RRB Group D Previous Year Paper (Held on: 15 Sept 2022 Shift 1)

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

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CBT

Q1. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

6 : 64 :: 11 : 169 :: 8 ?

(a) 72
(b) 70
(c) 81
(d) 100

Q2. Which one of the following is the official language of Goa?

(a) Kokborok
(b) Khamti
(c) Konkani
(d) Tamang

Q3. Find the value of cos² 12°+cos² 23° over2(sin²78°+sin²67°).

(a) 1over2
(b) 1
(c) 0
(d) 2

Q4. The greatest number which divides 1876, 12503, and 6877 leaving remainders 1, 3, and 2, respectively, is:

(a) 555
(b) 655
(c) 675
(d) 625

Q5. Which of the following elements does NOT belong to period 3 of the Modern Periodic Table?

(a) Ar
(b) Ge
(c) S
(d) Al

Q6. Who among the following founded the Satyashodhak Samaj?

(a) Jyotirao Phule
(b) Swami Dayanand Saraswati
(c) Narayana Guru
(d) Ishwarchandra VIdyasagar

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Q7. The Jewish festival of lights is called:

(a) Nauroj
(b) Anthurium
(c) Hanukkah
(d) Hornbill

Q8. Write the expanded form of $(3a + 4b + 5c)^2$.

(a) $9a^2 + 16b^2 + 25c^2 + 24ab + 40bc + 50ac$
(b) 9a2 + 16b2 + 25c2 + 24ab + 40bc + 60ac
(c) 9a2 + 16b2 + 25c2 + 24ab + 40bc + 30ac
(d) 9a2 + 16b2 + 25c2 + 24ab + 40bc + 40ac

Q9. A cricket club bought 12 bats and 18 balls for Rs. 2,100. After a few days, the cost of the same types of 8 bats and 22 balls purchased at the same rates was Rs. 1,900. The cost of a bat is:

(a) Rs. 150
(b) Rs. 50
(c) Rs. 200
(d) Rs. 100

Q10. The area of a square plot is 2916 m^2. The length of each side of the plot (in m) is

(a) 64
(b) 58
(c) 54
(d) 44

Q11. Electric energy consumed in one second is:

(a) work
(b) potential energy
(c) current
(d) power

Q12. In which of the following years was Shaktikanta Das appointed as the Reserve Bank of India's Governor?

(a) 2018
(b) 2019
(c) 2017
(d) 2020

Q13. In a code language, 'weather is cool' is written as 'nu vu du', 'temperature cool now' is written as 'hu du ru' and 'temperature is high' is written as 'tu vu ru'. What is the code for the word 'high' in that language?

(a) ru
(b) vu
(c) tu
(d) du

Q14. Baking powder is a mixture of:

(a) baking soda + strong base
(b) baking soda + mild edible acid
(c) baking soda + strong acid
(d) baking soda + weak base

Q15. This question is based on the five, three-digit numbers given below.

(Left) 986 432 631 387 267 (Right)

(Example- 123 - First digit = 1, second digit = 2 and third digit = 3)

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

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

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number?

(a) 11
(b) 9
(c) 12
(d) 10

Q16. The Supreme Court and High Courts have power to issue writs in the nature of habeas corpus, quo warranto, mandamus, certiorari, prohibition, etc., under _____.

(a) Articles 32 and 226, respectively
(b) Articles 42 and 26, respectively
(c) Articles 26 and 42, respectively
(d) Articles 226 and 32, respectively

Q17. The following table shows the sales of different brands of mobiles of a shop during the years 2018-2020. Study the table and answer the question.

Year	Brand (in thousands)		
A	S	M	
2018	175	388	112
2019	312	401	146
2020	202	255	126

What is the percentage decrease in the sales of brand S from the year 2019 to 2020?

(a) 57.25%
(b) 36.40%
(c) 38.32%
(d) 53.62%

Q18. Select the option that is related to the fifth letter-cluster in the same way as the second letter-cluster is related to the first letter-cluster and the fourth letter-cluster is related to the third letter-cluster.

MODERN : RONMED :: GERMAN : AENGMR :: JUNIOR : ?

(a) OURJNI
(b) OUJRIN
(c) OURJIN
(d) ORUJIN

Q19. Which of the following tissues is found below the skin and between the internal organs?

(a) Epithelial tissue
(b) Nervous tissue
(c) Muscular tissue
(d) Adipose tissue

Q20. Who among the following was a renowned Indian Statistician, and was instrumental in formulating India's strategy for Industrialisation in the Second Five Year Plan?

(a) Prasant Chandra Mahalanobis
(b) Jagdish Natwarlal Bhagwati
(c) Prof. VKRV Rao
(d) VR Gadgil

Q21. 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 chairs are tables.

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Some tables are pens.

All pens are inks.

Conclusions:

(I) Some chairs are pens.

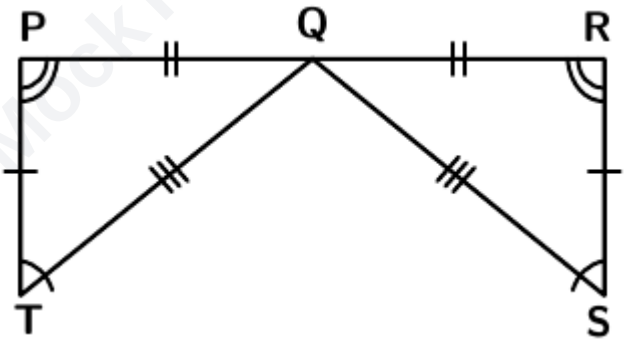
(II) Some tables are inks.

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

Q22. An object is placed on the principal axis of a lens of power 2.0 D, at a distance of 10 cm. The image formed is _____.

(a) virtual and inverted
(b) real and inverted
(c) virtual and erect
(d) real and erect

Q23. As per the figure given below, ΔQRS ~= _____. [Note: Diagram is not drawn to scale or measurements indicated.]



(a) ΔTPQ
(b) ΔQPT
(c) ΔPTQ
(d) ΔQTP

Q24. Who among the following was conferred the Dhyan Chand Award for life time achievement in sports for the year 2021 in the chess discipline?

(a) Abhijeet Kunte
(b) Pritam Siwach
(c) Sandhya Gurung
(d) Radhakrishnan Nair

Q25. During the first year, the population of a town increased by 10% and in the second year it diminished by 10%. At the end of the second year its population was 4,73,220. The population at the beginning of the first year was:

(a) 4,78,800
(b) 4,78,880
(c) 4,78,000
(d) 4,78,780

Q26. In this question, a statement is followed by two conclusions. Which of the two conclusions is/are true with respect to the statement?

Statement:

$N < L > J < K > I = H \leq G$

Conclusion:

I. J = G

II. K > H

(a) Both conclusions I and II are true
(b) Neither conclusion I nor II is true
(c) Only conclusion I is true
(d) Only conclusion II is true

Q27. Priyanka Nutakki is related to which of the following sports events?

(a) Hockey
(b) Badminton
(c) Chess
(d) Wrestling

Q28. How many years will it take for a certain sum to get doubled at the rate of 61/4% simple interest per annum?

(a) 6.25
(b) 8.4
(c) 16
(d) 4

Q29. Refer to the following letter, symbol series and answer the question.

R # A $ G H K % T B M & N Y ÷ X B / L Q @ D

If the second symbol and third letter from the left end of series are combined with the fifth and six terms from the right end of the series, then what letter symbol combination will be formed?

(a) $ L B
(b) $ # B X
(c) $ G / B
(d) A / B

Q30. In which of the following states is the concentration of Buddhism the largest as per 2011 Census data?

(a) Uttarakhand
(b) Maharashtra
(c) Goa
(d) Andhra Pradesh

Q31. A man sells two articles for Rs. 20,000 each. He gets a profit of 15% on one article and loses 15% on the other article. What is his overall profit or loss (to the nearest integer) in this transaction?

(a) Rs. 921 loss
(b) Rs. 921 profit
(c) Rs. 1,021 loss
(d) Rs. 1,021 profit

Q32. For a spherical mirror, the distance between the pole and the centre of the curvature is:

(a) half of the radius of curvature
(b) twice the distance between pole and F
(c) equal to the distance between c and F
(d) equal to the focal length

Q33. Which of the following states has the oldest operating oil refinery in India since 1901?

(a) Madhya Pradesh
(b) Assam
(c) West Bengal
(d) Mumbai

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Q34. Ashish went 1 km straight from his friend's home, then turned left and moved 3 km straight. He again turned left and travelled 4 km, from there she turned left and moved 1 km. If He was moving in the west direction at last. then in which direction He's initially moved from her friend's home?

(a) East
(b) North
(c) West
(d) South

Q35. If the saving function is S = - 30 + 0.3Y, what will be the value of MPC (marginal propensity to consume)?

(a) 0.9
(b) 0.3
(c) 0.7
(d) 0

Q36. Consumers lose satisfaction in a product the more they consume it, this is known as _____.

(a) decreasing marginal utility
(b) non-satiation
(c) increasing marginal utility
(d) maximum utilisation

Q37. This question is based on the five, three-digit numbers given below.

(Left) 734 462 397 354 881 (Right)

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

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

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

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

Q38. The Government of India has approved the Centrally Sponsored Scheme 'Pradhan Mantri Poshan Shakti Nirman (PM POSHAN)' for providing one hot cooked meal in Government and Government - aided Schools from 2021-22 to _____

(a) 2023-24
(b) 2025-26
(c) 2024-25
(d) 2026-27

Q39. If the length of the longest diagonal of a closed cube is $10\sqrt{3}$ cm, then its total surface area (in cm^2) is _____.

(a) $100\sqrt{3}$
(b) 300
(c) 900
(d) 600

Q40. Find the circumference (in m) of the largest circle that can be inscribed in a rectangle whose dimensions are given as 12 m and 7 m.

Take π = 22over7

(a) 11
(b) 19
(c) 22
(d) 37

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Q41. Which of the following states has the largest coal reserves of India?

(a) Chhattisgarh
(b) Odisha
(c) West Bengal
(d) Jharkhand

Q42. Chlorophyll pigment is present in which of the following components of a cell?

(a) Ribosomes
(b) Mitochondria
(c) Lysosomes
(d) Chloroplasts

Q43. Which of the following elements can form both a double bond and a single bond with a carbon atom?

(a) F
(b) O
(c) Cl
(d) Br

Q44. The feature of Quasi Federal Government system in the Constitution of India is borrowed from the constitution of which country?

(a) The UK
(b) The US
(c) Canada
(d) South Africa

Q45. This question is based on the five, three-digit numbers given below:

(Left) 485 746 379 137 254 (Right)

(Example: 697 - First digit = 6, second digit = 9 and third digit = 7)

(NOTE - All operations to be done from left to right.)

If all the numbers of the given series are arranged in ascending order, the position of which of the following numbers will remain unchanged?

(a) 254
(b) 137
(c) 379
(d) 746

Q46. All 20 students of a class are standing in a straight row facing north. Shilpa is 7^(th) from the right end, while Nikhil is 18^(th) from the left end. How many students are standing between Shilpa and Nikhil?

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

Q47. Joint forest management is an example of which of the following?

(a) Single man dominance
(b) Economic equality
(c) Participatory approach
(d) Political equality

Q48. Glucose is represented by which of the following formulae?

(a) C6H12O6
(b) C2H5OH
(c) CH3COOH
(d) C6H14O8

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Q49. Which of the following states was ranked first in Category I of e-Panchayat Puraskar 2021?

(a) Himachal Pradesh
(b) Uttar Pradesh
(c) Haryana
(d) Rajasthan

Q50. Which of the following numbers will replace the question mark (?) in the given series?

17, 30, 47, 66, 89, ?

(a) 119
(b) 118
(c) 117
(d) 116

Q51. As per a news report of February 2022, _____ developed a biodegradable nanoparticle to protect crops from fungal and bacterial infections.

(a) IIT Roorkee
(b) IIT Guwahati
(c) IIT Kharagpur
(d) IIT Kanpur

Q52. U,V, W, X,Y and Z are sitting in a row facing towards North (but not necessarily in the same order). Z is sitting second to the right of V and immediate left of Y. Only one person is sitting between U and V. W is not the immediate neighbor of U. Who is sitting at second position from the right end?

(a) U
(b) Y
(c) Z
(d) X

Q53. A boy goes to school at a speed of 3 km/h. He returns at a speed of 5 km/h. He takes a total of 4 hours for both going to school and returning. The distance (in km) between his home and school is:

(a) 7.2
(b) 7.4
(c) 7.3
(d) 7.5

Q54. The heating element of a bulb is made up of:

(a) mercury
(b) silicon
(c) copper
(d) Tungsten

Q55. What will come in the place of '?' in the following equation, if '+' and '-' are interchanged and also '×' and '÷' are interchanged?

45 × 15 ÷ 40 - 30 + 5 = ?

(a) 126
(b) 125
(c) 146
(d) 145

Q56. 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 notebooks are pencils.

All pencils are bags.

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All bags are bottles.

Conclusions:

(I) All pencils are bottles.

(II) Some bags are notebooks.

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

Q57. Each of the digits in the number 354982 is arranged in ascending order from left to right. The position of how many digits will remain unchanged as compared to that in the original number?

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

Q58. Shyam starts from Point A and drives 15 km towards the north. He then takes a right turn, drives 5 km, turns right and drives 20 km. He then takes a right turn and drives 10 km. He takes a final right turn, drives 5 km and stops at Point P. How far and towards which direction should he drive in order to reach Point A from Point P in a straight line? (All turns are 90 degree turns only)

(a) 7 km towards the west
(b) 5 km towards the west
(c) 5 km towards the east
(d) 4 km towards the east

Q59. There are 50 students (boys and girls only) in a class. The number of boys is 10 more than the number of girls. The number of boys in the class is:

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

Q60. Two right-angled triangles are congruent when which of the following conditions is true?

(a) When only one of the sides of one of these triangles is equal in length to the corresponding side of the other triangle
(b) When one more angle is equal
(c) When their hypotenuses are equal and one of the sides of one of these triangles is equal in length to the corresponding side of the other triangle
(d) When only their hypotenuses are equal

Q61. If 6 : 18 :: 18 : y, find the value of y.

(a) 54
(b) 36
(c) 72
(d) 108

Q62. White AgCl turns grey in presence of:

(a) CO2
(b) O2
(c) Water
(d) sunlight

Q63. The positive square root of (2+ √3 over2- √3 + 2- √3 over2+ √3 + 11) is _____.

(a) 2√3
(b) 2 + √3
(c) 5 - √3

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(d) 5

Q64. Which of the following can cause cramps in our muscles?

(a) Lack of CO2
(b) Lack of O2
(c) Excess of CO2
(d) Excess of O2

Q65. If m, v and u, respectively, represent magnification, image distance and object distance, then the correct relation between m, v and u for a lens will be:

(a) m = v × u
(b) m = u/v
(c) m = u + v
(d) m = v/u

Q66. The quadratic equation $x^2 + 7x - 60$ has:

(a) two equal roots
(b) two equal imaginary roots
(c) two real and unequal roots
(d) no real roots

Q67. In a certain code language, ‘KHADI’ is written as 'OJGNQ' and ‘DRINK’ is written as ‘QTOXJ’. How will ‘INLET’ be written in that language?

(a) ZKRTO
(b) ZLRTO
(c) ZERTP
(d) YKRTO

Q68. In which state is the first Graphene Innovation Centre of the India set up?

(a) Kerala
(b) Telangana
(c) Gujarat
(d) Karnataka

Q69. The colour of CuCl2 solution is:

(a) red-green
(b) blue-red
(c) blue-green
(d) yellow-green

Q70. The HCF of 450, 1500 and 1650 is:

(a) 150
(b) 200
(c) 50
(d) 100

Q71. The height of the image of an object below principal axis of a spherical mirror _____.

(a) depends on position of image
(b) depends on position of object
(c) is positive
(d) is negative

Q72. Which of the following numbers will replace the question mark (?) in the given series?

3,7, 6, 14, 12, 28, 24, ?

(a) 56

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(b) 60
(c) 51
(d) 54

Q73. The quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ has:
(a) two equal real roots
(b) no real roots
(c) two distinct real roots
(d) two imaginary roots

Q74. What is a 'bawri'?
(a) A traditional way of collecting water
(b) A narrow bore tube-well
(c) An underground tank to store water
(d) A canal providing water to agricultural land

Q75. Acid rain has pH value less than:
(a) 8.6
(b) 5.6
(c) 6.6
(d) 7.6

Q76. Working principle of an electric motor is
(a) A coil carrying conductor experiences force in the region of non-uniform magnetic field
(b) A coil carrying current experiences force in the region of gravitational field
(c) Electromagnetic induction
(d) A coil carrying current experiences force in the region of electric field

Q77. A solenoid carrying constant current can be used as a:
(a) source of a constant magnetic field
(b) source of a light
(c) source of a non-uniform magnetic field
(d) source of a mechanical energy

Q78. Formal health education is important for women for various reasons listed below. Which of the following is an INCORRECT option with regard to formal health education in women?
(a) Provides knowledge about sexually transmitted diseases
(b) Provides information about nutritional needs of children
(c) Helps to reduce child and maternal deaths
(d) Empowers them to decide about child bearing

Q79. Two pipes can fill a tank in 25 hours and 35 hours, respectively. The time (in hours) required to fill the tank when both pipes are opened simultaneously is:
(a) 165over14
(b) 175over14
(c) 175over12
(d) 165over12

Q80. The weights (in kg) of 9 members of a school cricket team are 50, 63, x, 62, 64, 48, 51, 55, 48. If the mean weight is 56 kg, then the value of x is _____.
(a) 63
(b) 57
(c) 48
(d) 64

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Q81. Four years ago, Rajesh was three times as old as Naresh. Four years hence he will be twice as old as Naresh will then be. The present age of Rajesh (in years) is:

(a) 32
(b) 33
(c) 28
(d) 35

Q82. The river Tapi rises in the _____.

(a) Satpura range
(b) Nilgiri hills
(c) Aravali range
(d) Himalayan range

Q83. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

14 : 20 :: 26 : 38 :: 18 : ?

(a) 24
(b) 30
(c) 26
(d) 28

Q84. Effective resistance of the series combination of three resistors each with resistance 2 Ω is:

(a) 2 Ω
(b) 1.5 Ω
(c) 0.66 Ω
(d) 6 Ω

Q85. A bronze article having a marked price of Rs. 1,000 is sold during a festive season sale after three successive discounts of 20% and 30% and 10%. What will be the amount (in Rs.) to be paid by a customer if she buys the article during the festival season?

(a) 564
(b) 508
(c) 496
(d) 504

Q86. Which element is NOT included in Group 2 of the Modern Periodic Table?

(a) Mg
(b) Ca
(c) Na
(d) Be

Q87. Select the combination of letters and numbers that when sequentially placed from left to right in the same sequence in the blanks of the given series, will complete the series.

D _ H 10 L _ P 18 _

(a) 8 S 20
(b) 7 12 S
(c) 6 14 T
(d) F N 20

Q88. Seven boxes are kept one over the other but not necessarily in the same order. S is fifth from the top. Only two boxes are kept between S and V. R is kept just below V. Only two boxes are kept between P and T. P is placed in one of the positions above T. Only one box is kept between S and Q. Which box is kept fourth from the bottom?

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

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(d) S

Q89. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

All potatoes are tomatoes.

All tomatoes are onions.

All onions are books.

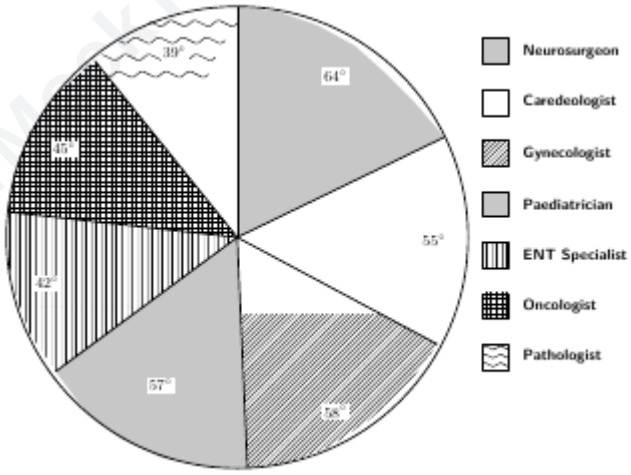
Conclusions

(I) Some books are potatoes.

(II) Some onions are tomatoes.

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

Q90. The following pie chart shows the different specialists in ABC hospital during the year 2021-2022. Study the pie-chart and answer the question.



If the total number of all these specialists was 60, then how many ENT specialists were there in the hospital?

(a) 12
(b) 5
(c) 7
(d) 10

Q91. The arithmetic mean of 2.5, 6.5, 4.5, 16.5, 3.5 and 2.5 is:

(a) 6
(b) 7.25
(c) 8.25
(d) 5.75

Q92. A certain number of persons are sitting in a row, facing North. Hriday is sitting to the immediate right of Vijay. There are only three persons sitting between Gaurav and Vijay. Vijay is sitting exactly second to the left of Imran, who is sitting at the extreme right end. Kiara and David are immediate neighbours of Lalita. There is only one person to the left of Gaurav. If no other person is sitting in the row, what is the total number of persons seated?

(a) Seven
(b) Eight
(c) Nine
(d) Six

Q93. What approximate value should come in place of the question mark (?) in the following equation?

14.95 × 27.05 ÷ 2.99 - 35.98 + 12.10 = ?

(a) 109
(b) 110
(c) 111
(d) 112

Q94. Six persons are sitting around a circular table facing the centre. Alok sits to the immediate right of Sonu. Ladoo sits third to the left of Alok. Soni sits third to the right of Sonu. Dimple is an immediate neighbour of both Ladoo and Sonu. Sushma is not an immediate neighbour of Ladoo. Who sits second to the right of Sushma?

(a) Dimple
(b) sonu
(c) Ladoo
(d) Alok

Q95. Which of the following properties remain(s) the same in a homologous series?

(a) Melting points
(b) Boiling points
(c) Molecular mass
(d) Chemical properties

Q96. Which of the following Ministries of India, has created 'Women Safety Division' to address issues of women safety comprehensively?

(a) Ministry of Law and Justice
(b) Ministry of Women and Child Development
(c) Ministry of Labour and Employment
(d) Ministry of Home Affairs

Q97. In this question, a statement is followed by four conclusions. Find out which conclusion is true based on the given statement.

Statement:

H ≥ E > S ≤ T = P > Q

Conclusions:

1. Q = T
2. S < H
3. S > P
4. E > T

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

Q98. Evaluate 9.4677...-2.4677...+4.4677....

(a) 10321over1100
(b) 10321over900
(c) 10521over900
(d) 10521over1100

Q99. What is the environmental loss if many trees are cut in a forest to get wood?

(a) It will give livelihood to many poor people.
(b) It will let in more sunlight to let smaller plants to grow.
(c) It will provide open space for other trees to grow.
(d) It will lead to soil erosion and degradation.

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Q100. Read the given statement and the arguments carefully and select the appropriate answer from the given options.

Statement:

"If waste management capabilities of Hospital X are dealt with, we will definitely win the 'excellence in service' award for year 22-23." One of the board of directors from Hospital X.

Arguments:

I. In four separate incidents in the year 22-23, 15 patients lost their lives and 46 were injured due to various incidents such as fire breakout in ICU, lack of oxygen etc.

II. Hospital A located in the nearby city has won 'excellence in service' award for a record five times.

(a) II weakens while I strengthens the statement.
(b) II weakens while I is a neutral argument
(c) I weakens while II is a neutral argument
(d) I weakens while II strengthens the statement.

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) 100

The logic followed here is :-

(First term + 2)² = Second term

In 6 : 64 → (6 + 2)² = 64

In 11 : 169 → (11 + 2)² = 169

Similarly,

In 8 : 100 → (8 + 2)² = 100

Hence, the correct answer is "100".

Q2. Answer: (c) Konkani

The correct answer is Konkani.

Key Points

• Konkani is an Indo-Aryan language spoken predominantly in the Konkan region of India, which includes Goa, Maharashtra, and Karnataka.

• It is the official language of the Indian state of Goa and is also recognized as a minority language in the states of Karnataka and Maharashtra.

• Konkani has several dialects, including Goan Konkani, Mangalorean Konkani, and Malvani Konkani.

• The script used to write Konkani varies depending on the region and community.

• In Goa, it is written in the Devanagari script, while in Maharashtra and Karnataka, it is written in the Kannada script.

Additional Information

• Kokborok is a Tibeto-Burman language.

• It is spoken in the Indian state of Tripura and parts of Bangladesh.

• Khamti is a Tai language.
• It is spoken in parts of Myanmar and India's Arunachal Pradesh state.
• Tamang is a Tibeto-Burman language.
• It is spoken in Nepal, India, and Bhutan.

Q3. Answer: (a) 1over2

Shortcut Trick
Identify complementary angles: 12° + 78° = 90° and 23° + 67° = 90°.
Since $\cos^2 \theta + \cos^2 (90° - \theta) = 1$ and $\sin^2 \theta + \sin^2 (90° - \theta) = 1$.
Numerator = $\cos^2 12° + \cos^2 (90° - 12°) = \cos^2 12° + \sin^2 12° = 1$.
Denominator = $2(\sin^2 78° + \sin^2 (90° - 78°)) = 2(\sin^2 78° + \cos^2 78°) = 2(1) = 2$.
Value = 1/2.
Therefore The correct answer is 1/2.
Alternate Method
Given: Expr = $(\cos^2 12° + \cos^2 23°) / [2(\sin^2 78° + \sin^2 67°)]$
Formula Used: $\cos(90° - \theta) = \sin \theta$ | $\sin(90° - \theta) = \cos \theta$ | $\sin^2 \theta + \cos^2 \theta = 1$
=> Numerator: $\cos^2 12° + \cos^2 23°$
=> Using $\cos \theta = \sin(90° - \theta)$, $\cos 23° = \sin(90° - 23°) = \sin 67°$
=> Numerator = $\cos^2 12° + \sin^2 67°$ (Alternatively, use $\cos^2 23° = \sin^2 67°$)
=> Let's convert denominator: $\sin^2 78° = \cos^2 (90° - 78°) = \cos^2 12°$
=> $\sin^2 67° = \cos^2 (90° - 67°) = \cos^2 23°$
=> Expression = $(\cos^2 12° + \cos^2 23°) / [2(\cos^2 12° + \cos^2 23°)]$
=> Expression = 1 / 2
Therefore The correct answer is 1/2.
Additional Information
Trigonometric Identities
Fundamental identity: $\sin^2 \theta + \cos^2 \theta = 1$ for any angle θ.
Complementary Angle Rules
If A + B = 90°, then sin A = cos B, tan A = cot B, and sec A = cosec B.
Square Sum for Complementary Angles
If A + B = 90°, then $\sin^2 A + \sin^2 B = 1$ and $\cos^2 A + \cos^2 B = 1$.

Q4. Answer: (d) 625

Shortcut Trick
Subtract the remainders from the numbers: (1876 − 1), (12503 − 3), (6877 − 2)
Numbers to find HCF for: 1875, 12500, 6875
Since 12500 and 1875 both end in multiples of 125, the HCF must be a multiple of 125.
Check options: Only 625 is a factor of 1875 (1875 = 625 × 3) and 12500 (12500 = 625 × 20).
Therefore The correct answer is 625.
Alternate Method
Given: Numbers 1876, 12503, 6877 and remainders 1, 3, 2.
Formula: Greatest number = HCF(Number1 − Remainder1, Number2 − Remainder2, Number3 − Remainder3)
=> First number = 1876 − 1 = 1875
=> Second number = 12503 − 3 = 12500
=> Third number = 6877 − 2 = 6875
=> Prime Factorization of 1875 = 3 × 5^4
=> Prime Factorization of 12500 = 2^2 × 5^5
=> Prime Factorization of 6875 = 11 × 5^4
=> HCF = 5^4 = 625
Therefore The correct answer is 625.
Additional Information
Highest Common Factor (HCF)

The largest number that divides two or more numbers without leaving a remainder. Also known as Greatest Common Divisor (GCD).

HCF with Remainders

To find the greatest number that divides x, y, and z leaving remainders a, b, and c, calculate HCF(x−a, y−b, z−c).

Common Remainder Property

If the remainder is the same but unknown, the greatest number is HCF(|x−y|, |y−z|, |z−x|).

Q5. Answer: (b) Ge

The correct answer is Ge.

Key Points

• Period 3 of the Modern Periodic Table includes elements from sodium (Na) to argon (Ar).

• S and Al are all located before Ar in the same period.

• Ge does NOT belong to period 3 of the Modern Periodic Table.

• It belongs to period 4.

Additional Information

• Ar is the last element in period 3 and has an electron configuration of 1s2 2s2 2p6 3s2 3p6.

• Ge is a metalloid element with properties between those of metals and nonmetals, and is used in electronic devices.

• S is a nonmetal element that is essential for life and commonly found in minerals and fuels.

• Al is a metal element that is the third most abundant element in the Earth's crust and is commonly used in construction materials.

• Knowing the correct period of an element can help predict its properties and reactivity, as elements within the same period share similar electronic configurations.

Q6. Answer: (a) Jyotirao Phule

The correct answer is Jyotirao Phule.

Key Points

• Jyotirao Phule was a social reformer, activist, and writer who lived in the 19th century in Maharashtra, India.

• He founded the Satyashodhak Samaj in 1873 with the aim of uplifting the lower castes and women through education and social reforms.

• The Satyashodhak Samaj was a movement that challenged the caste system and advocated for social equality and justice.

• Jyotirao Phule was also a strong advocate of women's education and established the first school for girls in Pune in 1848.

Additional Information

• Swami Dayanand Saraswati was a Hindu religious leader.

• He founded the Arya Samaj, a movement that aimed to reform Hinduism and promote Vedic teachings.

• Narayana Guru was a social reformer and spiritual leader from Kerala.

• He advocated for social equality and religious tolerance.

• Ishwarchandra Vidyasagar was a Bengali polymath.

• He worked towards women's education and social reforms in the 19th century.

Q7. Answer: (c) Hanukkah

The correct answer is Hanukkah.

Key Points

• Hanukkah is a Jewish festival that lasts for eight days and nights.

• It commemorates the rededication of the Second Temple in Jerusalem after it was reclaimed from the Seleucid Empire in the 2nd century BCE.

• The festival is also known as the Festival of Lights because of the tradition of lighting a special candelabrum called a menorah.

• Other customs associated with Hanukkah include playing with dreidels (spinning tops) and eating foods fried in oil, such as latkes (potato pancakes) and sufganiyot (jelly donuts).

Additional Information

• Nauroj is a Persian New Year celebration.

• It takes place on the spring equinox.

• Anthurium is a type of tropical flower often used in floral arrangements.

• Hornbill is a type of bird found in Africa and Asia.

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Q8. Answer: (c) 9a2 + 16b2 + 25c2 + 24ab + 40bc + 30ac

Shortcut Trick

To expand $(3a + 4b + 5c)^2$, identify the coefficients: x = 3, y = 4, z = 5.

Squared terms: $(3a)^2 = 9a^2$, $(4b)^2 = 16b^2$, $(5c)^2 = 25c^2$.

Product terms: 2 × (3 × 4)ab = 24ab, 2 × (4 × 5)bc = 40bc, 2 × (5 × 3)ac = 30ac.

Summing all results gives the final expansion directly.

Therefore The correct answer is $9a^2 + 16b^2 + 25c^2 + 24ab + 40bc + 30ac$.

Alternate Method

Given: The expression to expand is $(3a + 4b + 5c)^2$.

Formula Used: $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

=> Let x = 3a, y = 4b, and z = 5c.

=> Expansion = $(3a)^2 + (4b)^2 + (5c)^2 + 2(3a)(4b) + 2(4b)(5c) + 2(5c)(3a)$

=> Expansion = $9a^2 + 16b^2 + 25c^2 + 2(12ab) + 2(20bc) + 2(15ac)$

=> Expansion = $9a^2 + 16b^2 + 25c^2 + 24ab + 40bc + 30ac$

Therefore The correct answer is $9a^2 + 16b^2 + 25c^2 + 24ab + 40bc + 30ac$.

Additional Information

Algebraic Identity for Trinomial Square

The square of a trinomial is given by $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$.

Sign Variations in Expansion

If a term is negative, the signs of its products change: $(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$.

Sum of Squares Formula

The formula can be rearranged to find the sum of squares: $a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + bc + ca)$.

Q9. Answer: (d) Rs. 100

Shortcut Trick

Simplify first purchase: 12 bats + 18 balls = 2100 => 2 bats + 3 balls = 350 (Divide by 6).

Multiply this by 4 => 8 bats + 12 balls = 1400.

Compare with second purchase: 8 bats + 22 balls = 1900.

Difference in price => (22 − 12) balls = 1900 − 1400 => 10 balls = 500 => 1 ball = 50.

Substitute to find bat cost => 2 bats + 3(50) = 350 => 2 bats = 200 => 1 bat = 100.

Therefore The correct answer is Rs. 100.

Alternate Method

Given:

Total cost of 12 bats and 18 balls = Rs. 2,100

Total cost of 8 bats and 22 balls = Rs. 1,900

Calculations:

Let the cost of one bat be x and the cost of one ball be y.

=> 12x + 18y = 2100 ... (i)

=> 8x + 22y = 1900 ... (ii)

Divide equation (i) by 6:

=> 2x + 3y = 350 ... (iii)

Multiply equation (iii) by 4 to align coefficients of x with equation (ii):

=> 8x + 12y = 1400 ... (iv)

Subtract equation (iv) from equation (ii):

=> (8x + 22y) − (8x + 12y) = 1900 − 1400

=> 10y = 500 => y = 50

Substitute y = 50 in equation (iii):

=> 2x + 3(50) = 350

=> 2x + 150 = 350 => 2x = 200

=> x = 100

The cost of a bat is Rs. 100.

Therefore The correct answer is Rs. 100.

Additional Information

Elimination Method

A process of solving a system of equations by multiplying equations by suitable factors so that the coefficients of one variable become equal, then adding or subtracting to eliminate that variable.

Linear Equations in Two Variables

Equations of the form Ax + By = C, where A, B, and C are constants. A pair of such equations can be solved to find the unique values of x and y.

Substitution Method

Expressing one variable in terms of the other from one equation (e.g., x = (C − By)/A) and substituting it into the second equation to solve for the unknown.

Q10. Answer: (c) 54

Shortcut Trick

Area = 2916 m²

Side = √2916

Since $50^2 = 2500$ and $60^2 = 3600$, the side is between 50 and 60.

The last digit of 2916 is 6, so the square root must end in 4 or 6.

Checking 54^2: 54 × 54 = 2916.

Therefore The correct answer is 54 m.

Alternate Method

Given:

Area of the square plot = 2916 m²

Formula Used:

Area of a square = $(\text{Side})^2$

Calculations:

=> $\text{Side}^2 = 2916$

=> Side = √2916

=> Side = √(2 × 2 × 3 × 3 × 3 × 3 × 3 × 3)

=> Side = 2 × 3 × 3 × 3

=> Side = 54 m

Therefore The correct answer is 54 m.

Additional Information

Perimeter of a Square

The perimeter is the total length of the boundary, calculated as 4 × Side.

Diagonal of a Square

The diagonal of a square with side 's' is given by s√2.

Area in terms of Diagonal

The area can also be expressed as $(\text{Diagonal})^2 \div 2$.

Q11. Answer: (d) power

The correct answer is option 4) power

Power is a physical quantity that measures the rate at which work is done or energy is transferred or converted per unit of time.

P=W/t

Key Points

• In (SI), the standard unit of power (P) is the watt (W).

• Watt (W) which is defined as one joule of energy per second.

• Power can be used to describe the amount of work done, energy consumed, or energy transferred per unit of time.

• Power can be expressed in various forms, including mechanical power, electrical power, and thermal power.

Additional Information There are several different units for measuring power, depending on the context and the system of measurement being used.

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Watt (W)	**The watt is the SI unit of power. It represents one joule of energy transferred or converted per second. In other words, 1 watt (W) is equal to 1 joule per second (J/s). The relationship is expressed as 1 W = 1 J/s.**
Horsepower (hp)	Horsepower is a unit of power that is commonly used, especially in the context of mechanical power, particularly in the United States. The relationship between the watt and horsepower is approximately 1 horsepower (hp) is equal to 745.7 watts (W). The conversion factor may vary slightly depending on the standard used.
Kilowatt (kW)	The megawatt is an even larger unit used for very high-power applications, such as power plants. One megawatt (MW) is equal to 1,000,000 watts (W). The relationship is expressed as: 1 MW = 1,000,000 W.
Gigawatt (GW)	The gigawatt is another larger unit, often used to describe the power output of large power plants or the energy consumption of entire regions. One gigawatt (GW) is equal to 1,000,000,000 watts (W). The relationship is expressed as: 1 GW = 1,000,000,000 W.
Calories per Second	In some contexts, especially in nutrition and exercise science, power can be measured in calories per second. One calorie per second (cal/s) is approximately equal to 4.184 watts (W).
BTU per Hour (BTU/hr)	In some heating, ventilation, and air conditioning (HVAC) applications, power is measured in British Thermal Units per hour (BTU/hr). One BTU per hour is roughly equal to 0.293 watts (W).
Megawatt (MW)	The megawatt is an even larger unit used for very high power applications, such as power plants. One megawatt (MW) is equal to 1,000,000 watts (W). The relationship is expressed as: 1 MW = 1,000,000 W.

The unit of power, the "watt," (W) is named after James Watt, a Scottish engineer and inventor.

Q12. Answer: (a) 2018

The correct answer is 2018.

Key Points

• Shaktikanta Das was appointed as the Reserve Bank of India's Governor in 2018.

• Shaktikanta Das succeeded Urjit Patel as the 25th Governor of RBI.

• Prior to his appointment as the Governor, Shaktikanta Das served as the Economic Affairs Secretary in the Ministry of Finance.

• He has also served as a member of the 15th Finance Commission and India's Sherpa to G20.

Additional Information

• The Reserve Bank of India is both the nation's central bank and the regulatory agency in charge of overseeing the country's banking industry.

• The Indian government's Ministry of Finance is the owner of it.

• It is in charge of managing the Indian rupee's supply, issuing it, and keeping it in circulation.

• It was founded in 1935, Kolkata.

Q13. Answer: (c) tu

Given codes are:-

Here, code tu is used for word high.

Hence, the correct answer is "tu".

Q14. Answer: (b) baking soda + mild edible acid

The correct answer is Option - 2

Key Points

• Baking Powder is a mixture of a carbonate or bicarbonate and a weak acid (edible).

• Baking powder is used to increase the volume and lighten the texture of baked goods.

• It works by releasing CO2 gas into a batter or dough through an Acid-Base Reaction causing bubbles in the wet mixture to

expand.

Important Points

• The base and acid are prevented from reacting prematurely by the inclusion of a buffer such as Cornstarch.

• Baking powder is used instead of Yeast for end-products where fermentation products would be undesirable where the batter lacks the elastic structure to hold gas bubbles for more than a few minutes, and to speed the production of baked goods.

• Because carbon dioxide is released at a faster rate through the acid-base reaction than through fermentation, breads made by chemical leavening are called Quick breads.

• The introduction of baking powder was revolutionary in minimizing the time and labor required to make breadstuffs. It led to the creation of new types of cakes, cookies, biscuits, and other baked goods.

Additional Information

• Most commercially available baking powders are made up of Sodium Bicarbonate (NaHCO3) and one or more edible acids.

• Sodium Bicarbonate is also called baking soda.

• How Baking Powder Works-

• Acid-base reaction -

• NaHCO3 + H^+ → Na^+ + CO2 + H2O

• The first to create a form of baking powder was an English chemist and food manufacturer Alfred Bird in 1843.

• Difference between Baking soda and Baking Powder.

Q15. Answer: (d) 10

Given number: 986 432 631 387 267

Arranging all numbers in ascending order

267 387 432 631 986

The third greatest number is 432 and the second digit of the third greatest number is 3

The smallest number is 267 and the third digit of the smallest number is 7.

So, the sum of the third greatest number and the third digit of the smallest number is = 3 + 7 = 10

Hence, the answer is "10".

Q16. Answer: (a) Articles 32 and 226, respectively

The correct answer is Articles 32 and 226.

Key Points

• The Constitution of India provides for the writ jurisdiction of the Supreme Court and High Courts under Articles 32 and 226 respectively.

• A writ is a formal written order issued by a court to a person or entity, either to perform a specific act or to refrain from doing a particular act.

• The writs that can be issued by the Supreme Court and High Courts include habeas corpus, quo warranto, mandamus, certiorari, and prohibition.

Additional Information

• Habeas corpus is a writ that can be used to secure the release of a person who has been unlawfully detained.

• Quo warranto is a writ that can be used to challenge the authority of a person holding public office.

• Mandamus is a writ that can be used to compel a public official or government agency to perform a specific duty.

• Certiorari is a writ that can be used to review the decision of a lower court or tribunal.

• Prohibition is a writ that can be used to prevent a court or tribunal from exceeding its jurisdiction.

Q17. Answer: (b) 36.40%

Calculation:

Decrease in the sales of the brand S from the year 2019 to 2020.

401 - 255 = 146

% decreased = 146/401 × 100 = 36.40%.

Therefore Option 2 is the correct answer.

Q18. Answer: (c) OURJIN

The logic followed here is:

MODERN : RONMED

GERMAN : AENGMR

Similarly,

JUNIOR : OURJIN

Hence, the correct answer is "OURJIN".

Q19. Answer: (d) Adipose tissue

The correct answer is Option 4.

Key Points

• Adipose tissue which is known as body fat, is found below the skin and between the internal organs.

• It is a connective tissue that extends throughout your body.

• It is found under the skin (subcutaneous fat), between internal organs (visceral fat), and even in the inner cavities of bones (bone marrow adipose tissue) and in breast tissue.

Important Points

• Adipose tissue consists of lipid-rich cells called adipocytes.

• The adipocytes are storage reservoirs that store fat globules in a structural network of fibers.

• Apart from storage, it also serves as a cushion and insulator to protect our bodies.

• Types of Adipocyte-There are three types of Adipocytes.

TYPE OF ADIPOCYTES	DESCRIPTION
White Adipocyte	• Filled with a single, large lipid droplet and some cellular organelles.
Brown Adipocyte	• Filled with multiple lipid droplets and has a large number of mitochondria that help it generate heat. - Commonly occurs in newborn organisms and starts to decrease as the organism ages.
Beige Adipocyte	• Found scattered between the white adipocytes

Function of Adipose tissue-

TYPE OF ADIPOCYTES	Function
White Adipocyte	• Insulator - Energy reservoir at the time of starvation and exertion - Releases a number of hormones, such as leptin, resistin, and adiponectin, that play various roles in metabolism
Brown Adipocyte	• Generate heat and consume energy - In animals that hibernate, brown adipose tissue persists even in adolescence because these tissues help in their survival at the time of hibernation.
Beige Adipocyte	• The ability to generate heat under conditions, such as exposure to cold or stimulation of the adrenergic receptors. They are also known as Brite adipocytes.

Additional InformationDifferent types of tissue-

Q20. Answer: (a) Prasant Chandra Mahalanobis

The correct answer is Prasant Chandra Mahalanobis.

Key Points

• Prasant Chandra Mahalanobis was a renowned Indian statistician who was born in 1893 and passed away in 1972.

• He was a founder of the Indian Statistical Institute and made significant contributions to the field of statistics, including the development of the Mahalanobis distance measure.

• Mahalanobis was also an important figure in India's economic development, serving as the chief architect of the Second Five Year Plan, which aimed to promote industrialization and self-sufficiency in the country.

Additional Information

• Jagdish Natwarlal Bhagwati was an Indian-American economist who made significant contributions to the field of international trade theory.

• He was a professor at Columbia University and served as an economic advisor to several governments around the world.

• Prof. VKRV Rao was an Indian economist and educationist who played a key role in the development of higher education in India.

• He was the founder of the Institute of Social and Economic Change in Bangalore.

• VR Gadgil was an Indian politician and freedom fighter who was a member of the Indian National Congress.

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• He served as a member of parliament and held several ministerial positions in the government.

Q21. Answer: (b) Only conclusion II follows

The least possible Venn diagram for the given statements is as follows:

Conclusion:

I) Some chairs are pens. Does not follows (There is no relation between chairs and pens)

II) Some tables are inks. Follows (In the above figure shows there is a relation between tables and pens)

Hence, the correct answer is "Only conclusion II follows".

Q22. Answer: (c) virtual and erect

The correct answer is virtual and erect.

Key Points

• The power of the lens (P) is given as +2.0 D. Since the power is positive, the lens is a convex (converging) lens.

• The focal length (f) is calculated using: f = 1/P = 1/2 = 0.5 m = 50 cm.

• The object is placed at a distance of 10 cm, which is less than the focal length (50 cm), i.e., the object lies between the optical centre and the principal focus of the convex lens.

• When an object is placed within the focal length of a convex lens, the image formed is virtual, erect, and magnified on the same side of the lens as the object.

• Using the lens formula: 1/f = 1/v − 1/u, where f = +50 cm and u = –10 cm, we get 1/50 = 1/v + 1/10, which gives v = –12.5 cm. The negative sign indicates that the image is virtual.

• Hence, the image formed is virtual and erect.

Additional Information

• Power of a Lens:

• P = 1/f (where f is in metres).

• The SI unit of power is the dioptre (D).

• Convex Lens:

• Has positive focal length.

• Converges parallel rays of light to the principal focus.

• Image Formation by a Convex Lens:

• Beyond 2F: Real, inverted, diminished.

• At 2F: Real, inverted, same size.

• Between F and 2F: Real, inverted, magnified.

• At F: Image formed at infinity.

• Within F: Virtual, erect, magnified.

• Lens Sign Convention:

• Object distance (u) is taken as negative.

• Virtual image distance (v) is negative.

• Focal length of a convex lens is positive.

• Applications of Convex Lens:

• Used in magnifying glasses, cameras, microscopes, telescopes, and for correcting hypermetropia (long-sightedness).

Q23. Answer: (b) ΔQPT

Shortcut Trick

Identify the corresponding vertices by observing the markings on the sides.

Vertex Q is common to both triangles. Side QR (single tick) corresponds to side QP (single tick).

Side QS (double tick) corresponds to side QT (double tick).

Following the order of vertices in ΔQRS: Q → R (single tick) → S (double tick).

The matching order in the second triangle is Q → P (single tick) → T (double tick).

Therefore The correct answer is ΔQPT.

Alternate Method

Given: In the figure, side QR = QP (indicated by single tick) and side QS = QT (indicated by double tick).

Formula Used: SAS (Side-Angle-Side) Congruence Criterion states that if two sides and the included angle of one triangle are equal to the corresponding sides and included angle of another triangle, the triangles are congruent.

In ΔQRS and ΔQPT:

=> QR = QP (Given by single tick markings)

=> angle RQS = angle PQT (Vertically opposite angles are always equal)

=> QS = QT (Given by double tick markings)

=> By SAS Congruence Criterion, ΔQRS ~= ΔQPT.

Therefore The correct answer is ΔQPT.

Additional Information

SAS Congruence Rule

Two triangles are congruent if two sides and the included angle of one triangle are equal to the corresponding two sides and the included angle of the other triangle.

CPCT (Corresponding Parts of Congruent Triangles)

Once two triangles are proved congruent, all their remaining corresponding parts (angles and sides) are also equal.

Vertically Opposite Angles

When two straight lines intersect at a point, the angles formed opposite to each other at the vertex are always equal.

Q24. Answer: (a) Abhijeet Kunte

The correct answer is Abhijeet Kunte.

Key Points

• Abhijeet Kunte is an Indian chess player who has represented the country in several international events.

• He has won several national and international tournaments, including the Commonwealth Chess Championship in 2003.

• Kunte has also been awarded the Arjuna Award in 2002, which is India's second-highest sporting honour.

Additional Information

• Dhyan Chand Award is India's highest award for lifetime achievement in sports and games, given by the Ministry of Youth Affairs and Sports.

• The award is named after the legendary hockey player Dhyan Chand, who won three Olympic gold medals for India in 1928, 1932, and 1936.

• Pritam Siwach is a boxer who won a gold medal in the 2019 National Championships.

• Sandhya Gurung is a football player who has represented India in the South Asian Games.

• Radhakrishnan Nair is a coach who has trained several Indian badminton players.

Q25. Answer: (c) 4,78,000

Shortcut Trick

Net percentage change = x − y − (xy/100) = 10 − 10 − (10 × 10)/100 = −1%.

Successive change of 10% increase and 10% decrease results in a net 1% decrease.

99% of initial population = 4,73,220.

100% of initial population = (4,73,220 ÷ 99) × 100 = 4,78,000.

Therefore The correct answer is 4,78,000.

Alternate Method

Given:

First year increase = 10%

Second year decrease = 10%

Final population = 4,73,220

Let the population at the beginning of the first year be P.

=> P × (1 + 10/100) × (1 − 10/100) = 4,73,220

=> P × (110/100) × (90/100) = 4,73,220

=> P × (11/10) × (9/10) = 4,73,220

=> P × (99/100) = 4,73,220

=> P = (4,73,220 × 100) ÷ 99

=> P = 4,780 × 100

=> P = 4,78,000

Therefore The correct answer is 4,78,000.

Additional Information

Successive Percentage Change

When a value changes by x% and then y%, the net change is given by [x + y + (xy/100)]%.

Same Percent Increase and Decrease

If a value is increased by x% and then decreased by x%, there is always a net decrease of $(x^2/100)$%.

Population Formula

Population after n years = $P(1 \pm R/100)^n$, where P is the initial population and R is the rate of growth/decay.

Q26. Answer: (d) Only conclusion II is true

Given Statement:

N < L > J < K > I = H ≤ G

Conclusion:

I) J = G → False (As J < K > I = H ≤ G → no clear relation between J and G can be determined)

II) K > H → True (As K > I = H → There is the relation between K and H can be determined)

Hence, the correct answer is "Only conclusion II is true ".

Q27. Answer: (c) Chess

The correct answer is Chess.

Key Points

• Priyanka Nutakki is an Indian chess player.

• In 2022, she was awarded the FIDE title of Woman Grandmaster (WGM).

• Chess is a board game played between two players on a checkered board.

• It is a popular game worldwide and is recognized as a sport by the International Olympic Committee.

Additional Information

• Hockey is a team sport played on a field with a stick and a ball.

• It is a popular sport in countries like India, Pakistan, and Australia.

• Badminton is a racquet sport played on a court with a shuttlecock.

• It is a popular sport in countries like China, Indonesia, and India.

• Wrestling is a combat sport involving grappling techniques.

• It is a popular sport in countries like the United States, Russia, and Iran.

Q28. Answer: (c) 16

Shortcut Trick

To double a sum at Simple Interest, use the formula: Time (T) = 100 ÷ Rate of Interest (R).

Given R = 6.25% (since 6 ¼ = 6.25).

T = 100 ÷ 6.25 = 16 years.

Therefore The correct answer is 16 years.

Alternate Method

Given Principal (P) = P

Given Amount (A) = 2P (as the sum gets doubled)

Given Rate of Interest (R) = 6 ¼% = 25/4% per annum.

=> Simple Interest (SI) = Amount − Principal = 2P − P = P

=> Formula: SI = (P × R × T) ÷ 100

=> P = (P × (25 ÷ 4) × T) ÷ 100

=> 1 = (25 × T) ÷ 400

=> 25 × T = 400

=> T = 400 ÷ 25

=> T = 16 years.

Therefore The correct answer is 16 years.

Additional Information

Simple Interest Formula

SI = (P × R × T) ÷ 100, where P is the Principal, R is the Rate per annum, and T is Time in years.

Amount in SI

The total Amount (A) is the sum of Principal and Simple Interest: A = P + SI = P × [1 + (R × T) ÷ 100].

Shortcut for n-times sum

If a sum becomes 'n' times itself in T years at SI, then R = [(n − 1) × 100] ÷ T.

Q29. Answer: (c) $ G / B

(Left) R # A $ G H K % T B M & N Y ÷ X B / L Q @ D (Right)

1) Second symbol and third letter from the left end

R # A $ G H K % T B M & N Y ÷ X B / L Q

In the above series second symbol and third letter is $ G

2) The fifth and six terms from the right end

R # A $ G H K % T B M & N Y ÷ X B / L Q @ D

In the above series the fifth and six terms from the right end is B /

If The second symbol and third letter from the left end of series are combined with the fifth and six terms from the right end of the series, then we get $ G / B.

Hence, the correct answer is "$ G / B".

Q30. Answer: (b) Maharashtra

The correct answer is Maharashtra.

Key Points

• According to the 2011 Census data, the concentration of Buddhism is the largest in Maharashtra.

• Maharashtra has the highest number of Buddhists in India, with over 6 million people following the religion.

• The state is home to important Buddhist pilgrimage sites such as Ajanta and Ellora caves, and the famous Buddhist stupa at Sanchi.

• While Uttarakhand also has a significant Buddhist population, it is much smaller than Maharashtra's.

• Goa and Andhra Pradesh have relatively small Buddhist populations compared to other states in India.

Additional Information

• Buddhism is an ancient religion that originated in India over 2,500 years ago and spread across Asia and beyond.

• It is based on the teachings of Siddhartha Gautama, who is also known as the Buddha or the enlightened one.

• Today, Buddhism is one of the major world religions, with millions of followers around the globe.

Q31. Answer: (a) Rs. 921 loss

Shortcut Trick

When two articles are sold at the same Selling Price (SP), one at a gain of x% and another at a loss of x%, there is always a net loss.

Net loss % = $x^2 \div 100 = 15^2 \div 100 = 225 \div 100 = 2.25\%$.

Total Selling Price = 20,000 × 2 = Rs. 40,000.

Loss Amount = [Total SP ÷ (100 − Loss%)] × Loss% = [40,000 ÷ (100 − 2.25)] × 2.25.

Loss Amount = (40,000 ÷ 97.75) × 2.25 ≈ Rs. 921.

Therefore The correct answer is Rs. 921 loss.

Alternate Method

Given: SP1 = SP2 = Rs. 20,000 | Gain = 15% | Loss = 15%.

Formulas: CP = [SP × 100] ÷ [100 ± Profit/Loss%] | Total Loss = Total CP − Total SP.

=> CP of 1st article = (20,000 × 100) ÷ 115 ≈ Rs. 17,391.30.

=> CP of 2nd article = (20,000 × 100) ÷ 85 ≈ Rs. 23,529.41.

=> Total CP = 17,391.30 ± 23,529.41 = Rs. 40,920.71.

=> Total SP = 20,000 × 2 = Rs. 40,000.

=> Overall Loss = 40,920.71 − 40,000 = Rs. 920.71 ≈ Rs. 921.

Therefore The correct answer is Rs. 921 loss.

Additional Information

Net Percentage Change

When a value is increased by x% and then decreased by x%, the net change is always a decrease of $(x^2/100)\%$.

Equal Selling Price Case

If SP of two items is same, and profit% on one equals loss% on other, net loss = $(\text{Common Profit or Loss \% / } 10)^2$.

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Q32. Answer: (b) twice the distance between pole and F

The correct answer is Option 2.

Key Points

• Pole (P/O): Geometric center of the spherical surface of the mirror.

• Centre of curvature (C): Centre of the sphere of which the mirror is a part.

• Focus point: The point where incident rays parallel to the principal axis meet or seem to be met.

• For a small spherical mirror, the principal focus 'F' lies exactly at the midpoint of the pole P and the center of curvature C.

• Therefore, the focal length of a spherical mirror (concave or convex) is equal to half of its radius of curvature.

• Or, The distance between the pole and the center of the curvature is twice the distance between the pole and the focus.

• This means if R = distance between the center of the curvature and the pole (Radius of curvature), f = distance between the focus point and the center of curvature (focal length).

• Then R = 2f.

Additional Information

• Some other useful terms -

• Principal Axis - the straight line passing through the center of curvature C and pole P of a spherical mirror, produced on both sides.

• Aperture - The portion of a mirror from which the reflection of light actually takes place is called the aperture of the mirror. It is also called the linear aperture of the mirror. The aperture of a spherical mirror is denoted by the diameter of its reflecting surface.

• Types of spherical mirror -

• There are two types of spherical mirrors -

• 1. Convex Spherical Mirror: whose inner (cave type) surface is silvered and reflection takes place at the outer (convex) surface.

• 2. Concave Spherical Mirror: whose outer bulged surface is silvered and reflection takes place from the inner hollow (cave type) surface.

Uses of the concave and concave mirror -

Q33. Answer: (b) Assam

The correct answer is Assam.

Key Points

• Assam has the oldest operating oil refinery in India since 1901, which is Digboi Refinery.

• It was established by the Assam Oil Company, which was later taken over by the Indian Oil Corporation in 1981.

• The refinery has a processing capacity of 0.65 million metric tonnes per annum and produces various petroleum products like petrol, diesel, kerosene, and LPG.

• Digboi Refinery is also known for its historical significance as it played a vital role during World War II and supplied fuel for the Allied forces.

Additional Information

• Madhya Pradesh has three oil refineries, namely Bina Refinery, Bharat Oman Refinery, and Ratnagiri Refinery.

• West Bengal has two oil refineries, namely Haldia Refinery and Barauni Refinery.

• Mumbai has two oil refineries, namely Mumbai Refinery and Bina Refinery.

Q34. Answer: (d) South

From the given information:

Ashish is moving 1k straight from his home but there is no direction is given in which direction he is moving. We can start by taking any direction. So we are starting with east direction.

After that he turned left and moved 3 km straight.

He then turned left and travelled 4 km, from there he turned left and moved 1 km.

So according to the question, if the final position of Ashish is in west direction then the starting position was in south direction.

Hence, the correct answer is "South".

Q35. Answer: (c) 0.7

The correct answer is 0.7.

Key Points

• Marginal Propensity to Consume (MPC) is the increase in consumer spending when disposable income increases by one unit.

• In the given saving function, the formula is S = -30 + 0.3Y, where S is savings and Y is income.

• Therefore, the consumption function will be C = Y - S.

• To calculate MPC, we need to take the derivative of the consumption function with respect to income, which will be MPC = dC/dY.

• Here, dC/dY = 1 - dS/dY.

• In the given saving function, dS/dY = 0.3, so MPC will be 1 - 0.3, which is equal to 0.7.

• Hence, the correct answer is 0.7.

Additional Information

• Based on income level, MPC fluctuates.

• MPC usually decreases with increasing income.

• The Keynesian multiplier, which characterizes the impact of more investment or government expenditure as an economic stimulus, has MPC as its primary factor.

• MPC cannot be more than 1, which means that a consumer cannot spend more than the increase in income.

• The marginal propensity to save is the decrease in savings when disposable income increases by one unit.

• 0 is the case where there is no increase in consumer spending with an increase in disposable income, which is highly unlikely.

Q36. Answer: (a) decreasing marginal utility

The correct answer is decreasing marginal utility.

Key Points

• Marginal utility refers to the additional satisfaction or value that a consumer derives from consuming an additional unit of a product.

• Decreasing marginal utility means that as a consumer consumes more and more units of a product, the additional satisfaction or value derived from consuming each additional unit decreases.

• This happens because the consumer's needs and wants are limited, and as they consume more of a product, their needs and wants related to that product are increasingly satisfied, leading to a decrease in marginal utility.

• This concept is important for businesses to understand because it helps them determine the optimal quantity of a product to produce and sell, as well as the optimal price to charge for it.

Additional Information

• Non-satiation refers to the concept that consumers always want more of a good and will never be fully satisfied.

• It is the opposite of decreasing marginal utility.

• Increasing marginal utility refers to the concept that as a consumer consumes more units of a product, the additional satisfaction or value derived from consuming each additional unit increases.

• This concept is rare and not commonly observed in real-world scenarios.

Q37. Answer: (a) 1

The given series is as follows:

(Left) 734 462 397 354 881 (Right)

The numbers after arranging in ascending order are as follows

(Left) 354 397 462 734 881 (Right)

So we can see that after rearranging the number only 881 remain's unchanged.

Hence, the correct answer is "option 1".

Q38. Answer: (b) 2025-26

The correct answer is 2025-26.

Key Points

• The Pradhan Mantri Poshan Shakti Nirman (PM POSHAN) scheme aims to improve the nutritional status of children in the age group of 6 months to 6 years, adolescent girls, pregnant women, and lactating mothers.

• The scheme was launched in March 2018 and is implemented by the Ministry of Women and Child Development.

• The scheme provides financial assistance to States/UTs for the implementation of various interventions such as supplementary nutrition, counselling, and growth monitoring.

• The Government of India has approved the PM POSHAN for providing one hot cooked meal in Government and Government - aided Schools from 2021-22 to 2025-26.

Additional Information

• The national midday meal program in schools, often known as the midday meal scheme, was superseded by the PM-POSHAN initiative.

• It also includes pre-primary students from balvatikas, or youngsters in the age range of three to five.

• Supplementary nourishment is provided by the initiative to children in high-anemia prevalence areas and aspirational districts.

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• The central government recently asked union territory authorities and state governments to look into the potential of implementing millets under the PM POSHAN Scheme.

Q39. Answer: (d) 600

Shortcut Trick

Diagonal of a cube = side × √3

Given, 10√3 = side × √3 => side = 10 cm

Total Surface Area (TSA) = 6 × side² = 6 × 10² = 600 cm²

Therefore The correct answer is 600 cm².

Alternate Method

Given:

Longest diagonal of cube = 10√3 cm

Formula Used:

1. Length of diagonal of a cube = a√3 (where 'a' is the side)

2. Total Surface Area (TSA) of a cube = 6a²

Calculations:

=> a√3 = 10√3

=> a = 10 cm

=> TSA = 6 × (10)²

=> TSA = 6 × 100

=> TSA = 600 cm²

Therefore The correct answer is 600 cm².

Additional Information

Volume of Cube

The space occupied by the cube is given by a³.

Lateral Surface Area (LSA)

The area of the four side faces of a cube is 4a².

Diagonal of a Face

The diagonal of any single square face of the cube is a√2.

Q40. Answer: (c) 22

Shortcut Trick

The diameter of the largest circle in a rectangle is equal to the shorter side of the rectangle.

Here, shorter side = 7 m => Diameter (d) = 7 m.

Circumference = π × d = (22/7) × 7 = 22 m.

Therefore The correct answer is 22 m.

Alternate Method

Given: Length (L) = 12 m, Breadth (B) = 7 m.

Formula Used: Diameter of largest inscribed circle = min(Length, Breadth); Circumference = 2πr.

=> For a circle to fit inside a 12 m × 7 m rectangle, its diameter cannot exceed the smaller dimension.

=> Diameter (d) = 7 m.

=> Radius (r) = d/2 = 7/2 m.

=> Circumference = 2 × (22/7) × (7/2).

=> Circumference = 22 m.

Therefore The correct answer is 22 m.

Additional Information

Inscribed Circle in a Square

For a square of side 'a', the diameter of the inscribed circle is exactly 'a' and the area is πa²/4.

Rectangle Properties

The largest circle's radius is half the width (shorter side) of the rectangle.

Circle Mensuration

Area of circle = πr² and Circumference = 2πr = πd.

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Q41. Answer: (d) Jharkhand

The correct answer is Jharkhand.

Key Points

• Jharkhand has the largest coal reserves in India, accounting for about 17% of the country's total coal reserves.

Additional Information

• The coal reserves in Chhattisgarh contribute significantly to the state's revenue and power generation capacity.

• Coal mining activities in the state are managed by public and private sector companies, including South Eastern Coalfields Limited (SECL).

• Chhattisgarh's coalfields support a large number of mining and industrial activities, with long-term plans to expand coal-based energy production.

• Along with Jharkhand, Odisha, and West Bengal, Chhattisgarh forms the core of India's coal-producing belt, critical to the country's energy security.

Q42. Answer: (d) Chloroplasts

The correct answer is Chloroplasts.

Key Points

• Chlorophyll is a green pigment that is responsible for photosynthesis in plants.

• Chloroplasts are organelles found in plant cells that contain chlorophyll and are responsible for photosynthesis.

• The manufacture of active substances such vitamins, lipids, amino acids, phytohormones, nucleotides, and secondary metabolites is carried out by chloroplasts.

Additional Information

• Ribosomes are involved in protein synthesis.

• The messenger RNA (mRNA) sequence is read by the ribosome, which then converts the genetic code into a specific string of amino acids. These amino acids develop into long chains and fold to form proteins.

• Mitochondria are responsible for cellular respiration.

• Adenosine triphosphate, a little molecule, stores the chemical energy generated by the mitochondria.

• Lysosomes are responsible for breaking down waste material.

• They disintegrate extraneous or worn-out cell components.

• They could be applied to eliminate bacterial and viral invaders.

Q43. Answer: (b) O

The correct answer is O.

Key Points

• The element that can form both a double bond and a single bond with a carbon atom is oxygen (O).

• Oxygen can form a double bond with carbon by sharing two electrons and a single bond by sharing one electron.

• Fluorine (F) cannot form a single bond with carbon as it requires only one electron to complete its octet and carbon requires four electrons to complete its octet.

• Therefore, fluorine can only form a single bond with carbon.

• Chlorine (Cl) and bromine (Br) can form a single bond with carbon but cannot form a double bond as they require two electrons to complete their octet and carbon requires four electrons to complete its octet.

• In addition to oxygen, nitrogen (N) can also form both a double bond and a single bond with carbon.

• However, nitrogen requires three electrons to complete its octet and carbon requires four electrons to complete its octet.

• Therefore, nitrogen can only form a triple bond or a single bond with carbon.

Additional Information

• It is important to note that the ability of an element to form a double or single bond with carbon depends on the number of valence electrons it has and its electronegativity.

• Fluorine (F) is the most electronegative element and can form only a single bond with carbon.

• Chlorine (Cl) and bromine (Br) have lower electronegativity than oxygen (O) and nitrogen (N) and can form a single bond with carbon.

• Oxygen (O) and nitrogen (N) are both highly electronegative elements and can form both single and double bonds with carbon.

Q44. Answer: (c) Canada

The correct answer is Canada

Key Points

• The Constitution of India is a federal constitution, but it also has some unitary features.
• This feature is known as a Quasi Federal Government system.
• The Constitution of the United States of America is the oldest written national constitution still in use.
• It was adopted on September 17, 1787.
• The United States of America is a federal republic, with power divided between the federal government and the states.
• This division of powers is similar to the system in India.
• The United States of America also has a written Constitution, with a Bill of Rights that protects individual rights and freedoms.

Additional Information

• The United Kingdom is a unitary state, with power concentrated in the central government.
• The UK does not have a written constitution, and its system of government is based on parliamentary sovereignty.
• Canada
• The Canadian Constitution Act of 1867 established the federal system of government in Canada.
• South Africa is a unitary state, with power concentrated in the central government.
• The Constitution of South Africa was adopted in 1996, and it established a federal system of government with power divided between the national government and the provinces.

Q45. Answer: (c) 379

The given series is as follows:

(Left) 485 746 379 137 254 (Right)

The numbers after arranging in ascending order are as follows

(Left) 137 254 379 485 746 (Right)

So we can see that after rearranging the number only 379 remain's unchanged.

Hence, the correct answer is "379".

Q46. Answer: (b) 3

The following seating arrangement is as follows:

There are 20 students of a class standing in a straight row facing north.

1) Shilpa is 7th from the right end

2) Nikhil is 18th from the left end

So the final arrangement,

So as per the arrangement 3 students are sitting between Shilpa and Nikhil.

Hence, the correct answer is "3".

Q47. Answer: (c) Participatory approach

Joint Forest Management (JFM) is a collaborative approach to forest management that involves local communities and government forest departments.

Key Points

• It is based on the principle that local communities have a vested interest in the sustainable management of their forests, and that they should be given a say in how their forests are managed.
• JFM is an example of a participatory approach to development.
• Participatory approaches emphasize the importance of involving local communities in the planning and implementation of development projects.
• This can lead to more sustainable and effective development outcomes.

Key Points

• Single-man dominance is an example of a top-down approach, in which decisions are made by a single individual or small group of individuals.
• Economic equality is an example of a distributive justice approach, which focuses on the fair distribution of resources.
• Political equality is an example of a procedural justice approach, which focuses on ensuring that everyone has a fair opportunity to participate in decision-making processes.

Hence, Joint forest management is an example of participatory approach.

Q48. Answer: (a) C6H12O6

The correct answer is C6H12O6.

Key Points

• Glucose is represented by C6H12O6.
• Glucose is a simple sugar and the most important carbohydrate in the body.
• Glucose is a monosaccharide, which means it is a single sugar molecule.
• It is a primary source of energy for the body and is used by every cell.
• Glucose is commonly found in foods such as fruits, vegetables, and grains.
• When glucose levels in the body are too high, it can lead to health problems such as diabetes.

Additional Information

• C2H5OH is the formula for ethanol, which is a type of alcohol.
• Ethanol is a colorless, volatile, flammable liquid with a strong flavor and odor similar to wine.
• CH3COOH is the formula for acetic acid, which is the main component of vinegar.
• The distinctive smell of vinegar is caused by the fermentation byproduct known as acetic acid.

Q49. Answer: (b) Uttar Pradesh

The correct answer is Uttar Pradesh.

Key Points

• As the top-ranked state in Category I, Uttar Pradesh announced that it has won the "E-Panchayat Puraskar 2021."
• Assam and Chhattisgarh came in second and third, respectively.
• Tamil Nadu and Odisha came in third, according to the government.

Additional Information

• e-Panchayat Puraskar is an annual award scheme launched by the Ministry of Panchayati Raj to recognize the best performing Panchayats in the country.
• Category I includes Panchayats with a population of up to 5,000 and Category II includes Panchayats with a population of more than 5,000.
• Haryana, and Rajasthan were also among the states that received awards in different categories of e-Panchayat Puraskar 2021.
• The award scheme also aims to encourage and motivate Panchayats to improve their functioning and services for citizens.

Q50. Answer: (b) 118

The given logic here is as follows:

The difference of numbers follows the prime number series.

Hence, the correct answer is "118".

Prime number series: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43.....

Q51. Answer: (d) IIT Kanpur

The correct answer is IIT Kanpur.

Key Points

• As per a news report of February 2022, IIT Kanpur developed a biodegradable nanoparticle to protect crops from fungal and bacterial infections.
• A novel biodegradable carbenoid metabolite based on nanoparticles has been developed by researchers.
• It can assist farmers in preventing bacterial and fungal diseases in their crops and serve as an alternative to chemical-based insecticides.
• IIT Kanpur is a public technical and research university located in Uttar Pradesh.

Additional Information

• IIT Guwahati is a premier institute of engineering and technology located in Assam.
• IIT Kharagpur is a public technical and research university located in West Bengal.
• The technical university known as IIT Roorkee is situated in Roorkee, Uttarakhand, India.

Q52. Answer: (c) Z

Given:-

Six people → U, V, W, X, Y and Z are sitting in a row facing north.

1) Z is sitting second to the right of V ans immediate left of V.

2) Only one person is sitting between U and V.

Case 1 → Not possible as position at which U could be placed is already occupied by Z.

Case 2 → Not possible as only position is empty to the left of V and to the right of V the position is already occupied by Z.

Case 3:-

3) W is not an immediate neighbour of U.
4) The only position left will be occupied by X.
Hence, the correct answer is "Z".

Q53. Answer: (d) 7.5

Shortcut Trick
Distance = [(S1 × S2) ÷ (S1 + S2)] × Total Time
=> Distance = [(3 × 5) ÷ (3 + 5)] × 4
=> Distance = (15 ÷ 8) × 4 = 15 ÷ 2 = 7.5 km
Therefore The correct answer is 7.5 km.
Alternate Method
Given:
Speed (Going) = 3 km/h
Speed (Returning) = 5 km/h
Total Time = 4 hours
Formula Used:
Average Speed = (2 × S1 × S2) ÷ (S1 + S2)
Total Distance (Round Trip) = Average Speed × Total Time
Calculations:
=> Average Speed = (2 × 3 × 5) ÷ (3 + 5) = 30 ÷ 8 = 3.75 km/h
=> Total Distance (covered in both ways) = 3.75 × 4 = 15 km
=> Distance between Home and School = Total Distance ÷ 2
=> Required Distance = 15 ÷ 2 = 7.5 km
Therefore The correct answer is 7.5 km.
Additional Information
Average Speed for Constant Distance
When a person travels the same distance at two different speeds S1 and S2, the average speed is (2S1S2) ÷ (S1 + S2).
Speed and Time Relation
For a constant distance, speed is inversely proportional to time (S1 ÷ S2 = T2 ÷ T1).
Distance Formula
Distance = Speed × Time. Ensure units are consistent (e.g., km/h with hours or m/s with seconds).

Q54. Answer: (d) Tungsten

The correct answer is Tungsten.
Key Points
• Tungsten has a very high melting point which makes it ideal for use in the heating element of a bulb.
• Tungsten is frequently utilized in heavy metal alloys that are used to make cutting tools, such as high speed steel.
• It is also utilized to create wear-resistant coatings in what are known as "superalloys."
• Known to exist among the strongest materials are tungsten and diamond.
Additional Information
• Mercury is a liquid metal at room temperature and is used in fluorescent bulbs.
• Another name for it is quicksilver.
• Silicon is a semiconductor material.
• It is a tetravalent metalloid that is a hard, brittle crystalline solid with a metallic sheen that is blue-grey.
• Copper is a good conductor of electricity and is used in electrical wiring and circuits.
• It is an extremely high thermal and electrical conductivity metal that is ductile, soft, and malleable.

Q55. Answer: (d) 145

Given:-
45 × 15 ÷ 40 - 30 + 5
If '+' and '-' are interchanged and also '×' and '÷' are interchanged then
New equation → 45 ÷ 15 × 40 + 30 - 5
Now, By applying BODMAS Rule, we get

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45 ÷ 15 × 40 + 30 - 5

3 × 40 + 30 - 5

120 + 30 - 5

150 - 5 = 145

Hence, the correct answer is "145".

Q56. Answer: (a) Both conclusions I and II follow

The least possible Venn diagram for the given statements is as follows:-

Conclusions:

(I) All pencils are bottles → Follows (As all pencils are bags and all bags are bottles so, it is definite that all pencils are bottles.)

(II) Some bags are notebooks → Follows (As some notebooks are pencils and all pencils are bags so, it is definite that some bags are notebooks.)

Hence, the correct answer is "Both conclusions I and II follows".

Q57. Answer: (c) Two

Given number:-

Left 354982 Right

New number after arranging each digit of the given number in ascending order:-

Left 234589 Right

Digits whose position will remain unchanged as compared to that in original number → 4 and 8

Hence, the correct answer is "Two".

Q58. Answer: (c) 5 km towards the east

Given:-

1) Shyam starts from Point A and drives 15 km towards the north.

2) He then takes a right turn, drives 5 km, turns right and drives 20 km.

3) He then takes a right turn and drives 10 km.

4) He takes a final right turn, drives 5 km and stops at point P.

5) Distance and direction towards which shyam has to travel to reach point A from point P in a straight line.

Hence, the correct answer is "5 km towards the east".

Q59. Answer: (c) 30

Let the number of girls be ' x '.

And the number of boys be ' x + 10 '.

Given → Total Students = 50.

So, (x) + (x + 10) = 50.

2x + 10 = 50

2x = 40

x = 20.

So, the number of girls (x) is 20.

And the number of boys (x + 10) is 30.

Hence, the correct answer is " 30 ".

Q60. Answer: (c) When their hypotenuses are equal and one of the sides of one of these triangles is equal in length to the c...

Shortcut Trick

For right-angled triangles, the specific congruence criterion is RHS (Right angle-Hypotenuse-Side).

Two right triangles are congruent if the hypotenuse and one side of one triangle are equal to the corresponding parts of the other.

While other criteria like SAS, ASA, and SSS also apply, RHS is the unique condition specifically defined for right triangles.

Therefore The correct answer is When their hypotenuses are equal and one of the sides of one of these triangles is equal in length to the corresponding side of the other triangle.

Alternate Method

Given: Two triangles with one angle equal to 90°.

Property Used: RHS Congruence Rule.

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B
C
A
Q
R
P
Hypotenuse
Hypotenuse
Side

Q61. Answer: (a) 54

Shortcut Trick
For a continued proportion a : b :: b : c, the middle term is the mean proportional.
Trick logic: y = (18 × 18) ÷ 6
=> y = 18 × 3 = 54
Therefore The correct answer is 54.
Alternate Method
Given: 6 : 18 :: 18 : y
Formula Used: Product of Extremes = Product of Means
=> 6 × y = 18 × 18
=> 6y = 324
=> y = 324 ÷ 6
=> y = 54
Therefore The correct answer is 54.
Additional Information
Third Proportional
In a continued proportion a : b :: b : c, the term c is called the third proportional to a and b, where $c = b^2 \div a$.
Mean Proportional
The mean proportional between two numbers a and b is given by $\sqrt{(a \times b)}$.
Fourth Proportional
In the proportion a : b :: c : d, d is the fourth proportional and is calculated as (b × c) ÷ a.

Q62. Answer: (d) sunlight

The correct answer is sunlight.
Key Points
• When silver chloride (AgCl) is exposed to sunlight, it undergoes photodecomposition and forms silver metal and chlorine gas.
• This reaction causes the white AgCl to turn grey.
• AgCl is a white, insoluble, and inert compound that is commonly used in photography and silver plating.
• It is also used in the production of specialty glass, ceramics, and catalysts.
• CO2 and O2 do not have any significant effect on AgCl.
• Water can cause AgCl to dissolve and form a colorless solution.
Additional Information
• CO2 is a colorless and odorless gas that is present in the atmosphere.
• It is a greenhouse gas that contributes to global warming.
• It is also used in the production of carbonated beverages, dry ice, and fire extinguishers.
• O2 is a colorless and odorless gas that is essential for the survival of most living organisms.
• It is used in the production of steel, welding, and medical applications.
• Sunlight is a form of electromagnetic radiation that is emitted by the sun.
• It contains a range of wavelengths, including ultraviolet (UV) radiation.
• UV radiation can cause photodecomposition of certain compounds, such as AgCl.

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Q63. Answer: (d) 5

Calculation:

(2+ √3)/(2- √3)+ (2- √3)/(2+ √3)+ 11

By Rationalization of the (2+ √3)/(2- √3)+ (2- √3)/(2+ √3)

=> (2+ √3)(2+ √3)/(4- 3) + (2- √3)(2- √3)/(4- 3) + 11

=> 4 + 3 + 4√3 + 4 + 3 - 4√3 + 11

=> 14 + 11

=> 25

The square root of 25 is 5.

Therefore Option 4 is the correct answer.

Q64. Answer: (b) Lack of O2

The correct answer is Lack of O2.

Key Points

• Our muscles need oxygen to function properly.

• Lack of oxygen can cause muscle cramps.

• Oxygen helps in the process of energy production in our muscles.

• Without enough oxygen, this process becomes less efficient, leading to muscle fatigue and cramping.

• Lack of oxygen can also cause a buildup of lactic acid in the muscles, which can contribute to cramping.

Additional Information

• Oxygen is also important for removing waste products from the muscles.

• Without enough oxygen, waste products can build up and cause muscle cramps.

• Carbon dioxide is a waste product of cellular respiration and has no direct impact on muscle cramps.

• Excess carbon dioxide can lead to respiratory acidosis, which can cause muscle weakness and fatigue, but not necessarily cramps.

• Excess oxygen is not harmful to the body, but it may not necessarily prevent muscle cramps.

Q65. Answer: (d) m = v/u

The correct answer is m = v/u.

Key Points

• Magnification is the ratio of the size of the image to the size of the object.

• It is a dimensionless quantity.

• Image distance (v) is the distance between the lens and the image formed by the lens.

• It is measured in meters.

• Object distance (u) is the distance between the lens and the object being viewed.

• It is also measured in meters.

• The correct relation between m, v, and u for a lens is given by the formula m = v/u.

• This means that magnification is directly proportional to the object distance and inversely proportional to the image distance.

Additional Information

• Magnification can be positive or negative depending on the orientation of the image formed by the lens.

• If the image is upright and virtual, magnification is positive.

• If the image is inverted and real, magnification is negative.

• The focal length of a lens is the distance between the lens and the point at which the light rays converge or diverge.

• It is denoted by the symbol f.

• The formula for the focal length of a lens is given by 1/f = 1/v - 1/u.

• This formula is used to determine the focal length of a lens if the image distance and object distance are known.

• The unit of measurement for focal length is meters.

Q66. Answer: (c) two real and unequal roots

Shortcut Trick

For any quadratic equation of the form $ax^2 + bx + c = 0$, calculate the discriminant ($D = b^2 - 4ac$).

In $x^2 + 7x - 60 = 0$, we have a = 1, b = 7, and c = −60.

$D = 7^2 - 4 \times 1 \times (-60) = 49 + 240 = 289$.

Since the discriminant D > 0, the equation has two real and unequal roots.

Therefore The correct answer is two real and unequal roots.

Alternate Method

Given:

The quadratic equation is $x^2 + 7x - 60 = 0$.

Formula Used:

The nature of roots is determined by the discriminant (D):

$D = b^2 - 4ac$

1. If D > 0, roots are real and unequal.
2. If D = 0, roots are real and equal.
3. If D < 0, roots are imaginary (no real roots).

Calculations:

=> Comparing $x^2 + 7x - 60 = 0$ with $ax^2 + bx + c = 0$:

=> a = 1, b = 7, c = −60

=> $D = (7)^2 - 4 \times 1 \times (-60)$

=> D = 49 + 240

=> D = 289

=> Since 289 > 0, the value of the discriminant is positive.

=> Therefore, the equation has two real and unequal roots.

Therefore The correct answer is two real and unequal roots.

Additional Information

Quadratic Formula

The roots of $ax^2 + bx + c = 0$ are given by $x = [-b \pm \sqrt{(b^2 - 4ac)}] \div 2a$.

Sum and Product of Roots

For the equation $ax^2 + bx + c = 0$, the sum of roots is $-b/a$ and the product of roots is c/a.

Nature of Roots Table

D > 0 and a perfect square: Roots are rational and unequal. D > 0 and not a perfect square: Roots are irrational and unequal.

Complex Roots

If D < 0, roots are complex conjugates of each other, often written in the form $p \pm iq$.

Q67. Answer: (a) ZKRTO

The logic used here is → 6 is added to each letter to get the diagonally opposite letter.

KHADI:

DRINK:

Similarly,

INLET:

Hence, the correct answer is " ZKRTO ".

Q68. Answer: (a) Kerala

The correct answer is Kerala.

Key Points

• India’s first Graphene Innovation Centre set up in Kerala.

• Graphene is a form of carbon that has unique properties such as high thermal and electrical conductivity, mechanical strength, and flexibility.

• It is considered a wonder material with potential applications in various fields such as electronics, energy, and medicine.

• India is one of the leading countries in graphene research and has several research institutions and startups working on graphene-related projects.

• The centre is a collaboration between the Telangana government and the Indian Institute of Technology (IIT) Hyderabad.

• It aims to promote research and development of graphene-based technologies and products.

Additional Information

• Kerala, Gujarat, and Karnataka are among the states in India that have active research and development activities in graphene.

• Kerala has a Graphene Research Centre at the Cochin University of Science and Technology.

• Gujarat has a Graphene Centre at the Gujarat Council on Science and Technology.

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• Karnataka has several institutions and startups working on graphene research, including the Indian Institute of Science (IISc) and the startup Log 9 Materials.

Q69. Answer: (c) blue-green

The correct answer is blue-green.

Key Points

• Copper (II) chloride (CuCl2) is a compound that is greenish-brown in solid form.

• However, when it is dissolved in water, it forms a blue-green solution.

• The blue-green colour of the solution is due to the presence of Cu2+ ions, which absorb light in the orange and red regions of the spectrum and appear blue-green to the human eye.

Additional Information

• Copper (II) chloride is commonly used as a reagent in chemistry experiments and is also used in the production of pigments, dyes, and wood preservatives.

• Copper (I) chloride can produce a red or green colour in solution depending on the concentration and conditions.

• Cobalt (II) chloride produces a pink/red colour in solution.

• Nickel (II) chloride produces a yellow-green colour in solution.

Q70. Answer: (a) 150

Shortcut Trick

Identify the Common Factors among the given numbers: 450, 1500, and 1650.

Find the Difference between the closest numbers: 1650 − 1500 = 150.

Check if 150 divides all numbers: 450 ÷ 150 = 3, 1500 ÷ 150 = 10, 1650 ÷ 150 = 11.

Since 150 divides all three numbers, it is the Highest Common Factor (HCF).

Therefore The correct answer is 150.

Alternate Method

Given: Numbers 450, 1500, and 1650.

Formula Used: Prime Factorization Method.

Calculations:

=> Prime factors of 450 = $2 \times 3 \times 3 \times 5 \times 5 = 2^1 \times 3^2 \times 5^2$

=> Prime factors of 1500 = $2 \times 2 \times 3 \times 5 \times 5 \times 5 = 2^2 \times 3^1 \times 5^3$

=> Prime factors of 1650 = $2 \times 3 \times 5 \times 5 \times 11 = 2^1 \times 3^1 \times 5^2 \times 11^1$

=> HCF = Product of the lowest power of all common prime factors.

=> HCF = $2^1 \times 3^1 \times 5^2 = 2 \times 3 \times 25 = 150$.

Therefore The correct answer is 150.

Additional Information

HCF (Highest Common Factor)

The largest positive integer that divides each of the integers without a remainder. Also known as GCD (Greatest Common Divisor).

Difference Method for HCF

The HCF of any two or more numbers is always a factor of the difference between those numbers.

Relation between HCF and LCM

For two numbers a and b, the product of the numbers is equal to the product of their HCF and LCM: $a \times b = HCF(a,b) \times LCM(a,b)$.

Q71. Answer: (d) is negative

The correct answer is is negative.

Key Points

• The height of the image of an object below principal axis of a spherical mirror is negative.

• This is because the image formed by a spherical mirror below the principal axis is virtual and inverted.

• As a result, the height of the image will be negative.

• The position of the object will affect the location and size of the image, but it does not determine the height of the image.

• The height of the image will vary depending on where it is located with respect to the principal axis, and if the image is located below the principal axis, the height will be negative.

Additional Information

• The height of the image will vary depending on where it is located with respect to the principal axis.

• The position of the object will affect the location and size of the image, but it does not determine the height of the image.
• If the image is located above the principal axis, the height will be positive.
• Spherical mirrors are mirrors that have a curved surface, with the shape of a sphere.
• The principal axis is an imaginary line that passes through the center of the sphere and the vertex of the mirror.
• The height of the image refers to the distance between the top of the image and the principal axis, or between the bottom of the image and the principal axis.
• The height of the object refers to the distance between the top of the object and the principal axis, or between the bottom of the object and the principal axis.

Q72. Answer: (a) 56

The logic used here is → Numbers are multiplied by 2 to get the alternate numbers of the series.

Hence, the correct answer is " 56 ".

Q73. Answer: (a) two equal real roots

Shortcut Trick

Identify the nature of roots by calculating the discriminant ($D = b^2 - 4ac$).

For the equation $3x^2 - 4\sqrt{3}x + 4 = 0$, $D = (-4\sqrt{3})^2 - 4(3)(4)$.

$D = (16 \times 3) - 48 = 48 - 48 = 0$.

Since D = 0, the equation must have two equal real roots.

Therefore The correct answer is two equal real roots.

Alternate Method

Given quadratic equation: $3x^2 - 4\sqrt{3}x + 4 = 0$

The standard form of a quadratic equation is $ax^2 + bx + c = 0$.

By comparison, we find the coefficients:

$a = 3$

$b = -4\sqrt{3}$

$c = 4$

The nature of roots is determined by the discriminant (D) formula:

$D = b^2 - 4ac$

$\Rightarrow D = (-4\sqrt{3})^2 - 4 \times 3 \times 4$

$\Rightarrow D = (16 \times 3) - 48$

$\Rightarrow D = 48 - 48$

$\Rightarrow D = 0$

When the discriminant of a quadratic equation is equal to zero, the roots are real and equal.

Therefore The correct answer is two equal real roots.

Additional Information

Nature of Roots of Quadratic Equation

The value $D = b^2 - 4ac$ is called the discriminant. It decides whether the roots are real, distinct, or imaginary.

Distinct Real Roots

If D > 0, the roots are real and distinct (unequal).

Imaginary Roots

If D < 0, the roots are imaginary (no real roots exist for the equation).

Perfect Square Discriminant

If D > 0 and is a perfect square, the roots are rational and distinct (provided a, b, c are rational).

Q74. Answer: (a) A traditional way of collecting water

The correct answer is A traditional way of collecting water.

Key Points

• A 'bawri' is a traditional way of collecting water.
• It is a stepwell, which is a type of well or pond that was used for accessing groundwater in ancient times.
• Stepwells were constructed by digging into the ground and building steps leading down to the water level.
• They were commonly found in the arid regions of India and were used for both irrigation and drinking water.
• Stepwells were also used for social gatherings and religious ceremonies.

Additional Information

• A narrow bore tube-well is a modern method of accessing groundwater.

• It involves drilling a narrow borehole into the ground and installing a tube or pipe to bring the water to the surface.

• This method is commonly used in areas where groundwater is available at a deep level.

• An underground tank is a storage facility for water.

• It is used to store water for later use, particularly in areas where water is scarce.

• A canal is a man-made waterway that is used to transport water from one place to another.

• Canals are commonly used for irrigation, particularly in agricultural areas.

Q75. Answer: (b) 5.6

The correct answer is 5.6.

Key Points

• Acid rain is caused by the release of sulfur dioxide and nitrogen oxides into the atmosphere, which react with water, oxygen, and other chemicals to form sulfuric acid, nitric acid, and other pollutants.

• The pH scale ranges from 0 to 14, with 7 being neutral.

• Anything below 7 is considered acidic, and anything above 7 is considered basic.

• The pH of acid rain is typically between 4.2 and 5.6, which is significantly more acidic than normal rainwater (pH 5.6-6.5).

• Acid rain can have harmful effects on the environment, including damaging crops and forests, making bodies of water more acidic, and causing respiratory problems in humans.

Additional Information

• A pH value of 8.6 is actually considered basic, not acidic.

• Water with a pH of 8.6 is slightly alkaline and can be found in some natural springs and wells.

• A pH value of 6.6 is still slightly acidic, but less so than acid rain.

• This pH level can be found in some natural bodies of water and is generally safe for aquatic life.

• A pH value of 7.6 is neutral, not acidic.

• This pH level can be found in most tap water and is safe for human consumption.

Q76. Answer: (a) A coil carrying conductor experiences force in the region of non-uniform magnetic field

The correct answer is A coil carrying conductor experiences force in the region of non-uniform magnetic field.

Key Points

• An electric motor works on the principle of converting electrical energy into mechanical energy.

• It consists of a coil of wire (conductor) placed in a magnetic field.

• When an electric current is passed through the coil, it experiences a force due to the interaction of the magnetic field and the current-carrying conductor.

• This force causes the coil to rotate, which in turn rotates the shaft of the motor and produces mechanical energy.

• This phenomenon is known as electromagnetic induction, which is the basis of the working of electric motors and generators.

Additional Information

• The induced voltage is directly correlated with the wire's number of coils or twists.

• The voltage generated increases with the number of turns.

• The induced voltage changes as the magnetic field changes.

• The conductor can be moved in the magnetic field or the magnetic field can be moved around the conductor to accomplish this.

• The electromagnetic induction concept underlies the operation of AC generators.

• Electrical transformers operate on the principle of electromagnetic induction.

• The electromagnetic induction principle underpins the magnetic flow meter.

Q77. Answer: (a) source of a constant magnetic field

The correct answer is source of a constant magnetic field.

Key Points

• A solenoid is a coil of wire, and when current flows through it, a magnetic field is generated.

• The magnetic field inside a solenoid is uniform and strong, making it useful for applications such as electromagnets and magnetic locks.

• The strength of the magnetic field can be increased by increasing the current or the number of turns in the coil.

• A solenoid is a type of electromagnet that consists of a coil of wire wrapped around a cylindrical core.

• The magnetic field produced by a solenoid is proportional to the current flowing through the coil and the number of turns in the coil.

• Solenoids are commonly used in a variety of applications, including door locks, valves, relays, and motors.

Additional Information

• A solenoid carrying current does not emit light on its own.

• However, it can be used in conjunction with other components such as LEDs or incandescent bulbs to create a light source.

• If the solenoid is not constructed properly or if there is a defect in the coil, it may produce a non-uniform magnetic field.

• A solenoid can be used to convert electrical energy into mechanical energy.

• When current flows through the coil, it creates a magnetic field that can be used to move a plunger or other mechanical component.

Q78. Answer: (d) Empowers them to decide about child bearing

The correct answer is Empowers them to decide about child bearing.

Key Points

• Formal health education provides knowledge about sexually transmitted diseases, which is important for women to protect themselves and their partners from infections.

• It also provides information about nutritional needs of children, which is important for women to ensure that their children grow up healthy and strong.

• Formal health education helps to reduce child and maternal deaths by teaching women about the importance of prenatal care, safe delivery practices, and postnatal care for both the mother and the child.

• Empowering women to decide about child bearing is also an important aspect of formal health education, as it enables them to make informed choices about their reproductive health and family planning.

Additional Information

• Sexually transmitted diseases (STDs) are infections that are passed from one person to another through sexual contact.

• Formal health education can provide information on how to prevent and treat STDs, as well as how to reduce the risk of transmission.

• Nutritional needs of children vary depending on their age, gender, and activity level.

• Formal health education can provide information on how to meet these needs through a balanced diet and healthy eating habits.

• Child and maternal deaths are a major public health concern, particularly in low-income countries.

• Formal health education can help to address this issue by improving access to healthcare services and promoting healthy behaviors.

• Empowering women to make decisions about child bearing can have a positive impact on their health and well-being, as well as that of their families.

• This can include access to family planning services, education on contraception methods, and support for safe and healthy pregnancies.

Q79. Answer: (c) 175over12

Shortcut Trick

For two pipes filling a tank in x and y hours, the time taken together is (x × y) / (x + y).

Required time = (25 × 35) / (25 + 35)

Required time = 875 / 60

Divide by 5 = 175 / 12

Therefore The correct answer is 175/12 hours.

Alternate Method

Given: Time for Pipe 1 = 25 hours, Pipe 2 = 35 hours.

Formula Used: Total Work = LCM of individual times; Efficiency = Total Work ÷ Time.

Person	Days	Total Work	Efficiency
Pipe 1	25	175	7
Pipe 2	35	5	

=> Combined Efficiency = 7 + 5 = 12 units/hour

=> Time taken = Total Work ÷ Combined Efficiency

=> Time taken = 175 / 12 hours

Therefore The correct answer is 175/12 hours.

Additional Information

Pipes & Cisterns Concept

If an inlet pipe fills a tank in A hours and an outlet pipe empties it in B hours, net work per hour = (1/A) − (1/B).

Efficiency and Time

Efficiency is inversely proportional to time. If the ratio of time is 5:7, the ratio of efficiency is 7:5.

Q80. Answer: (a) 63

Shortcut Trick

Using the Net Deviation method from the mean (56):

Deviations: (50−56), (63−56), (62−56), (64−56), (48−56), (51−56), (55−56), (48−56)

Sum of deviations = −6 + 7 + 6 + 8 − 8 − 5 − 1 − 8 = −7

Since the total net deviation must be zero: (x − 56) + (−7) = 0 => x = 56 + 7 = 63

Therefore The correct answer is 63 kg.

Alternate Method

Given:

Weights of 9 members = 50, 63, x, 62, 64, 48, 51, 55, 48 kg

Mean weight = 56 kg

Formula Used:

Mean = (Sum of all observations) ÷ (Total number of observations)

Calculations:

=> Sum of weights = 56 × 9

=> 50 + 63 + x + 62 + 64 + 48 + 51 + 55 + 48 = 504

=> 441 + x = 504

=> x = 504 − 441

=> x = 63

Therefore The correct answer is 63 kg.

Additional Information

Arithmetic Mean

The average of a set of numerical values, calculated by adding them together and dividing by the count of terms: Σx ÷ n.

Properties of Mean

If a constant k is added to or subtracted from every term, the new mean will be (Old Mean ± k).

Median of Data

The middle value when the data is arranged in ascending order. For 9 terms, it is the (9+1)÷2 = 5^(th) term.

Q81. Answer: (c) 28

Shortcut Trick

Ratio Method:

4 years ago Rajesh : Naresh = 3 : 1 (Difference = 2)

4 years hence Rajesh : Naresh = 2 : 1 (Difference = 1)

Equating differences: 3 : 1 and 4 : 2. Gap of 1 unit = 8 years (4 years past to 4 years future).

Rajesh age 4 years ago = 3 × 8 = 24 years. Present age = 24 + 4 = 28 years.

Therefore The correct answer is 28 years.

Alternate Method

Given: Ratio of ages 4 years ago and 4 years after.

Let: Naresh age 4 years ago = x years. Then Rajesh age 4 years ago = 3x years.

=> Present age of Rajesh = 3x + 4, Present age of Naresh = x + 4

=> Ages 4 years hence: Rajesh = 3x + 8, Naresh = x + 8

=> (3x + 8) = 2 × (x + 8)

=> 3x + 8 = 2x + 16

=> x = 8

=> Rajesh present age = 3(8) + 4 = 24 + 4 = 28 years.

Therefore The correct answer is 28 years.

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Additional Information

Age Difference Property

The difference between the ages of two persons remains constant regardless of the number of years that pass.

Ratio Balancing

To solve age problems quickly, multiply ratios such that the numerical difference between the parts is equal to the time gap in years.

Q82. Answer: (a) Satpura range

The correct answer is Satpura range.

Key Points

• The river Tapi is also known as the Tapti river.

• It is one of the major rivers in central India that flows through the states of Maharashtra, Gujarat, and Madhya Pradesh.

• The river Tapi originates in the Satpura range of central India, near the Multai town in the Betul district of Madhya Pradesh.

• The Satpura range is a series of hills and mountains that run parallel to the Vindhya range in central India.

• It covers parts of Maharashtra, Madhya Pradesh, and Gujarat, and is home to several wildlife sanctuaries and national parks.

Additional Information

• The Nilgiri hills are a range of mountains located in the southern Indian states of Tamil Nadu, Karnataka, and Kerala.

• They are known for their scenic beauty and are a popular tourist destination.

• The Aravali range is a mountain range in western India that runs through the states of Gujarat, Rajasthan, Haryana, and Delhi.

• It is one of the oldest mountain ranges in the world and is known for its rich mineral resources.

• The Himalayan range is a mountain range in South Asia that runs through several countries including India, Nepal, Bhutan, and Tibet.

• It is the highest mountain range in the world and is home to several of the world's highest peaks including Mount Everest.

Q83. Answer: (c) 26

The logic followed here,

1^(st) Number → Second multiple of a number.

2^(nd) Number → (Third multiple of the same number) - 1

14: 20 →

14: Second multiple of 7.

20: (Third multiple of 7) - 1 = (21 - 1) = 20.

26: 38 →

26: Second multiple of 13.

38: (Third multiple of 13) - 1 = (39 - 1) = 38.

Similarly,

18: ? →

18: Second multiple of 9.

? = (Third multiple of 9) - 1

? = 27 - 1

? = 26

Hence, the correct answer is " 26 ".

Q84. Answer: (d) 6 Ω

The correct answer is 6 Ω.

Key Points

• The effective resistance of the series combination of three resistors each with resistance 2 Ω is equal to the sum of the individual resistances, which is 6 Ω.

• Resistance is the measure of a material's ability to oppose the flow of electric current.

• The unit of resistance is the ohm.

• In a series circuit, the components are connected end-to-end, and the current flows through each component in turn.

Additional Information

• In a parallel circuit, the components are connected across each other, and the current is divided among them.

• Every element of the parallel circuit has the same voltage applied to it.

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• The total current flowing from the source is equal to the sum of the currents flowing through each path.

Q85. Answer: (d) 504

Shortcut Trick

Multipliers for discounts: 20% => 0.8, 30% => 0.7, 10% => 0.9.

Net selling price = 1000 × 0.8 × 0.7 × 0.9.

Net selling price = 1000 × (8/10 × 7/10 × 9/10) = 8 × 7 × 9.

Net selling price = 56 × 9 = 504.

Therefore The correct answer is Rs. 504.

Alternate Method

Given: Marked Price (MP) = Rs. 1000, Successive Discounts = 20%, 30%, 10%.

Formula: Selling Price (SP) = MP × (100 − d1)/100 × (100 − d2)/100 × (100 − d3)/100.

=> Price after 1^(st) discount = 1000 − (20% of 1000) = 1000 − 200 = 800.

=> Price after 2^(nd) discount = 800 − (30% of 800) = 800 − 240 = 560.

=> Price after 3^(rd) discount = 560 − (10% of 560) = 560 − 56 = 504.

Therefore The correct answer is Rs. 504.

Additional Information

Successive Discounts

When two or more discounts are applied one after another, they are called successive discounts. Net discount % for two discounts 'a' and 'b' is calculated as a + b − (ab/100)%.

Marked Price & Selling Price

Marked Price is the price printed on the label, and Selling Price is the final amount after deducting the discount from the MP.

Q86. Answer: (c) Na

The correct answer is Na.

Key Points

• Group 2 of the Modern Periodic Table is also known as the Alkaline Earth Metals.

• These elements have two valence electrons in their outermost shell.

• They are highly reactive and have similar chemical properties.

• The elements in Group 2 include Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Ba), and Radium (Ra).

Additional Information

• Na is NOT included in Group 2 of the Modern Periodic Table.

• Sodium (Na) belongs to Group 1, also known as the Alkali Metals.

• The elements in Group 1 have one valence electron in their outermost shell and are highly reactive.

Q87. Answer: (c) 6 14 T

The logic used here:

• 4 is added in the positional value of the alphabet to get the next alphabet of the series.

• 4 is added to the number to get the next number of the series.

Given Series → D _ H 10 L _ P 18 _

Using the logic,

D 6 H 10 L 14 P 18 T

Hence, the correct answer is " 6 14 T ".

Q88. Answer: (c) T

Given: Seven boxes are kept one over the other but not necessarily in the same order.

1) S is fifth from the top.

2) Only two boxes are kept between S and V.

3) R is kept just below V.

4) Only one box is kept between S and Q.

V

R
S
Q

5) Only two boxes are kept between P and T.

6) P is placed in one of the positions above T.

And, U will placed at the remaining box.

P
V
R
T
S
U
Q

So, box 'T' is kept fourth from the bottom.

Hence, the correct answer is "Option 3".

Q89. Answer: (a) Both conclusions I and II follow

Given Statements:

All potatoes are tomatoes.

All tomatoes are onions.

All onions are books.

The least possible Venn diagram for the given statement is:

Conclusions:

I. Some books are potatoes - True (Because, All the potatoes are comes under the part of books, so some books will be definitely potatoes).

II. Some onions are tomatoes - True (Because, All the tomatoes are comes under the part of onions, so some onions will be definitely tomatoes).

So, Both conclusions I and II follow.

Hence, the correct answer is "Option 1".

Q90. Answer: (c) 7

Given:

ENT specialists were 42° as per the pie chart.

Calculation:

As the circle is 360° which is equal to 60.

So the value of 1° = 60/360 = 1/6

So 42° = 42 × 1/6 = 7

Therefore Option 3 is the correct answer.

Q91. Answer: (a) 6

Given:

The numbers are 2.5, 6.5, 4.5, 16.5, 3.5, and 2.5.

Concept used:

Mean = Sum of all observation/number of observations.

Calculation:

=> Mean = (2.5 + 6.5 + 4.5 + 16.5 + 3.5 + 2.5)/6

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=> Mean = (36)/6

=> Mean = 6

Therefore Option 1 is the correct answer.

Q92. Answer: (b) Eight

Given: A certain number of persons are sitting in a row, facing North.

1) Vijay is sitting exactly second to the left of Imran, who is sitting at the extreme right end.

2) Hriday is sitting to the immediate right of Vijay.

3) There are only three persons sitting between Gaurav and Vijay.

4) There is only one person to the left of Gaurav.

5) Kiara and David are immediate neighbours of Lalita.

So, If no other person is sitting in the row, there are total 'Eight' persons seated in the row.

Hence, the correct answer is "Option 2".

Q93. Answer: (c) 111

Calculation:

14.95 × 27.05 ÷ 2.99 - 35.98 + 12.10 = ?

135.25 - 35.98 + 12.1 = ?

111.37 = ?

Round off the nearest integer which is equal to 111.

Therefore Option 3 is the correct answer.

Q94. Answer: (c) Ladoo

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

1) Alok sits to the immediate right of Sonu.

2) Ladoo sits third to the left of Alok.

3) Dimple is an immediate neighbour of both Ladoo and Sonu.

4) Soni sits third to the right of Sonu.

5) Sushma is not an immediate neighbour of Ladoo.

So, 'Ladoo' sits second to the right of Sushma.

Hence, the correct answer is "Option 3".

Q95. Answer: (d) Chemical properties

The correct answer is Chemical properties.

Key Points

• Homologous series refers to a group of organic compounds that have the same functional group and similar chemical properties.

• They differ from each other by the number of carbon atoms in their chain.

• A homologous series has a regular increase in the molecular mass due to the addition of a methylene group (-CH2-) in each successive compound.

• The molecular mass of the compounds in a homologous series increases by a constant value, which is equal to the molecular mass of the -CH2- group.

• Therefore, theChemical properties remain the same because all members of a homologous series have the same functional group, which dictates the chemical behavior of the molecule.

• Melting and boiling points of the compounds in a homologous series show a regular increase with increasing molecular mass due to the increase in intermolecular forces of attraction.

• Chemical properties of the compounds in a homologous series are determined by the functional group present in them.

Additional Information

• The melting point of a compound is the temperature at which it changes from a solid to a liquid state.

• It depends on the strength of the intermolecular forces of attraction between the molecules of the compound.

• The boiling point of a compound is the temperature at which it changes from a liquid to a gaseous state.

• It depends on the strength of the intermolecular forces of attraction between the molecules of the compound.

• The molecular mass of a compound is the sum of the atomic masses of all the atoms present in a molecule of the compound.

• The chemical properties of a compound are determined by the functional group present in it.

• The functional group determines how the compound reacts with other substances.

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Q96. Answer: (b) Ministry of Women and Child Development

The correct answer is Ministry of Women and Child Development.

Key Points

• The Women Safety Division was created in 2013 to address the issue of women's safety in a comprehensive manner.

• Ministry of Women and Child Development created this division.

• The division aims to coordinate with various ministries and agencies to ensure the safety and security of women.

• The division also works towards creating awareness among women about their rights and the laws related to their safety.

• The Ministry of Women and Child Development also runs various schemes and programs for the welfare and empowerment of women and children in India.

Additional Information

• The Universalization of Women Helplines and One Stop Center are the two Nirbhaya Fund initiatives that are managed by the Ministry of WCD.

• The One Stop Centers (OSCs), also referred to as Sakhi Centers, are designed to provide women who have experienced violence—including domestic abuse—with a variety of integrated services under one roof.

• These services include police support, medical assistance, legal aid and counseling, psycho-social counseling, and temporary housing, among other things.

• The Women Helpline (WHL) Program connects women who have experienced violence in public and private settings with the necessary authorities, including the police, one stop center, hospital, legal services, etc., offering them a round-the-clock emergency and non-emergency response.

Q97. Answer: (d) 2

Given Statement: H ≥ E > S ≤ T = P > Q

Now,

Conclusions:

1. Q = T → False (T = P > Q It gives Q < T)

2. S < H → True (H ≥ E > S It gives S < H)

3. S > P → False (S ≤ T = P It gives S ≤ P)

4. E > T → False (E > S ≤ T No relation can be established between E and T)

Here, Conclusions 2 follows.

Hence, the correct answer is "Option 4".

Q98. Answer: (b) 10321over900

Given:

9.4677...-2.4677...+4.4677...

Concept used:

0.ab = ab/99

0.ab = (ab - a)/90

a.bc = (abc - ab)/90

Calculation:

9.4677...-2.4677...+4.4677...

=> (9467 - 946)/900 - (2467-246)/900 + (4467-446)/900

=> 8521/900 - 2221/900 + 4021/900

=> 10321/900

Therefore The required answer is 10321/900.

Q99. Answer: (d) It will lead to soil erosion and degradation.

The correct answer is It will lead to soil erosion and degradation.

Key Points

• Cutting down many trees in a forest will lead to soil erosion and degradation as trees hold the soil together and prevent it from washing away during heavy rains or winds.

• Deforestation can also cause a decrease in soil fertility as the nutrients in the soil are absorbed by the remaining plants and are not replenished by the decaying leaves and branches of the cut down trees.

• Deforestation also leads to an increase in greenhouse gas emissions as trees absorb carbon dioxide and release oxygen during photosynthesis.

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• Cutting down trees reduces the amount of carbon dioxide absorbed and increases the amount of carbon dioxide released into the atmosphere.

• While cutting down trees may provide livelihood to some people, it is not a sustainable solution in the long run as it leads to environmental degradation and loss of biodiversity.

Additional Information

• Environmental degradation is the term used to describe how the environment deteriorates due to pollution, ecosystem devastation, species extinction, habitat destruction, and the loss of resources like clean air, water, and soil.

• It is described as any alteration or disruption to the surroundings that is thought to be harmful or unfavorable.

• Pollution of the air, water, natural environment, garbage, and so on are some of the main environmental issues that are causing a lot of concern.

• The High-level Panel on Threats, Challenges and Change of the United Nations has formally warned of ten threats, including environmental degradation.

Q100. Answer: (c) I weakens while II is a neutral argument

The correct answer is I weakens while II is a neutral argument.

Key Points

• Argument I weakens the statement because it highlights a major issue in the hospital's operations that needs to be addressed immediately.

• The hospital cannot receive an award for excellence in service if patients are losing their lives due to preventable incidents.

• Argument II is a neutral argument as it does not provide any relevant information that supports or weakens the statement.

• The fact that another hospital has won the award five times does not impact Hospital X's chances of winning the award if they address their waste management capabilities.

• Therefore, the correct answer is "I weakens while II is a neutral argument."

• In summary, the statement suggests that if Hospital X improves its waste management capabilities, they will win the 'excellence in service' award for year 22-23.

Additional Information

• Waste management refers to the process of collecting, transporting, processing, recycling, and disposing of waste materials.

• The "7R" approach—"R'efuse, 'R'educe, 'R'euse, 'R'epair, 'R'epurpose, 'R'ecycle, and 'R'ecover—is essential to effective "waste management."

• The 'excellence in service' award is likely a recognition given to hospitals that provide exceptional healthcare services to their patients.

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