RRB Group D Previous Year Paper (Held on: 15 Sept 2022 Shift 3)

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

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CBT

Q1. Sumit starts from Point F and drives 5 km towards the east. He then takes a left turn, drives 10 km, turns left and drives 8 km. He then takes a left turn and drives 3 km. He takes a final left turn, drives 3 km and stops at Point G. How far and towards which direction should he drive in order to reach Point F from Point G? (All turns are 90 degree turns only)

(a) 8 km towards the east
(b) 5 km towards the west
(c) 7 km towards the east
(d) 7 km towards the south

Q2. A certain amount of money was divided between x and y in the ratio 4 : 3. If y's share is Rs. 2,400, the total initial amount is _____.

(a) Rs. 5,600
(b) Rs. 8,000
(c) Rs. 6,000
(d) Rs. 7,200

Q3. The perimeter of a circle whose radius is 15 cm is:

(a) 20 π cm
(b) 50 π cm
(c) 40 π cm
(d) 30 π cm

Q4. The area of a rectangle is 225 cm². The length (x) of the rectangle is 4 more than 4 times the breadth (y). The area in terms of a quadratic form (in x) is:

(a) $x^2 - 4x - 900 = 0$
(b) x2 + 4x + 900 = 0
(c) x2 - 4x + 900 = 0
(d) x2 + 4x - 900 = 0

Q5. Select the combination of letters that when placed in the same sequence in the blanks of the given series will complete the series.

AGPLH, _____, KOVPJ, PSYRK, UWBTL, ZAEVM

(a) FKSNI
(b) FISPM
(c) BISPM
(d) FKSNJ

Q6. Which of the following numbers will replace the question mark (?) in the given series?

13, 16, 22, 31, 43, ?

(a) 55
(b) 58
(c) 52
(d) 48

Q7. In the Modern Periodic Table, Tellurium (atomic number 52) is surrounded by elements with atomic numbers:

(a) 36, 50, 53, 84
(b) 35, 51, 54, 85
(c) 34, 51, 53, 84
(d) 33, 50, 53, 83

Q8. Three statements are given, followed by four conclusions numbered I, IL, III and IV. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:

1. Some cats are pets.
2. All pets are snakes.
3. Some snakes are cats.

Conclusions:

I. Some snakes are pets.
II. All cats are snakes.
III. All pets are cats.
IV. No snake is a cat.

(a) Only conclusions I follows
(b) Only conclusions II and III follow
(c) Only conclusion IV follows
(d) Only conclusions I and IV follow

Q9. The magnetic field produced by the long solenoid carrying current is:

(a) maximum at the ends of the solenoid
(b) non-uniform inside the solenoid
(c) zero inside the solenoid
(d) uniform inside the solenoid

Q10. Each of six students, A, B, C, D, E and F, have their class monitor duties on six different days of a week starting from Monday and ending on Saturday of the same week, but not necessarily in the same order. A's monitor duties are on the day immediately after C. D's monitor duties are on the day immediately before E, but it is not on Monday. B's monitor duties are on Saturday. F's monitor duties are on Wednesday. Who among the following has monitor duties on Tuesday?

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

Q11. In a certain code language, 'YOUTH' is written as 'DUBBQ' and 'AGENT' is written as 'FMLVC'. How will 'CURVE' be written in that language?

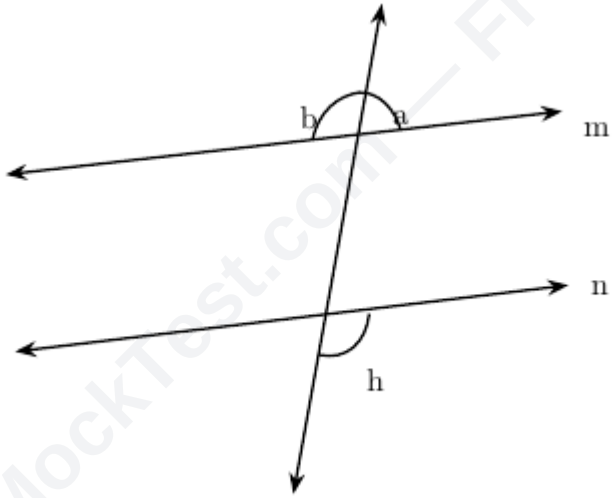
(a) OUDNE
(b) DOIFJ
(c) HAYDN
(d) HAIRN

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Q12. If we add 1 to the numerator and subtract 1 from the denominator of a given fraction, it becomes 1. It becomes 2over3 if 1 is added to the denominator of the given fraction while the numerator is left unchanged. The fraction originally given is:

(a) 6over8
(b) 1over8
(c) 5over8
(d) 3over8

Q13. In the given figure, if n || m and m angle a : mangle b = 2: 3, then what is mangle h?



(a) 120°
(b) 90°
(c) 72°
(d) 108°

Q14. When electrolysis of brine is done, a gas X is formed at the cathode, which gives a pop sound when a burning splinter is brought near it. The gas X is:

(a) CO2
(b) H2
(c) Cl2
(d) O2

Q15. How many such pairs of letters are there in the word CONVERTS (in both forward and backward directions) which have as many letters between them in the word as there are in the English alphabetical order?

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

Q16. If 2tan θ = 3, then the value of (sec θ + tan θ - 1)(sec θ - tan θ + 1) = _____.

(a) 2over3
(b) 1over3
(c) 3
(d) 2

Q17. Electric power consumed by two electric bulbs (each with 5 Ω resistance) connected in series with a 3 V battery is:

(a) 0.9 W
(b) 3 W
(c) 1 W
(d) 0.3 W

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Q18. This question is based on the five, three-digit numbers given below.

(Left) 478 775 357 183 246 (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 the smallest number?

(a) 10
(b) 18
(c) 12
(d) 13

Q19. Six boxes, red, green, yellow, pink, blue, and orange, are kept vertically, one over the other (but not necessarily in the same order). The red box is placed at an odd number position when counted from the bottom but it is not in the fifth position. The red box is placed immediately above the yellow box. Only two boxes are placed between the yellow box and the orange box. Only two boxes are placed between the blue box and the pink box and only one box is placed between the blue box and the green box. Which box is placed third from the top?

(a) Red
(b) Blue
(c) Pink
(d) Green

Q20. If the mode of a distribution is 27 and its median is 35, then the mean of the distribution is _____ (using empirical relation).

(a) 43.5
(b) 62
(c) 39
(d) 37.5

Q21. Evaluate 1over4/5+ 3/7 ÷ 8over35.

(a) 3199/344
(b) 3197/344
(c) 3193/344
(d) 3191/344

Q22. As per a news report in March 2022, scientists at the Centre for Nano and Soft Matter Sciences (CeNS) designed an electrocatalyst system for energy-efficient production of _____ with the help of electrolysis of urea.

(a) helium
(b) nitrogen
(c) hydrogen
(d) oxygen

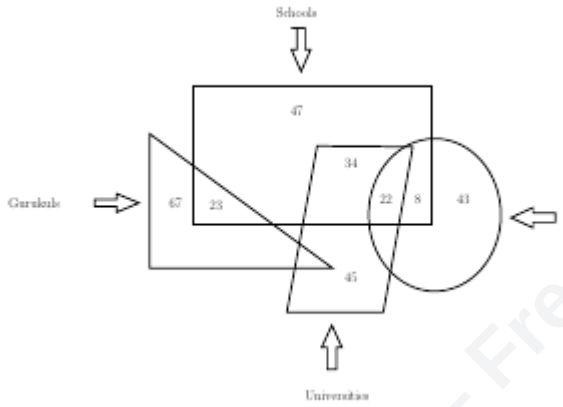
Q23. An incident ray passes through the focus of a concave mirror. The reflected ray:

(a) is parallel to the principal axis
(b) passes through the centre of curvature
(c) passes through the focus of the mirror
(d) is normal to the mirror

Q24. Study the given diagram carefully and answer the question that follows.

The numbers in different sections indicate the number of schools/colleges/universities/gurukuls.

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How many Schools are Colleges and Universities but NOT Gurukuls?

(a) 8
(b) 22
(c) 23
(d) 34

Q25. The larger of two supplementary angles is 36° more than the smaller. The smaller angle is:

(a) 108°
(b) 63°
(c) 27°
(d) 72°

Q26. Refer to the following letter, number, symbol series and answer the question.

(Left) F $ 3 & 4 P W S 8 # T * A 2 F 5 M 2 6 $ Y 9 K (Right)

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

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

Q27. The strong, gusty, hot, dry winds blowing during the day over the north and northwestern India in summer are known as _____.

(a) Mango winds
(b) Loo
(c) Kaal Baishakhi
(d) Trade winds

Q28. The _____ scheme of Rajasthan was launched in collaboration with 'IPE Global', which provides the rural girls of the state with scholarship schemes by enrolling them at the secondary level.

(a) Yuvika
(b) Begum Hazrat Scholarship
(c) Beti Bachao, Beti Padhao.
(d) Udaan

Q29. If 361 : y :: y : 121, and y > 0, then the value of y is:

(a) 381
(b) 121
(c) 209
(d) 247

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Q30. If consumption function = 50 + 0.6Y and Investment = 20, then find the equilibrium income.

(a) 175
(b) 150
(c) 200
(d) 165

Q31. When white light is passed through a prism it undergoes dispersion. The angle of deviation is:

(a) directly proportional to the wavelength
(b) independent of the wavelength
(c) inversely proportional to the wavelength
(d) maximum for red colour

Q32. Which of the following bonds are formed between carbon-carbon atoms of hydrocarbons?

(a) Ionic bonds
(b) Coordination covalent bonds
(c) Hydrogen bonds
(d) Covalent bonds

Q33. Where is the Mahatma Gandhi Antarrashtriya Hindi VishwaVidyalaya located?

(a) Thiruvananthapuram
(b) Wardha
(c) Vijayawada
(d) Madurai

Q34. The positive square root of $(6+2\sqrt{3})(6-2\sqrt{3})$ is _____.

(a) $2\sqrt{6}$
(b) 12
(c) $6\sqrt{2}$
(d) 24

Q35. Which of the following statements is INCORRECT about voluntary muscles?

(a) Cells are long, cylindrical, unbranched and uninucleate.
(b) These muscles are also called skeletal muscles.
(c) These muscles show alternate light and dark bands.
(d) They are mostly attached to bones.

Q36. The difference between the compound interest (when interest is compounded annually) and the simple interest if Rs. 10,000 is deposited at 5% rate of interest per annum for 2 years is:

(a) Rs. 50
(b) Rs. 25
(c) Rs. 15
(d) Rs. 35

Q37. The Council of Ministers (Government of India) are headed by the _____.

(a) Prime Minister
(b) Speaker of Lok Sabha
(c) President
(d) Vice president

Q38. Each Gram Panchayat is represented by how many sarpanch?

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

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Q39. Read the given statement and the arguments carefully and select the appropriate answer from the given options.

Statement:

The impact of social media is very much visible in every sphere of society.

Arguments:

I. Today, people are connected across different countries though social media.

II. Different cultures have been explored by people through social media.

(a) Both I and II strengthen the statement.
(b) II weakens while I strengthens the statement.
(c) I weakens while II strengthens the statement.
(d) Both I and II weaken the statement.

Q40. Evaluate 93^2.

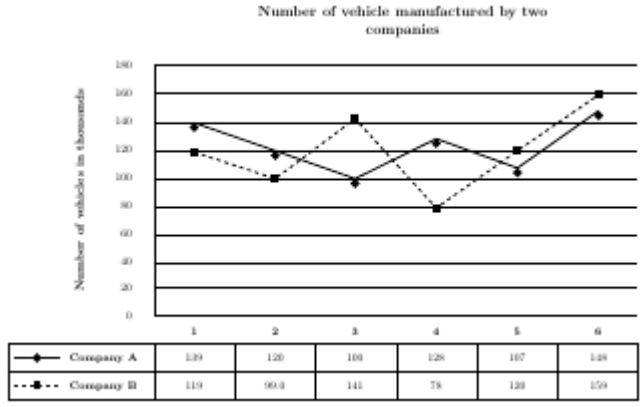
(a) 8549
(b) 8349
(c) 8449
(d) 8649

Q41. Five persons are sitting around a circular table facing the centre. Aman is an immediate neighbour of both Ansu and Ajit. Akash sits second to the left of Aman. Ansh sits second to the right of Aman. Akash is an immediate neighbour of both Ansu and Ansh. Who is an immediate neighbour of both Ajit and Akash?

(a) Ansu
(b) Ansh
(c) Aman
(d) Cannot be determined

Q42. Study the given graph and answer the question that follows.

The numbers 1 to 6 represents the years from 2001 to 2006.



In which year was the difference between the production of two companies maximum?

(a) 2002
(b) 2004
(c) 2003
(d) 2001

Q43. The _____ is the central stretch of land between Western Ghats and the Arabian Sea in the Western Coast.

(a) Uttkal Plain
(b) Kannad Plain
(c) Rohilkhand Plain
(d) Barind Tract

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Q44. Which of the following elements is the most metallic in nature?

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

Q45. Evaluate $984^2 - 16^2$.

(a) 966660
(b) 968000
(c) 967000
(d) 969000

Q46. In which sport did Abhishek Verma win the Arjuna Award 2021?

(a) Shooting
(b) Hockey
(c) Table Tennis
(d) Golf

Q47. Consider the reaction KI (aq) + PbNO3 (aq) → 2 KNO3 (aq) + PbI2 (s).
This is an example of:

(a) double displacement reaction
(b) decomposition reaction
(c) displacement reaction
(d) combination reaction

Q48. An electric motor is a device which converts:

(a) electrical energy into mechanical energy
(b) solar energy into electrical energy
(c) mechanical energy into electrical energy
(d) mechanical energy into solar energy

Q49. A shopkeeper sells wheat at Rs. 20/kg that he purchased at Rs. 18/kg and he gives only 900 gm of wheat instead of 1 kg while selling. The actual percentage profit of the shopkeeper is:

(a) 20.45%
(b) 23.45%
(c) 22.45%
(d) 24.45%

Q50. A music school has classes for teaching six different musical instruments - flute, harmonium, guitar, sitar, drum and violin - each on a different day of a week starting from Monday and ending on Saturday of the same week, but not necessarily in the same order. Drum class is scheduled on Monday. Flute class is on Friday. Sitar class is on the day immediately after flute class. Only three classes are scheduled between Guitar and Sitar classes. Only Violin class is scheduled between Flute and Harmonium classes. On which day is Harmonium class scheduled?

(a) Thursday
(b) Wednesday
(c) Monday
(d) Tuesday

Q51. The river island of Majuli is a part of the vast dynamic river system of the _____ basin.

(a) Ganga
(b) Yamuna
(c) Godavari
(d) Brahmaputra

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Q52. What is the sum of the measures of the exterior angles of a triangle?

(a) 360°
(b) 270°
(c) 180°
(d) 90°

Q53. In which of the following Five-Year Plans was removal of poverty and attainment of self-reliance the main objective?

(a) Third Five-Year Plan
(b) Fourth Five-Year Plan
(c) Fifth Five-Year Plan
(d) Second Five-Year Plan

Q54. The total amount payable after 3 years on a sum of Rs. 1,000 invested at 10% interest per annum compounded annually is:

(a) Rs. 1,300
(b) Rs. 1,331
(c) Rs. 1,390
(d) Rs. 1,376

Q55. Ten Fundamental Duties have been added in Part-IV of the Constitution under _____ in the year 1976 through the 42^(nd) Constitutional Amendment.

(a) Article 51
(b) Article 52
(c) Article 36
(d) Article 51A

Q56. The sum of two numbers is 20 and their difference is 16. The ratio of the larger number to the smaller number is:

(a) 2 : 11
(b) 11 : 2
(c) 9 : 1
(d) 1 : 9

Q57. Who among the following surpassed Argentine superstar Lionel Messi to become the second-highest active international goal-scorer in June 2021?

(a) Sandesh Jhingan
(b) Sunil Chhetri
(c) Subrata Pal
(d) Gurpreet Singh Sandhu

Q58. What is the major product when ethanol reacts with potassium dichromate (K2Cr2O7) in an acidic medium?

(a) Ethanal
(b) Ethene
(c) Ethyl ethanoate
(d) Ethanoic acid

Q59. Out of indigo, green, orange and yellow colours, which colour has the least refractive index?

(a) Indigo
(b) Yellow
(c) Orange
(d) Green

Q60. In the history of India, where did the Black Hole incident take place in the year 1756?

(a) Bombay
(b) Calcutta
(c) Madras

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(d) Surat

Q61. Where are waste products stored within a plant cell?

(a) Vacuoles
(b) Mitochondria
(c) Golgi bodies
(d) Lysosomes

Q62. What is the name of the supercomputer designed and installed by Centre for Development of Advanced Computing (CDAC) at IIT Roorkee, under Phase II of National Supercomputing Mission (NSM) in March 2022?

(a) PARAM Ganga
(b) PARAM Bheem
(c) PARAM Yuva
(d) PARAM Yamuna

Q63. 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 he numbers into its constituent digits. E.g. 12 - Operations on 12 such as adding/subtracting/multiplying etc. to 12 can be performed. Breaking down 12 into 1 and 2 and then performing mathematical operations on 1 and 2 is not allowed)

(10, 300, 10)

(11, 165, 5)

(a) (10, 400, 20)
(b) (8, 20, 8)
(c) (11, 188, 6)
(d) (9, 243, 9)

Q64. If '×' and '-' are interchanged, what will be the value of the given expression?

13 - 7 + 8 ÷ 2 × 10

(a) 92
(b) 53
(c) 76
(d) 85

Q65. Amongst six friends A, B, C, D, E and F, each has a different height. A is taller than only two other friends. C is shorter than only one friend. E is shorter than A but taller than B. F is shorter than D. Who is the tallest among all the friends?

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

Q66. Ramesh buys a radio for Rs. 4,000. He sells it at a profit of 10% to Mohan. Mohan spends Rs. 500 on it. Then he sells it at a profit of 12% to Ritwik. The cost price of the radio to Ritwik is:

(a) Rs. 5,488
(b) Rs. 5,088
(c) Rs. 5,288
(d) Rs. 4,900

Q67. Konsachem Fest, or the Harvest feast, a thanksgiving ritual wherein farmers pray for gods continued blessings, is celebrated in which of the following states?

(a) Sikkim
(b) Goa
(c) Meghalaya
(d) Manipur

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Q68. Which of the following reactions releases heat along with the formation of products?

(a) Exothermic reaction
(b) Endothermic reaction
(c) Sigma tropic reactions
(d) Rearrangement reactions

Q69. At what rate of simple interest per annum will a sum of money get doubled in 10 years?

(a) 20%
(b) 15%
(c) 8.5%
(d) 10%

Q70. If '+' means '-', '-' means '×', '×' means '÷', '÷' means '+', what will come in place of the question mark (?) in the following equation?

21 + 7 - 3 ÷ 20 × 5 = ?

(a) 5
(b) 2
(c) 10
(d) 4

Q71. The smallest prime number is:

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

Q72. Select the option that is related to the fifth number in the same way as the fourth number is related to the third number and the second number is related to the first number.

58 : 115 :: 47 : 93 :: 67 : ?

(a) 124
(b) 113
(c) 133
(d) 138

Q73. When 60 KJ heat is produced by a heater in 1 minute and 20 seconds then its power is:

(a) 7.5 kW
(b) 150 W
(c) 1.5 kW
(d) 750 W

Q74. If 11 is subtracted from each of the following numbers and the digits of each number are written in reverse order and then the numbers are arranged in ascending order, the position of how many numbers will NOT change?

167, 876, 567, 187, 873

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

Q75. In the given letter-cluster pairs, the first letter-cluster is related to the second letter-cluster following a certain logic. Study the given pairs carefully and from the given options, select the pair that follows the same logic.

HP : MS

DL : IO

(a) GE : LI
(b) HT : KY
(c) AL : FO

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(d) GR : KT

Q76. When parallel beam of light rays are incident on the convex mirror of focal length 1 m, reflected rays:

(a) converge to a point at a distance 1 m from the convex surface
(b) appear to diverge from a point at a distance 0.5 m behind the mirror
(c) appear to diverge from a point at a distance 1 m behind the mirror
(d) converge to a point at a distance 0.5 m from the convex surface

Q77. Which of the following contraceptive methods is useful for controlling both unwanted pregnancies and STDs?

(a) Condom
(b) Oral pills
(c) Surgical method
(d) Copper-T

Q78. A and B can do a job in 14 days and 18 days, respectively. A works alone for 6 days and leaves. The number of days required by B to complete the remaining job is:

(a) 104/7
(b) 102/7
(c) 105/7
(d) 103/7

Q79. What is meant by non-biodegradable?

(a) Substances that are broken down by biological processes
(b) Substances that are not broken down by biological processes
(c) Substances that are broken down by biochemical reactions.
(d) Substances that are not broken down by chemical processes

Q80. Cash Grant-in-Aid from foreign countries and international organisations are a part of _____.

(a) non-planned revenue receipt
(b) planned revenue income
(c) capital receipt
(d) revenue receipt

Q81. The women who started the Chipko Andolan in the 1970s wanted to save _____.

(a) a renewable resource
(b) an endangered resource
(c) an extremely rare resource
(d) a non-biodegradable resource

Q82. P, Q, R, S, T, X, Y and Z are sitting around a square table facing the centre of the table (but not necessarily in the same order). Some of them are sitting at the corners while some are sitting at the exact centre of the sides. S is the immediate neighbor of Q and X. Y does not have X and P as his immediate neighbours. Z who is to the immediate left of R, has P as immediate neighbours. If S, T, Y and Z are sitting at the exact center of the sides of the table, then who sitting to the immediate right of X?

(a) P
(b) S
(c) T
(d) Y

Q83. salivary amylase helps in the digestion of _____.

(a) lipid
(b) protein
(c) starch
(d) Cellulose

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Q84. As notified by Government of India in July 2022, Mission Vatsalya, in partnership with states and districts, will execute a 24×7 helpline service for children, as defined under Juvenile Justice Act, _____.

(a) 2017
(b) 2013
(c) 2015
(d) 2010

Q85. Arabari forest is located in _____.

(a) Midnapore
(b) Assam
(c) Pachmarhi
(d) Garhwal

Q86. 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 condition is your answer.

Number/Symbol	2	6	%	@	?	4	<	3	7	=	!	&	9	8
Code	K	S	R	T	U	M	W	Y	A	V	C	X	E	B

Conditions:

(i) If the first element is a number and the last a symbol, the codes for these two are to be interchanged.

(ii) If the first element is an even number and the last an odd number, the first and the last elements are to be coded as Ø.

(iii) If both the second and third elements are perfect squares, the third element is to be coded as the code for the second element.

How will '3 = 7 4 %' be coded?

(a) X C R B Y
(b) R V A M Y
(c) S V Y B R
(d) M V S B Y

Q87. What role does transpiration play in the transport of water in plants?

(a) It exerts a suction force.
(b) It promotes growth of roots.
(c) It exerts a pumping force.
(d) It promotes diffusion of water.

Q88. Read the given statement(s) and conclusions carefully and decide which of the conclusions logically follow(s) from the statement(s).

Statement:

$B \leq L \leq U = A > D > E$

Conclusions:

I. $B < D$

II. $A \geq B$

(a) Neither conclusion I nor II follows
(b) Either conclusion I or II follows
(c) Only conclusion II follows
(d) Only conclusion I follows

Q89. The average of 10, 15, 30, 100 is:

(a) 38.65
(b) 39.55
(c) 38.75

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(d) 39.45

Q90. 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 chains are knives.

All knives are cats.

All cats are rats.

Conclusions:

(I) Some rats are chains.

(II) All rats are knives.

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

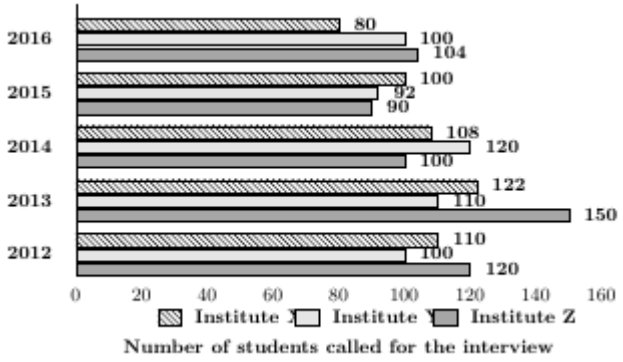
Q91. The acid and base which form sodium hydrogen carbonate are:

(a) HCl and NaCl
(b) HCl and NaOH
(c) H2CO3 and Na2CO3
(d) H2CO3 and NaOH

Q92. The correct relation between P, V, R and I amongst the following is:

(a) $P = I^2R$
(b) $P = V^2IR$
(c) P2 = VI R^2
(d) $P = V^2/IR$

Q93. The bar graph given below shows the number of students who were called for a certain job interview by company A from three different institutes, X, Y and Z, over the years.



In which of the following years was the total number of students called for the interview the highest?

(a) 2012
(b) 2014
(c) 2013
(d) 2016

Q94. Refer to the following letter and symbol series and answer the question.

(Left) Z # U * Y $ K W P Q @ G & A % J B L % & H D # V (Right)

Which of the following is the twelfth letter/symbol to the left of the eighteenth letter/symbol from the left end of the given series?

(a) $
(b) Y

(c) L
(d) K

Q95. If Y is to the south of X and Z is to the east of X, then what is the position of Z with respect to Y?
(a) North-east
(b) South-east
(c) North-west
(d) North

Q96. What is the positive difference between the sum of all prime numbers between 11 and 20 (both included) and the sum of all prime numbers between 30 and 50 (both included)?
(a) 137
(b) 139
(c) 135
(d) 141

Q97. Which of the following describes the nature of the roots of the quadratic equation $3x^2 - 4x + 10 = 0$?
(a) Two distinct real roots
(b) Two equal roots
(c) One real root and one imaginary root
(d) No real roots

Q98. Which of the following numbers will replace the question mark (?) in the given series?
17, 23, 27, 29, ?
(a) 29
(b) 25
(c) 31
(d) 30

Q99. Which of the following animals is present on the insignia of Reserve Bank of India?
(a) Elephant
(b) Zebra
(c) Rhinoceros
(d) Tiger

Q100. Who is believed to be the first person to bring Christianity to India?
(a) Saint Thomas
(b) Vasco Da Gama
(c) Queen Elizabeth
(d) Queen Victoria

ANSWER KEY

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

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91 d	92 a	93 c	94 a	95 a	96 b	97 d	98 a	99 d	100 a

SOLUTIONS

Q1. Answer: (d) 7 km towards the south

Given:

Sumit starts from Point F and drives 5 km towards the east.

He then takes a left turn, drives 10 km, turns left and drives 8 km.

He then takes a left turn and drives 3 km.

He takes a final left turn, drives 3 km and stops at Point G.

So, Point F is '7 km towards the south' from Point G.

Hence, the correct answer is "Option 4".

Q2. Answer: (a) Rs. 5,600

Shortcut Trick

Ratio of x : y is 4 : 3.

Value of 3 units (y share) = Rs. 2,400.

=> 1 unit = 2,400 ÷ 3 = Rs. 800.

Total amount (4 + 3 units) = 7 units × 800 = Rs. 5,600.

Therefore The correct answer is Rs. 5,600.

Alternate Method

Given: Ratio of x : y = 4 : 3, y share = Rs. 2,400.

Formula: Total Amount = (Sum of Ratios ÷ Specific Ratio Part) × Specific Share

=> Let the shares of x and y be 4k and 3k.

=> 3k = 2,400

=> k = 2,400 ÷ 3 = 800

=> Total Amount = 4k + 3k = 7k

=> Total Amount = 7 × 800 = 5,600

Therefore The correct answer is Rs. 5,600.

Additional Information

Ratio and Proportion

If a total quantity Q is divided in the ratio a : b, then the first part is Q × [a/(a+b)] and the second part is Q × [b/(a+b)].

Invertendo and Dividendo

Properties used to manipulate ratios where if a/b = c/d, then b/a = d/c (Invertendo) and (a+b)/b = (c+d)/d (Componendo).

Q3. Answer: (d) 30 π cm

Shortcut Trick

Perimeter (Circumference) of a circle is calculated as 2 × π × radius.

Given radius = 15 cm.

Perimeter = 2 × π × 15 = 30π cm.

Therefore The correct answer is 30 π cm.

Alternate Method

Given:

Radius (r) of the circle = 15 cm

Formula Used:

Perimeter (C) = 2πr

Calculations:

=> Perimeter = 2 × π × 15

=> Perimeter = 30π cm

Therefore The correct answer is 30 π cm.

Additional Information

Area of a Circle

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The total space occupied by a circle is given by Area = πr².

Diameter of a Circle

The diameter (d) is the longest chord and is equal to twice the radius, d = 2r.

Semicircle Perimeter

The perimeter of a semicircle including the diameter base is πr + 2r.

Q4. Answer: (a) x² - 4x - 900 = 0

Shortcut Trick

Given: Area = 225 cm2 and Length (x) = 4y + 4.

=> y = (x − 4) / 4.

Substitute in Area = x × y => x × (x − 4) / 4 = 225.

=> x2 − 4x = 900 => x2 − 4x − 900 = 0.

Therefore The correct answer is x2 − 4x − 900 = 0.

Alternate Method

Given:

Area of rectangle = 225 cm2

Length = x

Breadth = y

Relation: x = 4y + 4

Formula Used:

Area of Rectangle = Length × Breadth

Calculations:

=> Area = x × y = 225

=> From relation: 4y = x − 4

=> y = (x − 4) / 4

=> x × [(x − 4) / 4] = 225

=> (x2 − 4x) / 4 = 225

=> x2 − 4x = 225 × 4

=> x2 − 4x = 900

=> x2 − 4x − 900 = 0

Therefore The correct answer is x2 − 4x − 900 = 0.

Additional Information

Quadratic Equation Form

A standard quadratic equation is represented as ax2 + bx + c = 0, where x is the variable and a, b, c are constants.

Area and Perimeter of Rectangle

Area = L × B and Perimeter = 2(L + B). These relationships are often used to form algebraic equations in geometry problems.

Nature of Roots

The nature of roots for ax2 + bx + c = 0 depends on the discriminant (D = b2 − 4ac). If D > 0, the roots are real and distinct.

Q5. Answer: (a) FKSNI

The logic followed here is:

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

Hence, the correct answer is "Option 1".

Q6. Answer: (b) 58

The logic followed here is:

So, '58' will replace the question mark in the given series.

Hence, the correct answer is "Option 2".

Q7. Answer: (c) 34, 51, 53, 84

The correct answer is 34, 51, 53, 84.

Key Points

• Tellurium's symbol is Te and atomic number is 52.

• It is a rare metalloid found in ores like gold and silver tellurides.
• Used in thermoelectric devices, semiconductors, and alloys.
• It appears silvery-white, brittle, and metallic.
• Tellurium compounds have a garlic-like odor and are toxic.

Additional Information

• In the modern periodic table metals, metalloids and nonmetals are found in the p-block which is on the right-hand side of the chart.
• Metalloids are those elements possessing properties between nonmetals and metals.
• These are also known as semi-metals.
• They have a metallic appearance with the brittle property of non-metals.
• They show average conductance and most of their chemical properties resemble the non-metals.
• The elements which are metalloids in the periodic table are boron, silicon, arsenic, antimony, polonium, and carbon.
• Metalloids are semiconductors.

Q8. Answer: (a) Only conclusions I follows

Given Statements:

1. Some cats are pets.
2. All pets are snakes.
3. Some snakes are cats.

The least possible Venn diagram for the given statement is:

Conclusions:

I. Some snakes are pets - True (Because, All pets are snakes implies that some snakes are pets).

II. All cats are snakes - False (Because, Some snakes are definitely cats, but All cats are snakes can be possible only).

III. No snake is a cat - False (Because, Some snakes are cats).

So, Only conclusions I follows.

Hence, the correct answer is "Option 1".

Q9. Answer: (d) uniform inside the solenoid

The correct answer is uniform inside the solenoid.

Key Points

• A solenoid is a long coil of wire tightly wound in a helix shape.
• The magnetic field inside a long solenoid is uniform and parallel to the axis of the solenoid.
• Outside the solenoid, the magnetic field is weak and dispersed.
• The strength of the magnetic field inside the solenoid depends on the current through the wire and the number of turns per unit length of the solenoid.

Additional Information

• Magnetic Field:
• A magnetic field is a vector field that describes the magnetic influence on moving electric charges, electric currents, and magnetic materials.
• It is represented by magnetic field lines that show the direction and strength of the field.
• The SI unit of magnetic field strength is the Tesla (T).
• Solenoid:
• A solenoid is a type of electromagnet, the purpose of which is to generate a controlled magnetic field.
• It consists of a coil of wire, and when an electric current is passed through it, a magnetic field is created.
• Solenoids are commonly used in electromechanical devices such as relays, valves, and actuators.
• Electromagnetism:
• Electromagnetism is a branch of physics that deals with the study of electromagnetic forces, which occur between electrically charged particles.
• It encompasses various phenomena like electric fields, magnetic fields, and light.
• Electromagnetic forces are one of the four fundamental forces of nature.

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Q10. Answer: (d) A

Given: Each of six students, A, B, C, D, E and F, have their class monitor duties on six different days of a week starting from Monday and ending on Saturday of the same week, but not necessarily in the same order.

1) B's monitor duties are on Saturday.

2) F's monitor duties are on Wednesday.

Day	Monitor
Monday	
Tuesday	
Wednesday	F
Thursday	
Friday	
Saturday	B

3) D's monitor duties are on the day immediately before E, but it is not on Monday.

Day	Monitor
Monday	
Tuesday	
Wednesday	F
Thursday	D
Friday	E
Saturday	B

4) A's monitor duties are on the day immediately after C.

Day	Monitor
Monday	C
Tuesday	A
Wednesday	F
Thursday	D
Friday	E
Saturday	B

So, monitor 'A' duties on Tuesday.

Hence, the correct answer is "Option 4".

Q11. Answer: (c) HAYDN

The logic followed here is:

For, 'YOUTH' is written as 'DUBBQ',

For, 'AGENT' is written as 'FMLVC',

Similarly, for 'CURVE'

So, 'CURVE' will be written as 'HAYDN'.

Hence, the correct answer is "Option 3".

Q12. Answer: (a) 6over8

Given:

Adding 1 to the numerator and subtracting 1 from the denominator of a given fraction makes it 1.

Adding 1 to the denominator while leaving the numerator unchanged makes the fraction 2/3.

Calculation:

Let the original fraction be (x/y).

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From condition 1: ((x + 1)/(y - 1) = 1)
From condition 2: (x/(y + 1) = 2/3)
From condition 1:
=> (x + 1 = y - 1)
=> (x - y = -2) .....(I)
From condition 2:
=> (3x = 2(y + 1))
=> (3x = 2y + 2)
=> (3x - 2y = 2) .....(ii)
Solving equations (i) and (ii) together:
From (i) (x = y - 2), substitute in (ii):
=> (3(y - 2) - 2y = 2)
=> (3y - 6 - 2y = 2)
=> (y - 6 = 2)
=> (y = 8)
Substitute (y = 8) in (x = y - 2):
=> (x = 8 - 2)
=> (x = 6)
The original fraction is 6/8.

Q13. Answer: (d) 108°

Shortcut Trick
Since n || m, angles a and b form a linear pair, so a + b = 180°.
Given ratio a : b = 2 : 3 => 5 units = 180° => 1 unit = 36°.
=> b = 3 × 36° = 108°.
By parallel line properties, angle b and angle h are alternate exterior angles, so angle h = angle b.
Therefore The correct answer is 108°.
Alternate Method
Given:
Lines n || m intersected by a transversal.
Ratio of angles mangle a : mangle b = 2 : 3.
Formula Used:
1. Linear Pair Axiom: Sum of adjacent angles on a straight line is 180°.
2. Alternate Exterior Angles Theorem: When two parallel lines are cut by a transversal, the alternate exterior angles are equal.
Calculations:
Let mangle a = 2x and mangle b = 3x.
Since angle a and angle b lie on the straight line n:
=> mangle a + mangle b = 180°
=> 2x + 3x = 180°
=> 5x = 180°
=> x = 36°
=> mangle b = 3 × 36° = 108°
Since n || m, angle b and angle h are alternate exterior angles:
=> mangle h = mangle b
=> mangle h = 108°
Therefore The correct answer is 108°.

Q14. Answer: (b) H2

The correct answer is H2.
Key Points
• Hydrogen's symbol is H and atomic number is 1.
• It is the lightest element and most abundant in the universe.

• It is found in water (H2O) and most organic compounds.

• It is used as a fuel in rockets and clean energy systems.

• It exists in diatomic form (H2) under normal conditions.

Additional Information

• Brine can be obtained from industrial facilities, salt mining operations, or the waste stream of reverse osmosis (RO) desalination plants, and can be processed to produce useful chemicals like sodium hydroxide (NaOH) or hydrochloric acid (HCl).

• Due to their efficiency as conductors and the quantity of free electrons they have available for transfer, carbon electrodes are utilised in electrolysis.

• Carbon not only has a high melting point but is also a good conductor of electricity, which means that it can facilitate a variety of reactions.

• Salt hydroxide, hydrogen, and chlorine are produced during the electrolysis of brine.

• Hydrogen is a byproduct regularly burned with chlorine in the traditional chlor-alkali business to create hydrochloric acid.

Q15. Answer: (c) 4

Given word: 'CONVERTS'

Now, checking the pairs in both forward and backward directions:

The pairs in forward direction are: OT and NS.

And, The pairs in backward direction are: ON and TS.

So, Total 'Four' pairs are formed from the given word.

Hence, the correct answer is "Option 3".

Q16. Answer: (c) 3

Shortcut Trick

Given $2\tan\theta = 3 \Rightarrow \tan\theta = 3/2$.

Expression: $(\sec\theta + (\tan\theta - 1))(\sec\theta - (\tan\theta - 1)) = \sec^2\theta - (\tan\theta - 1)^2$.

Using $\sec^2\theta = 1 + \tan^2\theta$: $(1 + \tan^2\theta) - (\tan^2\theta - 2\tan\theta + 1)$.

Simplifying: $1 + \tan^2\theta - \tan^2\theta + 2\tan\theta - 1 = 2\tan\theta$.

Result = $2 \times (3/2) = 3$.

Therefore The correct answer is 3.

Alternate Method

Given: $2\tan\theta = 3 \Rightarrow \tan\theta = 3/2$ (Perpendicular/Base).

Formula Used: $(a + b)(a - b) = a^2 - b^2$ and $\sec^2\theta - \tan^2\theta = 1$.

Let the expression be $E = (\sec\theta + \tan\theta - 1)(\sec\theta - \tan\theta + 1)$.

$\Rightarrow E = [\sec\theta + (\tan\theta - 1)]\,[\sec\theta - (\tan\theta - 1)]$.

$\Rightarrow E = \sec^2\theta - (\tan\theta - 1)^2$.

$\Rightarrow E = \sec^2\theta - (\tan^2\theta + 1 - 2\tan\theta)$.

$\Rightarrow E = (\sec^2\theta - \tan^2\theta) - 1 + 2\tan\theta$.

$\Rightarrow E = 1 - 1 + 2\tan\theta$.

$\Rightarrow E = 2\tan\theta$.

$\Rightarrow E = 2 \times (3/2) = 3$.

Therefore The correct answer is 3.

Additional Information

Trigonometric Identities

Fundamental identities include $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \operatorname{cosec}^2\theta$.

Pythagorean Triplets

In a right-angled triangle, $P^2 + B^2 = H^2$. Common triplets include (3, 4, 5), (5, 12, 13), and (8, 15, 17).

Reciprocal Relations

$\sec\theta = 1/\cos\theta$, $\operatorname{cosec}\theta = 1/\sin\theta$, and $\cot\theta = 1/\tan\theta$.

Q17. Answer: (a) 0.9 W

The correct answer is 0.9 W.

Key Points

• Two 5 Ω bulbs in series give total resistance: R_(total)= 5+5 = 10 Ω.

• Current from a 3 V source: I = V/R = 3/10 = 0.3 A (Ohm's law V = IR).

• Total power drawn: P = $V^2/R = 3^2/10$ = 0.9 W (equivalently P = VI).

• Each bulb dissipates $P_{(bulb)} = I^2R = (0.3)^2 \times 5$ = 0.45 W; sum of bulb powers equals 0.9 W.

Additional Information

• Series vs. Parallel: In series, the same current flows through all elements; in parallel, the same voltage appears across each branch.

• Equivalent Resistance: Series resistances add ($R_s = \Sigma R$); in parallel, $1/R_p = \Sigma(1/R)$.

• Power Identities: P = VI = $I^2R = V^2/R$ (from combining power with Ohm's law).

• What if parallel? Two 5 Ω bulbs in parallel → R = 2.5 Ω; P = V^2/R = 9/2.5 = 3.6 W (greater than series).

• SI Units: ampere (A) for current, ohm (Ω) for resistance, watt (W) for power (SI-defined).

Q18. Answer: (d) 13

Given: (Left) 478 775 357 183 246 (Right)

Now,

The third digit of the largest number is: 5 (775)

The second digit of the smallest number is: 8 (183)

And, the sum of the third digit of the largest number and the second digit of the smallest number is: 5 + 8 = 13.

Hence, the correct answer is "Option 4".

Q19. Answer: (b) Blue

Given: Six boxes, red, green, yellow, pink, blue, and orange, are kept vertically, one over the other (but not necessarily in the same order).

1) The red box is placed at an odd number position when counted from the bottom but it is not in the fifth position.

2) The red box is placed immediately above the yellow box.

Position	Box
6	
5	
4	
3	Red
2	Yellow
1	

3) Only two boxes are placed between the yellow box and the orange box.

Position	Box
6	
5	Orange
4	
3	Red
2	Yellow
1	

4) Only two boxes are placed between the blue box and the pink box and only one box is placed between the blue box and the green box.

Position	Box
6	Green
5	Orange
4	Blue
3	Red

2	Yellow
1	Pink

So, 'Blue' box is placed third from the top.

Hence, the correct answer is "Option 2".

Q20. Answer: (c) 39

Shortcut Trick

Apply the Empirical formula: 2 × Mean = 3 × Median − Mode

2 × Mean = 3 × 35 − 27

2 × Mean = 105 − 27 = 78

Mean = 78 ÷ 2 = 39

Therefore The correct answer is 39.

Alternate Method

Given:

Mode = 27

Median = 35

Formula Used:

In a moderately skewed distribution, the relationship between Mean, Median, and Mode is:

Mean − Mode = 3 × (Mean − Median)

Calculations:

=> Let Mean be x.

=> x − 27 = 3 × (x − 35)

=> x − 27 = 3x − 105

=> 3x − x = 105 − 27

=> 2x = 78

=> x = 78 ÷ 2

=> x = 39

Therefore The correct answer is 39.

Additional Information

Karl Pearson's Empirical Relation

For moderately asymmetrical distributions, Mode ≈ 3 Median − 2 Mean.

Symmetrical Distribution

In a perfectly symmetrical distribution, the values of Mean, Median, and Mode are equal (Mean = Median = Mode).

Skewness of Distribution

If Mean > Median > Mode, the distribution is positively skewed. If Mode > Median > Mean, the distribution is negatively skewed.

Q21. Answer: (c) 3193/344

Calculation:

1over4/5+ 3/7 ÷ 8over35

=> 1over(28+15)/35 ÷ 8over35

=> 35/43 × 35/8

=> 1225/344

=> 3193/344

Therefore Option 3 is the correct answer.

Q22. Answer: (c) hydrogen

The correct answer is hydrogen.

Key Points

• Scientists at the Centre for Nano and Soft Matter Sciences (CeNS) have designed an electrocatalyst system for the energy-efficient production of hydrogen.

• This production of hydrogen is achieved through the electrolysis of urea, which is more energy-efficient compared to water electrolysis.

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• Hydrogen is a clean fuel and has the potential to be a significant part of the renewable energy landscape.

• The development of efficient and cost-effective methods for hydrogen production is crucial for the advancement of hydrogen energy technologies.

Additional Information

• Hydrogen:

• Hydrogen is the most abundant element in the universe and is considered a potential clean energy carrier for the future.

• It can be used in fuel cells to generate electricity, with water as the only byproduct, making it environmentally friendly.

• Hydrogen can be produced from various sources, including natural gas, biomass, and water, through different processes such as steam methane reforming, gasification, and electrolysis.

• Research and development in hydrogen production aim to make the process more efficient and cost-effective to promote its use as a sustainable energy source.

• Electrolysis of Urea:

• Urea electrolysis is a process that involves the decomposition of urea into hydrogen, nitrogen, and carbon dioxide using an electric current.

• This process is more energy-efficient compared to water electrolysis because urea has a lower thermodynamic potential for decomposition.

• Urea is commonly available as a waste product in agricultural and industrial processes, making it a cost-effective feedstock for hydrogen production.

• The development of effective electrocatalysts for urea electrolysis is crucial for enhancing the efficiency and feasibility of this method.

• Centre for Nano and Soft Matter Sciences (CeNS):

• CeNS is an autonomous research institute under the Department of Science and Technology (DST), Government of India.

• The institute focuses on research in the areas of nano and soft matter sciences, including the development of novel materials and technologies.

• CeNS aims to address scientific and technological challenges through innovative research and collaboration with academic and industrial partners.

• The development of the electrocatalyst system for hydrogen production is one of the many significant contributions of CeNS in the field of renewable energy.

Q23. Answer: (a) is parallel to the principal axis

The correct answer is is parallel to the principal axis.

Key Points

• An incident ray that passes through the focus of a concave mirror will reflect parallel to the principal axis.

• This is due to the property of concave mirrors where rays passing through the focus reflect parallel to the principal axis.

• The principal axis is the line that passes through the center of curvature and the focus, extending to infinity on both sides.

• This property is used in various optical devices to direct light in a specific direction.

Additional Information

• Concave Mirror:

• A concave mirror is a spherical mirror with a reflecting surface that curves inward.

• It is also known as a converging mirror because it converges light to a point.

• Principal Axis:

• The principal axis is a straight line that passes through the pole (the midpoint of the mirror) and the center of curvature of the mirror.

• Focus (Focal Point):

• The focus of a concave mirror is the point where parallel rays of light either converge or appear to converge after reflecting off the mirror.

• Center of Curvature:

• The center of curvature is the center of the sphere of which the concave mirror is a part.

Q24. Answer: (b) 22

The shaded part represents the Schools are Colleges and Universities but NOT Gurukuls.

The number of Schools who are Colleges and Universities but NOT Gurukuls = 22

Hence, ‘22’ is the correct answer.

Q25. Answer: (d) 72°

Shortcut Trick

Sum of supplementary angles = 180°

Difference between angles = 36°

Smaller angle = (Sum − Difference) ÷ 2

Smaller angle = (180° − 36°) ÷ 2 = 144° ÷ 2 = 72°

Therefore The correct answer is 72°.

Alternate Method

Given: Sum of supplementary angles = 180°, Difference = 36°.

Formula: Let the smaller angle be x and the larger angle be y. Then x + y = 180°.

Calculations:

=> y = x + 36°

=> x + (x + 36°) = 180°

=> 2x + 36° = 180°

=> 2x = 180° − 36°

=> 2x = 144°

=> x = 72°

Therefore The correct answer is 72°.

Additional Information

Supplementary Angles

Two angles are called supplementary

Q26. Answer: (a) 1

Given Series: (Left) F $ 3 & 4 P W S 8 # T * A 2 F 5 M 2 6 $ Y 9 K (Right)

Letters immediately preceded by a letter and also immediately followed by a number,

So, the pattern needed is: Letter - Letter - Number

Now,

So, there are 'One' pairs i.e.: 'WS8'.

Hence, the correct answer is "Option 1".

Q27. Answer: (b) Loo

The correct answer is Loo.

Key Points

• Loo refers to the strong, gusty, hot, dry winds that blow during the day over the north and northwestern parts of India during the summer season.

• These winds are extremely hot and can cause severe heat waves, leading to heatstroke and other health issues.

• They typically blow from the west or northwest and are particularly prevalent in the states of Rajasthan, Haryana, Punjab, and Uttar Pradesh.

• The temperature of Loo winds can often exceed 45°C, significantly raising the ambient temperature and creating harsh living conditions.

Additional Information

• Mango Winds

• Mango winds are pre-monsoon showers in the coastal regions of Kerala and Karnataka in India.

• These winds are named so because they help in the ripening of mangoes in these regions.

• Kaal Baishakhi

• Kaal Baishakhi refers to the violent thunderstorms that occur in the eastern parts of India, particularly in West Bengal and Assam, during the pre-monsoon months of April and May.

• These storms are characterized by strong winds, heavy rains, and lightning, often causing significant damage to property and crops.

• Trade Winds

• Trade winds are steady winds that blow from east to west just north and south of the equator.

• They are part of the Earth's atmospheric circulation system and play a crucial role in maritime navigation and weather patterns across tropical regions.

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Q28. Answer: (d) Udaan

The correct answer is Udaan.

Key Points

• The Udaan scheme was launched by the Government of Rajasthan in collaboration with 'IPE Global'.

• The aim of the scheme is to provide scholarships to rural girls to encourage their enrollment at the secondary level of education.

• This initiative is part of the broader efforts to improve female education and reduce gender disparity in education in rural areas.

• By providing financial support, the scheme aims to reduce the dropout rates of girls at the secondary level and promote higher education among rural girls.

Additional Information

• Begum Hazrat Scholarship:

• Begum Hazrat Mahal National Scholarship is a scheme for meritorious girl students belonging to minority communities.

• It aims to provide financial assistance to girls in the minority community to reduce their dropout rate and promote higher education.

• This scholarship is provided by the Ministry of Minority Affairs, Government of India.

• Beti Bachao, Beti Padhao:

• Beti Bachao, Beti Padhao (BBBP) is a national campaign to save and educate the girl child.

• It was launched by the Government of India to address the declining child sex ratio and promote the education of girls.

• BBBP focuses on changing mindsets and creating awareness about the importance of girls' education and their rights.

• Yuvika:

• Yuvika, also known as the Young Scientist Programme, is an initiative by ISRO to impart basic knowledge on space technology and its applications to school students.

• It aims to create interest in space activities among young students and encourage them to pursue careers in space science and technology.

Q29. Answer: (c) 209

Shortcut Trick

When three numbers are in continued proportion a : b :: b : c, then b is the mean proportional.

Direct formula: $y = \sqrt{(a \times c)}$

$y = \sqrt{(361 \times 121)}$

$y = 19 \times 11 = 209$

Therefore The correct answer is 209.

Alternate Method

Given: 361 : y :: y : 121

Formula Used: Product of means = Product of extremes ($y^2 = a \times c$)

=> 361 / y = y / 121

=> $y^2 = 361 \times 121$

=> $y = \sqrt{(361 \times 121)}$

=> $y = \sqrt{(19^2 \times 11^2)}$

=> $y = 19 \times 11$

=> $y = 209$

Therefore The correct answer is 209.

Additional Information

Mean Proportional

For two numbers a and b, the mean proportional x is defined such that a:x = x:b, which gives $x = \sqrt{(ab)}$.

Third Proportional

If a : b :: b : c, then c is called the third proportional to a and b, calculated as $c = b^2/a$.

Fourth Proportional

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

Q30. Answer: (a) 175

The correct answer is 175.

Key Points

• Consumption Function: C = 50 + 0.6Y, where 50 is autonomous consumption and 0.6 is the marginal propensity to consume

(MPC).

• Investment: The given investment value is I=20 (autonomous and constant).

• Equilibrium Condition: = C + IY=C+I, meaning total income equals the sum of consumption and investment.

• Calculation: Solving the equation Y = 50 + 0.6Y + 20, we get Y = 175

Additional Information

• Equilibrium Income Concept: Equilibrium income occurs where total demand (consumption + investment) equals total output or income in an economy.

• Keynesian Model: Keynesian economics, emphasizes the role of aggregate demand in determining income and employment levels.

• Real-World Applications: Understanding equilibrium income helps policymakers predict the impact of fiscal policies, such as government spending or tax changes, on national income.

• Autonomous Components: Both autonomous consumption and investment are independent of income and represent fixed expenditures regardless of income levels.

• Economic Multiplier: Changes in autonomous investment (like ΔI) have a multiplied effect on equilibrium income, influencing GDP growth significantly.

Q31. Answer: (c) inversely proportional to the wavelength

The correct answer is inversely proportional to the wavelength.

Key Points

• When white light passes through a prism, it splits into its constituent colors due to dispersion.

• The angle of deviation for each color depends on its wavelength.

• The angle of deviation is inversely proportional to the wavelength of the light.

• This means that light with a shorter wavelength (e.g., violet) deviates more than light with a longer wavelength (e.g., red).

Additional Information

• Dispersion of Light

• Dispersion occurs when light separates into its component colors due to different degrees of refraction for different wavelengths.

• The refractive index of the material of the prism varies with wavelength, causing different colors to bend by different amounts.

• Wavelength and Frequency

• Wavelength is the distance between successive crests of a wave, typically measured in meters.

• Frequency is the number of waves that pass a point in one second, measured in Hertz (Hz).

• The speed of light (c) is the product of its wavelength (λ) and frequency (f): c = λf.

• Prism

• A prism is a transparent optical element with flat, polished surfaces that refract light.

• The most common type of prism is a triangular prism, used to disperse light into a spectrum of colors.

Q32. Answer: (d) Covalent bonds

The correct answer is Covalent bonds.

Key Points

• Covalent bonds are formed by the sharing of electrons between atoms, which allows each atom to attain the electron configuration of a noble gas.

• Carbon atoms form covalent bonds in hydrocarbons due to their ability to form four bonds, satisfying their valence electron requirement.

• Hydrocarbons are organic compounds consisting entirely of hydrogen and carbon, and their structures are stabilized through covalent bonding.

• Covalent bonds result in the formation of molecules with specific geometries and properties, important for the diverse range of hydrocarbon compounds.

Additional Information

• Ionic Bonds

• Ionic bonds are formed through the transfer of electrons from one atom to another, resulting in the creation of positively and negatively charged ions.

• These bonds are typically found in compounds formed between metals and non-metals, such as sodium chloride (NaCl).

• Coordination Covalent Bonds

• Coordination covalent bonds, also known as dative bonds, occur when one atom provides both electrons for a shared pair in a bond.

• These bonds are common in complex ions and coordination compounds, such as in metal-ligand complexes.

• Hydrogen Bonds

• Hydrogen bonds are weak interactions that occur between a hydrogen atom covalently bonded to a highly electronegative atom (like oxygen, nitrogen, or fluorine) and another electronegative atom.

• These bonds are essential for the properties of water and the structure of biological molecules like DNA.

• Covalent Bonds

• Covalent bonds involve the sharing of electron pairs between atoms, leading to the formation of molecules.

• These bonds can be single, double, or triple, depending on the number of shared electron pairs.

• Covalent bonding is fundamental to organic chemistry, forming the basis of the structures of hydrocarbons and other organic molecules.

Q33. Answer: (b) Wardha

The correct answer is Wardha.

Key Points

• Mahatma Gandhi Antarrashtriya Hindi VishwaVidyalaya is located in Wardha, Maharashtra.

• The university was established to promote and develop the Hindi language.

• Wardha is a city in the state of Maharashtra, which has historical significance due to its association with Mahatma Gandhi.

• The university aims to provide higher education and advanced research opportunities in the field of Hindi language and literature.

Additional Information

• Mahatma Gandhi Antarrashtriya Hindi VishwaVidyalaya

• It was established by an Act of Parliament in 1997.

• The primary objective of the university is to promote and spread the knowledge of Hindi language and literature at national and international levels.

• It offers various undergraduate, postgraduate, and doctoral programs in Hindi and related fields.

• The university also conducts research in Hindi language, literature, and culture.

• Wardha

• Wardha is a city in Maharashtra known for its connection with Mahatma Gandhi and the Indian independence movement.

• It is the location of Sevagram Ashram, where Mahatma Gandhi lived for several years.

• The city is also known for its educational institutions and contribution to the promotion of Hindi and Gandhian studies.

Q34. Answer: (a) 2√6

Shortcut Trick

Identify the expression as the difference of squares: $(a + b)(a - b) = a^2 - b^2$.

Here, $a = 6$ and $b = 2\sqrt{3}$.

Product = $6^2 - (2\sqrt{3})^2 = 36 - 12 = 24$.

Positive square root = $\sqrt{24} = \sqrt{(4 \times 6)} = 2\sqrt{6}$.

Therefore The correct answer is $2\sqrt{6}$.

Alternate Method

Given: The expression is $(6 + 2\sqrt{3})(6 - 2\sqrt{3})$.

Formula Used: $(a + b)(a - b) = a^2 - b^2$ and $\sqrt{(x \times y)} = \sqrt{x} \times \sqrt{y}$

=> First, simplify the product inside the square root:

=> $(6 + 2\sqrt{3})(6 - 2\sqrt{3}) = (6)^2 - (2\sqrt{3})^2$

=> $= 36 - (4 \times 3)$

=> $= 36 - 12 = 24$

=> Required positive square root = $\sqrt{24}$

=> $\sqrt{24} = \sqrt{(4 \times 6)} = \sqrt{4} \times \sqrt{6}$

=> $= 2\sqrt{6}$

Therefore The correct answer is $2\sqrt{6}$.

Additional Information

Difference of Squares

The identity $(a + b)(a - b) = a^2 - b^2$ is a core algebraic property used to simplify conjugate pairs of surds.

Simplification of Radicals

To simplify a square root, factor out the largest perfect square. For example, $\sqrt{24} = \sqrt{(4 \times 6)} = 2\sqrt{6}$.

Surd Squaring Rule

When squaring a term like $(x\sqrt{y})$, the result is $x^2 \times y$. In this case, $(2\sqrt{3})^2 = 4 \times 3 = 12$.

Q35. Answer: (a) Cells are long, cylindrical, unbranched and uninucleate.

The correct answer is 1) Cells are long, cylindrical, unbranched and uninucleate..

Key Points

• Voluntary muscles are also known as skeletal muscles because they are usually attached to bones and can be consciously controlled.

• These muscles are characterized by their striated appearance, showing alternate light and dark bands.

• Cells of voluntary muscles are long, cylindrical, and typically multinucleate, not uninucleate.

• These muscles play a crucial role in movements and locomotion of the body.

Additional Information

• Voluntary Muscles

• These muscles are under conscious control, meaning they can be voluntarily moved.

• Skeletal muscles are attached to bones by tendons and are responsible for movement.

• The structure of these muscles includes muscle fibers that are long and cylindrical, containing multiple nuclei (multinucleate).

• The striated appearance of these muscles is due to the arrangement of actin and myosin filaments within the muscle cells.

• Involuntary Muscles

• These muscles are not under conscious control and function automatically.

• Examples include smooth muscles found in the walls of internal organs and blood vessels, and cardiac muscles found in the heart.

• Smooth muscles are spindle-shaped, unstriated, and uninucleate.

• Cardiac muscles are striated like skeletal muscles but are branched and typically uninucleate.

Q36. Answer: (b) Rs. 25

Shortcut Trick

For a period of 2 years, the difference between CI and SI is given by the formula:

Difference (D) = $P \times (R/100)^2$

$D = 10,000 \times (5/100)^2$

$D = 10,000 \times (25/10,000)$

$D = 25$

Therefore The correct answer is Rs. 25.

Alternate Method

Given: Principal (P) = Rs. 10,000, Rate (R) = 5% per annum, Time (T) = 2 years.

Formula Used: SI = (P × R × T) ÷ 100; CI = P[(1 + R/100)^T − 1]

=> Simple Interest (SI) = (10,000 × 5 × 2) ÷ 100 = 1,00,000 ÷ 100 = Rs. 1,000

=> Compound Interest (CI) = $10,000 \times [(1 + 5/100)^2 - 1]$

=> CI = $10,000 \times [(1.05)^2 - 1] = 10,000 \times [1.1025 - 1]$

=> CI = $10,000 \times 0.1025$ = Rs. 1,025

=> Difference = CI − SI = 1,025 − 1,000 = Rs. 25

Therefore The correct answer is Rs. 25.

Additional Information

Difference for 3 Years

For 3 years, the difference between CI and SI is $P \times (R/100)^2 \times (3 + R/100)$.

Successive Percentage Change

The effective rate for CI for 2 years can be calculated as $x + y + (xy/100)$, where $x = y = R\%$.

Simple Interest Property

Simple interest remains constant for every year if the principal and rate do not change.

Q37. Answer: (a) Prime Minister

The correct answer is Prime Minister.

Key Points

• The Prime Minister of India is the head of the Council of Ministers.

• The Prime Minister is appointed by the President of India.

• The Prime Minister is usually the leader of the majority party in the Lok Sabha.

• As the head of the Council of Ministers, the Prime Minister plays a key role in the executive branch of the Government of India.

Additional Information

• Prime Minister: The Prime Minister is the head of the government in India and leads the executive branch. The Prime Minister is responsible for running the government and implementing policies.

• Speaker of Lok Sabha: The Speaker is the presiding officer of the Lok Sabha, the lower house of the Parliament of India. The Speaker's role is to maintain order during debates and ensure that parliamentary procedures are followed.

• President: The President of India is the ceremonial head of state and the supreme commander of the Indian Armed Forces. The President's role is largely ceremonial, with executive powers being exercised by the Prime Minister and the Council of Ministers.

• Vice President: The Vice President of India is the second-highest constitutional office in the country. The Vice President also serves as the Chairman of the Rajya Sabha, the upper house of the Parliament of India.

Q38. Answer: (b) One

The correct answer is One.

Key Points

• Each Gram Panchayat is typically represented by one Sarpanch.

• The Sarpanch is the elected head of the Gram Panchayat.

• The Sarpanch plays a crucial role in local governance and administration in rural areas.

• The position of Sarpanch is a cornerstone of the Panchayati Raj system in India.

Additional Information

• Gram Panchayat

• A Gram Panchayat is the basic unit of local administration in India, functioning at the village level.

• It consists of members elected by the village residents, with the Sarpanch serving as the head.

• The Gram Panchayat is responsible for implementing government schemes and addressing local issues.

• Panchayati Raj System

• The Panchayati Raj system is a decentralized form of government where each village or group of villages is governed by a Gram Panchayat.

• This system was formalized in India by the 73rd Constitutional Amendment Act of 1992.

• The goal of the Panchayati Raj is to empower local communities and promote participatory governance.

• Role of the Sarpanch

• The Sarpanch is responsible for calling and presiding over Gram Panchayat meetings.

• The Sarpanch ensures the execution of developmental projects and government schemes at the village level.

• The Sarpanch acts as a liaison between the village residents and higher levels of government.

Q39. Answer: (a) Both I and II strengthen the statement.

Given:

Statement:

The impact of social media is very much visible in every sphere of society.

Arguments:

I. Today, people are connected across different countries though social media - Strong Argument (Because, it does not necessarily demonstrate a widespread impact of social media across every sphere of society. It only highlights one specific aspect of social media's influence)

II. Different cultures have been explored by people through social media - Strong Argument (Because, this statement focuses on a specific aspect of social media's impact. While it is true that social media can expose people to different cultures, it does not necessarily translate to a significant impact across all spheres of society.)

So, Both I and II strengthen the statement.

Hence, the correct answer is "Option 1".

Q40. Answer: (d) 8649

Calculation:

932

=> 93 × 93

=> 8649

Therefore Option 4 is the correct answer.

Q41. Answer: (b) Ansh

Given: Five persons are sitting around a circular table facing the centre.

1) Akash sits second to the left of Aman.

2) Ansh sits second to the right of Aman.

3) Akash is an immediate neighbour of both Ansu and Ansh.

4) Aman is an immediate neighbour of both Ansu and Ajit.

So, 'Ansh' is an immediate neighbour of both Ajit and Akash.

Hence, the correct answer is "Option 2".

Q42. Answer: (b) 2004

Calculation:

Difference between the production of two companies in 2001 = 139 - 119 = 20

Difference between the production of two companies in 2002 = 120 - 99 = 21

Difference between the production of two companies in 2003 = 141 - 100 = 41

Difference between the production of two companies in 2004 = 128 - 78 = 50

Difference between the production of two companies in 2005 = 120 - 107 = 13

Difference between the production of two companies in 2006 = 159 - 148 = 11

Therefore Difference between the production of two companies was maximum in 2004.

Q43. Answer: (b) Kannad Plain

The correct answer is Kannad Plain.

Key Points

• The Kannad Plain is located on the western coast of India, between the Western Ghats and the Arabian Sea.

• This plain is part of the larger Western Coastal Plains, which stretch from Gujarat in the north to Kerala in the south.

• The Western Coastal Plains are known for their fertile soil and significant agricultural activities.

• The Kannad Plain, in particular, is characterized by its flat terrain and is a prominent feature of the Karnataka coast.

Additional Information

• Uttkal Plain:

• The Uttkal Plain is located in the eastern part of India, in the state of Odisha.

• It is known for its rich cultural heritage and historical significance.

• Rohilkhand Plain:

• The Rohilkhand Plain is located in the northern part of India, primarily in the state of Uttar Pradesh.

• It is named after the Rohilla Pathans who settled in the region.

• Barind Tract:

• The Barind Tract is located in the eastern part of the Indian subcontinent, primarily in Bangladesh and parts of West Bengal, India.

• It is characterized by its older alluvial soil and is an important agricultural region.

Q44. Answer: (c) Cs

The correct answer is Cs (Cesium).

Key Points

• Cesium (Cs) is located in Group 1 (alkali metals) and Period 6 of the periodic table.

• It has the lowest ionization energy among the elements listed, making it the most metallic.

• Cesium is highly reactive and readily loses its single valence electron to form positive ions.

• It is characterized by its large atomic radius and low electronegativity.

Additional Information

• Metallic Character:

• Metallic character refers to the level of reactivity of a metal.

• Metals tend to lose electrons and form positive ions (cations).

• The metallic character increases as we move down a group in the periodic table.

• This is due to the increase in atomic size and the decreasing attraction between the nucleus and the valence electrons.

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• Periodic Table Trends:
• The periodic table is arranged in such a way that elements with similar properties fall into the same groups or columns.
• Group 1 elements, also known as alkali metals, are highly reactive and have a single valence electron.
• Reactivity and metallic character increase as we move down the group from lithium (Li) to cesium (Cs).
• Ionization Energy:
• Ionization energy is the energy required to remove an electron from an atom in its gaseous state.
• Elements with low ionization energies lose electrons more easily and exhibit higher metallic character.
• In alkali metals, ionization energy decreases down the group, making cesium the most metallic among the options provided.

Q45. Answer: (b) 968000

Given:
(a = 984, b = 16)
Formula:
($a^2 - b^2 = (a+b)(a-b)$)
Calculation:
=> ((984 + 16) × (984 - 16))
=> (1000 × 968)
=> (968000)
Therefore Option 2 is the correct answer.

Q46. Answer: (a) Shooting

The correct answer is Shooting.
Key Points
• Abhishek Verma is an Indian sport shooter who has earned significant accolades in the sport of shooting.
• He has competed in the 10-meter air pistol events and has won numerous medals in international competitions.
• In recognition of his outstanding achievements in shooting, he was awarded the Arjuna Award in 2021.
• The Arjuna Award is one of the highest honors given by the Indian government to athletes for their exceptional performance in national sports.
Additional Information
• Arjuna Award:
• The Arjuna Award was instituted in 1961 by the Government of India to recognize outstanding achievements in national sports.
• The award includes a bronze statuette of Arjuna, a certificate, ceremonial dress, and a cash prize.
• It aims to encourage and motivate athletes to achieve higher levels of performance.
• The selection committee considers athletes' performance over a period of four years and other factors such as leadership qualities, discipline, and sportsmanship.
• Shooting Sport:
• Shooting is a competitive sport involving tests of proficiency (accuracy and speed) using various types of guns such as firearms and airguns.
• In India, shooting has become increasingly popular, with Indian shooters excelling in various international competitions, including the Olympics.
• Some of the prominent shooting events include 10m air pistol, 10m air rifle, and 50m rifle events, among others.
• The National Rifle Association of India (NRAI) is the governing body for shooting sports in India.

Q47. Answer: (a) double displacement reaction

The correct answer is Double Displacement Reaction.
Key Points$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
• In the given equation, $Pb(NO_3)_2$ reacts with 2KI to produce PbI_2 and $2KNO_3$.
• In a double displacement reaction, elements from two different compounds displace each other to create new compounds. This is exactly what is happening in the equation.
• The lead ion (Pb^{2+}) in lead nitrate displaces the potassium ion (K^+) in potassium iodide, and the potassium ion (K^+) in potassium iodide displaces the lead ion (Pb^{2+}) in lead nitrate.
• As a result, lead ends up with iodide to form lead iodide (PbI_2) and potassium ends up with nitrate to form potassium nitrate ($2KNO_3$).
Additional Information

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• Combination:

• A combination reaction is a type of reaction in which two or more substances (elements or compounds) combine to form a single product.

• However, in this provided equation, we have two reactants and two products. Hence, it is not a combination reaction.

• Decomposition:

• A decomposition reaction is characterized by a single compound breaking down into two or more smaller compounds or elements.

• The given chemical equation does not depict this type of reaction as we start with two reactants which form two new products.

Q48. Answer: (a) electrical energy into mechanical energy

The correct answer is electrical energy into mechanical energy.

Key Points

• An electric motor is a device that converts electrical energy into mechanical energy.

• It operates on the principle of electromagnetic induction.

• Electric motors are widely used in industrial, commercial, and residential applications.

• Common examples include fans, pumps, electric vehicles, and household appliances.

Additional Information

• Electromagnetic Induction: The process by which a conductor placed in a changing magnetic field causes the production of a voltage across the conductor.

• Types of Electric Motors: There are various types of electric motors including DC motors, AC motors, synchronous motors, and induction motors.

• Applications of Electric Motors: Electric motors are used in various applications such as home appliances (refrigerators, washing machines), industrial machinery (conveyors, pumps), and transportation (electric vehicles, trains).

• Maintenance of Electric Motors: Regular maintenance of electric motors includes checking for wear and tear, lubrication of moving parts, and ensuring proper electrical connections to ensure optimal performance and longevity.

Q49. Answer: (b) 23.45%

Shortcut Trick

Successive ratio method: Price Ratio × Weight Ratio = Profit Ratio.

Price Ratio = 18 : 20 = 9 : 10.

Weight Ratio (Inversely proportional to quantity) = 900 : 1000 = 9 : 10.

Overall Ratio = (9 × 9) : (10 × 10) = 81 : 100.

Profit% = (19 ÷ 81) × 100 = 23.456...% ≈ 23.45%.

Therefore The correct answer is 23.45 %.

Alternate Method

Given → CP = Rs. 18/kg, SP = Rs. 20/kg, Actual weight given = 900 gm.

Formulas: Profit% = (Total SP − Total CP) ÷ Total CP × 100.

=> Effective CP for 900 gm = (18 ÷ 1000) × 900 = Rs. 16.2.

=> SP for the same 900 gm = Rs. 20.

=> Profit = 20 − 16.2 = Rs. 3.8.

=> Profit% = (3.8 ÷ 16.2) × 100.

=> Profit% = 3800 ÷ 162 = 23.456...% ≈ 23.45%.

Therefore The correct answer is 23.45 %.

Additional Information

Dishonest Dealer Concept

When a dealer sells goods at cost price but uses less weight, Profit% = [Error ÷ (True Value − Error)] × 100.

Combined Profit

If there is a price markup and weight manipulation, the net profit is calculated by multiplying the respective ratios of SP/CP for each transaction.

Q50. Answer: (b) Wednesday

Given: A music school has classes for teaching six different musical instruments - flute, harmonium, guitar, sitar, drum and violin - each on a different day of a week starting from Monday and ending on Saturday of the same week, but not necessarily in the same order.

1) Drum class is scheduled on Monday.
2) Flute class is on Friday.
3) Sitar class is on the day immediately after flute class.

Day	Class
Monday	Drum
Tuesday	
Wednesday	
Thursday	
Friday	Flute
Saturday	Sitar

4) Only three classes are scheduled between Guitar and Sitar classes.

Day	Class
Monday	Drum
Tuesday	Guitar
Wednesday	
Thursday	
Friday	Flute
Saturday	Sitar

5) Only Violin class is scheduled between Flute and Harmonium classes.

Day	Class
Monday	Drum
Tuesday	Guitar
Wednesday	Harmonium
Thursday	Violin
Friday	Flute
Saturday	Sitar

So, Harmonium class is scheduled at 'Wednesday'.
Hence, the correct answer is "Option 2".

Q51. Answer: (d) Brahmaputra

The correct answer is Brahmaputra.
Key Points
• Majuli is the world's largest river island and is located in the Brahmaputra River in Assam, India.
• The Brahmaputra River is one of the major rivers of the Indian subcontinent, originating from the Angsi Glacier in Tibet.
• Majuli has been the cultural capital of Assam since the 16th century and is known for its satras (Vaishnavite monasteries).
• The island is prone to erosion and flooding due to its location within the dynamic Brahmaputra basin.
Additional Information
• Brahmaputra River
• The Brahmaputra River flows through Tibet, India, and Bangladesh, covering a total distance of about 2,900 km.
• In Tibet, it is known as the Yarlung Tsangpo River, and in Bangladesh, it is called the Jamuna River.
• The river is crucial for the irrigation, transportation, and power generation in the regions it flows through.
• The Brahmaputra basin is subject to seasonal flooding, which affects agriculture and settlements in the area.
• Majuli Island
• Majuli was declared a district in Assam in 2016, making it India's first island district.

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• The island is home to a diverse range of flora and fauna, including many migratory birds.

• It is also a significant center for the Neo-Vaishnavism culture and has around 22 satras that preserve ancient practices, art, and culture.

• The island faces environmental challenges such as erosion and flooding, leading to a reduction in its size over the years.

Q52. Answer: (a) 360°

Shortcut Trick

The sum of exterior angles of any convex polygon, including a triangle, is always 360°.

Regardless of the number of sides, if you traverse around the boundary, you complete one full rotation.

Total rotation = 360°.

Therefore The correct answer is 360°.

Alternate Method

Given: A triangle with three interior angles.

Formula Used:

1. Linear Pair Postulate: Interior angle + Exterior angle = 180°

2. Angle Sum Property: Sum of interior angles of a triangle = 180°

Calculations:

Let the interior angles be α, β, and γ.

=> α + β + γ = 180°

Let the corresponding exterior angles be E1, E2, and E3.

=> E1 = 180° − α

=> E2 = 180° − β

=> E3 = 180° − γ

=> Sum = E1 + E2 + E3

=> Sum = (180° − α) + (180° − β) + (180° − γ)

=> Sum = 540° − (α + β + γ)

=> Sum = 540° − 180°

=> Sum = 360°

Therefore The correct answer is 360°.

Additional Information

Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior angles.

Polygon Exterior Angle Sum

For any n-sided convex polygon, the sum of the exterior angles (one at each vertex) is always constant and equal to 360°.

Interior Angle Sum Formula

The sum of the interior angles of a polygon with n sides is given by (n − 2) × 180°.

Q53. Answer: (c) Fifth Five-Year Plan

The correct answer is Fifth Five-Year Plan.

Key Points

• The Fifth Five-Year Plan (1974-1978) aimed at removing poverty and attaining self-reliance through the promotion of economic growth, social justice, and self-reliance.

• This plan was formulated and launched under the guidance of D.P. Dhar and was approved during the tenure of Prime Minister Indira Gandhi.

• The plan focused on increasing the income levels of the poor and providing employment opportunities to reduce poverty.

• It emphasized the reduction of inequalities in income and wealth distribution, and the expansion of the agriculture sector to ensure food security.

Additional Information

• Five-Year Plans in India

• The Five-Year Plans were centralized and integrated national economic programs. Initially, they were implemented by the Planning Commission of India.

• The First Five-Year Plan (1951-1956) focused on the agricultural sector, aiming to increase food production and improve the living standards of the rural population.

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• The Second Five-Year Plan (1956-1961) prioritized industrialization, especially heavy industries and the public sector.

• Each subsequent plan aimed at addressing specific economic challenges faced by the country, with a long-term vision for balanced and sustainable growth.

• Poverty Alleviation Programs in India

• Various poverty alleviation programs have been launched in India, such as the Integrated Rural Development Program (IRDP), National Rural Employment Guarantee Act (NREGA), and the Public Distribution System (PDS).

• The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) provides legal guarantees for at least 100 days of wage employment in a year to every household whose adult members volunteer to do unskilled manual work.

• These programs aim to provide direct assistance to the poor and promote economic development through job creation and social support.

Q54. Answer: (b) Rs. 1,331

Shortcut Trick

Convert the interest rate to a ratio: 10% = 1/10. For Compound Interest, the amount grows from 10 to 11 units each year.

For 3 years, the growth factor is the cube of the ratio: $(10)^3 \rightarrow (11)^3$.

Principal (1000 units) → Amount (1331 units).

Given Principal = Rs. 1,000 (which is 1000 units), so Amount = 1331 units = Rs. 1331.

Therefore The correct answer is Rs. 1331.

Alternate Method

Given:

Principal (P) = Rs. 1,000

Rate (R) = 10% per annum

Time (n) = 3 years

Formula Used:

Amount (A) = $P \times (1 + R/100)^n$

Calculations:

=> $A = 1000 \times (1 + 10/100)^3$

=> $A = 1000 \times (1 + 0.1)^3$

=> $A = 1000 \times (1.1)^3$

=> $A = 1000 \times (1.1 \times 1.1 \times 1.1)$

=> $A = 1000 \times 1.331$

=> $A = 1331$

Therefore The correct answer is Rs. 1331.

Additional Information

Effective Rate of Interest

For a 10% rate compounded annually for 3 years, the Effective Percentage Rate is 33.1%. Net Amount = P × (100 + 33.1)%.

CI vs SI Difference for 3 Years

The difference (D) between Compound Interest and Simple Interest for 3 years is given by: $D = P(R/100)^2 \times (3 + R/100)$.

Compounding Half-Yearly

If interest is compounded half-yearly, the rate becomes R/2 and the time period becomes 2n.

Q55. Answer: (d) Article 51A

The correct answer is Article 51A.

Key Points

• The 42nd Constitutional Amendment Act of 1976 added a new part IV-A to the Indian Constitution, which enshrines the Fundamental Duties of citizens.

• Article 51A, specifically, lists ten Fundamental Duties for every citizen of India.

• These duties include respecting the Constitution, the national flag, and the national anthem; cherishing the noble ideals of the freedom struggle; and upholding and protecting the sovereignty, unity, and integrity of India.

• Other duties involve promoting harmony, safeguarding public property, protecting the environment, and striving towards excellence in all spheres of individual and collective activity.

Additional Information

• Constitutional Amendments:

• Constitutional amendments are changes made to the Constitution to address issues or update its provisions. The Constitution of India provides a detailed process for amendments under Article 368.

• The 42nd Amendment, enacted in 1976, is one of the most significant amendments as it brought about extensive changes, including the addition of the Fundamental Duties.

• Part IV-A of the Indian Constitution:

• Part IV-A was added to the Constitution through the 42nd Amendment and it deals with Fundamental Duties. This part aims to remind citizens that while they enjoy their rights, they also have certain duties to perform.

• The Fundamental Duties are inspired by the Constitution of the erstwhile USSR. They are non-justiciable, which means they are not enforceable by the courts for their violation.

• Importance of Fundamental Duties:

• The inclusion of Fundamental Duties was intended to serve as a constant reminder to citizens that they should be conscious of their duties towards their country, society, and fellow citizens.

• These duties help in promoting a sense of discipline and commitment among citizens, which is essential for the unity and integrity of the nation.

Q56. Answer: (c) 9 : 1

Shortcut Trick

For two numbers with sum (S) and difference (D), the ratio of the larger number to the smaller number is (S + D) : (S − D).

Given Sum = 20 and Difference = 16.

Ratio = (20 + 16) : (20 − 16) = 36 : 4 = 9 : 1.

Therefore The correct answer is 9 : 1.

Alternate Method

Given: Sum of numbers = 20, Difference of numbers = 16.

Formula Used: Larger number (L) = (Sum + Difference) ÷ 2; Smaller number (S) = (Sum − Difference) ÷ 2.

=> Let the numbers be x and y (where x > y).

=> x + y = 20

=> x − y = 16

=> Adding both equations: 2x = 36 => x = 18

=> Subtracting both equations: 2y = 4 => y = 2

=> Required Ratio = x : y = 18 : 2

=> Ratio = 9 : 1

Therefore The correct answer is 9 : 1.

Additional Information

Linear Equations in Two Variables

To find two quantities when their sum and difference are known, the values are (S+D)/2 and (S-D)/2 respectively.

Ratio Simplification

A ratio is always expressed in its simplest form by dividing both terms by their Highest Common Factor (HCF).

Q57. Answer: (b) Sunil Chhetri

The correct answer is Sunil Chhetri.

Key Points

• Sunil Chhetri is an Indian professional footballer who plays as a forward and captains both the Indian Super League side Bengaluru FC and the Indian national team.

• As of June 2021, Sunil Chhetri surpassed Lionel Messi to become the second-highest active international goal-scorer, with 74 goals.

• Sunil Chhetri is considered one of the greatest footballers in Indian history and has received numerous accolades for his contributions to Indian football.

• He has been awarded the AIFF Player of the Year a record six times and has been instrumental in India's performance in international tournaments.

Additional Information

• Lionel Messi:

• He is an Argentine professional footballer who plays as a forward for Paris Saint-Germain and the Argentina national team.

• Messi is widely regarded as one of the greatest footballers of all time.

• He has won the Ballon d'Or award seven times, which is the most by any player in history.

• Cristiano Ronaldo:
• He is a Portuguese professional footballer who plays as a forward for Al Nassr and the Portugal national team.
• As of June 2021, Cristiano Ronaldo is the highest active international goal-scorer.
• Ronaldo has won the Ballon d'Or award five times.
• AIFF (All India Football Federation):
• It is the governing body of football in India under the jurisdiction of the Ministry of Youth Affairs and Sports, Government of India.
• The AIFF is responsible for the development and promotion of football in India.
• It organizes various leagues and tournaments, including the Indian Super League and I-League.
• International Goals:
• International goals refer to the goals scored by a footballer in matches representing their national team.
• These matches include official tournaments like the FIFA World Cup, continental championships, and international friendlies.
• Scoring international goals is considered a significant achievement and contributes to a player's legacy in the sport.

Q58. Answer: (d) Ethanoic acid

The correct answer is Ethanoic acid.

Key Points

• When ethanol (C_2H_5OH) reacts with potassium dichromate ($K_2Cr_2O_7$) in an acidic medium, it undergoes oxidation.
• Potassium dichromate in the presence of acid acts as a strong oxidizing agent.
• The primary alcohol ethanol is first oxidized to ethanal (acetaldehyde), which is further oxidized to ethanoic acid (acetic acid).
• This two-step oxidation process results in the formation of ethanoic acid as the major product.

Additional Information

• Ethanol (C_2H_5OH):
• Ethanol, commonly known as alcohol, is a volatile, flammable, colorless liquid with a slight characteristic odor.
• It is used in alcoholic beverages, as a solvent, and as a fuel.
• Potassium Dichromate ($K_2Cr_2O_7$):
• Potassium dichromate is a common inorganic chemical reagent, mostly used as an oxidizing agent in various laboratory and industrial applications.
• In the presence of acid, it acts as a strong oxidizing agent and can oxidize primary alcohols to carboxylic acids.
• Oxidation Reactions:
• Oxidation involves the loss of electrons or an increase in the oxidation state of a molecule, atom, or ion.
• In organic chemistry, oxidation often involves the addition of oxygen to a compound or the removal of hydrogen.
• Ethanoic Acid (CH_3COOH):
• Ethanoic acid, also known as acetic acid, is a colorless liquid organic compound with the chemical formula CH_3COOH.
• It is the main component of vinegar and has a distinctive sour taste and pungent smell.
• Ethanoic acid is widely used in the production of synthetic fibers, plastics, food additives, and as a chemical reagent in laboratories.

The correct answer is Option 2.

Q59. Answer: (c) Orange

The correct answer is Orange.

Key Points

• Orange light has a lower refractive index compared to indigo, green, and yellow lights.
• The refractive index of a color decreases as the wavelength of the light increases. Orange light has a longer wavelength compared to indigo, green, and yellow.
• Refractive index is inversely related to the speed of light in the medium. Orange light, having a lower refractive index, travels faster in a medium compared to indigo, green, and yellow lights.
• Therefore, among the given options, orange light bends the least when passing through a prism, indicating it has the lowest refractive index.

Additional Information

• Refractive Index:
• The refractive index of a material is a measure of how much the speed of light is reduced inside the material compared to the speed of light in a vacuum.
• It is a dimensionless number, typically greater than 1, and is denoted by the letter 'n'.

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• The refractive index can be calculated using the formula n = c/v, where c is the speed of light in a vacuum and v is the speed of light in the material.
• Dispersion of Light:
• When light passes through a prism, it is separated into its constituent colors, a process known as dispersion.
• Different colors of light bend by different amounts due to their varying refractive indices.
• Violet and indigo light, having shorter wavelengths, bend more than red and orange light, which have longer wavelengths.
• Wavelength and Frequency:
• The wavelength of light is the distance between successive peaks of the electromagnetic waves.
• Frequency is the number of wave cycles that pass a point per unit time, typically measured in hertz (Hz).
• There is an inverse relationship between wavelength and frequency: λ = c/f, where λ is the wavelength, c is the speed of light, and f is the frequency.
• Prisms and Light Bending:
• A prism is a transparent optical element with flat, polished surfaces that refract light.
• The angle at which light enters and exits the prism affects how much it bends and how it is dispersed into its constituent colors.
• Prisms are commonly used in spectrometers to analyze light and determine the wavelengths present in a light source.

The correct answer is Option 2.

Q60. Answer: (b) Calcutta

The correct answer is Calcutta.

Key Points

• The Black Hole of Calcutta was a small prison or dungeon in Fort William, Calcutta, where British soldiers and Indian sepoys were held by the Nawab of Bengal, Siraj-ud-Daulah.
• The incident took place on the night of June 20, 1756, when troops of Siraj-ud-Daulah captured Fort William.
• It is alleged that 146 prisoners were confined in a room measuring 14 by 18 feet, and by morning only 23 survived due to suffocation and heat exhaustion.
• The event was used by the British to justify their subsequent military actions in India, leading to the Battle of Plassey in 1757.

Additional Information

• Siraj-ud-Daulah
• Siraj-ud-Daulah was the last independent Nawab of Bengal, Bihar, and Orissa.
• He succeeded his grandfather, Alivardi Khan, in April 1756 and immediately faced challenges from the British East India Company.
• His attack on Fort William was a response to British military fortifications in Bengal without his permission.
• After his defeat at the Battle of Plassey, he was overthrown and executed.
• Fort William
• Fort William is a fort built in Calcutta in 1696 during the early years of British East India Company rule in India.
• The fort was named after King William III of England.
• It served as the British stronghold in Bengal and was the site of significant events in the early colonial history of India.
• After the Black Hole incident, the fort was extensively rebuilt and expanded.
• Battle of Plassey
• The Battle of Plassey was fought on June 23, 1757, between the forces of the British East India Company, led by Robert Clive, and the Nawab of Bengal, Siraj-ud-Daulah.
• It was a decisive victory for the British, largely due to the betrayal of Siraj-ud-Daulah's key general, Mir Jafar.
• The battle marked the beginning of British political control over India.
• It led to the establishment of the British East India Company's rule in Bengal and eventually all of India.

The correct answer is Option 2.

Q61. Answer: (a) Vacuoles

The correct answer is Vacuoles.

Key Points

• Vacuoles are membrane-bound organelles present in plant cells.
• They play a crucial role in storing nutrients, waste products, and maintaining turgor pressure within the cell.
• The vacuole in a plant cell is large and centrally located, occupying a significant portion of the cell's volume.
• Besides waste storage, vacuoles also store essential compounds such as ions, sugars, and amino acids.

Additional Information

• Mitochondria

• They are known as the powerhouse of the cell because they generate most of the cell's supply of ATP, used as a source of chemical energy.

• Mitochondria are not involved in storing waste products.

• Golgi Bodies

• Also known as the Golgi apparatus, they are involved in modifying, sorting, and packaging proteins and lipids for secretion or for use within the cell.

• Golgi bodies do not play a role in storing waste products.

• Lysosomes

• They are membrane-bound organelles that contain enzymes to break down waste materials and cellular debris.

• While lysosomes do help in waste processing, they do not store waste products.

The correct answer is Option 2.

Q62. Answer: (a) PARAM Ganga

The correct answer is PARAM Ganga.

Key Points

• The supercomputer PARAM Ganga was designed and installed by the Centre for Development of Advanced Computing (CDAC).

• It was installed at IIT Roorkee as part of Phase II of the National Supercomputing Mission (NSM) in March 2022.

• The installation of PARAM Ganga is aimed at boosting research and innovation in various scientific fields.

• The National Supercomputing Mission (NSM) is an initiative by the Indian government to enhance the computing capabilities in academic and research institutions.

Additional Information

• Centre for Development of Advanced Computing (CDAC)

• CDAC is an organization established in 1988 by the Indian government to carry out research and development in IT, Electronics, and associated areas.

• It is known for its high-performance computing and grid computing capabilities.

• CDAC has played a significant role in the development of the PARAM series of supercomputers.

• National Supercomputing Mission (NSM)

• Launched in 2015, NSM is a joint initiative of the Department of Science and Technology (DST) and the Ministry of Electronics and Information Technology (MeitY).

• The mission aims to enhance the research capacities and capabilities of the country by setting up a network of supercomputers.

• It involves the installation of more than 70 high-performance computing facilities across India.

• The mission also focuses on the development of indigenous supercomputing capabilities and applications.

• Supercomputing Applications

• Supercomputers are used for complex simulations, scientific research, weather forecasting, drug discovery, and various other fields that require high computational power.

• They play a crucial role in solving large-scale problems in physics, chemistry, biology, and engineering.

The correct answer is Option 2.

Q63. Answer: (d) (9, 243, 9)

The logic followed here is:

Logic: 1st number × 3rd number × 3 = 2nd number.

For, (10, 300, 10)

=> 10 × 10 × 3 = 300.

For, (11, 165, 5)

=> 11 × 5 × 3 = 165.

Similarly, for (9, 243, 9)

=> 9 × 9 × 3 = 243.

Hence, the correct option is "Option 4".

Q64. Answer: (d) 85

BODMAS Table:

Given equation: 13 - 7 + 8 ÷ 2 × 10

Now, if '×' and '-' are interchanged, then:

=> 13 × 7 + 8 ÷ 2 - 10

=> 13 × 7 + 4 - 10

=> 91 + 4 - 10

=> 95 - 10 = 85.

Hence, the correct answer is "Option 4".

Q65. Answer: (d) D

Given: Amongst six friends A, B, C, D, E and F, each has a different height.

1) A is taller than only two other friends.

> > A > > __

2) C is shorter than only one friend.

C > > A > >

3) E is shorter than A but taller than B.

C > > A > E > B

4) F is shorter than D.

D > C > F > A > E > B

So, 'D' is the tallest among all the friends.

Hence, the correct answer is "Option 4".

Q66. Answer: (a) Rs. 5,488

Shortcut Trick

Ramesh's selling price (SP) = 4,000 × (110 ÷ 100) = 4,400.

Mohan's total cost price = 4,400 + 500 = 4,900.

Ritwik's cost price = 4,900 × (112 ÷ 100) = 49 × 112.

Multiplier method: 4,900 × 1.12 = 5,488.

Therefore The correct answer is Rs. 5,488.

Alternate Method

Given → CP of Ramesh = Rs. 4,000 | Profit% Ramesh = 10% | Repairs = Rs. 500 | Profit% Mohan = 12%.

Formulas: SP = CP × (100 + Profit%) ÷ 100 | Total CP = Purchase Price + Overheads.

=> Selling Price of Ramesh = 4,000 + (10 ÷ 100 × 4,000) = 4,000 + 400 = Rs. 4,400.

=> Cost Price for Mohan = Rs. 4,400.

=> Total effective CP for Mohan = Purchase Price + Repairs = 4,400 + 500 = Rs. 4,900.

=> Selling Price of Mohan (CP for Ritwik) = 4,900 × (112 ÷ 100).

=> CP for Ritwik = 49 × 112 = Rs. 5,488.

Therefore The correct answer is Rs. 5,488.

Additional Information

Effective Cost Price

Any additional expenditure like repairs, transportation, or installation is always added to the purchase price to calculate the total Cost Price (CP) before calculating profit or loss.

Successive Transactions

In a chain of sales, the Selling Price (SP) of the previous seller becomes the Cost Price (CP) for the next buyer.

Q67. Answer: (b) Goa

The correct answer is Goa.

Key Points

• Konsachem Fest is a traditional harvest festival celebrated in the state of Goa.

• It is also known as the Harvest feast, a thanksgiving ritual wherein farmers pray for continued blessings from the gods.

• The festival is marked by various rituals and ceremonies to honor the agricultural bounty.

• During the Konsachem Fest, farmers bring the first sheaves of paddy to the church as an offering and thanksgiving for a good harvest.

Additional Information

• Harvest Festivals in India

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• Harvest festivals are celebrated across India with great enthusiasm, each region having its unique customs and traditions.

• Some of the prominent harvest festivals include Pongal in Tamil Nadu, Makar Sankranti in various parts of India, Baisakhi in Punjab, and Onam in Kerala.

• These festivals are a way to thank nature and gods for a bountiful harvest and are often marked by feasting, dancing, and various cultural activities.

• Goa's Cultural Festivities

• Goa is known for its vibrant and diverse cultural heritage, with numerous festivals celebrated throughout the year.

• Some of the key festivals include Carnival, Shigmo, Sao Joao, and Christmas, reflecting the state's unique blend of Indian and Portuguese influences.

• These festivals often involve colorful parades, music, dance, and traditional rituals, showcasing Goa's rich cultural tapestry.

The correct answer is Option 2.

Q68. Answer: (a) Exothermic reaction

The correct answer is Option 1: Exothermic reaction.

Key Points

• Exothermic reactions are chemical reactions that release energy by light or heat.

• In an exothermic reaction, the energy released in the form of heat is greater than the energy absorbed during the reaction.

• Common examples of exothermic reactions include combustion reactions, such as burning wood or fossil fuels, and many oxidation reactions.

• These reactions are characterized by a negative change in enthalpy ($\Delta H < 0$), indicating that energy is being released.

Additional Information

• Endothermic Reaction

• An endothermic reaction is a chemical reaction that absorbs energy from its surroundings, usually in the form of heat.

• These reactions are characterized by a positive change in enthalpy ($\Delta H > 0$), indicating that energy is being absorbed.

• An example of an endothermic reaction is the process of photosynthesis in plants.

• Sigma Tropic Reactions

• Sigma tropic reactions are a class of pericyclic reactions where a sigma bond adjacent to one or more pi systems shifts to a new position in the molecule, resulting in a new sigma bond.

• These reactions are typically involved in organic transformations and are governed by the Woodward-Hoffmann rules.

• Rearrangement Reactions

• Rearrangement reactions involve the reorganization of the structure of a molecule, leading to a different isomer.

• These reactions can involve shifts of atoms or groups within a molecule and often occur via a series of intermediate steps.

• Examples include the Wagner-Meerwein rearrangement and the Beckmann rearrangement.

The correct answer is Option 2: Both the statements (I) and (II) are not related..

Q69. Answer: (d) 10%

Shortcut Trick

When a sum of money doubles itself, the Simple Interest (SI) earned is exactly 100% of the Principal.

Shortcut Formula: Rate (R) = 100 ÷ Time (T)

R = 100 ÷ 10

R = 10%

Therefore The correct answer is 10%.

Alternate Method

Given:

Let Principal (P) = Rs. 100

Since the sum doubles, Amount (A) = Rs. 200

Time (T) = 10 years

Formula Used:

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

Calculations:

=> SI = Amount − Principal

=> SI = 200 − 100 = Rs. 100

=> 100 = (100 × R × 10) ÷ 100

=> 100 = 10 × R

=> R = 100 ÷ 10

=> R = 10%

Therefore The correct answer is 10%.

Additional Information

General Formula for 'n' times

If a sum becomes n times itself in T years at Simple Interest, then the Rate (R) = [(n − 1) × 100] ÷ T.

Simple Interest vs Compound Interest

In Simple Interest, the interest remains constant every year as it is always calculated on the original principal.

Time to Triple

To find the time (T) required for a sum to triple (n=3) at a given rate (R): T = 200 ÷ R.

Q70. Answer: (d) 4

Given equation: 21 + 7 - 3 ÷ 20 × 5 = ?

Decoding the given information :

Symbol	•	•	×	÷
Means	•	×	÷	•

Now, replacing the sign from left to right and using BODMAS rule, we get :

New equation : 21 - 7 × 3 + 20 ÷ 5 = ?

Calculation :

=> 21 - 7 × 3 + 20 ÷ 5 = ?

=> 21 - 7 × 3 + 4 = ?

=> 21 - 21 + 4 = ?

=> 25 - 21 = 4.

Hence, the correct answer is "Option 4".

Q71. Answer: (b) 2

Shortcut Trick

A Prime Number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Numbers list: 1 (neither prime nor composite), 2 (first prime), 3 (second prime), 4 (composite)...

The smallest prime number is 2, which is also the only even prime number.

Therefore The correct answer is 2.

Alternate Method

Given: A set of natural numbers to identify the smallest prime.

Definition: Prime numbers must have exactly two distinct factors: 1 and the number itself.

=> Number 1: Factors are {1}. Only 1 factor, so it is not prime.

=> Number 2: Factors are {1, 2}. Exactly 2 factors, so it is prime.

=> Number 3: Factors are {1, 3}. Exactly 2 factors, so it is prime.

=> Comparing 2 and 3, 2 is the smallest value.

Therefore The correct answer is 2.

Additional Information

Even Prime Number

The number 2 is the only even prime number in the entire number system; all other prime numbers are odd.

Co-prime Numbers

Two numbers are called co-prime if their Highest Common Factor (HCF) is 1. They do not necessarily have to be prime individually.

Composite Numbers

Numbers with more than two factors are called composite numbers. The smallest composite number is 4.

The Number 1

The number 1 is a unique number that is neither prime nor composite.

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Q72. Answer: (c) 133

The logic followed here is:

Logic: (1st number × 2) - 1 = 2nd number.

For, 58 : 115

=> (58 × 2) - 1

=> 116 - 1 = 115.

For, 47 : 93

=> (47 × 2) - 1

=> 94 - 1 = 93.

Similarly, for 67 : ?

=> (67 × 2) - 1

=> 134 - 1 = 133.

Hence, the correct option is "Option 3"

Q73. Answer: (d) 750 W

The correct answer is 750 W.

Key Points

• Given Values:

• Heat produced (Q) = 60 kJ = 60000 J

• Time Taken: The given time is 1 minute and 20 seconds, which equals 80 seconds.

• Formula for Power:

• Power is calculated as the total heat divided by time.

• Power (P) = Q / t

• Substitute the Values:

• P = 60000 / 80

• Calculating the Power:

• P = 750 W

Additional Information

• Power is the rate at which energy is transferred or converted and is measured in watts (W).

• Heat is a form of energy, and its rate of transfer determines the power of the system.

• The SI unit of power is the watt (W), where 1 watt equals 1 joule per second.

• The heat generated in devices like heaters depends on current, resistance, and voltage.

• Power ratings of electrical appliances help determine their energy consumption and operational efficiency.

• Understanding power and heat transfer is crucial in designing efficient heating systems and optimizing energy usage.

Q74. Answer: (d) One

Given: 167, 876, 567, 187, 873

Now, 11 is subtracted from each of the following numbers:

167 - 11 = 156,

876 - 11 = 865,

567 - 11 = 556,

187 - 11 = 176,

873 - 11 = 862,

If the digits of each number are written in reverse order:

Number	Number - 11	Digits of each number are written in reverse order
167	156	651
876	865	568
567	556	655
187	176	671

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873	862	268

And now, the numbers are arranged in ascending order:

Original Position	Number	Reversed	New Position
1st	167	651	3rd
2nd	876	568	2nd Yes (unchanged)
3rd	567	655	4th
4th	187	671	5th
5th	873	268	1st

So, the position of 'one' numbers will NOT change.

The correct answer is "Option 4".

Q75. Answer: (c) AL : FO

The logic followed here is:

For, HP : MS

For, DL : IO

Similarly, for AL : FO

Hence, the correct answer is "Option 3".

Q76. Answer: (c) appear to diverge from a point at a distance 1 m behind the mirror

The correct answer is Option 3: appear to diverge from a point at a distance 1 m behind the mirror.

Key Points

• A convex mirror is also known as a diverging mirror.

• When parallel rays of light strike a convex mirror, they appear to diverge from a single point behind the mirror.

• This point is called the focal point, and the distance from the mirror's surface to this point is called the focal length (f).

• For a convex mirror, the focal length is considered positive, and the focal point is virtual as the light rays do not actually converge there.

Additional Information

• Convex Mirror:

• A convex mirror is a spherical mirror in which the reflective surface bulges outwards.

• It is used in various applications like vehicle rearview mirrors and in surveillance.

• Focal Length (f):

• The focal length is the distance between the mirror's surface and the focal point.

• For a convex mirror, the focal length is positive and virtual.

• Virtual Image:

• A virtual image is formed when the reflected rays appear to diverge from a point behind the mirror.

• Virtual images cannot be projected on a screen as the light rays do not actually meet.

• Diverging Mirror:

• Convex mirrors are also known as diverging mirrors because they spread out light rays that are initially parallel when they reflect off the mirror.

The correct answer is Option 2: Both the statements (I) and (II) are not related..

Q77. Answer: (a) Condom

The correct answer is Condom.

Key Points

• Condoms are a barrier method of contraception that can prevent both unwanted pregnancies and sexually transmitted diseases (STDs).

• They work by preventing sperm from entering the vagina, thereby preventing fertilization.

• Condoms also act as a barrier to viruses and bacteria that cause STDs, including HIV.

• They are available for both males and females and are one of the most accessible and cost-effective methods of contraception.

Additional Information

• Oral Pills:
• Oral contraceptive pills are taken by women to prevent pregnancy.
• They contain hormones that inhibit ovulation and thicken cervical mucus to prevent sperm from reaching an egg.
• While effective in preventing pregnancy, they do not offer any protection against STDs.
• Surgical Method:
• Surgical methods such as vasectomy in men and tubal ligation in women are permanent methods of contraception.
• These procedures involve cutting or sealing the reproductive tubes to prevent sperm and egg from meeting.
• They do not offer protection against STDs.
• Copper-T:
• Copper-T is a type of intrauterine device (IUD) used by women to prevent pregnancy.
• It is a small T-shaped device inserted into the uterus that releases copper to prevent fertilization and implantation of an egg.
• It does not provide protection against STDs.
The correct answer is Both the statements (I) and (II) are not related.

Q78. Answer: (b) 102/7

Shortcut Trick
Total Work (LCM of 14, 18) = 126 units.
Efficiency of A = 9 units/day, Efficiency of B = 7 units/day.
A works for 6 days: 9 × 6 = 54 units done.
Remaining work: 126 − 54 = 72 units.
Days for B = 72 ÷ 7 = 10 2/7 days.
Therefore The correct answer is 10 2/7 days.
Alternate Method
Given: Time taken by A = 14 days, Time taken by B = 18 days.
Formula Used: Total Work = Efficiency × Time; Remaining Work = Total Work − Completed Work.

Person	Days	Total Work	Efficiency
A	14	126	9
B	18	7	

Calculations:
=> Work completed by A in 6 days = 9 × 6 = 54 units
=> Remaining Job = 126 − 54 = 72 units
=> Days required by B to complete remaining work = 72 ÷ 7
=> Time = 10 2/7 days
Therefore The correct answer is 10 2/7 days.
Additional Information
Work-Efficiency Relationship
Efficiency is inversely proportional to the time taken to complete a job. If A is twice as efficient as B, A will take half the time of B.
Fractional Work Method
If a person completes a job in 'D' days, work done in 1 day = 1/D. Total work is always considered as 1 unit.
Pipes & Cisterns Analogy
This concept is identical to inlet pipes filling a tank, where work done is equivalent to the volume of the tank.

Q79. Answer: (b) Substances that are not broken down by biological processes

The correct answer is Substances that are not broken down by biological processes.
Key Points
• Non-biodegradable substances are materials that cannot be decomposed by natural biological processes.
• These substances tend to persist in the environment for a long time, often causing pollution.
• Common examples include plastics, synthetic chemicals, and certain types of metals.
• Managing non-biodegradable waste is crucial for environmental protection and sustainability.
Additional Information
• Biodegradable Substances:

• These are materials that can be broken down by microorganisms into simpler, non-toxic substances.
• Common examples include food scraps, paper, and natural fibers like cotton and wool.
• Biodegradation is a crucial process in the natural recycling of organic matter.
• Proper waste management of biodegradable substances helps reduce landfill use and greenhouse gas emissions.
• Environmental Impact of Non-Biodegradable Substances:
• Non-biodegradable waste contributes significantly to environmental pollution.
• Plastics, in particular, can cause harm to wildlife and marine life.
• These substances often accumulate in landfills, leading to soil and water contamination.
• Efforts to reduce the use of non-biodegradable materials include recycling, using alternative materials, and promoting sustainable practices.
• Recycling and Waste Management:
• Recycling is the process of converting waste materials into new materials and objects.
• Effective waste management involves reducing, reusing, and recycling materials to minimize environmental impact.
• Governments and organizations are increasingly promoting recycling programs to manage non-biodegradable waste effectively.
• Public awareness and participation are essential for the success of recycling and waste management initiatives.

Q80. Answer: (d) revenue receipt

The correct answer is revenue receipt.

Key Points

• Revenue receipts are the income that the government receives from its normal, day-to-day activities.
• These include tax revenues such as income tax, corporate tax, excise duty, and non-tax revenues such as interest receipts, dividends, and profits from public sector enterprises.
• Cash Grant-in-Aid from foreign countries and international organizations are considered as non-tax revenues under revenue receipts.
• Revenue receipts do not create any liability or lead to a reduction in assets.

Additional Information

• Non-Planned Revenue Receipt
• Non-planned revenue receipts are those which are not included in the planned revenue receipts of the government.
• These include items like interest receipts, dividends and profits from public sector enterprises, and other non-tax revenues.
• Planned Revenue Income
• Planned revenue income refers to the income that is expected to be received as per the budgetary plans of the government.
• It includes both tax and non-tax revenues that have been planned for in the budget.
• Capital Receipt
• Capital receipts are the income received by the government that either creates liabilities or reduces the assets of the government.
• Examples include loans from the public, foreign governments, or international organizations, and disinvestment proceeds.

Q81. Answer: (a) a renewable resource

The correct answer is a renewable resource.

Key Points

• The Chipko Andolan, or Chipko Movement, was primarily an environmental movement in India.
• The movement was aimed at protecting trees from being cut down by contractors and loggers.
• Women played a significant role in this movement, emphasizing the conservation of forests as a renewable resource.
• Forests are considered a renewable resource because they can regrow and provide ecological benefits over time if managed sustainably.

Additional Information

• Chipko Movement:
• Started in the early 1970s in the Garhwal Himalayas of Uttarakhand, India.
• The name "Chipko" means "to hug" or "to cling to," reflecting the method of protest where villagers, especially women, hugged trees to prevent them from being cut down.
• The movement led to a ban on the felling of trees in the Himalayan regions for 15 years, allowing the forests to regenerate.
• Renewable Resources:
• Resources that can be replenished naturally over short periods of time.

• Examples include sunlight, wind, water, and biomass.

• Renewable resources are crucial for sustainable development as they reduce dependency on non-renewable resources, which can be depleted.

• Importance of Forests:

• Forests play a critical role in maintaining ecological balance and supporting biodiversity.

• They act as carbon sinks, absorbing CO2 from the atmosphere and mitigating climate change.

• Forests provide livelihood to millions of people, especially in rural areas, through resources like timber, fruits, and medicinal plants.

Q82. Answer: (c) T

Given: P, Q, R, S, T, X, Y and Z are sitting around a square table facing the centre of the table (but not necessarily in the same order).

Some of them are sitting at the corners while some are sitting at the exact centre of the sides.

If S, T, Y and Z are sitting at the exact center of the sides of the table,

1) Z who is to the immediate left of R, has P as immediate neighbours.

2) S is the immediate neighbor of Q and X.

3) Y does not have X and P as his immediate neighbours.

And, T sits at the remaining place.

So, 'T' is sitting to the immediate right of X.

Hence, the correct answer is "Option 3".

Q83. Answer: (c) starch

The correct answer is starch.

Key Points

• Salivary amylase is an enzyme found in the saliva of humans and some other animals.

• It begins the process of digesting starch, breaking it down into simpler sugars such as maltose and dextrin.

• Starch digestion by salivary amylase starts in the mouth and continues until the enzyme is inactivated by stomach acid.

• Salivary amylase is produced by the salivary glands, including the parotid, submandibular, and sublingual glands.

Additional Information

• Enzyme: A protein that acts as a catalyst to speed up chemical reactions in the body, including digestion.

• Starch: A complex carbohydrate found in foods like potatoes, rice, and bread that is broken down into glucose by enzymes like amylase for energy.

• Maltose: A disaccharide sugar produced by the breakdown of starch by amylase; consists of two glucose units.

• Dextrin: Intermediate products of the breakdown of starch by amylase, consisting of varying lengths of glucose chains.

Q84. Answer: (c) 2015

The correct answer is 2015.

Key Points

• Mission Vatsalya is an initiative by the Government of India to ensure the welfare and protection of children.

• The Juvenile Justice (Care and Protection of Children) Act, 2015, provides a framework for the care, protection, and rehabilitation of children in need.

• The 24×7 helpline service under Mission Vatsalya aims to provide immediate assistance and support to children in distress.

• This initiative will be executed in partnership with states and districts to ensure effective implementation and reach.

Additional Information

• Juvenile Justice (Care and Protection of Children) Act, 2015

• This Act was enacted to consolidate and amend the law relating to children alleged and found to be in conflict with the law and children in need of care and protection.

• It aims to cater to their basic needs through proper care, protection, development, treatment, and social re-integration.

• The Act provides for the establishment of Child Welfare Committees and Juvenile Justice Boards in each district.

• It also emphasizes the rehabilitation and social re-integration of children through various child care institutions.

• Mission Vatsalya

• Mission Vatsalya is an umbrella scheme for child protection services in India.

• It focuses on the welfare of children in difficult circumstances, ensuring their rights and protection.

• The mission includes a range of services such as foster care, adoption, and sponsorship to support the holistic development of

children.

• It also aims to strengthen the child protection mechanism at the district and state levels.

• Childline 1098

• Childline 1098 is a 24x7, free, emergency phone service for children in need of aid and assistance.

• The service is managed by Childline India Foundation and operates across various cities and districts in India.

• It aims to reach out to children in distress and provide them with immediate assistance, counseling, and rehabilitation services.

• Childline 1098 works in collaboration with government bodies, NGOs, and other stakeholders to ensure the safety and well-being of children.

Q85. Answer: (a) Midnapore

The correct answer is Midnapore.

Key Points

• The Arabari forest is located in the Midnapore district of West Bengal, India.

• It is known for its success in joint forest management and community-based forest conservation.

• The forest covers an area of 1,272 hectares and is predominantly comprised of Sal trees.

• Arabari forest has become a model for forest management practices in India.

Additional Information

• Arabari Forest:

• The Arabari forest is located in the Midnapore district of the Indian state of West Bengal.

• It became famous due to the pioneering efforts in joint forest management (JFM) initiated by the forest department in the 1970s.

• JFM is a concept where the local community is involved in the protection and management of forests, and in return, they receive a share of the benefits derived from these forests.

• The Arabari model of JFM has been replicated in various parts of India and has helped in the regeneration and conservation of degraded forests.

Q86. Answer: (b) R V A M Y

Given:

Number/Symbol	**2**	**6**	**%**	**@**	**?**	**4**	**<**	**3**	**7**	**=**	**!**	**&**	**9**	**8**
Code	K	S	R	T	U	M	W	Y	A	V	C	X	E	B

Conditions	**Coded As**
First element is a number and the last a symbol	Codes for these two (the first and the last elements) are to be interchanged
First element is an even number and the last an odd number	First and last elements are to be coded as Ø
Second and Third elements are perfect squares	Third element is to be coded as the code for the second element

Now, the group of numbers and symbols is: '3 = 7 4 %'

Here, Here, First conditions followed in the given group,

So, codes of the First and Last elements are to be interchanged.

Then, the code for '3 = 7 4 %' is → 'R V A M Y'.

Hence, the correct answer is "Option 2".

Q87. Answer: (a) It exerts a suction force.

The correct answer is It exerts a suction force..

Key Points

• Transpiration is the process by which water vapor is lost from the aerial parts of the plant, primarily through the stomata of leaves.

• This process creates a negative pressure (suction force) in the leaf's air spaces, which pulls water from the roots up through the xylem vessels.

• Water molecules stick together due to cohesion and stick to the walls of xylem vessels due to adhesion, aiding in water transport.

• Transpiration helps in the upward movement of water and dissolved nutrients from the roots to the leaves, known as the

transpiration pull.

Additional Information

• Xylem

• Xylem is one of the two types of transport tissue in vascular plants, the other being phloem.

• The primary function of xylem is to transport water and nutrients from the roots to the shoots and leaves.

• Xylem tissue consists of tracheids, vessel elements, xylem parenchyma, and xylem fibers.

• Stomata

• Stomata are tiny openings or pores in plant tissue that allow for gas exchange.

• They are found primarily on the surface of leaves.

• Stomata play a critical role in the process of transpiration and photosynthesis.

• Cohesion-Tension Theory

• This theory explains the mechanism of water movement from roots to leaves in plants.

• According to this theory, water is pulled up the xylem vessels by the cohesive forces between water molecules and the tension created by transpiration.

• This continuous column of water is maintained due to the cohesive properties of water molecules.

• Adhesion

• Adhesion refers to the attraction between water molecules and the walls of xylem vessels.

• This property helps in the upward movement of water against gravity.

Q88. Answer: (c) Only conclusion II follows

Given Statement: $B \leq L \leq U = A > D > E$

Now,

Conclusions:

(i) $B < D \rightarrow$ False ($B \leq L \leq U = A > D$ No relation can be established between B and D)

(ii) $A \geq B \rightarrow$ True ($B \leq L \leq U = A$ It gives $B \leq A$)

Here, Only conclusion II follows.

Hence, the correct answer is "Option 3".

Q89. Answer: (c) 38.75

Shortcut Trick

Identify the sum of all observations: 10 + 15 + 30 + 100 = 155.

Identify the total number of observations: 4.

Calculate Average directly: 155 ÷ 4 = 38.75.

Therefore The correct answer is 38.75.

Alternate Method

Given:

Observations = 10, 15, 30, 100

Total count (n) = 4

Formula Used:

Average (μ) = (Sum of all observations) ÷ (Total number of observations)

Calculations:

=> Sum = 10 + 15 + 30 + 100

=> Sum = 155

=> Average = 155 ÷ 4

=> Average = 38.75

Therefore The correct answer is 38.75.

Additional Information

Properties of Average

If every observation is increased or decreased by a constant k, the mean also increases or decreases by k.

Weighted Average

When groups have different sizes, the combined average is calculated as (n1x1 + n2x2) ÷ (n1 + n2).

Arithmetic Progression (AP) Average

For a series in AP, the Average is always the middle term or (First term + Last term) ÷ 2.

Q90. Answer: (d) Only conclusion I follows

Given Statements:

Some chains are knives.

All knives are cats.

All cats are rats.

The least possible Venn diagram for the given statement is:

Conclusions:

I. Some rats are chains - True (Because, Those part of rats which is knives will also chains).

II. All rats are knives - False (Because, All knives are rats, but All rats are knives can be possible only).

So, Only conclusions I follows.

Hence, the correct answer is "Option 4".

Q91. Answer: (d) H2CO3 and NaOH

The correct answer is H2CO3 and NaOH.

Key Points

• Sodium hydrogen carbonate, also known as baking soda, is formed from the reaction of carbonic acid (H2CO3) and sodium hydroxide (NaOH).

• Carbonic acid (H2CO3) is a weak acid formed when carbon dioxide (CO2) dissolves in water (H2O).

• Sodium hydroxide (NaOH) is a strong base commonly used in various chemical reactions and industrial processes.

• The chemical reaction for the formation of sodium hydrogen carbonate is:

H2CO3 + NaOH → NaHCO3 + H2O

Additional Information

• Carbonic Acid (H2CO3)

• Carbonic acid is a weak acid that is formed when carbon dioxide (CO2) is dissolved in water (H2O).

• It plays a crucial role in the carbon cycle and is involved in the formation of caves and limestone structures.

• Carbonic acid is also present in carbonated beverages, giving them their fizz.

• Sodium Hydroxide (NaOH)

• Sodium hydroxide, also known as lye or caustic soda, is a strong base used in various industrial processes such as paper manufacturing, soap making, and water treatment.

• It is highly corrosive and can cause severe burns upon contact with skin or eyes.

• NaOH is commonly used in laboratories for titrations and pH adjustments.

• Sodium Hydrogen Carbonate (NaHCO3)

• Sodium hydrogen carbonate, commonly known as baking soda, is a white crystalline powder that is often used in baking as a leavening agent.

• It reacts with acids to produce carbon dioxide gas, which helps dough rise.

• NaHCO3 is also used in various household cleaning products and as an antacid to relieve heartburn and indigestion.

Q92. Answer: (a) $P = I^2R$

The correct answer is $P = I^2R$.

Key Points

• Ohm's Law states that the current through a conductor between two points is directly proportional to the voltage across the two points.

• The formula $P = I^2R$ comes from the combination of Ohm's Law ($V = IR$) and the formula for power ($P = VI$).

• By substituting V from Ohm's Law ($V = IR$) into the power formula ($P = VI$), we get $P = I^2R$.

• This formula is used to calculate the power dissipated in a resistor when the current flowing through it is known.

Additional Information

• Power (P):

• Power is the rate at which electrical energy is transferred by an electric circuit. The SI unit of power is the watt (W).

• In electrical circuits, power can be calculated using the formula $P = VI$, where V is the voltage and I is the current.

• Voltage (V):

• Voltage is the electrical potential difference between two points in a circuit. It is the force that pushes electric charges to flow through a conductor. The SI unit of voltage is the volt (V).

• Current (I):
• Current is the flow of electric charge in a conductor. It is measured in amperes (A).
• According to Ohm's Law, current (I) can be calculated using the formula I = V/R, where V is the voltage and R is the resistance.
• Resistance (R):
• Resistance is a measure of the opposition to the flow of current in a conductor. It is measured in ohms (Ω).
• Resistance can be calculated using the formula R = V/I, where V is the voltage and I is the current.

Q93. Answer: (c) 2013

Calculation:
Total number of students called for the interview in year 2012 = 110 + 100 + 120 = 330
Total number of students called for the interview in year 2013 = 122 + 110 + 150 = 382
Total number of students called for the interview in year 2014 = 108 + 100 + 120 = 328
Total number of students called for the interview in year 2015 = 100 + 92 + 90 = 282
Total number of students called for the interview in year 2016 = 80 + 100 + 104 = 284
Therefore Total number of students called for the interview was highest in year 2013.

Q94. Answer: (a) $

Given terms: (Left) Z # U * Y $ K W P Q @ G & A % J B L % & H D # V (Right)
Here,
Eighteenth letter/symbol from the left end: L (Z # U * Y $ K W P Q @ G & A % J B L % & H D # V)
And, twelfth letter/symbol to the left of L is: $ (Z # U * Y $ K W P Q @ G & A % J B L % & H D # V)
So, the twelfth letter/symbol to the left of the eighteenth letter/symbol from the left end of the given series are: '$'.
Hence, the correct answer is "Option 1".

Q95. Answer: (a) North-east

Given:
Y is to the south of X and Z is to the east of X.
So, Z is at the 'North-east' direction with respect to Y.
Hence, the correct answer is "Option 1".

Q96. Answer: (b) 139

Shortcut Trick
Prime numbers (11 to 20): 11, 13, 17, 19
Sum1 = 11 + 13 + 17 + 19 = 60
Prime numbers (30 to 50): 31, 37, 41, 43, 47
Sum2 = 31 + 37 + 41 + 43 + 47 = 199
Difference = 199 − 60 = 139
Therefore The correct answer is 139.
Alternate Method
Given: Intervals are [11, 20] and [30, 50].
Step 1: List Prime numbers between 11 and 20.
=> Primes = {11, 13, 17, 19}
=> Sum1 = 11 + 13 + 17 + 19 = 60
Step 2: List Prime numbers between 30 and 50.
=> Primes = {31, 37, 41, 43, 47}
=> Sum2 = 31 + 37 + 41 + 43 + 47 = 199
Step 3: Find the positive difference.
=> Difference = 199 − 60
=> Difference = 139
Therefore The correct answer is 139.
Additional Information
Definition of Prime Numbers
A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Properties of Primes

2 is the only even prime number. All other prime numbers are odd. The smallest prime number is 2.

Checking for Primes

To check if N is prime, test divisibility by primes up to √N. For 50, we check primes up to 7 (2, 3, 5, 7).

Q97. Answer: (d) No real roots

Shortcut Trick

Identify the nature of roots by calculating the Discriminant ($D = b^2 - 4ac$).

For $3x^2 - 4x + 10 = 0$, we have $a = 3$, $b = -4$, $c = 10$.

$D = (-4)^2 - 4 \times 3 \times 10 = 16 - 120 = -104$.

Since $D < 0$, the quadratic equation has no real roots.

Therefore The correct answer is No real roots.

Alternate Method

Given: The quadratic equation is $3x^2 - 4x + 10 = 0$.

Formula Used: For a quadratic equation $ax^2 + bx + c = 0$, the nature of roots is determined by $D = b^2 - 4ac$.

=> Here, $a = 3$, $b = -4$, and $c = 10$.

=> $D = (-4)^2 - 4 \times 3 \times 10$

=> $D = 16 - 120$

=> $D = -104$

=> Since the Discriminant (D) is negative ($D < 0$), the roots are complex/imaginary.

Therefore The correct answer is No real roots.

Additional Information

Nature of Roots Summary

1. If $D > 0$: Two distinct real roots. 2. If $D = 0$: Two equal real roots. 3. If $D < 0$: No real roots (imaginary roots).

Quadratic Formula

The roots are given by $x = [-b \pm \sqrt{(b^2 - 4ac)}] / 2a$. The term inside the square root is the Discriminant.

Sum and Product of Roots

For $ax^2 + bx + c = 0$, the Sum of roots $(\alpha + \beta) = -b/a$ and the Product of roots $(\alpha\beta) = c/a$.

Q98. Answer: (a) 29

The logic followed here is:

So, '29' will replace the question mark in the given series.

Hence, the correct answer is "Option 1".

Q99. Answer: (d) Tiger

The correct answer is Tiger.

Key Points

- The insignia of the Reserve Bank of India (RBI) features a strong and majestic tiger.
- This symbol was chosen to reflect the strength and resilience of the Indian economy.
- The tiger in the RBI logo is depicted standing under a palm tree.
- The insignia signifies the RBI's commitment to the economic welfare of the country and its role as a central banking institution.

Additional Information

- Reserve Bank of India (RBI)
- The Reserve Bank of India is India's central banking institution, which controls the issuance and supply of the Indian rupee.
- It commenced its operations on 1 April 1935 in accordance with the Reserve Bank of India Act, 1934.
- The RBI plays a crucial role in the development strategy of the Government of India.
- It is responsible for regulating the country's currency and credit systems to ensure monetary stability and economic growth.
- Central Bank
- A central bank is an institution that manages a state's currency, money supply, and interest rates.
- Central banks also oversee the commercial banking system of their respective countries.
- Examples include the Federal Reserve in the United States, the European Central Bank (ECB), and the Bank of England (BoE).
- Central banks conduct monetary policy to achieve goals like controlling inflation, managing employment levels, and maintaining financial stability.

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• Monetary Policy

• Monetary policy refers to the actions undertaken by a central bank to control the money supply and achieve macroeconomic goals such as inflation control, consumption, growth, and liquidity.

• It involves the management of interest rates and the total supply of money in circulation.

• Tools of monetary policy include open market operations, reserve requirements, and interest rate changes.

• Effective monetary policy helps stabilize the economy and promotes sustainable growth.

Q100. Answer: (a) Saint Thomas

The correct answer is Saint Thomas.

Key Points

• Saint Thomas, also known as Doubting Thomas, is believed to be one of the twelve apostles of Jesus Christ who brought Christianity to India.

• According to tradition, he arrived in India in AD 52 and preached the gospel, establishing several churches.

• His missionary work is particularly associated with the region of Kerala, on the southwestern coast of India.

• Saint Thomas is said to have been martyred near Chennai (formerly Madras) and is commemorated in various Christian traditions.

Additional Information

• Christianity in India

• Christianity is India's third-largest religion, with about 2.3% of the population identifying as Christians.

• The faith has a long history in India, with traditions dating back to the arrival of Saint Thomas.

• Various Christian denominations exist in India, including Roman Catholic, Protestant, and Orthodox churches.

• Kerala, Goa, and northeastern states have significant Christian populations, with many communities tracing their heritage back to early missionaries.

• Historical Context

• Saint Thomas's arrival in India coincided with the early spread of Christianity in the first century AD.

• This period saw the establishment of Christian communities in the Roman Empire and beyond.

• Saint Thomas's mission in India is part of the larger history of the apostolic age, when the apostles spread the teachings of Jesus worldwide.

• Saint Thomas's Legacy

• Saint Thomas is venerated as a saint in various Christian traditions, including the Roman Catholic, Eastern Orthodox, and Anglican churches.

• His feast day is celebrated on July 3rd, known as Saint Thomas Day.

• Several churches and places of pilgrimage in India are dedicated to his memory, reflecting his lasting influence on Indian Christianity.

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