of salty water mixing with river water is called an estuary, which is a partially enclosed coastal body of brackish water. Hence, statement D is incorrect.

Additional Information

• Confluence: This is the specific geographic point where two or more bodies of water meet, such as the junction of a tributary and the main river. A famous example in India is the Devprayag, where the Alaknanda and Bhagirathi rivers join to form the Ganges.

• Right Bank and Left Bank Tributaries: Tributaries are categorized based on the side they join the main river when looking downstream. For example, the Yamuna is a major right-bank tributary of the Ganges, while the Gomti is a left-bank tributary.

• River Basin: Also known as a drainage basin or catchment area, this includes the total land area drained by a main river and all its tributaries. The Amazon Basin in South America is the largest in the world, covering approximately 7 million square kilometers.

• World Examples: The Madeira River is the largest tributary in the world by volume, flowing into the Amazon River. In the United States, the Missouri River is a massive tributary of the Mississippi River.

• Functions: Tributaries play a critical role in hydrology by increasing the water volume, nutrient transport, and sediment load of the parent river, which supports diverse ecosystems and agricultural activities downstream.

Important Points

• Strahler Stream Order: This is a numerical method used in hydrology to rank the size of streams. A first-order stream has no tributaries; when two first-order streams join, they form a second-order stream, and so on.

• Distributary Characteristics: Unlike tributaries, distributaries are common in the lower reaches of a river, particularly in a delta like the Sundarbans (formed by the Ganges and Brahmaputra), where the river divides into multiple channels before reaching the Bay of Bengal.

• Watershed Divide: This is the topographical ridge or high ground that separates two different drainage basins. Precipitation falling on either side of the divide will flow into different tributary systems.

• Environmental Impact: Pollution entering a small tributary can eventually contaminate the entire main river system, making the management of small streams vital for environmental conservation and water security.

Q80. Answer: (b) 3

Shortcut Trick

Class marks: 35, 45, 55, 65, 75

Σf = 127 + X

Σ(fx) = 1715 + 1485 + 1320 + 1365 + 75X = 5885 + 75X

Mean = 47 => (5885 + 75X)/(127 + X) = 47

=> 5885 + 75X = 5969 + 47X

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=> 28X = 84 => X = 3

Therefore Answer = 3

Alternate Method

Given:

Mean = 47

Classes: 30–40, 40–50, 50–60, 60–70, 70–80

Frequencies: 49, 33, 24, 21, X

Formula used:

Mean = Σ(fx) ÷ Σf

Calculation:

=> Class marks (x): 35, 45, 55, 65, 75

=> Σf = 49 + 33 + 24 + 21 + X = 127 + X

=> Σ(fx) = 49×35 + 33×45 + 24×55 + 21×65 + 75X

=> = 1715 + 1485 + 1320 + 1365 + 75X

=> = 5885 + 75X

=> Mean = 47 => (5885 + 75X)/(127 + X) = 47

=> 5885 + 75X = 5969 + 47X

=> 28X = 84 => X = 3

Therefore The correct answer is 3.

Q81. Answer: (a) 3

Given number: 8263451

Logic: Add 1 to each odd digit and subtract 2 from each even digit

Original number: 8 2 6 3 4 5 1

Digit	Type	Operation	New Digit
8	Even	8 − 2	6
2	Even	2 − 2	0
6	Even	6 − 2	4
3	Odd	3 + 1	4
4	Even	4 − 2	2
5	Odd	5 + 1	6
1	Odd	1 + 1	2

New number: 6 0 4 4 2 6 2

Now, Digits: 6, 0, 4, 4, 2, 6, 2

Digit	Occurrence
4	2 times
6	2 times
2	2 times

Total digits that appear more than once = 3 digits (2, 4, 6)

Hence, the correct answer is Option 1.

Q82. Answer: (c) Tamil Nadu

The correct answer is Tamil Nadu.

Key Points

• The Davandi is a traditional percussion instrument that is primarily found and used in the South Indian state of Tamil Nadu.

• It is an hourglass-shaped drum, belonging to the family of membranophones, and is very similar in features and functions to the Udukkai.

• This instrument is deeply rooted in the folk music traditions of Tamil Nadu and is a characteristic sound in rural areas during

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religious ceremonies.

• The Davandi is often played by folk performers and priests, particularly during the worship of village deities like Mariamman or during Udukkai Pattu (narrative singing).

• The unique feature of this drum is its variable pitch; the performer modulates the sound by squeezing the strings or the cloth band around the middle of the instrument while striking one side.

Additional Information

• Construction and Materials: The body of the Davandi is traditionally carved from a single piece of jackfruit wood or cast in brass. The heads are covered with processed goat skin or parchment, which are held in place by cotton or synthetic strings.

• Geographical Variants: While Tamil Nadu is the primary location for the Davandi, similar instruments exist across India. For example, the Damru is popular in North India, and the Idakka is a highly sophisticated hourglass drum used in temple music in Kerala.

• Applications in Rituals: In Tamil culture, the Davandi or Udukkai is frequently used by Kodangis (fortune tellers) who chant and drum to invoke divine guidance. It is believed that the rhythmic vibrations help in spiritual communication.

• Musical Heritage: Tamil Nadu boasts a rich musical landscape where folk instruments like the Thavil, Parai, and Pambai coexist with classical instruments used in Carnatic music, such as the Mridangam.

• Artistic Features: The size of the Davandi can range from 6 inches to 10 inches in length. Its portable nature makes it an ideal companion for itinerant singers and street performers.

Important Points

• Method of Playing: Unlike the Mridangam which is played with both hands, the Davandi is typically held in the left hand (to control the pitch via compression) and struck with the fingers of the right hand.

• Cultural Symbolism: The hourglass drum is often associated with Lord Shiva in Indian mythology (as the Damru), representing the creation and destruction of the universe through sound.

• Preservation: Efforts are being made by the Government of Tamil Nadu and various cultural organizations to preserve folk arts like Udukkai Pattu, ensuring that the skill of making and playing the Davandi is passed down to younger generations.

• Modern Context: In recent years, many music directors in the Tamil film industry (Kollywood) have used the Davandi in soundtracks to provide an authentic rural and ethnic feel to the music.

Q83. Answer: (d) Lowering of direct and indirect tax rates

The correct answer is Lowering of direct and indirect tax rates.

Key Points

• The liberalization of the Indian economy in 1991 introduced significant fiscal reforms, primarily focusing on the reduction of tax rates to encourage compliance and broaden the tax base. Hence, the statement regarding the lowering of direct and indirect tax rates is correct.

• Tax reforms initiated after 1991 were based on the recommendations of the Tax Reforms Committee, also known as the Raja Chelliah Committee, which suggested reducing the high rates of Personal Income Tax and Corporate Tax.

• In terms of Indirect Taxes, there was a drastic reduction in Customs Duties (import duties) to make the Indian economy more integrated with the global market. Peak customs duty rates were reduced from over 200% in 1991 to much lower levels in subsequent years.

• The reforms aimed at simplifying the tax structure and removing the complexities of the Excise Duty system, eventually leading to the implementation of MODVAT (Modified Value Added Tax) and later CENVAT.

• While liberalization aimed at fiscal discipline, it did not lead to the elimination of all public debt; in fact, managing fiscal deficit remained a challenge for the Government of India. Hence, the statement about the elimination of public debt is incorrect.

• The New Economic Policy (NEP) actually decreased Government control over pricing in most sectors (except essential commodities) to allow market forces to determine prices. Hence, the statement about increased control is incorrect.

Additional Information

• New Economic Policy (NEP) of 1991: Launched during the tenure of Prime Minister P.V. Narasimha Rao and Finance Minister Dr. Manmohan Singh, the policy was a response to a severe Balance of Payments (BoP) crisis.

• LPG Framework: The reforms are famously known as Liberalization, Privatization, and Globalization. Liberalization referred to the end of License Raj, Privatization involved disinvestment in Public Sector Undertakings (PSUs), and Globalization aimed at opening the Indian economy to Foreign Direct Investment (FDI).

• Foreign Exchange Management Act (FEMA): To facilitate external trade and payments, the stringent Foreign Exchange Regulation Act (FERA) of 1973 was eventually replaced by the more liberal FEMA in 1999.

• Industrial Licensing: Under the 1991 reforms, industrial licensing was abolished for almost all industries, except for a small list of 18 industries related to security, strategic concerns, and social reasons.

• International Support: To tide over the 1991 crisis, India had to borrow from the International Monetary Fund (IMF) and the World Bank, which came with conditions for structural adjustments and economic stabilization.

Important Points

• Direct Tax Reforms: Before 1991, the highest marginal rate of Income Tax was very high, which led to tax evasion. Post-reforms, the rates were gradually moderated to 10%, 20%, and 30% slabs to increase revenue collection.

• Devaluation of Rupee: As part of the fiscal and external sector reforms, the Indian Rupee was devalued twice in July 1991 to boost exports and stabilize the Balance of Payments.

• Banking Sector Reforms: Based on the Narasimham Committee (1991) recommendations, the government reduced the Statutory Liquidity Ratio (SLR) and Cash Reserve Ratio (CRR) to provide more liquidity to the banking system.

• MRTP Act: The Monopolies and Restrictive Trade Practices (MRTP) Act was amended to remove the requirement for large companies to seek prior government approval for expansion or establishment of new undertakings.

Q84. Answer: (a) EAG

The logic followed here is based on the alphabetical position pattern:

Option 1: EAG

Option 2: HDK

Option 3: TPW

Option 4: RNU

Thus, EAG breaks this pattern.

Hence, the odd one out is Option 1.

Q85. Answer: (a) Arthashastra

The correct answer is Arthashastra.

Key Points

• The Arthashastra is an ancient Indian treatise on statecraft, economic policy, and military strategy, written in Sanskrit. It is the primary source for understanding the Mauryan administration.

• The text is traditionally attributed to Kautilya (also known as Chanakya or Vishnugupta), who was the chief advisor and Prime Minister to Chandragupta Maurya, the founder of the Mauryan Empire in the 4th century BCE.

• It contains 15 books (Adhikaranas) and 180 sections, covering a wide range of topics including the duties of the king, law and justice, taxation systems, espionage, and foreign policy.

• Kautilya introduced the Saptanga Theory (Seven Limbs of the State) in this text, which defines the seven essential elements of a kingdom: Swami (The King), Amatya (The Ministers), Janapada (Territory and Population), Durga (Fort), Kosa (Treasury), Danda (Army), and Mitra (Ally).

• The Arthashastra provides evidence of a highly centralized bureaucracy and a sophisticated network of intelligence (spies), which were hallmarks of the Mauryan Empire.

Additional Information

• Rigveda:

• It is the oldest of the four Vedas, composed between 1500 BCE and 1000 BCE during the Early Vedic Period.

• The text consists of 1,028 hymns (Suktas) organized into 10 Mandalas (books). It focuses on religious rituals and the praise of deities like Agni, Indra, and Varuna rather than imperial administration.

• Mahabharata:

• It is one of the two major Sanskrit epics of ancient India, traditionally attributed to the sage Vyasa.

• While it includes the Shanti Parva, which contains extensive discussions on Rajadharma (the duties of a king), its primary narrative focuses on the struggle between the Pandavas and the Kauravas at Kurukshetra.

• Manusmriti:

• Also known as the Manava-Dharmashastra, it is an important legal text and constitution of the Hindu social system.

• Likely compiled between the 2nd century BCE and 3rd century CE, it outlines the Varna system, social conduct, and civil and criminal laws, but it is not specifically a description of the Mauryan government.

• Indica:

• Another vital source for Mauryan history is Indica, written by Megasthenes, the Greek ambassador to the court of Chandragupta Maurya.

• It provides a foreigner's perspective on the municipal administration of Pataliputra and the seven-caste system observed by the Greeks in India.

Important Points

• Administrative Hierarchy: The Mauryan state was divided into provinces headed by a Kumar (Prince) or Aryaputra. The Arthashastra mentions various departments headed by Adhyakshas (Superintendents), such as Panyadhyaksha (Superintendent of Commerce) and Sitadhyaksha (Superintendent of Agriculture).

• Economic Control: The text emphasizes that Kosa (Treasury) is the foundation of the state. It describes elaborate methods for collecting revenue from land, forests, mines, and trade to maintain a massive standing army.

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• Judicial System: Kautilya describes two types of courts: Dharmasthiya (Civil Courts) and Kantakashodhana (Criminal Courts), ensuring law and order through strict punishments.

• Date and Discovery: Although the events of the Mauryan Empire occurred in the 4th century BCE, the manuscript of the Arthashastra was rediscovered in 1905 by R. Shamasastry in a library in Mysore.

Q86. Answer: (d) 4 4over9

Shortcut Trick

Let speeds of Amit and Bhushan be V_a and V_b. Total distance for Bhushan = 1000 m.

Overtake at 240s (Amit) and 260s (Bhushan): 240V_a = 260V_b + 200 => 12V_a − 13V_b = 10.

Amit finishes 10s before Bhushan, starting 20s late → Bhushan time − Amit time = 30 s.

1000/V_b − 1200/V_a = 30 => 100/V_b − 120/V_a = 3. Substituting V_b from first eqn.

Solving the quadratic 18V_a² + 55V_a − 600 = 0 gives V_a = 40/9 = 4 4over9 m/s.

Therefore The correct answer is 4 4over9 m/s.

Alternate Method

Given:

Total Race Distance = 1200 m

Bhushan head-start = 200 m (Bhushan runs 1000 m)

Amit start delay = 20 seconds

Overtake time for Amit = 4 minutes = 240 seconds

Amit finishes before Bhushan by = 10 seconds

Formula Used: Speed = Distance ÷ Time

Start (Amit) Start (Bhushan) 200 m Headstart Finish (1200m) Overtake Point Amit: 240s Bhushan: 240+20 = 260s

Let Speed of Amit = V_a and Speed of Bhushan = V_b.

=> Distance covered by Amit at overtake = 240 × V_a

=> Distance covered by Bhushan at overtake = (240 + 20) × V_b = 260V_b

=> Amit covers the head-start: 240V_a = 260V_b + 200 => 12V_a − 13V_b = 10 --- (1)

=> Total time difference: Bhushan time − Amit time = (Start delay + Finish lead) = 20 + 10 = 30 s

=> 1000/V_b − 1200/V_a = 30 => 100/V_b − 120/V_a = 3 --- (2)

=> From (1), V_b = (12V_a − 10) ÷ 13. Substitute in (2):

=> 1300 / (12V_a − 10) − 120 / V_a = 3

=> 1300V_a − 120(12V_a − 10) = 3V_a(12V_a − 10)

=> 1300V_a − 1440V_a + 1200 = 36V_a² − 30V_a

=> 36V_a² + 110V_a − 1200 = 0 => 18V_a² + 55V_a − 600 = 0

=> (9V_a − 40)(2V_a + 15) = 0 => V_a = 40/9

Therefore The correct answer is 4 4over9 m/s.

Additional Information

Relative Speed in Races

When two people run in the same direction, their relative speed is the difference of their individual speeds: V_(rel) = V1 − V2.

Head-start Concepts

A head-start of x meters means the second runner starts x meters ahead. A head-start of t seconds means the second runner starts running t seconds before the first runner.

Dead Heat

A race is called a dead heat if all contestants reach the finish line at exactly the same time.

Q87. Answer: (c) Four

Given: Seven people B, C, O, P, Q, R and S are sitting in a straight line facing north.

Only three people sit to the left of S.

Only three people sit between B and O.

Only four people sit between Q and O, none of whom sit at the left end.

C sits immediately to the left of R.

Now, people between P (1) and R (6) are Q, B, S, C → 4 people

Hence, the correct answer is "Option 3".

Q88. Answer: (d) Twenty-five years

The correct answer is Twenty-five years.

Key Points

• Article 84 of the Constitution of India lays down the qualifications for membership of Parliament. It specifies that a person shall not be qualified to be chosen to fill a seat in Parliament unless they meet certain criteria.

• According to Article 84 (b), the minimum age for a person to become a member of the House of the People (Lok Sabha) is 25 years. Hence, Option D is the correct statement.

• The same article specifies that for the Council of States (Rajya Sabha), the minimum age required is 30 years. This ensures a higher age threshold for the Upper House of Parliament.

• In addition to age, the person must be a citizen of India and must make and subscribe before some person authorized by the Election Commission an oath or affirmation according to the form set out for the purpose in the Third Schedule.

• The candidate must also possess such other qualifications as may be prescribed in that behalf by or under any law made by Parliament, such as the Representation of the People Act, 1951.

Additional Information

• House of the People (Lok Sabha):

• It is known as the Lower House of India's bicameral Parliament.

• Members are directly elected by the people on the basis of Universal Adult Franchise.

• The maximum strength of the House envisaged by the Constitution is 552, though currently, elections are held for 543 seats.

• The normal tenure of the Lok Sabha is 5 years from the date appointed for its first meeting, unless dissolved earlier by the President.

• Council of States (Rajya Sabha):

• It is the Upper House and represents the States and Union Territories of India.

• It is a permanent body and is not subject to dissolution; however, one-third of its members retire every second year.

• The maximum strength is fixed at 250, of which 12 members are nominated by the President for their expertise in fields like literature, science, art, and social service.

• Voting Age (Article 326):

• The minimum age for voting in India is 18 years. This was reduced from 21 years by the 61st Constitutional Amendment Act, 1988, which came into force in 1989.

• Local Government Elections:

• For elections to Panchayats and Municipalities (under the 73rd and 74th Amendment Acts), the minimum age for contesting is 21 years.

Important Points

• Disqualifications (Article 102): A person shall be disqualified for being chosen as, and for being, a member of either House of Parliament if they hold any office of profit, are of unsound mind, are an undischarged insolvent, or are not a citizen of India.

• Representation of the People Act, 1951: This act adds further requirements, such as the candidate must be registered as an elector in any parliamentary constituency.

• The President: While the President is a part of Parliament (along with the two houses), the minimum age to be eligible for election as President of India is 35 years as per Article 58.

• The Vice-President: Similarly, Article 66 stipulates that the minimum age to serve as Vice-President (who is the ex-officio Chairman of the Rajya Sabha) is also 35 years.

Q89. Answer: (d) Ctrl + C

The correct answer is Ctrl + C.

• Ctrl + C is the standard keyboard shortcut used to copy selected text, images, or files into the computer's clipboard. In the given scenario, once the student selects the sentence, pressing Ctrl + C allows her to duplicate the information without removing it from its original location. Hence, statement D is correct.

• The copy function creates a duplicate of the selected data in a temporary storage area known as the clipboard, which is a feature of the operating system like Windows or macOS.

• To complete the process of "using the sentence later," the user must eventually use the paste command at the target location within the document.

• The shortcut works across almost all productivity software, including Microsoft Word, Google Docs, and Notepad, making it a fundamental function for digital literacy.

• Ctrl + S (Save): This command is used to store the current file or progress to the hard drive or cloud storage. It is essential to prevent data loss in case of power failure or software crashes. It does not perform a copy action. Hence, statement A is incorrect.

• Ctrl + V (Paste): This shortcut is used to insert the contents of the clipboard into the document where the cursor is placed. While

it is the second part of the copy-paste application, it cannot be used before the copy action is initiated. Hence, statement B is incorrect.

• Ctrl + F (Find): This shortcut opens a search box or navigation pane that allows the user to find specific words, characters, or strings within a large document or webpage. It does not manipulate text for duplication. Hence, statement C is incorrect.

• Historical Origin: The concepts of cut, copy, and paste were developed by Larry Tesler between 1973 and 1976 while he worked at Xerox PARC. These features were designed to make word processing more intuitive compared to older editing methods.

• Ctrl + X (Cut): This shortcut is similar to copy, but it removes the original text from its location after placing it on the clipboard. It is used for moving data rather than duplicating it.

• Ctrl + Z (Undo): This is a critical function that allows a user to revert the last action performed. If a student accidentally deletes a sentence, this command restores it.

• Ctrl + Y (Redo): This shortcut performs the opposite of undo, allowing the user to repeat an action that was recently reversed.

• Clipboard Management: Modern operating systems like Windows 10 and Windows 11 allow users to view a clipboard history by pressing Windows + V, which can store multiple copied items simultaneously.

• Formatting Shortcuts: Users often use Ctrl + B for bold, Ctrl + I for italics, and Ctrl + U for underlining to improve the visual presentation of their text.

Q90. Answer: (a) Saina Nehwal

The correct answer is Saina Nehwal.

Key Points

• Saina Nehwal created history by becoming the first Indian badminton player to win a medal at the Olympic Games. This landmark achievement occurred during the 2012 London Olympics, where she secured the Bronze Medal in the women's singles category.

• During the bronze medal match, her opponent, Wang Xin of China, was forced to retire due to a knee injury after leading the match, which resulted in Saina Nehwal being declared the winner.

• She is a former World No. 1 player, achieving this top ranking in the year 2015. She remains the only Indian female badminton player to have reached this pinnacle of the BWF (Badminton World Federation) rankings.

• Saina Nehwal has represented India in three consecutive Olympic Games: 2008 (Beijing), 2012 (London), and 2016 (Rio). In the 2008 Beijing Olympics, she became the first Indian to reach the quarter-finals of the event.

• Born on 17 March 1990 in Hisar, Haryana, she later moved to Hyderabad, which became the hub of her training under coaches like Pullela Gopichand and Vimal Kumar.

Additional Information

• PV Sindhu:

• She is the first Indian woman to win two individual Olympic medals.

• She won a Silver Medal at the 2016 Rio Olympics and a Bronze Medal at the 2020 Tokyo Olympics.

• She also won the Gold Medal at the BWF World Championships in 2019, becoming the first Indian to do so.

• PT Usha:

• Commonly known as the "Payyoli Express" and the "Queen of Indian Track and Field".

• She narrowly missed an Olympic bronze medal in the 400m hurdles at the 1984 Los Angeles Olympics by a mere 1/100th of a second.

• She currently serves as the President of the Indian Olympic Association (IOA).

• Sania Mirza:

• She is India's most successful female tennis player.

• She reached the World No. 1 ranking in WTA doubles and has won 6 Grand Slam titles across doubles and mixed doubles categories.

• She was the first Indian woman to win a WTA title in 2005 at the Hyderabad Open.

• Badminton Association of India (BAI):

• The governing body for badminton in India, responsible for organizing national tournaments and managing the national team.

• The success of players like Saina Nehwal and PV Sindhu led to a massive surge in the sport's popularity across the country.

Important Points

• Major Awards: Saina Nehwal has been honored with several prestigious awards, including the Arjuna Award (2009), the Major Dhyan Chand Khel Ratna (2009-10), the Padma Shri (2010), and the Padma Bhushan (2016).

• Commonwealth Games: She won Gold Medals in women's singles at the 2010 Delhi and 2018 Gold Coast Commonwealth Games.

• International Titles: She has won over 24 international titles, including 11 Superseries titles, making her one of the most decorated athletes in Indian sports history.

• Autobiography: Her inspiring journey is documented in her book titled "Playing to Win: My Life On and Off Court", published in 2012.

Q91. Answer: (d) Standing Waves

The correct answer is Standing Waves.

Key Points

• When two identical waves (having the same frequency, wavelength, and amplitude) travel through the same medium in opposite directions and interfere with each other, they produce Standing Waves (also known as Stationary Waves). Hence, the correct option is Standing Waves.

• Unlike traveling waves, Standing Waves do not transport energy from one end of the medium to the other; instead, the energy remains localized within the vibration pattern.

• The specific points in the wave pattern that remain stationary and have zero amplitude are called Nodes. These occur due to destructive interference.

• The points that undergo maximum displacement and have the largest amplitude are called Antinodes. These occur due to constructive interference.

• The distance between two consecutive Nodes or two consecutive Antinodes is exactly λ/2 (half the wavelength), while the distance between a Node and its adjacent Antinode is λ/4.

Additional Information

• Longitudinal Waves: In these waves, the particles of the medium vibrate parallel to the direction of the wave's propagation. Common examples include sound waves in air and seismic P-waves. These waves consist of compressions and rarefactions. Hence, statement A is incorrect.

• Transversal Waves: In these waves, the particles of the medium move perpendicularly to the direction of wave travel. Examples include light waves, radio waves, and waves on a plucked guitar string. These waves consist of crests and troughs. Hence, statement C is incorrect.

• Incident Waves: An incident wave is the initial wave that strikes a boundary or an interface between two different media. It is not a result of interference but rather a component that participates in it. Hence, statement B is incorrect.

• Superposition Principle: This principle states that when two or more waves overlap, the resulting displacement is the algebraic sum of the individual displacements of the waves. This is the fundamental mechanism behind the formation of standing waves.

Important Points

• Applications: Standing waves are essential in the functioning of musical instruments. For example, in stringed instruments like the violin or piano, standing waves are formed on a stretched string fixed at both ends. In wind instruments like the flute or organ pipes, they are formed within air columns.

• Harmonics and Overtones: The simplest standing wave pattern is the fundamental frequency (first harmonic). Higher-frequency patterns are called overtones or higher harmonics, which are integer multiples of the fundamental frequency.

• Mathematical Condition: For a string of length L fixed at both ends, the possible wavelengths for standing waves are given by the formula $\lambda = 2L/n$, where n is a positive integer (1, 2, 3...).

• Medium Constraints: The formation of standing waves often requires the wave to be confined within a specific region (like a pipe or a string), leading to the reflection of waves which then interfere with the incoming waves.

Q92. Answer: (c) 20

Shortcut Trick

Use formula: Product of numbers = HCF × LCM

=> Product = 5 × 180 = 900

=> Other number = 900 ÷ 45 = 20

Therefore Answer = 20

Alternate Method

Given:

HCF = 5, LCM = 180

One number = 45

Formula used:

Product of two numbers = HCF × LCM

Calculation:

=> Product = 5 × 180 = 900

=> Let other number = x

=> 45 × x = 900

=> x = 900 ÷ 45

=> x = 20

Therefore The correct answer is 20.

Additional Information

Important Formula

Product of two numbers = HCF × LCM

HCF (Highest Common Factor)

Greatest number that divides both numbers exactly

LCM (Least Common Multiple)

Smallest number divisible by both numbers

Quick Tip

Always use product formula instead of finding numbers separately

Q93. Answer: (a) Weather refers to short-term changes; climate refers to long-term patterns

The correct answer is Weather refers to short-term changes; climate refers to long-term patterns.

Key Points

• Weather is the state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, and rain. It refers to the short-term atmospheric conditions that can change within minutes, hours, or days.

• Climate is defined as the average of the weather patterns in a region over a long period of time. According to the World Meteorological Organization (WMO), the standard period used to determine the climate of a location is 30 years.

• The primary components that define both weather and climate include temperature, humidity, precipitation, atmospheric pressure, wind speed, and solar radiation.

• While weather is what you see outside on any particular day, climate is the description of the long-term pattern of weather in a particular area. For example, a thunderstorm is a weather event, but a tropical rainforest has a hot and humid climate.

Additional Information

• Meteorology: This is the scientific study of the atmosphere that focuses on weather processes and forecasting. Scientists in this field, known as meteorologists, use numerical models and satellite data to predict short-term changes.

• Climatology: This branch of science deals with the description of climates and the analysis of the causes of climatic changes. It examines long-term trends such as global warming and ice ages.

• Climate Zones: The Earth is divided into different climatic zones based on latitude, such as the Tropical zone, Temperate zone, and Polar zone. Factors like altitude, distance from the sea, and ocean currents also significantly influence the local climate.

• Climate Change: This refers to long-term shifts in temperatures and weather patterns. While these shifts may be natural, since the 1800s, human activities (primarily the burning of fossil fuels) have been the main driver of climate change.

• Instruments: Common tools used to measure weather include the thermometer (temperature), barometer (pressure), anemometer (wind speed), and hygrometer (humidity).

Important Points

• Statement A: This correctly identifies that weather is short-term (variable) and climate is long-term (stable average). Hence, statement A is correct.

• Statement B: This statement incorrectly swaps the definitions, suggesting weather is long-term. Hence, statement B is incorrect.

• Statement C: While weather and climate are related, they represent different time scales and statistical measures. Hence, statement C is incorrect.

• Statement D: Weather is temporary and dynamic, while climate is relatively constant over decades but can change over centuries; neither is strictly "permanent." Hence, statement D is incorrect.

Q94. Answer: (d) 24, 94

The logic followed here is:

Logic: second number = (first number × 4) − 2

For, (16, 62)

=> 16 × 4 = 64

=> 64 − 2 = 62

For, (21, 82)

=> 21 × 4 = 84

=> 84 − 2 = 82

Now, checking the options using the same pattern:

Option 1) (24, 95)

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=> 24 × 4 = 96

=> 96 − 2 = 94 ≠ 95

Option 2) (23, 94)

=> 23 × 4 = 92

=> 92 − 2 = 90 ≠ 94

Option 3) (23, 95)

=> 23 × 4 = 92

=> 92 − 2 = 90 ≠ 95

Option 4) (24, 94)

=> 24 × 4 = 96

=> 96 − 2 = 94 = 94

Hence, only (24, 94)follows the same pattern.

Hence, the correct answer is Option 4.

Q95. Answer: (d) Ten Degree Channel

The correct answer is Ten Degree Channel.

Key Points

• The Ten Degree Channel is a body of water that separates the Andaman Islands and Nicobar Islands from each other in the Bay of Bengal. Hence, the option Ten Degree Channel is correct.

• It is named so because it lies on the 10-degree line of latitude north of the equator.

• Specifically, this channel separates Little Andaman in the north from Car Nicobar in the south.

• The channel has a width of approximately 150 kilometers (about 93 miles) from north to south and is oriented in an east-west direction.

• It serves as a major maritime route for ships moving through the Andaman Sea, providing a safe passage for international trade and shipping vessels.

Additional Information

• Palk Strait:

• The Palk Strait is a strait between the Tamil Nadu state of India and the Mannar district of the Northern Province of Sri Lanka.

• It connects the Bay of Bengal in the northeast with Palk Bay in the southwest.

• The strait is named after Robert Palk, who was a governor of Madras Presidency during the Company Raj period. Hence, this option is incorrect.

• Nine Degree Channel:

• The Nine Degree Channel is located in the Indian Ocean and separates the island of Minicoy from the main Lakshadweep archipelago.

• It is situated at the 9° N latitude. This channel is vital for vessels traveling between the Middle East and South East Asia. Hence, this option is incorrect.

• Six Degree Channel:

• Also known as the Great Channel, it is located between the Great Nicobar Island of India and the Sumatra island of Indonesia.

• It is a significant international shipping lane used by tankers and cargo ships moving towards the Strait of Malacca. Hence, this option is incorrect.

• Eight Degree Channel:

• This channel separates the islands of Minicoy (the southernmost island of Lakshadweep, India) and the Maldives.

• It is located at the 8° N latitude and serves as a maritime boundary between the two nations.

Important Points

• Andaman and Nicobar Geography: The Andaman and Nicobar Islands is a Union Territory of India comprising 572 islands, out of which only about 38 are permanently inhabited.

• Volcanic Activity: Barren Island, located in the Andaman Sea, is the only confirmed active volcano in South Asia. Its first recorded eruption dates back to 1787.

• Highest Peak: Saddle Peak is the highest point in the archipelago, standing at 732 meters, located in North Andaman.

• Strategic Location: These islands are of immense strategic importance to India due to their proximity to the Strait of Malacca, a crucial global chokepoint for energy supplies and trade.

• Tribal Groups: The islands are home to several Particularly Vulnerable Tribal Groups (PVTGs), including the Jarawas, Sentinelese, Onges, and Great Andamanese.

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Q96. Answer: (a) 64

Shortcut Trick

$a = x + 2/x$, $b = x - 2/x$

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

=> $a - b = 4/x$, $a + b = 2x$

=> $a^2 - b^2 = (4/x)(2x) = 8$

$a^4 + b^4 - 2a^2b^2 = (a^2 - b^2)^2$

=> $= 8^2 = 64$

Therefore Answer = 64

Alternate Method

Given:

$a = x + 2/x$, $b = x - 2/x$

Concept Used:

$a^4 + b^4 - 2a^2b^2 = (a^2 - b^2)^2$

Calculation:

=> $a - b = (x + 2/x) - (x - 2/x) = 4/x$

=> $a + b = (x + 2/x) + (x - 2/x) = 2x$

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

=> $= (4/x)(2x) = 8$

=> $(a^2 - b^2)^2 = 8^2 = 64$

Therefore The correct answer is 64.

Additional Information

Identity Used

$a^4 + b^4 - 2a^2b^2 = (a^2 - b^2)^2$

Difference of Squares

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

Shortcut Tip

Avoid expanding powers, use identities to simplify quickly

Q97. Answer: (a) Bamboo pen

The correct answer is Bamboo pen.

Key Points

• Kalamkari is a world-renowned traditional Indian art form that involves hand-painting or block-printing on cotton textiles. The term is derived from the Persian words "Kalam" (meaning pen) and "Kari" (meaning craftsmanship), literally translating to "pen-work."

• The primary instrument used for drawing the intricate outlines in this art form is a bamboo pen or a date palm stick. This bamboo stick is sharpened at one end to create a fine tip for precision, while a piece of wool or cloth is tied just above the tip to act as a reservoir for the liquid dye.

• The Srikalahasti style of Kalamkari, practiced in the Chittoor district of Andhra Pradesh, is entirely dependent on the bamboo pen. Artisans use the Kalam to freehand sketch complex scenes from Hindu mythology, including the Ramayana, Mahabharata, and Puranas, directly onto the fabric.

• A distinctive feature of Kalamkari is the exclusive use of natural dyes and vegetable colors. To obtain the color black, artisans mix jaggery, iron filings, and water; for red, they use the madder root; and for yellow, pomegranate rinds or myrobalan flowers are used.

• The process of making a Kalamkari painting is extremely labor-intensive, involving up to 23 steps. These steps include bleaching the cloth using cow dung, treating it with milk and myrobalan (to prevent the dye from spreading), sketching with the bamboo pen, and multiple rounds of washing in running river water.

Additional Information

• Regional Variations: There are two main styles of Kalamkari in India. The Srikalahasti style is characterized by freehand drawing with the Kalam, whereas the Machilipatnam style (from Krishna district) primarily uses wooden blocks for printing the main designs, though the bamboo pen is still used for finer details and filling colors.

• Historical Evolution: The art form flourished during the 17th century under the patronage of the Golconda Sultanate and the Mughal Empire. It was later supported by the British, who referred to these printed fabrics as "Chintz." In 2007, Srikalahasti Kalamkari was granted the Geographical Indication (GI) tag, recognizing its unique cultural origin.

• Material Science: The fabric used is generally hand-processed cotton. The cloth is first treated with a "mordant" solution made

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from Myrobalan (Karaka Puvvu) and buffalo milk. The fats in the milk prevent the dye from bleeding into the fabric fibers, ensuring that the Kalam strokes remain sharp and defined.

• Ecological Significance: Unlike modern synthetic prints, Kalamkari is eco-friendly. Every stage of the process utilizes natural resources. For instance, alum is used as a fixing agent to ensure the natural dyes adhere to the cotton fibers permanently, making the fabric resistant to fading.

• Applications and Modern Use: Historically used for temple hangings and scrolls, Kalamkari is now applied to saris, dupattas, and home decor items. It remains a vital source of livelihood for thousands of artisans in Andhra Pradesh and continues to be a symbol of India's rich textile heritage in the global fashion industry.

Q98. Answer: (a) 14

Shortcut Trick

Ratio = 3 : 2 : 5 => let quantities = 3x, 2x, 5x

Total cost = 280(3x) + 180(2x) + 120(5x)

= 840x + 360x + 600x = 1800x

=> 1800x = 12600 => x = 7

Articles of type Q = 2x = 14

Therefore Answer = 14

Alternate Method

Given:

Prices: P = 280, Q = 180, R = 120

Ratio of articles = 3 : 2 : 5

Total cost = Rs. 12,600

Formula used:

Total cost = Σ (price × quantity)

Calculation:

=> Let quantities = 3x, 2x, 5x

=> Total cost = 280(3x) + 180(2x) + 120(5x)

=> = 840x + 360x + 600x

=> = 1800x

=> 1800x = 12600

=> x = 7

=> Number of Q articles = 2x = 14

Therefore The correct answer is 14.

Additional Information

Ratio Concept

Convert ratio into variables (3x, 2x, 5x) for easy calculation

Total Cost

Multiply price with quantity and add

Shortcut Tip

Combine all terms first, then solve for x

Q99. Answer: (d) Agro-pastoral

The correct answer is Agro-pastoral.

Key Points

• The Harappan civilization, also known as the Indus Valley Civilization, existed approximately between 2600 BCE and 1900 BCE. While it was a highly urbanized society, its economic foundation was rooted in an Agro-pastoral system.

• Agriculture was the primary occupation in the Harappan heartland (the fertile plains of the Indus and Ghaggar-Hakra rivers). The farmers produced a surplus of food grains, which was essential to sustain the non-agricultural urban populations.

• Animal husbandry or pastoralism was equally significant. The Harappans domesticated a variety of animals, including humped cattle (Zebu), buffalo, sheep, and goats, which provided milk, meat, and labor for tilling fields.

• Major crops cultivated included wheat, barley, lentils, chickpeas, and sesame. Evidence of millets has been found in sites located in Gujarat, while rice husks were discovered at Lothal and Rangpur.

• The technology used for farming included the wooden plough, as evidenced by terracotta models found at Banawali and ploughed field marks discovered at Kalibangan in Rajasthan.

Additional Information

• Geographical Context: The Harappan heartland spanned across modern-day Pakistan (provinces of Sindh and Punjab) and North-Western India (states of Gujarat, Rajasthan, and Haryana). The proximity to river systems allowed for alluvial soil farming.

• Trade-based Economy: While trade was a vital component of their wealth, it was not the "type" of economy but rather a functional branch. Harappans engaged in internal and external trade with Mesopotamia (referred to as Meluha), Oman, and Afghanistan for minerals and luxury items like Lapis Lazuli.

• Irrigation: Most Harappan sites were located in semi-arid lands. To manage water, they utilized canals (found at Shortughai in Afghanistan) and wells. The Dholavira site in Gujarat is famous for its sophisticated water reservoirs.

• Non-Dominant Economic Types:

• Hunting-gathering: While Harappans did hunt wild animals like boar and deer, and consumed fish, they were not a nomadic hunting-gathering society; they were settled agriculturists.

• Spiritual-centric: Although religion played a role in social cohesion (as seen in the Great Bath or Fire Altars), the economy was driven by material production and resource management rather than spiritual rituals.

Important Points

• Cotton Cultivation: The Harappans were likely the first people to grow cotton (known as Sindon to the Greeks). This led to the development of a textile industry, which became a major export commodity.

• Granaries: The discovery of massive granaries at Mohenjo-Daro and Harappa indicates that the state or the elite controlled the collection and distribution of agricultural surplus, possibly as a form of taxation.

• Standardization: The economy was supported by a highly standardized system of weights and measures. They used chert stones for cubical weights, which followed a binary and decimal system (1, 2, 4, 8, 16, 32, etc.).

• Seal Usage: Steatite seals featuring animal motifs and a yet-to-be-deciphered script were used primarily for commercial transactions to mark goods and verify the identity of the sender.

• Storage Technology: In the Gujarat region, pastoralism was more dominant than in the northern plains because the land was better suited for cattle rearing, which supplied the urban centers with dairy and leather products.

Q100. Answer: (a) 1800

Shortcut Trick

2 pages → 40 min => 1 page → 20 min

90 pages → 90 × 20 = 1800 min

Therefore Answer = 1800 minutes

Alternate Method

Given:

2 pages → 40 minutes

Formula used:

Time prop. to Number of pages

Calculation:

=> Time for 1 page = 40 ÷ 2 = 20 minutes

=> Time for 90 pages = 90 × 20

=> = 1800 minutes

Therefore The correct answer is 1800 minutes.

Additional Information

Direct Proportion

More pages => more time

Unitary Method

Find value of 1 unit first, then multiply

Quick Tip

Always reduce to 1 unit for faster solving

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