RRB Group D Previous Year Paper (Held on: 27 Sept 2022 Shift 3)

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

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Scan the QR code or click the link to open it.

1 question is in Hindi and not printed here. Each one links to the online version, where you can read it.

CBT

Q1. Which of the following numbers will replace the question mark (?) in the given number series?

2.9, 4.4, 5.9, 7.4, 8.9, ?

(a) 10.4
(b) 9.4
(c) 9.9
(d) 10.9

Q2. Find the area of a rhombus whose diagonals measure 24.6 cm and 28.6 cm, respectively.

(a) 351.78 cm2
(b) 703.56 cm2
(c) 657.46 cm2
(d) 251.78 cm2

Q3. The units digit of a 2 -digit number is three times its tens digit. If the units digit is 6, what is the value of twice the number?

(a) 52
(b) 26
(c) 48
(d) 24

Q4. Find the arithmetic mean of the following data.

x	5	10	15	20	25	30
f	3	5	6	2	1	3

(a) 13.5
(b) 15.5
(c) 12.5
(d) 14.5

Q5. When copper oxide is added to dilute hydrochloric acid, the colour of the acid changes to blue-green, due to the formation of ___.

(a) Water
(b) hydrogen gas
(c) copper (II) chloride
(d) copper (I) chloride

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Q6. Identify the substance that is reduced in the following reaction.

$ZnO + C \rightarrow Zn + CO$

(a) O
(b) Zn
(c) C
(d) ZnO

Q7. If $x = b + c$, $y = c - a$, $z = a - b$, then find the value of $x^2 + y^2 + z^2 - 2xy - 2xz + 2yz$.

(a) 2b
(b) $4c^2$
(c) 4b2
(d) 4a2

Q8. A square-shaped coil of copper wires is rotating in a magnetic field. Then direction of the induced current in the coil changes once in each:

(a) one-fourth of the revolution of the coil
(b) one-half of the revolution of the coil
(c) one-eighth of the revolution of the coil
(d) one-sixth of the revolution of the coil

Q9. In Mendel's experiments, crossing a pea plant bearing yellow-coloured peas with a plant bearing green-coloured peas gave plants that all had yellow-coloured peas. If these plants were allowed to self-pollinate and 500 peas were collected from them, how many would be green-coloured?

(a) Around 220
(b) Around 440
(c) Around 330
(d) Around 110

Q10. The most widespread forests in India are of what type?

(a) Mangrove Forests
(b) Tropical Evergreen Forests
(c) Tropical Deciduous Forests
(d) Montane Forests

Q11. Bleaching powder is produced by the action of chlorine on?

(a) Quick lime
(b) Slaked lime
(c) Sodium chloride
(d) Caustic soda

Q12. Who won the third edition of the BBC Indian Sportswoman of the Year Award in 2021?

(a) Saina Nehwal
(b) Mirabai Chanu
(c) Radha Yadav
(d) PV Sindhu

Q13. A man of blood type A married a woman of blood type B, they had a child of type AB. What does this mean in terms of genetics?

(a) The gene is dominant for blood group A and the gene is recessive for blood group B.
(b) The gene for blood group B is dominant and the gene for blood group A is recessive.
(c) The gene for blood type A and the gene for blood type B are both inactive.
(d) Both the gene for blood type A and the gene for blood type B are dominant.

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Q14. A group of friends are playing a game sitting together facing north. Rehana is to the left of Arjun, who is seated exactly in front of Somil. If Arjun exchanges his position with Somil, to which direction of Arjun is Rehana seated now?

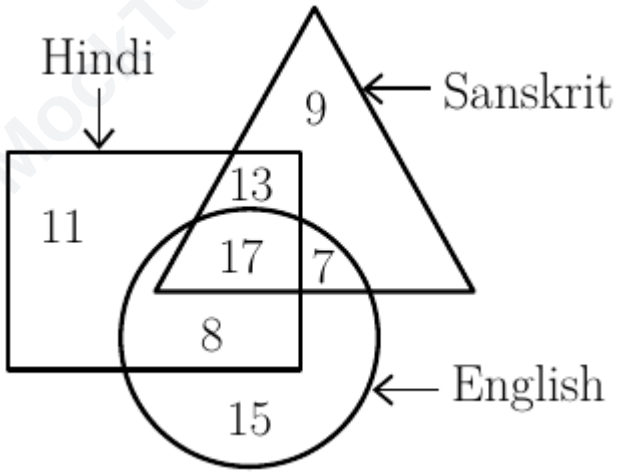
(a) North
(b) South-West
(c) North-West
(d) North-East

Q15. Bharti starts from point T and drives 7 km towards north. Then she turns right, drives 4 km, turns right and drives 10 km. She then turns right and walks 6 km. She takes a final right turn, drives 3 km and stops at point E. How far and in which direction should she drive to reach point T from point E?

(All turns are 90° turns only)

(a) 2 km towards north
(b) 2 km towards east
(c) 2 km towards west
(d) 2 km towards south

Q16. Study the given diagram carefully and answer the question. The numbers in different sections indicate the number of students speaking various languages.



How many students can speak all three languages i.e. Sanskrit, Hindi and English?

(a) 25
(b) 17
(c) 30
(d) 24

Q17. Which of the following changes in our eating habits would have the greatest impact on our environment?

(a) Stopping food wastage
(b) Avoiding processed foods
(c) Avoiding meat and animal products
(d) Growing your own food

Q18. Which of the following letter-clusters will replace the question mark (?) in the given series to make it logically complete?

FAN 15, KFS 20, PKX 25, UPC 30, ?

(a) YSL 40
(b) YLS 45
(c) ZVI 35
(d) ZUH 35

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Q19. If an investment earns straight interest at the rate of 4% per annum, how many years will it take for the investment to double?

(a) 10
(b) 20
(c) 25
(d) 15

Q20. If '-' means '+', '+' means '×', '×' means '÷', '÷' means '-', what will come in place of the question mark (?) in the following equation?

3 ÷ 8 × 2 + 1 - 5 = ?

(a) 6
(b) 5
(c) 4
(d) 7

Q21. Name the tiny pores present on leaves of plants.

(a) Stomata
(b) Chloroplasts
(c) Lenticels
(d) Guard cells

Q22. This question is based on five, five-digit numbers given below.

(Left) 72238 83745 52227 72253 63776 (Right)

(Example: 697 - 1st digit = 6, 2nd digit = 9, 3rd digit = 7)

(Note: All activities are to be done from left to right.)

If 1 is subtracted from the first digit of each number, how many numbers will have the first digit fully divisible by 3?

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

Q23. A statement is given followed by four conclusions. Find out which conclusion is INCORRECT based on the given statement.

Statement: G ≥ B > D > P < H = C

Conclusions:

1) P < C

2) G > P

3) D < C

4) B > P

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

Q24. Refer to the following letter, number, symbol series and answer the question.

(Left) B & Z $ 6 N M @ 4 X & 7 L # 3 T Z * 5 (Right)

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

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

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Q25. Simplify the given expression.

$(y - z)^3 + (z - x)^3 + (x - y)^3$

(a) 3(x - y) (y - z) (z - x)
(b) 3(x - y) (y - z) (z + x)
(c) (x - y) (y - z) (z - x)
(d) 3(x - y) (y - z) (x - z)

Q26. Plants release excess water through a process called:

(a) evaporation
(b) transpiration
(c) transportation
(d) translocation

Q27. In a certain code language, 5 ,8, 2, 3, 4, 1, 7 and 6 are coded as P, W, D, L, X, T, A and G, respectively.
If the last two digits of the number-cluster are odd, then the first and last digits are to be coded as Q.
If the last two digits of the number-cluster are even, then the first and last digits are to be coded as L.
How will '231578' be coded in that language?

(a) LLTPAL
(b) DLTPAL
(c) DLTPAW
(d) LLTPAW

Q28. What is the most effective way to reduce waste generation?

(a) Garbage
(b) Making compost
(c) Recycling
(d) Combustion

Q29. Which Gana did Gautam Buddha belong to?

(a) Lichchavi
(b) Malla
(c) Moriya
(d) Sakya

Q30. Two pipes can fill a cistern, individually, in 60 min and 75 min, respectively. There is a pipe located at the bottom of the cistern to empty it. If all the three pipes are opened simultaneously, then the empty cistern gets filled in 50 min. How long will the pipe at the bottom of the tank take to empty the completely filled cistern if no other pipe is then open?

(a) 100 min
(b) 75 min
(c) 200 min
(d) 150 min

Q31. In which of the following years did the Twelfth Five Year Plan end?

(a) 2018
(b) 2019
(c) 2016
(d) 2017

Q32. Which of the following numbers will replace the question mark (?) in the given number series?

19, 19, 21, 63, 67, ?

(a) 330
(b) 72
(c) 335

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(d) 196

Q33. In which year was the AU Small Finance Bank founded?

(a) 1996
(b) 2012
(c) 2005
(d) 2000

Q34. A, B, C, D, E and F are sitting around a circular table facing the centre. B is sitting second to the right of D. C is sitting third to the right of A. A is an immediate neighbour of both E and F. D sits to the immediate right of E. Who is sitting to the immediate left of B?

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

Q35. M, N, O, P, Q and R live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 6.

Q lives on an odd-numbered floor but not on the lowermost floor. Only one person lives between Q and N. R lives immediately above Q. Only two people live between O and Q. If P lives immediately above R, where does M live?

(a) 6^(th) floor
(b) 4^(th) floor
(c) 2^(nd)floor
(d) 1^(st) floor

Q36. Express 3. 3131... in the form p/q, where p and q are integers and q ≠ 0.

(a) 329/99
(b) 328/99
(c) 10/3
(d) 109/33

Q37. Five friends live on five different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 5. Only Meera lives on the floor between Shrishti and Richa. Anshul lives on the floor immediately below Richa. Chandan lives on the first floor. No one lives above Shrishti. Who lives on the second floor?

(a) Shrishti
(b) Anshul
(c) Meera
(d) Richa

Q38. Select the correct group of statements that support the criteria of being a classical language in India according to the Government of India.

The language in its property should have:

A) High antiquity of its early texts/recorded history over a period of 1500-2000 years.

B) A body of ancient literature/texts, which is considered a valuable heritage by generations of speakers

C) Original literary tradition that is not borrowed from another speech community

D) Been spoken by at least two million active speakers

(a) A, C and D
(b) A, B and D
(c) A, B and C
(d) B, C and D

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Q39. If tanq + cotq = 14, then find the value of $7\tan^2 q + 7\cot^2 q$.

(a) 198
(b) 194
(c) 1358
(d) 1386

Q40. _____ helps to maintain potential difference across a conductor.

(a) Battery
(b) Plug key
(c) Resistance
(d) Voltmeter

Q41. Which of the following is produced when magnesium ribbon burns in the presence of air?

(a) Blue powder of magnesium oxide
(b) White powder of magnesium dioxide
(c) White powder of magnesium oxide
(d) White powder of magnesium carbonate

Q42. Ramu works in shop for Rs. 125 per hour. If his pay is increased to Rs. 145 per hour, find his percentage increase in pay.

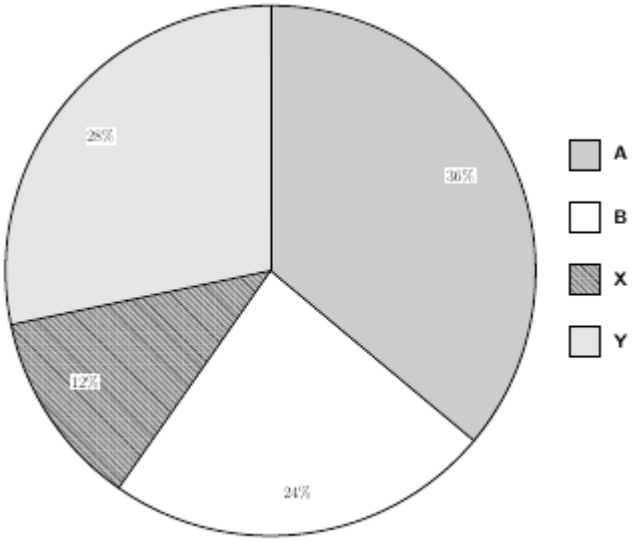
(a) 18%
(b) 12%
(c) 14%
(d) 16%

Q43. 145 is divided into two parts, a and b, such that a : b :: 2 : 3. Also, a : c :: c : b and c > 0. Find the value of c, correct to the nearest integer.

(a) 71
(b) 75
(c) 61
(d) 65

Q44. Study the given pie-chart and answer the following question.

The given pie chart depicts the number of chairs manufactured of four brands (A, B, X and Y). The total number of chairs manufactured of the four brands together is 200.



The total manufacturing cost of chairs of Brand A was Rs. 14,400. What was the manufacturing cost of one chair of Brand A?

(a) Rs. 200

(b) Rs. 240
(c) Rs. 150
(d) Rs. 220

Q45. Direction of the magnetic field produced by the straight conductor carrying current in the east direction is along the _____ direction at a point directly below the conductor.
(a) South
(b) West
(c) north
(d) east

Q46. Select the set in which the numbers are related in the same way as are the numbers of the following sets.
(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. EXAMPLE: 13 - Operations on 13 such as adding/subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)
(11, 117, 2)
(9, 56, 5)
(a) (13, 169, 2)
(b) (12, 108, 6)
(c) (7, 46, 1)
(d) (10, 98, 2)

Q47. Which of the following are the three-carbon molecules formed during respiration?
(a) Pyruvate and ethanol
(b) Lactic acid and pyruvate
(c) Ethanol and lactic acid
(d) Ethanol and malic acid

Q48. The _____ is a macroeconomic term that refers to the proportion of income that is saved rather than spent on current goods and services.
(a) Marginal propensity to consume
(b) Marginal propensity to save
(c) Average propensity to consume
(d) Average propensity to save

Q49. Select the correct balanced chemical equation for the given reaction.
Zinc + Silver nitrate → Zinc nitrate + Silver
(a) 2Zn (s) + AgNO3(aq) → 2ZnNO3(aq) + Ag(s)
(b) Zn (s) + 2AgNO3 (aq) → Zn(NO3)2 (aq) + 2Ag(s)
(c) Zn (s) + AgNO3 (aq) → ZnNO3 (aq) Ag(s)
(d) 2Zn (s) + AgNO3 (aq) → ZnNO3 (aq) + Ag(s)

Q50. In an electrical circuit, five identical bulbs are connected in parallel to each other to a battery of 20 V (negligible internal resistance). When all the five bulbs glow, a current of 5 A is recorded. Then the power dissipated in the circuit and the resistance of each bulb are _____ and _____ respectively.
(a) 56.25 W, 2.25 Ω
(b) 38.75 W, 1.55 Ω
(c) 46.25 W, 1.85 Ω
(d) 100 W, 20 Ω

Q51. The potential difference across a resistor of 2 ohm when 200 joule of heat is produced each second is given by _____.
(a) 10 volt
(b) 80 volt
(c) 40 volt

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(d) 20 volt

Q52. An object of height 3 cm is placed at a distance 30 cm in front of a convex lens of focal length 20 cm. The height of the image will be:

(a) 10 cm
(b) 14 cm
(c) 8 cm
(d) 6 cm

Q53. In which of the following years, was Article 21-A inserted in the Constitution of India, which deals with the Fundamental Right of getting compulsory education for all children in the age group of six to fourteen years?

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

Q54. What is the name of the grant-in-aid scheme of the department under the Tribal Sub Plan that aims at improving living conditions and empowerment of scheduled tribes based on sustainable science and technology (S & T) activities/application?

(a) Technical Interventions for Tribal Empowerment (TITE)
(b) Technological Interventions for Tribal Empowerment (TITE)
(c) Technological Interventions for Tribal Enablement (TITE)
(d) Technological Involvements for Tribal Empowerment (TITE)

Q55. The average score of a cricketer in his first 7 innings is 28 runs. His average score in the next 3 innings is 32 runs. Determine the score he should get in his 11^(th) inning so that his overall average score becomes 33 runs,

(a) 50
(b) 55
(c) 71
(d) 49

Q56. Suppose Ram has placed a ball in front of a concave mirror of focal length (f) at various distances (u) and he has measured the corresponding image distances (v). From the values of u and v, Ram is able to plot a graph of 1/v against 1/u. From the graph, Ram has observed that x intercept and y intercept are 0.1 cm and 0.11 cm, respectively. Then the focal length of the mirror is:

(a) 9.55 cm
(b) 11.25 cm
(c) 12.65 cm
(d) 8.5 cm

Q57. How many such pairs of letters are there in the word INTERNATIONAL (in both forward and backward directions) which have as many letters between them in the word as there are in the English alphabetical order?

(a) 5
(b) 7
(c) 4
(d) 6

Q58. Which of the following statements is not necessarily true?

(a) Diagonals of a parallelogram bisect each other
(b) Diagonals of a rectangle bisect each other.
(c) Diagonals of a kite bisect each other
(d) Diagonals of a rhombus bisect each other

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Q59. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits.

E.g. 13 - Operations on 13 such as adding /subtracting /multiplying etc. to 13 can be performed.

Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(17, 238, 7)

(23, 414, 9)

(a) (19, 360, 9)
(b) (13, 273, 7)
(c) (27, 270, 5)
(d) (15, 225, 15)

Q60. During the revolt of 1857, which of the following Jat leaders mobilised the headmen and cultivators in and around pargana Barut in Uttar Pradesh to rebel against the British?

(a) Gajadhar Singh
(b) Maulvi Ahmadullah Shah
(c) Shah Mal
(d) Maulvi Liyakat Ali

Q61. Study the given table and answer the following question.

	Number of cushions sold in	
February	March	
Store X	196	114
Store Y	72	98
Store Z	84	155

The total number of cushions sold by store X in February and March is what percentage more than the number of cushions sold by store Z in March?

(a) 200%
(b) 50%
(c) 100%
(d) 155%

Q62. If the sum of two numbers is 48, while the HCF of these two numbers is 6, then the total number of such pairs of numbers (x, y), where x > y, is:

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

Q63. In a certain code language, 'BFKMT' is written as 'CHNQY' and 'XUAFL' is written as 'YWDJQ'. How will 'GESIO' be written in that language?

(a) HFUJQ
(b) HGVMT
(c) HGVOT
(d) HGUMT

Q64. Refer to the given number, symbol series and answer the following question.

(left) 9 + $ 5 @ $ 2 6 3 % 2 & 8 # * 2 9 ! 4 3 (right)

How many signs are there (from left to right) that are immediately preceded by a sign and immediately followed by an even number?

(a) 4

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

Q65. Which of the following represents a quadratic equation?
(a) 4x2 + 6x + 5 = 4x (x + 1)
(b) (x + 7) 4 = 14
(c) 3x + 7 = 7 x3
(d) 5x2 + 4x - 2 = 7x

Q66. A shopkeeper bought articles A and B for a total of Rs. 2,540. He sold A at a gain of 15% and sold B at a loss of 25%. The selling price of A was Rs. 109 more than that of B. His profit or loss percentage in the entire transaction is (correct to one decimal place):
(a) loss, 8.5%
(b) profit, 8.3%
(c) loss, 8.3%
(d) profit, 8.5%

Q67. The difference between the total surface area and the lateral surface area of a cube is 4050 units². Find the length of each side of the cube.
(a) 54 units
(b) 45 units
(c) 40 units
(d) 35 units

Q68. Five friends live on five different floors of the samebuilding. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 5. Namita lives on the floor which is second from the top. Sanjana lives on one of the floor between Anand and Ritu. Avdhesh lives on the floor immediately above Namita. Ritu lives on the lowermost floor. Who lives on the fourth floor from the top?
(a) Sanjana
(b) Anand
(c) Avdhesh
(d) Namita

Q69. If 1 is added to each even digit and 2 is subtracted from each odd digit in the number 38572352, what will be the sum of the digits which are second from the left and fourth from the right in the number thus formed?
(a) 10
(b) 4
(c) 11
(d) 12

Q70. Five friends, Hiba, Suhani, Pritam, Ahmed, and Rosy are sitting around a circular table facing the centre. Rosy is second to the right of Pritam, and is an immediate neighbour to both Suhani and Ahmed. If Ahmed is second to the left of Pritam, where is Hiba seated?
(a) To the immediate left of Suhani
(b) Second to the left of Suhani
(c) Third to the left of Suhani
(d) Second to the right of Suhani

Q71. Navya and Bhavya can paint a house in 20 days and 30 days, respectively. If they work on alternate days, starting with Bhavya, in how many days can the duo complete painting that house?
(a) 48 days
(b) 40 days
(c) 12 days
(d) 24 days

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Q72. By selling an article for Rs. 940 a man incurs a loss of 6%. What is its cost price?

(a) Rs. 1,250
(b) Rs. 1,000
(c) Rs. 480
(d) Rs. 960

Q73. In the Leviathan telescope in Ireland, a concave mirror of focal length 3.0 m is used. If an image of height 80 cm is formed at a distance of 4.0 m, then the object height, object distance and magnification are (the object is placed in front of the mirror):

(a) 2.4 m, 12 m and 1/2 respectively
(b) 2.4 m, 12 m and 1/3 respectively
(c) 1.2 m, 12 m and 1/3 respectively
(d) 2.4 m, 6 m and 1/3 respectively

Q74. An integrated scheme for school education, 'Samagra Shiksha Scheme' of the Government of India has been continued for which of the following periods?

(a) 2022-23 to 2026-27
(b) 2020-21 to 2025-26
(c) 2019-20 to 2024-25
(d) 2021-22 to 2025-26

Q75. This question is in Hindi. Read it online.

Q76. Which of the following chemical reactions are examples of combination reactions?

i) $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$
ii) $CO(g) + H_2(g) \rightarrow CH_3OH(l)$
iii) $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$
iv) $Zn(s) + 2AgNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2Ag(s)$

(a) i and ii
(b) iii and iv
(c) i and iv
(d) ii and iii

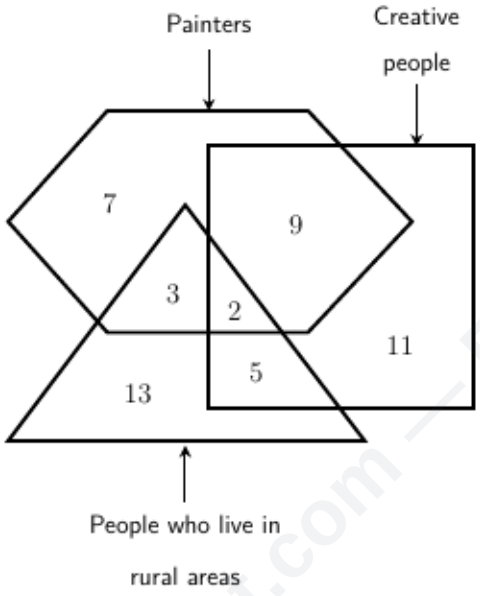
Q77. Which of the following national sports events is NOT associated with cricket?

(a) Deodhar Trophy
(b) Durand Cup
(c) Vijay Hazare Trophy
(d) Ranji Trophy

Q78. In the following Venn diagram, the square represents 'creative people', the hexagon represents 'painters', and the triangle represents 'people who live in rural areas'.

Select the option which represents the number of creative painters who live in rural areas.

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(a) 5
(b) 9
(c) 2
(d) 3

Q79. If x=2/3 is one of the solutions of the quadratic equation $7x^2 + kx - 3 = 0$, then the value of k satisfies the equation:
(a) 6k2 - 3k - 1 = 0
(b) 6k2 - 5k + 1 = 0
(c) 12k2 - 4k - 1 = 0
(d) 12k2 + 4k - 1 = 0

Q80. Integrated approach in S&T for Sustainable Future' is the theme for which one of the following?
(a) National Engineers Day 2022
(b) National Doctors' Day 2022
(c) National Science Day 2022
(d) National Teachers Day 2022

Q81. Stars twinkle at night due to:
(a) atmospheric scattering of starlight
(b) atmospheric reflection of starlight
(c) atmospheric dispersion
(d) atmospheric refraction of starlight

Q82. OT 05 is related to SX 07 in a certain way. In the same way, GK 09 is related to KO 11. To which of the following is BG 13 related following the same logic?
(a) KF 15
(b) FK 20
(c) FK 15
(d) KF 51

Q83. In March 2022, Narasingapettai Nagaswaram of which state has received the Geographical Indication Tag?
(a) Tamil Nadu
(b) Punjab
(c) Haryana
(d) Kerala

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Q84. What will happen if bubbles of air are sent through lime water taken in a container?

(a) The solution will turn milky due to insoluble suspension of Calcium carbonate
(b) The temperature will rise due to an exothermic reaction
(c) The solution will foam and froth
(d) The solution will instantly red as reacts with lime

Q85. The 73^(rd) and 74^(th)Amendments to the Indian Constitution provide for elections to local bodies _____.

(a) every year
(b) after every five years
(c) after every two years
(d) after every three years

Q86. Which two numbers, from among the given options, should be interchanged to make the given equation correct?

21÷ 9 + 99 - 81 × 5 = 3

(a) 9 and 81
(b) 21 and 81
(c) 21 and 5
(d) 9 and 5

Q87. Which of the following days marked the 17^(th) Foundation Day of the National Commission for Protection of Child Rights?

(a) 2 March 2022
(b) 4 March 2022
(c) 3 March 2022
(d) 1 March 2022

Q88. Let x = 55^(100) + 55^(101) + 55^(102). Which of the following prime number is NOT a factor of x?

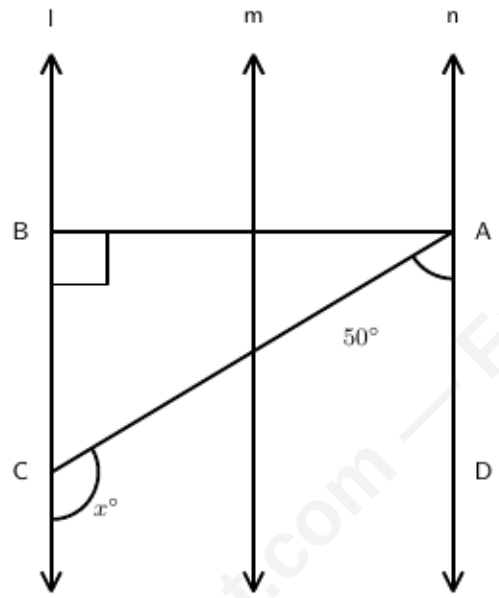
(a) 3
(b) 79
(c) 11
(d) 71

Q89. With reference to cost, what is the full form of SMC from the following?

(a) Special Marginal Cost
(b) Subjective Marginal Cost
(c) Silent Marginal Cost
(d) Short run Marginal Cost

Q90. In the given figure, l is parallel to m and m is parallel to n. Find the value of x°.

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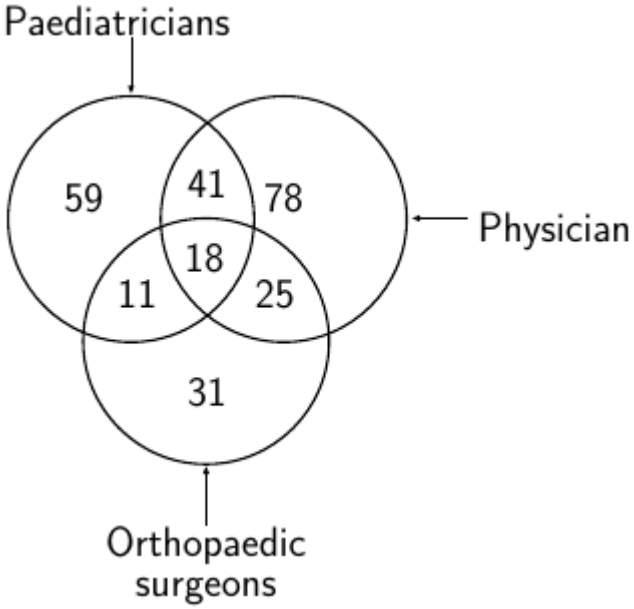


(a) 130°
(b) 100°
(c) 30°
(d) 50°

Q91. If 0.045 + 0.154 - 0.09 + 1.5 - (0.3 × 0.8) = x - 0.231, then the value of x lies between:

(a) 1.8 and 2.0
(b) 1.5 and 1.8
(c) 1.1 and 1.3
(d) 1.3 and 1.5

Q92. Study the given diagram carefully and answer the question. The numbers in different sections indicate the number of persons.



How many such persons are there who are paediatricians and also orthopaedic surgeons but NOT physicians?

(a) 19
(b) 40
(c) 36
(d) 11

Q93. [{(324 ÷ 9) ÷ 4} × 25 + 186] equals:

(a) 411
(b) 141
(c) 114
(d) 386

Q94. The Constitution of India does NOT consider _____ as a part of the Union Executive.

(a) Vice President
(b) Prime Minister of India and her/his Council of Ministers
(c) President of India
(d) Advocate-General of State

Q95. In the Modern Periodic Table, phosphorous is placed in the _____.

(a) 14th group and 2nd period
(b) 15th group and 3rd period
(c) 14th group and 3rd period
(d) 15th group and 2nd period

Q96. Which of the following is the largest fair in West Bengal?

(a) Raas Mela
(b) Jaydev Kenduli Mela
(c) Gangasagar Mela
(d) Ramkeli Mela, Malda

Q97. In a group of six friends, Teena, Monu, Lalit, Rekha, Garima and Suman, each has a different height. Lalit is shorter than Garima and Rekha but taller than Monu. Suman is shorter than only Teena. Who is the shortest among all the six friends?

(a) Monu
(b) Suman
(c) Lalit
(d) Garima

Q98. How many triads were identified by Dobereiner in his system of classification of elements?

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

Q99. Simplify the given expression.

$[(x-y)+(y^2)/(x+y)] \div [x^2+y^2+(y\text{^}4)/(x^2-y^2)] \times (y^2)/(x-y)$

(a) $(y^2)/(x^2)$
(b) $(x^2-y^2)/(x^2\ y^2)$
(c) $(x^2)/(y^2)$
(d) x^2y^2

Q100. Which of the following types of soils found in India cover about 40 per cent of the total area of the country?

(a) Alluvial soils
(b) Black soils
(c) Red and yellow soils
(d) Laterite soils

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ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) 10.4

The logic followed here is:

Thus, the number which will replace question mark in the series is 10.4.

Hence, the correct answer is Option (1).

Q2. Answer: (a) 351.78 cm2

Shortcut Trick

Area of a rhombus = 1/2 × Product of diagonals

Area = 1/2 × 24.6 × 28.6

Area = 12.3 × 28.6 = 351.78 cm²

Therefore The correct answer is 351.78 cm².

Alternate Method

Given:

Diagonal 1 (d1) = 24.6 cm

Diagonal 2 (d2) = 28.6 cm

Formula Used:

Area of Rhombus = (d1 × d2) ÷ 2

Calculations:

=> Area = (24.6 × 28.6) / 2

=> Area = 703.56 / 2

=> Area = 351.78 cm²

Therefore The correct answer is 351.78 cm².

Additional Information

Properties of Rhombus

All four sides are equal and diagonals bisect each other at right angles (90°).

Perimeter of Rhombus

Perimeter = 4 × side. Side can be found using diagonals: side = 1/2 × √(d1² + d2²).

Alternative Area Formula

Area = Base × Height, where base is any side and height is the perpendicular distance between opposite sides.

Q3. Answer: (a) 52

Shortcut Trick

Units digit = 6

Tens digit = 6 ÷ 3 = 2

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Original number = 26

Required value = 26 × 2 = 52

Therefore The correct answer is 52.

Alternate Method

Given:

Units digit (y) = 6

Tens digit (x) = y ÷ 3

Calculation:

=> x = 6 ÷ 3 = 2

=> Original number = 10x + y = 10(2) + 6 = 26

=> Twice the number = 2 × 26 = 52

Therefore The correct answer is 52.

Additional Information

Standard Form of a 2-Digit Number

A 2-digit number with tens digit x and units digit y is represented as 10x + y.

Interchanging Digits

When digits are reversed, the new number is 10y + x. The difference between the original and reversed number is always divisible by 9.

Sum of Digits

The sum of the digits is simply x + y. The original number minus the sum of its digits is always a multiple of 9.

Q4. Answer: (b) 15.5

Shortcut Trick

Total Frequency (Σf) = 3 + 5 + 6 + 2 + 1 + 3 = 20

Sum of products (Σfx) = (5×3) + (10×5) + (15×6) + (20×2) + (25×1) + (30×3)

Σfx = 15 + 50 + 90 + 40 + 25 + 90 = 310

Arithmetic Mean = Σfx ÷ Σf = 310 ÷ 20 = 15.5

Therefore The correct answer is 15.5.

Alternate Method

Given:

Observations (x) = {5, 10, 15, 20, 25, 30}

Frequencies (f) = {3, 5, 6, 2, 1, 3}

Formula Used:

Arithmetic Mean (x) = Σfx ÷ Σf

Calculations:

=> Σf = 3 + 5 + 6 + 2 + 1 + 3 = 20

=> Σfx = (5 × 3) + (10 × 5) + (15 × 6) + (20 × 2) + (25 × 1) + (30 × 3)

=> Σfx = 15 + 50 + 90 + 40 + 25 + 90

=> Σfx = 310

=> x = 310 ÷ 20

=> x = 15.5

Therefore The correct answer is 15.5.

Additional Information

Arithmetic Mean for Discrete Series

The mean is calculated by dividing the sum of the products of values and their frequencies (Σfx) by the total number of observations (Σf).

Assumed Mean Method

Mean = A + (Σfd ÷ Σf), where A is the assumed mean and d = x − A. This simplifies calculations for larger datasets.

Properties of Mean

The algebraic sum of the deviations of a set of observations from their arithmetic mean is always zero, i.e., Σ(x − x) = 0.

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Q5. Answer: (c) copper (II) chloride

The correct answer is " copper (ll) chloride ".

Key Points

• When copper oxide is added to dilute hydrochloric acid it results in the formation of copper chloride.

• The soluble copper chloride is blue-green in color and changes the color of the solution to blue-green.

• It is a double displacement reaction.

Q6. Answer: (d) ZnO

The correct answer is " ZnO".

Key Points

• Reduction is also termed as the removal of oxygen.

• In the given reaction, ZnO looses an oxygen atom and is getting reduced to Zn.

• This is a displacement reaction.

Q7. Answer: (c) 4b2

Shortcut Trick

The given mathematical expression directly matches an algebraic identity.

$x^2 + y^2 + z^2 - 2xy - 2xz + 2yz = (x - y - z)^2$

Substitute the given variable values into the term (x − y − z):

=> (b + c) − (c − a) − (a − b) = b + c − c + a − a + b = 2b

=> $(2b)^2 = 4b^2$

Therefore The correct answer is $4b^2$.

Alternate Method

Given:

=> x = b + c

=> y = c − a

=> z = a − b

Formula Used:

=> $(p + q + r)^2 = p^2 + q^2 + r^2 + 2pq + 2qr + 2pr$

Calculation:

=> Let us evaluate the given expression: $x^2 + y^2 + z^2 - 2xy - 2xz + 2yz$

=> Comparing this with our standard formula, we take p = x, q = −y, and r = −z.

=> This simplifies our original expression cleanly to: $(x - y - z)^2$

=> Next, we substitute the given expressions for x, y, and z into (x − y − z):

=> x − y − z = (b + c) − (c − a) − (a − b)

=> Distribute the negative signs and open the brackets:

=> x − y − z = b + c − c + a − a + b

=> Cancel out the opposite terms (+c − c) and (+a − a) and group together:

=> x − y − z = 2b

=> Finally, substitute this result back into the squared identity expression:

=> $(x - y - z)^2 = (2b)^2 = 4b^2$

Therefore The correct answer is $4b^2$.

Additional Information

Trinomial Expansion Identity

The fundamental identity for the square of a sum of three variables is represented as $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$.

Sign Variations in Expansion

By assigning negative signs to the variables, we derive adapted identities depending on the requirements. For instance, $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$.

Important Cubic Identity

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$. Notably, if a + b + c = 0, the equation cleanly reduces to a single relation: $a^3 + b^3 + c^3 = 3abc$.

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Q8. Answer: (b) one-half of the revolution of the coil

The correct answer is " one-half of the revolution of the coil ".

Key Points

• The direction of the induced current in a square-shaped coil changes once per half revolution of the coil.

• The direction of the current in the coil remains unchanged.

• The current induced by the magnetic field composed of copper wire is rotated in order to rotate the magnetic field.

• At each turn, the direction of the induced current changes, and because it is a vector quantity, it changes every half revolution.

• Because the direction of the relative motion of the coil and the magnetic field changes every half cycle, the direction of the induced current changes every half rotation.

Q9. Answer: (d) Around 110

The correct answer is "Around 110".

Key Points

• The F1 generation is the first one. 100% yellow, then yellow(Y) is dominant trait and green(y) is recessive trait.

• F2 generation results from the crossing of F1 individuals (Yy).

• We receive 3 yellow plants and 1 green plant in the F2 generation.

• Therefore, there are three yellow and one green in this F2 generation.

• We pronounce it as 3:1.

• So, No. of green plants in pea plants are, 500×1/4=125

• As the above value is an experimental one. So, around 110 pea plants are green in actuality.

Q10. Answer: (c) Tropical Deciduous Forests

The correct answer is 'Tropical Deciduous Forests'.

Key Points

• The most widespread forests in india is Tropical Deciduous Forests.

• This forests are called Moonson Forest.

• There are two types of Deciduous Forests: Moist Deciduous Forests - Mixture of Trees and Grasses ; 2. Dry Deciduous Forests

• As the name goes, tropical deciduous forests are found along the Equator belt between the tropic of Cancer and tropic of Capricorn.

Q11. Answer: (b) Slaked lime

The correct answer is " Slaked lime ".

Key Points

• Bleaching powder is a pale yellowish powder existing with a strong smell of chlorine.

• It is synthesized by the action of chlorine gas on dry slaked lime (Ca(OH)2).

• $Ca(OH)2+ Cl2 \rightarrow Ca(OCl2)+ H2O$

Q12. Answer: (b) Mirabai Chanu

The correct answer is 'Mirabai Chanu'.

Key Points

• Weightlifter Mirabai Chanu won the BBC Indian Sportswoman of the Year award for 2021 on 29 March 2022.

• Chanu became the first Indian weightlifter to win a silver medal at an Olympic Games when she finished second in the 49kg category in Tokyo.

• Chanu won the gold medal in the 48kg division at the 2017 World Championships in Anaheim and followed up with Commonwealth Games gold in 2018.

Additional Information

• Saina Nehwal is related to Badminton.

• Saina Nehwal is an Indian professional badminton player.

• She won the Bronze medal in Olympic Games in London in 2012.

• She became the first Indian to win two singles gold medals in Commonwealth Games (2010 and 2018).

• She is honoured with awards:

• Arjuna Award in 2009

• Major Dhyan Chand Khel Ratna in 2010

• Padma Shri in 2010

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• Padma Bhushan in 2016

• Radha Prakash Yadav is an Indian cricketer. She plays for Mumbai, Baroda and West Zone.

• PV Sindhu

• The full name of her is Pusarla Venkata Sindhu .She is a world-famous Indian female badminton player.

• PV Sindhu won two consecutive medals at the Olympics- silver in the 2016 Rio Games and bronze at the 2020 Tokyo Olympics.

• In the year 2021 she won a a silver at the Badminton World Federation (BWF).

• She was also the winner of the Syed Modi International Badminton title in January 2022.

• She became the first Indian to win a historic Gold at the Badminton World Championships in 2019.

• She also won the inaugural BBC Indian Sportswoman of the year award in 2019 following a public vote.

Q13. Answer: (d) Both the gene for blood type A and the gene for blood type B are dominant.

The correct answer is Both the gene for blood type A and the gene for blood type B are dominant.

Key Points

• The gene for blood group A is dominant and the gene for blood group B is recessive.

• This means that if a person has one gene for blood group A and one gene for blood group B, they will express the A phenotype because the A gene is dominant.

• The child having blood type AB indicates that they inherited one gene for A from the father and one gene for B from the mother.

• The A and B genes are codominant, which means that when they are both present, they both express themselves equally.

• If both the gene for blood type A and the gene for blood type B are inactive, then the person would have blood type O, which is the absence of A and B antigens on the surface of red blood cells.

• If both the gene for blood type A and the gene for blood type B are dominant, then a person with that genotype would have blood type AB, which is the codominant expression of both antigens.

Additional Information

• Blood type is determined by the presence or absence of specific antigens on the surface of red blood cells.

• The ABO blood group system is based on the presence or absence of two antigens: A and B.

• A person with blood type A has the A antigen on their red blood cells, while a person with blood type B has the B antigen.

• A person with blood type AB has both A and B antigens, while a person with blood type O has neither A nor B antigens.

• The Rh factor is another antigen that can be present on red blood cells, and its presence or absence determines whether a person is Rh positive or Rh negative.

Q14. Answer: (c) North-West

Diagram is drawn following the given conditions:

1. Rehana is to the left of Arjun, who is seated exactly in front of Somil.

2. Arjun exchanges his position with Somil.

After Arjun exchanges his position with Somil, Rehana is now in North-West direction of Arjun.

Hence, the correct answer is Option (3).

Q15. Answer: (b) 2 km towards east

Diagram is drawn as per the given statements:

1. Bharti starts from point T and drives 7 km towards north.

2. Then she turns right, drives 4 km, turns right and drives 10 km.

3. She then turns right and walks 6 km.

4. She takes a final right turn, drives 3 km and stops at point E.

Bharti should drive 2 km in East direction to reach point T from point E.

Hence, the correct answer is Option (2).

Q16. Answer: (b) 17

Students who can speak all three languages i.e. Sanskrit, Hindi and English are highlighted below:

Thus, there are 17 such students.

Hence, the correct answer is Option (2).

Q17. Answer: (c) Avoiding meat and animal products

The correct answer is Avoiding meat and animal products.

Key Points

• Avoiding meat and animal products would have the greatest impact on our environment because:

• Animal agriculture contributes significantly to greenhouse gas emissions, deforestation, and water pollution.

• It takes much more resources, such as land, water, and energy, to produce animal products compared to plant-based foods.

• By avoiding meat and animal products, we can reduce the demand for factory farming and encourage more sustainable and ethical farming practices.

• Plant-based diets have been shown to be healthier for humans and can also reduce the risk of chronic diseases.

Additional Information

• Stopping food wastage:

• This is also an important step to reduce the environmental impact of our food system.

• Food waste not only wastes resources and contributes to greenhouse gas emissions, but it also means that people are going hungry while food is being thrown away.

• However, it may not have as significant an impact as avoiding meat and animal products.

• Avoiding processed foods:

• Processed foods often contain unhealthy additives and preservatives, and they also require more resources to produce and package.

• However, this option may not have as significant an impact on the environment as avoiding meat and animal products.

• Growing your own food:

• This can be a great way to reduce the environmental impact of our food system, as it reduces the need for transportation and packaging.

• However, it may not be feasible for everyone and may not have as significant an impact as avoiding meat and animal products.

Q18. Answer: (d) ZUH 35

The pattern followed here is:

Thus, the pattern which logically completes the series is ZUH 35.

Hence, the correct answer is Option (4).

Q19. Answer: (c) 25

Shortcut Trick

For an investment to double itself under Simple Interest, the total interest earned must be equal to 100% of the Principal.

Shortcut formula for time period (T) to double: $T = 100 ÷ R$

Given Rate (R) = 4% per annum.

=> $T = 100 ÷ 4 = 25$ years.

Therefore The correct answer is 25 years.

Alternate Method

Given:

=> Rate of Interest (R) = 4% p.a.

=> Let Principal (P) = x

=> Amount (A) = $2x$ (since the investment doubles)

Formula Used:

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

=> SI = (P × R × T) ÷ 100

Calculations:

=> $SI = 2x − x = x$

=> x = (x × 4 × T) ÷ 100

=> 1 = (4 × T) ÷ 100

=> 4 × T = 100

=> $T = 100 ÷ 4$

=> $T = 25$ years.

Therefore The correct answer is 25 years.

Additional Information

Tripling an Investment (Simple Interest)

To triple an investment ($A = 3P$), the interest earned must be 200% of the principal. The time required is $T = 200 ÷ R$.

Rule of 72 (Compound Interest)

In Compound Interest, the approximate time to double an investment is found by dividing 72 by the annual interest rate ($T ≈ 72 ÷ R$).

Simple Interest Formula

The basic formula for Simple Interest is I = P × R × T, where R is expressed as a decimal or fraction ($R/100$).

Q20. Answer: (c) 4

Decoding the information:

Sign	•	•	×	÷
Means	•	×	÷	•

Given:

3 ÷ 8 × 2 + 1 - 5

After interchanging:

3 - 8 ÷ 2 × 1 + 5

= 3 - 4 × 1 +5

= 3 - 4 + 5

= 8 - 4

= 4

Hence, the correct answer is "4".

Q21. Answer: (a) Stomata

The correct answer is Stomata.

Key Points

• The pores present on the leaves of plants is stomota.

• Stomata are mostly found in green aerial parts of plants, such as stem and particularly on the leaves.

• Stomata play a very important role as it provides direct pathways between leaves and the air.

• Carbon dioxide enters through the stomata while water and oxygen exit through it.

Additional Information Some of the main functions of stomata are as follows:

i. It opens and closes the pores in the leaves for an exchange of gases.

ii. It allows the plant to take in carbon dioxide and give out oxygen for photosynthesis.

Iii. Depending on the weather conditions, it closes or opens its pores to keep the moisture content developed.

Q22. Answer: (d) Two

Given: (Left) 72238 83745 52227 72253 63776 (Right)

Now, 1 is subtracted from the first digit of each number,

Numbers	**Subtracted 1 from the first digit**
72238	62238
83745	73745
52227	42227
72253	62253
63776	53776

Now, the first digit numbers that will completely divisible with 3 is: 62238 and 62253.

So, there are 'Two' numbers that have its first digit is fully divisible by 3.

Hence, the correct answer is "Option 4".

Q23. Answer: (c) 3

Statement: G ≥ B > D > P < H = C

Conclusions:

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1) P < C → True (G ≥ B > D > P < H = C, As H is greater than P and H is equal to C, thus C is also greater than P.)

2) G > P → True (G ≥ B > D > P < H = C, G, B and D all are greater than P.)

3) D < C → False (G ≥ B > D > P < H = C, There is no definite relationship between D and C, so we cannot say D < C.)

4) B > P → True (G ≥ B > D > P < H = C, G, B and D all are greater than P.)

Three out of four conclusions are correct. Only conclusion 3 is incorrect.

Hence, the correct answer is Option (3).

Q24. Answer: (a) Five

Such symbols are there which are immediately preceded by a letter and also immediately followed by a number are shown below:

Letters → Symbols → Number

Thus, there are 5 such patterns:

1. Z $ 6
2. M @ 4
3. X & 7
4. L # 3
5. Z * 5

Hence, the correct answer is 'Option (1).

Q25. Answer: (a) 3(x - y) (y - z) (z - x)

Shortcut Trick

Check the sum of the base terms: $(y - z) + (z - x) + (x - y) = 0$.

When the sum of three terms is zero, then the sum of their cubes is equal to three times the product of those terms.

Result = $3 \times (y - z) \times (z - x) \times (x - y)$.

Therefore The correct answer is $3(x - y)(y - z)(z - x)$.

Alternate Method

Given:

$(y - z)^3 + (z - x)^3 + (x - y)^3$

Formula Used:

The algebraic identity: $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$.

Calculations:

=> Let $a = (y - z)$, $b = (z - x)$, and $c = (x - y)$.

=> Calculate the sum: $a + b + c = (y - z) + (z - x) + (x - y)$.

=> $a + b + c = y - z + z - x + x - y = 0$.

=> Since $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$.

=> $(y - z)^3 + (z - x)^3 + (x - y)^3 = 3(y - z)(z - x)(x - y)$.

Therefore The correct answer is $3(x - y)(y - z)(z - x)$.

Additional Information

Sum of Cubes Identity

The general identity is $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$. It is vital for factoring cubic expressions.

Special Case: $a + b + c = 0$

When the sum of the variables is zero, the identity simplifies to $a^3 + b^3 + c^3 = 3abc$, which is frequently tested in banking and standard exams.

Standard Cube Expansion

The expansion of $(x - y)^3$ is $x^3 - 3x^2y + 3xy^2 - y^3$ or $x^3 - y^3 - 3xy(x - y)$.

Q26. Answer: (b) transpiration

The correct answer is transpiration.

Key Points

- Plants produce carbon dioxide and water as respiratory waste products.
- Plants get rid of excess water by transpiration and guttation.
- Transpiration is the evaporative loss of water from plant leaves through stomata.

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Additional Information 1. Evaporation is the process by which a liquid turns into a gas.

2. Transportation is defined as the movement of goods and persons from place to place and the various means by which such movement is accomplished.

3. Translocation is defined as a genetic change in which a piece of one chromosome breaks off and attaches to another chromosome.

Q27. Answer: (c) DLTPAW

Code in certain language:

Number	5	8	2	3	4	1	7	6
Code	P	W	D	L	X	T	A	G

Conditions:

S. No.	Condition	Result
1.	f the last two digits of the number-cluster are odd	the first and last digits are to be coded as Q.
2.	If the last two digits of the number-cluster are even	the first and last digits are to be coded as L.

Given digits: 231578

Condition 1 → Does not follow (As one of the last two numbers is even).

Condition 2 → Does not follow (As one of the last two numbers is odd).

Thus, '231578' will be coded as 'DLTPAW'.

Hence, the correct answer is Option (3).

Q28. Answer: (c) Recycling

The correct answer is Recycling.

Key Points

• The most effective way to reduce waste generation is by recycling.

• This is because recycling helps in reducing the amount of waste that goes into landfills and helps conserve natural resources.

• Here are some of the reasons why recycling is the most effective way to reduce waste generation:

• Reduces the amount of waste going to landfills:

• Recycling helps in reducing the amount of waste that goes into landfills.

• This is because when we recycle, we are reusing materials that would otherwise end up in landfills.

• Conserves natural resources:

• Recycling helps conserve natural resources like timber, water, and minerals.

• By recycling materials like paper, plastic, and metal, we are reducing the need to extract new resources from the environment.

• Reduces greenhouse gas emissions:

• Recycling also helps in reducing greenhouse gas emissions.

• This is because when we recycle materials, we are using less energy than we would if we were to extract new resources from the environment.

• Creates jobs:

• Recycling also creates jobs in the recycling industry.

• This is because recycling requires people to collect, sort, and process materials, and these jobs help stimulate the economy.

Additional Information

• Garbage:

• Garbage is the waste that is produced from households, businesses, and industries.

• Garbage is typically sent to landfills or incinerators for disposal.

• While incineration can help in reducing the volume of waste, it can also lead to air pollution.

• Making compost:

• Composting is the process of decomposing organic waste like food scraps and yard waste into a nutrient-rich soil amendment.

• While composting can help in reducing the amount of waste going to landfills, it is not a solution for all types of waste.

• Combustion:

• Combustion refers to the process of burning waste to generate energy.

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• While combustion can help in reducing the volume of waste going to landfills, it can also lead to air pollution and greenhouse gas emissions.

Q29. Answer: (d) Sakya

The correct answer is "Sakya".

Key Points

• Around 2500 years ago, Gautama Buddha was born.

• Buddha was a native of Sakya Gana, a small "Gana." He was born a Kshatriya.

• At a young age, he set off from home to learn more about life and its hardships and to investigate them.

• Enlightenment refers to this period of Buddha Shakyamuni's life.

• He later attained enlightenment and was given the name Buddha, which means "Wise Man." The Buddha will travel to Sarnath, which is close to Varanasi, next.

• He first instructed his followers in Sarnath.

Q30. Answer: (a) 100 min

Shortcut Trick

Total Capacity (LCM of 60, 75, 50) = 300 units.

Efficiency of Pipe A = 300 ÷ 60 = 5; Pipe B = 300 ÷ 75 = 4.

Combined Efficiency (A + B − C) = 300 ÷ 50 = 6.

Efficiency of Emptying Pipe C = (5 + 4) − 6 = 3.

Time taken by Pipe C = 300 ÷ 3 = 100 min.

Therefore The correct answer is 100 min.

Alternate Method

Given: Time for Pipe A = 60 min, Time for Pipe B = 75 min, Time for (A + B − C) = 50 min.

Formula Used: Efficiency = Total Work ÷ Time Taken

Person	Days	Total Work	Efficiency
Pipe A	60	300	5
Pipe B	75	4	
A + B − C	50	6	

=> Let efficiency of emptying pipe be C.

=> Efficiency(A) + Efficiency(B) − Efficiency(C) = Combined Efficiency

=> 5 + 4 − C = 6

=> 9 − C = 6

=> C = 3 units/min

=> Time to empty full cistern = Total Capacity ÷ Efficiency(C)

=> Time = 300 ÷ 3 = 100 min

Therefore The correct answer is 100 min.

Additional Information

Inlet and Outlet Pipes

Inlet pipes add to the volume (positive efficiency) while outlet or leak pipes remove volume (negative efficiency).

Total Work Concept

For pipes and cisterns, the LCM of individual times is taken as the total capacity of the tank to simplify calculations.

Time and Efficiency Relation

Time taken is inversely proportional to efficiency: Time = Work ÷ Efficiency.

Q31. Answer: (d) 2017

The correct answer is "2017".

Key Points

• The 12th Five-Year Plan of the Government of India (2012–17) served as the last Five-Year Plan for the nation.

• Its main theme was “Faster, More Inclusive and Sustainable Growth”

• The Twelfth Five-Year Plan of the Government of India was expected to achieve a growth rate of 9%, however, on December 27, 2012, the National Development Council approved an 8% growth rate instead.

• In the 12th Five-Year Plan, the government wants to see a 10% decrease in poverty.

• The strategy aims to enhance national infrastructure initiatives while avoiding bottlenecks of any form.

• In the 12th five-year plan, the planning commission's report seeks to increase private infrastructure investment by up to $1 trillion and lower the government's subsidy burden from 2% of GDP to 1.5% of GDP.

• The plan's subsidies will be transferred in cash via the Unique Identification Number.

Q32. Answer: (c) 335

The logic followed here is:

Thus, the number that will replace question mark in the series is 335.

Hence, the correct answer is Option (3).

Q33. Answer: (a) 1996

The correct answer is "1996".

Key Points

• The Company was first incorporated under the name "L.N. On January 10, 1996, Finco Gems Private Limited was established with the RoC as a private limited company under the Companies Act, of 1956.

• The RoC issued a new certificate of incorporation for the Company on May 24, 2005, by the name change to Au Financiers (India) Private Limited to reflect the Company's varied financial activity.

• The Company was converted into a public limited company and given the name "Au Financiers (India) Limited" thanks to a special resolution accepted by the Shareholders at the EGM held on January 10, 2013.

• The Company has been given permission to establish an SFB, according to a letter from the RBI dated October 7, 2015.

• By its letter dated December 20, 2016, the RBI subsequently gave the Company its final clearance to create an SFB.

• The name of the Company was changed to "AU Small Finance Bank Limited" and a new certificate of incorporation was issued by the RoC on April 13, 2017, by the Company being created as an SFB.

• Mr. Sanjay Agarwal is the Managing Director & CEO of the Bank.

Q34. Answer: (b) C

Drawing sitting arrangement as per the given information:

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

2. B is sitting second to the right of D.

3. C is sitting third to the right of A.

4. A is an immediate neighbour of both E and F. D sits to the immediate right of E.

Therefore, C is sitting to the immediate left of B.

Hence, the correct answer is Option (2).

Q35. Answer: (c) 2^(nd)floor

Given statement: M, N, O, P, Q and R live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 6.

1. Q lives on an odd-numbered floor but not on the lowermost floor.

Case 1	**Case 2**		
Floor	Person	Floor	Person
6		6	
5		5	Q
4		4	
3	Q	3	
2		2	
1		1	

2. Only one person lives between Q and N.

Case 1a	**Case 1b**	**Case 2**			
Floor	Person	Floor	Person	Floor	Person

6		6		6	
5		5	N	5	Q
4		4		4	
3	Q	3	Q	3	N
2		2		2	
1	N	1		1	

3. R lives immediately above Q.

Case 1a	**Case 1b**	**Case 2**			
Floor	Person	Floor	Person	Floor	Person
6		6		6	R
5		5	N	5	Q
4	R	4	R	4	
3	Q	3	Q	3	N
2		2		2	
1	N	1		1	

4. Only two people live between O and Q.

Case 1a	**Case 1b**	**Case 2**			
Floor	Person	Floor	Person	Floor	Person
6	O	6	O	6	
5		5	N	5	Q
4		4		4	
3	Q	3	Q	3	N
2		2		2	O
1	N	1		1	

5. P lives immediately above R.

Case 1b will be eliminated here as there is N just above R. Case 2 will also be eliminated at this step because there is no floor above R for P to live.

Case 1a	
Floor	Person
6	O
5	P
4	R
3	Q
2	
1	N

Thus, the position of M will be 2^(nd)floor.

Case 1a	
Floor	Person
6	O

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5	P
4	R
3	Q
2	M
1	N

Hence, the correct answer is Option (3).

Q36. Answer: (b) 328/99

Shortcut Trick

To convert a recurring decimal to a fraction directly:

Numerator = (Complete number without decimal) − (Non-recurring part) = 331 − 3 = 328

Denominator = (Place 9 for each recurring digit after decimal) = 99

Fraction = Numerator / Denominator = 328/99

Therefore The correct answer is 328/99.

Alternate Method

Given:

The decimal number is 3.313131...

Method Used:

Let x be the given recurring decimal. Multiply x by 100 since there are 2 repeating digits, then subtract the original equation.

Calculations:

=> Let x = 3.313131... — (1)

=> Multiplying both sides by 100:

=> 100x = 331.313131... — (2)

=> Subtracting (1) from (2):

=> 100x − x = 331.313131... − 3.313131...

=> 99x = 328

=> x = 328 / 99

Therefore The correct answer is 328/99.

Additional Information

Pure Recurring Decimal

A decimal where all digits after the decimal point are repeated is called a pure recurring decimal. Convert by writing the repeated sequence divided by an equal number of 9s.

Mixed Recurring Decimal

A decimal where some digits after the decimal point do not repeat, followed by repeating digits. Convert by subtracting the non-repeating part from the entire number, divided by 9s for repeating digits and 0s for non-repeating digits.

Terminating Decimal

A decimal that ends after a finite number of digits. Its fractional equivalent always has a denominator whose prime factors consist only of 2 and/or 5.

Q37. Answer: (b) Anshul

Given statement: Five friends live on five different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 5.

1. Only Meera lives on the floor between Shrishti and Richa. No one lives above Shrishti.

Floor	Persons
5	Shrishti
4	Meera
3	Richa
2	
1	

2. Anshul lives on the floor immediately below Richa.

Floor	Persons
5	Shrishti
4	Meera
3	Richa
2	Anshul
1	

3. Chandan lives on the first floor.

Floor	Persons
5	Shrishti
4	Meera
3	Richa
2	Anshul
1	Chandan

Therefore, Anshul lives on the second floor.

Hence, the correct answer is Option (2).

Q38. Answer: (c) A, B and C

The correct answer is "A, B, and C".

Key Points

• The criteria for a language to be a classical language are:

1. Exceptional antiquity of its earliest records or history, which dates back between 1500 and 2000 years.

2. A body of prehistoric writings or literature that has been preserved for future speakers as a priceless cultural legacy.

3. The literary heritage must be distinctive and distinct, and it must not borrow from literature from another language group.

4. The literature and language of the classical era are distinct from those of the modern era, and there may be a break between the classical era's language and its offshoots.

• So, comparing the properties listed above which are the real criteria to that in question we get,

• First property → True.

• Second property→ True.

• Third property→ True.

• Forth property→ False.

Q39. Answer: (c) 1358

Shortcut Trick

If $\tan\theta + \cot\theta = k$, then $\tan^2\theta + \cot^2\theta = k^2 - 2$.

Given: $\tan\theta + \cot\theta = 14$

Applying the trick: $\tan^2\theta + \cot^2\theta = 14^2 - 2 = 196 - 2 = 194$.

Required value: $7 \times (\tan^2\theta + \cot^2\theta) = 7 \times 194 = 1358$.

Therefore The correct answer is 1358.

Alternate Method

Given: $\tan\theta + \cot\theta = 14$

Formula Used: $(a + b)^2 = a^2 + b^2 + 2ab$ and $\tan\theta \times \cot\theta = 1$

=> Square both sides: $(\tan\theta + \cot\theta)^2 = 14^2$

=> $\tan^2\theta + \cot^2\theta + 2(\tan\theta \times \cot\theta) = 196$

=> $\tan^2\theta + \cot^2\theta + 2(1) = 196$

=> $\tan^2\theta + \cot^2\theta = 196 - 2 = 194$

=> Multiply by 7: $7 \times (\tan^2\theta + \cot^2\theta) = 7 \times 194$

=> $7\tan^2\theta + 7\cot^2\theta = 1358$

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Therefore The correct answer is 1358.

Additional Information

Reciprocal Trigonometric Ratios

tanθ and cotθ are reciprocals, meaning tanθ × cotθ = 1. Similarly, sinθ × cosecθ = 1 and cosθ × secθ = 1.

Algebraic Identity for Squares

For any variable x where x + 1/x = n, the value of $x^2 + 1/x^2$ is always $n^2 - 2$. Here, x represents tanθ and 1/x represents cotθ.

Trigonometric Identities

$1 + \tan^2\theta = \sec^2\theta$ and $1 + \cot^2\theta = \text{cosec}^2\theta$. These can be used to convert square terms into other trigonometric functions if required.

Q40. Answer: (a) Battery

The correct answer is 'Battery'.

Key Points

• Battery helps to maintain potential difference across a conductor.

• Potential difference is measured in volts (V)and is also known as voltage.

• It is also defined as the amount of work, that has been done in moving a unit charge from one point to another.

Additional Information

• A plug key is an electrical component that acts as a switch. To turn on the circuit, a little metallic key is put into a metallic base, and the circuit is shut off if it is detached from its base.

• Resistance is a measure of the opposition to current flow in an electrical circuit. Resistance is measured in ohms, symbolized by the Greek letter omega (Ω).

• A voltmeter is a device that measures voltages of direct current or alternating current on a scale commonly in volts, millivolts, or kilovolts. Many voltmeters are digital that give readings as numerical displays.

Q41. Answer: (c) White powder of magnesium oxide

The correct answer is 'white powder of magnesium oxide'.

Key Points

• When magnesium ribbon is burnt, it reacts with the oxygen present in the air to form magnesium oxide.

• Magnesium oxide is made up of Mg^(+2) and O^(-2) is connected to each other by an ionic oxide.

• The color of magnesium is white.

• The reaction is 2Mg+O2=2MgO.

Q42. Answer: (d) 16%

Shortcut Trick

Initial Pay = Rs. 125

Final Pay = Rs. 145

Increase = 145 − 125 = 20

Percentage Increase = (Increase ÷ Initial Pay) × 100 = (20 ÷ 125) × 100

Percentage Increase = 1/6.25 × 100 = 16%

Therefore The correct answer is 16%.

Alternate Method

Given:

Original Hourly Wage (Old Pay) = Rs. 125

Increased Hourly Wage (New Pay) = Rs. 145

Formula Used:

Percentage Increase = [(New Value − Old Value) ÷ Old Value] × 100

Calculations:

=> Increase in pay = 145 − 125 = Rs. 20

=> Percentage increase = (20 ÷ 125) × 100

=> Percentage increase = (4 ÷ 25) × 100

=> Percentage increase = 4 × 4 = 16%

Therefore The correct answer is 16%.

Additional Information

Percentage Change Formula

Used to find the relative change: Percentage Change = (Difference ÷ Original Value) × 100.

Base Value Concept

In percentage increase or decrease problems, the Initial Value or Original Value is always taken as the 100% base.

Successive Percentage Change

If a value is increased by x% and then y%, the effective change is [x + y + (xy ÷ 100)]%.

Q43. Answer: (a) 71

Shortcut Trick

Ratio a : b = 2 : 3 and a + b = 145

Value of 5 parts = 145 => 1 part = 29

a = 2 × 29 = 58 and b = 3 × 29 = 87

Mean proportional c = √(a × b) = √(58 × 87) = 29√6

c ≈ 29 × 2.449 ≈ 71.02

Therefore The correct answer is 71.

Alternate Method

Given:

Sum of two parts a + b = 145

Ratio a : b = 2 : 3

Proportion a : c :: c : b where c > 0

Formula Used:

Mean proportional c between a and b is given by c2 = ab.

Calculations:

=> a = (2 / (2 + 3)) × 145

=> a = (2 / 5) × 145 = 2 × 29 = 58

=> b = (3 / 5) × 145 = 3 × 29 = 87

=> a : c = c : b => c / a = b / c

=> c2 = a × b

=> c2 = 58 × 87

=> c2 = 5046

=> c = √5046

=> Since 712 = 5041 and 722 = 5184

=> c ≈ 71.035

Rounding to the nearest integer:

Therefore The correct answer is 71.

Additional Information

Mean Proportional

If three quantities a, b, and c are in continued proportion such that a : c = c : b, then c is the mean proportional and c = √(ab).

Third Proportional

In the continued proportion a : b = b : c, the term c is called the third proportional to a and b, calculated as c = b2 / a.

Fourth Proportional

If four quantities a, b, c, and d are in proportion (a : b = c : d), then d is the fourth proportional, calculated as d = (b × c) / a.

Q44. Answer: (a) Rs. 200

Given:

The given pie chart depicts the number of chairs manufactured of four brands (A, B, X and Y).

The total number of chairs manufactured of the four brands together is 200.

The total manufacturing cost of chairs of Brand A was Rs. 14,400.

Calculation:

The total number o chairs manufactured of chairs of Brand A = 36/100× 200 = 72

The total manufacturing cost of 72 chairs of Brand A = 14400.

The total manufacturing cost of one chair of Brand A = 14400/72 =200.

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Hence, 'option 1' is correct.

Q45. Answer: (a) South

The correct answer is 'South'.

Key Points

• Right-hand rule says -the magnetic field made by a current in straight conductor curls around the conductor in a ring. You can find it by pointing your right thumb in the direction of the conducting straight wire and curling your fingers. Your fingers will be curled in the same direction as the magnetic field around the conductor.

• Direction of the magnetic field produced by the straight conductor carrying current in the east direction is along the South direction at a point directly below the conductor.

Q46. Answer: (b) (12, 108, 6)

The logic followed here is:

The sum of first and last number is divisible by the second number.

first number + third number = divisible by second number

1. (11, 117, 2)

11 + 2 = 13

117 ÷ 13 = 9

2. (9, 56, 5)

9 + 5 = 14

56 ÷ 14 = 4

Now, let us check each options:

1. (13, 169, 2)

13 + 2 = 15

169 is not exactly divisible by 15.

2. (12, 108, 6)

12 + 6 = 18

108 ÷ 18 = 6

Thus, 108 is exactly divisible by 18.

3. (7, 46, 1)

7 + 1 = 8

46 is not exactly divisible by 8.

4. (10, 98, 2)

10 + 2 = 12

98 is not exactly divisible by 12.

Hence, the correct answer is Option (2).

Q47. Answer: (b) Lactic acid and pyruvate

The correct answer is Lactic acid and pyruvate.

Key Points

• Respiration is a metabolic process that occurs in all organisms.

• It is a biochemical process that occurs within the cells of organisms.

• In this process, the energy (ATP-Adenosine triphosphate) is produced by the breakdown of glucose which is further used by cells to perform various functions.

• In this step, enzymes split a molecule of glucose into two molecules of pyruvate, which releases energy that is transferred to ATP.

• Lactic acid fermentation occurs in some strains of bacteria and in skeletal muscle and produces lactic acid.

• During the reaction ,NaDH is oxidized to NaD^+.

Q48. Answer: (d) Average propensity to save

The correct answer is "Average propensity to save".

Key Points

• The average propensity to save (APS) is a macroeconomic term referring to the percentage of income that is saved rather than spent on current items.

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• Also known as the savings ratio, it is typically stated as a proportion of the total disposable income of the household (income minus taxes).

• The opposite of APS is the average consumption propensity (APC). APS is also associated with the marginal propensity to save (MPS), which measures the proportion of a change in income that is saved as opposed to consuming.

• A population's APS is a key economic indicator. From a personal finance standpoint, the present savings rate of a population can be correlated with ageing-related habits, such as retirement savings.

• Savings indicate the decision to forego current spending in favour of future consumption, which frees up the real economic resources required for productive investment and the production of capital goods.

• The greater a society's APS, the greater its citizens' preference for investing in the future over consumption in the present. Directly propelling sustainable economic expansion is an investment in productive capital goods.

Q49. Answer: (b) Zn (s) + 2AgNO3 (aq) → Zn(NO3)2 (aq) + 2Ag(s)

The correct answer is Zn (s) + 2AgNO3 (aq) → Zn(NO3)2 (aq) + 2Ag(s).

Key Points

• The chemical formula of zinc is Zn.

• The chemical formula of silver nitrate is AgNO3.

• The chemical formula of zinc nitrate is Zn(NO3)2.

• And the chemical formula of silver is Ag.

• The reaction will be: Zn (s) + 2AgNO3 (aq) → Zn(NO3)2 (aq) + 2Ag(s).

Q50. Answer: (d) 100 W, 20 Ω

The correct answer is 100 W, 20 Ω.

Key Points

• Given in the question:

• Potential difference across the circuit (V) = 20 V

• Current in the circuit (I) = 5A

• Using the formula P = V x I,

• P = 20V x 5A = 100 W

• Thus, the power dissipated in the circuit is 100 W.

• Now, using Ohm's Law, R_(net) = V / I, we get,

• Rnet = 20/5 = 4 Ω

• This gives us the net resistance across the circuit.

• As, it is given that the bulb are identical, their resistance will be same (say R).

• Since the bulbs are connected in parallel combination,

• 1/R_(net) = 1/R + 1/R +1/R + 1/R + 1/R

• 1/R_(net) = 5/R

• 1/4 = 5/R (as Rnet = 4 Ω)

• R = 5 x 4

• R = 20 Ω

• Thus, the resistance of each bulb is 20 Ω.

• Therefore, the power dissipated in the circuit and the resistance of each bulb are 100W and 20 Ω respectively.

Additional Information

• Ohm's Law:

• Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across its ends, provided the physical state of the conductor remains unchanged.

• If I be the current flowing through the conductor and V the potential difference across its ends, then V prop. to I

• Hence, V = I x R, where, R is the constant of proportionality termed as Resistance of the conductor.

• Power:

• Energy is the word for the ability to perform tasks. Power is the energy used to complete a task in a given amount of time.

• P is used to represent it.

• These three formulas are used to calculate power in any electrical circuit.

• P = V x I

• P = I^2 x R

• $P = V^2 / R$

• Resistance:

• The amount of obstruction to current passage in an electrical circuit is measured as resistance. Ohms, or the Greek letter omega (Ω), are used to measure resistance (R).

• There are mainly two ways of combination of resistance:

• Series Combination:

• When two or more resistances are connected end to end and the same current passes through each one successively, they are said to be connected in series. In this instance, the sum of the individual resistances found in the series combination determines the equivalent or total resistance.

• In terms of mathematics, the equivalent resistance (R) of any number of resistances connected in series (R1, R2, R3,...) is as follows:

• R = R1 + R2 + R3 + …

• Parallel Combination:

• When two or more resistances are connected between two places and have distinct current directions, they are referred to as being in parallel connections. In these circuits, the current splits off and recombines at the point where the branches meet.

• The equivalent resistance (R) of any number of parallel resistances (R1, R2, R3,...) can be found mathematically as follows:

• 1/R = 1/R1 + 1/R2 + 1/R3 + …

Q51. Answer: (d) 20 volt

Given:

Heat Produced =200 J.

Registance=2 ohm.

Formula used:

Amount of heat produced $H=(V^2t)/R$

[Where V is the amount of Voltage produced; t is the time required ;R is the resistance]

Calculation:

$200=(V^2 \times 1)/2$; => $V^2=400$; Rightarrow V=20 v

Hence the correct answer is 20 volt.

Q52. Answer: (d) 6 cm

The correct answer is '6 cm'.

Key Points

• In optics, the relationship between the distance of the image (v), the distance of the object (u), and the focal length (f) of the lens is given by the formula known as the Lens formula. The Lens formula is applicable for convex as well as concave lenses. These lenses have negligible thickness. The formula is as follows:

1/f= 1/v-1/u

Where f is focus of lens, v is distance of image and u is distance of object.

• An given object of height 3 cm is placed at a distance 30 cm in front of a convex lens of focal length 20 cm. then Image of object formed at distance(v) of,

1/v= 1/f+1/u

v=(f× u)/(f+u)

v=(20× (-30))/(20+(-30)) = 60 cm

• The relationship between size of image and object w.r.t. distance of object is as follows:

(Height of image)/(Height of object)=v/(- u)

(Height of image)/3=60/(-30)

Height of image=-2× 3= -6cm

where negative sign indicate nature of image.

• Hence, the height of image will be at 6cm.

Additional Information

• Sign convention in the case of the concave mirror:

• Since, the object is always placed in front of the mirror hence the sign of the object is taken as negative.

• Since, the center of curvature and focus lie in front of the concave mirror, signs of the radius of curvature and focal length are taken as negative in the case of the concave mirror.

• When an image is formed in front of the mirror, the distance of the image is taken as – (negative), and when the image is formed

behind the mirror, the distance of the image is taken as + (positive).

• Height of image is taken as positive in the case of the erect image and taken as negative in the case of the inverted image.

• Sign convention in the case of a convex mirror:

• Since, the object is always placed in front of the mirror hence the sign of the object is taken as negative.

• Since, the center of curvature and focus lies behind the convex mirror, signs of the radius of curvature and focal length are taken as + (positive) in the case of the convex mirror.

• In the case of a convex mirror, images are always formed behind the mirror, thus the distance of the image is taken as positive.

• In the case of a convex mirror, always an erect image is formed, thus the height of the image is taken as positive.

Q53. Answer: (d) 2002

The correct answer is "2002".

Key Points

• Article 21-A was added to India's Constitution by the Constitution (Eighty-Sixth Amendment) Act of 2002.

• It says that all children between the ages of 6 and 14 have the right to a free and mandatory education in a way that the State can decide by law.

• The Right of Children to Free and Compulsory Education (RTE) Act, 2009, which is the result of Article 21-A, says that every child has the right to full-time elementary education of satisfactory and equal quality in a formal school that meets certain essential norms and standards.

• On April 1, 2010, Article 21-A and the RTE Act became law. The words "free and mandatory" are in the name of the RTE Act.

• "Free education" means that no child, other than one whose parents have put him or her in a school that isn't paid for by the government, should have to pay any kind of fee, charge, or expense that might keep him or her from getting an elementary education and finishing it.

• "Compulsory education" means that the government and local authorities have to make sure that all kids between the ages of 6 and 14 can get into elementary school, go to school, and finish it.

• With this, India has moved toward a rights-based framework that makes it a legal requirement for the Central and State Governments to implement this basic child right, as written in Article 21A of the Constitution and as stated in the RTE Act.

Q54. Answer: (b) Technological Interventions for Tribal Empowerment (TITE)

The correct answer is "Technological Interventions for Tribal Empowerment (TITE)".

Key Points

• Tribal Sub Plan Technological Interventions for Tribal Empowerment (TITE):

• The department's grant-in-aid scheme for the Tribal Sub Plan, TITE aims to improve the living conditions of scheduled tribes and give them more power through sustainable science and technology (S&T) activities and applications.

• By creating an action research project, S&T applications and interventions should meet the following goals:

• To encourage research, development, and adaptation of science and technology to improve the lives of tribal groups.

• Start of S&T-based programmes in major socioeconomic sectors that are tailored to the location.

• To keep traditional artisan skills alive by building on local innovation and knowledge systems and using a participatory research approach to make local resource management plans.

• To look into and promote alternative ways to make a living in places where people are losing their jobs, focusing on innovative community-based approaches and technological options to increase the impact on the ground.

• To improve the equipment and machinery that is already there and to bring in new techniques, systems, and a full set of technology.

• Widening the effect of the above S&T-based activities by encouraging the replication and scaling up of successful approaches that lead to empowering tribal populations and building their technical skills.

Q55. Answer: (c) 71

Shortcut Trick

Target average for 11 innings = 33 runs.

Total deficiency in first 7 innings = 7 × (33 − 28) = 7 × 5 = 35 runs.

Total deficiency in next 3 innings = 3 × (33 − 32) = 3 × 1 = 3 runs.

Score needed in 11^(th) inning = Target average + Total deficiency = 33 + (35 + 3) = 71.

Therefore The correct answer is 71 runs.

Alternate Method

Given: Average of first 7 innings = 28 runs, Average of next 3 innings = 32 runs, Overall target average for 11 innings = 33 runs.

Formula Used: Total Sum = Average × Number of innings.

=> Total runs in first 7 innings = 7 × 28 = 196

=> Total runs in next 3 innings = 3 × 32 = 96

=> Total runs in first 10 innings = 196 + 96 = 292

=> Total runs required for 11 innings = 11 × 33 = 363

=> Score needed in 11^(th) inning = Total runs required − Runs scored in 10 innings

=> Score needed in 11^(th) inning = 363 − 292 = 71

Therefore The correct answer is 71 runs.

Additional Information

Weighted Average

When different groups have different averages, the combined average is given by: Average_(total) = (n1×A1 + n2×A2 + ...) ÷ (n1 + n2 + ...).

Change in Average

If a new observation is added, the new score = (New Average × New Total Count) − (Old Average × Old Total Count).

Deviation Rule

The sum of deviations of all observations from their arithmetic mean is always zero (Σ(x_i − mean) = 0).

Q56. Answer: (a) 9.55 cm

Concept:

Concave Mirror and Graph Analysis:

• The relationship between object distance (u), image distance (v), and focal length (f) of a concave mirror is given by the mirror formula:

• Mirror Formula: 1/f = 1/v + 1/u

• When plotting a graph of 1/v against 1/u, the intercepts can provide the focal length.

• The x-intercept represents 1/f and the y-intercept also represents 1/f.

• SI Unit: The SI unit of focal length is meter (m), but in this context, we use centimeters (cm).

• Dimensional Formula: The dimensional formula for focal length is [L].

Calculation:

Given,

x-intercept = 1/u = 0.1 cm^(-1)

y-intercept = 1/v = 0.11 cm^(-1)

Using the intercepts to find the focal length (f),

=> 1/f = x-intercept = 0.1

=> f = 1/0.1 = 10 cm

Similarly,

=> 1/f = y-intercept = 0.11

=> f = 1/0.11 ≈ 9.09 cm

Taking the average of both values,

=> f = (10 + 9.09)/2 ≈ 9.55 cm

Therefore The focal length of the mirror is 9.55 cm.

Q57. Answer: (d) 6

Given: INTERNATIONAL

Solution:

Forward Pair - IN, NT

Backward Pair - LN, LO, NO, RT

Hence, six such pair of which has as many letters between them in the word as they have between them in the English alphabetical series.

Hence, 'option 4' is correct.

Q58. Answer: (c) Diagonals of a kite bisect each other

Shortcut Trick

In a parallelogram and its special cases (rectangle, rhombus, square), the diagonals always bisect each other.

In a kite, only the longer diagonal bisects the shorter diagonal at a 90° angle.

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The shorter diagonal does not bisect the longer one; therefore, they do not bisect each other.

Therefore The correct answer is Diagonals of a kite bisect each other.

Alternate Method

Given: Properties of diagonals for various quadrilaterals.

Formula Used: A parallelogram is a quadrilateral where opposite sides are parallel, ensuring diagonals bisect each other.

=> In the kite ABCD shown above, diagonal BD is bisected by AC at point E (BE = ED).

=> However, diagonal AC is not bisected by BD (AE ≠ EC).

=> For parallelograms, rectangles, and rhombuses, the intersection point E is the midpoint of both diagonals.

=> Thus, the statement regarding the kite is not necessarily true for both diagonals.

&there4) The correct answer is Diagonals of a kite bisect each other.

Q59. Answer: (c) (27, 270, 5)

Given:

(17, 238, 7)

(23, 414, 9)

Solution:

the logic follows here is:

Now applying all options,

option 1:

option 2:

option 3:

option 4:

Thus, the logic applied on set (27, 270, 5)

Hence, 'option 3' is correct.

Q60. Answer: (c) Shah Mal

The correct answer is "Shah Mal".

Key Points

• During the 1857 uprising, Shah Mal, a simple farmer from Bijrol village in Uttar Pradesh's Baghpat district (it used to be Meerut), led a fierce rebellion in Baraut pargana.

• On May 10, 1857, the Sepoy uprising began in Meerut. Shah Mal and other rebels from the area attacked a large group of merchants.

• In the end, he attacked all the way across the tehsil of Baraut, destroyed the boat bridge over the Yamuna in Baghpat, and looted its bazaar.

• Shah Mal showed his leadership by making alliances with people outside of his area and sending people to Delhi to ask the rebels there for help.

• Baghpat quickly became an important place for the sepoys from Delhi to get supplies.

• Shah Mal rallied the Chowrassee des, or 84 villages, in his area, and with the help of the freed prisoners from Meerut jail, he grew his rebel forces even more.

• Shah Mal set up an effective intelligence network and turned the bungalow of an English officer into a "hall of justice" where he settled local disputes and gave justice.

• This made it hard for the English to communicate with Meerut.

• Shah Mal died in a battle in Baraut in July 1857, when he was fighting against the rebels.

Q61. Answer: (c) 100%

Given:

total number of cushions sold in store x-

in February= 196

in march= 114

total number of cushions sold in store z in march= 155

formula used:

percentage= value/(total value)×100

calculation:

total number of cushions sold in store x = 196+114= 310

total number of cushions sold in store z in march= 155

total numbers of cushions sold more in store x than store z= 310-155= 155

percentage= 155/155×100 = 100%

Therefore, the cushions sold in store x in both months is 100% more than the cushions sold in store z in the month of march.

Q62. Answer: (a) 2

Shortcut Trick

Sum of numbers = 48, HCF = 6

Sum of co-prime ratios (a + b) = 48 ÷ 6 = 8

Possible co-prime pairs (a, b) where a > b are (7, 1) and (5, 3).

Pairs (6, 2) and (4, 4) are rejected as they are not co-prime.

Therefore The correct answer is 2.

Alternate Method

Given: Sum = 48, HCF = 6, Condition: x > y

=> Let the numbers be x = 6a and y = 6b, where a and b are co-prime numbers.

=> 6a + 6b = 48

=> 6(a + b) = 48

=> a + b = 8

=> Pairs of (a, b) whose sum is 8 and are co-prime (HCF = 1):

=> Case 1: (7, 1) → x = 6×7 = 42, y = 6×1 = 6 (Valid as 42 > 6)

=> Case 2: (5, 3) → x = 6×5 = 30, y = 6×3 = 18 (Valid as 30 > 18)

=> Note: (6, 2) is not co-prime (HCF=2), and (4, 4) is not co-prime (HCF=4).

Therefore The correct answer is 2.

Additional Information

HCF and Sum Relation

If the HCF of two numbers is H, the numbers can be represented as Ha and Hb, where a and b are co-prime. Their sum is H(a + b).

Co-prime Numbers

Two numbers are said to be co-prime if their Highest Common Factor (HCF) is 1. Example: (3, 5), (7, 8).

HCF and LCM Relation

Product of two numbers = HCF × LCM. Also, LCM is always exactly divisible by the HCF.

Q63. Answer: (b) HGVMT

The logic follows here is -

Thus, 'GESIO' will be written in HGVMT.

hence, the correct answer is 'option 2'.

Q64. Answer: (d) 2

Given: 9 + $ 5 @ $ 2 6 3 % 2 & 8 # * 2 9 ! 4 3

According to given information,

• Sign → Sign → Even number

So, there are 2 signs (from left to right) that are immediately preceded by a sign and immediately followed by an even number.

Hence, 'option 4' is correct.

Q65. Answer: (d) 5x2 + 4x - 2 = 7x

Shortcut Trick

A quadratic equation is an equation of the second degree, meaning the highest power of the variable is 2.

Scan for the highest exponent: Option 1 has x2 but it cancels out; Option 2 has degree 4; Option 3 has degree 3.

In 5x2 + 4x − 2 = 7x, the highest power is 2 and the x2 term does not cancel.

Therefore The correct answer is 5x2 + 4x − 2 = 7x.

Alternate Method

Given: Four mathematical equations.

Formula Used: The standard form of a quadratic equation is ax2 + bx + c = 0, where a ≠ 0.

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Step-by-step Evaluation:

Case 1: 4x2 + 6x + 5 = 4x(x + 1)

=> 4x2 + 6x + 5 = 4x2 + 4x

=> 6x − 4x + 5 = 0

=> 2x + 5 = 0 (This is a linear equation because degree = 1).

Case 2: (x + 7)4 = 14

=> The highest power of x is 4 (This is a quartic equation).

Case 3: 3x + 7 = 7x3

=> 7x3 − 3x − 7 = 0 (This is a cubic equation because degree = 3).

Case 4: 5x2 + 4x − 2 = 7x

=> 5x2 − 3x − 2 = 0

=> Here, the highest power of x is 2 and the coefficient of x2 is 5 (not zero).

=> This matches the standard form ax2 + bx + c = 0.

Therefore The correct answer is 5x2 + 4x − 2 = 7x.

Additional Information

Nature of Roots

For a quadratic equation ax2 + bx + c = 0, the discriminant D = b2 − 4ac determines the roots. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Sum and Product of Roots

If α and β are the roots, then Sum of roots (α + β) = −b/a and Product of roots (αβ) = c/a.

Quadratic Formula

The roots can be found using the formula x = (−b ± √(b2 − 4ac)) / 2a.

Equation Degrees

Linear equations have degree 1, Quadratic equations have degree 2, Cubic equations have degree 3, and Quartic equations have degree 4.

Q66. Answer: (c) loss, 8.3%

Shortcut Trick

Let CP_A be x and CP_B be (2540 − x).

SP_A = 1.15x and SP_B = 0.75 × (2540 − x).

Given: SP_A − SP_B = 109 => 1.15x − [1905 − 0.75x] = 109.

1.9x = 2014 => x = 1060. So, CP_A = 1060 and CP_B = 1480.

Total SP = 1.15(1060) + 0.75(1480) = 1219 + 1110 = 2329.

Total Loss = 2540 − 2329 = 211. Loss % = (211 ÷ 2540) × 100 ≈ 8.3%.

Therefore The correct answer is loss, 8.3%.

Alternate Method

Formulas: SP = CP × (100 ± P/L)% | Total Profit/Loss = Total SP − Total CP

=> Let Cost Price of A = A and Cost Price of B = B.

=> A + B = 2540 --- (i)

=> SP_A = 1.15A and SP_B = 0.75B.

=> 1.15A − 0.75B = 109 --- (ii)

=> Multiply (i) by 0.75: 0.75A + 0.75B = 1905.

=> Add to (ii): 1.9A = 2014 => A = 1060.

=> B = 2540 − 1060 = 1480.

=> Total SP = (1060 × 1.15) + (1480 × 0.75) = 1219 + 1110 = 2329.

=> Loss = 2540 − 2329 = 211.

=> Loss % = (211 ÷ 2540) × 100 = 8.307...% ≈ 8.3%.

Therefore The correct answer is loss, 8.3%.

Additional Information

Overall Profit/Loss Percentage

It is calculated based on the Net Change in the value of the total transaction relative to the Total Cost Price.

Linear Equations in Profit and Loss

When two articles have different CP and different conditions on SP, representing them as x and (Total - x) simplifies the calculation to one variable.

Q67. Answer: (b) 45 units

Shortcut Trick

The difference between Total Surface Area (TSA) and Lateral Surface Area (LSA) of a cube is always the area of the two bases.

TSA − LSA = 2 × (Area of one face) = $2a^2$

$2a^2 = 4050 \Rightarrow a^2 = 2025$

$a = \sqrt{2025} = 45$ units.

Therefore The correct answer is 45 units.

Alternate Method

Given: Difference between Total Surface Area and Lateral Surface Area = 4050 units².

Formula Used:

=> Total Surface Area (TSA) of cube = $6a^2$

=> Lateral Surface Area (LSA) of cube = $4a^2$

Where 'a' is the side length of the cube.

Calculations:

=> TSA − LSA = 4050

=> $6a^2 - 4a^2 = 4050$

=> $2a^2 = 4050$

=> $a^2 = 4050 \div 2$

=> $a^2 = 2025$

=> $a = \sqrt{2025}$

=> a = 45 units

Therefore The correct answer is 45 units.

Additional Information

Volume of Cube

The amount of space occupied by the cube, calculated as Volume = a^3.

Diagonal of Cube

The longest rod that can be placed inside a cube is its diagonal, given by $d = a\sqrt{3}$.

Surface Area of Cuboid

For a cuboid with dimensions l, b, h: TSA = 2(lb + bh + hl) and LSA = 2h(l + b).

Q68. Answer: (a) Sanjana

Given:

• Five friends live on five different floors of the same building.

• The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 5.

Solution:

(1.) Namita lives on the floor which is second from the top.

(2.) Avdhesh lives on the floor immediately above Namita.

(3.) Ritu lives on the lowermost floor.

(4.) Sanjana lives on one of the floor between Anand and Ritu.

Hence, 'Sanjana' lives on the fourth floor from the top.

Q69. Answer: (d) 12

Given number : 38572352

Condition:

• 1 is added to each even digit

• 2 is subtracted from each odd digit

After applying above condition,

Second from the left = 9

Fourth from the right = 3

the sum of the digits which are second from the left and fourth from the right = 9 + 3 = 12

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Hence, '12' is the correct answer.

Q70. Answer: (b) Second to the left of Suhani

Given:

Five friends, Hiba, Suhani, Pritam, Ahmed, and Rosy are sitting around a circular table facing the centre.

Solution:

(1.) Rosy is second to the right of pritam.

(2.) Ahmed is second to the left of Pritam,

(3.) Rosy is second to the right of Pritam, and is an immediate neighbour to both Suhani and Ahmed.

(4.) Now, Hiba sits on only vacant seat.

Thus, Hiba is seated second to the left of Suhani.

Hence, the correct answer is 'option 2'.

Q71. Answer: (d) 24 days

Shortcut Trick

Total Work (LCM of 20, 30) = 60 units.

Efficiency: Navya = 3 units/day, Bhavya = 2 units/day.

Alternate pair (Bhavya + Navya): 2 + 3 = 5 units in 2 days.

Total time = (60 ÷ 5) × 2 = 12 × 2 = 24 days.

Therefore The correct answer is 24 days.

Alternate Method

Given: Time taken by Navya = 20 days, Time taken by Bhavya = 30 days.

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

Person	Days	Total Work	Efficiency
Navya	20	60	3
Bhavya	30	2	

Calculations:

=> Work done in Cycle 1 (Day 1 by Bhavya + Day 2 by Navya) = 2 + 3 = 5 units.

=> Time taken for 1 cycle = 2 days.

=> Number of cycles required = Total Work ÷ Work per cycle = 60 ÷ 5 = 12 cycles.

=> Total time = 12 cycles × 2 days/cycle = 24 days.

Therefore The correct answer is 24 days.

Additional Information

Alternate Day Work

In alternate work, identify the starting person and calculate work done in one full rotation (cycle) to find the total duration.

Pipes and Cisterns

Similar to time and work, but outlet pipes have negative efficiency, reducing the total work done per cycle.

Work and Wages

Wages are always distributed in the ratio of work done by each person, which is Efficiency × Time.

Q72. Answer: (b) Rs. 1,000

Shortcut Trick

Let the Cost Price (CP) be 100%.

Loss = 6%, so Selling Price (SP) = 100% − 6% = 94%.

Given, 94% = Rs. 940.

Using the Unitary Method: 1% = 940 ÷ 94 = 10.

Therefore, 100% (CP) = 10 × 100 = Rs. 1,000.

Therefore The correct answer is Rs. 1,000.

Alternate Method

Given: Selling Price (SP) = Rs. 940, Loss% = 6%.

Formula: CP = [SP × 100] ÷ [100 − Loss%]

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=> CP = [940 × 100] ÷ [100 − 6]

=> CP = [940 × 100] ÷ 94

=> CP = 10 × 100

=> CP = Rs. 1,000

Therefore The correct answer is Rs. 1,000.

Additional Information

Cost Price & Selling Price

The Cost Price is the price at which an item is bought. If SP is less than CP, there is a Loss. Formula: Loss = CP − SP.

Profit and Loss Percentage

Profit% and Loss% are always calculated on the Cost Price unless stated otherwise in the problem.

Q73. Answer: (b) 2.4 m, 12 m and 1/3 respectively

The correct answer is 2.4 m, 12 m and 1/3 respectively.

Key Points

We know that f = -3.0 m (it is negative because the mirror is concave), v = -4.0 m (it is negative because the image is real and formed on the same side as the object).

Substitute these values into the mirror equation:

1/(-3) = 1/(-4) + 1/u

Solving this gives:

u = -12 m (it is negative because the object is on the same side as the light source).

Now we can find the magnification m. The magnification of a mirror is the ratio of the image height (h') to the object height (h), and it's also equal to -v/u.

Therefore, m = (h')/h = (-v)/u

We know that h' = 80 = 0.8cm m (it is positive because the image is inverted).

Therefore, m = 0.8/h = (-4)/(-12) = 1/3

Solving this gives:

h = 0.8 * 3 = 2.4 m

Therefore, the object height is 2.4 m, the object distance is 12 m, and the magnification is 1/3.

Q74. Answer: (d) 2021-22 to 2025-26

The correct answer is "2021-22 to 2025-26".

Key Points

• The Centrally Sponsored Scheme-Samagra Shiksha Scheme, an integrated programme for the school education sector, would continue from 1 April 2021 to 31 March 2026 with an anticipated investment of 294283.04 crores, according to the Cabinet Committee on Economic Affairs.

• To achieve inclusive and equitable, high-quality, holistic schooling, the Scheme is in line with the Sustainable Development Goal for Education (SDG-4) and has now been connected with the National Education Policy (NEP) 2020.

• It strives to guarantee that all children have access to high-quality education in a fair and inclusive classroom setting that accommodates their diverse backgrounds, language requirements, and range of academic skills while also empowering them to actively engage in the learning process.

Additional Information

• These are the main goals of the Scheme:

• Help states and UTs put the ideas in the National Education Policy 2020 into action (NEP 2020).

• The right of Children to Free and Mandatory Education (RTE) Act, 2009, says that all children have the right to free and required education.

• Pay attention to care and education for young children.

• The focus is on basic reading and math skills.

• Focus on a holistic, integrated, inclusive, and activity-based curriculum and pedagogy to teach students 21st century skills.

Q75. Answer: (c)

The solution is in Hindi. Read it online.

Q76. Answer: (d) ii and iii

The correct answer is 'ii and iii'.

Key Points

• A combination reaction is a reaction in which two or more substances combine to form a single new substance.

• Combination reactions can also be called synthesis reactions.

• The general form of a combination reaction is: A+B→AB.

• One combination reaction is two elements combining to form a compound.

• The reaction - CO(g) + H2(g) → CH3OH(l) ;2Mg(s) + O2(g) → 2MgO(s) are combination reaction.

Additional Information

• The reaction 3Fe(s) + 4H2O(g) → Fe3O4(s) + 4H2(g) is a redox reaction.

• The reaction Zn (s) + 2AgNO3(aq) → Zn(NO3)2(aq) + 2Ag(s) is a displacement reaction.

Q77. Answer: (b) Durand Cup

The correct answer is "Durand Cup".

Key Points

• Durand Cup:

• The 131st edition of the Durand Cup, the oldest football competition in Asia, and the first one since it was recognised by the Asian Football Confederation were the 2022 Durand Cup, also known as the Indian Oil Durand Cup because of sponsorship connections with Indian Oil Corporation.

Additional Information

• Deodhar Trophy:

• The Deodhar Trophy, sometimes spelled Devdhar Trophy, is an Indian domestic cricket List A championship competition. It is a 50-over knockout competition that is played annually between India A, India B, and India C and is named for D B Deodhar, also referred to as the Grand Old Man of Indian Cricket. India B currently holds the title after defeating India C by 51 runs in the 2019–20 final. In 2022 it was held from 8 September.

• Vijay Hazare trophy:

• The Board of Control for Cricket in India hosts the annual domestic limited-overs cricket competition known as the Vijay Hazare Trophy, commonly known as the Ranji One-Day Trophy. It is officially known as the Mastercard Vijay Hazare Trophy due to sponsorship considerations (BCCI). In 2022, it was played from November 12 to December 2 with 38 teams.

• Ranji trophy:

• The Ranji Trophy is a domestic first-class cricket championship played in India involving numerous teams representing regional and state cricket bodies. It is sometimes known as the Mastercard Ranji Trophy due to sponsorship reasons. Ranji Trophy was established in 1935 by the Board of Control for Cricket in India, and since then it has been held yearly on different Indian grounds and stadiums. In 2022, it was played from December 13 to February 19.

Q78. Answer: (c) 2

• The shaded part represents the number of creative painters who live in rural areas..

• The number representing the number of creative painters who live in rural areas = 2

Hence, ‘option 3’ is the correct.

Q79. Answer: (c) 12k2 - 4k - 1 = 0

Shortcut Trick

Substitute x = 2/3 into the quadratic equation $7x^2 + kx - 3 = 0$.

$7(4/9) + 2k/3 - 3 = 0 \rightarrow 28 + 6k - 27 = 0 \rightarrow 6k = -1 \rightarrow k = -1/6$.

Test $k = -1/6$ in $12k^2 - 4k - 1 = 0$: $12(1/36) - 4(-1/6) - 1 = 1/3 + 2/3 - 1 = 0$.

Therefore The correct answer is $12k^2 - 4k - 1 = 0$.

Alternate Method

Given: $x = 2/3$ is a solution of $7x^2 + kx - 3 = 0$.

Method: If a value is a root of an equation, it must satisfy the equation when substituted for the variable.

$\Rightarrow 7(2/3)^2 + k(2/3) - 3 = 0$

$\Rightarrow 7(4/9) + 2k/3 - 3 = 0$

$\Rightarrow 28/9 + 2k/3 - 3 = 0$

=> Multiply the entire equation by 9: $28 + 6k - 27 = 0$

$\Rightarrow 6k + 1 = 0 \Rightarrow k = -1/6$

Now, we substitute $k = -1/6$ into the target expression $12k^2 - 4k - 1$:

$\Rightarrow 12(-1/6)^2 - 4(-1/6) - 1$

$\Rightarrow 12(1/36) + 4/6 - 1$

=> 1/3 + 2/3 − 1 = 3/3 − 1 = 0

Therefore The correct answer is $12k^2 - 4k - 1 = 0$.

Additional Information

Root of a Quadratic Equation

If α is a root of $ax^2 + bx + c = 0$, then $a\alpha^2 + b\alpha + c = 0$ must hold true.

Nature of Roots

The nature of roots is determined by the discriminant $D = b^2 - 4ac$. If $D \geq 0$, roots are real.

Relationship between Roots and Coefficients

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

Q80. Answer: (c) National Science Day 2022

The correct answer is "National Science Day 2022".

Key Points

• "Integrated Approach in Science and Technology for Sustainable Future" is the focus of National Science Day.

• The theme for National Science Day was introduced in January by Dr. Jitendra Singh, the Union Minister of Science and Technology.

• According to a statement released by the Department of Science and Technology, Singh emphasised that a four-fold integrated strategy in Science and Technology for a sustainable future will help us break our culture of working in silos (DST).

• According to the statement, Prime Minister Narendra Modi proposed this four-fold integrated approach to play a leading role in the international arena.

• According to Singh, the four-fold method would integrate all scientific divisions that might operate using a theme-based approach. Which are:

• Extended scientific action that also includes engineering

• Institutions, both medical and otherwise

• Additional scientific integration entails determining the requirements of other ministries, including Jal Shakti and the Railways, among others.

• A comprehensive, science-driven approach incorporating startups and industry.

Additional Information

• India celebrates the day on July 1 as ‘National Doctor’s Day’ and it’s organized by the Indian Medical Association (IMA) annually.

• The theme of National Doctors Day 2022 is ‘Family Doctors on the Front Line’.

• In India, where 'Teacher's Day is celebrated on 5 September, 'International Teacher's Day is celebrated on 5 October.

• National Engineers Day is celebrated on 15 September.

• It is celebrated to pay tribute to Sir M. Visvesvaraya, one of the most visionary and eminent civil engineers the country has had.

• It was first celebrated in 1968.

Q81. Answer: (d) atmospheric refraction of starlight

The correct answer is the 'atmospheric refraction of starlight'.

Key Points

• The stars seem to twinkle in the night sky due to the effects of the Earth's atmosphere.

• When starlight enters the atmosphere, it is affected by winds in the atmosphere and areas with different temperatures and densities.

• This causes the light from the star to twinkle when seen from the ground.

• when the light from a star passes through these different layers, it experiences different levels of refraction.

• Thus, the image of the star gets distorted constantly in brightness and position which makes the star look like its twinkling.

Q82. Answer: (c) FK 15

The logic follows here is,

Similarly.

Hence, 'option 3' is correct answer.

Q83. Answer: (a) Tamil Nadu

The correct answer is "Tamil Nadu".

Key Points

• The Narasingapettai Nagaswaram has received a Geographical Indication tag in the class 15 musical instrument category.

• The ancient wind instrument known as Narasinghapettai Nagaswaram is still created the old-fashioned way in a village close to Kumbakonam, Tamil Nadu.

• Tamil Nadu's Nodal Officer for GI Registration of Products submitted the application for receiving the GI tag on behalf of Thanjavur Musical Instruments Workers Co-operative Cottage Industrial Society Limited.

• The pari nagaswaram, which is longer than the thimiri, is the nagaswaram that is being employed by artists.

• The body of this musical instrument is cylindrical in shape and assumes the form of a bell at the bottom.

• The nagaswaram in this form gives volume and tone. The instrument is 2.5 feet in length.

Q84. Answer: (a) The solution will turn milky due to insoluble suspension of Calcium carbonate

The correct answer is 'The solution will turn milky due to insoluble suspension of Calcium carbonate'.

Key Points

• If bubbles of air are sent through lime water taken in a container then the solution will turn milky due to insoluble suspension of Calcium carbonate.

• On bubbling Carbon dioxide in clear lime water in small amounts, the clear solution turns milky due to the formation of calcium carbonate.

• $Ca(OH)2(a\ q)+CO2(g) \rightarrow CaCO3(s)+H2\ O(l)$ (CaCO3)

Q85. Answer: (b) after every five years

The correct answer is "After every five years".

Key Points

• The 73rd and 74th Amendments to the Indian Constitution provide for elections to local bodies after every five years.

• It is located right where both of these acts are focused.

• The Panchayati Raj System's operation in rural regions is the focus of the 73rd Constitutional Amendment Act.

• The 74th Constitutional Amendment Act, on the other hand, focuses on the urban local government units, the municipalities.

• These two Amendment Acts have established a foundation for the effective decentralization of authority across the nation.

• The 74th Amendment had an effect on local government since it increased the number of people who participated in governing society as a whole. Adding a third tier to the administering authority after the federal and state levels of government maintains the administration more efficient.

• In addition, the act has increased uniformity in the legislation or laws for the numerous urban municipal organizations.

Q86. Answer: (b) 21 and 81

Given:

$21 \div 9 + 99 - 81 \times 5 = 3$

where LHS = $21 \div 9 + 99 - 81 \times 5$

RHS = 3

using the BODMAS rule on options, after changing number calculated number of LHS is equal to RHS then it will be answer.

option 1: 9 and 81

After interchanging:

$= 21 \div 81 + 99 - 9 \times 5$

$= 0.26 + 99 - 9 \times 5$

$= 0.26 + 99 - 45$

$= 99.26 - 45$

$= 54.26$

54.26 is not equal to RHS.

option 2: 21 and 81

Given:

$21 \div 9 + 99 - 81 \times 5 = 3$

After interchanging:

$= 81 \div 9 + 99 - 21 \times 5$

$= 9 + 99 - 21 \times 5$

$= 9 + 99 - 105$

$= 108 - 105$

$= 3$

3 is equal to RHS so it will be answer.

Option 3: 21 and 5

Given:

21÷ 9 + 99 - 81 × 5 = 3

After interchanging:

= 5 ÷ 9 + 99 - 81 × 21

= 0.56 + 99 -81 × 21

= 0.56 + 99 -1701

=-1601.44

-1601.44 is not equal to RHS.

option 4: 9 and 5

Given:

21÷ 9 + 99 - 81 × 5 = 3

After interchanging:

= 21÷ 5 + 99 - 81 × 9

= 4.2 + 99 - 81 x 9

=4.2 + 99 - 729

= -625.8

-625.8 is not equal to RHS.

Hence, “option 2” is the correct answer.

Q87. Answer: (d) 1 March 2022

The correct answer is "1 March 2022".

Key Points

• At the Red Fort's 15th August Ground in New Delhi, the National Commission for the Protection of Children's Rights (NCPCR) commemorated its 17th anniversary on 1st march 2022.

• The occasion was attended by the Chairperson of the NCPCR, Shri Priyank Kanoongo, the Secretary of the WCD, Shri Indevar Pandey, and other officials.

• The major guest was the Union Minister for Women and Child Development, Smt. Smriti Zubin Irani. "The new slogan exhorts us to protect the future, i.e. our children, for in their wellbeing lies the foundation of a strong Nation," Smt. Irani stated at the event as she unveiled the NCPCR's new motto.

• The Minister talked with kids from several States and went to an exhibition about young freedom warriors that was put on by the Border Security Forces (BSF) in association with NCPCR to honour their sacrifices.

Q88. Answer: (d) 71

Shortcut Trick

Take the least power common: x = 55^(100) (1 + 55^1 + 55^2).

x = 55^(100) (1 + 55 + 3025) = 55^(100) × 3081.

Analyze the factors of 3081: Sum of digits = 3+0+8+1 = 12, so it is divisible by 3.

3081 = 3 × 1027 and 1027 = 13 × 79. Factors are 5, 11, 3, 13, 79.

Therefore The correct answer is 71.

Alternate Method

Given: x = 55^(100) + 55^(101) + 55^(102)

Formula Used: Factorization by taking the common term out: a^n + a^(n+1) + a^(n+2) = a^n(1 + a + a^2).

=> x = 55^(100)(1 + 55 + 55^2)

=> x = (5 × 11)^(100) × (56 + 3025)

=> x = 5^(100) × 11^(100) × 3081

=> Factorize 3081: 3081 ÷ 3 = 1027

=> 1027 is not divisible by 3, 7, or 11. Check 13: 1027 ÷ 13 = 79

=> x = 5^(100) × 11^(100) × 3 × 13 × 79

=> The prime factors of x are 3, 5, 11, 13, and 79.

=> Comparing with options: 3, 79, and 11 are factors, but 71 is not.

Therefore The correct answer is 71.

Additional Information

Divisibility Rule of 3

A number is divisible by 3 if the sum of its digits is divisible by 3.

Prime Factorization

Every composite number can be expressed as a unique product of prime numbers.

Laws of Exponents

a^m × aⁿ = a^(m+n). This allows us to factor out the lowest power from an algebraic sum.

Q89. Answer: (d) Short run Marginal Cost

The correct answer is "Short run marginal cost".

Key Points

• When more production is generated in the short term but some costs are fixed, the overall cost changes. This is known as the short-run marginal cost.

• The short-run marginal cost forms a U-shape on the right side of the page, with quantity on the x-axis and cost per unit on the y-axis.

• Some of the company's short-term costs are fixed regardless of the output level (e.g. buildings, machinery).

• Other costs, like labour and materials, fluctuate with output and are therefore reflected in marginal cost.

• If the additional cost per unit is considerable and the firm works at a low level of output, the marginal cost may first decrease as shown in the diagram, start flat, or quickly climb.

• The marginal cost eventually grows as the pressure on fixed assets like building size from rising variable input costs like labour increases.

Q90. Answer: (a) 130°

Shortcut Trick

Since l || m and m || n, it follows by transitivity that l || n.

The given angle 50° and the angle x° are consecutive interior angles (or related as supplementary angles) formed by a transversal intersecting parallel lines.

The sum of consecutive interior angles is always 180°.

Therefore x + 50° = 180° => x = 130°.

Therefore The correct answer is 130 °.

Alternate Method

Given: The lines l, m, and n are parallel to each other (l || m || n). A transversal intersects these lines, forming an angle of 50° with line l.

Formula Used: Consecutive Interior Angles Theorem states that when two parallel lines are intersected by a transversal, the interior angles on the same side of the transversal are supplementary (their sum is 180°).

Calculations:

=> Since l || m and m || n, then l || n.

=> When line l and line n are parallel, the angles formed by the transversal on the same side between the lines are consecutive interior angles.

=> Sum of consecutive interior angles = 180°

=> x + 50° = 180°

=> x = 180° − 50°

=> x = 130°

Therefore The correct answer is 130 °.

Additional Information

Transitivity of Parallel Lines

If two lines are each parallel to a third line, then they are parallel to each other (If l || m and m || n, then l || n).

Corresponding Angles

When two parallel lines are cut by a transversal, the corresponding angles are equal in measure.

Alternate Interior Angles

When two parallel lines are cut by a transversal, the alternate interior angles (angles on opposite sides of the transversal) are equal.

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Q91. Answer: (b) 1.5 and 1.8

Given:

0.045 + 0.154 - 0.09 + 1.5 - (0.3 × 0.8) = x - 0.231

Calculation:

=> 0.045 + 0.154 - 0.09 + 1.5 - (0.3 × 0.8) = x - 0.231

=> 0.199 + 1.41 - 0.24 = x - 0.231

=> 1.369 = x - 0.231

=> x = 1.6

Therefore The answer lies between 1.5 and 1.8

Q92. Answer: (d) 11

• The shaded part represents paediatricians and also orthopaedic surgeons but NOT physicians.

• The number representingpaediatricians and also orthopaedic surgeons but NOT physicians = 11

Hence, '11' is the correct answer.

Q93. Answer: (a) 411

Given:

[{(324 ÷ 9) ÷ 4} × 25 + 186]

Concept used:

follow the BODMAS rule as given in the table below:-

Calculation:

[{(324 ÷ 9) ÷ 4} × 25 + 186]

[{36 ÷ 4} × 25 + 186]

[9× 25 + 186]

225+186

411

Therefore, the correct answer is 411.

Q94. Answer: (d) Advocate-General of State

The correct answer is "Advocate-General of state".

Key Points

• The Union Executive grants the government the authority to enact laws covered by Articles 52 to 78 of Chapter I of Part IV.

• The Union Executive became the most significant branch of government as a result of its substantial actions.

• The President, who serves as the head of state, the Vice-President, the Prime Minister, the Council of Ministers, who oversees the Union, and the Attorney General make up India's union executive.

• The Indian Constitution grants the President executive authority, but he or she cannot act alone in using it.

• In order for the President to exercise executive authority, the Prime Minister oversees the Council of Ministers.

• Three people make up India's union executive, which develops legislation and oversees parliamentary operations.

• Some important points on Advocate-General of state are:-

• The Additional Solicitor General is placed before the Advocate General of State in the Order of Precedence.

• Only Indian citizens are granted the right to be eligible for the position of Advocate General of State; foreigners are not permitted to hold this public office.

• He has the absolute right to show up in any state court.

• He is not permitted to cast a ballot in any state legislative committees or in any sessions of the state legislature's houses. However, he is entitled to speak and take part in these procedures.

Q95. Answer: (b) 15th group and 3rd period

The correct answer is '15th group and 3rd period'.

Key Points

• The periodic table of elements is a tabular array used in chemistry to organize all chemical elements in increasing order of the number of protons in their atoms.

• The number of protons in an atom is better known as the atomic number of the element.

• The phosphorus element symbol is P.

• Its atomic number is 15.

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• Phosphorus is belong to 15th group and 3rd period in the modern periodic table.

Q96. Answer: (c) Gangasagar Mela

The correct answer is Gangasagar Mela.

Key Points

• Gangasagar Mela is the largest fair in West Bengal.
• Gangasagar Mela is held annually in January on the occasion of Makar Sankranti.
• It is held on Sagar Island at the confluence of the Ganges and Bay of Bengal.
• The fair attracts a huge number of pilgrims who come to take a holy dip in the water.
• The fair also has various stalls selling religious items, handicrafts, and food.

Additional Information

• Raas Mela is a popular fair held in Cooch Behar district of West Bengal.
• It is celebrated during the Hindu month of Kartik (October-November).
• The fair is known for its cultural programs, especially the Raas Leela dance.
• It also has various stalls selling handicrafts, food, and toys.
• Jaydev Kenduli Mela is held in Birbhum district of West Bengal.
• It is held in January on the occasion of Makar Sankranti.
• The fair is known for its Baul music and dance performances.
• It also has various stalls selling handicrafts, food, and clothes.
• Ramkeli Mela is held in Malda district of West Bengal.
• It is held in February-March.
• The fair is known for its classical music performances.
• It also has various stalls selling handicrafts, food, and clothes.

Q97. Answer: (a) Monu

The logic follows here is:

There are five friends L, M, N, O, and P each having different heights.

1) Lalit is shorter than Garima and Rekha but taller than Monu.

=> Garima / Rekha > Lalit > Monu

2) Suman is shorter than only Teena SO Teena will be the tallest among all.

=> Teena > Suman

Therefore, the final order of five friends as per their heights is as follows:

=> Teena > Suman > Garima / Rekha > Lalit > Monu

From the above arrangement, it is clear that among all the six friends Monu is the shortest one.

Hence, the correct answer is 'Monu'.

Q98. Answer: (d) Three

The correct answer is 'Three'.

Key Points

• Dobereiner's triads were groups of elements with similar properties that were identified by the German chemist Johann Wolfgang Dobereiner.
• He observed that groups of three elements (triads) could be formed in which all the elements shared similar physical and chemical properties.
• Dobereiner stated in his law of triads that the arithmetic mean of the atomic masses of the first and third element in a triad would be approximately equal to the atomic mass of the second element in that triad.
• This first triad was made up of the alkali metals lithium, sodium and potassium.
• The second triad was made up by calcium, barium and strontium.
• The third triads are made up of chlorine, bromine and iodine.

Q99. Answer: (a) $(y^2)/(x^2)$

Shortcut Trick

Simplify each bracketed term: Bracket 1 → $x^2/(x+y)$ and Bracket 2 → $x^4/(x^2-y^2)$.

Convert division to multiplication: $[x^2/(x+y)] \times [(x^2-y^2)/x^4] \times [y^2/(x-y)]$.

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

Cancel (x+y) and (x−y) from numerator and denominator.

Remaining terms: $(x^2 \times y^2) / x^4 = y^2/x^2$.

Therefore The correct answer is y^2/x^2.

Alternate Method

Given Expression: $[(x-y) + (y^2)/(x+y)] \div [x^2+y^2 + (y^4)/(x^2-y^2)] \times (y^2)/(x-y)$

Step 1: Simplify the first bracketed term.

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

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

Step 2: Simplify the second bracketed term.

$=> x^2+y^2 + y^4/(x^2-y^2) = [(x^2+y^2)(x^2-y^2) + y^4] / (x^2-y^2)$

$=> (x^4 - y^4 + y^4) / (x^2-y^2) = x^4/(x^2-y^2)$

Step 3: Substitute back into the expression and solve.

$=> [x^2/(x+y)] \div [x^4/(x^2-y^2)] \times [y^2/(x-y)]$

$=> [x^2/(x+y)] \times [(x^2-y^2)/x^4] \times [y^2/(x-y)]$

$=> [x^2/(x+y)] \times [((x+y)(x-y))/x^4] \times [y^2/(x-y)]$

$=> (x^2 \times (x+y) \times (x-y) \times y^2) / ((x+y) \times x^4 \times (x-y))$

$=> (x^2 \times y^2) / x^4 = y^2/x^2$

Therefore The correct answer is y^2/x^2.

Additional Information

Difference of Squares

The identity $a^2 - b^2 = (a - b)(a + b)$ is a fundamental algebraic tool used for factorizing expressions.

Difference of Fourth Powers

Applying the difference of squares twice: $a^4 - b^4 = (a^2 - b^2)(a^2 + b^2) = (a - b)(a + b)(a^2 + b^2)$.

Division of Fractions

To divide by a fraction, multiply by its reciprocal: $(a/b) \div (c/d) = (a/b) \times (d/c)$.

BODMAS Rule

Always follow the BODMAS (Brackets, Orders, Division, Multiplication, Addition, Subtraction) order for accurate simplification.

Q100. Answer: (a) Alluvial soils

The correct answer is "Alluvial soils".

Key Points

- The northern plains and river basins are covered in alluvial soils.
- It occupies around 40% of the nation's total land area.
- These soils primarily come from the Himalayan rubble that has been transported down.
- They can be found in the river basins and east coast deltas of the Peninsula.
- The alluvial soil ranges in colour from light grey to ash grey.
- The alluvial soil can be either clay or sandy loam in composition. Potash is abundant, but phosphorus is scarce.
- In the Upper and Middle Ganga plains, two separate alluvial soil types (Khadar and Bhangar) have grown.
- In the lower and middle Ganga plains as well as the Brahmaputra valley, these soils are more loamy and clayey.
- Wheat, maize, sugarcane, pulses, oilseeds, and other crops are primarily grown on alluvial soils.

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