RRB Group D Previous Year Paper (Held on: 18 Sept 2022 Shift 2)

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

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CBT

Q1. Calcium sulphate dihydrate is the chemical name of _____.

(a) gypsum
(b) baking powder
(c) plaster of Paris
(d) washing soda

Q2. What is the angle traced by the hour hand in 23 minutes?

(a) 13°
(b) 12°
(c) 12.5°
(d) 11.5°

Q3. Oral contraceptive pills work by stopping _____.

(a) ovulation and implantation
(b) ovulation
(c) fertilisation and implantation
(d) ovulation and fertilisation

Q4. The formation of water from hydrogen and oxygen is an example of _____.

(a) displacement reaction
(b) decomposition reaction
(c) oxidation and reduction
(d) combination reaction

Q5. A class of 30 students appeared in a test. The average score of 12 students is 80, and that of the rest is 75. What is the average score of the class?

(a) 77
(b) 87
(c) 67
(d) 56

Q6. Which of the following is the most electropositive element?

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

Q7. The Asiatic lion population largely resides in the protected park area of _____.

(a) Bhitarkanika National Park
(b) Gir National Park
(c) Balphakram National Park
(d) Anamudi Shola National Park

Q8. Study the given letter, symbol series and answer the question that follows.

L @ S O J ^ B U # W R < E M @ N U # B * H ! A & L E W % H & G A * S A # L D

How many consonants are immediately preceded by a symbol and immediately followed by a vowel?

(a) 3
(b) 5
(c) 6
(d) 4

Q9. The table given below shows the record of the number of students who got selected in the entrance exam of M.Phil. in a particular central university from five different states of India over the years. Study the table and answer the question.

Years ↓ / States →	Kashmir	Bihar	MP	Punjab	Delhi
2017	300	440	250	350	280
2018	400	400	280	400	320
2019	450	350	240	260	260
2020	500	380	400	320	400
2021	430	420	540	280	350

The number of students who got selected in 2020 from Bihar was approximately what percentage of the total number of students who got selected from Delhi for all the years together?

(a) 23.6%
(b) 15.5%
(c) 15.0%
(d) 20.5%

Q10. What will come in place of the question mark (?) in the following equation, if '+' and '-' are interchanged and also '×' and '÷' are interchanged?

8 - 13 + 18 ÷ 9 × 3 = ?

(a) 33
(b) -32
(c) -33
(d) 32

Q11. 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 /deleting /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)

(12, 51, 5)

(5, 36, 7)

(a) (11, 51, 6)
(b) (14, 120, 16)
(c) (13, 10, 7)
(d) (19, 44, 3)

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Q12. Which of the following is NOT a part of the 5 R's needed to be followed for sustainable development?

(a) Regeneration
(b) Repurpose
(c) Recycle
(d) Refuse

Q13. P, Q, R, S and T are sitting in a straight row, facing north. Neither Q nor S sit at the exact central position of the row. R is adjacent to S, while P and T are sitting at the extreme ends of the row. Who is sitting at the exact central position of the row?

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

Q14. A vendor sold 25 laptops at a profit of 12% and 15 laptops at a profit of 20%. If he had sold all the 40 laptops at a profit of 18%, his profit would have increased by Rs. 30,000. What is the cost price of each laptop, if the cost price of all the 40 laptops is the same?

(a) Rs. 27,000
(b) Rs. 28,000
(c) Rs. 26,000
(d) Rs. 25,000

Q15. Identify the FALSE statement.

(a) The sunflower is a phototrophic plant.
(b) Geotropism is demonstrated by the downward migration of roots.
(c) Hydrotropism is the tendency to grow in moist areas, i.e., the movement of roots towards high humidity.
(d) The growth of pollen tubes towards ovules is an example of geotropism

Q16. _____ is represented by the root apex's constantly dividing cells.

(a) Increase hormonal level
(b) Germination
(c) Maturation
(d) Meristematic growth

Q17. An optical device Y has positive focal length. Y is:

(a) either a concave lens or a concave mirror
(b) either a convex lens or a concave mirror
(c) either concave lens or a convex mirror
(d) either a convex lens or a convex mirror

Q18. The first and second members, respectively, of the ketone homologous series are _____.

(a) ethanone, propanone
(b) methanone, ethanone
(c) butanone, propanone
(d) propanone, butanone

Q19. Find the mode of the data 2, 2, 3, 5, 15, 15, 15, 20, 21, 23, 25, 15, 23, 25.

(a) 15
(b) 25
(c) 21
(d) 23

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Q20. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

3 : 12 :: 25 : 78 :: 21 : ?

(a) 48
(b) 66
(c) 42
(d) 63

Q21. Which of the following events takes place during diastole in the human heart?

(a) Blood enters the lungs
(b) Blood enters the ventricle
(c) Blood leaves the ventricle
(d) Blood enters the aorta

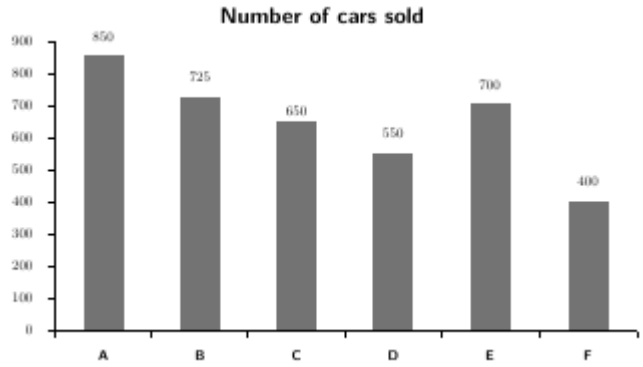
Q22. Which of the following pairs of numbers are co-primes?

(a) 34 and 35
(b) 7 and 14
(c) 12 and 18
(d) 17 and 170

Q23. The Panchayati Raj Institutions DO NOT exist in which of the following states as on June 2022?

(a) Manipur
(b) Arunachal Pradesh
(c) Nagaland
(d) Tripura

Q24. The following chart shows the numbers of cars sold by a company at its six branches named A, B, C, D, E and F. Study the chart and answer the question.



For how many branches was the sale of the cars above the average sale for all six branches?

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

Q25. In which of the following years was The Indian Official Language Act passed?

(a) 1953
(b) 1973
(c) 1963
(d) 1936

Q26. Which team won the Santosh Trophy 2021-22, the 75^(th) edition of the Football tournament?

(a) Meghalaya
(b) Karnataka
(c) Kerala

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(d) West Bengal

Q27. As per NITI Aayog National Multidimensional Poverty Index - 2021, which state is the poorest?

(a) Jharkhand
(b) Himachal Pradesh
(c) Bihar
(d) Chhattisgarh

Q28. Which of the following options is the closest approximate value which will come in place of question mark (?) in the following equation?

48.9 × 3.95 - 2.97 + 17.86 = ?

(a) 125
(b) 140
(c) 211
(d) 250

Q29. Read the given statement and conclusions carefully. Assuming that the information given in the statements is true, decide which of the given conclusions logically follow(s) from the statement.

Statement:

Cyclone Sepa is expected to make landfall by 3 p.m. today on the Balasore coast. Rough seas, heavy rain and strong winds are expected to lash Balasore from 11 a.m. onwards. Power supply in Balasore is likely to be affected from 2 p.m. to 9 p.m.

Conclusions:

I. There could be power cuts in Balasore after 3 p.m. today.

II. It would be unsafe for fishermen to venture out into the sea today, till the cyclone passes.

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

Q30. Which of the following was the guest nation at the Hyderabad Literary Festival 2022?

(a) Canada
(b) United Kingdom
(c) China
(d) Australia

Q31. How many seconds will a boy take to run one complete round around a square field of side 38 metres, if he runs at a speed of 6 km/h?

(a) 50.1
(b) 91.2
(c) 71.2
(d) 61.2

Q32. Study the given letter series and answer the question that follows.

K I O X J E T R U L E B A C K J M N

How many such vowels are there each of which is immediately followed by atleast two consonants appearing together in the above series?

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

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Q33. A man buys 15 identical articles for a total of Rs. 15. If he sells each of them for Rs. 1.23, then his profit percentage is:

(a) 23%
(b) 50%
(c) 32%
(d) 8%

Q34. Two angles are complementary. The larger angle is 6° less than thrice the measure of the smaller angle. What is the measure of the larger angle?

(a) 63°
(b) 66°
(c) 54°
(d) 57°

Q35. L, K, J, H, G, F, D and S live on eight 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 8. L lives exactly one floor above K and exactly one floor below G. Only K lives between H and L, whereas H lives exactly one floor above J. Only D lives between S and J. F lives on the 8^(th) floor, while S lives on the 1^(st)floor.

On which floor does K live?

(a) 5^(th)
(b) 4^(th)
(c) 3^(rd)
(d) 7^(th)

Q36. The area (in square units) of the triangle formed by the vertices (0, 2), (2, 3) and (3, 1) is:

(a) 2.5
(b) 5.5
(c) 3.5
(d) 4.4

Q37. The smallest natural number that must be added to 1212 to make it a perfect square is:

(a) 13
(b) 27
(c) 24
(d) 18

Q38. Select the option that is related to the fifth letter-cluster in the same way as the second letter-cluster is related to the first letter-cluster and the fourth letter-cluster is related to the third letter-cluster.

SMILE : ELIMS :: MASTE : ETSAM :: STARV : ?

(a) VRATS
(b) VRTAS
(c) SRVAT
(d) VTARS

Q39. Which of the following is the greatest number that divides 72 and 119 and leaves 3 and 4 as respective remainders?

(a) 17
(b) 23
(c) 21
(d) 19

Q40. Based on the given statement, two conclusions are drawn. Find out which conclusion is true based on the statement.

Statement: B ≥ M > G, S < G ≥ Y = L

Conclusions:

1. B > Y

2. M = L

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(a) Neither conclusion 1 nor 2 is true
(b) Only conclusion 2 is true
(c) Only conclusion 1 is true
(d) Both conclusions 1 and 2 are true

Q41. Three statements are followed by three conclusions numbered I, II and III. You have to consider these statements to be true, even if they seem to be at variance with commonly known facts, and decide which of the given conclusions logically follow/s from the given statements.

Statements:

All toys are plastics.

All plastics are disposables.

Some toys are fibres.

Conclusions:

(I) Some fibres are plastics.

(II) Some disposables are fibres.

(III) No fibre is a disposable.

(a) Only conclusions I and II follow
(b) Only conclusions II and III follow
(c) None of the conclusions follow
(d) Either conclusion I or conclusion III follows

Q42. To connect a number of resistors in parallel can be considered equivalent to:
(a) increasing length of the conductor
(b) increasing resistance of the conductor
(c) decreasing cross sectional area of the conductor
(d) increasing cross sectional area of the conductor

Q43. Safflower, shisham, khair, arjun and mulberry are the main trees of which vegetation?
(a) Tropical Deciduous Forests
(b) Montane Forests
(c) Tropical Evergreen Forests
(d) Mangrove Forests

Q44. Which Indian Badminton Player won a silver medal in the All England Badminton Championships 2022 in Birmingham?
(a) PV Sindhu
(b) Saina Nehwal
(c) Kidambi Srikanth
(d) Lakshya Sen

Q45. The fraction equivalent to 0.474747... is:
(a) 11/27
(b) 27/9
(c) 27/100
(d) 47/99

Q46. Who is the Controller General of Accounts (CGA) as on 15^(th) June 2022?
(a) Sonali Singh
(b) Girraj Prasad Gupta
(c) Soma Roy
(d) Deepak Das

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Q47. Select the correct group of scientists who are the recipients of the Shanti Swarup Bhatnagar Prize for Science and Technology, 2021.

(a) Dr. Vatsasla Thirumalai, Dr. Abhijit Mukharjee and Dr. Subi Jacob George
(b) Dr. Bushra Ateeq, Dr. Ritesh Agarwal and Dr. Surajit Dhara
(c) Dr. Amit Singh, Dr. Kanishka Biswas and Dr. Anish Ghosh
(d) Dr. Subimal Ghosh, Dr. Neena Gupta and Dr. Dhiraj Kumar

Q48. A certain number of people are sitting in a row, facing the north. Only 7 persons sit between F and U. F is at one of the extreme ends of the row. Only 9 persons sit between H and U. Only 12 persons sit between E and H. E is at the extreme right end. H is at the 19th position from the extreme left end. H is 14th from the extreme right end. If no other person is sitting in the row, what is the total number of persons seated?

(a) 33
(b) 34
(c) 31
(d) 32

Q49. How many such pairs of letters are there in the word 'CAPITAL' (in both forward and backward directions) each of which have as many letters between them in the word as there are in the English alphabetical order?

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

Q50. The sum of ages of P and Q is 15 years more than the sum of ages of Q and R. How many years younger is R as compared to P?

(a) 15
(b) 12
(c) 19
(d) 13

Q51. If 10% of 24% of x is 240, then x = ?

(a) 100000
(b) 100
(c) 10000
(d) 1000

Q52. Which of the following alphanumeric clusters will replace the question mark (?) in the series to make it logically complete?

BE 2, GJ 3, LO 5, QT 7, ?

(a) WX 6
(b) VY 6
(c) WX 7
(d) VY 11

Q53. The magnetic field due to a circular coil carrying six turns will be _____ equal to the magnetic field due to a single circular loop carrying the same current.

(a) 6 Times
(b) 2 Times
(c) 8 Times
(d) 4 Times

Q54. G, H, I, J, K and L live on six different floors of the same building. The lowermost floor in the building is numbered 6, the floor above it is numbered 5, and so on till the topmost floor is numbered 1.

J lives on an even numbered floor. G and K each live on an odd numbered floor. I lives on floor number 2. H lives on an odd numbered floor, immediately above L and immediately below I. G does not live on the topmost floor. Who lives on the lowermost floor?

(a) L
(b) G
(c) K
(d) J

Q55. In a certain code language, TRIP is written as WULS and SOME is written as VRPH. How will CLAN be written in the same language?
(a) FODR
(b) FOEQ
(c) FPDQ
(d) FODQ

Q56. Three statements are given, followed by two conclusions numbered I and II. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.
Statements:
1. Some avalanches are precipitations.
2. Some cataclysms are avalanches.
3. All avalanches are storms.
Conclusions:
I. Some storms are cataclysms.
II. No precipitation is storms.
(a) Only conclusion I follows
(b) Both conclusions I and II follow
(c) Only conclusion II follows
(d) Neither conclusion I nor II follows

Q57. Caustic soda is not commonly used in _____.
(a) Ammonia Formation
(b) Detergent Industry
(c) Textile Industry
(d) Paper and pulp industry

Q58. About 85% of the Indian population of colonial India depended on which of the following sector of the economy?
(a) Transport
(b) Agriculture
(c) Hospitality and real estate
(d) Handicraft industries

Q59. If AB = x + 3, BC = 2x and AC = 4x - 5, then for what value of 'x' does B lie on AC?
(a) 5
(b) 3
(c) 8
(d) 2

Q60. Q started from a point and walked towards the south for 42 m, then from there he turned right and walked 2 m, then he turned right again and walked 30 m, and then turned left and walked 10 m. In which direction is Q facing now?
(All turns are 90 degree turns only)
(a) East
(b) North
(c) South
(d) West

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Q61. If $x^2 + 2x + 9 = (x - 2)(x - 3)$, then the resultant equation is:

(a) a cubic equation
(b) a cubic polynomial
(c) not a quadratic equation
(d) a quadratic equation

Q62. A magnet, when moved near a coil, produces an induced current. Which of the following method(s) can be used to increase the magnitude of the induced current?

(i) Increasing the number of turns in the coil
(ii) Increasing the speed of the magnet
(iii) Increasing the resistivity of the wire of the coil

(a) Both (i) and (ii)
(b) Only (iii)
(c) Both (ii) and (iii)
(d) Only (i)

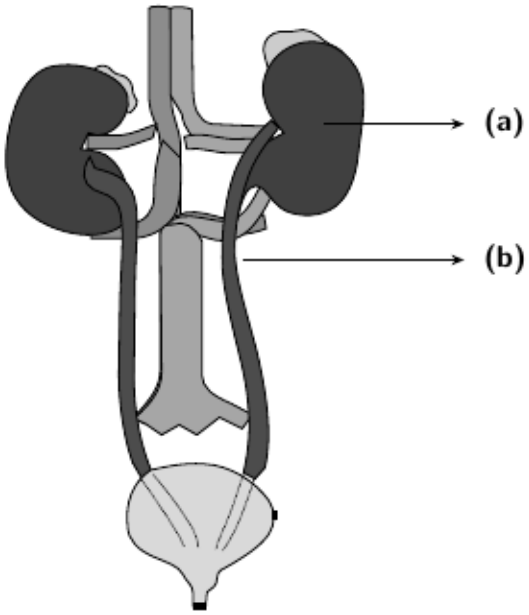
Q63. Mendeleev's Periodic Law states that _____.

(a) the properties of elements are the periodic function of their colour
(b) the properties of elements are the periodic function of their magnetic properties
(c) the properties of elements are the periodic function of their atomic numbers
(d) the properties of elements are the periodic function of their atomic masses

Q64. Vikas took a bus from a bus stop. The bus travelled 50 m towards the west. Then, it took a right turn and travelled 70 m. Then, it took a left turn and travelled 15 m. Then, it took a left turn and travelled 30 m. Then, it took a left turn and travelled 35 m. Then, it took a right turn and travelled 10 m. Finally, it took a left turn and travelled 30 m to reach the school. How far and in which direction is the bus stop from the school? (All turns are 90 degree turns only)

(a) 40 m, East
(b) 30 m, North
(c) 40 m, South
(d) 30 m, South

Q65. The diagram of the human excretory system is given below. Select the option that correctly shows the functions of parts 'a' and 'b'.



(a) a - Formation of urine, b - Throwing urine outside the body
(b) a - Collection of urine, b - Formation of urine
(c) a - Formation of urine, b - Collection of urine
(d) a - Formation of urine, b - Carrying urine for storage

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Q66. A metallic wire having resistivity ρ is cut into four equal parts. The resistivity of each part is:

(a) 4 ρ
(b) ρ/4
(c) ρ/2
(d) ρ

Q67. Find the roots of 6/x - 2/(x - 1) - 1/(x - 2) = 0.

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

Q68. Who is the Chief Election Commissioner of India as on March 2022?

(a) Rajiv Kumar
(b) KK Menon
(c) Sushil Chandra
(d) Anup Chandra Pandey

Q69. The country's first commercial-scale biomass-based hydrogen plant is coming up in which district of Madhya Pradesh?

(a) Agar Malwa
(b) Anuppur
(c) Khandwa
(d) Betul

Q70. Which of the following reactions represents symbolic combination reaction?

(a) A + B → C
(b) XY → X + Y
(c) AB + CD → AC + BD
(d) PQ + R → PR + Q

Q71. Which Article deals with protection of life and personal liberty?

(a) Article 22
(b) Article 31
(c) Article 21
(d) Article 12

Q72. In a certain code language, 'LEFT' is written as 'VGFN' and 'DESK' is written as 'MTFF'. How will 'HELP' be written in that language?

(a) RMFJ
(b) SMFJ
(c) QMFJ
(d) RNFJ

Q73. If $3x - 2y = 10$ and $xy = 11$, the value of $27x^3 - 8y^3$ is _____

(a) 3170
(b) 2980
(c) 3336
(d) 2569

Q74. Two pipes A and B can fill a cistern in 21 hours and 24 hours, respectively. The pipes are opened simultaneously and it is found that due to a leakage in the bottom it takes 48 minutes more to fill the cistern. When the cistern is full, in how much time will the leak empty it if no pipe is open during that time?

(a) 130 hours
(b) 168 hours

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(c) 144 hours
(d) 120 hours

Q75. Which of the following numbers will replace the question mark (?) in the given series?

13, 21, 33, 54, 91, ?

(a) 175
(b) 183
(c) 162
(d) 153

Q76. A statement is given, followed by four conclusions given in the options. Find out which conclusion is true based on the given statement.

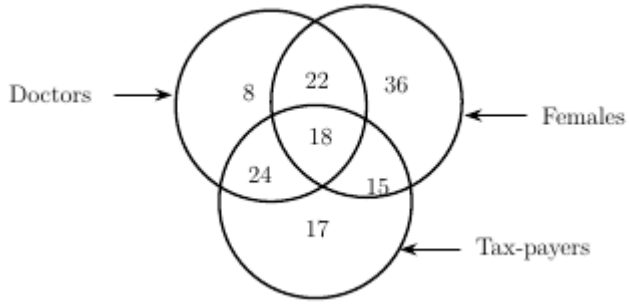
Statement: K = U = R > N > E > G < W

(a) K < N
(b) W < N
(c) K = N
(d) G < R

Q77. Two wires A and B are made of same material and have the same length but different cross-sectional areas. If the resistance of wire A is 9 times the resistance of wire B, the ratio of the radius of wire A to that of wire B is:

(a) 9 : 1
(b) 1 : 3
(c) 1 : 9
(d) 3 : 1

Q78. Study the given diagram carefully and answer the question. The numbers in different sections indicate the number of persons.



How many such females are there who are also tax-payers but NOT doctors?

(a) 40
(b) 33
(c) 15
(d) 18

Q79. Which of the following was the first city planned by Mughal Empire?

(a) Islamabad
(b) Agra
(c) Delhi
(d) Fatehpur Sikri

Q80. Which of the following established by Raja Rammohan Roy was a precursor in socio-religious reforms in Bengal?

(a) Dharma Sabha
(b) Atmiya Sabha
(c) Arya Samaj
(d) Prarthana Samaj

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Q81. How many autosomes will be present in a sexually reproducing organism with the chromosome number 2n = 18?

(a) 18
(b) 16
(c) 15
(d) 17

Q82. As of January 2022, which country has become the world's top exporter of cucumber?

(a) India
(b) China
(c) Canada
(d) America

Q83. If a + b = 56 and $(a - b)^2 = 496$, find the value of product of a and b.

(a) 760
(b) 560
(c) 660
(d) 460

Q84. The apparent position of a star keeps on changing slightly because:

(a) the physical conditions of the atmosphere keep changing
(b) the atmosphere scatters star light
(c) the atmosphere consists of a mixture of gases
(d) the physical conditions of the atmosphere are stationary

Q85. The diagonal and one side of a rectangular plot are 65 m and 63 m, respectively. What is the perimeter of the rectangular plot?

(a) 256 m
(b) 158 m
(c) 196 m
(d) 225 m

Q86. A spherical mirror forms an erect and diminished image. Identify the correct statement(s) about the spherical mirror.

(A) The mirror is concave.
(B) The mirror forms a virtual image.
(C) The mirror has positive focal length.

(a) Only A
(b) Both B and C
(c) Both A and B
(d) Only B

Q87. The rate of increase in ex-ante consumption due to a unit increment in income is called _____.

(a) marginal propensity to consume
(b) average propensity to save
(c) marginal propensity to save
(d) average propensity to consume

Q88. All the compounds of which of the following sets belongs to the same homologous series?

(a) C_4H_8, C_5H_8, C_6H_{10}
(b) C_2H_6, C_2H_4, C_2H_2
(c) C_6H_{10}, C_6H_{12}, C_6H_{14}
(d) C_3H_8, C_4H_{10}, C_5H_{12}

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Q89. A and B invest Rs. 42,000 and Rs. 56,000 respectively, in a business. At the end of the year they make a profit of Rs. 87,220. Find B's share in the profit.

(a) Rs. 47,240
(b) Rs. 48,480
(c) Rs. 45,620
(d) Rs. 49,840

Q90. Which of the following options is the closest appro×imate value which will come in place of question mark (?) in the following equation?

26.52 × 3.89 - 7.79 × 2 + 27.39 = ?

(a) 82
(b) 181
(c) 136
(d) 119

Q91. In how many years will a sum of Rs. 10,000 become Rs. 13,310 at 10% compound interest per annum, compounded annually?

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

Q92. What is the angle traced by the hour hand in 23 minutes?

(a) 13
(b) 12
(c) 12.5
(d) 11.5

Q93. Magnification produced by a lens is equal to:

(a) u/v
(b) -u/v
(c) -v/u
(d) v/u

Q94. If sec 4A = cosec (3A - 50°), where 4A and 3A are acute angles, find the value of A + 75.

(a) 105°
(b) 78°
(c) 67°
(d) 95°

Q95. What is the assistance to be given to the elderly, per person per month, after the age of 60 years, under the 'Jiyo Parsi' Scheme with effect from 22 October 2021?

(a) Rs. 20,000
(b) Rs. 15,000
(c) Rs. 10,000
(d) Rs. 25,000

Q96. Find the smallest number by which 6300 must be multiplied to make it a perfect square.

(a) 6
(b) 15
(c) 7
(d) 12

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Q97. If each interior angle of a regular polygon is 135°, then the number of sides that polygon has is:

(a) 10
(b) 12
(c) 15
(d) 8

Q98. Which of the following numbers will replace the question mark (?) in the given series?

2, 14, 70, 210, ?

(a) 630
(b) 430
(c) 410
(d) 210

Q99. Which of the following medicinal plants is the best remedy to treat blood pressure?

(a) Sarpagandha
(b) Navmallika
(c) Alukam
(d) Rajnigandha

Q100. Three of the following statements pertaining to non-biodegradable plastics indicate their implications on animals, plants and our surrounding. Choose the odd one out.

(a) Choke the drains
(b) Plastic bags are durable carry bags
(c) Can prove fatal when eaten by animals
(d) Reduce the fertility of the soil

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) gypsum

The correct answer is gypsum.

Key Points

• Gypsum is the name given to a mineral categorized as calcium sulfate mineral,

• Its chemical formula is calcium sulfate dihydrate, CaSO_(4 ? 2H2 O.)

• The purity and shape of gypsum and its components vary, but the main characteristic of this material is that the water of hydration can be powered off with controlled heating.

Additional Information

• Gypsum is used as a fluxing agent, fertilizer, filler in paper and textiles, and retarder in portland cement.

• The chemical name of baking powder is sodium hydrogencarbonate(NaHCO 3).

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• The chemical name of plaster of Paris is Calcium sulphate hemihydrate (CaSO 4 ,1/2 H 2 O).

• The chemical name of washing soda is sodium carbonate decahydrate (Na 2 CO 3 ,10H 2 O).

Q2. Answer: (d) 11.5°

The angle forms for Hour Hand:-

12 hours = 360°

1 hours = 30°

1 minute = 0.5°

The angle traced by an hour hand in 1 minute is: 0.5°

Thus, the angle traced by an hour hand in 23 minutes is 23 × 0.5° = 11.5°

Hence, the correct answer is "11.5°".

Q3. Answer: (d) ovulation and fertilisation

The correct answer is 'ovulation and fertilisation'.

Key Points Oral contraceptive pills or Hormones in birth control pills prevent pregnancy by:

• Stopping or reducing ovulation (the release of an egg from an ovary) and fertilisation.

• Thickening cervical mucus to keep sperm from entering the uterus.

• Thinning the lining of the uterus so that a fertilized egg is less likely to attach.

Additional Information There are two different types of birth control pills. Both types contain hormones that prevent pregnancy.

• Combination pills contain estrogen and progestin.

• Progestin-only pills are also called “the minipill.” They’re better for some women, such as those who are breastfeeding or have a history of blood clots and strokes and shouldn’t take estrogen.

Q4. Answer: (d) combination reaction

The correct answer is Combination Reaction.

Key Points

• The formation of water from hydrogen and oxygen is a combination reaction because hydrogen and oxygen are combined to form a single product.

• Those reactions in which two or more substances combine to form a single substance are called combination reactions.

• The reaction occurs as follows:

• 2H2 (g) + O2 (g) → 2H2O(l)

Additional Information

• Displacement reaction:

• Displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element from its compound

• The reaction occurs as follows: 2K +Mgcl2→ 2Kcl + Mg

• Decomposition reaction:

• A decomposition reaction can be defined as a chemical reaction in which one reactant breaks down into two or more products.

• The reaction occurs as follows: Nacl → Na + cl

• Oxidation:

• According to Classical or earlier concepts, oxidation is a process that involves the addition of oxygen or any electronegative element or the removal of hydrogen or any electropositive element.

• According to the electronic concept, oxidation is defined as the process in which an atom or ion loses one or more electrons.

• The reaction occurs as follows: C + O2→ CO2

• Reduction:

• According to Classical or earlier concepts, the reduction is a process that involves the addition of hydrogen or any electropositive element or the removal of oxygen or any electronegative element.

• According to electronic concept reduction is defined as the process in which an atom or ion gains one or more electrons.

• The reaction occurs as follows: N2 + 3H2 → 2NH3

Q5. Answer: (a) 77

Shortcut Trick

Ratio of students = 12 : 18 => 2 : 3

Difference in average scores = 80 − 75 = 5

Weighted deviation to be added to lower average = (2 × 5) ÷ (2 + 3) = 2

Overall average = 75 + 2 = 77

Therefore The correct answer is 77.

Alternate Method

Given:

Total students in the class = 30

Number of students in Group 1 = 12 (Average score = 80)

Number of students in Group 2 = 30 − 12 = 18 (Average score = 75)

Formula Used:

Average Score = (Total Sum of Scores) ÷ (Total Number of Students)

Calculations:

=> Total score of 12 students = 12 × 80 = 960

=> Total score of remaining 18 students = 18 × 75 = 1350

=> Total class score = 960 + 1350 = 2310

=> Class average = 2310 ÷ 30

=> Class average = 77

Therefore The correct answer is 77.

Additional Information

Weighted Average Formula

When two groups with sizes n1, n2 and averages A1, A2 are combined, the new average is (n1A1 + n2A2) ÷ (n1 + n2).

Deviation Method

Pick an assumed average (usually the lower one) and add the (net deviation ÷ total count) to it to find the actual average.

Property of Average

The combined average of two or more groups always lies between the minimum and maximum individual averages of those groups.

Q6. Answer: (b) Cs

The correct answer is 'Cs'.

Key PointsElectropositivity is the ability of elements (mainly metals) to donate electrons to form positive ions.

• Along the period, the electropositivity of the elements decreases from left to right.

• the electropositivity of the elements increase from top to bottom.

• Cesium(Cs) is present in the first group of the modern periodic and present at bottom than Na in table,

• hence, Cs is more electropositive than the other given elements.

• Electropositive Series: Cs > Na > Ca > Mg

Q7. Answer: (b) Gir National Park

The correct answer is 'Gir National Park'.

Key Points

• Asiatic lions are slightly smaller than African lions.

• At present Asiatic lions are naturally found in India only in Gir National Park and Wildlife Sanctuary.

• The Asiatic lion is a population of Panthera leo Leo that today survives in the wild only in India.

• There are only around 600 Asiatic lions left in the wild, living in the Indian state of Gujarat, Western India. The population largely live in the protected park area of the Gir Forest National Park and Sanctuary.

Q8. Answer: (c) 6

In the given statement: 'Consonants which are immediately preceded by a symbol and immediately followed by a vowel'.

Thus,

Here,

Thus, There are a total 6 pairs of the given condition:

1. @ S O

2. ^ B U

3. @ N U

4. & L E

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5. & G A

6. * S A

Hence, the correct answer is '6'.

Q9. Answer: (a) 23.6%

Given:

Number of students who got selected in the entrance exam from five different states of India over the years are as given in the table.

Formula used:

Percentage= (Total students of Delhi - Students of Bihar)/(Total students of Delhi)× 100

Calculation:

We know that,

Number of students of Bihar got selected in the year 2020 = 380

Total number of students of Delhi got selected for all the years together = 280 + 320 + 260 + 400 + 350 = 1610

Now, according to the question,

Percentage= (Students of Bihar got selected in 2020)/(Total students of Delhi)× 100; =380/1610×100; =0.236× 100; =23.6%

Thus, the number of students who got selected in 2020 from Bihar was approximately 23.6% of the total number of students who got selected from Delhi for all the years together.

Hence, the correct answer is 23.6%.

Q10. Answer: (c) -33

According to the problem,

Sign	•	•	×	÷
Means	•	•	÷	×

Given Equation: 8 - 13 + 18 ÷ 9 × 3

After interchanging '+' and '-' and also '×' and '÷'

8 +13 - 18 × 9 ÷ 3 =?

Applying BODMAS,

= 8 +13 - 18 × 9 ÷ 3

= 8 + 13 - 18 × 3

= 8 + 13 - 54

= 21 - 54

= -33

Hence, The correct answer is '-33'.

Q11. Answer: (a) (11, 51, 6)

The logic followed here is as:

Logic: (2nd number / 3 = Sum of 1st + 3rd number)

Hence The correct answer is: ''(11, 51, 6)'.

Q12. Answer: (a) Regeneration

The correct answer is Regeneration.

Key Points5 R’s of Sustainable Development are: Refuse, Reduce, Reuse, Repurpose, and Recycle.

• Refuse:

• Refusing to buy certain products can be the most effective way to minimize waste.

• You can refuse to purchase wasteful or non-recyclable products and instead buy items you can reuse multiple times.

• Some common examples are Ziplock bags and paper towels.

• Reduce:

• Reduce the use of harmful, wasteful, and non-recyclable products.

• Reducing dependency on these kinds of products can result in fewer waste materials ending up in a landfill.

• Reuse:

• Reuse items instead of buying new ones.

• Begin by focusing on one area of your life at a time.

• Repurposing:

• Repurposing or up-cycling items is the process of transforming by-products, waste materials, and useless, or unwanted products with a new purpose.

• Recycling:

• Recycling is a great option if you cannot do any of the above R's first.

• Recycling is one activity that allows everyone to do their part in bettering the environment.

Q13. Answer: (b) R

step 1) Q and S are not sitting at the exact central position. Step 2) P and T are sitting at the extreme ends of the row.

Step 3) R is adjacent to S.

Hence, 'R is sitting at the exact central position of the row.'

Thus, the correct answer is 'Option 2'.

Q14. Answer: (d) Rs. 25,000

Shortcut Trick

Weighted average profit % = [(25 × 12) + (15 × 20)] ÷ (25 + 15) = (300 + 300) ÷ 40 = 15%.

New profit % = 18%. Difference in profit % = 18% − 15% = 3%.

Given, 3% of total cost price = Rs. 30,000.

Total CP = (30,000 ÷ 3) × 100 = Rs. 1,000,000.

CP of each laptop = 1,000,000 ÷ 40 = Rs. 25,000.

Therefore The correct answer is Rs. 25,000.

Alternate Method

Let the cost price of each laptop be x.

Total laptops = 25 + 15 = 40.

=> Total CP = 40x.

=> Initial Profit = (12% of 25x) + (20% of 15x) = 3x + 3x = 6x.

=> New Profit = 18% of 40x = 7.2x.

=> Increase in Profit = 7.2x − 6x = 1.2x.

=> 1.2x = 30,000.

=> x = 30,000 ÷ 1.2 = 25,000.

Therefore The correct answer is Rs. 25,000.

Additional Information

Weighted Average Profit

When items with different profit percentages are combined, the overall profit % = (n1p1 + n2p2) ÷ (n1 + n2).

Cost Price & Profit Relation

Profit is always calculated on the Cost Price unless stated otherwise. Profit = CP × Profit%.

Q15. Answer: (d) The growth of pollen tubes towards ovules is an example of geotropism

The false statement is The growth of pollen tubes towards ovules is an example of geotropism.

Key Points

• Tropic movements can be defined as the growth moments in plants in which the direction of the external stimulus(light, heat, chemical, etc) is a factor.

• Chemotropism is a type of tropic movement in which the growth or movement of a plant or plant part is in response to a chemical stimulus.

• The growth of the pollen tube towards the ovule occurs in response to the presence of sugars in the style. Hence it is an example of chemotropism.

• So, the correct answer is 'Chemotropism'.

Q16. Answer: (d) Meristematic growth

The correct answer is 'Meristematic growth'.

Key Points

• Meristematic growth phase:

• The constant dividing phase of cells at the shoot and root apex both indicate the meristematic phase of growth.

• The cells present in the shoot and root apex are meristematic cells.

• Meristematic cells are the only cells of plants that have a tendency to divide.

• The cells present in the meristematic phase contain dense protoplasm, a large nucleus, a primary cell wall, and proplastids.

Additional Information

• Increase hormonal level:

• Plant hormones control all the growth and development activities like cell division, enlargement, flowering, seed formation, dormancy and abscission.

• Based on their action, plant hormones are categorised into two categories:

• Plant Growth Promoters - Auxins, Gibberellins, Adenine (Cytokinins)

• Plant Growth Inhibitors - carotenoids (Abscisic acid)

• Germination:

• Germination is the process by which an organism grows from a seed or spore.

• The term is applied to the sprouting of a seedling from a seed of an angiosperm or gymnosperm, the growth of a sporeling from a spore, such as the spores of fungi, ferns, bacteria, and the growth of the pollen tube from the pollen grain of a seed plant.

• Maturation:

• In this region, the cells differentiate into various tissues, Specific functionary organs ,Root hair absorbs nutrients and water from the soil.

• It anchors the roots firmly in the soil and transports water and nutrients upwards.

• Also, it produces lateral roots.

Q17. Answer: (d) either a convex lens or a convex mirror

The correct answer is 'either a convex lens or a convex mirror'.

Key Points

• Convex Mirror:

• The focal length of a convex mirror is at the right-hand side of the optical centers, so it is taken as positive.

• A convex mirror is also known as a diverging mirror as this mirror diverges light rays when they strike its reflecting surface.

• Virtual, erect, and diminished images are always formed with convex mirrors, irrespective of the distance between the object and the mirror.

• Convex lens:

• The focal length of the convex lens is at the right-hand side of the lens; hence focal length is positive.

• A convex lens is a lens that is thick at the middle and thin at the edges.

• When the incident rays are parallel to the principal axis, they converge at a point after refraction.

• This point where the parallel set of incident rays meet at a point after refraction is called the principal focus of a convex lens.

• Since the rays actually meet at focus in a convex lens, it is said to be a real focus

Hence, the convex mirror and convex lens have positive focal length.

Q18. Answer: (d) propanone, butanone

The correct answer is propanone, butanone.

Key Points

• The general structure of ketones and aldehydes are:

• H represents a hydrogen atom and R represents a hydrocarbon chain/ring.

• In ketones, the carbon atom bonded with the oxygen atom is connected to two other carbon atoms.

• In aldehydes, the carbon atom bonded with an oxygen atom is connected to one carbon atom and one hydrogen atom or both hydrogen atoms.

• To obtain the first and second members of the homologous series of ketones, R and R” should be the smallest hydrocarbon chain which is – CH3. Therefore, the first and second member of the homologous series of ketones is propanone and butanone.

Q19. Answer: (a) 15

Shortcut Trick

Mode is the observation that occurs the maximum number of times in a data set.

Count the frequency of each number in the set.

The number 15 appears 4 times, while all other numbers appear at most 2 times.

The highest frequency corresponds to 15.

Therefore The correct answer is 15.

Alternate Method

Given: Data = 2, 2, 3, 5, 15, 15, 15, 20, 21, 23, 25, 15, 23, 25

Formula: Mode = Value with the Highest Frequency

Arranging the data to count frequency:

=> Number 2: Appears 2 times

=> Number 3: Appears 1 time

=> Number 5: Appears 1 time

=> Number 15: Appears 4 times

=> Number 20: Appears 1 time

=> Number 21: Appears 1 time

=> Number 23: Appears 2 times

=> Number 25: Appears 2 times

=> Maximum frequency = 4

=> Mode = 15

Therefore The correct answer is 15.

Additional Information

Empirical Relationship

For a moderately skewed distribution, the relationship between mean, median, and mode is: Mode = 3 Median − 2 Mean.

Bimodal and Multimodal Data

If two values in a data set have the same maximum frequency, the data is bimodal. If more than two values share the max frequency, it is multimodal.

No Mode

If all observations in a data set occur only once (frequency of each is 1), the data set is said to have no mode.

Q20. Answer: (b) 66

The Logic followed here is:

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

For, 3 : 12

=> 3 × 3 + 3 = 12.

For, 25 : 78

=> 25 × 3 + 3 = 78.

Similarly, for 21 : ?

=> 21 × 3 + 3 = 66.

Hence, The correct answer is '66'.

Q21. Answer: (b) Blood enters the ventricle

The correct answer is 'Blood enters the ventricle'.

Key Points

• Cardiac Cycle:

• The cardiac cycle is defined as a sequence of alternating contraction and relaxation of the atria and ventricles in order to pump blood throughout the body.

• It starts at the beginning of one heartbeat and ends at the beginning of another.

• Each cardiac cycle has:

• a diastolic phase (also called diastole) where the heart chamber is in a state of relaxation and fills with blood that receives from the veins and enters the ventricle.

• a systolic phase (also called systole) where the heart chambers are contracting and pumps the blood towards the periphery via the arteries.

• Both the atria and the ventricles undergo alternating states of systole and diastole.

Q22. Answer: (a) 34 and 35

Shortcut Trick

Co-prime numbers are pairs of numbers where the HCF (Highest Common Factor) is 1.

Any two consecutive natural numbers are always co-prime.

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Since 34 and 35 are consecutive numbers, their HCF must be 1.

Therefore The correct answer is 34 and 35.

Alternate Method

Given: Pairs of numbers (34, 35), (7, 14), (12, 18), (17, 170).

Definition: Two numbers are co-prime if their only common factor is 1.

=> For (34, 35): Factors of 34 = 1, 2, 17, 34; Factors of 35 = 1, 5, 7, 35. Common factor = 1.

=> For (7, 14): Factors of 7 = 1, 7; Factors of 14 = 1, 2, 7, 14. Common factor = 7.

=> For (12, 18): Factors of 12 = 1, 2, 3, 4, 6, 12; Factors of 18 = 1, 2, 3, 6, 9, 18. Common factor = 6.

=> For (17, 170): 170 is divisible by 17. Common factor = 17.

Therefore The correct answer is 34 and 35.

Additional Information

Co-prime Property

Two numbers need not be prime numbers themselves to be co-prime. For example, 8 and 9 are composite but co-prime.

Consecutive Numbers

Any two consecutive integers n and n+1 always have HCF = 1 and are therefore always co-prime.

Prime Numbers

Any two distinct prime numbers are always co-prime to each other since their only common factor is 1.

Q23. Answer: (c) Nagaland

The correct answer is 'Nagaland'.

Key Points

• Panchayati Raj Institution (PRI) is a system of rural local self-government in India.

• Panchayati Raj system was added to the Indian constitution by the 73rd amendment act 1992.

• The amendment added a new part IX consisting of 16 Articles and the Eleventh Schedule to the Constitution.

• According to article 243 M of the Indian constitution, Panchayati Raj System is not applicable to certain areas.

• The system has three levels: Gram Panchayat (village level), Mandal Parishad or Block Samiti or Panchayat Samiti (block level), and Zila Parishad (district level).

• The Panchayati Raj system exists in all states except Nagaland, Meghalaya, and Mizoram, and in all Union Territories except Delhi.

Additional Information

• In 1882 Lord Rippon provided the democratic framework to local governance. This gave him the title of “father of local self-government in India”.

• Some of the important committees related to the Panchayati raj system are -

• Hanumantha Rao Committee (1983)

• G.V.K Rao committee (1985)

• L.M. Singhvi Committee (1986)

• Balwant Rai Mehta Committee (1957)

• Ashok Mehta committee (1977)

• Thungan committee (1989)

• 24 April is celebrated as National Panchayati Raj day.

• Panchayat was first introduced in Rajasthan.

• Panchayati Raj bill was passed during Narasimha Rao Government.

• The duration of the Elected panchayat is 5 years.

• Election of Panchayat-

• Before the expiry of the 5-year duration of the current panchayat.

• In case of dissolution of Panchayat before the expiry of 6 months period

Q24. Answer: (c) Four

Given:

The numbers of cars sold by a company at its six branches named A, B, C, D, E and F are as plotted in the graph.

Formula used:

Average sales of cars = Total sales of cars ÷ Total number of branches

Calculation:

We know that,

• Sales of the first branch = 850

• Sales of the second branch = 725

• Sales of the third branch = 650

• Sales of the fourth branch = 550

• Sales of the fifth branch = 700

• Sales of the sixth branch = 400

Total sales = 850 + 725 + 650 + 550 + 700 + 400 = 3875

Average of sales = 3875/6 = 645.833

Now, by comparing sales with the individual sales of branches.

We have, Four branches have sales more than average sales.

Hence, the correct answer is Four.

Q25. Answer: (c) 1963

The correct answer is '1963'.

Key-points:

• This is also known as Act No. 19 of 1963.

• This act provide for the languages which may be used for the official purpose of the union, for transaction of business in Parliament, for central and State Acts and for the certain purpose in High courts

• The provisions of section 6 and section 7 shall not apply to the states of Jammu and Kashmir.

Q26. Answer: (c) Kerala

The correct answer is 'Kerala'.

Key-points:

• The 2021-22 Santosh Trophy was the 75th edition of the Santosh Trophy, the premier competition in India for teams representing their regional and state football associations.

• The main round of the tournament was held in Malappuram, and was contested by 10 teams divided into two groups.

• Kerala beat West Bengal 5-4 in the penalty shootout.

• West Bengal has the greatest number of Santosh trophy titles.

Q27. Answer: (c) Bihar

The correct answer is ' Bihar'.

Key Points

• Bihar has emerged as India's poorest, with half of its population (51.91 percent) living in below poverty line.

• This state has a poverty rate of about 33.74 %.

• Kerala, Goa, and Sikkim have the lowest percentage of the population being multidimensionally poor.

• This base line report of the national MPI measure is based on the reference period of 2015-16 of the National Family Health Survey (NFHS).

Additional Information

• NITI Aayog National Multidimensional Poverty Index:

• Its objective is to measure poverty across its multiple dimensions .

• In effect completes existing poverty statistics based on per capita consumption expenditure.

• India's national MPI measures the globally accepted and robust methodology developed by the Oxford Poverty and Human Development Initiative (OPHI) and United Nations Development Program (UNDP) which publishes the global Multidimensional Poverty Index.

Q28. Answer: (c) 211

Given: 48.9 × 3.95 - 2.97 + 17.86

Calculation:

Using BODMAS rule,

=> 48.9 × 3.95 - 2.97 + 17.86

=> 193.155 + 17.86 - 2.97

=> 211.015 - 2.97

=> 208.045

Thus, the closest approximate value to 208.045 is 211.

Hence, '211' is the correct answer.

Q29. Answer: (c) Both conclusions I and II follow

Statement:

'Cyclone Sepa is expected to make landfall by 3 p.m. today on the Balasore coast. Rough seas, heavy rain and strong winds are expected to lash Balasore from 11 a.m. onwards. Power supply in Balasore is likely to be affected from 2 p.m. to 9 p.m.'

Conclusions:

1. There could be power cuts in Balasore after 3 p.m. today. = True (Power supply in Balasore is likely to be affected from 2 p.m. to 9 p.m.)

2. It would be unsafe for fishermen to venture out into the sea today, till the cyclone passes. = True (As cyclone Sepa is expected to make landfall and Rough seas, heavy rain and strong winds are expected to lash Balasore from 11 a.m. today.)

So, 'Both conclusions I and II follow'.

Hence, the correct answer is "Option 3".

Q30. Answer: (b) United Kingdom

The correct answer is ' United Kingdom'.

Key PointsHyderabad Literary Festival is a literary festival held in Telangana, Hyderabad.

• It is a 3-day annual event that celebrates creativity in all its forms.

• Hyderabad Literary Festival is organized by Hyderabad Literary Trust in association with the Department of Tourism, Government of Telangana, and with the support of several academic, literary, cultural organizations and publishing houses.

• The guest nation for HLF 2022 is the United Kingdom and the Indian language in focus was Punjabi.

Q31. Answer: (b) 91.2

Shortcut Trick

Perimeter of square = 4 × 38 = 152 m

Speed in m/s = 6 × (5/18) = 5/3 m/s

Time = 152 ÷ (5/3) = 152 × 3 ÷ 5 = 456 ÷ 5 = 91.2 seconds

Therefore The correct answer is 91.2 seconds.

Alternate Method

Given:

Side of the square field (a) = 38 m

Speed of the boy (v) = 6 km/h

Formula Used:

Distance (D) = Perimeter of square = 4 × side

Speed (m/s) = Speed (km/h) × (5/18)

Time (t) = Distance / Speed

Calculations:

=> Total Distance = 4 × 38 = 152 m

=> Speed in m/s = 6 × (5/18) = 5/3 m/s

=> Time = 152 / (5/3)

=> Time = (152 × 3) / 5

=> Time = 456 / 5 = 91.2 seconds

Therefore The correct answer is 91.2 seconds.

Additional Information

Unit Conversion

To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Square Properties

Perimeter = 4 × side; Area = side². All sides are equal and angles are 90°.

Speed-Distance-Time

Basic Relation: Distance = Speed × Time. Ensure all units are consistent (m and m/s or km and km/h) before calculating.

Q32. Answer: (c) 3

According to the given statement:

Vowels that are immediately followed by at least two consonants appearing together.

VOWEL → CONSONANTS → CONSONANTS

Thus only three pairs of Vowels are present in the given series which are immediately followed by at least two consonants:

1. OXJ
2. ETR
3. ACK

Hence, The correct answer is "3".

Q33. Answer: (a) 23%

Shortcut Trick

Compare the cost price and selling price of a single article.

CP of 1 article = 15 ÷ 15 = Rs. 1.

SP of 1 article = Rs. 1.23.

Profit % = (SP − CP) ÷ CP × 100.

Profit % = (1.23 − 1) ÷ 1 × 100 = 0.23 × 100 = 23%.

Therefore The correct answer is 23%.

Alternate Method

Given: Total articles = 15, Total Cost Price (CP) = Rs. 15, Selling Price (SP) per article = Rs. 1.23.

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

=> Total Cost Price (CP) of 15 articles = Rs. 15.

=> Total Selling Price (SP) of 15 articles = 15 × 1.23 = Rs. 18.45.

=> Total Profit = 18.45 − 15 = Rs. 3.45.

=> Profit Percentage = (3.45 ÷ 15) × 100.

=> Profit % = 345 ÷ 15 = 23%.

Therefore The correct answer is 23%.

Additional Information

Cost Price and Selling Price

The price at which an item is purchased is the Cost Price (CP), and the price at which it is sold is the Selling Price (SP).

Profit and Loss Percentage

Profit % or Loss % is always calculated on the Cost Price unless stated otherwise in the problem.

Q34. Answer: (b) 66°

Shortcut Trick

Sum of complementary angles = 90°.

Let the smaller angle be x.

Larger angle = 3x − 6.

Total sum: x + (3x − 6) = 90°

=> 4x = 96° => x = 24°.

Larger angle = 90° − 24° = 66°.

Therefore The correct answer is 66°.

Alternate Method

Given:

Sum of two angles = 90° (Complementary)

Larger angle (L) = 3 × Smaller angle (S) − 6°

Formula Used:

angle 1 + angle 2 = 90°

Calculations:

Let the smaller angle be S.

According to the question, the larger angle L = 3S − 6.

Since they are complementary:

=> S + L = 90
=> S + (3S − 6) = 90
=> 4S − 6 = 90
=> 4S = 96
=> S = 24°
Now, find the larger angle:
=> L = 3 × 24 − 6
=> L = 72 − 6
=> L = 66°
Therefore The correct answer is 66°.
Additional Information
Complementary Angles
Two angles are called complementary if the sum of their measures is exactly 90°.
Supplementary Angles
Two angles are called supplementary if the sum of their measures is exactly 180°.
Linear Pair
A pair of adjacent angles formed by intersecting lines, which are always supplementary (sum = 180°).

Q35. Answer: (a) 5^(th)

Given:
• L, K, J, H, G, F, D and S live on eight 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 8
Solution step by steps:
(1.) L lives exactly one floor above K and exactly one floor below G..Thus floor block look like-
(2.) Only K lives between H and L.
(3) H lives exactly one floor above J.
(4.) Only D lives between S and J.
(5.) F lives on the 8th floor, while S lives on the 1st floor.
(6.) now, clear that one which lives on which floor of building as like-
Thus, K lives on the 5th floor.
Hence, the correct answer is Option (1).

Q36. Answer: (a) 2.5

Shortcut Trick
Shift one vertex to the origin (0, 0) by subtracting (0, 2) from all vertices.
(0, 2) → (0, 0)
(2, 3) → (2 − 0, 3 − 2) = (2, 1)
(3, 1) → (3 − 0, 1 − 2) = (3, −1)
Area = 1/2 |x1y2 − x2y1| = 1/2 |(2 × −1) − (3 × 1)| = 1/2 |−2 − 3| = 2.5
Therefore The correct answer is 2.5 square units.
Alternate Method
Given: Vertices of the triangle are A(0, 2), B(2, 3), and C(3, 1).
Formula Used: Area of triangle = 1/2 |x1(y2 − y3) + x2(y3 − y1) + x3(y1 − y2)|
Calculations:
=> x1 = 0, y1 = 2
=> x2 = 2, y2 = 3
=> x3 = 3, y3 = 1
=> Area = 1/2 |0(3 − 1) + 2(1 − 2) + 3(2 − 3)|
=> Area = 1/2 |0(2) + 2(−1) + 3(−1)|
=> Area = 1/2 |0 − 2 − 3|
=> Area = 1/2 |−5|
=> Area = 2.5 square units

Therefore The correct answer is 2.5 square units.

Additional Information

Collinearity

Q37. Answer: (a) 13

Shortcut Trick

Identify the nearest perfect square greater than 1212.

We know $30^2 = 900$ and $40^2 = 1600$. Checking numbers in between:

$34^2 = 1156$ and $35^2 = 1225$.

The smallest natural number to be added = 1225 − 1212 = 13.

Therefore The correct answer is 13.

Alternate Method

Given: The number is 1212.

Formula Used: Long division method for square roots.

=> Grouping 1212 from right: (12)(12).

=> Nearest square to 12 is $3^2 = 9$. Remainder is 3.

=> Bring down next pair 12: number becomes 312.

=> Double the divisor 3 to get 6. Find 'x' such that $6x \times x > 312$.

=> If x = 4, 64 × 4 = 256 (less than 312).

=> If x = 5, 65 × 5 = 325 (greater than 312).

=> Number to be added = 325 − 312 = 13.

Therefore The correct answer is 13.

Additional Information

Perfect Square Properties

A perfect square never ends with the digits 2, 3, 7, or 8 in the unit place.

Adding vs Subtracting

To find what must be added, take the next higher square $(n+1)^2$ − Number. To find what must be subtracted, take Number − n^2.

Unit Digit Rule

If a number ends in 5, its square ends in 25. For example, 35^2 = (3 × 4) followed by 25 = 1225.

Q38. Answer: (a) VRATS

The logic followed here is: The second letter cluster and fourth letter cluster are the inverses of the first and third letter cluster respectively.

Thus, the correct pattern is STRAV : VARTS.

Hence, the correct answer is Option (1).

Q39. Answer: (b) 23

Shortcut Trick

Subtract the remainders from the given numbers to find the numbers that are exactly divisible.

72 − 3 = 69

119 − 4 = 115

Find the HCF of 69 and 115: 69 = 23 × 3 and 115 = 23 × 5.

Common factor is 23.

Therefore The correct answer is 23.

Alternate Method

Given: Numbers are 72 and 119; Remainders are 3 and 4 respectively.

Formula Used: Required Number = HCF((Number1 − Remainder1), (Number2 − Remainder2))

=> First number = 72 − 3 = 69

=> Second number = 119 − 4 = 115

=> Prime factors of 69 = 3 × 23

=> Prime factors of 115 = 5 × 23

=> Highest Common Factor (HCF) = 23

Therefore The correct answer is 23.

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Additional Information

HCF of Numbers leaving same remainder

To find the greatest number that divides x, y, and z leaving the same remainder r, find HCF(x−r, y−r, z−r).

LCM and Remainder

To find the smallest number divisible by x, y, and z leaving remainder r in each case, the value is LCM(x, y, z) + r.

Greatest Number for same unknown remainder

If the remainder is same but not given, the required number is HCF(|x−y|, |y−z|, |z−x|).

Q40. Answer: (c) Only conclusion 1 is true

Given statement: B ≥ M > G, S < G ≥ Y = L

According to the given information:

B is greater or equal to M, M is greater than G, G is Greater than S, And Greater or equal to Y, Y is equal to L.

Conclusions:

i) B > Y => True (B ≥ M > G ≥ Y thus, B > Y)

ii) M = L => False (M > G ≥ Y = L, thus, M > L)

So, Only Conclusion 1 is True.

Hence, the correct answer is "Option 3".

Q41. Answer: (a) Only conclusions I and II follow

The least possible Venn diagram of the given statements is:

1. Some Fibres are Plastic = True (As all Toys are Plastic and Some toys are Fibres, Thus Some Fibres are also Plastic)

2. Some disposables are Fibres = True (As All toys are plastics. All plastics are disposables, and some Toys are Fibres, Thus Some disposables are Fibres)

3. No Fibre is disposable = False (As Some disposables are fibres means Some Fibres are also disposable)

Hence*,* Only conclusions I and II follow the correct answer.

Q42. Answer: (d) increasing cross sectional area of the conductor

The correct answer is 'increasing cross sectional area of the conductor'.

Key Points

• When resistors are connected in parallel, equivalent resistance is less than each individual resistance.

• The resistance of the conductor is always inversely proportional to the cross-section area of conductor.

R α1/A

• In parallel circuit, the resultant value of connected resistor which will be smaller than any of connected resistor.

• Hence, equivalent resistance become less than smallest resistance in parallel circuit. As resultant cross-sectional area of the conductor increases w.r.t equivalent resistance.

Q43. Answer: (a) Tropical Deciduous Forests

The correct answer 'Tropical Deciduous Forests.'

Key Points

• Tropical Deciduous Forests-

• They are called monsoon forests.

• Rainfall is in the range the range of 70-200 cm.

• A long dry season followed by heavy rainfall season is a feature of the regions where these forests are found.

• There are two types of Deciduous Forests:

1. 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.

• vegetation-Teak, Sal, Shisham, Hurra, Mahua, Amla, Semul, Kusum, Sandalwood, khair, arjun, mulberry.

• Major states where tropical deciduous forests are found:

1. Madhya Pradesh

• Uttar Pradesh

• Chattisgarh

• Odisha

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• Maharashtra (Some Parts)

Additional Information

• Montane Forests-

• Montane ecosystems refer to any ecosystem found in mountains.

• Dense forests are common in areas of moderate elevations.

• At higher elevations, the climate is harsher, with lower temperatures and higher winds, preventing the growth of trees and causing the plant community to transition to montane grasslands, shrublands or alpine tundra.

• Some significant trees of a montane temperate forest are rhododendrons, ferns, oak, maple, juniper, deodar, chilgoza, etc.

• Tropical evergreen forests:

• Tropical evergreen forests of India are found in the Andaman and Nicobar Islands, the Western Ghats, which fringe the Arabian Sea, the coastline of peninsular India, and the greater Assam region in the north-east.

• Small remnants of evergreen forest are found in Odisha state.

• Species-Ebony, Mahogany, Rosewood and Rubber Chinchona.

• The tropical wet evergreen forest in India is usually found in areas receiving more than 200 cm of rainfall and having a temperature of 15-30 degrees Celsius.

• They occupy about 7% of the earth's surface.

• They are found mostly near the equator.

• Mangrove forests-

• They represent the littoral forest ecosystem.

• Low lying areas of tropical and subtropical regions (Between 24 degrees North and 38 degrees South) are home to Mangroves

• They are also called Halophytes – They are salt-tolerant.

• The trees that grow in Mangrove Forests are generally 8-20 meters high. These trees have thick leaves.

• They are confined to tropical and subtropical regions as they need high solar radiation to filter saline water through their roots.

Q44. Answer: (d) Lakshya Sen

The correct answer is ' Lakshya Sen '

Key-points:

• The 2022 All England Open (officially known as the Yonex All England Open Badminton Championships 2022 for sponsorship reasons) was a badminton tournament that took place at Utilita Arena Birmingham in Birmingham, England, from 16 to 20 March 2022 and had a total prize pool of $990,000.

• This tournament took place at Utilita Arena Birmingham in Birmingham, England.

• Lakshya Sen went down to world No. 1 Viktor Axelsen in the final but became the first Indian men's player in 21 years to win a silver medal at the All England Open Badminton Championships 2022 on Sunday.

Q45. Answer: (d) 47/99

Given:

The Number is 0.474747

Calculation:

Let x = 0.474747.... -----(1)

Here, the number of repeating digits = 2. So we have to multiply 100 on both sides.

100x = 47.4747.... -------(2)

Subtracting equations (2) from (1), we get,

100x - x = (47.4747...) - (0.4747...)

99x = 47

x = 47/99

Hence, the fraction equal to 0.474747... is 47/99.

Q46. Answer: (a) Sonali Singh

The correct answer is ' Sonali Singh'.

Key-points:

• The Government of India has appointed Sonali Singh to hold the additional charge of the Controller General of Accounts (CGA), under the Department of Expenditure, Ministry of Finance, with effect from February 01, 2022.

• She has been appointed in place of Dipak Dash, who superannuated on January 31, 2022.

• Sonali Singh is a 1987 batch officer of the Indian Civil Accounts Service (ICAS).

• She is serving as the Additional Controller General of Accounts since October 2019.

• Prior to that, she had also served as Additional Secretary at Central Vigilance Commission.

Additional information:

• Controller General of Accounts (CGA)

• The Office of CGA prepares monthly and annual analysis of expenditure, revenues, borrowings and various fiscal indicators for the Union Government. Under Article 150 of the Constitution.

• The Controller General of Accounts (CGA), in the Department of Expenditure, Ministry of Finance, is the Principal Accounting Adviser to Government of India and is responsible for establishing and maintaining a technically sound Management Accounting System.

• The Annual Appropriation Accounts (Civil) and Union Finance Accounts are submitted to Parliament on the advice of Comptroller and Auditor General of India.

• Along with these documents, an M.I.S Report titled 'Accounts at a Glance' is prepared and circulated to Hon'ble Members of Parliament.

Q47. Answer: (c) Dr. Amit Singh, Dr. Kanishka Biswas and Dr. Anish Ghosh

The correct answer is 'Dr. Amit Singh, Dr. Kanishka Biswas and Dr. Anish Ghosh'.

Key-points:

• The Shanti Swarup Bhatnagar Prize for Science and Technology (SSB) is a science award in India given annually by the Council of Scientific and Industrial Research (CSIR) for notable and outstanding research, applied or fundamental, in biology, chemistry, environmental science, engineering, mathematics, medicine, and physics.

• The prize recognizes outstanding Indian work (according to the view of CSIR awarding committee) in science and technology.

• It is the most coveted award in multidisciplinary science in India.

• The award is named after the founder Director of the Council of Scientific & Industrial Research, Shanti Swarup Bhatnagar.

• It was first awarded in 1958.

• Any citizen of India engaged in research in any field of science and technology up to the age of 45 years is eligible for the prize.

• The prize is awarded on the basis of contributions made through work done in India only during the five years preceding the year of the prize.

• recipients of the Shanti Swarup Bhatnagar Prize for Science and Technology, 2021.

• For Biological Sciences, Dr Amit Singh, department of microbiology and cell biology, Indian Institute of Science, Bengaluru.

• In chemical sciences, two researchers from the Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, Dr Kanishka Biswas from the International Centre of Materials Science.

• In the mathematical sciences category, Dr Anish Ghosh, school of mathematics, Tata Institute of Fundamental Research, Mumbai.

Q48. Answer: (d) 32

Given:

• A certain number of people are sitting in a row, facing the north.

• Only 7 persons sit between F and U. F is at one of the extreme ends of the row.

• Only 9 persons sit between H and U.

• Only 12 persons sit between E and H.

• E is at the extreme right end. H is at the 19th position from the extreme left end. H is 14th from the extreme right end.

Hence, there are "32" persons that are sitting in a row.

Q49. Answer: (a) 2

The positions of letters according to the English alphabet series:

The word can be represented as follows,

Clearly, we can see that 2 such pairs are there,IL and LP.

Hence, the correct answer is Option (1).

Q50. Answer: (a) 15

Shortcut Trick

Common person Q appears on both sides of the age sum equation.

Difference between (P + Q) and (Q + R) is simply the difference between P and R.

Net difference = 15 years.

Therefore The correct answer is 15 years.

Alternate Method

Given:

Sum of ages of P and Q = (Sum of ages of Q and R) + 15

Calculations:

=> Let the ages of P, Q, and R be P, Q, and R years respectively.

=> According to the question: P + Q = (Q + R) + 15

=> P + Q − Q − R = 15

=> P − R = 15

=> This implies P is 15 years older than R, or R is 15 years younger than P.

Therefore The correct answer is 15 years.

Additional Information

Linear Equations in Ages

When a common variable exists on both sides of an addition equation, it cancels out, leaving the direct difference between the other two variables.

Age Difference Invariance

The difference between the ages of two people remains constant regardless of the number of years passed or the current sum with a third person.

Q51. Answer: (c) 10000

Given: 10% of 24% of x = 240

Calculation:

=> 10/100 ×24/100× x=240

=> x= (240 × 100× 100)/10×24

Therefore x = 10000

Q52. Answer: (d) VY 11

The pattern followed here is,

So, VY 11 will be next in the series.

Hence, the correct answer is "Option 4".

Q53. Answer: (a) 6 Times

The solution is in Hindi. Read it online.

Q54. Answer: (d) J

Given:

• G, H, I, J, K and L live on six different floors of the same building. The lowermost floor in the building is numbered 6, the floor above it is numbered 5, and so on till the topmost floor is numbered 1.

• I lives on floor number 2. H lives on an odd numbered floor, immediately above L and immediately below I.

• J lives on an even numbered floor.

• G and K each live on an odd numbered floor.G does not live on the topmost floor.

So, J lives on the lowermost floor.

Therefore, the correct answer is option 4.

Q55. Answer: (d) FODQ

The logic followed here is,

• TRIP is coded as WULS.

• SOME is coded as VRPH.

• Similarly, for CLAN:

So, 'CLEAN' will be coded as 'FODQ'.

Hence, the correct answer is "Option 4".

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Q56. Answer: (a) Only conclusion I follows

Statements:

1. Some avalanches are precipitations.

2. Some cataclysms are avalanches.

3. All avalanches are storms.

Venn diagram:

Conclusions:

I. Some storms are cataclysms → True (Because all avalanches are storms and some cataclysms are avalanches which implies that some storms are cataclysms).

II. No precipitation is storms → False (Because some Avalanches are precipitation which implies that some precipitations are Storms).

So, “Only conclusion I follow”.

Hence, the correct answer is "Option 1".

Q57. Answer: (a) Ammonia Formation

The solution is in Hindi. Read it online.

Q58. Answer: (b) Agriculture

The correct answer is 'Agriculture'.

Key Points Agriculture-

• During the British rule also the Indian economy remained agrarian.

• Rough estimates claim that about 85% of the economy derived their livelihood directly or indirectly from agriculture.

• Though, unlike the pre-colonial India, the feature of self-sufficiency vanished in the colonial state.

Additional Information

• Handicraft and transportation

• During British rule, the handicrafts industries in India declined.

• These handicrafts were very famous throughout the world.

• These traditional handicrafts got set back during the colonial rule.

• The main reasons for the decline was introduction of British made goods and ignorance of Indian Handicrafts Industries.

• The manufacturing and service sectors accounted for only 10% and 15-20%, respectively.

Q59. Answer: (c) 8

Shortcut Trick

For point B to lie on the line segment AC, the sum of the individual segments must equal the total length: AB + BC = AC.

$(x + 3) + 2x = 4x - 5$

$3x + 3 = 4x - 5$

$x = 8$

Therefore The correct answer is 8.

Alternate Method

Given:

Length of AB = x + 3

Length of BC = 2x

Length of AC = 4x − 5

Formula Used:

According to the Segment Addition Postulate, if point B lies on the segment AC, then the sum of the lengths of AB and BC is equal to the length of AC.

AB + BC = AC

Calculations:

=> $(x + 3) + 2x = 4x - 5$

=> $3x + 3 = 4x - 5$

=> $4x - 3x = 3 + 5$

=> $x = 8$

Therefore The correct answer is 8.

Additional Information

Collinearity of Points

Three points are collinear if they lie on the same straight line. For three collinear points A, B, and C, B lies between A and C if and only if AB + BC = AC.

Segment Addition Postulate

This fundamental principle in geometry states that given two points A and C, a third point B lies on the line segment AC if the distances satisfy the equation AB + BC = AC.

Linear Equations

Solving for a variable involves isolating the variable on one side of the equation by performing inverse operations (addition, subtraction, multiplication, or division).

Q60. Answer: (d) West

Drawing the diagram according to the given information,

• Q started from a point and walked towards the south for 42 m.

• Then he turned right and walked 2 m.

• Then he turned right again and walked 30 m.

• Then turned left and walked 10 m.

Here, Q is facing in the 'West' direction.

Hence, the correct answer is "Option 4".

Q61. Answer: (c) not a quadratic equation

Shortcut Trick

Identify the highest power of x on both sides of the equation.

LHS has x^2 and RHS expansion $(x - 2)(x - 3)$ also results in x^2.

Since the coefficients of x^2 are the same (1) on both sides, they cancel each other out.

The resulting equation will have a degree of 1 (linear), meaning it is no longer quadratic.

Therefore The correct answer is not a quadratic equation.

Alternate Method

Given: $x^2 + 2x + 9 = (x - 2)(x - 3)$

Formula Used: $(x - a)(x - b) = x^2 - (a + b)x + ab$

$\Rightarrow x^2 + 2x + 9 = x(x - 3) - 2(x - 3)$

$\Rightarrow x^2 + 2x + 9 = x^2 - 3x - 2x + 6$

$\Rightarrow x^2 + 2x + 9 = x^2 - 5x + 6$

$\Rightarrow x^2 - x^2 + 2x + 5x + 9 - 6 = 0$

$\Rightarrow 7x + 3 = 0$

The highest power (degree) of the variable x in the final equation $7x + 3 = 0$ is 1. For an equation to be a quadratic equation, its degree must be exactly 2.

Therefore The correct answer is not a quadratic equation.

Additional Information

Quadratic Equation

An equation of the form $ax^2 + bx + c = 0$, where a, b, and c are real numbers and $a \neq 0$.

Linear Equation

An equation in which the highest power of the variable is 1. It represents a straight line on a graph.

Degree of a Polynomial

The degree is the greatest exponent of the variable in the polynomial. Degree 2 is quadratic, degree 3 is cubic.

Identity vs Equation

An identity is true for all values of the variable, while an equation is true only for specific values (roots).

Q62. Answer: (a) Both (i) and (ii)

The correct answer is 'Both (i) and (ii)'.

Key PointsThe magnitude of the induced current can be increased by:

• Taking the conductor in the form of a coil of many turns of insulated wire.

• Increasing the strength of the magnetic field used.

• Increasing the rate of change of magnetic flux associated with the coil corelated with speed of the magnet.

Q63. Answer: (d) the properties of elements are the periodic function of their atomic masses

The correct answer is 'the properties of elements are the periodic function of their atomic masses'.

Key PointsMendeleev's periodic law:

• Mendeleev's periodic law states that the physical and chemical properties of elements are a periodic function of their atomic masses.

• According to Mendeleev periodic physical and chemical properties of elements depend on their atomic masses such that on arranging elements in increasing order of atomic weight, elements with similar properties are repeated after regular intervals of increasing atomic masses.

Additional Information

• Modern Periodic Law:

• “The physical and chemical properties of the elements are periodic functions of their atomic numbers”.

• The atomic number is equal to the number of electrons or protons in a neutral atom.

• It is given by the english physicist, Henry Moseley.

• Features of Modern Periodic Table:

• There are eighteen vertical columns known as groups in the modern periodic table which are arranged from left to right and seven horizontal rows which are known as periods.

• The elements of group 1, 2, 13, 14, 15, 16, and 17 are known as the main group elements or normal elements.

• The elements of groups 3, 4, 5, 6, 7, 8, 9, 11, and 12 are known as the transition elements.

• Group 18 is called noble gases or inert gases.

Q64. Answer: (d) 30 m, South

Drawing the diagram according to the given information,

• Vikas took a bus from a bus stop. The bus traveled 50 m towards the west.

• Then, it took a right turn and traveled 70 m.

• Then, it took a left turn and traveled 15 m.

• Then, it took a left turn and traveled 30 m.

• Then, it took a left turn and traveled 35 m.

• Then, it took a right turn and traveled 10 m.

• Finally, it took a left turn and traveled 30 m to reach the school.

The bus stop is '30 m in the South' from the school.

Hence, the correct answer is "Option 4".

Q65. Answer: (d) a - Formation of urine, b - Carrying urine for storage

The correct answer is 'a - Formation of urine, b - Carrying urine for storage'.

Key Points

The kidneys are considered as the most vital organs of the human body.

• kidney:

• Kidneys are bean-shaped structures located on either side of the backbone and are protected by the ribs and muscles of the back.

• Each human adult kidney has a length of 10-12 cm, a width of 5-7 cm and weighs around 120- 170g.

• The blood vessels, ureter and nerves enter the kidneys through the hilum, which is a tilted at the inner concave surface of the kidney.

• The excretory product come out as Urine. Thus responsible for formation of urine.

• Ureter:

• A pair of thin muscular tubes called the ureter comes out of each kidney extending from the renal pelvis.

• It carries urine from the kidney to the urinary bladder.

• Urine formed in each kidney passes and collection through the ureter.

• Urinary Bladder:

• It is a muscular sac-like structure, which stores urine.

• The urinary bladder is emptied by the process of micturition, i.e. the act of urination.

• Urethra:

• This tube arises from the urinary bladder and helps to expel urine out of the body. In males, it acts as the common route for sperms and urine. Its opening is guarded by sphincter muscles.

• Urine flows into the bladder before finally being excreted through the urethra.

Q66. Answer: (d) ρ

The correct answer is ρ.

Key Points

• A wire of length l having resistivity ρ cut into four equal parts of its length, then the resistivity of the wire is ρ.

• If we cut the wire into four equal parts then the length of the wire will be changed but the resistivity of the wire will remain the same.

• Because resistivity depends upon the material of the wire.

• But, resistivity depends on temperature.

Additional Information

• Resistivity:

• Resistivity is a measure of the resistance of a given size of a specific material to electrical conduction.

• The resistivity is a figure that enables comparisons of the way in which different materials allow or resist current flow.

• The SI unit of electrical resistivity is the ohm metre (Ωm).

• It is commonly represented by the Greek letter ρ, rho.

Important Points

• Resistance:

• It is a property that resists the flow of electrons in a conductor. It controls the magnitude of the current. The SI unit of resistance is the ohm (Ω).

• The resistance of a conductor depends directly on its length, inversely on its area of cross-section and also on the material of the conductor.

• Ohm's law:

• The potential difference across the ends of a resistor is directly proportional to the current through it, provided its temperature remains the same.

Q67. Answer: (d) 4/3 and 3

Shortcut Trick

The substitution method is the fastest way to identify the correct roots by testing values from the given options.

Test x = 3: 6/3 − 2/(3 − 1) − 1/(3 − 2) => 2 − 2/2 − 1/1 = 2 − 1 − 1 = 0. (Satisfied)

Test x = 4/3: 6/(4/3) − 2/(4/3 − 1) − 1/(4/3 − 2) => 18/4 − 2/(1/3) − 1/(−2/3) = 4.5 − 6 + 1.5 = 0. (Satisfied)

Since both values satisfy the equation, they are the required roots.

Therefore The correct answer is 4/3 and 3.

Alternate Method

Given Equation: 6/x − 2/(x − 1) − 1/(x − 2) = 0

Multiply the entire equation by the Least Common Multiple (LCM) of the denominators: x(x − 1)(x − 2).

=> 6(x − 1)(x − 2) − 2x(x − 2) − x(x − 1) = 0

=> 6(x2 − 3x + 2) − (2x2 − 4x) − (x2 − x) = 0

=> 6x2 − 18x + 12 − 2x2 + 4x − x2 + x = 0

=> (6 − 2 − 1)x2 + (−18 + 4 + 1)x + 12 = 0

=> 3x2 − 13x + 12 = 0

Now, solve this quadratic equation using the factorization method (splitting the middle term):

=> 3x2 − 9x − 4x + 12 = 0

=> 3x(x − 3) − 4(x − 3) = 0

=> (3x − 4)(x − 3) = 0

=> 3x − 4 = 0 or x − 3 = 0

=> x = 4/3 or x = 3

Therefore The correct answer is 4/3 and 3.

Additional Information

Quadratic Formula

The roots of any quadratic equation ax2 + bx + c = 0 can be found using the formula x = [−b ± √(b2 − 4ac)] / 2a.

Nature of Roots

The value D = b2 − 4ac is called the Discriminant. If D > 0 and a perfect square, roots are real, rational, and unequal.

Sum and Product of Roots

For the equation ax2 + bx + c = 0, the sum of the roots is −b/a and the product of the roots is c/a.

Q68. Answer: (c) Sushil Chandra

The correct answer is 'Sushil Chandra'.

Key PointsThe Chief Election Commissioner of India heads the Election Commission of India, a body constitutionally empowered to conduct free and fair elections to the national and state legislatures and of President and Vice-President.

• This power of the Election Commission of India is derived from the Article 324 of the Constitution of India.

• Chief Election Commissioner of India is usually a member of the Indian Civil Service and mostly from the Indian Administrative Service.

• It is very difficult to remove the authority of the Chief Election Commissioner once appointed by the president, as two-thirds of the Lok Sabha and the Rajya Sabha need to present and vote against him for disorderly conduct or improper actions.

• Sushil Chandra is the Chief Election Commissioner of India as on March 2022.

Q69. Answer: (c) Khandwa

The correct answer is 'Khandwa'.

Key Points

• The country's first commercial-scale biomass-based hydrogen plant is coming up in the Khandwa district of Madhya Pradesh.

• The plant will produce a tonne of hydrogen per day, from 30 tonnes of biomass feedstock.

• The plant is being put up by a joint venture of Watomo Energies Ltd and Biezel Green Energy with an investment of Rs. 24 crore.

• The company owns the technology for a ‘thermally accelerated anerobic digestion (TAD) reactor’ that can produce hydrogen, methane and biochar from biomass.

• Watomo Energies, headquartered in Mirzapur, Uttar Pradesh.

• Biezel Green is the technology partner.

• Biezel Green is a company promoted by Prof Preetam Singh, who teaches at the IIT BHU.

Q70. Answer: (a) A + B → C

The Correct answer is 'A + B → C'.

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 → C.

• Combination reaction is when two or more elements combine to form a compound.

Additional Information

• General forms of representation of different reactions are as follows:

• | Reaction | General formula |

Combination Reaction	**A + B → C**
Decomposition Reaction	AB → A + B
Displacement Reaction	AB + CD → AC + BD
Displacement Reaction	AB + C → AC + B

Q71. Answer: (c) Article 21

The correct answer is Article 21.

Key PointsArticle 21:

• According to Article 21, no person shall be deprived of his life or personal liberty except according to the procedure established by law.

• The Supreme Court reiterated in the Menaka Gandhi v. Union of India case, that the Right to Life and Liberty cannot be deprived merely based on the procedure established by law.

• It can not be suspended even during a National emergency.

• It is available to both citizens and non-citizens but not to enemy aliens.

Additional InformationImportant Rights included under Article 21:

• Right to privacy
• Right to education
• Right to go abroad
• Right to shelter
• Right to pollution-free water and air
• Right against public hanging
• Right against custodial death
• Right against handcuffing
• Right to health
• Right to food

Q72. Answer: (a) RMFJ

The logic followed here is,

• LEFT is coded as VGFN.
• DESK is coded as MTFF.
• HELP is coded as,

So, 'HELP' will be written as 'RMJF'.

Hence, the correct answer is "Option 1".

Q73. Answer: (b) 2980

Shortcut Trick

Identify the expression as a difference of cubes: $27x^3 - 8y^3 = (3x)^3 - (2y)^3$.

Use the direct expansion: $(a - b)^3 + 3ab(a - b)$.

Substitute a = 3x, b = 2y, and ab = 6xy.

Value = $10^3 + 3(6 \times 11)(10) = 1000 + 1980 = 2980$.

Therefore The correct answer is 2980.

Alternate Method

Given:

$3x - 2y = 10$

$xy = 11$

Formula Used:

$(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

Rearranging for $a^3 - b^3$:

$a^3 - b^3 = (a - b)^3 + 3ab(a - b)$

Calculations:

Let a = 3x and b = 2y.

=> $a - b = 3x - 2y = 10$

=> $ab = (3x)(2y) = 6xy$

Substitute xy = 11 into the product term:

=> $ab = 6 \times 11 = 66$

Now, substitute values into the identity for $27x^3 - 8y^3$:

=> $27x^3 - 8y^3 = (3x - 2y)^3 + 3(3x)(2y)(3x - 2y)$

=> $27x^3 - 8y^3 = (10)^3 + 3(6xy)(10)$

=> $27x^3 - 8y^3 = 1000 + 3(66)(10)$

=> $27x^3 - 8y^3 = 1000 + 1980$

=> $27x^3 - 8y^3 = 2980$

Therefore The correct answer is 2980.

Additional Information

Difference of Cubes

The factorized form is $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

Sum of Cubes

The expansion for the sum of two cubes is $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$.

Perfect Cube Identity

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$, which is used to derive the shortcut formula.

Q74. Answer: (b) 168 hours

Shortcut Trick

Total Work (LCM of 21, 24) = 168 units.

Efficiency of A = 8, B = 7. Combined Efficiency = 15.

Ideal filling time = 168 ÷ 15 = 11.2 hours = 11 hours 12 minutes.

Actual time with leak = 11 hours 12 minutes + 48 minutes = 12 hours.

Combined efficiency with leak = 168 ÷ 12 = 14. Leak efficiency = 15 − 14 = 1.

Time for leak to empty = 168 ÷ 1 = 168 hours.

Therefore The correct answer is 168 hr.

Alternate Method

Given: Pipe A fills in 21 hours, Pipe B fills in 24 hours. Leakage adds 48 minutes to the filling time.

Formula Used: Efficiency = Total Work ÷ Time; Time = Total Work ÷ Efficiency.

Person	Days	Total Work	Efficiency
Pipe A	21 hr	168 units	8
Pipe B	24 hr	7	

=> Total filling efficiency of A and B = 8 + 7 = 15 units/hr

=> Ideal time taken by A and B = 168 ÷ 15 = 11.2 hours

=> Convert 0.2 hours to minutes: 0.2 × 60 = 12 minutes. Total ideal time = 11 hours 12 minutes.

=> Actual time taken due to leak = 11 hr 12 min + 48 min = 12 hours.

=> Net efficiency of (A + B − Leak) = 168 ÷ 12 = 14 units/hr

=> Efficiency of leak = (Efficiency of A + B) − Net efficiency = 15 − 14 = 1 unit/hr

=> Time for leak to empty the cistern = Total Work ÷ Efficiency of leak = 168 ÷ 1 = 168 hours.

Therefore The correct answer is 168 hr.

Additional Information

Leakage Efficiency

Leakage is always considered as negative work. If a pipe fills at rate 'x' and net filling rate is 'y', then leak rate = x − y.

Pipes and Cisterns Logic

This topic follows the same principles as Time and Work, where 1/T_(net) = 1/T_A + 1/T_B − 1/T_(leak).

Q75. Answer: (d) 153

The logic followed here is,

So, "153" will complete the series.

Hence, the correct answer is "Option 4".

Q76. Answer: (d) G < R

Given statement: K = U = R > N > E > G < W

Conclusions:

1) K < N → False (as K=R>N →K>N).

2) W < N → False (as N>E>GN →K>N).

4) G < R → True (as R>N>E>G →R>G).

Hence, only conclusion of option 4 i.e. G<R follows the given statement.

Q77. Answer: (b) 1 : 3

Given:

• Two wires A and B are made of Same material and have same length (l say)

• They have different cross section of area. Let area of wire A be AA and Area of wire B be AB

• The resistance of wire A is 9 times the resistance of wire.

Concept

• The property by which an electric conductor opposes the flow of current through it is called as the resistance of the conductor.

• It is denoted by R.

• The SI unit of resistance is Ohm (Ω).

Resistivity (R) = ρ × l over A

Where ρ is the resistivity of the conductor, l is the length of conductor and A is the cross-sectional area.

R is inversely proportional to A.

Explanation :

Let's say the Area of wire A be A_Aand Area of wire B be A_(B')

The Resistance of wire A is (R_A) = 9 ×The Resistance of wire B is (RB)

(ρ × l) over A_A = 9 × (ρ × l) over A_B

A_A/A_B=1/9

$(\pi r_A^2)/(\pi r_B^2)=1/9$

r_A/r_B=1/3

hence, the Ratio is 1: 3.

The correct answer is '1:3'.

Q78. Answer: (c) 15

Given:

The shaded part shows the number of females who are tax-payers but NOT doctors.

Here, the number of females who are tax-payers but NOT doctors = 15

Hence, the correct answer is "Option 3".

Q79. Answer: (d) Fatehpur Sikri

The correct answer is 'Fatehpur Sikri'.

Key Points

• Fatehpur Sikri was the first planned city of the Mughals to be marked by magnificent administrative, residential, and religious buildings comprised of palaces, public buildings, mosques, and living areas for the court, the army, the servants of the king and an entire city.

• Fatehpur Sikri is a city in Agra district in the state of Uttar Pradesh, India.

• The city was founded in 1569 by the Mughal emperor Akbar and served as the capital of the Mughal Empire from 1571 to 1585.

• It was built between 1569 and 1585 and was intended to be the joint capital with Agra, but was soon deserted because the water system could not support any residents.

• It remained untouched for over 400 years now and its palaces are a remainder of the extravagance of the Mughals Fatehpur Sikri is the best example of the culmination of Hindu and Muslim architecture.

• Fatehpur Sikri Mosque is said to be a copy of the mosque in Mecca and has designs, derived from the Persian & Hindu architecture.

Q80. Answer: (b) Atmiya Sabha

The correct answer is 'Atmiya Sabha'.

Key Points

Atmiya Sabha was a philosophical discussion circle in India.

• The association was started by Ram Mohan Roy in 1815 in Kolkata (then Calcutta).

• They used to conduct debate and discussion sessions on philosophical topics, and also used to promote free and collective thinking and social reform.

• The foundation of Atmiya Sabha in 1815 is as the beginning of the modern age in Kolkata.

• In 1823, the association became defunct.

• It was not a formal organization, and there was no membership registration procedure.

• However, the association intended to promote free and collective thinking.

• They also challenged and denounced orthodox religions.

Reform Movement	Founder	Year	Focus
Dharma Sabha	Radhakanta Deb	1830	Orthodox Hinduism, anti-reform

Atmiya Sabha	Raja Ram Mohan Roy	1815	Monotheism, anti-idolatry
Arya Samaj	Swami Dayanand Saraswati	1875	Vedic revival, social reform
Prarthana Samaj	Dr. Atmaram Pandurang	1867	Monotheism, caste reform

Q81. Answer: (b) 16

The correct answer is '16'.

Key Points

• As the germ cells contain 2n chromosomes, it is a diploid cell.

• It goes through meiosis to develop from a gamete with half as many chromosomes.

• The chromosome is divided into two categories: autosomes and allosomes, which are sex chromosomes.

• Since, meiosis occurs in the production of ovum, chromosomes divide into exact half, thus there will be 8 autosomes and 1 sex chromosome.

• Therefore, it contains 2 sex chromosomes and 16 autosomes in total.

• Hence, 16 is the number of the autosomes of this species.

Q82. Answer: (a) India

The correct answer is 'India'.

Key Points

• India is the largest exporter of cucumber in the world as of January 2022.

• India has exported cucumber and gherkins to the tune of 1,23,846 metric tonnes with a value of $114 million during April-October (2020-21).

• India has crossed the USD 200 million mark of export of agricultural processed product- pickling cucumber, which is globally referred as gherkins or cornichons, in the last financial year.

• Gherkins are exported under two categories -- cucumbers and gherkins, which are prepared and preserved by vinegar or acetic acid and cucumbers and gherkins, which are provisionally preserved.

• Apart from its export potential, the gherkin industry plays a key role in the creation of rural employment.

• In India, cultivation of gherkins is carried out under contract farming by around 90,000 small and marginal farmers with an annual production area of 65,000 acres.

Q83. Answer: (c) 660

Shortcut Trick

Using the standard algebraic identity: $4ab = (a + b)^2 - (a - b)^2$

Substitute the given values directly into the formula:

$4ab = 56^2 - 496$

$4ab = 3136 - 496 = 2640$

$ab = 2640 \div 4 = 660$

Therefore The correct answer is 660.

Alternate Method

Given:

$a + b = 56$

$(a - b)^2 = 496$

Formula Used:

$(a + b)^2 = a^2 + b^2 + 2ab$

$(a - b)^2 = a^2 + b^2 - 2ab$

Subtracting the second equation from the first, we get:

$(a + b)^2 - (a - b)^2 = 4ab$

Calculations:

$\Rightarrow (56)^2 - 496 = 4ab$

$\Rightarrow 3136 - 496 = 4ab$

$\Rightarrow 2640 = 4ab$

$\Rightarrow ab = 2640 \div 4$

$\Rightarrow ab = 660$

Therefore The correct answer is 660.

Additional Information

Sum of Squares Identity

$(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$. This identity is directly useful when the sum of the squares of two variables is required.

Difference of Squares

$a^2 - b^2 = (a - b)(a + b)$. This is a foundational factorization rule widely used in simplifying algebraic fractions and equations.

Cubic Identities

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ and $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$. Frequently tested alongside square identities in competitive exams.

Q84. Answer: (a) the physical conditions of the atmosphere keep changing

The correct answer is 'the physical conditions of the atmosphere keep changing'.

Key Points

• Distant star acts as a point source of light.

• When the starlight enters the earth's atmosphere, it undergoes refraction continuously due to the changing refractive index, i.e., from rarer to denser.

• Since the physical conditions of the refracting medium (air) are not stationary, the apparent position of the object, as seen through the hot air, fluctuates.

• This wavering is thus an effect of atmospheric refraction (refraction of light by the earth's atmosphere) on a small scale in our local environment.

• Due to this, the apparent position of the star is different from the actual position.

Q85. Answer: (b) 158 m

Shortcut Trick

Using Pythagorean Triplet: 16, 63, 65.

Since Diagonal (hypotenuse) = 65 m and one Side = 63 m, the other side must be 16 m.

Perimeter = 2 × (Length + Breadth) = 2 × (63 + 16) = 2 × 79 = 158 m.

Therefore The correct answer is 158 m.

Alternate Method

Given: Diagonal (d) = 65 m, Length (l) = 63 m.

Formula Used: $d^2 = l^2 + b^2$ | Perimeter = 2(l + b)

$\Rightarrow b^2 = 65^2 - 63^2$

$\Rightarrow b^2 = (65 - 63)(65 + 63) = 2 \times 128 = 256$

$\Rightarrow b = \sqrt{256} = 16$ m

$\Rightarrow$ Perimeter = 2 × (63 + 16)

$\Rightarrow$ Perimeter = 2 × 79 = 158 m

Therefore The correct answer is 158 m.

Additional Information

Properties of a Rectangle

Opposite sides are equal and parallel, and each interior angle is 90°.

Area of Rectangle

Area = Length × Breadth (sq. units).

Diagonal Property

Diagonals of a rectangle are equal and bisect each other.

Q86. Answer: (b) Both B and C

The Correct Answer is 'Both B and C'.

Key Points

• The spherical mirror which forms an erect and diminished image is convex mirror.

• Convex mirror always forms virtual images because the focal point and the center of curvature of the convex mirror are imaginary points and that cannot be reached.

Fig: Convex MIrror

• From the above figure, it is clear that object distance (u) is on the left side of the mirror. Therefore object distance (u) is negative.

• Image distance (v) and focal length (f) is on the right side of the convex mirror. Therefore, image distance (v) and focal length (f)

will be positive.

• Statements:

• The mirror is concave. → False (It is convex mirror which forms erect and diminished image).

• The mirror forms a virtual image. → True (Convex mirror always forms virtual image).

• The mirror has positive focal length. → True (Convex mirror has focal point on the right side).

Q87. Answer: (a) marginal propensity to consume

The correct answer is 'marginal propensity to consume'.

Key Points

• Marginal propensity to consume is the rate of increase in ex ante consumption due to a unit increment in income.

• Marginal propensity to consume (MPC) measures how much more individuals will spend for every additional dollar of income.

• MPC is calculated as the ratio of marginal consumption to marginal income.

• MPC is related to the so-called Keynesian multiplier, where MPC can help predict the economic growth from a government stimulus.

• The multiplier effect refers to a chain reaction of consumption by various entities brought about by an initial increase in income.

• An MPC of one means a person spent all additional income.

• An MPC of zero means they spent none of it and, instead, invested it.

• The formula used to calculate marginal propensity to consume is change in consumption divided by change in income, or, MPC = triangle C overtriangle Y triangle C overtriangle Y

• To make this calculation, you first must determine the change in income and the resulting change in spending (consumption).

Q88. Answer: (d) C3H8, C4H10, C5H12

The Correct answer is C3H8, C4H10, C5H12.

Key Points

• A homologous series is a series of organic compounds which belong to the same family (i.e. possess the same functional group) and show similar chemical properties.

• The members of this series are called homologs and differ from each other by the number of CH2 units in the main carbon chain.

• Alkanes have the general formula of C_nH_(2n+2) where n is the number of carbon atoms.

• C3H8, C4H10, C5H12 are alkanes of the same homologous series they are differed by CH2.

Q89. Answer: (d) Rs. 49,840

Shortcut Trick

Ratio of investments of A and B = 42,000 : 56,000 = 3 : 4.

Since the time period is same, Profit ratio = Investment ratio = 3 : 4.

Total ratio parts = 3 + 4 = 7 units.

7 units = Rs. 87,220 => 1 unit = 87,220 ÷ 7 = Rs. 12,460.

B's share = 4 units = 4 × 12,460 = Rs. 49,840.

Therefore The correct answer is Rs. 49,840.

Alternate Method

Given → Investment of A = Rs. 42,000, Investment of B = Rs. 56,000, Total Profit = Rs. 87,220.

Formulas: Profit Share of Partner = (Individual Investment × Time) ÷ (Sum of all Investment × Time) × Total Profit.

=> Ratio of profits of A and B = (42,000 × 1) : (56,000 × 1)

=> Ratio = 42 : 56 = 3 : 4

=> B's share = [4 ÷ (3 + 4)] × 87,220

=> B's share = (4 ÷ 7) × 87,220

=> B's share = 4 × 12,460 = 49,840

Therefore The correct answer is Rs. 49,840.

Additional Information

Partnership Basics

When the time period for investment is the same for all partners, the profit is distributed in the ratio of their capital investments.

Variable Time Period

If partners invest for different time durations, Profit Ratio = (C1 × T1) : (C2 × T2), where C is Capital and T is Time.

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Q90. Answer: (d) 119

Given : 26.52 × 3.89 - 7.79 × 2 + 27.39

Calculation :

26.52 × 3.89 - 7.79 × 2 + 27.39

Taking appro×imation: 27 × 4 - 8 × 2 + 27

= 108 - 16 + 27 = 119

Thus, the closest appro×imate value is 119.

Hence, '119' is the correct answer.

Q91. Answer: (d) 3

Shortcut Trick

The ratio of Amount to Principal is 13,310 ÷ 10,000 = 1331 ÷ 1000.

Since the rate is 10%, the multiplying factor is 1.1 or 11/10 per annum.

We see that $(11/10)^3 = 1331/1000$.

The power of the factor directly gives the number of years.

Therefore The correct answer is 3 years.

Alternate Method

Given values:

=> Principal (P) = Rs. 10,000

=> Amount (A) = Rs. 13,310

=> Rate of Interest (R) = 10% per annum

Formula used:

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

Calculations:

=> $13,310 = 10,000 \times (1 + 10/100)^n$

=> $13,310 / 10,000 = (11/10)^n$

=> $1331 / 1000 = (11/10)^n$

=> $(11/10)^3 = (11/10)^n$

=> n = 3 years

Therefore The correct answer is 3 years.

Additional Information

Compound Interest Formula

The formula for compounding annually is A = P × (1 + R/100)^t, where A is the amount, P is the principal, R is the rate, and t is the time.

Half-Yearly Compounding

When compounded half-yearly, the rate is halved (R/2) and the time period is doubled (2t) in the standard formula.

Rule of 72

A quick shortcut to estimate doubling time is t ≈ 72 ÷ R, where R is the annual interest rate percentage.

4

Q92. Answer: (d) 11.5

To calculate the angle traced by the hour hand in a given amount of time, you can use the following formula:

Angle = (30 * hours) + (0.5 * minutes)

In this case, the time is 23 minutes. We can break it down as follows: 23 minutes = 0 hours and 23 minutes.

Plugging the values into the formula:

Angle = (30 * 0) + (0.5 * 23)

= 0 + 11.5

= 11.5 degrees

So, the correct answer is 11.5.

Q93. Answer: (d) v/u

The correct answer is 'v/u'.

Key Points

• The ratio of the image's height to the object's height is used to define the magnification a lens produces. It is represented by the letter m.

• If h is the height of the object and h′ is the height of the image given by a lens, then the magnification produced by the lens is given by,

• m= (Height of the image)/(Height of the object)=(h')/h

• The object distance 'u' and the image distance 'v' are also related to the magnification produced by a lens.

• This relationship is given by:

• Magnification (m)= (h')/h = v/(u)

Additional Information

• The term "magnification" refers to the lens's capacity to increase an object's size.

• Positive lens magnification occurs when the height of the image the lens produces exceeds the height of the object.

• The image's magnification is negative if the image's height is smaller than the height of the object.

Q94. Answer: (d) 95°

Shortcut Trick

If sec θ1 = cosec θ2, then θ1 + θ2 = 90°.

4A + (3A − 50°) = 90°

7A = 140° => A = 20°

Required value: A + 75° = 20° + 75° = 95°

Therefore The correct answer is 95°.

Alternate Method

Given: sec 4A = cosec (3A − 50°)

Formula Used: sec θ = cosec (90° − θ)

=> cosec (90° − 4A) = cosec (3A − 50°)

=> 90° − 4A = 3A − 50°

=> 90° + 50° = 3A + 4A

=> 140° = 7A

=> A = 140° ÷ 7 = 20°

=> Value of A + 75 = 20 + 75 = 95°

Therefore The correct answer is 95°.

Additional Information

Complementary Ratios

Trigonometric ratios of complementary angles: sin θ = cos (90° − θ), tan θ = cot (90° − θ), and sec θ = cosec (90° − θ).

Acute Angle Condition

These identities are primarily used in competitive exams for acute angles (0° < θ < 90°) where the sum of arguments is 90°.

Standard Values

Always remember basic values like sin 30° = 1/2, cos 60° = 1/2, and tan 45° = 1 to verify angle-based results.

Q95. Answer: (c) Rs. 10,000

The correct answer is 'Rs. 10,000'.

Key Points

• Financial Assistance towards the care of Elderly Dependant(s) will be provided to applicant couples towards the care of their elderly dependants in cases where supporting them is acting as a deterrent to start a family or to have their next child.

• A maximum amount of Rs. 10,000/- per month per Elderly Dependant will be given to the applicant couple in cases where they wish to have a/another child.

• Dependants over the age of 60 years will be considered Elderly Dependants.

• This component of assistance for elderly dependants is envisaged to provide monetary assistance to Parsi couples with family income below Rs. 15 lakhs who have elderly members and in cases where such responsibility is a deterrent to starting or increasing the number of children.

• Jiyo Parsi Counsellors will carry out timely checks and inspections to ensure the care of the Elder(s) and to determine whether the financial assistance should be continued.

• If a child (first or sibling) is conceived during the period of financial assistance from this scheme, the monetary provisions for the elderly will continue for the duration of the life of the elderly, as long as the scheme exists.

Q96. Answer: (c) 7

Shortcut Trick

Identify the prime factorization of 6300: 63 × 100 → (9 × 7) × (10 × 10).

Expand: $(3^2 \times 7^1) \times (2^2 \times 5^2)$.

For a perfect square, all exponents must be even.

The prime factor 7 has an odd power (7^1).

Multiply by 7 to make the power even (7^2).

Therefore The correct answer is 7.

Alternate Method

Given: Number = 6300

Formula Used: Prime Factorization Method.

=> Prime factors of 6300 = 2 × 2 × 3 × 3 × 5 × 5 × 7

=> Grouping into pairs = (2 × 2) × (3 × 3) × (5 × 5) × 7

=> Here, the prime factor 7 does not have a pair.

=> To make 6300 a perfect square, every factor must be in pairs.

=> Multiplying 6300 by 7 → 6300 × 7 = 44100.

=> √44100 = 210, which is a whole number.

Therefore The correct answer is 7.

Additional Information

Perfect Square Definition

A perfect square is an integer that is the square of an integer; its prime factors always appear in even powers.

Division Method for Perfect Squares

If the question asked for the smallest number to divide by, the answer would also be the unpaired factor (7).

Properties of Perfect Squares

A perfect square never ends in the digits 2, 3, 7, or 8 at the unit's place.

Q97. Answer: (d) 8

Shortcut Trick

Exterior angle of a regular polygon = 180° − Interior angle

Exterior angle = 180° − 135° = 45°

Number of sides (n) = 360° ÷ Exterior angle

=> n = 360° ÷ 45° = 8

Therefore The correct answer is 8.

Alternate Method

Given:

Interior angle of a regular polygon = 135°

Formula Used:

Each interior angle of a regular polygon with n sides = [(n − 2) × 180°] ÷ n

Calculations:

=> 135° = [(n − 2) × 180°] ÷ n

=> 135n = 180n − 360

=> 180n − 135n = 360

=> 45n = 360

=> n = 360 ÷ 45

=> n

Q98. Answer: (d) 210

The logic followed here is:

So, "210" complete the given series.

Hence, the correct answer is "Option 4".

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Q99. Answer: (a) Sarpagandha

The correct answer is Sarpagandha.

Key Points

• The powdered root derivatives of sarpagandha are a wonderful natural solution for managing hypertension symptoms.

• By relaxing the blood vessels and regulating nerve function in the muscles leading to the heart, sarpagandha brings down high blood pressure and facilitates the circulation of blood through the heart passages at a normal, healthy pace.

• It is hence a rather valuable herbal remedy for alleviating hypertension and augmenting heart wellness.

Additional Information

• Sarpagandha being its classical Sanskrit name which literally translates to snake root, since the roots of the plant are twisted and coiled like a snake.

• This herb is known by many common English names. These consist of Indian snakeroot, Serpentina root, Rauvolfia root, devil pepper and serpentine root.

• This herbal root is imbued with a plethora of phytonutrients, with the alkaloid reserpine being widely known for its antihypertensive and antipsychotic effects on the human system.

Q100. Answer: (b) Plastic bags are durable carry bags

The correct answer is Plastic bags are durable carry bags.

Key Points

• Non- biodegradable plastics cause a huge threat to animals, plants, and our surroundings which include:

• Choking the drains.

• Fatal to animals when eaten.

• Reduce the fertility of the soil, etc.

• While having disadvantages, it also has an advantage that non-biodegradable plastics are durable carry bags.

• Hence, out of all the four, statement 2 is odd one out, as it is the advantage of non-biodegradable plastics, while others are not.

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