RRB Group D Previous Year Paper (Held on: 8 Sept 2022 Shift 3)

RRB Group D • 2022 • 100 questions • 90 minutes • Answer key and solutions

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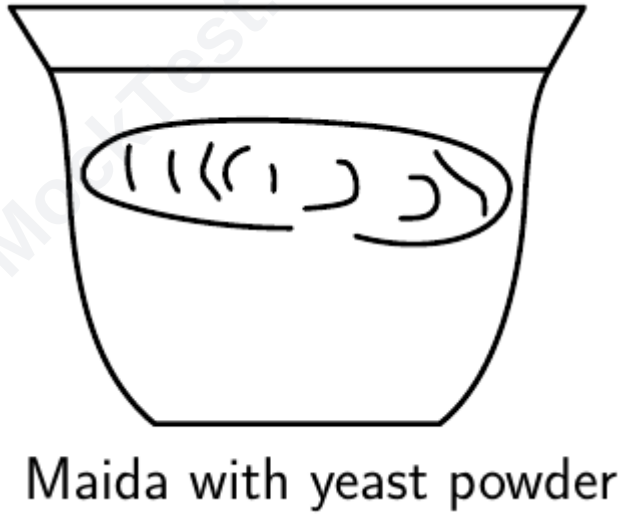
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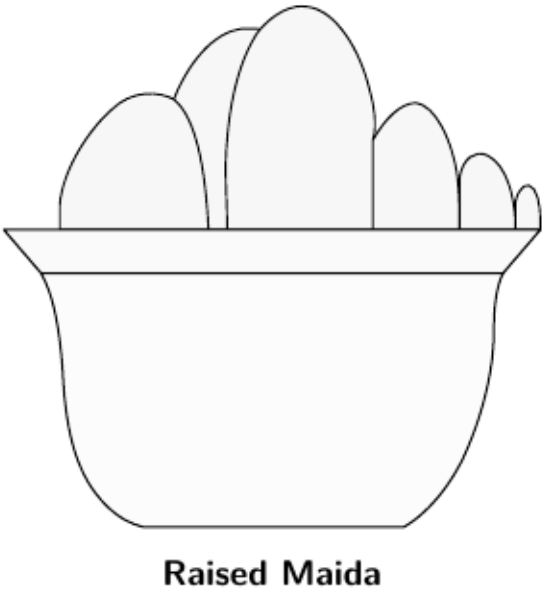
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CBT

Q1. Study the figures A and B carefully. What is the reason for the increase in volume in dough B?





(a) Alcohol is produced that increases the volume
(b) Lactic acid is produced that increases the volume
(c) CO_2 produced during respiration increases the volume
(d) Water is produced that increases the volume

Q2. Select the triad which follows the same pattern as that followed by the two triads given below. Both triads follow the same pattern.

AZ - CX - GT

XC - ZA - DW

(a) DW - FU - JQ
(b) MN - OM - SH
(c) TH - VE - ZA
(d) PK - RI - WD

Q3. A device of 60 W is connected to a 12 V battery. The current in the device is:

(a) 0.1 A
(b) 5.0 A
(c) 0.2 A
(d) 2.5 A

Q4. If all the numbers given below are arranged in ascending order, the position of how many numbers will remain unchanged?

246, 247, 548, 845, 346, 578, 145

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

Q5. The compound interest earned in 1 year on Rs. 40,000 at the rate of 40% per annum, compounded quarterly, is:

(a) Rs. 28,564
(b) Rs. 28,264
(c) Rs. 18,264
(d) Rs. 18,564

Q6. Which language institution gives away the Bhasha Bharti Samman award in India?

(a) Central Institute of Indian Languages
(b) Kendriya Hindi Sansthan
(c) Rashtriya Sanskrit Sansthan
(d) Central Hindi Directorate

Q7. Genes control traits through the activity of:

(a) gametes
(b) enzymes
(c) hormones
(d) chromosomes

Q8. A 4 Ω resistor, A, is connected in series to a 6 Ω resistor, B, and a 2 V battery. The potential drops across A and B are respectively _____.

(a) 1.4 V and 0.6 V
(b) 1.2 V and 0.8 V
(c) 0.6 V and 1.4 V
(d) 0.8 V and 1.2 V

Q9. The HCF of (x^4 − y^4), (x^8 − y^8) and ($x^2 - y^2$) is:

(a) (x − y) (x + y)
(b) (x − y) (x + y) (x − y) (x + y)
(c) (x + y) (x + y)
(d) (x − y) (x + y) (x + y)

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Q10. Which of the following numbers will replace the question mark (?) in the given series?

25, 23, 29, 28, 33, 33, ?

(a) 34
(b) 37
(c) 38
(d) 35

Q11. What is the normal systolic and diastolic pressure in humans?

(a) 120 mm of Hg / 80 mm of Hg
(b) 120 mm of Hg / 90 mm of Hg
(c) 130 mm of Hg / 90 mm of Hg
(d) 130 mm of Hg / 80 mm of Hg

Q12. Satheesh starts from a bus-stand and travels 6 km towards the north. He then takes a right turn, travels 2 km, turns right and travels 11 km. He then takes a right turn and travels 5 km. He takes a final right turn, travels 3 km and stops at a junction. In which direction is the bus-stand with respect to the junction? (All turns are 90° turns only.)

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

Q13. Given below is a statement followed by two possible underlying assumptions I and II. Read the information carefully and select the correct option.

Statement:

Extracts of plant C have been found useful in treating an earlier fatal disease. Although plant C, once imported, can be grown on any moist soil, most pharma companies in country Y are still choosing synthetic substitutes over using natural extracts.

Which of the following can be assumed by the given statement?

I. Unlike the case in all other countries, in Country Y, production of this synthetic substitute is substantially cheaper than growing Plant C.

II. The effect of a synthetic substitute is not drastically different from the plant extract.

(a) Only II can be assumed
(b) Both I and II can be assumed
(c) Neither I nor II can be assumed
(d) Only I can be assumed

Q14. A 100 W bulb is connected to a 220 V source. The current through the bulb is:

(a) 2.2 A
(b) 0.45 A
(c) 0.25 A
(d) 1.1 A

Q15. Select the correct statement.

(a) Investment multiplier is positively related to MPC.
(b) Slope of the consumption function is indicated by APC, and not MPC.
(c) Investment multiplier is zero when MPS is zero.
(d) MPC multiplied by MPS equals 1.

Q16. Which of the following numbers will replace the question mark (?) in the given series?

15, 18, 27, 54, 135, ?

(a) 368
(b) 367
(c) 378
(d) 398

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Q17. This question based on the five, three-digit numbers given below.

(Left) 634 145 317 534 621 (Right)

(Example: 697 − first digit = 6, second digit = 9, third digit = 7)

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

What will be the resultant if the third digit of the largest number is added to the second digit of smallest number?

(a) 9
(b) 7
(c) 4
(d) 8

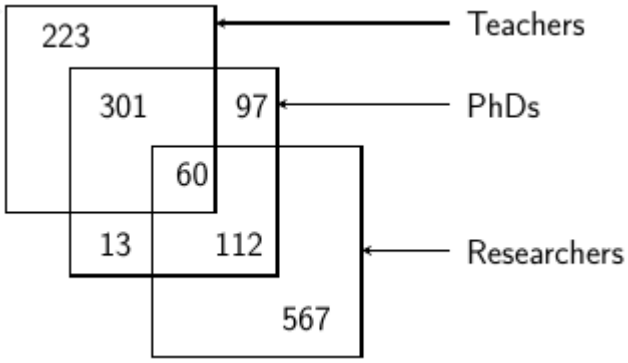
Q18. Which of the following gases is essential for all aerobic forms of life?

(a) CO2
(b) CO
(c) O3
(d) O2

Q19. An object is placed in front of a concave mirror at a point beyond its centre of curvature C. The image is formed at a point ____ and is ____.

(a) beyond C, diminished
(b) beyond C, enlarged
(c) between F and C, enlarged
(d) between F and C, diminished

Q20. Study the Venn Diagram given below and answer the question that follows.



How many PhDs are neither teachers nor researchers?

(a) 112
(b) 301
(c) 110
(d) 60

Q21. In this question, a group of numbers/symbols is coded using letters as per the table given below and the conditions which follow. The correct combination of codes following the conditions is your answer.

Number/Symbol	4	5	9	#	$	%	6
Codes	S	D	M	U	T	L	A

Conditions:

(i) If the first element is an even number and the last element is an odd number, the codes for these two (the first and the last elements) are to be interchanged.

(ii) If the second element is an even number and the fifth element is a symbol, the codes for these two (the second and the fifth elements) are to be interchanged.

(iii) If the fourth element is a number and the sixth element is a symbol, both these elements (the fourth and the sixth elements) are to be coded as G.

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Question: 4 5 $ 9 4 % # 6

(a) S D T M L G U A
(b) A D T G S G U S
(c) S D T G S G U A
(d) S S T G D G U A

Q22. The following bar chart shows the amount invested by a company in raw material over the duration of six years. Study the bar chart and answer the question based on it.



The sum of amount invested in raw materials in 2016 and 2021 was what percentage of the sum of the amount invested in raw materials in the year 2018 and 2020?

(a) 77.22%
(b) 78.36%
(c) 79.98%
(d) 79.56%

Q23. The HCF and LCM of two numbers are 24 and 456, respectively. If one number is 96, then the other number is:

(a) 112
(b) 192
(c) 114
(d) 216

Q24. A decomposition reaction carried out by heating is called _____.

(a) electrolysis
(b) photochemical decomposition
(c) thermal decomposition
(d) exothermic reaction

Q25. The term 'lithification' is related to which of the following geographic elements?

(a) Seas
(b) Valleys
(c) Rivers
(d) Rocks

Q26. If in a code language, THINE is written as SGHMD and ISLAND is written as HRKZMC, how will DYNAMIC be written that language?

(a) JUHGTRD
(b) EZNBMCI
(c) CXMZLHB
(d) FGTRDVN

Q27. The value of √625+√0.25-√0.000025 is:

(a) 25.495
(b) 25.5
(c) 25.405

(d) 25.395

Q28. The ratio of the present ages of a father and son is 7 : 4. The product of their ages is 6300. The age of the son is:

(a) 70 years
(b) 50 years
(c) 80 years
(d) 60 years

Q29. Which of the following festivals is also known as 'Vijayadashmi'?

(a) Dussehra
(b) Onam
(c) Diwali
(d) Pongal

Q30. During the British rule in India, about how much per cent of the country's population lived mostly in villages and derived their livelihood directly or indirectly from agriculture?

(a) 55%
(b) 85%
(c) 65%
(d) 75%

Q31. An area designated for wildlife in which they have unrestricted access to ecosystems and natural resources is called a _____.

(a) protected area
(b) national park
(c) wildlife sanctuary
(d) biosphere reserve

Q32. The guardian of the Constitution of India is:

(a) the Lok Sabha
(b) the Supreme Court
(c) the President
(d) the Rajya Sabha

Q33. One year ago, a man was 7 times as old as his daughter. Now his age is equal to the square of his daughter's age. If the daughter has already celebrated her first year birthday, then their present ages are:

(a) 7 and 49
(b) 5 and 25
(c) 4 and 28
(d) 6 and 36

Q34. The value of $47 + \{7 + [61 - (21 \div 3)] \div 9\}$ is:

(a) 40
(b) 80
(c) 100
(d) 60

Q35. Which of the following will NOT affect the magnetic strength of an electromagnet?

(a) Number of turns in the coil
(b) Direction of placement of the coil
(c) Length of the metallic core
(d) Current flowing through the coil

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Q36. If x + y = 8, product of x and y is 15, then the value of x^4+ y^4 is:

(a) 706
(b) 606
(c) 906
(d) 806

Q37. Refer to the following number series and answer the question.

7 2 9 6 3 8 3 8 7 2 3 2 7 3 2 2 1 3 3 9 9 7 4 2 9 3 0 9

Find the sum of number of occurrences of 2s and number of occurrences of 3s in the given series.

(a) 12
(b) 13
(c) 8
(d) 10

Q38. An object is placed on the principal axis of a concave lens, at a point between infinity and its optical centre O. Its image formed is _____.

(a) virtual and diminished
(b) virtual and enlarged
(c) real and diminished
(d) real and enlarged

Q39. _____ as a result of the 44^(th) Constitutional Amendment to the Constitution of India.

(a) Right to Property ceased to be a Fundamental Right
(b) Salaries of Judges of the High Courts and Supreme Court of India were revised
(c) Sikkim became the 22nd state of the India Union
(d) The Preamble to the Constitution of India was amended to include the words 'socialist' and 'secular'

Q40. Which of the following Indian states received the maximum of its rainfall from the Northeast Monsoon in 2021?

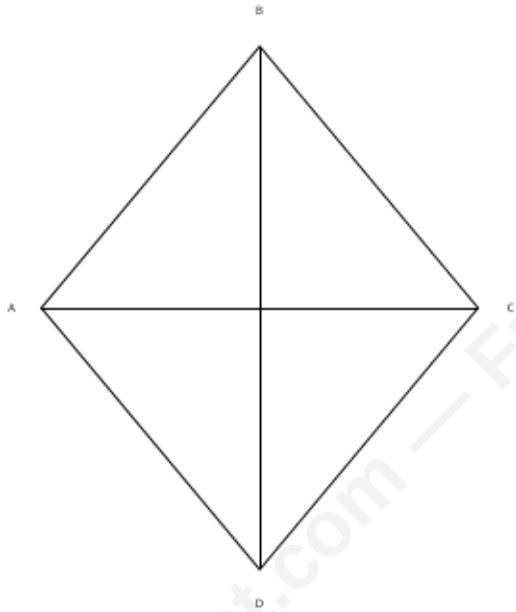
(a) Uttar Pradesh
(b) Haryana
(c) Tamil Nadu
(d) Gujarat

Q41. Which of the following metals is most metallic in nature?

(a) Cs
(b) Na
(c) Rb
(d) Li

Q42. If ABCD is a rhombus such that angle ACB = 50°, then angle BDC will be:

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(a) 40°
(b) 50°
(c) 60°
(d) 55°

Q43. In the year 2021, the sportspersons who won the most Arjuna Awards were associated with which sport?
(a) Shooting
(b) Cricket
(c) Hockey
(d) Archery

Q44. Acids that give rise to more H+ ions are said to be ____, while those which gives less H^+ ions are said to be ____.
(a) weak acid, strong acid
(b) strong acid, weak acid
(c) strong acid, weak base
(d) strong acid, strong base

Q45. What will come in place of the question mark (?) in the following equation, if '+' and '−' are interchanged and also '×' and '÷' are interchanged?
10 ÷ 5 + 144 × 12 + 13 − 45 × 9 + 12 = ?
(a) 22
(b) 20
(c) 16
(d) 18

Q46. Gaganpreet started walking towards the north from his school. After walking for 6 metres he turned left and walked further 8 metres to reach his home. In which direction is his school from his home? (All turns are 90 degree turns only)
(a) South-west
(b) South-east
(c) North-west
(d) North-east

Q47. Each vowel in the word 'EXACTLY' is changed to the letter following it in the English alphabetical order and each consonant is changed to the letter preceding it in the English alphabetical order. Which of the following letters will appear twice in the group of letters thus formed?
(a) S

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(b) K
(c) W
(d) B

Q48. The third proportional to ($x^3 - y^3$) and ($x - y$) is:
(a) $\frac{(x-y)^2}{x^2+xy+y^2}$
(b) $\frac{x-y}{x^2-xy+y^2}$
(c) $\frac{x-y}{x^2+xy+y^2}$
(d) $\frac{(x-y)^2}{x^2-xy+y^2}$

Q49. Roots of the equation $x^2 - 5x - 14 = 0$ are:
(a) 2, -7
(b) 3, -2
(c) 5, -3
(d) 7, -2

Q50. Select the set in which the numbers are related in the same way as are the numbers of the following sets.
(NOTE : Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g. 13 − Operations on 13 such as adding / subtracting / multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)
(20, 16, 8)
(13, 20, 23)
(a) (19, 18, 21)
(b) (14, 18, 16)
(c) (32, 27, 18)
(d) (13, 16, 13)

Q51. There are 20 members in group A, 32 members in group B and 28 members in group C. All the members of these groups went to a restaurant. The average amount spent on each member of group A, B and C is Rs. 120, Rs. 125 and Rs. 100, respectively. The total average amount (in Rs.) spent per member is:
(a) 118
(b) 112
(c) 116
(d) 115

Q52. In February 2022, which job portal was launched by IIT-Hyderabad to help people with disabilities acquire relevant skills and find employment?
(a) Swarajability
(b) Sarthakindia
(c) Yuvika
(d) Glassdoor

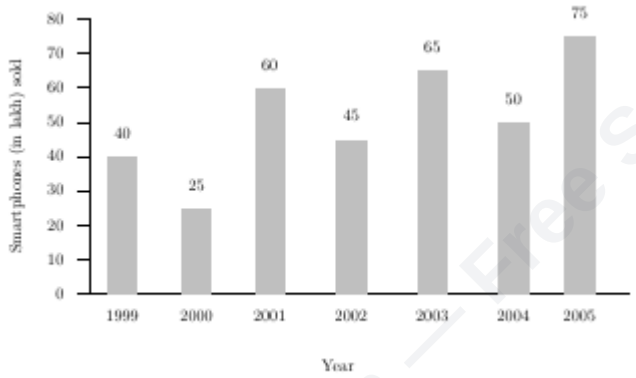
Q53. From the numbers 583, 459, 687, 754 and 853, which of the following will be the lowest number, if in each number, all the 8s and 5s are replaced with 2 and 1, respectively?
(a) 687
(b) 459
(c) 583
(d) 853

Q54. A started a business with a capital of Rs. 4,50,000. After 3 months, B joined him with a certain amount of capital. At the end of a year of A's starting the business, the profit was shared in the ratio 3 : 2. How much (in Rs.) did B invest?
(a) 4,20,000
(b) 4,00,000
(c) 3,20,000
(d) 3,60,000

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Q55. Study the given graph and answer the question that follows.

The graph presents smartphones (in lakh) sold by a company during the years 1999 to 2005.



What was the approximate percentage increase in the smartphone sales of the company from 2002 to 2003?

(a) 44%
(b) 48%
(c) 42%
(d) 39%

Q56. The value of $5\sqrt{6} - \sqrt{([3(4 - 2))]} + (12/\sqrt{6})$ is:

(a) $7\sqrt{6}$
(b) $6\sqrt{6}$
(c) $8\sqrt{6}$
(d) $5\sqrt{6}$

Q57. Which of the following phenomena is NOT involved during the formation of a rainbow?

(a) dispersion
(b) scattering
(c) refraction
(d) Total internal reflection

Q58. Three statements are followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they do not conform to real world knowledge, decide which of the given conclusions/possibilities can be true on the basis of the statements.

Statements:

1. Some students are males.
2. Some males are sincere.
3. All sincere are honest.

Conclusions:

I. Some honest are males.

II. All males are students is a possibility.

III. Some sincere are not students.

(a) Only conclusion II is true
(b) Only conclusion I and II are true
(c) Only conclusion III is true
(d) Only conclusion I is true

Q59. The National Commission for Protection of Child Rights (NCPCR) launched the SAMVEDNA helpline in 2021 to _____.

(a) counsel children of sex workers
(b) provide guidance to students about career choices
(c) counsel children who witness domestic violence
(d) provide mental support to children affected by Covid-19

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Q60. According to the Union Budget 2022, the overall workforce participation rate in India is _____.

(a) 19.1%
(b) 21.2%
(c) 20.3%
(d) 22.6%

Q61. A concave mirror is made from a section of the surface of a sphere of radius 8.0 cm. Its principal focus is at a distance of _____ from its pole.

(a) 8.0 cm
(b) 16.0 cm
(c) 12.0 cm
(d) 4.0 cm

Q62. Consider the statements given below and identify the correct answer.

Statement I: The Modern Periodic Table has 18 vertical columns known as 'periods' and 7 horizontal rows known as 'groups'.

Statement II: Groups in the Periodic Table signify an identical outer shell electronic configuration

(a) Statement II is correct, Statement I is incorrect.
(b) Statement I is correct, Statement II is incorrect.
(c) Both statements are correct.
(d) Both statements are incorrect.

Q63. Which amendments of the Constitution of India aimed at strengthening local governments and ensuring an element of uniformity in their structure and functioning across the country?

(a) 63^(rd) and 64^(th)
(b) 73^(rd) and 74^(th)
(c) 53^(rd) and 54^(th)
(d) 43^(rd) and 44^(th)

Q64. The average sale of cars by a dealer per day in the month of March, other than on Saturdays and Sundays, is 125. The average sale of cars per day on Sundays is 150. What is the average sale of cars per day on Saturdays, if the first Saturday is on the 3^(rd) of March and average sale of cars per day for the whole month is 130?

(a) 132
(b) 138
(c) 136
(d) 140

Q65. The double displacement reaction among the following is:

(a) $Pb(s) + CuCl_2(aq) \rightarrow PbCl_2(aq) + Cu(s)$
(b) $CuSO_4(aq) + H_2S(g) \rightarrow CuS(s) + H_2SO_4(aq)$
(c) $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$
(d) $Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$

Q66. The total surface area of a cube whose main diagonal length is $16\sqrt{3}$ cm is:

(a) 1868 cm^2
(b) 1854 cm^2
(c) 1764 cm^2
(d) 1536 cm^2

Q67. The value of

$\sin^2 54° + \sin^2 36°$ over $\tan^2 40° - \text{cosec}^2 50°$ is:

(a) 1
(b) 2
(c) −1
(d) 0

Q68. 12 unskilled and 14 skilled workers together complete a certain piece of work in 9 days. If each unskilled worker takes twice the time taken by a skilled worker to finish the work, in how many days will 12 skilled workers finish the same work?

(a) 12 days
(b) 18 days
(c) 15 days
(d) 10 days

Q69. Amongst six friends P, Q, R, S, T and U, each has a different height. T is taller than only two other friends. R is shorter than only one friend. P is shorter than T but taller than S. Q is shorter than U. Who is the third tallest among all the friends?

(a) T
(b) Q
(c) R
(d) U

Q70. If x^4 + 1over x^4 = 27, then what is the value of x^2 + 1over x^2 ?

(a) √31
(b) 29
(c) 31
(d) √29

Q71. Consider the following statements about an electric motor:

(a) It uses a commutator that reverses the direction of the current in the coil after each half-rotation.

(b) The direction of the force on an arm of the coil can be found using Fleming's left-hand rule.

Which of the above statements is/are correct?

(a) Only (a)
(b) Neither (a) nor (b)
(c) Both (a) and (b)
(d) Only (b)

Q72. Eight coloured boxes are kept in an almirah having eight shelves. Only one box is kept on one shelf. The lower most shelf is numbered one and the uppermost shelf is numbered eight. There are only two boxes kept above the blue box. The brown box is kept between the black and the blue box. Six boxes are kept below the green box. The orange box is kept on an odd numbered shelf. The yellow box is kept just above the white box and is somewhere below the red box.

Which box is kept on the lowermost shelf?

(a) Blue
(b) Red
(c) Yellow
(d) White

Q73. Among six friends, A, B, C, D, E and F, each with a different height, B is taller than D but shorter than E. C is shorter than E. A is taller than F. D and E are shorter than C and A, respectively. E is shorter than A and F. Who among the six friends is the tallest?

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

Q74. Name the state that became the first state to introduce carbon-neutral farming methods, in March 2022?

(a) Assam
(b) Kerala
(c) Tamil Nadu
(d) Jharkhand

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Q75. Indian Space Research Organization (ISRO) has successfully completed the ground test of the solid fuel-based booster stage (SS1) of its new SSLV at Satish Dhawan Space Centre (SDSC), Sriharikota at Andhra Pradesh in March 2022.

What is the full form of the above mentioned SSLV?

(a) Systematic Satellite Launch Vehicle
(b) Small Satellite Launch Vehicle
(c) Synchronized Satellite Launch Vehicle
(d) Solar Satellite Launch Vehicle

Q76. The marked price of an item is Rs. 250 and a shopkeeper allows a discount of 30%. The selling price of the item is:

(a) Rs. 165
(b) Rs. 185
(c) Rs. 195
(d) Rs. 175

Q77. Which of the following is the birthplace of the founder of Christianity?

(a) Galilee
(b) Haifa
(c) Bethlehem
(d) Nazareth

Q78. Which of the following terms will replace the question mark (?) in the given series to make it logically complete?

FUR37, LAX43, RGD49, XMJ55, ?

(a) DSP61
(b) DPS61
(c) PDS63
(d) PSD63

Q79. Six boxes of different food items are kept in a row on the dining table. The box with toffees is kept at one end. There are three boxes kept between the box with toffees and the box with chocolates. The box with ice cream is not kept with the toffee box or the fruit-jam box. Cookies and pancakes boxes are kept with the ice cream box. Which of the following box is kept at an end?

(a) Chocolates
(b) Fruit-jam
(c) Cookies
(d) Pancake

Q80. Five friends V, W, X, Y, and Z are eating dinner around a circular dining table, facing the centre. X is an immediate neighbour of both Z and W. V is sitting to the immediate left of W. Y is sitting second to the left of W. Who is sitting to the immediate left of X?

(a) Y
(b) Z
(c) V
(d) W

Q81. Which ministry released a draft of 'National Air Sports Policy (NASP)' for public feedback on January 2, 2022?

(a) Ministry of Home Affairs
(b) Ministry of External Affairs
(c) Ministry of Youth Affairs and Sports
(d) Ministry of Civil Aviation

Q82. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

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(13, 9, 5)

(14, 11, 8)

(a) (22, 32, 24)
(b) (22, 19, 16)
(c) (18, 26, 36)
(d) (14, 10, 12)

Q83. A man is 4 times as old his son. After 6 years, the man's age will be three times that of his son. The sum of their present ages is:

(a) 80 years
(b) 70 years
(c) 60 years
(d) 90 years

Q84. Which of the following members of the homologous series of alkanes has the highest melting point?

(a) C4H10
(b) C2H6
(c) C3H8
(d) CH4

Q85. Which of the following properties is NOT shown by bleaching powder?

(a) Reducing agent
(b) In water purification
(c) For bleaching cotton fibre
(d) Oxidizing agent

Q86. Who among the following freedom fighters has been honoured with the title of 'The Iron Man Of India'?

(a) Jawaharlal Nehru
(b) Vallabhbhai Patel
(c) Vithalbhai Patel
(d) Ram Manohar Lohia

Q87. Rakesh and Raman have their houses in an eight-storeyed building. The lower most floor of the building is numbered as one and the top most floor is numbered as eight.

Rakesh's house is just above Raman's floor. Every Day Raman has to go three floors down to drop his son to school which is nearby. On which floor Rakesh Lives?

(a) 3^(rd)
(b) 6^(th)
(c) 4^(th)
(d) 5^(th)

Q88. The marked price of an article is Rs. 100. If the article is sold at a discount of 25%, then 25% profit is realised. The percentage loss or percentage profit made (approximately) if it is sold for Rs. 20 less than the marked price is:

(a) 35% loss
(b) 12 1over2 % loss
(c) 25% profit
(d) 33 1over3 % profit

Q89. Which of the following is NOT a component of the male reproductive part of flower?

(a) Pollen
(b) Anther
(c) Filament
(d) Style

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Q90. A man goes from place A to B at a speed of 18 km/h and returns from B to A at a speed of 30 km/h using the same route. The average speed for the whole journey is:

(a) 42 1over2 km/h
(b) 52 1over2 km/h
(c) 22 1over2 km/h
(d) 32 1over2 km/h

Q91. In plants, diffusion is mainly responsible for the process of transportation. However for transport of some substances, energy is needed. Which option shows the substances transported using energy from ATP?

(a) Water, minerals and food
(b) Food, amino acids and hormones
(c) Water and minerals
(d) Only amino acids

Q92. The newer, younger deposits of the flood plains called _____ are renewed almost every year, and hence are fertile, thus being ideal for intensive agriculture.

(a) Tarai
(b) Bangar
(c) Bhabar
(d) Khadar

Q93. _____ is a newsletter published by the Small Industries Development Bank of India (SIDBI) and Equifax.

(a) Microfinance Pulse
(b) Microfinance World
(c) Microfinance Now
(d) Microfinance Times

Q94. I, J, K, L, M, N and O are sitting along a circle facing at the centre and are playing cards. M is the immediate neighbour of I and L. J is second to the left of O. N is on the immediate right of I. What is the position of N?

(a) 2^(nd) to the left of L
(b) 3^(rd) to the right of O
(c) To the immediate left of J
(d) 2^(nd) to the right of K

Q95. The total numbers of covalent bond in propane are _____.

(a) 7
(b) 12
(c) 8
(d) 10

Q96. A solid cube with an edge of 10 cm is cast into cuboids of dimensions 4 cm × 2 cm × 1 cm. The number of such cuboids that can be cast through it is:

(a) 120
(b) 130
(c) 100
(d) 125

Q97. Which of the following options correctly describes the features of arteries?

(a) Thick walls, blood flows under low pressure, collect blood from different parts of the body
(b) Thick walls, no valves, blood flows under high pressure, carry blood to different parts of the body
(c) Thin walls with valves, blood flows under low pressure, collect blood from different parts of the body
(d) Thin walls with valves, blood flows under high pressure, carry blood to different parts of the body

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Q98. Which two signs should be interchanged to make the following equation correct?

33 + 4 × 21 ÷ 3 − 17 = 122

(a) ÷ and −
(b) • and −
(c) • and ×
(d) − and ×

Q99. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

Some mats are figs.

All figs are clips.

No clip is a stand.

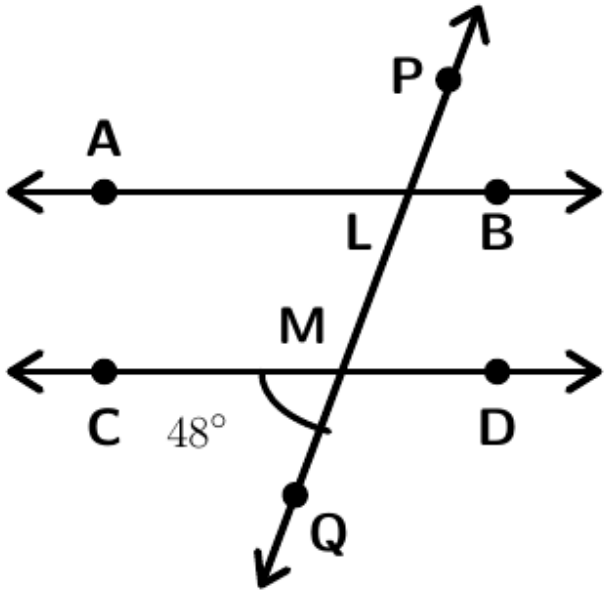
Conclusions:

I. All mats being stands is a possibility.

II. Some clips are mats.

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

Q100. In the given figure, AB and CD are parallel lines intersected by a transversal PQ at L and M, respectively. If angle CMQ = 48°, then angle PLA is:



(a) 132°
(b) 110°
(c) 125°
(d) 120°

ANSWER KEY

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

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

SOLUTIONS

Q1. Answer: (c) CO2 produced during respiration increases the volume

The correct answer is CO2 produced during respiration increases the volume

Key Points

• CO2 is a by-product of cellular respiration in living organisms.

• CO2 produced during respiration increases the volume of air in the lungs, this is known as hyperventilation.

• Hyperventilation occurs when an individual breathes faster or deeper than normal.

• Hyperventilation can lead to a decrease in the amount of CO2 in the blood.

• This decrease in CO2 can cause symptoms such as lightheadedness.

• Hyperventilation can also cause other symptoms such as tingling in the fingers and mouth, muscle spasms, and shortness of breath.

Additional Information

• During normal breathing, carbon dioxide (CO2) is produced as a waste product of metabolism.

• CO2 is carried by the blood to the lungs, where it is exhaled.

• In the lungs, CO2 acts as a respiratory stimulant, which helps to regulate the rate and depth of breathing.

• The CO2 level in the blood is closely regulated to maintain a balance between the amount produced and the amount exhaled.

• When the level of CO2 in the blood is too high, it can cause an increase in the volume of air in the lungs, which is known as hyperventilation.

• Hyperventilation can also be caused by anxiety, panic attacks, and other emotional disturbances.

• Hyperventilation can be treated by various methods, such as breathing exercises, to help regulate the breathing rate and decrease the volume of air in the lungs.

Q2. Answer: (a) DW - FU - JQ

According to the English alphabet and their positional values:

The pattern followed here in the given triads is:

AZ - CX - GT

And, XC - ZA - DW

Similarly,

Let us consider the given options:

Option 1) DW - FU - JQ

Option 2) MN - OM - SH

Option 3) TH - VE - ZA

Option 4) PK - RI - WD

Hence, the correct answer is “DW - FU - JQ”.

Confusion Points

• PK - RI - WD → In option 4 opposite letter pair is given but the alternate difference is not the match so we don't consider option 4 as correct. Thus, only option 1) is correct.

Q3. Answer: (b) 5.0 A

The correct answer is option 2)5.0A

Given:

P=60W,V=12V

Formula:

P=VI

where P is the power,

V is the voltage and I is the current in the circuit.

Calculations:

P=VI

60=12*I

I=60/12=5A

Therefore, the current in the circuit 5A.

Q4. Answer: (c) 1

We arrange the given numbers in ascending order, and we get:

Here we can see that the position of only one number remains unchanged.

Hence, the correct answer is “1”.

Q5. Answer: (d) Rs. 18,564

Shortcut Trick

For quarterly compounding, the rate becomes 1/4th and time becomes 4 times.

Quarterly Rate = 40% ÷ 4 = 10% | Number of quarters = 1 × 4 = 4.

Effective rate for 10% for 4 periods = 46.41% (using successive method: 10, 10 → 21%; 21, 21 → 46.41%).

Compound Interest (CI) = 46.41% of Rs. 40,000 = 0.4641 × 40,000 = 18,564.

Therefore The correct answer is Rs. 18,564.

Alternate Method

Given: Principal (P) = Rs. 40,000, Annual Rate (R) = 40%, Time (T) = 1 year.

Formula Used: Amount (A) = $P(1 + r/100)^n$; CI = A − P

=> Quarterly Rate (r) = 40 ÷ 4 = 10%

=> Number of periods (n) = 1 × 4 = 4

=> A = 40,000 × (1 + 10/100)^4

=> A = 40,000 × (1.1)^4

=> A = 40,000 × 1.4641 = 58,564

=> CI = Amount − Principal = 58,564 − 40,000 = Rs. 18,564

Therefore The correct answer is Rs. 18,564.

Additional Information

Quarterly Compounding

When interest is compounded quarterly, the effective rate is R/4 and the number of periods is 4T. Amount A = P(1 + R/400)^(4T).

Effective Annual Rate (EAR)

EAR = $[(1 + r/n)^n − 1] × 100$, where r is the annual nominal rate and n is the number of compounding periods per year.

Difference between CI and SI

For 2 periods, the difference is $P(r/100)^2$. For quarterly compounding in 1 year, compare 4 periods of interest.

Q6. Answer: (a) Central Institute of Indian Languages

The correct answer is Central Institute of Indian Languages.

Key Points:

• The Central Institute of Indian Languages (CIIL) in Mysore is governed by the Ministry of Human Resource Development.

• In order to support the creation and implementation of the Indian government's language policy, it was founded in 1969.

• It was also meant to coordinate the development of Indian languages by pursuing research in the areas of language analysis, language education, language technology, and language use in society.

• The Bhasha Bharati Samman Award is given out annually by the CIIL to authors of books or other works that have been published in any of the Indian languages included in the Constitution's Eighth Schedule.

Additional Information:

• The Sahitya Akademi, the Official Academy of Letters of India, presents the Bhasha Samman, an annual literary award, to Indian authors who publish works in regional languages other than the 24 national languages of India.

• The honour comes with a copper plaque and a cash prize of one lakh Indian rupees.

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• For their contributions to the growth of their respective languages and their literature, the first Bhasha Samman awards were given to Dharikshan Mishra for Bhojpuri, Bansi Ram Sharma and M.R. Thakur for Himachali, K. Jathappa Rai and Mandara Keshava Bhat for Tulu, and Chandra Kanta Mura Singh for Kokborok.

Q7. Answer: (c) hormones

The correct answer is hormones.

Key Points

• Hormones

• Genes control traits through the activity of hormones.

• The pituitary stalk connects the hypothalamus, a tiny portion of the brain, to the pituitary gland.

• Your pituitary gland is regulated by a number of hormones that are released.

• Peptide hormones, which are soluble in water, are made up of amino acids.

• In contrast to peptide hormones, steroid hormones can pass through cell membranes and are fat-soluble.

Additional Information

• Genes

• A gene is the primary structural and functional element of heredity.

• DNA is the component of genes.

• Most genes result in individual proteins or subsets of proteins, each of which serves a unique purpose in the body.

• There are about 20,000 protein-coding genes in humans.

Q8. Answer: (d) 0.8 V and 1.2 V

The correct answer is option 4)0.8 V and 1.2 V

Given:

R1=4Ω,R2=6Ω

Voltage, V=2V

Formula:

The potential drop of individual resistors are connected in series can be found by the formulas:

V1=R1/(R1+R2)*V

V2=R2/(R1+R2)*V

Calculations:

The potential drop at A is:

V1=R1/(R1+R2)*V

V1=4/(4+6)*2=4/10*2=0.8V

The potential drop at B is:

V2=R2/(R1+R2)*V

V2=6/(4+6)*2=6/10*2=1.2V

Therefore, the potential drops across A and B are 0.8 V and 1.2 V.

Q9. Answer: (a) (x − y) (x + y)

Shortcut Trick

Identify the smallest power expression that is a factor of all terms.

Expression 1: (x^4 − y^4) = (x² − y²)(x² + y²)

Expression 2: (x^8 − y^8) = (x^4 − y^4)(x^4 + y^4) = (x² − y²)(x² + y²)(x^4 + y^4)

Expression 3: (x² − y²)

The Common Factor is (x² − y²) = (x − y)(x + y).

Therefore The correct answer is (x − y) (x + y).

Alternate Method

Given: Three algebraic expressions: (x^4 − y^4), (x^8 − y^8) and (x² − y²).

Formula Used: a² − b² = (a − b)(a + b)

Calculations:

=> Factorizing (x^4 − y^4) = (x²)² − (y²)² = (x² − y²)(x² + y²)

=> Factorizing (x^8 − y^8) = (x^4)² − (y^4)² = (x^4 − y^4)(x^4 + y^4) = (x² − y²)(x² + y²)(x^4 + y^4)

=> Expression 3 is already (x² − y²).

=> HCF is the highest common factor among all terms = $(x^2 - y^2)$.

=> $(x^2 - y^2) = (x - y)(x + y)$.

Therefore The correct answer is $(x - y)(x + y)$.

Additional Information

HCF of Polynomials

The Highest Common Factor is the product of the lowest powers of common factors present in the given polynomials.

Difference of Squares

The formula $a^2 - b^2 = (a - b)(a + b)$ can be applied recursively for higher even powers like a^4 − b^4 or a^8 − b^8.

LCM of Polynomials

The Least Common Multiple is the product of the highest powers of all factors present in the expressions.

Q10. Answer: (b) 37

The pattern followed in the given series is:

Numbers at odd places are increased by +4 & numbers at even places are increased by +5.

Hence, the correct answer is “37”.

Q11. Answer: (a) 120 mm of Hg / 80 mm of Hg

The correct answer is 120 mm of Hg / 80 mm of Hg.

Key Points

• The normal systolic and diastolic pressure in humans is 120 mm of Hg / 80 mm of Hg.

• Blood is pushed through the arteries to the rest of the body when the heart contracts during each beat.

• The term "systolic blood pressure" refers to this. Systolic blood pressure should not exceed 120 mm Hg.

• When the heart is between beats or diastole, the blood pressure in the arteries is measured.

• When a person's health changes, or when they engage in particular activities like sports or exercise, their systolic and diastolic pressure will vary. Afterwards, the pressure will return to normal.

Additional Information

• Blood Pressure

• Blood pressure readings that are less than 120/80 mm Hg are regarded as normal.

• If your outcomes fall within this category, keep up heart-healthy routines like eating a balanced diet and exercising frequently.

• Systolic blood pressure, or the first number, is typically given more consideration as a significant risk factor for cardiovascular disease in adults over 50.

Q12. Answer: (c) North-east

From the given information:

1) Satheesh starts from a bus-stand and travels 6 km towards the north.

2) He then takes a right turn and travels 2 km.

3) He again turns right and travels 11 km.

4) He then takes a right turn and travels 5 km.

5) He takes a final right turn, travels 3 km and stops at a junction.

Here, we can see that the bus stand is towards the north-east direction of the junction.

Hence, the correct answer is " North - east ".

Q13. Answer: (a) Only II can be assumed

Statement:

Extracts of plant C have been found useful in treating an earlier fatal disease. Although plant C, once imported, can be grown on any moist soil, most pharma companies in country Y are still choosing synthetic substitutes over using natural extracts.

Assumptions:

I. Unlike the case in all other countries, in Country Y, production of this synthetic substitute is substantially cheaper than growing Plant C → The statement tells us about the usefulness and preference of the extracts but no part of it considers the prices being cheaper or expensive in any way so the assumption here does not support the given statement.

II. The effect of a synthetic substitute is not drastically different from the plant extract → From the part 'most pharma companies in country Y are still choosing synthetic substitutes over using natural extracts' we can assume that the companies are very much satisfied with the performance of synthetic substitutes, so it is used over plant extract and it is not drastically different therefore the assumption is true.

So, only II can be assumed.

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Hence the correct answer is " Only II can be assumed ".

Q14. Answer: (b) 0.45 A

The correct answer is 0.45 A.

Key Points By using the formula, P = VI

where, P = Power = 100 W

V = Voltage = 220 V

I = Current = ?

100 = 220 x I

On solving, we get

I = 0.45 A

Additional Information

• Current

• Electrical charge carriers, such as electrons, flow as current. From negative to positive points, current flows.

• The ampere is the SI unit used to measure electric current (A).

• One coulomb of electrical charge travelling across a certain place in one second is referred to as one ampere of current.

• Appliances for use in the home and in the industry frequently utilise electric current.

Q15. Answer: (a) Investment multiplier is positively related to MPC.

The correct answer is Investment multiplier is positively related to MPC.

Key Points:

• The stimulating impacts of governmental or private investments are referred to as the investment multiplier.

• It is based on John Maynard Keynes' economic theories.

• The marginal propensity to save (MPS) and the marginal propensity to consume (MPC) determine the size of the investment multiplier (MPS).

• An investment's potential to stimulate the economy more strongly is indicated by a higher investment multiplier.

Additional Information:

• The percentage of additional income that is spent on consumption is known as the marginal propensity to consume.

• Depending on income, MPC fluctuates.

• MPC tends to be lower at higher income levels.

• The Keynesian multiplier, which describes the impact of the additional investment or government spending as an economic stimulus, is mostly determined by MPC.

Q16. Answer: (c) 378

The logic followed in the given series is:

The difference between the two consecutive terms is multiplied by 3 to get the next term.

Hence, the correct answer is " 378 ".

Q17. Answer: (d) 8

First we find the largest & the smallest numbers in the given series:

Now we add the third digit of the largest number to the second digit of the smallest number,

Third digit of the largest number = 4

Second digit of the smallest number = 4

So, 4 + 4 = 8

Hence, the correct answer is " 8 ".

Q18. Answer: (d) O2

The correct answer is O2.

Key Points

• O2 gas is essential for all aerobic forms of life.

• Oxygen is the name of the chemical element that has the atomic number 8 and the letter O.

• It is a very reactive nonmetal that is a member of the chalcogen group of the periodic table and an oxidising agent that readily forms oxides with most elements as well as other compounds.

• After hydrogen and helium, oxygen is the third most plentiful element in the universe and the most abundant element on Earth.

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Additional Information

• Two oxygen molecules combine to form molecule O2.

• Our bodies have evolved to breathe oxygen, which makes up the majority of our atmosphere.

• Chemical elements are substances that only contain one kind of atom, such as oxygen.

• Since oxygen has an atomic number of 8 and the official chemical symbol O, an oxygen atom has eight protons in its nucleus.

Q19. Answer: (d) between F and C, diminished

The correct answer is between F and C, diminished

Key Points

• An object is placed in front of a concave mirror at a point beyond its centre of curvature C, the image is formed at a point that is between the centre of curvature and the focus (C and F respectively), and is real, inverted and smaller than the object.

• When an object is placed at a point beyond the centre of curvature of a concave mirror, the reflected rays converge at a point before the mirror, creating a real image that is inverted and smaller than the object. The image is also located between the centre of curvature and the focus of the mirror.

• It's also worth noting that in this case, the image is also always virtual, since the image is formed "behind" the mirror, meaning that it cannot be projected on a screen.

Additional Information

• When an object is placed at a point beyond the centre of curvature (C) of a concave mirror, the reflected rays converge at a point before the mirror, creating a real image that is inverted (upside-down) and smaller than the object. The image is also located between the centre of curvature and the focus (F) of the mirror.

• Additionally, it is also worth noting that the distance of the object (u), the distance of the image (v), and the focal length (f) of the mirror are related by the mirror equation:

• 1/f = 1/v - 1/u

• Where, a negative value of v represents that the image is real, inverted and on the same side of the mirror as the object, and a positive value of v represents that the image is virtual, erect and on the opposite side of the mirror.

• Also, The image is always diminished in size as the object is beyond the centre of curvature of the mirror, The image is also always virtual, since the image is formed "behind" the mirror, meaning that it cannot be projected on a screen.

Q20. Answer: (c) 110

From the given diagram, we have to find out the number of PhDs that are neither teachers nor researchers which means we have to find the region that represents PhDs and does not share any region with either of the teachers or researchers:

From the above Venn diagram we have:

Number of PhDs that are neither teachers nor researchers = 97 + 13 = 110

Hence, the correct answer is "110".

Q21. Answer: (c) S D T G S G U A

From the given information:

Number/Symbol	4	5	9	#	$	%	6
Codes	S	D	M	U	T	L	A

Conditions:

Sr. No	First Element	Second Element	Fourth Element	Fifth Element	Sixth Element	Last Element	Codes for both
i)	Even Number					Odd Number	Codes are interchanged.
ii)		Even Number		Symbol			Codes are interchanged.
iii)			Number		Symbol		Both are coded as " G ".

Given code: 4 5 $ 9 4 % # 6

Now we can see that condition (iii) has to be applied in the given code which states 'If the fourth element is a number and the sixth element is a symbol, both these elements (the fourth and the sixth elements) are to be coded as G:

Hence the correct answer is " S D T G S G U A ".

Q22. Answer: (a) 77.22%

Given:

Concept used:

Percentage = Value/(Total value)×100

Calculation:

=> Sum of the amount invested in raw materials in 2016 and 2021 = 240 + 370 = 610 lakhs

=> Sum of the amount invested in raw materials in 2018 and 2020 = 365 + 425 = 790 lakhs

Percentage = 610/790× 100 = 77.22%

Therefore, the sum of the amount invested in raw materials in 2016 and 2021 was 77.22% of the sum of the amount invested in raw materials in the year 2018 and 2020.

Q23. Answer: (c) 114

Shortcut Trick

Product of numbers = HCF × LCM

Other number = (24 × 456) ÷ 96

Other number = 456 ÷ 4 = 114

Therefore The correct answer is 114.

Alternate Method

Given:

HCF = 24

LCM = 456

First Number (a) = 96

Formula Used:

First Number (a) × Second Number (b) = HCF × LCM

Calculations:

=> 96 × b = 24 × 456

=> b = (24 × 456) ÷ 96

=> b = 10944 ÷ 96

=> b = 114

Therefore The correct answer is 114.

Additional Information

Fundamental Property of HCF and LCM

For any two positive integers a and b, HCF(a, b) × LCM(a, b) = a × b.

HCF of Fractions

HCF = HCF of Numerators ÷ LCM of Denominators.

LCM of Fractions

LCM = LCM of Numerators ÷ HCF of Denominators.

Q24. Answer: (c) thermal decomposition

The correct answer is thermal decomposition.

Key Points

• Thermal Decomposition

• A decomposition reaction carried out by heating is called thermal decomposition.

• Thermolysis, also known as thermal decomposition, is a chemical decomposition brought on by heat.

• The decomposition temperature of a substance is the temperature at which the substance begins to chemically break down.

• The process is often endothermic because heat is required to break the chemical bonds in the substance that is being broken down.

• A positive feedback loop that results in thermal runaway and maybe an explosion or other chemical event is formed if decomposition is sufficiently exothermic.

Additional Information

• Decomposition Reaction

• One reactant produces two or more products in a decomposition reaction.

• A decomposition Reaction is a type of chemical reaction.

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• Chemical breakdowns or analysis reactions are other names for decomposition processes.

• Synthesis, which involves the combination of less complex reactants to create a more complex result, is the reverse of this kind of reaction.

• Hydrogen gas and oxygen gas can be produced from water by electrolysis through a decomposition reaction.

Q25. Answer: (d) Rocks

The correct answer is Rocks.

Key Points:

• The challenging process of lithification converts loose silt grains that have recently been deposited into rock.

• After a silt is deposited, lithification may occur immediately or later.

• Cementation is one of the crucial processes, particularly for sandstones and conglomerates.

• Additionally, interactions between various minerals and between minerals and the fluids contained in the pores of a sediment take place.

• These processes, collectively known as authigenesis, may produce new minerals or contribute to those already present in the sediment.

• It is possible for minerals in solution that enter the sediment from another area to be deposited or to interact with minerals already present.

• In the form of nodules and other concretions, minerals can also disintegrate and be redistributed.

Additional Information:

• Sand, gravel, bones, and silt are examples of material bits that have been carried by water, ice, or wind and deposited in a specific location.

• Other natural processes, such as erosion, which reduce large boulders to small pieces, may have produced these sediments.

• These minute components are subsequently transformed into rock through lithification.

• It is the last stage in the formation of sedimentary rock.

• Compaction and cementation are typical steps in lithification.

Q26. Answer: (c) CXMZLHB

The logic followed here is :

THINE is written as SGHMD

ISLAND is written as HRKZMC

Similarly,

DYNAMIC is written as CXMZLHB

Hence, the correct answer is "CXMZLHB".

Q27. Answer: (a) 25.495

Given:

$\sqrt{625}+\sqrt{0.25}-\sqrt{0.000025}$

Calculation:

$\sqrt{625}+\sqrt{0.25}-\sqrt{0.000025}$

$= \sqrt{(25\times 25)}+\sqrt{0.25}-\sqrt{0.000025}$

$= 25 + \sqrt{(0.5\times 0.5)}-\sqrt{0.000025}$

$= 25 + 0.5 - \sqrt{(0.005\times 0.005)}$

$= 25.5 - 0.005$

$= 25.495$

Hence, the required value is 25.495.

Q28. Answer: (d) 60 years

Shortcut Trick

Ratio of Father to Son = 7 : 4

Product of ratios = $7 \times 4 = 28$ units²

28 units² = 6300 => 1 unit² = 6300 ÷ 28 = 225

1 unit = $\sqrt{225} = 15$

Age of Son = 4 units = $4 \times 15 = 60$ years

Therefore The correct answer is 60 years.

Alternate Method

Given: Ratio of ages = 7 : 4, Product = 6300

Let the age of the Father be 7x and the age of the Son be 4x.

=> 7x × 4x = 6300

=> $28x^2 = 6300$

=> $x^2 = 6300 \div 28$

=> $x^2 = 225$

=> $x = \sqrt{225} = 15$

=> Age of Son = 4x = 4 × 15 = 60 years

Therefore The correct answer is 60 years.

Additional Information

Ratio and Multiplier

When the product of two quantities in ratio a : b is given as P, the common multiplier x is calculated as $x = \sqrt{(P \div (a \times b))}$.

Ratio and Sum

If the sum of ages is S and ratio is a : b, then common multiplier x = S ÷ (a + b).

Ratio and Difference

If the difference of ages is D and ratio is a : b, then common multiplier x = D ÷ (a − b).

Q29. Answer: (a) Dussehra

The correct answer is "Dussehra"

Key Points

• Hindus celebrate Dussehra, also known as Dasara or Vijayadashami, as the victory of Rama, a Vishnu avatar, over the ten-headed demon king Ravana, who kidnapped Rama's bride, Sita.

• The festival of Dussehra is observed with great zeal and grandeur.

• It includes Ram Lila, a grand theatrical presentation of Rama's life narrative performed in North India.

• In open fields at night, effigies of Ravana—often combined with those of Meghnada, Ravana's son, and Kumbhkarana, Ravana's brother—are lit on fire.

Additional Information

• Onam is an annual harvest festival in India that is mostly observed by Keralan Hindus.

• Diwali, often known as the "Festival of Lights," is observed by lighting lamps and setting off rockets and crackers.

• Pongal, also known as Thai Pongal, is a several-day Hindu harvest festival that Tamil people in India and Sri Lanka celebrate.

Q30. Answer: (b) 85%

The correct answer is "85%".

Key Points

• India's economy remained mostly agricultural during the British colonial era because 85% of the country's people lived in villages and depended on agriculture for their livelihood.

• Almost half of India's national GDP came from agriculture and related sectors.

• Nevertheless, while employing such a sizable population, the agricultural sector continued to develop and occasionally face extraordinary decline.

Additional Information

• Although the total area under cultivation increased, agricultural productivity decreased even if the sector saw a considerable gain in absolute terms.

• The different land settlement schemes that the colonial authority implemented were mostly to blame for the stagnation in the agricultural sector.

• Particularly, under the zamindari system, which was put in place in the former Bengal Presidency, which included some of the modern-day eastern states of India, the profit generated by the agricultural sector went to the zamindars rather than the cultivators.

• However, a sizable portion of zamindars—not simply the colonial administration—did nothing to improve the state of agriculture.

Q31. Answer: (b) national park

The correct answer is a national park.

Key Points

• The ecology is to be preserved via national parks.

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• They participate in public leisure and amusement activities.

• The natural ecosystems of its flora, animals, and landscapes are preserved in national parks.

• Wildlife in India is very diverse.

• It has about 7.6% mammals, 6.2% reptiles, 12.6% birds, and 6.0% flowering plant species under the Indomalayan ecozone.

• The Shola woodlands and other ecoregions of our country exhibit high levels of endemism.

• The range of woods includes everything from coniferous forests in the Himalayan region to tropical rainforests, the Western Ghats, and Northeast India.

Additional Information

• National parks that are far from populated areas might serve as a haven for wildlife.

• Currently, India has more than 100 national parks dispersed across the country's various biomes.

• Hailey National Park is the country's first national park.

• It is one of the outstanding examples of ecological protection.

Q32. Answer: (b) the Supreme Court

The correct answer is the Supreme Court.

Key Points

• The Judiciary is permitted by the Constitution to review the legislation passed by Parliament; hence the Supreme Court serves as the guardian of the Indian Constitution.

• The Supreme Court has the authority to review and annul a law passed by the legislature if it is ultra vires certain constitutional requirements, according to Article 14 of the Constitution.

• By ruling any measure that violates fundamental rights unconstitutional, the Supreme Court also serves as the guardian of these rights.

• According to Article 32 of the Constitution, the Supreme Court may issue writs to compel adherence to fundamental rights if it discovers that they are being violated.

• These writs are of the Habeas Corpus, Mandamus, Quo Warranto, Prohibition, and Certiorari varieties.

Additional Information

• The Lok Sabha, or House of the People in official usage, is the name of the lower house of India's bicameral Parliament.

• The president of a nation generally performs the roles of the official head of state, head of the executive branch, and pivotal leader of the nation.

• According to its constitution, India's bicameral Parliament's upper chamber is referred to as the Rajya Sabha or Council of States.

Q33. Answer: (d) 6 and 36

Shortcut Trick

Check options for Present Age: Father’s age must be square of Daughter’s age.

Condition 2: (Father − 1) = 7 × (Daughter − 1).

Test Option (4): 36 = 62 (Condition 1 satisfied).

One year ago: (36 − 1) = 35 and (6 − 1) = 5. Since 35 = 7 × 5, it matches perfectly.

Therefore The correct answer is 6 and 36.

Alternate Method

Given: Daughter’s Present Age = x years | Father’s Present Age = x2 years.

1 Year Ago: Father = (x2 − 1) | Daughter = (x − 1).

=> (x2 − 1) = 7(x − 1)

=> (x − 1)(x + 1) = 7(x − 1)

=> x + 1 = 7 (Since daughter > 1 year old, x − 1 ≠ 0)

=> x = 6

=> Daughter’s age = 6 years | Father’s age = 62 = 36 years.

Therefore The correct answer is 6 and 36.

Additional Information

Quadratic Equations in Ages

When a condition involves the square of an age, use the substitution method from options to save time during exams.

Age Difference Constant

The difference between the ages of two people remains constant regardless of the number of years passed.

Ratio of Ages

If the ratio of ages is given as a:b, we assume ages to be ax and bx to form linear equations.

Q34. Answer: (d) 60

Given:

47 + {7 + [61 − (21 ÷ 3)] ÷ 9}

Concept Used:

Follow the BODMAS rule according to the table given below:

Calculation:

47 + {7 + [61 − (21 ÷ 3)] ÷ 9}

= 47 + {7 + [61 − 7] ÷ 9}

= 47 + {7 + 54 ÷ 9}

= 47 + {7 + 6}

= 47 + 13

= 60

Hence, the required value is 60.

Q35. Answer: (b) Direction of placement of the coil

The correct answer is the Direction of placement of the coil.

Key Points

• The direction of placement of the coil will not affect the polarity of the electromagnet.

• The magnetic strength of an electromagnet is determined by factors such as the number of turns of wire, the current flowing through the wire, the type of core material, and the size of the core.

• The direction of placement of the coil does not affect any of the above factors.

• Therefore, the direction of placement of the coil does not affect the magnetic strength of the electromagnet.

• The direction of placement of the coil will not affect the magnetic field generated by the electromagnet.

Additional Information

• The direction of placement of the coil refers to the orientation of the coil in relation to the surrounding environment, not the direction of the current flowing through the coil.

• The magnetic strength of an electromagnet is determined by the amount of current flowing through the coil and the number of turns in the coil, not the orientation of the coil.

• The direction of placement of the coil will not affect the strength of the magnetic field generated by the electromagnet

• The direction of placement of the coil will not affect the polarity of the electromagnet. The polarity of an electromagnet is determined by the direction of the current flowing through the coil, not the orientation of the coil.

• The direction of placement of the coil may affect the direction of the magnetic field, but it will not affect its strength

• Therefore, the direction of placement of the coil will not affect the overall performance of the electromagnet.

Q36. Answer: (a) 706

Shortcut Trick

Identify two numbers x and y such that their sum is 8 and product is 15.

The factors of 15 are 3 and 5, where 3 + 5 = 8.

Substitute x = 5 and y = 3 into the expression x^4 + y^4.

5^4 + 3^4 = 625 + 81 = 706.

Therefore The correct answer is 706.

Alternate Method

Given: x + y = 8 and xy = 15

Formula Used: $(x + y)^2 = x^2 + y^2 + 2xy$ and $(x^2 + y^2)^2 = x^4 + y^4 + 2(xy)^2$

=> $(x + y)^2 = 8^2$

=> $x^2 + y^2 + 2xy = 64$

=> $x^2 + y^2 + 2(15) = 64$

=> $x^2 + y^2 = 64 − 30 = 34$

=> $(x^2 + y^2)^2 = 34^2$

=> $x^4 + y^4 + 2(xy)^2 = 1156$

=> x^4 + y^4 + 2(15)² = 1156

=> x^4 + y^4 + 2(225) = 1156

=> x^4 + y^4 = 1156 − 450

=> x^4 + y^4 = 706

Therefore The correct answer is 706.

Additional Information

Algebraic Expansion

The square of a binomial is given by (a + b)² = a² + 2ab + b².

Sum of Fourth Powers

To find higher even powers like a^4 + b^4, use the identity (a² + b²)² − 2a²b².

Difference of Squares

The identity a² − b² = (a − b)(a + b) is helpful for simplifying quadratic expressions.

Q37. Answer: (b) 13

Given series → 7 2 9 6 3 8 3 8 7 2 3 2 7 3 2 2 1 3 3 9 9 7 4 2 9 3 0 9

Find the total numbers of 2s and 3s present in the series :

We can see that we have 6 twos & 7 threes so their addition will be:

=> 6 + 7

=> 13

Hence, the correct answer is "13".

Q38. Answer: (a) virtual and diminished

The correct answer is Virtual and Diminished.

Key Points

• When an object is between the lens's infinity and optical centre, a diminished, virtual, and upright picture is created between the focus and centre of the lens.

• A convex lens is one that has a refracting surface on the inside, while a concave lens, also known as a diverging lens, has a refracting surface on the outside.

• Concave lenses are sometimes known as diverging lenses because they diverge light beams.

• A lens is a transparent, curved surface that bends light such that it creates an image of whatever is in front of it.

Additional Information

• Positions of the object and image:

Position of the object	Position of the Image	The relative size of the image	Nature of the image
1. At infinity	At focus F1	Highly diminished, point-sized	Virtual and erect.
2. Between infinity and optical centre O of the lens	Between focus F1 and optical centre O	Diminished	Virtual and erect.

Q39. Answer: (a) Right to Property ceased to be a Fundamental Right

The correct answer is Right to Property ceased to be a Fundamental Right.

Key Points

• The right to property was no longer fundamental freedom as a result of the Constitution (Forty-Fourth Amendment) Act of 1978, but it remained one under Article 300 A of the Constitution and a human right in a welfare state.

• Only legal authorities have the power to take away someone's property, according to Article 300 A.

• The State cannot seize a citizen's property unless it follows the right legal procedures.

• Even if it isn't stated explicitly in Article 300 A, the responsibility to pay compensation is implied by that Article.

Additional Information

• Until a change was made to the Indian Constitution in 1978, the right to property was considered a fundamental right.

• Article 31 and Article 19(1)(f) of Part III of the Constitution's Fundamental Rights were totally abolished as part of this amendment, the 44^(th) to the Constitution.

• This amendment was made because the government was unable to move forward with reforms and projects involving public infrastructure because citizens began petitioning the courts to stop the purchase of private land.

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Q40. Answer: (c) Tamil Nadu

The correct answer is Tamil Nadu.

Key Points

• In Tamil Nadu, the state experiences the maximum North-East monsoon rainfall.

• The southwest monsoon is the exact opposite, known as a monsoon of summer that blows from sea to land, while the northeast monsoon is typically known as a monsoon of winter that blows from the land towards the sea.

• The North-East monsoon typically lasts from October to March, though this might vary from year to year.

• The monsoons in the northeast are known as retreating monsoons.

Additional Information

• Rainfall Regions in India

Rainfall (cm)	Regions
More than 200 cm	• Assam Hill, Southern Part of Kerala. - The Western slope of Western Ghats. - The coastal plain of Kerala, Karnataka.
Between 100 to 200 cm	• The middle valley in Bihar, Jharkhand, West Bengal and Odisha. - Part of the Western Ghat - Northern Part of Andra Pradesh - Southern part of Tamil Nadu.
Between 50 to 100 cm	• The Upper Ganga Valley & Eastern Rajasthan. - Parts of Punjab & Hariyana. - Parts of Jammu & Kashmir.
Less than 50 cm	• Western Rajasthan - Ladakh in Jammu & Kashmir

Q41. Answer: (a) Cs

The correct answer is Cs

Key Points

• Cesium (Cs), the final naturally occurring alkali metal, possesses the most incredible metallic properties.

• Alkali metals, alkaline earth metals, and transition metals all contain metallic elements.

• Metal-containing elements are said to have a metallic quality.

• Most metals have high melting and boiling temperatures, are malleable and ductile, and are hard.

• Cesium (Cs) is the most metallic naturally occurring element, while Francium (Fr) is the most metallic and radioactive.

Additional Information

• Non-metallic elements

• Non-metallic elements are those that exhibit non-metallic properties.

• Typically, their melting and boiling points are low.

• Non-metals are often poor conductors of both electricity and heat.

• The periodic table's least metallic element is Fluorine (F).

Q42. Answer: (a) 40°

Shortcut Trick

In a rhombus, diagonals bisect the vertex angles and are perpendicular to each other.

angle BCD = 2 × angle ACB = 2 × 50° = 100°.

Adjacent angles in a rhombus are supplementary: angle ADC = 180° − 100° = 80°.

The diagonal BD bisects angle ADC.

Therefore angle BDC = 80° ÷ 2 = 40°.

Therefore The correct answer is 40°.

Alternate Method

Given: ABCD is a rhombus and angle ACB = 50°.

Formula Used: Diagonals of a rhombus are perpendicular bisectors of each other. Sum of angles in a triangle is 180°.

Let the diagonals AC and BD intersect at point O.

=> In a rhombus, diagonals intersect at 90°, so angle BOC = 90°.

=> In ΔBOC, angle BOC + angle OCB + angle OBC = 180°.

=> 90° + 50° + angle OBC = 180°.

=> angle OBC = 180° − 140° = 40°.

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=> Since BC = CD (all sides of a rhombus are equal), ΔBCD is an isosceles triangle.

=> angle BDC = angle CBD = 40° (Angles opposite to equal sides are equal).

Therefore The correct answer is 40°.

Additional Information

Rhombus Diagonal Properties

The diagonals of a rhombus bisect each other at right angles (90°) and also bisect the internal angles of the vertices they connect.

Parallel Lines and Transversals

Since opposite sides of a rhombus are parallel (AD || BC), the diagonal BD acts as a transversal, making alternate interior angles equal (angle ADB = angle CBD).

Isosceles Triangles in Rhombus

Each diagonal divides the rhombus into two congruent isosceles triangles because all four sides of the rhombus are equal in length.

Q43. Answer: (c) Hockey

The correct answer is Hockey

Key Points

• Arjuna Award is India's second-highest sporting accolade which is given to sportspersons who have excelled in both National and International competitions and possess leadership qualities and a strong moral character.

• This award was given to Indian sportspersons from 1961 till now.

• The President of India honours the awards the winners with a cash prize and also a bronze statue of Arjuna.

• In 2021, according to the statistics there are 35 awardees out of which 17 of them were hockey players from India.

Additional Information

• Hockey

• Hockey refers to a family of summer and winter team sports that evolved on an open field, dry floor, or sheet of ice such as a gymnasium.

• While the specific regulations, player counts, attire, and most notably the playing field differ amongst these games, they all include two opposing teams utilising sticks to direct a ball or disc towards a goal.

• Hockey comes in a variety of forms. Skates, whether wheeled or bladed, are used in some games yet not in others. The word "hockey" is frequently followed by another word, such as " ice hockey," "roller hockey," "field hockey," "rink hockey," or "floor hockey," to assist distinguish between these different games.

Q44. Answer: (b) strong acid, weak acid

The correct answer is strong acid, weak acid.

Key Points

• The quantity of H+ ions that a substance may produce is used to determine how acidic it is. Strong acids are those that produce more H+ ions, whereas weak acids are those that produce fewer H+ ions.

• An acid that is totally ionized in an aqueous solution is referred to be a strong acid. In water, hydrogen chloride (HCl) totally ionizes into hydrogen and chloride ions.

• A weak acid is one that ionizes very little in an aqueous solution. Acetic acid is a highly popular weak acid that can be found in vinegar.

Additional Information

• Some strong and weak acids:

Strong Acids	Weak Acids
HCl - Hydrochloric acid	HO 2 C 2 O 2 H - Oxalic acid
HNO 3 - Nitric acid	H 2 SO 3- Sulfurous acid
H 2 SO 4 - Sulfuric acid	HCO 2 H - Methanoic acid
HBr - Hydrobromic acid	C 6 H 5 COOH - Benzoic acid
HI - Hydroiodic acid	CH 3 COOH - Acetic acid
HClO 4 - Perchloric acid	H COOH - Formic acid

Q45. Answer: (d) 18

Given equation → 10 ÷ 5 + 144 × 12 + 13 − 45 × 9 + 12 = ?

After '+' and '−' are interchanged and also '×' and '÷' are interchanged then, we get

→ 10 × 5 - 144 ÷ 12 - 13 + 45 ÷ 9 - 12 = ?

10 × 5 - 144 ÷ 12 - 13 + 45 ÷ 9 - 12 = ?

10 × 5 - 12 - 13 + 5 - 12 = ?

50 - 12 - 13 + 5 - 12 = ?

55 - 12 - 13 - 12 = ?

18

Hence, the correct answer is "18".

Q46. Answer: (b) South-east

From the given information:

Step 1: Gaganpreet started walking towards the north from his school. After walking for 6 metres he turned left and walked further 8 metres to reach his home.

From the diagram, we can see that the school is towards south-east of home.

Hence, the correct answer is “South-east”.

Q47. Answer: (d) B

The given word is 'EXACTLY'

The pattern followed here is:

1) Each vowel is changed to the letter following it in the English alphabetical order → Positional value of vowel +1

2) Each consonant is changed to the letter preceding it in the English alphabetical order → Positional value of Consonant - 1

We can see that the alphabet 'B' appears twice.

Hence, the correct answer is "B".

Q48. Answer: (c) x-yoverx²+xy+y²

Shortcut Trick

For two numbers a and b, the third proportional is given by the formula $b^2 \div a$.

Here, $a = (x^3 - y^3)$ and $b = (x - y)$.

Third Proportional = $(x - y)^2 \div (x^3 - y^3)$.

Using $(x^3 - y^3) = (x - y)(x^2 + xy + y^2)$, we get:

$(x - y)^2 \div [(x - y)(x^2 + xy + y^2)] = (x - y) / (x^2 + xy + y^2)$.

Therefore The correct answer is $(x-y)/(x^2+xy+y^2)$.

Alternate Method

Given: First term $a = x^3 - y^3$, Second term $b = x - y$.

Formula Used: If a, b, c are in continued proportion, then a : b = b : c, where c is the third proportional.

=> $c = b^2 / a$

=> $c = (x - y)^2 / (x^3 - y^3)$

=> $c = (x - y)(x - y) / [(x - y)(x^2 + xy + y^2)]$

=> $c = (x - y) / (x^2 + xy + y^2)$

Therefore The correct answer is $(x-y)/(x^2+xy+y^2)$.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is given by $\sqrt{(ab)}$.

Algebraic Identity

The identity for the difference of cubes is $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

Fourth Proportional

If four numbers a, b, c, d are in proportion (a:b = c:d), then d is the fourth proportional, calculated as $d = (b \times c) / a$.

Q49. Answer: (d) 7, -2

Shortcut Trick

For the equation x2 − 5x − 14 = 0, identify two numbers that multiply to −14 and add up to −5.

The factors of −14 that sum to −5 are −7 and +2.

To find the roots, simply change the signs of these factors: −7 → +7 and +2 → −2.

Therefore The correct answer is 7, -2.

Alternate Method

Given Equation: x2 − 5x − 14 = 0

Method: Factorization by Splitting the Middle Term.

=> x2 − 7x + 2x − 14 = 0

=> x(x − 7) + 2(x − 7) = 0

=> (x − 7)(x + 2) = 0

To find the roots, set each factor to zero:

=> x − 7 = 0 or x + 2 = 0

=> x = 7 or x = −2

Therefore The correct answer is 7, -2.

Additional Information

Standard Quadratic Form

A quadratic equation is expressed as ax2 + bx + c = 0, where a ≠ 0.

Sum and Product of Roots

For roots α and β, Sum (α + β) = −b/a and Product (α × β) = c/a.

Discriminant (D)

The nature of roots is determined by D = b2 − 4ac. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Quadratic Formula

Roots can also be found using x = [−b ± √(b2 − 4ac)] ÷ 2a.

Q50. Answer: (c) (32, 27, 18)

The pattern followed in the given sets is:

(First term + Third term) ÷ 2 + 2 = Second term

Now we apply the pattern on the given sets:

(20, 16, 8)

(20 + 8) ÷ 2 + 2 = 16

28 ÷ 2 + 2 = 16

14 + 2 = 16

16 = 16

(13, 20, 23)

(13 + 23) ÷ 2 + 2 = 20

36 ÷ 2 + 2 = 20

18 + 2 = 20

20 = 20

Now we apply the pattern on the given options:

Option 1) (19, 18, 21)

(19 + 21) ÷ 2 + 2 = 18

40 ÷ 2 + 2 = 18

20 + 2 = 18

22 ≠ 18

Option 2) (14, 18, 16)

(14 + 16) ÷ 2 + 2 = 18

30 ÷ 2 + 2 = 18

15 + 2 = 18

17 ≠ 18

Option 3) (32, 27, 18)

(32 + 18) ÷ 2 + 2 = 27

50 ÷ 2 + 2 = 27

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25 + 2 = 27

27 = 27

Option 4) (13, 16, 13)

(13 + 13) ÷ 2 + 2 = 16

26 ÷ 2 + 2 = 16

13 + 2 = 16

15 ≠ 16

Hence, the correct answer is “(32, 27, 18)”.

Q51. Answer: (d) 115

Shortcut Trick

Simplify the ratio of members in groups A, B, and C: 20 : 32 : 28 = 5 : 8 : 7.

Using the weighted average method with simplified ratios:

Total Average = (5 × 120 + 8 × 125 + 7 × 100) ÷ (5 + 8 + 7)

Total Average = (600 + 1000 + 700) ÷ 20 = 2300 ÷ 20 = 115.

Therefore The correct answer is Rs. 115.

Alternate Method

Given:

Members in Group A (n1) = 20, Average spent (A1) = Rs. 120

Members in Group B (n2) = 32, Average spent (A2) = Rs. 125

Members in Group C (n3) = 28, Average spent (A3) = Rs. 100

Formula Used:

Combined Average = (n1A1 + n2A2 + n3A3) ÷ (n1 + n2 + n3)

Calculations:

=> Total Members = 20 + 32 + 28 = 80

=> Total Spending = (20 × 120) + (32 × 125) + (28 × 100)

=> Total Spending = 2400 + 4000 + 2800 = Rs. 9200

=> Total Average = 9200 ÷ 80

=> Total Average = 920 ÷ 8 = 115

Therefore The correct answer is Rs. 115.

Additional Information

Weighted Average Property

The combined average of two or more groups depends on both their individual averages and the number of entities in each group. Formula: $A_{(avg)} = \Sigma(n_i A_i) \div \Sigma n_i$.

Deviation Method for Averages

You can assume a base average (e.g., 100) and calculate the net deviation. Final Average = Assumed Average + (Net Deviation ÷ Total Members).

Range of Average

The combined average will always lie between the lowest individual group average (Rs. 100) and the highest individual group average (Rs. 125).

Q52. Answer: (a) Swarajability

The correct answer is Swarajability.

Key Points

• The Indian Institute of Technology (IIT-Hyderabad) has launched the beta version of 'Swarajability,' a job portal powered by artificial intelligence that assists people with disabilities in acquiring relevant skills and finding employment.

• The platform will analyse 'the jobseekers' profiles and recommend the skills they would need to qualify.

• The new website has been designed to make it easier for citizens to access government services.

• It was formally launched by Vijay Raghavan, a principal scientific advisor to the Union Governme

Additional Information

• The project was developed in association with Youth4Jobs, Visual Quest and Kotak Mahindra Bank.

• IIT-H provides expertise in AI, Visual Quest India developed the platform, Youth4Jobs provides skilling services to job seekers and the project is funded by Kotak Mahindra Bank.

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• Kotak Mahindra Bank is a leading Indian banking and financial services company headquartered in Mumbai.
• As of November 2021, it is the third largest private sector bank in India by assets and market capitalization.
• The bank was founded by Uday Kotak in February 2003.

Q53. Answer: (c) 583

When all the 8s and 5s are replaced with 2 and 1, respectively, we get:
We can see that the lowest number is 123 which was originally 583.
Hence, the correct answer is "583".

Q54. Answer: (b) 4,00,000

Shortcut Trick
Profit Ratio = (Capital_A × Time_A) : (Capital_B × Time_B)
Given Profit Ratio = 3 : 2
A's Investment period = 12 months, B's Investment period = 12 − 3 = 9 months
3 : 2 = (4,50,000 × 12) : (Capital_B × 9)
Capital_B = (4,50,000 × 12 × 2) ÷ (3 × 9) = 4,00,000
Therefore The correct answer is Rs. 4,00,000.
Alternate Method
Given: Capital of A = Rs. 4,50,000, Time of A = 12 months, Time of B = 9 months, Profit ratio A:B = 3:2.
Formulas: Profit = Capital × Time | Capital = Profit ÷ Time.
=> Let B's capital be X.
=> Ratio of investment of A and B = (4,50,000 × 12) : (X × 9)
=> According to the question, (4,50,000 × 12) ÷ (9X) = 3 ÷ 2
=> 5,400,000 ÷ 9X = 3 ÷ 2
=> 600,000 ÷ X = 3 ÷ 2
=> 3X = 1,200,000
=> X = 4,00,000
Therefore The correct answer is Rs. 4,00,000.
Additional Information
Partnership Basics
In a partnership, the profit is divided in the ratio of the product of capital and time for which the capital was invested.
Time Calculation
If a person joins after 'n' months in a business of one year, their time period is (12 − n) months.

Q55. Answer: (a) 44%

Given:
Concept used:
Percentage = Value/(Total value)× 100
Calculation:
Increase in the smartphone sales of the company from the year 2002 to 2003
= 65 - 45
= 20
Percentage Increase = 20/45×100
= 400/9 %
= 44.44% ~ 44%
Hence, approximately 44% increase in the smartphone sales of the company from 2002 to 2003.

Q56. Answer: (b) 6√6

Given expression:
5√6 − √([3(4 − 2))] + (12/√6)
Concept used:
Follow the BODMAS rule to solve this question, as per the order given below:
Calculation:

5√6 - √([3(4 − 2))] + (12/√6)

= 5√6 - √([3(2)]) + 2√6

= 5√6 - √6 + 2√6

= 7√6 - √6

= 6√6

Hence, The Required value is 6√6.

Q57. Answer: (b) scattering

The correct answer is Scattering.

Key Points

• The method of a rainbow's production doesn't include scattering.

• The phenomena of dispersion, refraction and internal reflection are involved in the production of a rainbow.

• A rainbow is a naturally occurring spectrum that develops after a downpour of rain (each drop of water functions as a tiny prism) as a result of the dispersion, refraction, and internal reflection of many colours.

Additional Information

• Dispersion

• The breaking of the light beam into its seven individual colours when it passes through any transparent medium is known as dispersion of light.

• Sir Isaac Newton described this phenomenon in the year 1666. He found that when sunlight travels through a glass prism, white light is composed of seven distinct colours kinds.

• Scattering

• The process of electromagnetic energy being reflected off of the atoms or molecules of the medium they are travelling through is known as a scattering of light. Light scattering occurs when light is absorbed by the medium's molecules, which then reradiates the light in various directions.

• Refraction

• The phenomenon of light bending and moving from one transparent substance to another is known as the refraction of light.

• Total internal reflection

• Total refraction of a light ray from the surrounding surfaces back into a medium like glass or water. If the incidence angle exceeds a specific limitation angle known as the critical angle, the phenomenon will manifest.

Q58. Answer: (b) Only conclusion I and II are true

Statements:

1. Some students are males.

2. Some males are sincere.

3. All sincere are honest.

Venn diagram:

Conclusions:

I. Some honest are males→ Follow (We have 'some males are sincere' and 'all sincere are honest' which indirectly implies that some males are honest and vice versa & the same can be seen in the Venn diagram therefore the conclusion follows.)

II. All males are students is a possibility→ Follow (As some 'students are males' we can say that there is a possibility of 'All males can be students')

III. Some sincere are not students→ Does not follow (It's possible but not definite)

Hence the correct answer is "only conclusions I and II follow".

Q59. Answer: (d) provide mental support to children affected by Covid-19

The correct answer is to provide mental support to children affected by Covid-19.

Key Points

• The National Commission for Protection of Child Rights (NCPCR) has launched a toll-free helpline called SAMVEDNA.

• To provide psychological first aid and emotional support to children affected by the COVID-19 pandemic.

• The helpline is trained by Dr Shekhar Seshadri and his team from NIMHANS.

• The service is offered seven days a week from 10 a.m. to 1 p.m. and 3 p.m. to 8 p.m. at the toll-free number 1800-121-2830.

• The service is provided to children in three categories: those in quarantine, and isolation, children with COVID-positive parents, and children who have lost their parents due to the pandemic.

• The service is available in various regional languages such as Tamil, Telugu, Kannada, Oriya, Marathi, Gujarati, Bengali, etc.

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Additional Information

• The service was launched in September 2020 and continues to support children during the difficult times of the COVID-19 pandemic.

• Children need counselling now more than ever before.

• The Child helpline provides a much-needed service for children who are struggling with the effects of the pandemic.

• It gives them a place to voice their fears and concerns and receive support from trained counsellors.

• The service is available in multiple languages, making it accessible to children from all over India.

• The helpline has already helped countless kids through this tough time and will continue to do so as long as the pandemic continues.

Q60. Answer: (c) 20.3%

The correct answer is "20.3%".

Key Points

• According to the Union Budget 2022, 18.2% of India's population is currently living in urban areas, making the country's overall workforce participation rate 20.3%.

• In 2022, there will be more women employed (51.44%), compared to 41.25% in 2021.

• India has one of the lowest rates of female labour force participation in the world, with fewer than one-third of the population being female, according to the World Bank.

• It also points out that India's female labour force participation rate, which was over 26% in 2005 but fell to 19% in 2020, was lower than that of Bangladesh (35%) and Sri Lanka (31%), two other nations.

Additional Information

• The issue grew worse as more urban women lost their jobs or left their occupations during the period due to the Covid-19 pandemic.

• It hit a record-low 15.5% in the first quarter of the lockdown, from April to June.

• The Periodic Labour Force Survey (PLFS) conducted by the Ministry of Statistics and Programme Implementation found that female labour force participation had somewhat grown over the years prior to the pandemic's arrival in our country and stood at 22.8% in FY20.

• According to Deloitte India, more than 65% of women wanted to leave their employment both during the pandemic and a year later.

Q61. Answer: (d) 4.0 cm

The correct answer is option 4) 4.0 cm.

Given:

Radius of curvature, R=8cm

Formula used:

For a mirror, we have: f=R/2

where f is the focal length i.e. the distance from the principal focus to the mirror pole.

Calculations:

As, R=8cm we have:

f=R/2=8/2=4cm

Therefore, the principal focus is at a distance of 4cm from the pole.

Q62. Answer: (a) Statement II is correct, Statement I is incorrect.

The correct answer is Statement II is correct, Statement I is incorrect.

Key Points

• Modern periodic table is an arranged format of the elements according to the increasing order of their atomic numbers.

• At present, the modern periodic table has 118 elements.

• Groups in the periodic table are the vertical columns in the periodic table which has a total of 18 groups.

• Periods in the periodic table are the horizontal rows in the periodic table which has a total of 7 periods.

• Groups signifies the outer electronic configuration and periods signifies the addition of shells.

Thus, here in the given two statements, Statement II is correct, Statement I is incorrect.

Additional Information

• Modern periodic table was introduced by IUPAC, after the announcement of modern periodic law by Moseley.

• Moseley's modern periodic law states that, "The physical and chemical properties of elements are periodic functions of their

atomic number".

Q63. Answer: (b) 73^(rd) and 74^(th)

The correct answer is 73rd and 74th.

Key Points

• Amendments to the Constitution

• There are three kinds of amendments to the Indian Constitution that are mentioned in Article 368. There are three types of amendments: those approved by a special majority of the Parliament (Lok Sabha and Rajya Sabha), and those approved by a special majority of the Parliament and ratified by half of the states.

• The following is a list of the various kinds of amendments. The Constitution is able to be changed in three ways:

1. Amendment by a simple majority of the Parliament: Outside of the scope of Article 368, a simple majority of the two houses of Parliament is required to amend a number of Constitutional provisions. Among these provisions are:

• new states' admission or establishment

• alterations to existing states' areas, borders, and names as well as the creation of new states.

• state legislative councils being abolished or created.

• Second Schedule: the president, governors, Speakers, judges, and other high-ranking officials' perks and allowances.

• In Parliament, quorum.

• allowances and salaries for Parliamentary members.

2. Amendment by a special majority of the Parliament

• A special majority of Parliament—that is, a majority of more than 50% of the total members of each House and a majority of two-thirds of the members of each House who are present and voting—is required to amend the majority of the Constitution's provisions. The term "total membership" refers to the total number of House members, regardless of whether there are vacancies or absentees.

• The following are some of the provisions that can be altered in this manner: (i) Fundamental Rights; ii) State Policy Directive Principles; and (iii) any additional regulations that fall outside of the first and third categories.

3. Amendment by a special majority of the Parliament and the ratification of at least half of the state legislatures: Amendments to the Constitution that pertain to the federal structure of the polity can be made by a special majority of Parliament and a simple majority of half of the state legislatures, respectively, with the consent of the other half. This modification is possible for the following provisions:

• The manner of the President's election.

• The extent of the states' and Union's executive authority.

• High courts and the Supreme Court.

• Legislative authority distribution between the Union and the states.

• any of the Seventh Schedule's lists.

Additional Information

• Constitutional Amendment Process

• In order to initiate a constitutional amendment, a bill must be introduced in either House of Parliament (Lok Sabha or Rajya Sabha), not in the state legislatures.

• The bill does not require the president's prior approval to be introduced by a minister or private member.

• A special majority—that is, a majority of more than 50% of the House's total members and a majority of two-thirds of the House's present and voting members—is required for the bill to be approved in each House. The bill must be passed separately by each House.

• There is no provision for holding a joint session of the two Houses for the purpose of deliberation and bill passage in the event of disagreement.

• A simple majority, or a majority of the House members present and voting, is required for the bill to be ratified by the legislatures of half of the states if it aims to amend federal Constitutional provisions.

• The bill is presented to the president for approval after being approved by both Houses of Parliament and ratified, if necessary, by state legislatures.

• The bill needs the president's approval. After receiving the president's assent, the bill becomes an Act—also known as a constitutional amendment act—and the Constitution is amended in accordance with the terms of the Act. He cannot withhold his assent or return the bill to Parliament for reconsideration.

Q64. Answer: (c) 136

Shortcut Trick

Total days in March = 31. Saturdays = 5 (3, 10, 17, 24, 31), Sundays = 4, Weekdays = 22.

Net deviation from month average (130):

Weekdays (22 days): 22 × (125 − 130) = −110

Sundays (4 days): 4 × (150 − 130) = +80

Required deviation for 5 Saturdays = −(−110 + 80) = +30

Average Saturday sale = 130 + (30 ÷ 5) = 136.

Therefore The correct answer is 136.

Alternate Method

Given:

Total days in March = 31

Month Average Sale = 130

Weekdays (excluding Sat/Sun) Average = 125

Sundays Average = 150

Formula Used:

Total Sale = Average Sale × Number of Days

Calculations:

=> Total sales for the month = 31 × 130 = 4030

=> Number of Saturdays (3^(rd), 10^(th), 17^(th), 24^(th), 31^(st)) = 5

=> Number of Sundays (4^(th), 11^(th), 18^(th), 25^(th)) = 4

=> Number of Weekdays = 31 − (5 + 4) = 22

=> Total sales (Weekdays) = 22 × 125 = 2750

=> Total sales (Sundays) = 4 × 150 = 600

=> Total sales (Saturdays) = 4030 − (2750 + 600)

=> Total sales (Saturdays) = 4030 − 3350 = 680

=> Average sale (Saturdays) = 680 ÷ 5 = 136

Therefore The correct answer is 136.

Additional Information

Weighted Average Formula

Weighted Average = (n1x1 + n2x2 + n3x3) ÷ (n1 + n2 + n3), where n is the number of items and x is the average.

Number of Days in a Month

Any day of the week that falls on the 1^(st), 2^(nd), or 3^(rd) of a 31-day month appears 5 times.

Deviation Method

Sum of deviations of all observations from the mean is always zero (∑(x_i − Mean) = 0).

Q65. Answer: (b) CuSO4(aq) + H2S(g) → CuS(s) + H2SO4(aq)

The correct answer is CuSO 4 (aq) + H 2 S(g) → CuS(s) + H 2 SO 4 (aq).

Key Points

• A sort of chemical reaction known as double displacement occurs when two compounds interact and the positive ions (cations) and the negative ions (anion) of the two reactants transfer positions, creating two new compounds or products.

• CuSO 4(aq) + H2 S(g) → CuS(s) + H 2 SO 4 (aq)

• Two atoms are displaced in the process that is described. In order to create new compounds, H (hydrogen) and Cu (Copper) are displaced.

Additional Information

• Displacement Reaction

• When one reactant is partially replaced by another, this is referred to as a displacement reaction. Displacement reactions and replacement reactions can both be used interchangeably. There are two types of displacement reactions:

• Single Displacement Reaction: A chemical reaction in which a more reactive ingredient replaces a less reactive element is known as a single displacement reaction.

• Zn(s) + 2HCl(aq) → ZnCl 2 (aq) + H 2 (g)

• Because zinc is more reactive than hydrogen, there was just one displacement in this instance.

• Double Displacement Reaction: A double displacement reaction is an exchange of two ionic species between two molecules in a chemical reaction.

• BaCl 2 (aq) + Na 2 SO 4 (aq) → BaSO 4 (s) + 2NaCl(aq)

• A white barium sulphate precipitate occurs quickly when sodium sulphate and a barium chloride solution are mixed together.

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Q66. Answer: (d) 1536 cm²

Shortcut Trick

Diagonal of a cube = side × √3

Given 16√3 = side × √3 => side = 16 cm

Total Surface Area = 6 × (side)² = 6 × 16²

Total Surface Area = 6 × 256 = 1536 cm²

Therefore The correct answer is 1536 cm².

Alternate Method

Given:

Length of Main Diagonal (d) = 16√3 cm

Formula Used:

1. Diagonal of cube = a√3 (where a is the side)

2. Total Surface Area (TSA) = 6a²

Calculations:

=> a√3 = 16√3

=> a = 16 cm

=> TSA = 6 × (16)²

=> TSA = 6 × 256

=> TSA = 1536 cm²

Therefore The correct answer is 1536 cm².

Additional Information

Cube Volume

The volume of a cube is calculated by the formula V = a³, where 'a' is the edge length.

Lateral Surface Area

The lateral surface area (area of 4 walls) of a cube is 4a².

Face Diagonal

The diagonal of any single face of a cube is given by a√2.

Q67. Answer: (c) −1

Shortcut Trick

Identify complementary angles: 54° + 36° = 90° and 40° + 50° = 90°.

Use identities: sin²θ + sin²(90°−θ) = 1 and tan²θ − sec²θ = −1.

The numerator becomes sin²54° + cos²54° = 1.

The denominator becomes tan²40° − sec²40° = −1.

Final calculation: 1 ÷ (−1) = −1.

Therefore The correct answer is −1.

Alternate Method

Given: expression = (sin²54° + sin²36°) ÷ (tan²40° − cosec²50°)

Formula Used: sin(90°−θ) = cosθ | cosec(90°−θ) = secθ | sin²θ + cos²θ = 1 | sec²θ − tan²θ = 1

=> Numerator = sin²54° + sin²(90° − 54°)

=> Numerator = sin²54° + cos²54° = 1

=> Denominator = tan²40° − cosec²(90° − 40°)

=> Denominator = tan²40° − sec²40°

=> Denominator = −(sec²40° − tan²40°) = −1

=> Expression = 1 ÷ (−1) = −1

Therefore The correct answer is −1.

Additional Information

Complementary Angle Relations

Trigonometric ratios of complementary angles satisfy sinθ = cos(90°−θ), tanθ = cot(90°−θ), and secθ = cosec(90°−θ).

Pythagorean Identities

Key identities include sin²θ + cos²θ = 1, 1 + tan²θ = sec²θ, and 1 + cot²θ = cosec²θ.

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Q68. Answer: (c) 15 days

Shortcut Trick

Efficiency Ratio (Skilled : Unskilled) = 2 : 1 (since unskilled takes twice the time).

Total Efficiency = (12 × 1) + (14 × 2) = 12 + 28 = 40 units/day.

Total Work = Total Efficiency × Days = 40 × 9 = 360 units.

Efficiency of 12 skilled workers = 12 × 2 = 24 units/day.

Required Days = 360 ÷ 24 = 15 days.

Therefore The correct answer is 15 days.

Alternate Method

Given: 12 unskilled and 14 skilled workers finish work in 9 days. Efficiency of 1 unskilled = 1/2 of 1 skilled.

Formula Used: Total Work = (Efficiency × Number of Persons) × Time

Person Type	Efficiency (e)	Total Work (W)	Combined Efficiency
Skilled	2 units/day	40 × 9 = 360	14 × 2 = 28
Unskilled	1 unit/day	12 × 1 = 12	

=> Total efficiency of group = 28 + 12 = 40 units/day

=> Total work = 40 × 9 = 360 units

=> Efficiency of 12 skilled workers = 12 × 2 = 24 units/day

=> Time taken = 360 ÷ 24 = 15 days

Therefore The correct answer is 15 days.

Additional Information

Work-Efficiency Relation

Efficiency is inversely proportional to the time taken. If person A is twice as fast as B, A takes half the time B takes.

Man-Days Formula

M1D1E1 = M2D2E2, where M is number of workers, D is days, and E is individual efficiency.

Work and Wages

Wages are always distributed in the ratio of the work done, which is equivalent to the ratio of efficiencies if time is constant.

Q69. Answer: (b) Q

From the given information:

There are Six Friends P, Q, R, S, T and U, each has a different height.

1) T is taller than only two other friends. R is shorter than only one friend.

_ > R > _ > T > _ > _.

2) P is shorter than T but taller than S.

_ > R > _ > T > P > S

3) Q is shorter than U.

U > R > Q > T > P > S.

From the arrangement we can see that Q is the third tallest among all the friends.

Hence, the correct answer is "Q".

Q70. Answer: (d) √29

Shortcut Trick

If x^4 + 1/x^4 = k, then $x^2 + 1/x^2 = \sqrt{(k + 2)}$.

Given the value k = 27.

Applying the trick: $x^2 + 1/x^2 = \sqrt{(27 + 2)} = \sqrt{29}$.

Therefore The correct answer is √29.

Alternate Method

Given:

x^4 + 1/x^4 = 27

Formula Used:

Algebraic identity: $(a + b)^2 = a^2 + b^2 + 2ab$

Calculations:

=> Let a = x^2 and b = $1/x^2$.

=> $(x^2 + 1/x^2)^2 = (x^2)^2 + (1/x^2)^2 + 2 \times x^2 \times (1/x^2)$

=> $(x^2 + 1/x^2)^2 = x^4 + 1/x^4 + 2$

=> Substitute 27 for ($x^4 + 1/x^4$):

=> $(x^2 + 1/x^2)^2 = 27 + 2$

=> $(x^2 + 1/x^2)^2 = 29$

=> Taking square root on both sides: $x^2 + 1/x^2 = \sqrt{29}$

Therefore The correct answer is $\sqrt{29}$.

Additional Information

Standard Algebraic Identities

$(x + 1/x)^2 = x^2 + 1/x^2 + 2$ and $(x - 1/x)^2 = x^2 + 1/x^2 - 2$.

Higher Power Conversion

If $x + 1/x = a$, then $x^2 + 1/x^2 = a^2 - 2$ and $x^3 + 1/x^3 = a^3 - 3a$.

Reverse Square Root Rule

To find $x + 1/x$ from $x^2 + 1/x^2 = k$, the value is always $\sqrt{(k + 2)}$.

Q71. Answer: (c) Both (a) and (b)

The correct answer is Both (a) and (b).

Key Points

• When a current-carrying conductor is placed in a magnetic field, this rule is used to identify the direction of the force that is induced in the conductor.

• The magnetic field and the current's directions are opposed by the force that is induced in the conductor.

• The split ring acts as the commutator in an electric motor. After each half-rotation of the coil, the commutator changes the direction of the current flowing through the coil.

• The coil keeps turning in the same direction as a result of this current reversal.

Additional Information

• Electric motor

• An electromechanical device known as an electric motor transforms electrical energy into mechanical energy.

• In other words, a motor is a device that generates rotational force.

• The interaction of the magnetic and electric fields is fundamental to how an electric motor operates.

• Electric motors can be divided into two primary categories:

• Both AC and DC motors fall under this category.

• While a DC motor uses direct current as its input, an AC motor uses alternating current.

Q72. Answer: (d) White

Given → Eight coloured boxes are kept in an almirah having eight shelves.

Step 1) There are only two boxes kept above the blue box. Six boxes are kept below the green box.

8	
7	Green
6	Blue
5	
4	
3	
2	
1	

Step 2) The brown box is kept between the black and the blue box.

8	
7	Green
6	Blue

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5	Brown
4	Black
3	
2	
1	

Step 3) The yellow box is kept just above the white box and is somewhere below the red box.

8	**Red**
7	Green
6	Blue
5	Brown
4	Black
3	
2	Yellow
1	White

Step 4) The orange box is kept on an odd numbered shelf.

8	**Red**
7	Green
6	Blue
5	Brown
4	Black
3	Orange
2	Yellow
1	White

We can place Orange at 1, but it is not present in the given options which means it cannot be the correct answer.
So from the table we can see that white box is at the lowermost shelf.
Hence, the correct answer is Option.

Q73. Answer: (a) A

Given → Six friends, A, B, C, D, E and F, each of different height.
1) B is taller than D but shorter than E.
• E > B > D
2) E is shorter than A and F.
• A, F > E > B > D
3) A is taller than F
• A > F > E > B >
4) D and E are shorter than C and A, respectively
• D < C ; E < A
Since, no relation is given between the length of B and C, so on combining the statements we get:-
Case 1 → A > F > E > B > C > D
Case 2 → A > F > E > C > B > D
In both the cases, A is the tallest among the six friends.
Hence the correct answer is "A".

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Q74. Answer: (b) Kerala

The correct answer is Kerala.

Key Points

• Carbon-neutral farming methods in Kerala

• In some areas, the state will implement carbon-neutral farming methods, for which the government has allocated 6 crores in the budget for 2022-23.

• 13 farms will use carbon-neutral farming in the first phase, and efforts are being made to make the State Seed Farm in Aluva a carbon-neutral farm.

• Model carbon-neutral farms will be built in each of the 140 Assembly constituencies during the second phase.

Additional Information

• Importance of Carbon-Neutral Farming Methods

• Agriculture that doesn't use carbon is becoming more and more important to keep the environment in balance, improve people's health, and provide safe food for future generations.

• As the recent unpredictability of heavy rain and flooding indicate, Kerala is experiencing the effects of climate change and global warming.

• The state must implement new and creative agricultural methods in this circumstance.

• Agriculture that is carbon neutral would help the soil store carbon and reduce carbon emissions.

Q75. Answer: (b) Small Satellite Launch Vehicle

The correct answer is Small Satellite Launch Vehicle.

Key Points

• Small Satellite Launch Vehicle

• ISRO developed the Small Satellite Launch Vehicle (SSLV), a small-lift launch vehicle that can support multiple orbital drop-offs and can deliver payloads of 500 kg (1,100 Lb) to low Earth orbit (500 km (310 mi)) or 300 kg (660 lb) to Sun-synchronous orbit (500 km (310 mi) for the launch of small satellites.

• With launch-on-demand flexibility and minimal infrastructure requirements, SSLV is developed with low cost and quick turnaround in mind.

• The SSLV was developed with the intention of commercially launching small satellites at a significantly lower cost and with a higher launch rate than the Polar Satellite Launch Vehicle (PSLV).

• While a small team of about six people would oversee SSLV launch operations, a PSLV launch involves 600 officials.

Additional Information

• Systematic Satellite Launch Vehicle

• The Indian Space Research Organization started the small The SLV was designed to carry a payload of 40 kg (88 lb) and travel 400 kilometres (250 miles) in height. In August 1979, SLV-3's first experimental flight was a failure. On July 18, 1980, the first successful launch took place.

• Synchronized Satellite Launch Vehicle

• The Indian Space Research Organization (ISRO) designed, developed, and operates the Geosynchronous Satellite Launch Vehicle (GSLV), an expendable space launch vehicle for launching satellites and other space objects into geosynchronous transfer orbits. GSLV stands 49.13 meters tall, making it the tallest ISRO vehicle.

• It is a vehicle with three stages and a lift-off mass of 420 Tonnes.

• Polar Satellite Launch Vehicle

• The Indian Space Research Organization (ISRO) created and operates the reusable medium-lift launch vehicle known as the Polar Satellite Launch Vehicle (PSLV).

• It was designed to make it possible for India to launch its Indian Remote Sensing (IRS) satellites into sun-synchronous orbits, a service that was only commercially available from Russia prior to the PSLV's introduction in 1993.

• Additionally, PSLV is capable of sending small satellites into Geostationary Transfer Orbit (GTO).

Q76. Answer: (d) Rs. 175

Shortcut Trick

Discount of 30% means Selling Price is 70% of Marked Price.

SP = MP × (100 − Discount%) ÷ 100

SP = 250 × 70 ÷ 100

SP = 25 × 7 = 175

Therefore The correct answer is Rs. 175.

Alternate Method

Given → Marked Price (MP) = Rs. 250, Discount Percentage = 30%.

Formulas: Discount Value = (Discount% ÷ 100) × MP | Selling Price (SP) = MP − Discount Value.

→ Discount Value = (30 ÷ 100) × 250

→ Discount Value = 3 × 25 = Rs. 75

→ Selling Price = 250 − 75 = Rs. 175

Therefore The correct answer is Rs. 175.

Additional Information

Marked Price & Discount

The Marked Price (MP) is the price listed by the seller. Discount is always calculated on the MP.

Selling Price formula

SP = MP × (1 − d/100), where d is the discount rate in percentage.

Q77. Answer: (c) Bethlehem

The correct answer is Bethlehem.

Key Points

• Bethlehem

• Bethlehem is a city in Palestine's West Bank. It is about 6.2 miles (or 10 km) south of Jerusalem.

• It is home to approximately 25,000 people and serves as the Bethlehem Governorate's capital.

• The city's economy is largely dependent on tourism; Around Christmas, when Christians make a pilgrimage to the Church of the Nativity, which is regarded as the site of Jesus' Nativity, international tourism peaks.

• Rachel's Tomb, the burial ground of the biblical matriarch Rachel, can be found at the city's northern entrance. The Israeli West Bank barrier restricts movement throughout the city.

Additional Information

• Galilee

• Between northern Israel and southern Lebanon is the region known as Galilee. The mountainous region of Upper and Lower Galilee is traditionally referred to as Galilee.

• The term "Galilee" refers to the entire region to the south of the Litani River's east-west section and north of the Mount Carmel-Mount Gilboa ridge.

• It stretches from Acre in the west to the Jordan Rift Valley in the east, joining the shores of the Mediterranean Sea and the Israeli coastal plain. and from the Litani to Dan at the base of Mount Hermon in the northeast, Mount Carmel, and Mount Gilboa in the south, as well as a portion bordering the Golan Heights in the north.

• Haifa

• With a population of 285,316 in 2019, Haifa is Israel's third-largest city, behind Tel Aviv and Jerusalem. The Haifa metropolitan area, which is Israel's third-most populous, includes the city of Haifa.

• It is the location of the Bahá World Centre, a UNESCO World Heritage Site, and a place where Bahá people go on pilgrimages.

• Nazareth

• The largest city in Israel's Northern District is Nazareth. Nazareth is referred to as "Israel's Arab capital."

• It had 77,445 people living there in 2019. The majority of residents are Israeli Arab citizens, with 30.9% Christian and 69% Muslim.

Q78. Answer: (a) DSP61

The logic followed here is :

Hence, the correct answer is "DSP61".

Q79. Answer: (b) Fruit-jam

As per the given information:

Step 1: The box with toffees is kept at one end.

Step 2: There are three boxes kept between the box with toffees and the box with chocolates.

Step 3: Cookies and pancakes boxes are kept with the ice cream box.

Step 4: The box with ice cream is not kept with the toffee box or the fruit jam box.

From the arrangement we can see that, fruit jam will be placed at the other end.

Hence the correct answer is Option 2.

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Q80. Answer: (d) W

As per the information given in the question, Five friends V, W, X, Y, and Z are sitting around the circular table facing centre as below:

Step 1: V is sitting to the immediate left of W.

Step 2: X is an immediate neighbour of both Z and W.

Step 3: Y is sitting second to the left of W

In the above arrangement, W sits to the immediate left of X.

Hence, the correct answer is 'W'.

Q81. Answer: (d) Ministry of Civil Aviation

The correct answer is Ministry of Civil Aviation.

Key Points

• National Air Sports Policy (NASP)

• The government of India intends to promote the air sports industry in India by investing in technology and infrastructure, focusing on quality and safety, simplifying processes and systems, training, and raising awareness, as outlined in the draft National Air Sports Policy (NASP) 2022.

• The NASP's primary goal is to increase air sports' safety, affordability, accessibility, sustainability, and enjoyment in India.

• By 2030, the Indian government intends to make India a leading air sports nation.

• It will cover paragliding, aerobatics, aeromodelling, ballooning, drones, gliding, hang gliding, skydiving, microlighting, paramotoring, and vintage aircraft, as well as amateur-built and experimental aircraft.

Additional Information

• Features of National Air Sports Policy (NASP)

• A governance structure with two levels: The Air Sports Federation of India (AFSI) and the associations for each air sport will be part of this.

• Role of AFSI: It will be the summit overseeing body. It will represent India at international air sports events like the Fédération Aéronautique Internationale (FAI).

• Associations for each air sport: The day-to-day operations will be handled by these organizations, such as the Paragliding Association of India or the Skydiving Association of India, among others.

• The FAI's guidelines will be followed at all air sports competitions in India.

• The NASP 2022 places an emphasis on ensuring international best practices in safety because air sports involve a higher level of risk than flying a regular aircraft.

Q82. Answer: (b) (22, 19, 16)

Logic: The difference between the first and Second numbers = the difference between the second and third numbers (Subtracting the smaller number from the greater number)

(13, 9, 5) → 13 - 9 = 4 and 9 - 5 = 4

And,

(14, 11, 8) → 14 - 11 = 3 and 11 - 8 = 3

Similarly,

Option 1: (22, 32, 24) → 32 - 22 = 10 and 32 - 24 = 8 => 10 ≠ 8

Option 2: (22, 19, 16) → 22 - 19 = 3 and 19 - 16 = 3 => 3 = 3.

Option 3: (18, 26, 36) → 26 - 18 = 8 and 36 - 26 = 10 => 8 ≠ 10.

Option 4: (4, 10, 12) → 10 - 4 = 6 and 12 - 10 = 2 => 4 ≠ 2.

Thus, only the second option follows the logic

Hence, the correct answer is "(22, 19, 16)".

Q83. Answer: (c) 60 years

The solution is in Hindi. Read it online.

Q84. Answer: (a) C4H10

The correct answer is C4H10.

Key Points:

• The hydrocarbon butane (C4H10) is non-polar.

• Due to the negligible difference in electronegativity between the bonds connecting carbon and hydrogen, the molecule as a whole lacks a dipole moment.

• Purely non-polar compounds show dispersion forces, which become stronger with increasing molar mass.

• These forces are based on electron orbits, which momentarily produce positive and negative ends, or dipoles, in the molecule.

• More electrons will be present in a molecule with a greater molar mass, which will result in stronger dispersion forces since the temporary dipoles will be more pronounced.

• Because butane has stronger dispersion forces and needs more heat energy to overcome them, it has a higher melting and boiling point.

Additional Information:

• A collection of chemicals known as a homologous series differ only in the length of the carbon chain but have the same general formula.

• There is often a shared set of functional groups among molecules in a homologous series, leading to identical chemical and physical properties.

• Alkane homologous series like CH4, C2H6, C3H8, etc. are an example.

• They diverge from one another in terms of -CH2 units.

Q85. Answer: (a) Reducing agent

The correct answer is Reducing agent.

Key Points:

• Bleaching powder has a distinct chlorine odor and is a light yellowish powder.

• Although it is soluble in water, there are always impurities present, therefore a clear solution is never seen.

• Its scientific name is Calcium hypochlorite, and its chemical formula is Ca(OCl2).

• It is employed in the textile sector as a bleaching agent for cotton and linen as well as for the laundry's use in bleaching soiled clothing.

• Due to its potent oxidizing properties, it is employed as an oxidizer in numerous industries.

• Bleaching powder cannot be used as a reducing agent because it is an oxidizing agent.

Additional Information:

• A chemical species known as a reducing agent in chemistry is one that "donates" an electron to an electron recipient (also known as a reductant, reducer, or electron donor).

• Earth metals, formic acid, oxalic acid, and sulfite compounds are a few examples of chemicals that are frequently used as reducing agents.

• In their pre-reaction states, oxidizers lack electrons while reducers do (that is, they are by themselves oxidized).

• Their oxidation states are a typical way to communicate this.

Q86. Answer: (b) Vallabhbhai Patel

The correct answer is Vallabhbhai Patel.

Key Points

• Vallabhbhai Patel

• Vallabhbhai Jhaverbhai Patel, more commonly referred to as Sardar Patel, was an Indian lawyer, influential political leader, barrister, and statesman who was the first Deputy Prime Minister and Home Minister of India from 1947 to 1950. He was born on October 31, 1875, and passed away on December 15, 1950.

• He was a senior leader of the Indian National Congress and a barrister. He was a key player in the country's struggle for independence and helped the country integrate into an independent nation.

• He was referred to as Sardar, which in Hindi, Urdu, Bengali, and Persian means "chief," both in India and elsewhere. During the 1947 Indo-Pakistani War and India's political integration, he served as Home Minister.

Additional Information

• Jawaharlal Nehru

• Indian anti-colonial nationalist, secular humanist, social democrat, democratic socialist statesman, and author Jawaharlal Nehru was born in November 1889 and died on May 27, 1964. He was a key figure in India during the middle of the 20th century.

• In the 1930s and 1940s, the Indian nationalist movement was led by Nehru. He was India's prime minister for 16 years after the country gained independence in 1947.

• Jawaharlal Nehru was educated in England at Harrow School and Trinity College, Cambridge, and trained in law at the Inner Temple. He was the son of Motilal Nehru, a prominent lawyer and Indian nationalist.

• Vithalbhai Patel

• Vithalbhai Jhaverbhai Patel was the third of five Patel brothers. He was born in the Indian state of Gujarat and raised in the village of Karamsad. He was two years older than Vallabhbhai Patel.

• Gordhanbhai Patel claims that Vithalbhai's birthdate has been altered in numerous contemporary accounts. On his last passport,

his birthdate is clearly written as 27 September 1873; however, obituary notices after his death incorrectly listed it as 18 February 1871, causing confusion.

• Ram Manohar Lohia

• Ram Manohar Lohia was a socialist political leader and activist for Indian independence. He was born on March 23, 1910, and died on October 12, 1967.

• He worked for Congress Radio, which broadcast secretly from various locations in Bombay until 1942, during the final period of British rule in India.

Q87. Answer: (d) 5^(th)

From the given information:

1) Every Day Raman has to go three floors down to drop his son at school which is nearby.

→ We will place Raman on the 4^(th)floor which satisfies the condition that he goes down 3 floors to drop his son.

8	
7	
6	
5	
4	Raman
3	
2	
1	

2) Rakesh's house is just above Raman's floor.

8	
7	
6	
5	Rakesh
4	Raman
3	
2	
1	

From the arrangement, we can see that Rakesh lives on the 5^(th) floor.

Hence, the correct answer is " 5^(th ".)

Q88. Answer: (d) 33 1over3 % profit

Shortcut Trick

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

CP : MP = (100 − 25) : (100 + 25) = 75 : 125 = 3 : 5

Given MP = Rs. 100 => 5 units = 100 => 1 unit = 20 Therefore CP = 3 × 20 = Rs. 60

New SP = MP − 20 = 100 − 20 = Rs. 80

Profit% = [(80 − 60) ÷ 60] × 100 = 1/3 × 100 = 33 ¹/3%

Therefore The correct answer is 33 ¹/3% profit.

Alternate Method

Given:

Marked Price (MP) = Rs. 100

Discount = 25%

Profit = 25%

New Selling Price = MP − Rs. 20

Formula Used:

SP = MP × (100 − D%)/100
CP = SP × 100 / (100 + P%)
Profit% = [(SP − CP) / CP] × 100
CP (60)
SP1 (75)
SP2 (80)
MP (100)
25% Discount
25% Profit
− Rs. 20 Case
Calculations:
=> Initial SP = 100 − (25% of 100) = Rs. 75
=> CP = 75 × (100 / 125) = 75 × (4 / 5)
=> CP = 15 × 4 = Rs. 60
=> New SP = 100 − 20 = Rs. 80
=> New Profit = New SP − CP = 80 − 60 = Rs. 20
=> New Profit% = (20 / 60) × 100 = (1 / 3) × 100
=> New Profit% = 33 ¹/3%
Therefore The correct answer is 33 ¹/3% profit.
Additional Information
CP, MP, Profit and Discount Relation
The ratio of Cost Price to Marked Price is given by CP/MP = (100 − D%) / (100 + P%).
Marked Price (MP)
MP = CP + Markup. It is the price printed on the label before any discount is applied.
Successive Discounts
If two successive discounts of x% and y% are given, the equivalent single discount = [x + y − (xy / 100)]%.

Q89. Answer: (d) Style

The correct answer is Style.
Key Points
• The male reproductive organ of a flower is called an androecium.
• It is made up of stamens.
• Pollen grains include stamen, which aids in the development of male gametes.
• In terminal sac-like structures called anthers, stamens produce pollen.
• The anther is made up of four microsporangia, which resembles the little sacs and produce pollen for pollination.
• Typically, stamens have a long, slender stalk, filament, and anthers at the terminal.
Additional Information:
• The female reproductive system of a flowering plant contains the component of style.
• It produces the gynoecium, or pistil, the female reproductive organ of the flower, along with the stigma and ovary.
• The style is the stalk that connects stigma with ovary.
• The pollen grains arrive at the stigma first during pollination, where they start to germinate.
• Under the direction of the secretions from the stigma, the pollen then forms a tube through the style called a pollen tube that ultimately travels to the ovary.

Q90. Answer: (c) 22 1over2 km/h

Shortcut Trick
When the distance for both ways is equal, use the Harmonic Mean formula for Average Speed.
Average Speed = (2 × s1 × s2) ÷ (s1 + s2)
Average Speed = (2 × 18 × 30) ÷ (18 + 30) = (1080) ÷ 48 = 22.5 km/h.
22.5 km/h = 22 1/2 km/h.
Therefore The correct answer is 22 1/2 km/h.
Alternate Method

Given: Speed from A to B (s1) = 18 km/h, Speed from B to A (s2) = 30 km/h.

Formula Used: Average Speed = Total Distance ÷ Total Time

=> Let the distance between A and B be the LCM of 18 and 30 = 90 km.

=> Time taken from A to B (t1) = Distance ÷ Speed = 90 ÷ 18 = 5 hours.

=> Time taken from B to A (t2) = Distance ÷ Speed = 90 ÷ 30 = 3 hours.

=> Total Distance = 90 + 90 = 180 km.

=> Total Time = 5 + 3 = 8 hours.

=> Average Speed = 180 ÷ 8 = 22.5 km/h.

=> 22.5 km/h = 22 1/2 km/h.

Therefore The correct answer is 22 1/2 km/h.

Additional Information

Average Speed (Equal Distances)

If a journey is divided into 'n' equal distances with speeds v1, v2...v_n, the average speed is the Harmonic Mean of the speeds.

Average Speed (General Case)

For unequal distances or times, always use the basic formula: Total Distance Traveled ÷ Total Time Taken.

Relative Speed

In the same direction, subtract speeds (s1 − s2). In opposite directions, add speeds (s1 + s2).

Q91. Answer: (b) Food, amino acids and hormones

The correct answer is Food, amino acids and hormones.

Key Points

• Transportation is an important phenomenon which helps in transfer of particles which will take place in all organisms including plants.

• The process of transportation takes place mainly through diffusion process in plants.

• In transportation of plants, main substances that transports include food, water, gases, organic matter like amino acids and hormones.

• The process of diffusion doesn't require more energy.

Thus, from the given options Food, amino acids and hormones is the correct answer.

Additional Information

• Movement of particles from the region of higher concentration to the lower one is called as diffusion.

• Different substances that transport like Food, amino acids and hormones diffuse at the same time at ATP.

• This process happens because as the partial pressure is higher in higher concentration region than in lower, it moves from high-low region.

Q92. Answer: (d) Khadar

The correct answer is Khadar.

Key Points

Khadar

• The lowlands, also known as Nali or Naili, are referred to as Khadir or Khadar. Flood-prone Khadar regions frequently contain remnants of former riverbeds that have been converted into agricultural land as a result of river changes. When wet, it becomes sticky and receptive to moisture.

• The Khadir formation is made of fresh alluvial soil that is very fertile and has a higher content of the river's new silt. It is added to with each flood cycle.

• The Khadir is also known as Nali in northern Haryana, where it is the abundant prairie tract that lies between the Ghaggar river and the southern limits of the Saraswati canal depression. The khadar map shows that these areas flood when it rains.

• It retains moisture and becomes sticky when wet. Khadir soil is made up of newly deposited alluvial soil with more river fresh silt. It is renewed with each flooding cycle and frequently produces a lot of fruit.

Additional Information

Tarai

• The Tarai, also spelled Terai, is a region in the north of India and the south of Nepal that runs parallel to the lower Himalayan ranges. It stretches from the Yamuna River in the west to the Brahmaputra River in the east, and it was once marshland.

• The Tarai, which means "moist land," is formed by a number of springs at its northern edge, forming numerous streams, including the important Ghaghara River, which intersects the Tarai and contributes to its marshy appearance.

• The marshlands, which were once plagued by malaria, have been reduced by drainage and cultivation. In the state of West

Bengal and in Bangladesh, the eastern Tarai is referred to as the Duars.

Bangar

• South of the Bhabar and Terai Plains are the Bhangar Plains. In contrast to the Bhabar Plains, which are unsuitable for agriculture due to the presence of sediments, the Bhangar Plains, which are well-drained plains in Northern India, are suitable for agriculture.

• In the Bhangar Plains, the old alluvial soil has little terraces that are elevated and patches of alkaline efflorescences, also known as "usar," which makes some areas infertile.

Bhabar

• In India's Kumaon, Bhabar or Bhabhar is a region south of the Shivalik Hills and the Lower Himalayas. It is home to some of Kumaon's largest cities, including Haldwani and Ramnagar, both in the Nainital District.

• It is the alluvial apron formed by sediments that were washed down from the Shivalik's along the Indo-Gangetic Plain's northern edge.

Q93. Answer: (a) Microfinance Pulse

The correct answer is Microfinance Pulse.

Key Points

Small Industries Development Bank of India (SIDBI)

• An independent financial institution, the Small Industries Development Bank of India (SIDBI) supports the expansion of Micro, Small, and Medium Enterprises (MSMEs), which make significant contributions to the national economy in terms of production, employment, and exports.

• SIDBI was established with the intention of addressing the development and financial gaps in the ecosystem of MSMEs and facilitating and strengthening the flow of credit to Micro, Small, and Medium-Sized Enterprises.

• The Small Industries Development Bank of India (SIDBI) is a government-run financial institution. It was established as a statutory body in 1990 by an act of the Indian Parliament.

Additional Information

Functions of SIDBI

• It aims to become a single point of contact for MSMEs' developmental and financial needs in order to keep the institution a customer-friendly financial body and make them strong, vibrant, and globally competitive.

• Additionally, it aims to increase shareholder wealth via a cutting-edge technology platform.

• It contributes to the growth and promotion of the MSME sector.

• It is the primary organization in charge of the MSME sector's development, promotion, and financing, as well as the coordination of the functions of other organizations involved in similar endeavors.

Q94. Answer: (c) To the immediate left of J

I, J, K, L, M, N and O are sitting along a circle facing at the centre.

1) J is second to the left of O.

2) M is the immediate neighbour of I and L.

3) N is on the immediate right of I.

N is to the immediate left of J.

Hence, the correct answer is "To the immediate left of J "

Q95. Answer: (d) 10

The correct answer is 10.

Key Points

• The atoms must be arranged in a precise way that will permit the orbitals to overlap in order for a covalent connection to form.

• Due to the fact that sigma bonds are more powerful than pi- bonds, it is challenging to break one.

• Sigma bonds are created by the alignment of atomic orbitals along the axis, and pi bonds are created by the alignment of two atomic orbital lobes.

• Propane, C3H8, contains 10 sigma bonds altogether, consisting of 2C-C bonds and 8C-H bonds.

• As seen in the picture, propane contains ten covalent bonds.

• Additional Information:

• The three-carbon alkane propane has the chemical formula C3H8.

• At room temperature and pressure, it is a gas, but it can be compressed into a liquid for transportation.

• It is a by-product of the processing of natural gas and the refining of petroleum and is frequently utilised as a fuel in home, commercial, and low-emission transportation systems.

• It was found in 1857 by French scientist Marcellin Berthelot, and by 1911 it was sold commercially in the US.
• One of a category of liquefied petroleum gases is propane (LP gases).

Q96. Answer: (d) 125

Shortcut Trick
Number of cuboids = Volume of Cube ÷ Volume of one Cuboid
Volume of Cube = 10 × 10 × 10 = 1000 cm^3
Volume of Cuboid = 4 × 2 × 1 = 8 cm^3
Number = 1000 ÷ 8 = 125
Therefore The correct answer is 125.
Alternate Method
Given:
Edge of the solid cube (a) = 10 cm
Dimensions of the cuboid: length (l) = 4 cm, breadth (b) = 2 cm, height (h) = 1 cm
Formula Used:
Volume of a cube = a^3
Volume of a cuboid = l × b × h
Calculations:
=> Volume of the large cube = 10 × 10 × 10 = 1000 cm^3
=> Volume of one small cuboid = 4 × 2 × 1 = 8 cm^3
=> Let n be the number of cuboids.
=> n × Volume of one cuboid = Volume of cube
=> n × 8 = 1000
=> n = 1000 ÷ 8
=> n = 125
Therefore The correct answer is 125.
Additional Information
Volume Conservation
When a solid is melted and recast into another shape, the total volume remains the same.
Total Surface Area of Cube
The total surface area of a cube with edge 'a' is $6a^2$.
Total Surface Area of Cuboid
The total surface area of a cuboid is 2(lb + bh + hl).

Q97. Answer: (b) Thick walls, no valves, blood flows under high pressure, carry blood to different parts of the body

The correct answer is Thick walls, no valves, blood flows under high pressure, carry blood to different parts of the body.
Key Points:
• Blood flows through the arteries.
• Most transport oxygen-rich blood away from the heart while delivering it to various organs and tissues.
• Arteries are a part of circulatory system, along with heart and the other blood vessels.
• The blood in arteries is typically oxygenated.
• As opposed to the pulmonary artery, which transports deoxygenated blood to the lungs for oxygenation, the pulmonary vein transports oxygenated blood back to the heart, where it is subsequently dispersed to rest of body through other arteries.
• Unlike arteries, which direct blood away from the heart, veins direct blood toward the heart.
• Because the arteries experience higher pressures than other blood vessels, they are often thicker and more elastic.
Additional Information:
• Normally, an artery has three layers:
• Tunica intima:
• The innermost layer of this layer is made up of elastic membranes and tissues that support healthy blood flow.
• Tunica media:
• This layer is the middle and thickest.
• There is elastin and smooth muscle.

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• Tunica adventitia:
• Elastin and collagen fibres make up the tunica adventitia, which adds strength.
• This layer also enables the dilation and widening of arteries, which is essential for controlling blood pressure.

Q98. Answer: (c) • and ×

Given expression: 33 + 4 × 21 ÷ 3 − 17 = 122
Interchanging the two signs and using BODMAS rule we get,
1. ÷ and −
33 + 4 × 21 − 3 ÷ 17 = 122
33 + 4 × 21 - 0.176 = 122
33 + 84 - 0.176 = 122
132 - 0.176 = 122
131.8 ≠ 122
2. + and −
33 - 4 × 21 ÷ 3 + 17 = 122
33 - 4 × 7 + 17 = 122
33 - 28 + 17 = 122
50 - 28 = 122
22 ≠ 122
3. + and ×
33 × 4 + 21 ÷ 3 − 17 = 122
33 × 4 + 7 − 17 = 122
132 + 7 − 17 = 122
139 − 17 = 122
122 = 122
4. − and ×
33 + 4 - 21 ÷ 3 × 17 = 122
33 + 4 - 7 × 17 = 122
33 + 4 - 119 = 122
37 - 119 = 122
-82 ≠ 122
Hence, the correct answer is " + and × ".

Q99. Answer: (c) Only conclusion II follows

The least possible Venn diagram of given statement is :
Conclusions:
I. All mats being stands is a possibility. → Does not follow (because a part of mats is common to figs that are clips and no clip is a stand.)
II. Some clips are mats.→ Follows (as shown above in the Venn diagram)
Hence, the correct answer is "Only conclusion II follows"
Hence, the correct answer is "Option 3"

Q100. Answer: (a) 132°

Shortcut Trick
In parallel lines AB and CD intersected by transversal PQ:
angle ALM = angle CMQ = 48° (Corresponding Angles are equal).
Since PQ is a straight line, angle PLA and angle ALM form a Linear Pair.
angle PLA + angle ALM = 180°
=> angle PLA = 180° − 48° = 132°.
Therefore The correct answer is 132°.
Alternate Method
Given:
=> Line AB || Line CD

=> Transversal PQ intersects AB at L and CD at M.
=> angle CMQ = 48°
Calculations:
=> angle LMC + angle CMQ = 180° (Linear pair on line CD)
=> angle LMC = 180° − 48° = 132°
=> angle PLA and angle LMC are Corresponding Angles because AB || CD and PQ is the transversal.
=> angle PLA = angle LMC
=> angle PLA = 132°
Therefore The correct answer is 132°.
Additional Information
Corresponding Angles
When two parallel lines are cut by a transversal, the angles in matching corners are equal.
Linear Pair Postulate
If two angles form a linear pair, then the measures of the angles add up to 180°.
Alternate Interior Angles
Angles between the parallel lines on opposite sides of the transversal are equal (angle ALM = angle LMD).
Consecutive Interior Angles
Angles between the parallel lines on the same side of the transversal are supplementary (angle ALM + angle LMC = 180°).

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