RRB Group D Previous Year Paper (Held on: 6 Oct 2022 Shift 2)

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

Take this paper as a timed mock test

Practise under exam conditions, then review your answers after you submit.

yourmocktest.com/pyq/rrb-group-d/rrb-group-d-previous-year-paper-held-on-6-oct-2022-shift-2

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

CBT

Q1. Which of the numbers given below is divisible by 11?

(a) 359247615447536920
(b) 359247615447536923
(c) 35924761544753698
(d) 359247615447536915

Q2. Select the correct example of double displacement reaction.

(a) $CuSO_4 + H_2S \rightarrow CuS + H_2SO_4$
(b) $2NaCl \rightarrow 2Na + Cl_2$
(c) $2AgBr \rightarrow 2Ag + Br_2$
(d) $CaO + H_2O \rightarrow Ca(OH)_2$

Q3. Let. $0.2727...+3.\overline{2} = x$, where x is a proper fraction in the simplest form. Then the sum of the numerator and the denominator of x is:

(a) 340
(b) 296
(c) 445
(d) 342

Q4. R, S, T, U, V and W are six cousins sitting around a circular dinner table facing the centre of the table. U is seated second to the right of S. T is seated to the immediate right of U. R is an immediate neighbour of both W and T. Who is seated to the immediate right of S?

(a) W
(b) R
(c) T
(d) V

Q5. The LCM of two numbers is 20 times their HCF and their HCF is 213. If one of the two numbers is divided by 225, the quotient is 4 and the remainder is 165. The other number is:

(a) 426
(b) 852
(c) 639
(d) 1065

Q6. Which of the following elements is more reactive than copper?

(a) Zinc
(b) Platinum
(c) Silver
(d) Gold

YourMockTest.com — Free Study Material

Q7. Which of the following components of blood promotes immunity and helps the body fight against germs?

(a) White blood cells
(b) Blood platelets
(c) Blood plasma
(d) Red blood cells

Q8. If the interest earned during the 2^(nd) year on a certain sum is Rs. 2,761, and the rate of interest is 10% per annum compounded annually, then the sum is:

(a) Rs. 26,100
(b) Rs. 21,500
(c) Rs. 25,100
(d) Rs. 25,150

Q9. Breakdown of pyruvate using oxygen takes place in the:

(a) mitochondria
(b) chloroplast
(c) nucleoplasm
(d) cytoplasm

Q10. Identify the true statement.

(a) Sperms containing X chromosome have 22 chromosomes but sperms containing Y chromosome have 23 chromosomes.
(b) Sperms containing X chromosome have 23 chromosomes but sperms containing Y chromosome have 22 chromosomes.
(c) Sperms containing X chromosome have 23 chromosomes and sperms containing Y chromosome also have 23 chromosomes.
(d) Sperms containing X chromosome have 22 chromosomes and sperms containing Y chromosome also have 22 chromosomes.

Q11. Use Mendeleev's periodic table to select the correct formula for the oxides of Ba and K.

(a) BaO and K2O
(b) BaO and KO
(c) BaO and KO2
(d) BaO2 and K2O

Q12. Yash was facing towards the north and moves 10 m to his right from his home. After that, he turns left and moves 20 m. Then he turns left and move 20 m, and then turns left again and moves 10 m. After that, he again turns left and moves 10 m, and then turns right and moves 10 m. In which direction is he facing now? (All turns are 90 degree turns only)

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

Q13. The cost that a firm incurs to employ fixed inputs is called:

(a) total variable cost
(b) average variable cost
(c) total fixed cost
(d) average fixed cost

Q14. If $4a + 3b = 2c$, then find $(4a)^3 + (3b)^3 + (-2c)^3$.

(a) 72 abc
(b) -72 abc
(c) 1
(d) 0

YourMockTest.com — Free Study Material

Q15. A trader owes a merchant Rs. 12,500 due in one year. However, the trader wants to settle the amount after 6 months. If the rate of interest is 8% per annum, then how much money should he pay? (Give your answer correct to the nearest whole number value.)

(a) Rs. 10,219
(b) Rs. 12,091
(c) Rs. 12,019
(d) Rs. 10,291

Q16. The Ballari - Chitradurga - Chikkamagaluru - Tumakuru belt in Karnataka is famous for reserves of which mineral from following?

(a) Copper
(b) Monazite
(c) Iron - ore
(d) Lead and Zinc

Q17. A statement is given followed by two arguments I and II. Read the statement and the arguments carefully and select the appropriate answer from the given options.

Statement:

A celebrity applies for a gun licence for self-protection after receiving death threats.

Arguments:

(I) A popular singer was recently found shot dead immediately after a week of him receiving a death threat letter.

(II) Celebrities are known to misuse their power and many have been convicted for wrongful killing of endangered animals.

(a) Argument (II) weakens, while argument (1) strengthens the statement.
(b) Both arguments (I) and (II) weaken the statement.
(c) Argument (I) weakens, while argument (II) strengthens the statement.
(d) Both arguments (I) and (II) strengthen the statement.

Q18. Two numbers a and b are such that a: 24 :: 24 : b, and a : b :: b : 192. Find the value of (a + b).

(a) 72
(b) 48
(c) 60
(d) 54

Q19. The given table shows the use of chemicals (in litres) in three science laboratories of a school from 2002 to 2006. Study the table and answer the question that follows.

Year	Laboratory		
Biology	Physics	Chemistry	
2002	52	61	47
2003	81	56	51
2004	67	49	57
2005	91	67	69
2006	93	73	72

What is the ratio of the total use of chemicals (in litres) in the Biology laboratory to the total use of chemicals (in litres) in the Chemistry laboratory from 2002 to 2006?

(a) 48 : 37
(b) 96 : 71
(c) 37 : 48
(d) 71 : 96

YourMockTest.com — Free Study Material

Q20. The Development Fund for MFI's is managed by the _____.

(a) Reserve Bank of India
(b) State Bank of India
(c) Ministry of Finance, Govt of India
(d) NABARD

Q21. In a certain code language, 'BDSHK' is written as 'GHVJL' and 'FGLRU' is written as 'KKOTV'. How will 'ELPHT' be written in that language?

(a) JPSJU
(b) JPTJV
(c) JPSJV
(d) JPTJU

Q22. MNOP is a quadrilateral in which each of its angles is a right angle. Side MN equals side PO and side MP equals side NO and its both diagonals do not intersect at 90°. What type of quadrilateral is MNOP?

(a) Rectangle
(b) Kite
(c) Square
(d) Rhombus

Q23. Why did Mendel study seven different characters?

(a) To uncover the universal principles of inheritance
(b) To create many new varieties of pea plants
(c) To produce enough peas for his monastery
(d) To find out which plants were the best

Q24. In which year was the Protection of Children from Sexual Offenses Act passed?

(a) 2012
(b) 2013
(c) 2011
(d) 2014

Q25. $x^4 - (x^2 - 2)^2 + (2 - x) = 0$ is:

(a) a bi-quadratic equation
(b) a quadratic equation
(c) just a number
(d) a linear equation

Q26. Which of the following units is considered as the foundation of the Panchayat Raj System to perform functions and powers entrusted to it by the State Legislatures?

(a) Nagarpalika
(b) Gram Sabha
(c) Zila Parishad
(d) Panchayat Samiti

Q27. Three statements are given followed by two conclusions numbered I and II. You have to take the statements to be true, even if they seem to be at variance with commonly known facts and decide which of the conclusions logically follow(s) from the statements.

Statements:

Some Ponds are Fishes.

Some Rivers are Fishes.

All Fishes are Tanks.

Conclusions:

(I) Some Rivers are Tanks.

YourMockTest.com — Free Study Material

(II) Some Ponds are Rivers.

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

Q28. What is the primary difference between domestic and industrial solid waste?

(a) The former is heterogeneous in composition.
(b) The latter is seasonal in nature.
(c) The former is smaller in quantity.
(d) The latter is a source of pollutants.

Q29. If a = (0.2929...÷ 0.3bar2)×(0.bar2 ÷ 0.1515...)+0.bar3, then the value of a is :

(a) 12/3
(b) 11/3
(c) 21/3
(d) 32/3

Q30. In which of the following years was Wipro Ltd incorporated ?

(a) 1945
(b) 1959
(c) 1952
(d) 1947

Q31. In a certain code language, 'DFGLM' is written as 'EHJPR' and 'HBEKS' is written as 'IDHOX'. How will 'TECKO' be written in that language?

(a) UGDOS
(b) UGFOT
(c) UGEOS
(d) UGFPT

Q32. The positions of the first and fourth letters in the word 'QUIRKY' are interchanged. Similarly the positions of the second and fifth letters are interchanged and in the same pattern the positions of the third and sixth letters are interchanged. If all letters are counted from left to right, then which letter will be the fourth letter from the right in the word so formed?

(a) R
(b) Q
(c) Y
(d) K

Q33. Which of the following numbers will replace the question mark (?) in the given series?

549, 508, 467, 426, 385, ?

(a) 344
(b) 289
(c) 276
(d) 320

Q34. If '×' means '-', '-' means '÷', '÷' means '+', '+' means '×', what will come in place of the question mark (?) in the following equation?

27 ÷ 288 + 2 × 2 × 22 - 2 = ?

(a) 420
(b) 550
(c) 590
(d) 450

YourMockTest.com — Free Study Material

Q35. Select the number from among the given options that can replace the question mark (?) in the following series.

32, 57, 93, 142, 206, ?

(a) 26
(b) 287
(c) 216
(d) 213

Q36. As of August 2022, who among the following is the Chairman of Tata Trusts?

(a) Neville Tata
(b) Noel Tata
(c) Leah Tata
(d) Ratan Tata

Q37. Which of the following states of India are related to the term 'Mango Showers'?

(a) Gujarat and Madhya Pradesh
(b) Kerala and Karnataka
(c) Meghalaya and Assam
(d) Punjab and Haryana

Q38. A metallic sphere of radius 10.5 cm is melted and then recast into small spheres, each of radius 3.5 cm. Find the number of small spheres thus obtained.

(a) 27
(b) 30
(c) 72
(d) 32

Q39. $(3-4\sin^2\theta)/(\cos^2\theta)$ can be simplified as :

(a) $3 + \tan^2\theta$
(b) $3\cos^2\theta - 4\sec^2\theta$
(c) $3 - \tan^2\theta$
(d) $3\cot^2\theta - \tan^2\theta$

Q40. Bleaching powder is produced by the action of chlorine on:

(a) Ca(OH)2
(b) NaOH
(c) CaO
(d) CaCO3

Q41. As of April 2022, what is the FDI limit in the insurance sector in India?

(a) up to 36%
(b) up to 74%
(c) up to 26%
(d) up to 46%

Q42. The resistance of a conductor is directly proportional to its _____.

(a) area of cross section
(b) length
(c) volume
(d) temperature

Q43. Who among the following sacrificed her life along with 363 others for the protection of khejri' trees in Khejrali village near Jodhpur in Rajasthan?

(a) Vandana Shiva
(b) Medha Patkar
(c) Amrita Devi Bishnoi

YourMockTest.com — Free Study Material

(d) Soumya Swaminadhan

Q44. The value of (x^(2/3)-x^((-2)/3)) (x^(4/3)+1+x^((-4)/3)) is _____.

(a) $1/(x^2)$
(b) $x^2- 1/(x^2)$
(c) 0
(d) x^2

Q45. When Blue light and Red light are mixed in equal amounts, they will produce light of colour:

(a) White
(b) Cyan
(c) Yellow
(d) Magenta

Q46. Which of the following is NOT a carbon compound?

(a) CHCI3
(b) Co(NO3)2
(c) CH4
(d) C2H6

Q47. Find the total surface area (in square units) of a hollow hemisphere whose outer radius is 10 units and inner radius is 5 units.

(a) 325π
(b) 225π
(c) 375π
(d) 425π

Q48. In the word 'DECORATING', if each vowel is changed to the letter immediately following it and each consonant is changed to the letter immediately following it in the English alphabetical order, then how many vowels will be there in the group of letters thus formed?

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

Q49. The sum of the interior angles of a polygon with 200 sides is:

(a) 36,540°
(b) 35,460°
(c) 35,604°
(d) 35,640°

Q50. If the mean and mode of a particular data are 12 and 21, respectively, then using empirical relation, find the median.

(a) 16
(b) 12
(c) 15
(d) 14

Q51. Study the given arrangement of letters and symbols and answer the question that follows:

(LEFT) W & T O ! A L % V E N # J * U D $ I X @ C ^ (RIGHT)

How many such consonants are there in the arrangement each of which is both immediately preceded by a vowel and immediately followed by a symbol?

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

YourMockTest.com — Free Study Material

Q52. Aruna bought 8 bananas for Rs. 25 and sold 6 bananas for Rs. 20. What is her profit or loss percentage?

(a) 62/3 % Profit
(b) 32/3 % Profit
(c) 52/3 % loss
(d) 61/3 % loss

Q53. Identify the name of the fellowship that is launched by the Department of Science and Technology (DST), Government of India, to recognise, encourage and support translational research by Indian nationals.

(a) Dr. Homi Jahangir Bhabha Technology Innovation National Fellowship
(b) CV Raman Technology Innovation National Fellowship
(c) Vikram Sarabhai Technology Innovation National Fellowship
(d) Abdul Kalam Technology Innovation National Fellowship

Q54. Which of the following is NOT an example of a classical language in India as declared by the Government of India?

(a) Malayalam
(b) Odia
(c) Bengali
(d) Kannada

Q55. Which of the following chemical equations is INCORRECT?

(a) $3Fe\ (s) + 4H_2O\ (l) \rightarrow Fe_3O_4\ (s) + 4H_2\ (l)$
(b) $2\ Mg(s) + O_2(g) \rightarrow 2MgO\ (s)$
(c) $CO\ (g) + 2H_2(g) \rightarrow CH_3OH\ (l)$
(d) $CO(g) + H_2(g) \rightarrow CH_2O\ (l)$

Q56. A light ray passing through the _____ of a lens passes without any deviation.

(a) 2F (twice of focal length)
(b) Focus
(c) edges
(d) optical centre

Q57. In the year 2021, who among the following was one of the five coaches who received Dronacharya Award for life-time achievement?

(a) Abhijeet Kunte
(b) Sajjan Singh
(c) Sarkar Talwar
(d) Davinder Singh Garcha

Q58. In India, which institution pioneered the first alternative to corneal transplantation?

(a) NIT Tiruchirappalli
(b) JIPMER
(c) AIIMS
(d) IIT Hyderabad

Q59. The direction of the induced current when the conductor is moving in the region of magnetic field is given by:

(a) Right-hand thumb rule
(b) Fleming's left-hand rule
(c) Fleming's right-hand rule
(d) Maxwell's corkscrew rule

Q60. Five friends, A, B, C, D and E appeared for the same exam and each scored differently. B scored higher than only two of her friends. C did not score the highest, but scored more than B. E scored higher than only D. Who scored the second highest in the exam?

(a) E
(b) B

YourMockTest.com — Free Study Material

(c) A
(d) C

Q61. The _____ is a strong, dusty, gusty, hot and dry summer wind from the west which blows over the western Indo-Gangetic Plain region of North India.
(a) Kaal Baisakhi
(b) Loo
(c) Sameer
(d) Uttrayan

Q62. Which of the following terms will replace the question mark (?) in the given series to make it logically complete?
H 16, K 22, N 28, Q 34, T 40, ?
(a) V 46
(b) W 44
(c) V 44
(d) W 46

Q63. If
P means 'multiplication',
Q means 'subtraction',
R means 'addition', and,
S means 'division',
then 15 S 5 P 10 Q 4 R 2 = ?
(a) 27
(b) 28
(c) 29
(d) 26

Q64. Find the quadratic equation whose roots are √3 + 1 and √3 – 1.
(a) x2 + 2 √3 x + 2 = 0
(b) x2 - √3 x + 2 = 0
(c) x2 - 2 √3 x + 4 = 0
(d) x2 - 2 √3 x + 2 = 0

Q65. A starts a business with Rs. 7,250 and after 3 months, B joins A as his partner. After a year since A started the business, the profit is divided between A and B in the ratio 8 : 9. What is B's contribution in the capital?
(a) Rs. 10,875
(b) Rs. 10,250
(c) Rs. 10,500
(d) Rs. 10,000

Q66. Select the option that is related to the third term in the same way as the second term is related to the first term and the sixth term is related to the fifth term.
392 : 7 : : 1452 : ? : : 810 : 9
(a) 11
(b) 15
(c) 10
(d) 12

Q67. Read the given statement(s) and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statement(s).
Statements:
No river is a mountain.

YourMockTest.com — Free Study Material

Some mountains are lakes.

All lakes are ponds.

Conclusions:

(I) Some lakes are not rivers.

(II) Some lakes are mountains.

(III) Some ponds are mountains.

(a) Only conclusion II follows
(b) Only conclusion I follows
(c) All the conclusions I, II and III follow
(d) Either conclusion I or conclusion III follows

Q68. Select the option that is related to the fifth number in the same way as the fourth number is related to the third number and the second number is related to the first number.

139 : 150 :: 73 : 84 :: 17 : ?

(a) 44
(b) 32
(c) 25
(d) 28

Q69. If the length of a conductor is doubled and the area of cross section is halved, the resistance will be _____.

(a) eight times of its original value
(b) four times of its original value
(c) half of its original value
(d) unaltered

Q70. Insects have a network of air tubes for gas exchange. These are called _____.

(a) spiracles
(b) tracheae
(c) capillaries
(d) arteries

Q71. Which festival is known as Magh Bihu in Assam?

(a) Makar Sankranti
(b) Raksha Bandhan
(c) Holi
(d) Dussehra

Q72. √8836+√6084-√1849 equals :

(a) 121
(b) 162
(c) 126
(d) 129

Q73. Under one of the provisions of Article 89 of the Indian Constitution, who shall be the ex-officio Chairman of the Council of States?

(a) The senior most member of the Council of States
(b) The President of India
(c) The Vice-President of India
(d) The Union Minister of Parliamentary Affairs

Q74. Refer to the following letter, number, symbol series and answer the question.

(Left)S 3 F X # 7 M T & 8 R 9 Y Z * 2 C G 6 A (Right)

If all numbers are dropped from the series, which of the following will be sixth from the right?

(a) M

YourMockTest.com — Free Study Material

(b) R
(c) Y
(d) &

Q75. In February 2022, Ministry of Social Justice and Empowerment launched the SMILE (Support for Marginalised Individuals for Livelihood and Enterprise) scheme in how many cities?

(a) 11
(b) 9
(c) 10
(d) 8

Q76. The difference between the ages of a father and son is 35 years. Five years from now the father's age would be double that of the son's age. What is the son's present age?

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

Q77. A and B are emptying pipes and C is a filling pipe. Pipes A and B can empty a full tank in 15 hours and 18 hours, respectively. When all three pipes are opened together, it takes 11/4 hours to empty 1/9 part of the tank. In how many hours can pipe C alone fill 2/3 part of the tank?

(a) 18
(b) 20
(c) 25
(d) 30

Q78. In the following table, the direction of incident ray of light and the direction of reflected ray of light are giver different columns: Choose the correct match of column I to column II.

Column I Direction of ray of light before reflection	**Column II Direction of ray of light after reflection**		
A)	Incident ray passing through or directed on to the principal focus	P)	Will pass through or appear to diverge from the principal focus
B)	Incident ray passing through or directed on to the center of curvature	Q)	Reflected ray is on the other side of the principal axis making same angle with respect to the incident ray
C)	Incident ray passing parallel to principal axis	R)	Reflected ray will propagate parallel to the principal axis
D)	Incident ray directed on to the pole of the mirror making an angle with the principal axis	S)	Reflected ray will retrace the path of incidence in the opposite direction

(a) A - P, B - S, C - Q, D - R
(b) A - R, B - S, C - Q, D - P
(c) A - R, B - Q, C - P, D - S
(d) A - R, B - S, C - P, D - Q

Q79. Amongst six friends, A, D, E, F, K and Z, each has a different height. Only two friends are taller than D. Only four friends are shorter than Z. K is taller than Z. F is immediately shorter than E. A is the shortest among all. Who is the second tallest among all the friends?

(a) E
(b) Z
(c) K
(d) D

YourMockTest.com — Free Study Material

Q80. Which of the following products is formed by the electrolytic decomposition of brine?

(a) Potassium hydroxide
(b) Calcium hydroxide
(c) Sodium hydroxide
(d) Bleaching powder

Q81. A, B, C, D, E and F are sitting around a circular table facing the centre. A is sitting second to the left of C. F is sitting to the immediate right of C. D is an immediate neighbour of both A and E. Who is sitting third to the right of E?

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

Q82. Brihadaranyaka, Mundaka and Taittiriya are some examples of which of the following categories of religious texts?

(a) Jataka Stories
(b) Epics
(c) Upanishads
(d) Puranas

Q83. In 10 years A will be twice as old as B was 10 years ago. If A is 9 years older than B, then the present age of A is:

(a) 13 years
(b) 211/2 years
(c) 48 years
(d) 39 years

Q84. In this question, the statement is followed by four conclusions. Find out which conclusion is NOT true based on the given statement.

Statement: C > N = R ≥ H > Q < S

(a) N ≥ H
(b) S > Q
(c) C > R
(d) C ≥ H

Q85. Five boxes containing different fruits, namely strawberry, apple, litchi, cherry and pear, are kept one above the other, not necessarily in the same order. The strawberry box is in the exact middle of the stack. The pear box is immediately below the litchi box. Only the apple box is in between the cherry and strawberry boxes. The box at the bottom most position contains pears. Which box is second from the top?

(a) Litchi
(b) Cherry
(c) Apple
(d) Pear

Q86. What is the revised timeline to apply online for cash award schemes for sportspersons from the last date of closing of the particular sports event?

(a) Six months
(b) Three months
(c) One and a half year
(d) One year

Q87. 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.

PAIN : APNI :: MODE : OMED :: JUST : ?

(a) JTUS
(b) SUJT
(c) UJTS

YourMockTest.com — Free Study Material

(d) TUJS

Q88. The compass needle gets deflected when it is brought near to a bar magnet because it _____.

(a) is a tiny magnet
(b) is a conductor
(c) carries current
(d) is an iron rod

Q89. The median of the data 9, 12, 11, 8, 16, 18, 10, 14, 15, 13, 17, 20, 2, 24 is x. If 2 and 8 are replaced by 21 and 18 in this data, respectively, then the median of the data so obtained is y. What is the value of (3x - y)?

(a) 26
(b) 25
(c) 24.5
(d) 23.5

Q90. In the human heart, the pulmonary vein is connected to the _____.

(a) right auricle
(b) left ventricle
(c) left auricle
(d) right ventricle

Q91. The unit Watt can be expressed as _____.

(a) 1 Watt = 1 Volt/1 Ampere
(b) 1 Watt =1 Volt × 1 Coulomb
(c) 1 Watt = 1 Volt × 1 Ampere
(d) 1 Watt = 1 Volt/1 Coulomb

Q92. A certain number of people are sitting in a row, facing north. A sits fourth to the left of D. Only two people sit between P and L. K sits to the immediate left of L. D sits fourth to the left of K. P sits at one of the positions to the right of K. If no other person is sitting in the row, what is the total number of people seated?

(a) 13
(b) 10
(c) 14
(d) 12

Q93. Pipe A can fill a tank in 8 hours. Pipes B and C can empty the full tank in 20 hours and 15 hours, respectively. Pipes A and B are opened together for 5 hours, and then B is closed, and C is opened instantly. The tank will be full in a total time of:

(a) 155/7 hours
(b) 103/7 hours
(c) 105/7 hours
(d) 112/7 hours

Q94. Which of the following Articles of the Constitution of India deals with the uniform civil code for the citizens?

(a) 44
(b) 42
(c) 45
(d) 43

Q95. Rekha started walking from her office in the west direction. On traveling a distance of 5 m, she turns to the right and travels a distance of 2 m. She further turns to the right and travels a distance of 7.5 m. She then turns right at 135° and travels a distance of 15 m. In which direction is she facing now?

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

Q96. Three statements are given followed by two conclusions numbered I and II. You have to take the statements to be true, even if they seem to be at variance with commonly known facts and decide which of the conclusions logically follow(s) from the statements.

Statements:

Some Mice are Rabbits.

All Rabbits are Carrots.

Some Carrots are Oranges.

Conclusions:

(I) Some Mice are Carrots.

(II) All Rabbits are Oranges.

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

Q97. If '+' means '×', '-' means '+', '×' means '÷', and '÷' means '-', what will come in place of the question mark (?) in the following equation?

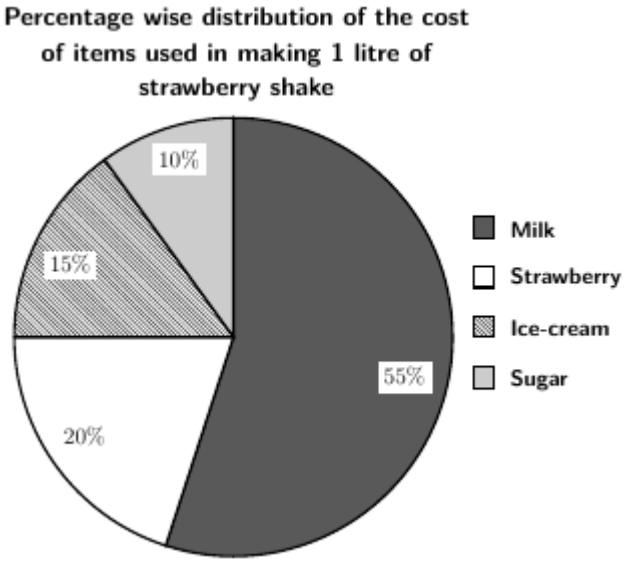
4 + 22 × 2 ÷ 4 - 9 = ?

(a) 59
(b) 49
(c) 110
(d) 99

Q98. Which among the following elements possesses greater tendency to gain electrons?

(a) Fluorine
(b) Nitrogen
(c) Carbon
(d) Oxygen

Q99. The given pie chart shows the percentage wise distribution of the cost of items used in making 1 litre of strawberry shake. Study the chart and answer the question that follows.



If the total cost in making 3 litres of strawberry shake is Rs. 1,500, then what is the cost of strawberries in making 1 litre of strawberry shake?

(a) Rs. 180
(b) Rs. 120
(c) Rs. 100
(d) Rs. 150

Q100. If a 10.0 - cm - tall object is kept at a distance 40.0 cm from a 20.0-cm-radius concave mirror, and all the distances are measured on the principal axis from the pole as origin, then the image position and image height, respectively, are:

(a) +26.6 cm and 0.66 cm
(b) -26.6 cm and 0.66 cm
(c) +13.3 cm and 0.33 cm
(d) -13.3 cm and 0.33 cm

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) 359247615447536915

Shortcut Trick

Apply the divisibility rule of 11: The difference between the sum of digits at odd places and the sum of digits at even places must be 0 or a multiple of 11.

For option (4): 359247615447536915

Sum at odd places: 3+9+4+6+5+4+5+6+1 = 43

Sum at even places: 5+2+7+1+4+7+3+9+5 = 43

Difference = 43 − 43 = 0, which is divisible by 11.

Therefore The correct answer is 359247615447536915.

Alternate Method

Given number: 359247615447536915

Formula Used: Divisibility by 11 => (Sum of digits at odd positions) − (Sum of digits at even positions) = 11k (where k is an integer).

Calculations:

=> Let S1 = sum of digits at 1^(st), 3^(rd), 5^(th)... places

=> S1 = 3 + 9 + 4 + 6 + 5 + 4 + 5 + 6 + 1 = 43

=> Let S2 = sum of digits at 2^(nd), 4^(th), 6^(th)... places

=> S2 = 5 + 2 + 7 + 1 + 4 + 7 + 3 + 9 + 5 = 43

=> Difference = |S1 − S2|

=> Difference = |43 − 43| = 0

=> Since the difference is 0, the number is divisible by 11.

Therefore The correct answer is 359247615447536915.

Additional Information

Divisibility by 3 and 9

A number is divisible by 3 or 9 if the sum of its digits is divisible by 3 or 9 respectively.

Divisibility by 4 and 8

A number is divisible by 4 if its last two digits are divisible by 4, and by 8 if its last three digits are divisible by 8.

YourMockTest.com — Free Study Material

Alternating Sum Property

For divisibility by 11, you can also subtract and add digits alternately from left to right (e.g., 3−5+9−2...). If the result is 0 or divisible by 11, the number is divisible by 11.

Q2. Answer: (a) CuSO4 + H2S → CuS + H2SO4

The correct answer is CuSO4 + H2S → CuS + H2SO4.

Key Points

• The Displacement reaction is a reaction in which a more reactive element displaces a less reactive element from its compound present in a dissolved state.

• In the Double displacement reaction, there is an exchange of ions between the reactants to give new substances.

• In BaCl2 + H2SO4 → BaSO4 + 2HCl, positive (Ba+) and negative(Cl-) ions of the two reactants switch places forming two new compounds and so it is a double displacement reaction.

Additional Information

• Types of Reaction

Type of Reaction	Description	General Formula	Example
Combination Reaction	Two or more substances combine to form a single product.	A+B→AB	2H2+O2→2H2O
Decomposition Reaction	A single compound breaks down into two or more simpler substances.	AB→A+B	2HgO→2Hg+O2
Displacement Reaction	One element replaces another in a compound.	A+BC→AC+B	Zn+CuSO4→ZnSO4+Cu
Redox Reaction	Reactions involving the transfer of electrons (oxidation and reduction).	•	Zn+Cu2+→Zn2++Cu
Neutralization Reaction	Reaction between an acid and a base to form salt and water.	Acid+Base→Salt+H2O	HCl+NaOH→NaCl+H2O
Combustion Reaction	A substance reacts with oxygen to produce energy in the form of heat and light.	Fuel+O2→CO2+H2O	CH4+2O2→CO2+2H2O
Precipitation Reaction	A reaction where an insoluble solid (precipitate) forms.	AB+CD→AD+CB	BaCl2+Na2SO4→BaSO4↓+2NaCl
Endothermic Reaction	A reaction that absorbs heat from the surroundings.	•	NH4Cl+H2O→NH4++Cl−
Exothermic Reaction	A reaction that releases heat to the surroundings.	•	CH4+2O2→CO2+2H2O

Q3. Answer: (c) 445

Given:

0.2727...+3.overline 2 = x

Calculation:

x = 0.2727...+3.overline2

=> x = 27/99 + (32 - 3)/9

=> x = 3/11 + 29/9

=> x = (27 + 319)/99

=> x = 346/99

The sum of the numerator and the denominator of x = 346 + 99 = 445

Therefore Option 3 is the correct answer.

Q4. Answer: (d) V

Given: R, S, T, U, V and W are six cousins sitting around a circular dinner table facing the centre of the table.

1) T is seated to the immediate right of U.

2) R is an immediate neighbour of both W and T.

3) U is seated second to the right of S.

After positioning S only one position is left which will be occupied by the only person left i.e. V.

Thus, according to the final arrangement, V is seated to the immediate right of S.

Hence, "Option 4" is the correct answer.

Q5. Answer: (b) 852

Shortcut Trick

Given HCF = 213 and LCM = 20 × HCF.

One number (N1) = (225 × 4) + 165 = 900 + 165 = 1065.

Using Product of numbers = HCF × LCM:

Other number (N2) = (HCF × 20 × HCF) ÷ N1 = (213 × 20 × 213) ÷ 1065.

N2 = (213 × 4260) ÷ 1065 = 213 × 4 = 852.

Therefore The correct answer is 852.

Alternate Method

Given:

HCF = 213

LCM = 20 × 213

Number 1 (N1) = (Divisor × Quotient) + Remainder

Formula Used:

N1 × N2 = HCF × LCM

Calculations:

=> N1 = (225 × 4) + 165

=> N1 = 900 + 165 = 1065

=> 1065 × N2 = 213 × (20 × 213)

=> 1065 × N2 = 213 × 4260

=> N2 = (213 × 4260) ÷ 1065

=> N2 = 213 × 4

=> N2 = 852

Therefore The correct answer is 852.

Additional Information

HCF and LCM Relation

The product of any two numbers is always equal to the product of their Least Common Multiple (LCM) and Highest Common Factor (HCF).

Division Algorithm

For any number, Dividend = (Divisor × Quotient) + Remainder, where the remainder is always less than the divisor.

Co-prime Property

If two numbers are co-prime, their HCF is 1 and their LCM is simply the product of the two numbers.

Q6. Answer: (a) Zinc

The correct answer is Zinc.

Key Points

• Zinc (Zn)

• Reactivity: Zinc is a moderately reactive metal.

• Reacts with acids (like hydrochloric acid) to produce hydrogen gas.

• Reacts with strong bases (like sodium hydroxide) to form complex ions.

• Reacts with oxygen in the air to form zinc oxide.

• Can displace less reactive metals (like copper) from their salt solutions.

Additional Information

• Platinum (Pt)

• Reactivity: Platinum is a noble metal, meaning it is very resistant to corrosion and chemical reactions.

• Reactions:

YourMockTest.com — Free Study Material

• Does not readily react with most acids, including hydrochloric acid and sulfuric acid.
• Reacts with aqua regia (a mixture of nitric acid and hydrochloric acid).
• Can form compounds with a few highly reactive elements like fluorine and chlorine.
• Silver (Ag)
• Reactivity: Silver is less reactive than zinc but more reactive than platinum and gold.
• Reactions:
• Reacts with sulfur and its compounds to form silver sulfide (tarnish).
• Reacts with nitric acid and concentrated sulfuric acid.
• Can be oxidized by ozone.
• Gold (Au)
• Reactivity: Gold is one of the least reactive metals.
• Reactions:
• Does not react with most acids, including hydrochloric acid and sulfuric acid.
• Reacts with aqua regia.
• Can form compounds with a few highly reactive elements like fluorine and chlorine.

Q7. Answer: (a) White blood cells

The correct answer is White blood cells.

Key Points

• White Blood Cells (WBCs)
• WBC-white blood cells are also called leukocytes or leucocytes. Hence, Option 3 is correct.
• They are cells of the immune system, which is mainly responsible for:
• Protecting and fighting against invading pathogens.
• Stimulates the production of the progesterone hormone
• Play a vital role in the human reproductive system by producing a network of blood vessels within the ovary.
• On average, the total count of white blood cells in every microliter of blood ranges between 4 and 11 thousand, and a healthy person will produce around 80 to 100 billion white blood cells every day.
• The lifespan of white blood cells ranges between 13 and 20 days.
• White blood cells are nucleotide blood cells that are white in color, hence they are called white blood cells.
• These blood cells are characterized as granulocytes and agranulocytes.

Additional Information

• Blood
• It is the only fluid connective tissue, which functions by circulating and transporting oxygen, nutrients, and other essential minerals to various cells and tissues of our body.
• In humans, blood is mainly composed of plasma, blood cells, and platelets. Overall, blood makes up 7 to 8 percent of total body weight, and an average, healthy person possesses around 5 to 6 liters of blood.
• A drop of blood contains millions of red blood cells, thousands of white blood cells, and lakhs of blood platelets.
• Overall, a healthy adult human body comprises approximately 1.325 gallons of blood cells.
• Types of Blood Cells
• Erythrocytes (Red blood cells)
• Leucocytes (White blood cells)
• Thrombocytes (Blood Platelets)

Q8. Answer: (c) Rs. 25,100

Shortcut Trick

Rate = 10% = 1/10. Let Principal = 10^2 = 100 units.

Interest for 1^(st) year = 100 × 1/10 = 10 units.

Interest for 2^(nd) year = 10 + (10 × 1/10) = 11 units.

Given 11 units = Rs. 2,761 => 1 unit = 2761 ÷ 11 = Rs. 251.

Sum (100 units) = 100 × 251 = Rs. 25,100.

Therefore The correct answer is Rs. 25,100.

Alternate Method

Given: Interest of 2^(nd) year = Rs. 2,761; Rate (R) = 10% p.a. compounded annually.

Formula Used: Interest for n^(th) year = P(1 + r/100)^(n−1) × (r/100)

=> 2761 = P × (1 + 10/100)^(2−1) × (10/100)

=> 2761 = P × $(1.1)^1$ × 0.1

=> 2761 = P × 0.11

=> P = 2761 ÷ 0.11

=> P = 25100

Therefore The correct answer is Rs. 25,100.

Additional Information

Effective Rate of Interest

For two years at rate r%, the effective compound interest rate is (2r + r^2/100)%.

CI and SI Difference

The difference between Compound Interest and Simple Interest for 2 years is given by P$(r/100)^2$.

Successive Interest Calculation

Interest for the second year (I2) is the interest for the first year (I1) plus the interest earned on I1: I2 = I1(1 + r/100).

Q9. Answer: (a) mitochondria

The correct answer is mitochondria.

Key Points

• Mitochondria

• Mitochondria is a double membrane organelle.

• Its number varies in the cell.

• It consists of the outer and inner mitochondrial membranes.

• It is present in the cytosol.

• It can replicate itself and can form its copy.

• It has its replication machinery.

• Mitochondria is semiautonomous.

• It has its DNA.

• It cannot synthesize all its protein and depend on the cell nucleus for it though term semiautonomous.

• It contains enzymes that aid in metabolism.

• It is the site of ATP formation.

• It consists of an Electron transport chain that is present on its membrane.

Additional Information

• Chloroplast:

• The chloroplast is a double membrane-bound cell organelle.

• Out of the two membranes, the inner membrane is relatively less permeable. (the outer membrane contains porins).

• The space limited by the inner membrane is called the stroma.

• Chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping of light energy essential for photosynthesis.

• The majority of chloroplasts are found in the mesophyll cells of the leaves.

• Nucleoplasm

• The nucleus of a cell is filled with a semi-solid substance called nucleoplasm.

• The nucleoplasm is a type of protoplasm and is enclosed in a nuclear envelope (also known as a nuclear membrane).

• Nucleoplasm contains chromosomes and nucleolus. Many substances, such as nucleotides (necessary for purposes such as DNA replication) and enzymes (which guide activities in the nucleus) are dissolved in the nucleoplasm.

• The main purpose of nucleoplasm is to programme as a suspension material for the organelles within the nucleus.

• It also helps preserve the form and composition of the nucleus and plays an important part in the transfer of materials that are essential to cell metabolism and function.

• cytoplasm

• Cytoplasm is a thick solution that fills each cell and is enclosed by the cell membrane.

• It is mainly composed of water, salts, and proteins. In eukaryotic cells, the cytoplasm includes all of the material inside the cell and outside of the nucleus.

YourMockTest.com — Free Study Material

Q10. Answer: (c) Sperms containing X chromosome have 23 chromosomes and sperms containing Y chromosome also have 23 chromoso...

The correct answer is Sperms containing X chromosome have 23 chromosomes and sperms containing Y chromosome also have 23 chromosomes.

Key Points

• Human cells, including sperm cells, typically contain 23 pairs of chromosomes (for a total of 46 chromosomes).

• These chromosomes carry the genetic information that determines an individual's traits.

• Of these 23 pairs, 22 pairs are called autosomes, which are identical in males and females.

• The 23rd pair consists of the sex chromosomes, which determine an individual's sex.

• Females have two X chromosomes (XX), while males have one X chromosome and one Y chromosome (XY).

• During sperm formation in males, the sex chromosomes separate. This means that each sperm cell will receive either an X chromosome or a Y chromosome.

• Therefore, sperm cells containing an X chromosome will have 23 chromosomes in total.

• Similarly, sperm cells containing a Y chromosome will also have 23 chromosomes in total.

• The sex of the offspring is determined by which sperm cell fertilizes the egg. If a sperm cell carrying an X chromosome fertilizes the egg (which always carries an X chromosome), the resulting offspring will be female (XX).

• If a sperm cell carrying a Y chromosome fertilizes the egg, the resulting offspring will be male (XY).

Q11. Answer: (a) BaO and K2O

The correct answer is BaO and K2O.

Key Points

• Mendeleev's Periodic Table

• Developed by Dmitri Mendeleev in 1869, the periodic table is an arrangement of chemical elements organized by their atomic number, electron configuration, and recurring chemical properties.

• Mendeleev's table predicted the existence and properties of elements that had not yet been discovered.

• His periodic law states that the properties of the elements are a periodic function of their atomic weights.

Additional Information

• Barium (Ba)

• Barium is a chemical element with the symbol Ba and atomic number 56.

• It is a soft, silvery-white alkaline earth metal.

• Barium is1 highly reactive and readily oxidizes in air

• It reacts vigorously with water to form barium hydroxide and hydrogen gas.

• Barium compounds are used in various applications, including:

• Drilling fluids: Barium sulfate is used to increase the density of drilling fluids in oil and gas exploration.

• Pyrotechnics: Barium compounds impart a green color to fireworks.

• Medical imaging: Barium sulfate is used as a contrast agent in medical imaging.

• Potassium (K)

• Potassium is a chemical element with the symbol K (from the Latin "kalium") and atomic number 19.

• It is a soft, silvery-white alkali metal.

• Potassium is highly reactive and reacts violently with water to produce potassium hydroxide and hydrogen gas.

• It is an essential element for plant and animal life.

• Potassium plays a crucial role in maintaining proper nerve function and muscle contraction.

• Potassium salts are widely used in fertilizers.

• Potassium hydroxide is used in the production of soaps and detergents.

Q12. Answer: (c) South

Given: All turns are 90 degree turns only

Yash was facing towards the north and moves 10 m to his right from his home.

After that, he turns left and moves 20 m.

Then he turns left and move 20 m, and then turns left again and moves 10 m.

After that, he again turns left and moves 10 m, and then turns right and moves 10 m.

Thus, Yash is facing in the south direction.

Hence, "Option 3" is the correct answer.

Q13. Answer: (c) total fixed cost

The correct answer is total fixed cost.

Key Points

• Fixed Costs: These are expenses that a business must pay regardless of the level of production or sales. They remain constant within a specific production period.

• Fixed Inputs: These are resources that a firm cannot easily change in the short run. Examples include:

• Rent or lease payments for buildings and equipment: These costs remain the same regardless of how much output is produced.

• Salaries of permanent employees: Even if production decreases, the company still needs to pay salaries to its core workforce.

• Insurance premiums: These costs are typically fixed for a certain period.

• Property taxes: These taxes are assessed on the property owned by the business and remain relatively stable.

• Key Characteristics:

• Independent of output: Fixed costs do not change with the level of production.

• Incurred even at zero output: A firm still incurs fixed costs even if it produces nothing.

• Relevant in the short run: In the short run, some inputs are fixed, leading to fixed costs. In the long run, all inputs can be adjusted, and thus, all costs become variable.

Additional Information

• Understanding Fixed Costs:

• Importance in Decision-Making: Fixed costs are crucial for businesses to understand. They significantly impact profitability and pricing decisions.

• Contribution Margin: The contribution margin, which is the difference between sales revenue and variable costs, helps determine how much revenue contributes towards covering fixed costs and generating profit.

• Break-Even Analysis: Break-even analysis helps determine the level of sales needed to cover both fixed and variable costs and achieve profitability.

Q14. Answer: (b) -72 abc

Shortcut Trick

Apply the Algebraic Identity: If $x + y + z = 0$, then $x^3 + y^3 + z^3 = 3xyz$.

Given $4a + 3b = 2c \Rightarrow 4a + 3b - 2c = 0$.

Let $x = 4a$, $y = 3b$, and $z = -2c$, such that $x + y + z = 0$.

The Sum of Cubes $(4a)^3 + (3b)^3 + (-2c)^3 = 3 \times (4a) \times (3b) \times (-2c)$.

Result = $3 \times 4 \times 3 \times (-2) \times abc = -72\ abc$.

Therefore The correct answer is -72 abc.

Alternate Method

Given: $4a + 3b = 2c$

Formula Used: $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

$\Rightarrow 4a + 3b - 2c = 0$

$\Rightarrow$ Let $x = 4a$, $y = 3b$, and $z = -2c$.

$\Rightarrow (4a)^3 + (3b)^3 + (-2c)^3 - 3(4a)(3b)(-2c) = (4a + 3b - 2c)((4a)^2 + (3b)^2 + (-2c)^2 - (4a)(3b) - (3b)(-2c) - (-2c)(4a))$

$\Rightarrow (4a)^3 + (3b)^3 + (-2c)^3 + 72abc = (0) \times ((4a)^2 + (3b)^2 + (-2c)^2 - 12ab + 6bc + 8ca)$

$\Rightarrow (4a)^3 + (3b)^3 + (-2c)^3 + 72abc = 0$

$\Rightarrow (4a)^3 + (3b)^3 + (-2c)^3 = -72\ abc$

Therefore The correct answer is -72 abc.

Additional Information

Algebraic Identity - Sum of Cubes

If $a + b + c = 0$, then the expression $a^3 + b^3 + c^3$ is always equal to $3abc$.

Special Condition for Identity

The value of $a^3 + b^3 + c^3 - 3abc$ is also 0 if $a = b = c$.

Alternative Identity Form

$a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a + b + c)((a - b)^2 + (b - c)^2 + (c - a)^2)$.

Q15. Answer: (c) Rs. 12,019

Shortcut Trick

To settle a debt early, the trader must pay the Present Value (PV) of the amount due.

Remaining time (T) = 12 months − 6 months = 6 months = 0.5 years.

Shortcut formula: PV = (Amount × 100) / (100 + Rate × Time)

PV = (12500 × 100) / (100 + 8 × 0.5) = 1250000 / 104

PV ≈ 12019.23

Therefore The correct answer is Rs. 12,019.

Alternate Method

Given:

Debt Amount (A) = Rs. 12,500

Interest Rate (R) = 8% per annum

Original tenure = 1 year

Settlement time = 6 months

Remaining period (t) = 12 months − 6 months = 6 months = 0.5 years

Calculations:

=> Amount (A) = Present Value (PV) + Interest on PV for 6 months

=> 12500 = PV × [1 + (8 × 0.5) / 100]

=> 12500 = PV × [1 + 4 / 100]

=> 12500 = PV × [1 + 0.04]

=> PV = 12500 / 1.04

=> PV = 1250000 / 104

=> PV = 12019.2307...

=> PV ≈ Rs. 12,019 (rounded to nearest whole number)

Therefore The correct answer is Rs. 12,019.

Additional Information

Present Value (PV)

It is the principal sum which, if invested at a given rate, grows to a specified future sum (Amount) over a given time period.

True Discount (TD)

It is the simple interest on the Present Value for the remaining period. Formula: TD = (Amount − PV) or (Amount × R × T) / (100 + RT).

Simple Interest vs True Discount

Simple Interest is calculated on the original sum, while True Discount is interest calculated on the money actually paid/present value.

Q16. Answer: (c) Iron - ore

The correct answer is Iron - ore.

Key Points

• The Ballari-Chitradurga-Chikkamagaluru-Tumakuru belt is a significant iron ore belt located in the southern part of India, primarily in the state of Karnataka.

• Key Characteristics:

• Rich in Iron Ore Deposits: This region is renowned for its abundant reserves of high-grade iron ore, particularly hematite and magnetite.

• Major Mining Hub: The presence of these valuable mineral resources has led to the establishment of numerous iron ore mines and associated industries in the region.

• Economic Significance: The mining and processing of iron ore have played a crucial role in the economic development of Karnataka and India as a whole.

• Geological Factors: The formation of this iron ore belt is attributed to specific geological processes that occurred over millions of years.

• Environmental Concerns: While economically important, the mining activities in this region have also raised environmental concerns, such as deforestation, soil erosion, and water pollution.

• Transportation Infrastructure: The development of this region has been facilitated by the construction of transportation infrastructure, including roads, railways, and ports, to transport the extracted iron ore to various destinations within India and for export.

YourMockTest.com — Free Study Material

Q17. Answer: (a) Argument (II) weakens, while argument (1) strengthens the statement.

Given:

Statement :

A celebrity applies for a gun licence for self-protection after receiving death threats.

Now,

Arguments :

I. A popular singer was recently found shot dead immediately after a week of him receiving a death threat letter - True (This strengthens the statement as it shows that the threat to celebrities can be real and having a gun for self-protection might be justified).

II. Celebrities are known to misuse their power and many have been convicted for wrongful killing of endangered animals - True (This weakens the statement as it suggests that giving a gun licence to a celebrity could potentially lead to misuse of power).

So, Argument (II) weakens, while argument (I) strengthens the statement.

Hence, the correct answer is "Option 1".

Q18. Answer: (c) 60

Shortcut Trick

Given a : 24 :: 24 : b => 24 is mean proportional => $ab = 24^2 = 576$.

Given a : b :: b : 192 => b is mean proportional => $b^2 = 192a$.

Substitute $a = 576/b \rightarrow b^2 = 192 \times (576/b) \Rightarrow b^3 = 192 \times 576 = 64 \times 3 \times 3 \times 192 = 64 \times 9 \times 192 = 110592$.

Cube root of 110592 is 48, so b = 48 and a = 576/48 = 12.

Value of (a + b) = 12 + 48 = 60.

Therefore The correct answer is 60.

Alternate Method

Given:

=> a/24 = 24/b => ab = 576 ... (Eq. 1)

=> a/b = b/192 => $b^2 = 192a$ ... (Eq. 2)

Calculations:

=> From (Eq. 1), a = 576/b

=> Substitute in (Eq. 2): $b^2 = 192 \times (576/b)$

=> $b^3 = 192 \times 576$

=> $b^3 = (64 \times 3) \times (3 \times 192) = 64 \times 576 \times 3 = 110592$

=> $b = \sqrt[3]{110592} = 48$

=> $a = 576 \div 48 = 12$

=> (a + b) = 12 + 48 = 60

Therefore The correct answer is 60.

Additional Information

Mean Proportional

If x, y, z are in continued proportion, then x/y = y/z, where y is the mean proportional and $y^2 = xz$.

Third Proportional

In the proportion a:b :: b:c, the term 'c' is called the third proportional to a and b, calculated as $c = b^2/a$.

Fourth Proportional

In the proportion a:b :: c:d, 'd' is the fourth proportional, where $d = (b \times c)/a$.

Q19. Answer: (a) 48 : 37

Calculation:

Step 1: Calculate the total use of chemicals in the Biology laboratory from 2002 to 2006:

Total use in Biology = 52 + 81 + 67 + 91 + 93 = 384 litres

Step 2: Calculate the total use of chemicals in the Chemistry laboratory from 2002 to 2006:

Total use in Chemistry = 47 + 51 + 57 + 69 + 72 = 296 litres

Step 3: Find the ratio:

Ratio = Total use in Biology / Total use in Chemistry

Ratio = 384 / 296 = 96 / 74 = 48 / 37

The ratio of the total use of chemicals in the Biology laboratory to the total use of chemicals in the Chemistry laboratory is 48:37.

Q20. Answer: (a) Reserve Bank of India

The correct answer is Reserve Bank of India.

Key Points

• Reserve Bank of India

• The Reserve Bank of India was established in April 1935.

• The RBI was nationalised on 1 January 1949.

• The Reserve Bank of India controls the issue and supply of the Indian rupee.

• It is basically the regulator of the Banking system in India. It strategizes monetary policy in India to control Inflation and money supply.

• The primary functions of the RBI include-

• Formulates, implements and monitors the monetary policy

• Regulator and supervisor of the financial system

• Manager of Foreign Exchange

• Issuer of currency

• Regulator and Supervisor of Payment and Settlement Systems

• Sir Osborne A Smith was the first governor of the Reserve Bank of India.

• He held the post of governor from 1 April 1935 to 30 June 1937.

• Shri Shaktikanta Das is the present Governor of the RBI.

• He assumed charge as the 25th Governor of the Reserve Bank of India effective from December 12, 2018.

Additional Information

• State Bank of India

• The State Bank of India is formed by the merger or amalgamation of three banks namely

• Bank of Bengal which was established in the year 1806

• Bank of Bombay incorporated in 1840

• Bank of Madras incorporated in 1843

• In 1921 all these three banks were amalgamated and came to be known as Imperial Bank of India.

• In the year 1955 the Reserve Bank of India acquired the controlling interest over the Imperial Bank of India and nationalized it and renamed it to State Bank of India. This is how the SBI was established.

• NABARD

• National Bank for Agriculture and Rural Development (NABARD) is an apex development financial institution in India.

• It was established on 12th July 1982 by a special act of the parliament.

• NABARD's main focus is to uplift rural India by increasing the credit flow for the elevation of agriculture and rural non-farm sectors.

• It is responsible for the development of the small industries, cottage industries, and any other such village or rural projects.

• NABARD also maintains and oversees the rural financial institutions and ensures their smooth functioning.

Q21. Answer: (a) JPSJU

The logic followed here is:

'BDSHK' is written as 'GHVJL'

And,

'FGLRU' is written as 'KKOTV'

Similarly,

'ELPHT' is written as

Hence, "Option 1" is the correct answer.

Q22. Answer: (a) Rectangle

Shortcut Trick

A quadrilateral with all interior angles equal to 90° can only be a Rectangle or a Square.

In a Square, the diagonals are perpendicular bisectors, meaning they must intersect at 90°.

In a Rectangle (that is not a square), the diagonals are equal and bisect each other, but they do not intersect at 90°.

Since the problem states the diagonals do not intersect at 90°, the shape must be a Rectangle.

Therefore The correct answer is Rectangle.

Alternate Method

Given: MNOP is a quadrilateral where angle M = angle N = angle O = angle P = 90°. Opposite sides MN = PO and MP = NO.

A quadrilateral with all angles equal to 90° is the fundamental definition of a Rectangle.

=> In a Rectangle, opposite sides are equal (MN = PO and MP = NO).

=> The diagonals of a rectangle are equal in length and bisect each other.

=> If the diagonals were to intersect at 90°, the rectangle would necessarily be a Square (all sides equal).

=> Since it is given that the diagonals do not intersect at 90°, the quadrilateral must be a Rectangle but not a square.

Therefore The correct answer is Rectangle.

Additional Information

Properties of a Rectangle

Opposite sides are parallel and equal; all interior angles are 90°; diagonals are equal and bisect each other.

Perpendicular Diagonals

Diagonals intersect at 90° only in a Square, Rhombus, or Kite.

Symmetry in Quadrilaterals

A rectangle has two lines of symmetry passing through the midpoints of opposite sides, unlike a square which has four.

Q23. Answer: (a) To uncover the universal principles of inheritance

The correct answer is To uncover the universal principles of inheritance.

Key Points

• Mendel chose Pisum sativum (pea plant) for his experiments.

• He selected seven traits of pea plants.

• It excludes plant color.

• There were 7 characters of the pea plant which were selected by Mendel for the experiments.

• The characters which were chosen by Mendel for his study were stem height, flower color, flower position, pod shape, pod color, seed shape, and seed color.

• All these characters belong to different chromosomes in the pea plant.

Q24. Answer: (a) 2012

The correct answer is 2012.

Key Points

• The POCSO Act was enacted on 14-Nov-2012.

• The POCSO Act,2012:

• The act is an acronym for Protection Of Children from Sexual Offences Act.

• The act was enacted on June 19, 2012.

• It was enforced on November 14, 2012.

• The act was enacted to protect children from offences of sexual assault, sexual harassment, and pornography and safeguard the interest and well-being of children.

• According to the act, the definition of a child is any person below eighteen years of age.

• It also defines different forms of sexual abuse which include penetrative and non-penetrative assault as well as sexual harassment and pornography.

Additional Information

• Protection of children by the state is guaranteed to Indian citizens by an expansive reading of Article 21[9] of the Indian constitution and also mandated given India's status as a signatory to the UN Convention on the Rights of the Child.

• The Protection of Children from Sexual Offences Act, 2012 was enacted to provide a robust legal framework for the protection of children from offenses of sexual assault, sexual harassment, and pornography, while safeguarding the interest of the child at every stage of the judicial process.

Q25. Answer: (b) a quadratic equation

Given:

x4 - (x2 - 2)2 + (2 - x) = 0

Calculation:

=> x4 - (x2 - 2)2 + (2 - x) = 0

=> x4 - (x^4 + 4 - 4x²) + (2 - x) = 0

=> x4 - x4 - 4 + 4x2 + 2 - x = 0

=> 4x2 - x -2 = 0

It is a quadratic equation.

Therefore Option 2 is the correct answer.

Q26. Answer: (b) Gram Sabha

The correct answer is Gram Sabha

Key Points

• The Gram Sabha is the foundation of the Panchayati Raj System in India.

• The 73rd Amendment envisages the Gram Sabha as the foundation of the Panchayat Raj System to perform functions and powers entrusted to it by the State Legislatures.

• The amendment provides for a three-tier Panchayat Raj System at the village, intermediate and district levels.

• Articles 243A provides that the Gram Sabha may exercise such power and perform such functions at the village level as the Legislature of a State may by law provide.

• The 73rd amendment thus envisages the Gram Sabha as the foundation of the Panchayat Raj System.

• “Gram Sabha” means a body consisting of persons registered in the electoral rolls comprised within the area of Panchayat at the village level.

• In the Panchayat Raj System Gram Sabha is the only permanent unit.

• Duration of Panchayat i.e. Mukhiyas and other members of Panchayat continue for 5 years only from the date appointed for the first meeting, but the villagers do not change.

Thus, the 73rd amendment act is the constitutional amendment act on Panchayat Raj Institutions.

Additional Information

• Panchayat Samiti

• An intermediate level institution in the Panchayati Raj system

• Also known as a block panchayat, taluka panchayat, or mandal

• The chief executive officer of a Panchayat Samiti is the Block Development Officer

• Zila Parishad

• A district-level institution in the Panchayati Raj system

• Also known as the District Council or District Panchayat

• The District Collector heads the Zila Parishad

• Nagarpalika

• Administers smaller urban areas

• Interacts with the state government

• Responsible for duties and responsibilities such as urban planning, water supply, and public health

Q27. Answer: (c) Only conclusion (I) follows.

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

Conclusions:

(I) Some Rivers are Tanks → Follow (As some Rivers are Fishes and all Fishes are Tanks. As whole fishes comes in tanks and has some part common with rivers, therefore it is true.)

(II) Some Ponds are Rivers → Does not follow (As some Ponds are Fishes and some Rivers are Fishes. So it is possible but not definite.)

Therefore Here, Only conclusion (I) follows.

Hence, the correct answer is "Option 3".

Q28. Answer: (a) The former is heterogeneous in composition.

The correct answer is The former is heterogeneous in composition

Key Points

• Domestic solid waste:

• It Refers to waste generated in households.

• It is highly heterogeneous in composition because it includes a wide variety of materials such as food scraps, plastics, paper, metals, glass, organic matter, and more.

• The sources of this waste are diverse within a household, leading to its mixed nature.

• Industrial solid waste:

• This waste is generated from specific industrial processes, making it relatively homogeneous in comparison to domestic waste.

• For example, an industry manufacturing steel will primarily produce slag and other steel-related waste.

• Similarly, a paper mill will predominantly generate paper-related waste.

• Though industrial waste can be hazardous and a source of pollutants, its composition tends to depend on the specific processes of the industry.

Additional Information The 3R's related to Environmental awareness is Reduce, Recycle and Reuse.

It is a motto used by conservationists to reduce waste, curtail consumption and ensure the best approach for the environment and human wellbeing.

• Reduce: It implies reducing the amount of waste generation.

• Recycle: It is the recovery and reprocessing of discarded material for usage in new products.

• Reuse: It suggests finding new ways to use things.

Q29. Answer: (a) 12/3

Calculation:

a = (0.2929...÷ 0.3bar2)×(0.bar2 ÷ 0.1515...)+0.bar3

=> (29/99 ÷ (32 - 3)/90) × (2/9 ÷ 15/99) + 3/9

=> (29/99 ÷ 29/90) × (2/9 ÷ 5/33) + 1/3

=> (29/99 × 90/29) × (2/9 × 33/5) + 1/3

=> 10/11 × 66/45 + 1/3

=> 4/3 + 1/3

=> 5/3

=> 12/3

Value of a = 12/3

Therefore Option 1 is the correct answer.

Q30. Answer: (a) 1945

The correct answer is 1945

Key Points

• The founder of WIPRO is Azim Premji.

• It was incorporated on 29 December 1945.

• The headquarters of WIPRO is in Bengaluru, India.

• Abidali Neemuchwala is the current CEO of WIPRO.

Additional InformationOther companies

Company	Headquarters	Founder	CEO
Infosys	Bengaluru	Narayana Murthi	Salil Parekh
TATA Group	Mumbai	Jamsetji Tata	Natarajan Chandrasekaran
Alphabet (Parent company of Google)	California, USA	Larry Page, Sergey Brin	Sundar Pichai

Q31. Answer: (b) UGFOT

The logic followed here is:

'DFGLM' is written as 'EHJPR'

And,

'HBEKS' is written as 'IDHOX'

Similarly,

'TECKO' is written as

Hence, "Option 2" is the correct answer.

Q32. Answer: (c) Y

Given word: QUIRKY

According to the question, the positions of the first and fourth letters in the given word are interchanged. Similarly the positions of the second and fifth letters are interchanged and in the same pattern the positions of the third and sixth letters are interchanged:

So, letter that will be the fourth letter from the right in the word so formed:

(Left) R K Y Q U I (Right) => Y

Hence, "Option 3" is the correct answer.

Q33. Answer: (a) 344

The logic followed here is:

Hence, "Option 1" is the correct answer.

Q34. Answer: (c) 590

Given Equation: 27 ÷ 288 + 2 × 2 × 22 - 2 = ?

BODMAS Rule:

Decoding the given information:

Symbol	×	•	÷	•
Meaning	•	÷	•	×

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

=> 27 + 288 × 2 - 2 - 22 ÷ 2 = ?

=> 27 + 288 × 2 - 2 - 11 = ?

=> 27 + 576 - 2 - 11 = ?

=> 603 - 2 - 11 = 590.

Hence, the correct option is "Option 3".

Q35. Answer: (b) 287

The logic followed here is:

Hence, "Option 2" is the correct answer.

Q36. Answer: (d) Ratan Tata

The correct answer is Ratan Tata

Key Points

• As of August 2022, the Chairman of Tata Trusts is Ratan Tata.

• He had served as the Chairman of Tata Trusts for many years, and while he stepped down from the leadership of Tata Group in 2012, he continued his role at the Trusts, steering its philanthropic initiatives.

• Ratan Tata was born on December 28, 1937.

• His father's name was Naval Tata who was adopted by Ratanji Tata - son of Jamshedji Tata, the Tata group founder.

• Ratan Tata joined the Tata group in 1961, and his first position was managing operations on the shop floor of Tata Steel.

Additional Information

Name	Relation	Details
Neville Tata	Son of Ratan Tata's half-brother Naval Tata	He is Ratan Tata’s step-nephew. Known for maintaining a low profile.
Noel Tata	Half-brother of Ratan Tata	Currently Chairman of Trent Ltd and involved in Tata Group’s retail business.
Leah Tata	Daughter of Noel Tata	Part of the Tata family’s next generation, known for her private lifestyle.

Q37. Answer: (b) Kerala and Karnataka

The correct answer is Kerala and Karnataka

Key Points

• Mango showers are pre-monsoon showers.

• These are common in the states of Kerala and Karnataka.

• These rains help in the ripening of mangoes and occur at the end of the summer season.

• These are also referred to as April rains.

Additional Information

• Types of Showers of India

• Blossom showers -

• This is also known as a cherry blossom or espresso shower.

YourMockTest.com — Free Study Material

• This occurs nearby the wind areas.
• This period in India is referred to as the early monsoon.
• Tea shower -
• Pre-monsoon rain is required for tea plantations.
• This is known as the 'Tea shower' in Assam.
• In West Bengal, it is called Kalbaishakh.

Q38. Answer: (a) 27

Shortcut Trick
Number of spheres = (Radius of larger sphere ÷ Radius of smaller sphere)³
=> n = (10.5 ÷ 3.5)³
=> n = (3)³
=> n = 27
Therefore The correct answer is 27 spheres.
Alternate Method
Given:
Radius of larger metallic sphere (R) = 10.5 cm
Radius of each small sphere (r) = 3.5 cm
Formula Used:
Volume of a sphere = (4/3) × π × r³
Calculations:
When one solid is melted and recast into another, the total volume remains constant.
=> Volume of large sphere = n × Volume of small sphere
=> (4/3) × π × R³ = n × (4/3) × π × r³
=> R³ = n × r³
=> n = R³ / r³
=> n = (10.5 × 10.5 × 10.5) / (3.5 × 3.5 × 3.5)
=> n = 3 × 3 × 3
=> n = 27
Therefore The correct answer is 27 spheres.
Additional Information
Volume Invariance
During melting and recasting, the Volume of the initial metal is always equal to the total Volume of the new objects.
Sphere Surface Area
The Total Surface Area of a sphere is given by 4 × π × r², which changes after recasting.
Hemisphere Volume
The volume of a Hemisphere is exactly half that of a sphere: (2/3) × π × r³.

Q39. Answer: (c) 3 - tan² θ

Shortcut Trick
Put θ = 45° in the given expression.
Expression = (3 − 4 sin² 45°) ÷ cos² 45° = (3 − 4 × 0.5) ÷ 0.5 = (3 − 2) ÷ 0.5 = 1 ÷ 0.5 = 2.
Now, test Option (3): 3 − tan² 45° = 3 − 1 = 2. This matches the result.
Therefore The correct answer is 3 − tan² θ.
Alternate Method
Given:
Expression: (3 − 4 sin² θ) ÷ cos² θ
Formula Used:
=> sin² θ + cos² θ = 1
=> tan θ = sin θ ÷ cos θ
=> sec θ = 1 ÷ cos θ
Calculations:

YourMockTest.com — Free Study Material

=> (3 − 4 $\sin^2\theta$) ÷ $\cos^2\theta$

=> 3 ÷ $\cos^2\theta$ − 4 $\sin^2\theta$ ÷ $\cos^2\theta$

=> 3 $\sec^2\theta$ − 4 $\tan^2\theta$

Since $\sec^2\theta = 1 + \tan^2\theta$:

=> 3(1 + $\tan^2\theta$) − 4 $\tan^2\theta$

=> 3 + 3 $\tan^2\theta$ − 4 $\tan^2\theta$

=> 3 − $\tan^2\theta$

Therefore The correct answer is 3 − $\tan^2\theta$.

Additional Information

Fundamental Trigonometric Identities

The three basic Pythagorean identities are $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \text{cosec}^2\theta$.

Value Substitution Method

For algebraic trigonometric simplifications, substituting standard values like θ = 0°, 30°, 45°, 60°, or 90° (where defined) can quickly eliminate incorrect options.

Q40. Answer: (a) Ca(OH)2

The correct answer is Ca(OH)2

Key Points

• Bleaching powder, also known as calcium hypochlorite,

• It is produced by the action of chlorine gas on slaked lime (calcium hydroxide):

• Reaction:

• Ca(OH)2+Cl2→Ca(OCl)2+H2OCa(OH)2+Cl2→Ca(OCl)2+H2OCa(OH)2+Cl2→Ca(OCl)2+H2OCa(OH)2+Cl2→Ca(OCl)2+H2OCa(OH)2+Cl2→Ca(OCl)2+H2OCa(OH)2+Cl2→Ca(OCl)2+H2O

• This process forms bleaching powder, which is commonly used as a disinfectant and bleaching agent.

Additional Information

• Bleaching powder is formed from lime and chlorine.

• It is formed by the action of chlorine on extinguished lime.

• It is used in making chloroform and chlorine gas.

• Another use of bleaching powder is to disinfect water.

Q41. Answer: (b) up to 74%

The correct answer is up to 74%

Key Points

• As of April 2022, the FDI limit in the insurance sector in India is up to 74%.

• The Foreign Direct Investment (FDI) limit in the insurance sector was raised from 49% to 74% in March 2021 through amendments to the Insurance Act, 1938.

• This change was made to attract foreign capital, boost the insurance penetration in the country, and improve financial inclusion.

• By April 2022, this policy was fully implemented.

Additional InformationImpact of the Change:

• Enhanced Capital Availability: Increased FDI brought in much-needed capital, enabling insurance companies to expand operations and enhance their reach.

• Boosting Insurance Penetration: India's insurance penetration was relatively low, at around 4.2% of GDP (in terms of premiums) in FY21, compared to the global average. The increase in FDI aimed to address this gap.

• Encouraging Competition: It encouraged global players to invest in Indian insurers, leading to more competition and improved products and services.

Q42. Answer: (b) length

The correct answer is Length.

Key Points

• The resistance of a conductor is directly proportional to length.

• The resistance of a wire is directly proportional to its length and inversely proportional to its cross-sectional area.

• As the length of the conductor increases, the resistance increases proportionally.

• This is because electrons have to travel a longer distance through the material, encountering more collisions and thus more resistance.

YourMockTest.com — Free Study Material

• Resistance also depends on the material of the conductor.

Additional Information

• The dissipation of electric energy in the form of heat, even though small, affects the amount of electromotive force, or electromotive force,e, required to produce a given current through the circuit.

• In fact, the electromotive force V (measured in volts) across a circuit divided by the current I (amperes) through that circuit defines quantitatively the amount of electricity.

• resistance R.

• Precisely, R = V/I.

• Thus, if a 12-volt battery steadily drives a two-ampere current through a length of wire, the wire has a resistance of six volts per ampere or six ohms.

• The ohm is the common unit of electrical resistance, equivalent to one volt per ampere and represented by the capital Greek letter omega, Ω.

Q43. Answer: (c) Amrita Devi Bishnoi

The correct answer is Amrita Devi Bishnoi

Key Points

• Amrita Devi Bishnoi and 363 other Bishnois sacrificed their lives to protect Khejri trees in Khejarli village, Rajasthan in 1730.

• Amrita Devi Bishnoi was a member of the Bishnoi community and an environmentalist.

• The Bishnoi community considered Khejri trees sacred.

• In 1730, Maharaja Abhay Singh of Marwar ordered the felling of Khejri trees to build his new palace.

• Amrita Devi led a movement to protest the felling of the trees.

• She famously said she would give her life to save the trees.

• According to legend, the king's men decapitated Amrita Devi after she put her arms around a tree to prevent it from being felled.

• In the Khejarli massacre, Amrita Devi's three daughters and 363 other Bishnois were killed.

• In memory of Amrita Devi, the "Amrita Devi Bishnoi National Award for Wildlife Conservation" was established.

Additional Information

Name	Vandana Shiva	Medha Patkar	Soumya Swaminathan
Profession	Environmental activist, author, and academic	Social activist and founder of Narmada Bachao Andolan	Chief Scientist at the World Health Organization (WHO)
Known For	Advocacy for biodiversity, organic farming, and environmental sustainability	Advocacy for water rights, displacement issues, and anti-dam movements	Work on tuberculosis and COVID-19 research
Notable Work	"Staying Alive: Women, Ecology, and Development", Navdanya Movement	Narmada Bachao Andolan, work for tribal rights, and anti-dam movements	Pioneering research on tuberculosis and COVID-19, vaccine development

Q44. Answer: (b) $x^2 - 1/(x^2)$

Shortcut Trick

Recognize the expression as the Difference of Cubes identity: $(a - b)(a^2 + ab + b^2) = a^3 - b^3$.

Let a = x^(2/3) and b = x^(−2/3). Then ab = x^(2/3) × x^(−2/3) = x^0 = 1.

The given expression matches the form $(a - b)(a^2 + 1 + b^2)$.

Applying the identity: $(x^{(2/3)})^3 - (x^{(-2/3)})^3 = x^2 - x^{(-2)}$.

Therefore The correct answer is $x^2 - 1/x^2$.

Alternate Method

Given: (x^(2/3) − x^(−2/3)) (x^(4/3) + 1 + x^(−4/3))

Formula Used: $(a - b)(a^2 + ab + b^2) = a^3 - b^3$

=> Let a = x^(2/3) and b = x^(−2/3).

=> Calculate $a^2 = (x^{(2/3)})^2 = x^{(4/3)}$.

=> Calculate $b^2 = (x^{(-2/3)})^2 = x^{(-4/3)}$.

=> Calculate ab = x^(2/3) × x^(−2/3) = x^((2/3 − 2/3)) = x^0 = 1.

=> Substituting these into the identity: $(a - b)(a^2 + ab + b^2) = a^3 - b^3$.

=> $(x^{(2/3)})^3 - (x^{(-2/3)})^3$.

=> x^((2/3 × 3)) − x^((−2/3 × 3)).

=> $x^2 - x^{-2}$.

=> $x^2 - 1/x^2$.

Therefore The correct answer is $x^2 - 1/x^2$.

Additional Information

Algebraic Cubing Identities

The difference of cubes is $(a - b)(a^2 + ab + b^2) = a^3 - b^3$, while the sum of cubes is $(a + b)(a^2 - ab + b^2) = a^3 + b^3$.

Laws of Indices

For any base x, the power of a power rule states $(x^m)^n = x^{(m \times n)}$ and the negative exponent rule states $x^{-n} = 1/x^n$.

Product of Reciprocals

If two terms are reciprocals such as x^n and x^{-n}, their product is always 1 because $x^n \times x^{-n} = x^{(n - n)} = x^0 = 1$.

Q45. Answer: (d) Magenta

The correct answer is Magenta

Key Points

• When blue light and red light are mixed in equal amounts, they will produce light of colour magenta.

• Red, blue, and green are considered primary colors of light, and when mixed in pairs

• They create secondary colors like magenta (red + blue), cyan (blue + green), and yellow (red + green).

Additional Information

• There are two types of colour mixing:

• additive

• subtractive.

• In both cases, mixing is typically described in terms of three colors and three secondary colors (colors made by mixing two of the three primary colors in equal amounts).

• All primary colours combined make an orange/brown shade.

• Additive mixing:

• Additive colour describes the situation where colour is created by mixing the visible light emitted from differently coloured light sources.

• This is in contrast to subtractive colors, where light is removed from various parts of the visible spectrum to create colors.

• Additive colours are created by adding coloured light to black.

• When we add all of the different wavelengths of sunlight.

• We see white light rather than many individual colours.

• It is called additive because all of the wavelengths still reach our eyes.

• Subtractive mixing:

• subtractive colours are created by completely or partially absorbing (or subtracting) some light wavelengths and reflecting others.

• It is called subtractive mixing because when the paints mix, wavelengths are deleted.

• we see because each paint will absorb some wavelengths that the other paint reflects, thus leaving us with a lesser number of wavelengths remaining afterwards.

Q46. Answer: (b) Co(NO3)2

The correct answer is Co(NO3)2

Key Points

• The compound that is NOT a carbon compound is Co(NO3)2

• This is because Co(NO3)2 is cobalt nitrate, which contains cobalt (Co), nitrogen (N), and oxygen (O), but no carbon atoms.

• It is a salt that results from the combination of cobalt(II) ions with nitrate (NO3^-) ions.

• Carbon compounds (also known as organic compounds) are primarily composed of carbon atoms, often combined with hydrogen, oxygen, nitrogen, or other elements

Additional Information

• Types of Carbon Compounds

• On the basis of a number of bonds formed between two carbon atoms in a compound, carbon compounds can be classified into two main categories:

Category	Description	Examples

Saturated Carbon Compounds	Compounds in which each carbon atom forms single bonds with other atoms. These compounds have the maximum number of hydrogen atoms attached to each carbon atom.	• Methane (CH4) • Ethane (C2H6) • Butane (C4H10)
Unsaturated Carbon Compounds	Compounds in which carbon atoms are connected by one or more double or triple bonds, leading to fewer hydrogen atoms attached to the carbon atoms.	• Ethene (C2H4) (Double bond between carbon atoms) • Ethyne (C2H2) (Triple bond between carbon atoms) • Benzene (C6H6) (Aromatic compound with alternating double bonds

Q47. Answer: (a) 325π

Shortcut Trick

Total Surface Area of hollow hemisphere = Area of outer curved surface + Area of inner curved surface + Area of ring base.

TSA = $2\pi R^2 + 2\pi r^2 + \pi(R^2 - r^2) = 3\pi R^2 + \pi r^2$.

Given R = 10, r = 5 => TSA = $3\pi(10)^2 + \pi(5)^2 = 300\pi + 25\pi = 325\pi$.

Therefore The correct answer is 325π sq. units.

Alternate Method

Given:

Outer radius (R) = 10 units

Inner radius (r) = 5 units

Formula Used:

Total Surface Area (TSA) = $2\pi R^2$ (Outer CSA) + $2\pi r^2$ (Inner CSA) + $\pi(R^2 - r^2)$ (Area of the top circular ring)

Calculations:

=> TSA = $2\pi(10)^2 + 2\pi(5)^2 + \pi(10^2 - 5^2)$

=> TSA = $2\pi(100) + 2\pi(25) + \pi(100 - 25)$

=> TSA = $200\pi + 50\pi + 75\pi$

=> TSA = 325π

Therefore The correct answer is 325π sq. units.

Additional Information

Hollow Hemisphere Volume

The volume of a hollow hemisphere is given by $V = (2/3)\pi(R^3 - r^3)$, where R is the outer and r is the inner radius.

Solid Hemisphere TSA

For a solid hemisphere of radius R, the Total Surface Area is $3\pi R^2$, which includes the curved surface ($2\pi R^2$) and the base (πR^2).

Surface Area of Sphere

The total surface area of a complete sphere is $4\pi R^2$, and it does not have a separate "curved" or "total" surface area as it is a closed surface.

Q48. Answer: (d) Three

The logic follows here is :-

Given word: "DECORATING"

Step 1: Change each vowel to the letter immediately following it in the English alphabetical order.

Vowels in "DECORATING" are E, O, A, and I. Changing them to the next letters gives us F, P, B, and J, respectively.

Step 2: Change each consonant to the letter immediately following it in the English alphabetical order.

Consonants in "DECORATING" are D, C, R, T, N, and G. Changing them to the next letters gives us E, D, S, U, O, and H, respectively.

Thus, the new sequence of letters is:

"EFDPSUBJHO"

Step 3: Count the number of vowels in the new sequence.

Vowels in the new sequence are E, U, and O.

Thus, the number of vowels in the group of letters thus formed is three.

Hence, the correct answer is "Option 4".

Q49. Answer: (d) 35,640°

Shortcut Trick

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

For a polygon with 200 sides:

Sum = (200 − 2) × 180° = 198 × 180° = 35,640°.

Therefore The correct answer is 35,640°.

Alternate Method

Given:

Number of sides (n) = 200

Formula Used:

Sum of interior angles = (n − 2) × 180°

Calculations:

=> n = 200

=> Sum = (200 − 2) × 180°

=> Sum = 198 × 180°

=> Sum = 35,640°

Therefore The correct answer is 35,640°.

Additional Information

Sum of exterior angles

The sum of the exterior angles of any convex polygon is always 360°, regardless of the number of sides.

Each interior angle of a regular polygon

For a regular polygon with n sides, each interior angle is [(n − 2) × 180°] ÷ n.

Each exterior angle of a regular polygon

For a regular polygon with n sides, each exterior angle is 360° ÷ n.

Q50. Answer: (c) 15

Shortcut Trick

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

Substitute given values: 21 = 3 × Median − 2 × 12.

21 + 24 = 3 × Median => 45 = 3 × Median.

Median = 45 ÷ 3 = 15.

Therefore The correct answer is 15.

Alternate Method

Given:

Mean of the data = 12

Mode of the data = 21

Formula Used:

The relationship between Mean, Median, and Mode is: 3 × Median = Mode + 2 × Mean

Calculations:

=> 3 × Median = 21 + 2 × 12

=> 3 × Median = 21 + 24

=> 3 × Median = 45

=> Median = 45 ÷ 3

=> Median = 15

Therefore The correct answer is 15.

Additional Information

Empirical Relationship

For a moderately skewed distribution, the relation is Mode = 3 Median − 2 Mean or Median = Mean − (1/3)(Mean − Mode).

Symmetrical Distribution

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

Skewness and Tendency

YourMockTest.com — Free Study Material

In a positively skewed distribution, Mean > Median > Mode. In a negatively skewed distribution, Mode > Median > Mean.

Q51. Answer: (c) Four

Given series: (LEFT) W & T O ! A L % V E N # J * U D $ I X @ C ^ (RIGHT)

Condition to be checked:

1. Consonants which are immediately preceded by a vowel.

2. Consonants which are immediately followed by a symbol.

So, the required pattern: Vowel → Consonant → Symbol

W & T O ! A L % V E N # J * U D $ I X @ C ^

Thus there are four such patterns that are following the above conditions.

Hence, "Option 3" is the correct answer.

Mistake Points

Immediately preceded by means immediately before or to come just before.

Immediately followed by means immediately after or to come just after.

Q52. Answer: (a) 62/3 % Profit

Shortcut Trick

To find profit/loss%, equalize the quantity of bananas.

LCM of 8 and 6 is 24.

CP of 24 bananas = 25 × 3 = Rs. 75.

SP of 24 bananas = 20 × 4 = Rs. 80.

Profit = 80 − 75 = Rs. 5.

Profit% = (5 ÷ 75) × 100 = 100 ÷ 15 = 20 ÷ 3 = 6(2/3)%.

Therefore The correct answer is 6(2/3)% Profit.

Alternate Method

Given → CP of 8 items = Rs. 25 | SP of 6 items = Rs. 20.

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

=> Cost Price (CP) of 1 banana = 25 ÷ 8 = Rs. 3.125.

=> Selling Price (SP) of 1 banana = 20 ÷ 6 = Rs. 3.333... (10/3).

=> Profit per banana = (10/3) − (25/8) = (80 − 75) ÷ 24 = 5/24.

=> Profit% = [(5/24) ÷ (25/8)] × 100.

=> Profit% = (5/24) × (8/25) × 100 = (1/3) × (1/5) × 100 = 100 ÷ 15 = 6(2/3)%.

Therefore The correct answer is 6(2/3)% Profit.

Additional Information

Unitary Method in Profit and Loss

Always calculate the price of a single unit or a common multiple of units to compare CP and SP accurately.

Cross Multiplication Trick

For (n1 items at Rs. p1) and (n2 items at Rs. p2), the ratio of CP:SP is (p1 × n2) : (p2 × n1).

Q53. Answer: (d) Abdul Kalam Technology Innovation National Fellowship

The correct answer is Abdul Kalam Technology Innovation National Fellowship

Key Points

• The Abdul Kalam Technology Innovation National Fellowship is an initiative by the Department of Science and Technology (DST), Government of India.

• It is designed to recognize and support Indian nationals engaged in high-impact, translational research that has the potential to solve societal problems.

• The fellowship particularly encourages researchers who are working towards innovation and technological solutions,

• It bridges the gap between laboratory research and real-world application.

Additional Information The key objectives of the fellowship are to:

• Encourage innovation: The fellowship promotes original research and innovation that can lead to new technologies, products, or processes.

• Support translation: It focuses on helping researchers bring their ideas and inventions to practical use, especially in sectors such as healthcare, agriculture, energy, and manufacturing.

• Provide financial and institutional support: Fellows receive financial assistance and are often given access to necessary infrastructure to carry out their work.

Q54. Answer: (c) Bengali

The correct answer is Bengali

Key Points

• According to the Government of India, Bengali is not currently considered a classical language.

• As of now, the recognized classical languages in India are Tamil, Sanskrit, Kannada, Telugu, Malayalam, and Odia.

• In 2004, the Government of India declared Tamil as the Classical Language of India.

• In 2005, right after Tamil, the government declared Sanskrit as a Classical Language of India.

• These two languages are undeniably parental sources for several languages belonging to the Indo-European family and the Dravidian family of language groups.

• The government gave the classical language status to Kannada and Telugu in 2008.

• Malayalam was declared as a classical language in 2013 and in 2014, Odia was also given the status of a Classical language.

Additional Information

• The idea of Classicism had its origin in Europe.

• According to information provided by the Ministry of Culture in the Rajya Sabha in February 2014, the guidelines for declaring a language as ‘Classical’ are given.

• The Government tracks the following criteria to define the eligibility of language to be considered for classification as “classical language”:

• Extraordinary antiquity of its early transcripts or verified history over a period of 1500-2000 years.

• A body of ancient literature or texts, which is considered a valuable heritage by generations of speakers.

• The literary tradition should be original and unique, and certainly not hired from another language community.

• Classical language and literature are diverse from modern, there may also be a discontinuity between the classical language and its later forms or its sprouts.

Q55. Answer: (d) $CO(g) + H_2(g) \rightarrow CH_2O(l)$

The correct answer is $CO(g) + H_2(g) \rightarrow CH_2O(l)$.

Key Points$CO(g) + H_2(g) \rightarrow CH_2O(l)$: This reaction is not feasible as written.

• Typically, the synthesis of formaldehyde (CH_2O) from carbon monoxide (CO) and hydrogen (H_2) does not proceed directly in this manner.

• Instead, formaldehyde is generally produced industrially by the oxidation of methanol or by processes involving careful control of conditions, which do not simply involve the direct combination of CO and H_2.

• Moreover, formaldehyde is usually found in gaseous or aqueous solution form under normal conditions, not as a liquid (l).

Additional InformationChemical Reactions:

• A process in which one or more compounds are formed as products completely different from the reacting substances is known as a chemical reaction.

• There is generally a change in heat, color, or appearance when a chemical reaction takes place.

Addition reaction:

• Unsaturated hydrocarbons such as alkenes add Hydrogen in the presence of catalysts such as Ni to form saturated hydrocarbons. This is called an addition reaction.

• The reaction is commonly used in the hydrogenation of vegetable oils using a Nickel catalyst.

• The reaction is:

Displacement reaction:

• The replacement of an atom by another atom in a chemical reaction is called a displacement reaction.

Decomposition reaction:

• Those reactions in which a compound splits up into two or more simpler substances are known as decomposition reactions.

• The decomposition reactions are carried out by applying heat, light or electricity.

• Heat, light, or electricity provide energy that breaks a compound into two or more simpler compounds.

• A decomposition reaction is the opposite of a combination reaction.

Neutralization reaction:

• The reaction of an acid with a base to give salt and water is called a neutralization reaction.

• Example is:NaOH (strong base) + HCl (strong acid) → NaCl + H_2O

Q56. Answer: (d) optical centre

The correct answer is Optical centre.

Key Points

• A light ray passing through the optical centre of a lens passes without any deviation.

• The optical centre is the central point of a lens, and when a light ray passes through this point,

• the curvature of the lens at the entry and exit points essentially cancel each other out, causing no deviation in the ray's path.

• This is true for both concave and convex lens.

Additional InformationLens:

• A lens is a piece of transparent refracting material bounded by two spherical surfaces or one spherical and another plane surface.

• A lens is used in microscopes, cameras, telescopes, projectors, etc.

• Types of lenses:

1. Convex lens

2. Concave lens

Concave and Convex Lens

• Convex lens: A lens that is thick at the centre and thin at the edges is called a convex lens. They converge ray of light toward its focus.

• Concave lens: A lens that is thin at the centre and thick at the edges are the concave lens. They are diverging lenses.

Q57. Answer: (c) Sarkar Talwar

The correct answer is Sarkar Talwar

Key Points

• In 2021, Sarkar Talwar was one of the five coaches who received the Dronacharya Award for Lifetime Achievement.

• He is a renowned coach in the field of Wrestling.

• Sarkar Talwar is particularly known for his expertise in freestyle wrestling and has been instrumental in shaping many successful wrestlers

• He has trained several prominent wrestlers, many of whom have gone on to represent India in international events, including the Asian Games, Commonwealth Games, and the Olympics.

Additional Information

• Dronacharya award:

• This award is given to those coaches who have successfully trained sportspersons or team and enable them to achieve outstanding results in international competitions.

• This eminent award was started in the year 1985.

• It is given to coaches for their hard work to produce top-level sportspersons.

• This award is named after the legendary guru or teacher ‘Dronacharaya’.

• In this award, the coach is given 15 lakh rupees cash, the scroll of honour, and a statue of guru Dronacharaya.

Q58. Answer: (d) IIT Hyderabad

The correct answer is IIT Hyderabad.

Key Points

• Centre for Cellular and Molecular Biology:-

• The institution in India that pioneered the first alternative to corneal transplantation is the Indian Institute of Technology Hyderabad (IIT Hyderabad), in collaboration with the LV Prasad Eye Institute (LVPEI)

• The team of researchers, led by Dr. Sayan Basu and Dr. Vivek Singh from LVPEI, successfully 3D-printed the artificial cornea from human donor corneal tissue and transplanted it into a rabbit eye in August 2022.

• The transplant was successful, and the rabbit is now able to see clearly.

• The 3D-printed cornea is made from a biocompatible hydrogel that is derived from human corneal tissue.

• This means that the cornea is completely natural and free of any synthetic or animal components.

• This makes it very safe for use in human patients.

Additional Information

Institute Name	City
All India Institute of Medical Sciences (AIIMS)	New Delhi

YourMockTest.com — Free Study Material

Post Graduate Institute of Medical Education and Research (PGIMER)	Chandigarh
Christian Medical College (CMC)	Vellore
Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER)	Puducherry
King George's Medical University (KGMU)	Lucknow
Maulana Azad Medical College (MAMC)	New Delhi
Grant Medical College	Mumbai
St. John's Medical College	Bengaluru
Institute of Medical Sciences, BHU	Varanasi
Kasturba Medical College	Manipal
Amrita Institute of Medical Sciences (AIMS)	Kochi
Seth GS Medical College	Mumbai
Sri Ramachandra Institute of Higher Education and Research	Chennai
Dr. D.Y. Patil Medical College	Pune
Armed Forces Medical College (AFMC)	Pune

Q59. Answer: (c) Fleming's right-hand rule

The correct answer is Fleming's right-hand rule

Key Points

• Fleming right-hand thumb rule:

• The direction of the induced current is obtained by Fleming's right-hand rule.

• Fleming's right-hand rule (for generators) shows the direction of induced current when a conductor attached to a circuit moves in a magnetic field.

• The thumb is pointed in the direction of the motion of the conductor relative to the magnetic field.

• The first finger is pointed in the direction of the magnetic field. (north to south)

• Then the second finger represents the direction of the induced or generated current within the conductor (from the terminal with lower electric potential to the terminal with higher electric potential, as in a voltage source)

Finger	Right-hand rule	Left-hand rule
Thumb	The direction of motion of conductor (input)	The direction of the conductor (output)
Forefinger	Magnetic field	Magnetic field
Middle finger	The direction of induced emf (output)	The direction of current (input)

Additional Information

• Fleming's left-hand rule:

• According to Fleming's left-hand rule, if the thumb, forefinger, and middle finger of the left hand are stretched to be perpendicular to each other as shown in the figure, and if the forefinger represents the direction of the magnetic field, the middle finger represents the direction of the current, then the thumb represents the direction of the force.

Q60. Answer: (d) C

Given: Five friends, A, B, C, D and E appeared for the same exam and each scored differently.

1) B scored higher than only two of her friends.

_ > _ > B > _ > _

2) E scored higher than only D.

_ > _ > B > E > D

3) C did not score the highest, but scored more than B.

After positioning C only one position is left which will be occupied by the only person left i.e. A.

A > C > B > E > D

Thus, according to the final arrangement, C scored the second highest in the exam.

Hence, "Option 4" is the correct answer.

Q61. Answer: (b) Loo

The correct answer is Loo.

Key Points

• The Loo is a strong, dusty, gusty, hot, and dry summer wind from the west which blows over the western Indo-Gangetic Plain region of North India and Pakistan.

• Loo winds originate over the Iranian, Baloch, and Thar deserts.

• It is especially strong in the months of May and June.

• Due to its very high temperatures (45 °C–50 °C or 115 °F–120 °F), exposure to it often leads to fatal heatstrokes.

• Since it causes extremely low humidity and high temperatures, the Loo also has a severe drying effect on vegetation leading to widespread browning in the areas affected by it during the months of May and June

Additional Information

Term	Meaning	Context/Significance
Kaal Baisakhi	A seasonal storm or unseasonal rainfall, often accompanied by strong winds.	Primarily occurs in April in parts of North India (especially in Bengal and Assam), marking the start of the Baisakhi festival. It is an unpredictable event and can cause sudden and severe weather disturbances.
Sameer	A common name in India, meaning air or breeze in Sanskrit.	Used as a name for individuals but also symbolically refers to a gentle breeze in various cultural contexts, especially in poetry and songs.
Uttarayan	Refers to the sun's journey northward in the zodiac, as per Hindu tradition.	It marks the Makar Sankranti festival, when the sun begins its movement towards the northern hemisphere. Uttarayan is celebrated with kite flying, especially in Gujarat and Rajasthan.

Q62. Answer: (d) W 46

The logic followed here is:

Hence, "Option 4" is the correct answer.

Q63. Answer: (b) 28

Decoding signs:

Letters	P	Q	R	S
Means	×	•	•	÷

Given: 15 S 5 P 10 Q 4 R 2 = ?480÷0.3×5+500190+9×27÷1.6=2480÷0.3×5+500190+9×27÷1.6=2

According to the question, after replacing the letters:

15 S 5 P 10 Q 4 R 2 = ? => 15 ÷ 5 × 10 - 4 + 2 = ?

=> 15 ÷ 5 × 10 - 4 + 2 = ?

=> 3 × 10 - 4 + 2 = ?

=> 30 + 2 - 4 = ?

=> 32 - 4 = ?

=> 28 = ?

Hence, "Option 2" is the correct answer.

Q64. Answer: (d) x2 - 2 √3 x + 2 = 0

Shortcut Trick

Identify the Sum (S) and Product (P) of the given roots.

Sum (S) = (√3 + 1) + (√3 − 1) = 2√3

Product (P) = (√3 + 1) × (√3 − 1) = 3 − 1 = 2

Equation pattern: $x^2 - (\text{Sum})x + (\text{Product}) = 0$

Therefore The correct answer is $x^2 - 2\sqrt{3}x + 2 = 0$.

Alternate Method

Given: The roots of the required equation are $\alpha = \sqrt{3} + 1$ and $\beta = \sqrt{3} - 1$.

Formula Used: A quadratic equation can be expressed as $x^2 - (\alpha + \beta)x + \alpha\beta = 0$, where $(\alpha + \beta)$ is the sum of roots and $\alpha\beta$ is the product of roots.

=> Sum of roots $(\alpha + \beta) = (\sqrt{3} + 1) + (\sqrt{3} - 1)$

=> Sum $= \sqrt{3} + 1 + \sqrt{3} - 1 = 2\sqrt{3}$

=> Product of roots $(\alpha\beta) = (\sqrt{3} + 1) \times (\sqrt{3} - 1)$

=> Using the identity $(a + b)(a - b) = a^2 - b^2$

=> Product $= (\sqrt{3})^2 - (1)^2 = 3 - 1 = 2$

=> Substituting the Sum and Product in the formula: $x^2 - (2\sqrt{3})x + 2 = 0$

Therefore The correct answer is $x^2 - 2\sqrt{3}x + 2 = 0$.

Additional Information

General Form of Quadratic Equation

The standard form is $ax^2 + bx + c = 0$, where $a \neq 0$.

Nature of Roots

Determined by the Discriminant $D = b^2 - 4ac$. If $D > 0$ roots are real and distinct; if $D = 0$ roots are real and equal; if $D < 0$ roots are imaginary.

Relation between Roots and Coefficients

For $ax^2 + bx + c = 0$, Sum of roots $= -b/a$ and Product of roots $= c/a$.

Irrational Roots

If coefficients are rational, irrational roots always occur in conjugate pairs (e.g., if one root is $a + \sqrt{b}$, the other is $a - \sqrt{b}$).

Q65. Answer: (a) Rs. 10,875

Shortcut Trick

Ratio of Profit = (Investment_A × Time_A) : (Investment_B × Time_B)

Given Profit Ratio = 8 : 9 and Time Ratio = 12 : 9 (since B joined after 3 months).

Investment Ratio = (Profit ÷ Time) => (8 ÷ 12) : (9 ÷ 9) = (2 ÷ 3) : 1 = 2 : 3.

If 2 units = Rs. 7,250, then 1 unit = Rs. 3,625.

B's contribution = 3 units = 3 × 3,625 = Rs. 10,875.

Therefore The correct answer is Rs. 10,875.

Alternate Method

Given: A's investment (C_A) = Rs. 7,250; A's time (T_A) = 12 months; B's time (T_B) = 12 − 3 = 9 months; Profit ratio (P_A : P_B) = 8 : 9.

Formula: (C_A × T_A) ÷ (C_B × T_B) = P_A ÷ P_B

=> (7,250 × 12) ÷ (C_B × 9) = 8 ÷ 9

=> (7,250 × 12 × 9) = 8 × 9 × C_B

=> 87,000 × 9 = 72 × C_B

=> C_B = (7,250 × 12) ÷ 8

=> C_B = 7,250 × 1.5 = 10,875

Therefore The correct answer is Rs. 10,875.

Additional Information

Partnership Basics

In a partnership, the profit is distributed in the ratio of the product of capital and the time period for which the capital is invested.

Types of Partnership

1. Simple Partnership: Investments are for the same time. 2. Compound Partnership: Investments are for different time periods.

Q66. Answer: (a) 11

The logic followed here is:

Logic: $(\text{2nd number})^3 + (\text{2nd number})^2 = \text{1st number}$.

Now,

For, 392 : 7

=> $(7^3 + 7^2) = (343 + 49) = 392$.

For, 810 : 9

=> $(9^3 + 9^2) = (729 + 81) = 810$.

Similarly, for 1452 : ?

=> $11^3 + 11^2 = (1331 + 121) = 1452$

On solving for ?, we find that ? = 11.

Hence, the correct answer is "Option 1".

Q67. Answer: (c) All the conclusions I, II and III follow

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

Conclusions:

(I) Some lakes are not rivers → Follow (As no river is a mountain and some mountains are lakes. As some part of lakes is common with mountains which cannot be river, therefore it is true.)

(II) Some lakes are mountains → Follow (As some mountains are lakes. As some part of mountains common with lakes, therefore it is true.)

(III) Some ponds are mountains → Follow (As some mountains are lakes and all lakes are ponds. As whole lakes comes in ponds and has some part common with mountains, therefore it is true.)

Therefore Here, All the conclusions I, II and III follow.

Hence, the correct answer is "Option 3".

Q68. Answer: (d) 28

The logic followed here is:

Logic: (1st number + 11) = 2nd number.

Now,

For, 139 : 150

=> 139 + 11 = 150.

For, 73 : 84

=> 73 + 11 = 84.

Similarly, for 17 : ?

=> 17 + 11 = 28.

Hence, the correct answer is "Option 4".

Q69. Answer: (b) four times of its original value

The correct answer is four times of its original value

Key Points

• The resistance of a conductor is given by the formula: $R=\rho \times A/L$

• Where:

• RR is the resistance

• ρρ is the resistivity of the material

• LL is the length of the conductor

• A is the area of the cross-section

• If the length

LL is doubled and the area A is halved, the new resistance

R'R′ will be:

• $R'=\rho \times 2L/2A=\rho \times 4L/A$

• So, the new resistance R′R′R′R′R′ R' R′ is four times the original resistance.

Additional Information

• Ohm’s Law

• Ohm’s law states that if the physical state (i.e. length, temperature, mechanical strain, material) of the conductor remains the same then the voltage applied across its ends is directly proportional to the current flowing through it.

• V prop. to I

• V = I R (V = Voltage, I = current, R = resistance)

Q70. Answer: (b) tracheae

The correct answer is Tracheae.

Key Points

• In the respiratory system of insects oxygen and carbon dioxide gases are exchanged through a network of tubes called tracheae.

• Air enters and exits the respiratory systems of insects through a series of external openings called spiracles.

• Spiracles' external openings, which act as muscular valves in some insects, lead to the internal respiratory system, a densely networked array of tubes known as tracheae.

• Air entered through the spiracles into the tracheal tubes and diffuses into the body tissues.

Additional Information

• Insects do not possess an arrangement of blood vessels such as those in mammals. Instead insects have a cavity that is full of insect blood (known as haemolymph) and the organs of the insect are suspended in this cavity.

• Ventral diaphragm

• An internal septum that divides the body cavity into compartments, located between the ventral nerve cord and the gut.

Q71. Answer: (a) Makar Sankranti

The correct answer is Makar Sankranti

Key Points

• The festival known as "Magh Bihu" in Assam is Makar Sankranti.

• Magh Bihu is the Assamese name for the harvest festival celebrated on Makar Sankranti,

• It marks the end of the harvesting season and is also called "Bhogali Bihu"

• Magh Bihu is celebrated in the month of Magh, which is January–February.

Additional Information

• Raksha Bandhan

• Raksha Bandhan is celebrated on the full-moon day of the Hindu month of Sravana (July/August).

• Raksha Bandhan festival celebrates the love of a brother for his sister.

• Rakhi strengthens the bond of love between brothers and sisters and revives the emotional bonding.

• Holi

• Holi is typically celebrated at the end of winter, on the day after the full moon in the Hindu month of Phalguna, which usually falls in late February or early March.

• The night before Holi is known as Holika Dahan or Choti Holi, during which bonfires are lit to signify the burning of the evil Holika.

• The next day, which is the main day of Holi celebrations, is often called Dhulandi or Rangwali Holi, where people play with colours and water.

• Dussehra

• The tenth day after Sharad Navratri is celebrated as Dussehra or Vijayadashami.

• Navratri ("nine nights") also called Durga Puja, in Hinduism, is a major festival held in honor of the divine feminine.

• Navratri occurs over 9 days during the month of Ashvin, or Ashvina (in the Gregorian calendar, usually September-October).

• It often ends with the Dussehra (also called Vijayadashami) celebration on the 10th day.

Q72. Answer: (d) 129

Given:

√8836+√6084-√1849

Calculation:

=> √8836 = 94

=> √6084 = 78

=> √1849 = 43

=> √8836+√6084-√1849

=> 94 + 78 - 43

=> 172 - 43

=> 129

Therefore Option 4 is the correct answer.

Q73. Answer: (c) The Vice-President of India

The correct answer is The Vice-President of India

Key Points

• Under Article 89 of the Indian Constitution, it is provided that the Vice-President of India shall be the ex-officio Chairman of the Council of States (Rajya Sabha).

• This means that the Vice-President automatically assumes the role of the Chairman of the Rajya Sabha by virtue of holding the office of the Vice-President.

• The Chairman presides over the sessions of the Rajya Sabha and ensures its smooth functioning.

• However, the Vice-President does not vote in the Rajya Sabha, except in the case of a tie, where the Chairman exercises a casting vote.

Additional Information

• Article 63 of the Indian Constitution tells that there shall be a Vice-President of India.

• Articles 64 and 89 (1) tell that the Vice-President of India shall be the ex-officio Chairman of the Council of States(Rajya Sabha).

• In the constitutional setup of India, the holder of the office of the Vice president is part of the executive but as the chairman of the Rajya Sabha, he is a part of Parliament. He has thus a dual capacity and holds two distinct and separate offices.

Q74. Answer: (c) Y

Given series:

S 3 F X # 7 M T & 8 R 9 Y Z * 2 C G 6 A

Condition to be checked:

If all numbers are dropped from the series, which of the following will be sixth from the right?

Series after dropping numbers:

S F X # M T & R Y Z * C G A

Counting from the right:

1. A
2. G
3. C
4. *
5. Z
6. Y

Thus, the sixth element from the right is Y.

Hence, the correct answer is "Option 3".

Q75. Answer: (c) 10

The correct answer is 10

Key Points

• The Ministry of Social Justice and Empowerment launched the SMILE (Support for Marginalized Individuals for Livelihood and Enterprise) scheme in 10 cities in February 2022

• SMILE stands for Support for Marginalized Individuals for livelihood and Enterprise.

• The Smile Scheme is launched by the union minister of Social justice and Empowerment, Dr. Virendra Singh in Feb 2022.

• The scheme targets the groups involved in the act of begging especially the transgender community.

• The scheme ensures necessary legal protection, and social security for the targeted groups.

• The budget allocated for the scheme is Rs.365 crores over a period of 5 years.

Additional Information

• Sweekruti Scheme was also introduced for the promotion of transgender and equality for transgenders in the Odisha government.

• There are schemes like Shelter homes for transgender persons in Gujarat under which people from the community would be provided with basic necessities of food and shelter.

Q76. Answer: (c) 30 years

Shortcut Trick

The difference in ages always remains constant (35 years).

5 years later, Father : Son = 2 : 1. Difference = 1 unit.

=> 1 unit = 35 years.

=> Son's age after 5 years = 1 × 35 = 35 years.
=> Son's present age = 35 − 5 = 30 years.
Therefore The correct answer is 30 years.
Alternate Method
Given: Difference = 35 years. Future ratio (after 5 years) = 2 : 1.
Let the present age of the son be x years.
Then the present age of the father = x + 35 years.
According to the question (after 5 years):
=> (Father's age + 5) = 2 × (Son's age + 5)
=> (x + 35) + 5 = 2 × (x + 5)
=> x + 40 = 2x + 10
=> 2x − x = 40 − 10
=> x = 30
Therefore The correct answer is 30 years.
Additional Information
Constant Age Difference
The numerical difference between the ages of two persons never changes with time, regardless of how many years pass.
Ratio Method
If the ratio of ages changes from a:b to c:d over 'n' years, ensure the ratio difference is balanced to solve quickly without variables.

Q77. Answer: (b) 20

Shortcut Trick
Net emptying part in 1 hour by (A + B + C) = (1/9) ÷ (5/4) = 4/45 part/hour.
Part emptied by A and B in 1 hour = 1/15 + 1/18 = 11/90 part/hour.
Filling part by C in 1 hour = (Part emptied by A + B) − Net emptying part.
Efficiency of C = 11/90 − 4/45 = 11/90 − 8/90 = 3/90 = 1/30 part/hour.
Time required for C to fill 2/3 part = (2/3) ÷ (1/30) = 20 hours.
Therefore The correct answer is 20 hours.
Alternate Method
Given:
Time taken by A to empty the tank = 15 hours
Time taken by B to empty the tank = 18 hours
Time taken by A, B, and C to empty 1/9 part of the tank = 5/4 hours
Calculations:
=> Time taken by A, B, and C together to empty the full tank = (5/4) × 9 = 45/4 hours
=> Let the total capacity of the tank be the LCM of (15, 18, and 45) = 90 units.

Pipe	Hours	Total Capacity	Efficiency
A	15	90	−6
B	18	−5	
A + B + C	45/4	−8	

=> Note: Emptying efficiencies are taken as negative.
=> Efficiency of A + B + C = −8
=> (−6) + (−5) + Efficiency of C = −8
=> −11 + Efficiency of C = −8
=> Efficiency of C = −8 + 11 = +3 units/hour (Positive sign indicates filling pipe)
=> We need to find the time taken by C to fill 2/3 part of the tank.
=> Required capacity to fill = 2/3 × 90 = 60 units
=> Time taken by pipe C = 60 ÷ 3 = 20 hours
Therefore The correct answer is 20 hours.
Additional Information

Pipes & Cisterns

If a pipe can fill a tank in x hours and another can empty it in y hours, their combined filling rate is (1/x − 1/y) per hour.

Negative Efficiency

Emptying pipes are assigned a negative efficiency since they constantly act against the total capacity to be filled.

LCM Method

Taking the LCM of the individual times provides a convenient unit value for the total capacity of the tank, thereby avoiding fractional calculations.

Q78. Answer: (d) A - R, B - S, C - P, D - Q

The correct answer is A - R, B - S, C - P, D - Q

Key Points

• A → R

• B → S

• C → P

• D → Q

• | Column I Direction of ray of light before reflection | Column II Direction of ray of light after reflection | | |

A)	**Incident ray passing through or directed on to the principal focus**	**R)**	**Reflected ray will propagate parallel to the principal axis**
B)	Incident ray passing through or directed on to the center of curvature	S))	Reflected ray will retrace the path of incidence in the opposite direction
C)	Incident ray passing parallel to principal axis	P)	Will pass through or appear to diverge from the principal focus
D)	Incident ray directed on to the pole of the mirror making an angle with the principal axis	Q)	Reflected ray is on the other side of the principal axis making same angle with respect to the incident ray

Additional Information

• A) Incident ray passing through or directed onto the principal focus

• The principal focus is a key point of a spherical mirror where light rays converge or appear to diverge.

• Rule: When a light ray passes through or is directed toward the principal focus of a mirror, after reflection, the ray becomes parallel to the principal axis.

• Match: A → R

• B) Incident ray passing through or directed onto the center of curvature

• The center of curvature is the center of the sphere from which the mirror is cut. A ray passing through it strikes the mirror perpendicularly.

• Rule: When a light ray passes through or is directed toward the center of curvature, it strikes the mirror at a 90° angle and reflects back along the same path.

• Match: B → S

• C) Incident ray passing parallel to the principal axis

• Rays parallel to the principal axis converge at the principal focus (concave mirror) or appear to diverge from it (convex mirror) after reflection.

• Rule: When a light ray is parallel to the principal axis, after reflection, it either passes through the principal focus (concave mirror) or appears to diverge from the principal focus (convex mirror).

• Match: C → P

• D) Incident ray directed onto the pole of the mirror making an angle with the principal axis

• The pole is the midpoint of the mirror's surface. The angle of incidence here equals the angle of reflection.

• Rule: When a ray strikes the pole, it reflects at an angle equal to its angle of incidence, making the same angle with the principal axis on the opposite side.

• Match: D → Q

YourMockTest.com — Free Study Material

Q79. Answer: (b) Z

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

1) Only two friends are taller than D.

_ > _ > D > _ > _ > _

2) Only four friends are shorter than Z.

_ > Z > D > _ > _ > _

3) A is the shortest among all.

_ > Z > D > _ > _ > A

4) K is taller than Z.

K > Z > D > _ > _ > A

5) F is immediately shorter than E.

K > Z > D > E > F > A

Thus, according to the final arrangement, Z is the second tallest among all the friends.

Hence, "Option 2" is the correct answer.

Q80. Answer: (c) Sodium hydroxide

The correct answer is Sodium hydroxide

Key Points

• Sodium hydroxide (NaOH) is the product formed by the electrolytic decomposition of brine.

• This process is called the chlor-alkali process.

• Brine is a highly concentrated solution of sodium chloride (NaCl) in water

• Electrolysis:

• The process of passing electricity through a solution

• Due to electrolysis Sodium Chloride gets decomposed and forms sodium hydroxide at the cathode.

• During this process, chlorine gas (Cl) gets liberated at the anode and Hydrogen (H) gas at the cathode.

• The whole equation is given by

• 2Nacl+2H2O→ 2NaOH+Cl2+H2.

Additional Information

Compound	Chemical Formula	Common Name	Properties	Uses
Potassium Hydroxide	KOH	Caustic Potash	• Strong base • Highly corrosive • White, deliquescent solid	• Soap and detergent production • Electrolyte in alkaline batteries • Fertilizers
Calcium Hydroxide	Ca(OH)2	Slaked Lime/Lime Water	• Weak base • Slightly soluble in water • White powder or crystal	• Neutralizing acidic soil • Preparation of lime mortar • Purifying sugar juice
Bleaching Powder	Ca(OCl)2	Chlorinated Lime	• Yellowish-white powder • Releases chlorine gas • Disinfectant and oxidizing agent	• Disinfecting drinking water • Bleaching in the textile industry • Sanitizing surfaces

Q81. Answer: (a) B

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

1) A is sitting second to the left of C.

2) F is sitting to the immediate right of C.

3) D is an immediate neighbour of both A and E.

After positioning D and E only one position is left which will be occupied by the only person left i.e. B.

Thus, according to the final arrangement, B is sitting third to the right of E.

Hence, "Option 1" is the correct answer.

YourMockTest.com — Free Study Material

Q82. Answer: (c) Upanishads

The correct answer is Upanishads

Key Points

• Brihadaranyaka, Mundaka, and Taittiriya are examples of Upanishads, which are a category of religious texts in the Vedas.
• Upanishads
• These are a set of texts in the Vedas that are considered to be authorless and eternal creations.
• The Upanishads are Philosophical texts.
• They are generally called Vedanta, as the came toward the end.
• Upanishad is derived from the words upa (near) and shad (to sit).
• It is derived from the concept of sitting near the feet of the teacher.
• Vrihadaranyaka is the oldest Upanishada.

Additional Information

Feature	Jataka Stories	Epics	Puranas
Definition	Stories about the previous births of Buddha.	Long narrative poems about heroic deeds.	Ancient texts containing mythology, legends, and cosmology.
Origin	Associated with Buddhist literature.	Rooted in Vedic tradition and Hindu culture.	Primarily part of Hindu religious tradition.
Purpose	Teach moral and ethical lessons.	Glorify heroism, dharma, and values.	Preserve myths, religious practices, and history.
Examples	Stories like "The Monkey King" and "The Golden Deer."	Mahabharata, Ramayana.	Vishnu Purana, Shiva Purana, Bhagavata Purana.

Q83. Answer: (c) 48 years

Shortcut Trick

Let B be x years old and A be (x + 9) years old.

In 10 years, A will be (x + 19) and 10 years ago, B was (x − 10).

Condition: (x + 19) = 2 × (x − 10) => x + 19 = 2x − 20 => x = 39.

Present age of A = 39 + 9 = 48 years.

Therefore The correct answer is 48 years.

Alternate Method

Given: Difference in ages (A − B) = 9. Relation after 10 years and before 10 years.

Formula Used: Linear equation based on age constraints.

Let the Present age of B = B years.

=> Present age of A = B + 9 years.

=> A after 10 years = (B + 9) + 10 = B + 19.

=> B 10 years ago = B − 10.

=> According to the question: B + 19 = 2 × (B − 10)

=> B + 19 = 2B − 20

=> 2B − B = 19 + 20

=> B = 39 years

=> Present age of A = 39 + 9 = 48 years.

Therefore The correct answer is 48 years.

Additional Information

Age Difference Property

The difference between the ages of two persons remains constant at any point in time (past, present, or future).

Ratio Method for Ages

When ratios at two different times are given, equating the difference between ratio parts helps solve age problems without long algebra.

Future and Past Ages

To find the age n years ago, subtract n from the present age. To find the age n years hence, add n to the present age.

Q84. Answer: (d) C ≥ H

Given Statement: C > N = R ≥ H > Q < S

Now,

Conclusions:

Option 1: N ≥ H → True (N = R ≥ H It gives N ≥ H)

Option 2: S > Q → True (Q < S It gives S > Q)

Option 3: C > R → True (C > N = R It gives C > R)

Option 4: C ≥ H → False (C > N = R ≥ H It gives C > H)

Hence, the correct answer is "Option 4".

Q85. Answer: (c) Apple

Given: Five boxes containing different fruits, namely strawberry, apple, litchi, cherry and pear, are kept one above the other.

1) The strawberry box is in the exact middle of the stack.

Box order	Fruits
Top	
1	
2	
3	Strawberry
4	
5	
Bottom	

2) The box at the bottom most position contains pears.

Box order	Fruits
Top	
1	
2	
3	Strawberry
4	
5	Pears
Bottom	

3) The pear box is immediately below the litchi box.

Box order	Fruits
Top	
1	
2	
3	Strawberry
4	Litchi
5	Pears
Bottom	

4) Only the apple box is in between the cherry and strawberry boxes.

Box order	Fruits
Top	

YourMockTest.com — Free Study Material

1	Cherry
2	Apple
3	Strawberry
4	Litchi
5	Pears
Bottom	

Thus, according to the final arrangement, Apple box is second from the top.

Hence, "Option 3" is the correct answer.

Q86. Answer: (a) Six months

The correct answer is Six months

Key Points

• Sportspersons can apply for cash award schemes online within six months of the last date of a sports event.

• The application can be submitted through the DBT-MIS portal of the Department of Sports.

• The online portal allows sportspersons to apply for cash awards for international sports events and their coaches.

• The portal also allows sportspersons to apply for the Pandit Deendayal Upadhyay National Welfare for Sportspersons and the Pension to Meritorious Sportsperson Scheme.

Additional Information

• Union Minister of Youth Affairs and Sports Anurag Thakur has launched revised schemes of cash awards, national welfare and pension to sportspersons.

• He also launched web portal for schemes of Department of Sports and National Sports Development Fund website in New Delhi.

• These revised schemes will provide more transparency and accountability to give benefit to sports persons in record time.

• The procedures have been relaxed for the athletes so that they can get the benefits of welfare schemes without any delay.

Q87. Answer: (c) UJTS

The logic followed here is:

PAIN : APNI

And,

MODE : OMED

Similarly,

JUST : ?

Hence, "Option 3" is the correct answer.

Q88. Answer: (a) is a tiny magnet

The correct answer is a tiny magnet

Key Points

• A compass needle is a small bar magnet.

• When it is brought near a bar magnet, it experiences a force due to the magnetic field of the bar magnet, causing it to get deflected.

• The compass needle itself is a small bar magnet, with its ends acting as the north and south poles.

• A bar magnet generates a magnetic field around it.

• When the compass needle is brought into this field, its poles experience forces that cause it to align with the field lines of the bar magnet.

Additional Information

• A compass is a device that shows the cardinal directions used for navigation and geographic orientation.

• It commonly consists of a magnetized needle or other element, such as a compass card or compass rose, which can pivot to align itself with magnetic north.

• Other methods may be used, including gyroscopes, magnetometers, and GPS receiver

Q89. Answer: (b) 25

Shortcut Trick

Original sorted data (n=14): 2, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 24

Initial Median x = (13 + 14) ÷ 2 = 13.5
After replacing 2, 8 with 21, 18, new sorted data: 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 18, 20, 21, 24
New Median y = (15 + 16) ÷ 2 = 15.5
Calculation: 3x − y = 3 × 13.5 − 15.5 = 40.5 − 15.5 = 25
Therefore The correct answer is 25.
Alternate Method
Given: Data set = {9, 12, 11, 8, 16, 18, 10, 14, 15, 13, 17, 20, 2, 24}. Total observations (n) = 14.
Formula Used: Median for even n = Average of (n/2)^(th) and (n/2 + 1)^(th) terms.
Step 1: Find x
=> Sorted Data: 2, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 24
=> n = 14 (Even)
=> Median x = ((14/2)^(th) term + (14/2 + 1)^(th) term) ÷ 2
=> x = (7^(th) term + 8^(th) term) ÷ 2 = (13 + 14) ÷ 2 = 13.5
Step 2: Find y
=> Replace 2 with 21 and 8 with 18.
=> New Sorted Data: 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 18, 20, 21, 24
=> Median y = (7^(th) term + 8^(th) term) ÷ 2 = (15 + 16) ÷ 2 = 15.5
Step 3: Calculate (3x − y)
=> 3 × 13.5 − 15.5
=> 40.5 − 15.5 = 25
Therefore The correct answer is 25.
Additional Information
Median for Odd n
If the number of observations (n) is odd, the median is the ((n + 1) / 2)^(th) term of the sorted data.
Empirical Formula
Relationship between Mean, Median, and Mode: Mode = 3 × Median − 2 × Mean.
Range
Range is the difference between the highest and lowest values in a data set: Range = Max Value − Min Value.

Q90. Answer: (c) left auricle

The correct answer is left auricle
Key Points
• In the human heart, the pulmonary vein is connected to the left atrium
• The pulmonary vein carries oxygenated blood from the lungs directly into the left atrium of the heart
• This blood is then pumped to the right ventricle.
• From there this deoxygenated blood is pumped to the lungs through the pulmonary artery.
• The blood then takes up the oxygen releasing out the carbon dioxide in the lungs and get oxygenated.
Additional Information
• The human heart is made up of 4 chambers:
• Right and left auricle (or atrium)
• Right and left ventricle
• The upper two chambers are called auricle and the lower two are called ventricle.
• There are different valves present which prevent the back flow of the blood.
• Between the right auricle and right ventricle there is a valve called tricuspid valve.
• Between the left auricle and the right ventricle there is a valve called the bicuspid valve.

Q91. Answer: (c) 1 Watt = 1 Volt × 1 Ampere

The correct answer is 1 Watt=1 Volt × 1 Ampere
Key Points
• The rate at which electric energy is dissipated or consumed in an electric circuit is termed as electric power.
• The power P is given by, P = VI.
• The SI unit of electric power is watt (W) or Volt Ampere.

• Watt (W) is the unit of power.
• Power (P) = Voltage (V) × Current (I).
• Thus, 1 Watt = 1 Volt × 1 Ampere.

Additional Information

• Kilowatt hour: The energy consumption in electricity bills is expressed in units of kWh.
• A kilowatt-hour is a thousand watt-hours.
• 1 kWh is equal to 3.6 × 106J 1kWh.
• A unit of energy equal to the energy of one watt acting for one second is equivalent to one joule.
• The joule-second is a unit of angular momentum.

Q92. Answer: (a) 13

Given: A certain number of people are sitting in a row, facing north.

1) A sits fourth to the left of D.
2) D sits fourth to the left of K.
3) K sits to the immediate left of L.
4) Only two people sit between P and L.
5) P sits at one of the positions to the right of K.

Thus. according to the final arrangement, total of 13 people are seated.

Hence, "Option 1" is the correct answer.

Q93. Answer: (a) 155/7 hours

Shortcut Trick

Let Total Capacity of tank = LCM(8, 20, 15) = 120 units.

Efficiencies: A = +15, B = −6, C = −8.

Work in first 5 hours (A+B): (15 − 6) × 5 = 45 units.

Remaining work: 120 − 45 = 75 units.

Time for (A+C) to fill remaining: 75 ÷ (15 − 8) = 75/7 = 10(5/7) hours.

Total time: 5 + 10(5/7) = 15(5/7) hours.

Therefore The correct answer is 15(5/7) hr.

Alternate Method

Pipe	Time (hr)	Total Work	Efficiency
A (Filling)	8	120	+15
B (Emptying)	20	−6	
C (Emptying)	15	−8	

Given: A and B work for 5 hours, then B is replaced by C.

=> Work done by (A + B) in 5 hours = (Efficiency_A + Efficiency_B) × 5

=> (15 − 6) × 5 = 9 × 5 = 45 units

=> Remaining work = Total Capacity − Filled units

=> 120 − 45 = 75 units

=> Combined efficiency of A and C = Efficiency_A + Efficiency_C = 15 − 8 = 7 units/hr

=> Time taken by (A + C) to fill remaining part = 75 ÷ 7 = 10(5/7) hours

=> Total time = Initial 5 hours + 10(5/7) hours = 15(5/7) hours

Therefore The correct answer is 15(5/7) hr.

Additional Information

Pipes and Cisterns Efficiency

Filling pipes have positive efficiency, while emptying pipes (leakage) have negative efficiency. Total Efficiency = ∑(Inlet efficiencies) − ∑(Outlet efficiencies).

Total Work Concept

Total Work = Efficiency × Time. Using the LCM of individual times as the total capacity simplifies calculation by avoiding fractions.

Alternate Operation

If pipes are opened in a sequence, calculate the work done in each phase separately and subtract from total capacity to find the

remaining volume.

Q94. Answer: (a) 44

The correct answer is 44.

Key Points

• Article 44 of the Directive Principles in the Constitution says:

• "State shall endeavor to provide for its citizens a uniform civil code (UCC) throughout the territory of India".

• The objective of Article 44 of the Directive Principles in the Indian Constitution was to address the discrimination against vulnerable groups and harmonize diverse cultural groups across the country.

• The Uniform Civil Code (UCC) calls for the formulation of one law for India, which would be applicable to all religious communities in matters such as marriage, divorce, inheritance, adoption.

• The origin of the UCC dates back to colonial India when the British government submitted its report in 1835 stressing the need for uniformity in the codification of Indian law relating to crimes, evidence, and contracts, specifically recommending that personal laws of Hindus and Muslims be kept outside such codification.

Additional Information

Article	Title/Content	Details
Article 42	Provision for just and humane conditions of work and maternity relief	Article 42 directs the State to make provisions for securing just and humane conditions of work and maternity relief. It aims to protect the rights of workers, ensuring humane working conditions.
Article 43	Provision for securing a living wage, conditions of work ensuring a decent standard of life	This article directs the State to secure a living wage, conditions of work, and a decent standard of living for all workers, with emphasis on leisure and cultural opportunities. It is one of the Directive Principles of State Policy that aims for the welfare of workers.
Article 45	Provision for free and compulsory education for children up to the age of 14 years	Article 45 originally required the State to provide free and compulsory education for children under 14. This was later implemented under the 86th Amendment, 2002, with the addition of Article 21-A, making education a fundamental right.

Q95. Answer: (c) South - West

Given:

Rekha started walking from her office in the west direction.

On traveling a distance of 5 m, she turns to the right and travels a distance of 2 m.

She further turns to the right and travels a distance of 7.5 m.

She then turns right at 135° and travels a distance of 15 m.

Thus, Rekha is facing in the southwest direction.

Hence, "Option 3" is the correct answer.

Q96. Answer: (a) Only conclusion (I) follows.

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

Conclusions:

(I) Some Mice are Carrots → Follow (As some Mice are Rabbits and all Rabbits are Carrots. As some part of mice is common with rabbits which whole comes in carrots, therefore it is true.)

(II) All Rabbits are Oranges → Does not follow (As all Rabbits are Carrots and some Carrots are Oranges. So it is possible but not definite.)

Therefore Here, Only conclusion (I) follows.

Hence, the correct answer is "Option 1".

Q97. Answer: (b) 49

Given Equation: 4 + 22 × 2 ÷ 4 - 9 = ?

BODMAS Rule:

Decoding the given information:

Symbol	•	•	×	÷
Meaning	×	•	÷	•

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

=> 4 × 22 ÷ 2 - 4 + 9 = ?

=> 4 × 11 - 4 + 9 = ?

=> 44 - 4 + 9 = ?

=> 53 - 4 = 49.

Hence, the correct option is "Option 2".

Q98. Answer: (a) Fluorine

The correct answer is Fluorine.

Key Points

• Fluorine is the most electronegative element.

• As we move right in a period, the electronegativity keeps increasing up to the halogens.

• This is because the number of electrons keeps increasing in the same valence shell so hold of the nucleus on the electrons is tight.

• And as we move down in a group, the electronegativity decreases. This is due to the fact that the number of shells keeps increasing down the group so the hold of the nucleus on the valence electron(s) keeps decreasing.

• Since Flourine is the first member of the halogen family (the rightmost group before noble gases), therefore it is the most electronegative element.

Additional Information

• Nitrogen (N):

• Atomic Number: 7

• Properties:

• Colorless, odorless, and tasteless.

• It makes up about 78% of the Earth's atmosphere.

• It is inert and does not easily react with other elements due to its strong triple bond.

• Has five valence electrons, usually sharing three to form stable bonds, leaving one lone pair.

• Carbon (C):

• Atomic Number: 6

• Properties:

• Carbon exists in different forms such as graphite, diamond, and graphene.

• It has a high ability to form covalent bonds, allowing it to create a wide variety of organic compounds.

• The diamond form of carbon is the hardest natural substance.

• Has four valence electrons, allowing it to form four covalent bonds with other atoms.

• Oxygen (O):

• Atomic Number: 8

• Properties:

• Oxygen is colorless, odorless, and tasteless.

• It is highly reactive and forms oxides when it reacts with most elements.

• It is essential for combustion and respiration.

• Has six valence electrons, typically sharing two to form stable bonds.

Q99. Answer: (c) Rs. 100

Given:

Cost of making 3 litres of strawberry shake = Rs. 1500

Calculation:

Cost of making 1 litres of strawberry shake = Rs. 1500/3 = Rs.500

YourMockTest.com — Free Study Material

Strawberry used in making 1 litre shake = 20%

Cost of strawberries in making 1 litre of strawberry shake = 20% of 500

=> (20/100) × 500

=> Rs. 100

Cost of strawberries in making 1 litre of strawberry shake is Rs. 100.

Therefore Option 3 is the correct answer.

Q100. Answer: (d) -13.3 cm and 0.33 cm

The correct answer is -13.3 cm and 0.33 cm

Key Points

• Given Data:

• Object height (h) = 10.0 cm

• Object distance (u) = -40.0 cm (negative because it's in front of the mirror)

• Radius of curvature (R) = -20.0 cm (negative for a concave mirror)

• Calculate Focal Length (f):

• f = R / 2 = -20.0 cm / 2 = -10.0 cm

• Use the Mirror Equation to find Image Distance (v):

• 1/f = 1/v + 1/u

• 1/v = 1/f - 1/u

• 1/v = 1/(-10.0 cm) - 1/(-40.0 cm)

• 1/v = -1/10 + 1/40

• 1/v = (-4 + 1)/40

• 1/v = -3/40

• v = -40/3 cm

• v ≈ -13.3 cm

• Calculate Magnification (M):

• M = -v / u

• M = -(-13.3 cm) / (-40.0 cm)

• M ≈ -0.33

• 5. Calculate Image Height (h'):

• h' = M * h

• h' = -0.33 * 10.0 cm

• h' ≈ -3.3 cm

• Image position (v) ≈ -13.3 cm (The negative sign indicates the image is real and inverted, located in front of the mirror)

• Image height (h') ≈ -3.3 cm (The negative sign indicates the image is inverted)

• Therefore, the closest answer among the provided options, considering the magnitude of the values, is:

• -13.3 cm and 0.33 cm

More previous year papers and mock tests: **www.yourmocktest.com/pyq**

YourMockTest.com — Free Study Material