RRB Group D Previous Year Paper (Held on: 18 Sept 2022 Shift 1)

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

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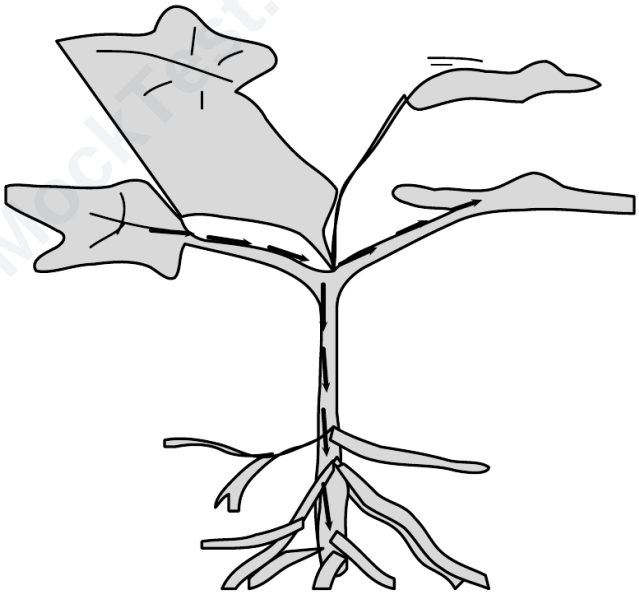
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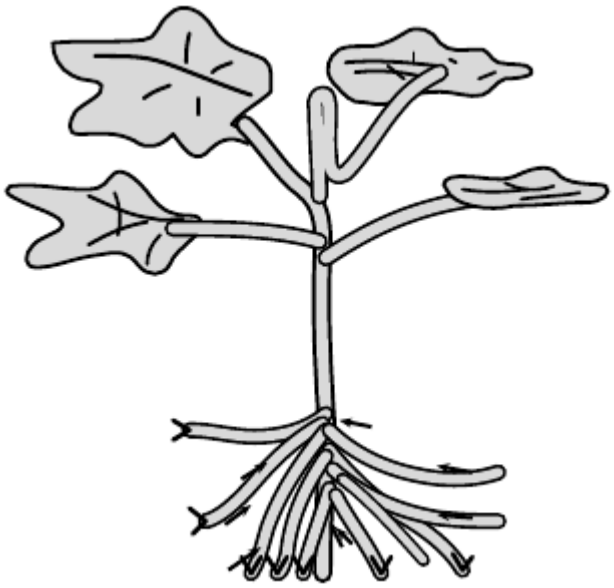
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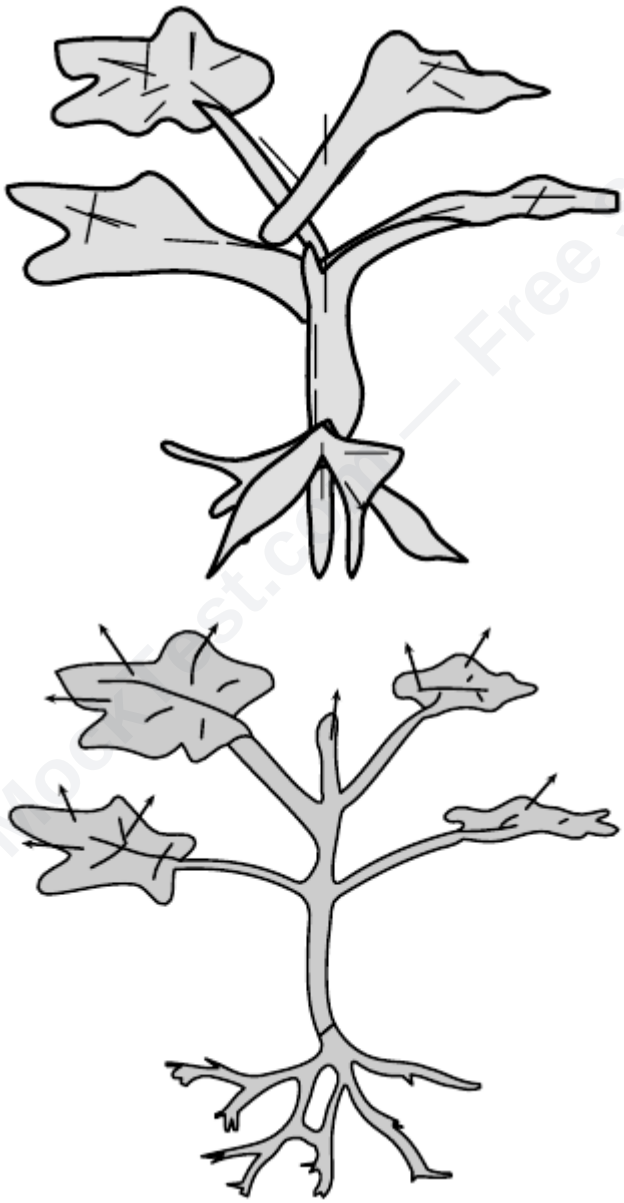
Q1. Which figure is the correct representation of the movement of food in phloem?





A B

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C D

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

Q2. In a certain code language, 'GLEPK' is written as 'DIBMH' and 'QRYHN' is written as 'NOVEK'. How will 'POTER' be written in that language?

(a) LMQOB
(b) MLPOB
(c) MLQBO
(d) LMPOB

Q3. The value of $5^3 \times 5^4 \times 5^2 = ?$

(a) 5^9
(b) 5^5
(c) 5^7
(d) 5^6

Q4. How many languages are there in the 8^(th) Schedule of the Indian Constitution as on June 2022?

(a) 15
(b) 22
(c) 19
(d) 25

Q5. A statement is given followed by two assumptions numbered I and II. You have to assume everything in the statement to be true and decide which of the given assumptions is/are implicit in the statement.

Statement :

Essay writing is an art. It requires an understanding of the subject as well as a command over the language to be able to write a good essay.

Assumptions :

I. Essays cannot be written without complete mastery over the subject.

II. Anyone with a good command over the language write a good essay.

(a) Only assumption I is implicit
(b) Neither assumption I nor II is implicit
(c) Only assumption II is implicit
(d) Both assumptions I and II are implicit

Q6. 1 horsepower equals :

(a) 74.6 J/s
(b) 746 J
(c) 746 W
(d) 746 kW

Q7. If three numbers are in the ratio 5 : 6 : 8 and the sum of their squares is 1250, then the product of those numbers is :

(a) 2400
(b) 1200
(c) 2400 √10
(d) 1200 √10

Q8. Identify the long jumper of India who won a silver medal at the U-20 World Athletics Championships in the year 2021.

(a) Seema Punia
(b) Shaili Singh
(c) Mercy Kuttan
(d) Nayana James

Q9. In India, Mangrove Forests are majorly found in which of the following states?

(a) Telangana
(b) Nagaland
(c) Maharashtra
(d) West Bengal

Q10. Three statements are followed by four conclusions numbered I, II, III and IV. You have to consider these statements to be true, even if they seem at variance from commonly known facts. Decide which of the given conclusions logically follow/s from the given statements.

Statements :

1. All couriers are shipments.

2. All shipments are transports.

3. No haul is transport.

Conclusions :

I. No transport is shipment.

II. All couriers are transports.

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III. Some transports are shipments.

IV. No courier is haul.

(a) Only conclusions II, III and IV follow.
(b) Only conclusions I and IV follow.
(c) All conclusions follow.
(d) Only conclusions II and IV follow.

Q11. The value of $\sqrt{(1 - \cos\theta)/(1 + \cos\theta)}$ is :

(a) $\sec\theta + \cot\theta$
(b) $\operatorname{cosec}\theta - \cot\theta$
(c) $\operatorname{cosec}\theta + \cot\theta$
(d) $\sec\theta - \cot\theta$

Q12. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

11 : 130 : : 7 : 58 : : 15 : ?

(a) 224
(b) 234
(c) 248
(d) 216

Q13. Three statements are followed by three conclusions numbered I, II and III. You have to consider these statements to be true, even if they seem to be at variance with commonly known facts, and decide which of the given conclusions logically follow/s from the given statements.

Statements :

All donkeys are zebras.

Some bulls are cats.

Some donkeys are apes.

Conclusions :

(I) Some zebras are bulls.

(II) Some zebras are apes.

(III) Some donkeys are cats.

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

Q14. My father is presently 25 years older than me. The sum of our ages 5 years ago was 39 years. Find my present age.

(a) 20 years
(b) 13 years
(c) 12 years
(d) 15 years

Q15. Among six persons, P, Q, R, S, T and U, each one has a different weight. The weight of Q is more than only two other persons. The weight of P is more than U's weight. The weight of S is more than Q's weight. The weight of R is less than the weight of T. The weight of Q is more than the weight of T. U has the second highest weight among all the six persons. Who has the third highest weight among all six persons?

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

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Q16. A, B, C, D, E and F were six friends playing games around a circular table. They were standing facing the centre of the table. E was standing to the immediate left of A. C was second to the left of F. There were exactly two people between D and A. B was at the immediate right of A. Which friend was at the immediate right of F?

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

Q17. 30 people are standing in a queue facing north. Manoj is standing at the 11^(th) position from the front. Shahin is standing at the 7^(th) position from the back. Neeraj is standing exactly in front of Shahin. How many people are standing between Neeraj and Manoj?

(a) 12
(b) 13
(c) 10
(d) 11

Q18. The HCF of any set of 10 co-prime numbers is always

(a) 10
(b) 0
(c) 1
(d) 2

Q19. A statement is given, followed by four conclusions given in the options. Find out which conclusion is true based on the given statement.

Statement : H = W > F ≥ S ≥ T > Y

(a) Y < S
(b) W < T
(c) H < F
(d) T ≥ F

Q20. If 9 : 12 : : 12 : x, and 28 : 42 : : 42 : y, then the value of 2x + y is :

(a) 69
(b) 95
(c) 84
(d) 79

Q21. Which of the following is NOT a possible isomer of hexane?

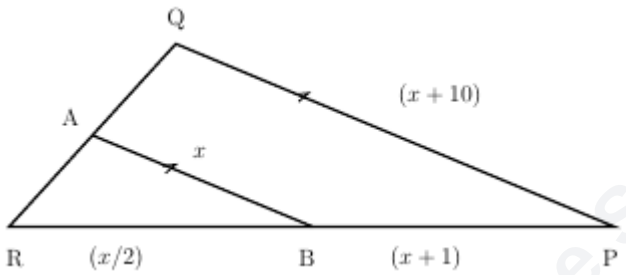
(a) 2-methyl pentane
(b) 3-methyl pentane
(c) 2, 2 dimethyl butane
(d) 2-ethyl pentane

Q22. India launched a commemorative logo to mark her 30^(th) anniversary of diplomatic ties with which of these countries?

(a) Canada
(b) Israel
(c) America
(d) Spain

Q23. In the given figure, AB || QP, AB = x, PQ = x + 10, RB = x/2, BP = x + 1. Find PQ

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(a) 4 units
(b) 13 units
(c) 14 units
(d) 12 units

Q24. The position of how many letters will remain unchanged if each of the letters in the word 'LAMENT' is arranged in alphabetical order?

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

Q25. An object is placed at the principal focus of a concave lens. Which of the following options represents the characteristics of the image formed?

(a) Real and diminished
(b) Virtual and enlarged
(c) Real and enlarged
(d) Virtual and highly diminished

Q26. Identify the correct chemical reaction involved in bleaching powder preparation

(a) NaCl + H2O + CO2 + NH3→ NH4Cl + NaHCO3
(b) Ca(OH)2 + Cl2→ CaOCl2 + H2O
(c) NaHCO3 + H^+→ CO2 + H2O + Sodium salt of acid
(d) 2 NaCl (aq) + 2 H2O (l) → 2 NaOH (aq) + Cl2 (g) + H2 (g)

Q27. If the difference between two numbers is 52 and they are in the ratio 7 : 3, then find the greater of the two numbers.

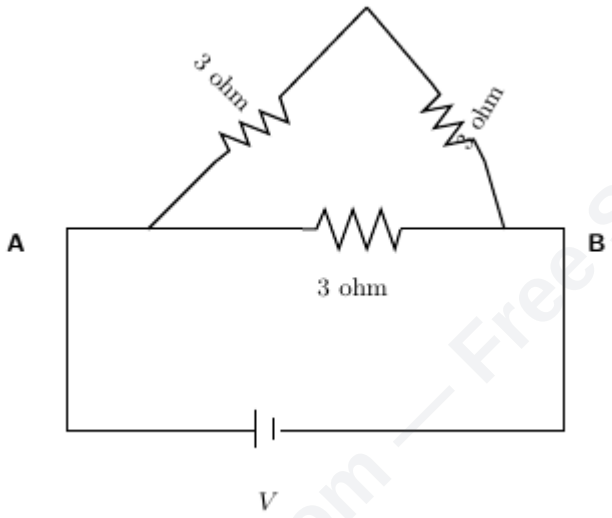
(a) 84
(b) 65
(c) 70
(d) 91

Q28. Anita is standing facing the north direction. Then, she turns 135° anticlockwise. After that, she turns 90° clockwise. In which direction is she facing now?

(a) North-west
(b) South-west
(c) South-east
(d) North-east

Q29. The equivalent resistance between points A and B shown in the figure below :

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(a) 9 Ω
(b) 4.5 Ω
(c) 6 Ω
(d) 2 Ω

Q30. In this question, a group of numbers/symbols is coded using letters as per the table given below and the conditions which follow. The correct combination of codes following the conditions is your answer.

Number/Symbol	5	6	8	3	%	#	7
Codes	U	S	C	K	D	T	A

Conditions :

(i) If the first element is an odd number and the last element is an even number, the codes for these two (the first and the last elements) are to be interchanged.

(ii) If the second element is a symbol and the fifth element is an even number, the codes for these two (the second and the fifth elements) are to be interchanged.

(iii) If the third element is a number and the fourth element is a symbol, both these elements (the third and the fourth elements) are to be coded as W.

Question : 5 # % 6 7 # 3 8

(a) C A D S T T K U
(b) C T D S A T K U
(c) U T D S A T K C
(d) C T W W A T K U

Q31. Consider the below statements and identify the correct answer.

Statement I: Dobereiner gave the law of triads.

Statement II: Dobereiner tried to arrange the elements with different properties into groups, having three elements each.

(a) Only Statement I is Correct.
(b) Both Statements are correct. Statement I is correct explanation of Statement II.
(c) Both statements are correct. Statement II is correct explanation of Statement I.
(d) Only Statement II is correct.

Q32. The position of how many letters will remain unchanged if each of the letters in the word 'DIRECT' is arranged in alphabetical order?

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

(d) None

Q33. Which Amendment of the Constitution of India envisages the Gram Sabha as the foundation of the Panchayat Raj System to perform functions and powers entrusted to it by the State Legislatures?

(a) 54th
(b) 73rd
(c) 71st
(d) 63rd

Q34. Which of the following is NOT included in the financial budget of India?

(a) Revenue deficit
(b) Credit control
(c) Fiscal deficit
(d) Primary deficit

Q35. Pankaj Advani bagged his 41st title by defeating whom, to lift his 8th title at the Asian 100 UP Billiards Championship 2022?

(a) Sourav Kothari
(b) Manan Chandra
(c) Aditya Mehta
(d) Dhruv Sitwala

Q36. The table below shows the differences between the structure and function of plants and animals.
Which options shows the INCORRECT statement?

Sr. no.	Plants	Animals
a.	Do not move	Move in search of food, mate and shelter
b.	Most tissues are dead	Most tissues are living
c.	Need less energy	Need more energy
d.	Growth is limited to certain regions	Growth is limited to certain regions

(a) c
(b) a
(c) b
(d) d

Q37. The area (in square units) of the quadrilateral ABCD, formed by the vertices A (0, -2), B (2, 1), C (0, 4), and D (-2, 1) is :

(a) 12
(b) 15
(c) 14
(d) 13

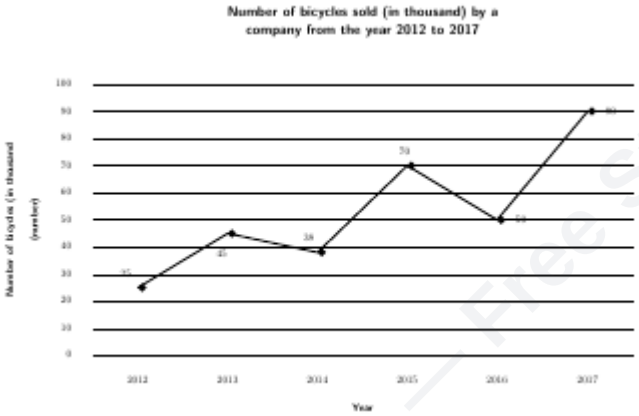
Q38. Match the following :

	A		B
i.	red cabbage leaves	a.	olfactory indicator
ii.	methyl orange	b.	acid base indictor
iii.	Onion, clove	c.	natural acid base indictor

(a) (i) - (c), (ii) - (a), (iii) - (b)
(b) (i) - (a), (ii) - (c), (iii) - (b)
(c) (i) - (a), (ii) - (b), (iii) - (c)
(d) (i) - (c), (ii) - (b), (iii) - (a)

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Q39. Study the following line graph carefully and answer the given question.



The number of bicycles sold in 2013 is approximately what percent of the number of bicycles sold in 2017?

(a) 45%
(b) 50%
(c) 10%
(d) 100%

Q40. Which of the following places is a harnessing site for geothermal energy in India?

(a) Bokaro
(b) Manikaran
(c) Tarapur
(d) Kolkata

Q41. An AC generator works on the principle of :

(a) electromagnetism
(b) force on a current carrying conductor
(c) heating effect of electric current
(d) electromagnetic induction

Q42. Eight friends Kriti, Durga, Manasi, Surya, Tahira, Vritti, Ahana and Yoshita are sitting around an square table in such a way that four friends are sitting on the corners of the table while the other four are sitting at the exact centre of sides of the table. All are facing the centre of the table. Surya is sitting at the third place to right of Durga. Only Tahira is between Kriti and Durga. Manasi is second to left of Durga, Only Vritti is sitting between Surya and Yoshita. Yoshita is second to left of Ahana. Vritti is second to left of Manasi. Who is sitting third to left of Tahira?

(a) Manasi
(b) Ahana
(c) Yoshita
(d) Surya

Q43. Two boxes have chocolates in the ratio 7 : 5. If the difference in the number of chocolates is 28, find the number of chocolates in the box with larger numbers.

(a) 84
(b) 77
(c) 91
(d) 98

Q44. Six girls decided to record a video of their talks, one on each separate day of the same week. Sunday will be a rest day. P said Friday will suit her. U will start the process and record on Monday. S will record immediately before T. Q will record on a day exactly between the days of U and S. T selected Thursday. Which day is left for R to record the video?

(a) Monday
(b) Saturday
(c) Wednesday

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(d) Thursday

Q45. Which of the following numbers will replace the question mark (?) in the given series?

5, 13, 23, 49, ?, 193

(a) 120
(b) 95
(c) 105
(d) 82

Q46. Which of the following numbers will replace the question mark (?) in the given series?

0, 2, 6, 12, 20, ?

(a) 34
(b) 35
(c) 28
(d) 30

Q47. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE : Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g. 13 - Operations on 13 such as adding/subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(1, 8, 3)

(2, 21, 5)

(a) (4, 33, 7)
(b) (5, 112, 11)
(c) (2, 26, 3)
(d) (7, 128, 10)

Q48. Find the area of a triangle whose sides are 12 m, 14 m and 16 m.

(a) 7 √15 m²
(b) 21 √15 m²
(c) √15 m²
(d) 2 √15 m²

Q49. According to the Economic Survey 2021-22, what is the rank of India (Globally) in average annual net gain in forest area?

(a) 3^(rd)
(b) 2^(nd)
(c) 4^(th)
(d) 1^(st)

Q50. The original Constitution of 1950 envisaged a Supreme Court with a Chief Justice and puisne Judges - leaving it to Parliament to increase this number.

(a) 7
(b) 11
(c) 14
(d) 17

Q51. Given below are three statements and three conclusions. Take the statements to be true even if they are at variance with commonly known facts, and decide whether the conclusion/s follow/s the given statements.

Statements :

I. All grasses are shrubs.

II. All roots are fruits.

III. All fruits are flowers.

Conclusions :

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I. All grasses are flowers.

II. All roots are flowers.

III. Some flowers are fruits.

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

Q52. According to the 'World Economic Outlook-April 2022' report, raised India's GDP growth estimate to 9% for 2022-23 and for 2023-24 it forecast the economy to grow by 7.1%. Who released this report?

(a) World Bank
(b) Ministry of Finance of India
(c) International Monetary Fund (IMF)
(d) Reserve Bank of India

Q53. A wire of a given material has length 'l' and resistance 'R'. Another wire of the same material having three times the length and twice the area of cross section will have a resistance equal to :

(a) 3 R
(b) 2/3 R
(c) 3/2 R
(d) 1/2 R

Q54. Which of the following uses spores to reproduce?

(a) Ferns
(b) Yeast
(c) Amoeba
(d) Mango

Q55. Which social reformer founded the 'Brahmo Samaj' in 1828 and became famous for his pioneering role in advocating education and opposing practices like Sati, child marriage and social division?

(a) Ishwarchandra Vidyasagar
(b) Raja Ram Mohan Roy
(c) Swami Vivekananda
(d) Swami Dayanand Saraswati

Q56. In March 2022, which state has became the first to start 'Air Health Service' in rural areas?

(a) Odisha
(b) Gujarat
(c) Tamil Nadu
(d) Bihar

Q57. A motor car starts with a speed of 60 km/h and increases its speed after every two hours by 15 km/h. In how much time will it cover a distance of 360 km?

(a) 2 hours
(b) 7 hours
(c) 5 hours
(d) 9 hours

Q58. Which of the following properties do covalent compounds generally NOT exhibit?

(a) They are bad conductors of electricity and heat.
(b) They form by sharing of electrons.
(c) They do not form ions generally.
(d) They are not soluble in an organic solvent.

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Q59. If a and b are the roots of $x^2 + x - 2 = 0$, then the quadratic equation in x whose roots are 1/a+1/b and ab is :

(a) $2x^2 + 3x - 2 = 0$
(b) 2x2 + 5x - 2 = 0
(c) 2x2 - 5x + 2 = 0
(d) 2x2 - 3x + 2 = 0

Q60. 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.

BEING : YVRMT : : PRIDE : KIRWV : : CLEAN : ?

(a) XOVZM
(b) XOWZM
(c) GOVZP
(d) XPVRM

Q61. A boy focusses a sharp image of a distant object on a screen using a lens. The distance between the lens and screen is approximately equal to _____.

(a) f/2
(b) f
(c) 2f
(d) f/3

Q62. If two parallel lines are intersected by a transversal, then which of the options below is not necessarily correct?

(a) A pair of interior angles on the same side of the transversal have the same measure.
(b) A pair of corresponding angles have the same measure.
(c) A pair of alternate interior angles have the same measure.
(d) A pair of vertically opposite angles have the same measure.

Q63. How many times are the hour and the minute hands of a clock at a right angle in a period of two days?

(a) 92
(b) 48
(c) 77
(d) 88

Q64. In January 2022, Paytm Money launched India's first intelligent messenger called.

(a) PayU
(b) Pops
(c) Pay Money
(d) Cops

Q65. Which of the following is worshipped by people during the festival of Pongal?

(a) Maa Durga
(b) The Moon
(c) God Shiva
(d) The Sun

Q66. A television costs Rs. 35,000 less than a printer. If the cost of the printer is twice the cost of the television, then the cost of the television is :

(a) Rs. 35,000
(b) Rs. 53,000
(c) Rs. 15,700
(d) Rs. 17,500

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Q67. Which of the following should be done to conserve coal and petroleum?

(a) Solar cookers should be avoided at all costs.
(b) Avoid substituting CFL bulbs for standard incandescent bulbs.
(c) Avoid using public transportation or joining a carpool.
(d) Do not overuse air conditioning or heating systems.

Q68. The value of 0.0486 ÷ 0.002 =

(a) 21.5
(b) 24.3
(c) 13.8
(d) 18.7

Q69. A truck travels at a speed of 60 km/h from city P to city Q and returns to city P by the same route at a speed of 100 km/h. What is the average speed of the truck for the given journey?

(a) 80 km/h
(b) 70 km/h
(c) 85 km/h
(d) 75 km/h

Q70. Consider the below statements and identify the correct answer.

Statement - I : If a substance loses oxygen during a reaction, it is said to be reduced.

Statement - II : If a substance gains hydrogen during a reaction, it is said to be reduced.

(a) Both the statements are false.
(b) Statement - I is false, and Statement - II is true.
(c) Both the statements are true.
(d) Statement - I is true, and Statement - II is false.

Q71. Under which five-year plan was Bharat Nirman started by the Government of India to upgrade rural infrastructure?

(a) Eight Five Year Plan
(b) Tenth Five Year Plan
(c) Ninth Five Year Plan
(d) Sixth Five Year Plan

Q72. Which of the following statements is/are correct?

(i) Magnetic field strength is strongest at the centre of a bar magnet.
(ii) No two magnetic field lines can intersect.
(iii) Magnetic field lines always form closed continuous curves.

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

Q73. Which of the following ministries introduced The Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Amendment Bill, 2022, in the Lok Sabha on 5 April 2022?

(a) Ministry of Law and Justice
(b) Ministry of Defence
(c) Ministry of External Affairs
(d) Ministry of Home Affairs

Q74. Which of the following statements are correct?

(a) For a lens the first principal focus is the position of the object whose image is at infinity
(b) For a lens the first principal focus is the position of the object whose image is formed at twice the focal length.
(c) For a lens the second principal focus is the position of the real image whose object is at infinity
(d) For a lens the second principal focus is the position of the object whose image is formed at twice the focal length

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(a) Both (a) and (b)
(b) Both (b) and (c)
(c) Both (b) and (d)
(d) Both (a) and (c)

Q75. 2.666 ... + 2.77 ... in fraction form is :

(a) 29/9
(b) 49/9
(c) 31/9
(d) 47/9

Q76. Select the option that represents the letters that, when placed from left to right in the same sequence in the blanks below, will complete the letter series.

B _ M _ Q _ V M W _ B V M W _ B V _ _ T

(a) V W B R S M W
(b) V W B V S W M
(c) V W V R S M R
(d) V W V R R M W

Q77. Which two numbers should be interchanged to make the given equation correct?

7 × 8 + 9 - 6 ÷ 3 = 59

(a) 8 and 9
(b) 7 and 3
(c) 6 and 9
(d) 3 and 6

Q78. P, Q, R, S, T, U and V live on seven different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2, and so on till the topmost floor is numbered 7. U lives on the top floor. Only two persons live between T and Q. Q is on floor number 3. V lives on the floor immediately above P's floor. S lives on the floor immediately above R's floor. Q lives on the floor immediately below R's floor. Who lives on floor number 6?

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

Q79. Some reasons highlighting the importance of delivering sex education in schools are mentioned below.

Choose the incorrect option.

(a) Knowing about their body changes, teenagers start making fun of each other
(b) Discouraging various myths and misconceptions
(c) Helps to keep teenagers away from sexual abuse
(d) Knowledge about changes taking place during puberty

Q80. In how many states was the first round of Mission Indradhanush (IMI) 4.0 organised by the Union Ministry of Health and Family Welfare in February 2022, with an aim to increase full immunisation coverage?

(a) 14
(b) 16
(c) 8
(d) 11

Q81. One of the roots of the equation $x^2 - 12x + k = 0$ is $x = 3$. The other root is.

(a) x = -4
(b) x = -9
(c) x = 4
(d) x = 9

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Q82. If x and y are the two digits of the number 115 xy such that this number is divisible by 90, then the value of x + y is :

(a) 6
(b) 2
(c) 3
(d) 5

Q83. A group of class IX students conducted a survey for the number of family members in a household on 40 households in a locality, which resulted in the given frequency table. What is the mode of the data?

Family size	Number of families
2-4	10
4-6	8
6-8	12
8-10	6
10-12	4

(a) 6.7
(b) 6.6
(c) 6.9
(d) 6.8

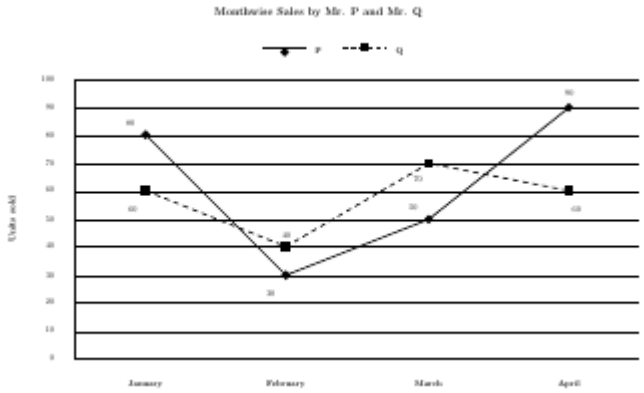
Q84. The simple interest on Rs. 1,280 at 5% p.a. for 3 years is :

(a) Rs. 192
(b) Rs. 195
(c) Rs. 480
(d) Rs. 180

Q85. In a clearance sale, a sari whose marked price was Rs. 10,490, is now sold for Rs. 9,441. What is the discount per cent on the sari?

(a) 15%
(b) 18%
(c) 10%
(d) 12%

Q86. The graph and the table below show the units sold by two salesmen, Mr. P and Mr. Q, in 4 months from January to April. Study the graph and the table and answer the question.



What is the respective ratio of the total units sold by Mr. P and Mr. Q during the 4 months?

(a) 25 : 27
(b) 23 : 21
(c) 25 : 23
(d) 24 : 23

Q87. If '+' means '÷', '-' means '+', '×' means '-' and '÷' means '×', then what will be the value of the following expression?

[{(23 × 15) - (1 ÷ 4)} + (2 - 2)] ÷ 2

(a) 8
(b) 4
(c) 10
(d) 6

Q88. Which of the following is NOT a biotic component of the ecosystem?

(a) Frog
(b) Flower
(c) Soil
(d) Insect

Q89. If '+' means '-', '-' means '÷', '÷' means '×' and '×' means '+', what will come in place of the question mark (?) in the following equation?

12 ÷ 6 + 28 - 7 × 14 = ?

(a) 80
(b) 82
(c) 72
(d) 78

Q90. Which of the following elements is the most reactive?

(a) Mg
(b) Al
(c) Ca
(d) Pb

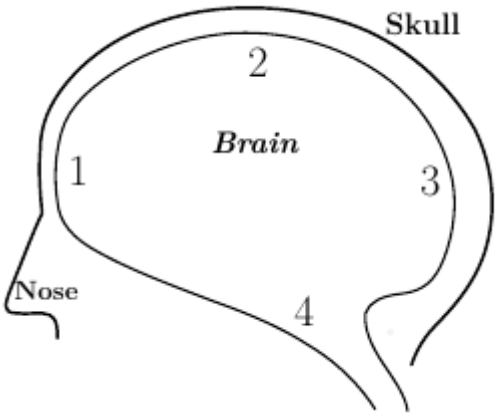
Q91. This question is based on the five, three-digit numbers given below :

(Left) 158 438 182 325 230 (Right)

If 5 is added to the first digit of every number, in how many numbers will the first digit be exactly divisible by the second digit?

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

Q92. Which of the following numbers indicates the spinal cord's location in the human brain?



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

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Q93. Janhvi starts walking from her home and goes 45 m towards the west. She then turns right and walks 32 m. Then, she turns right and walks 88 m. After that, she turns right and walks 50 m. Finally, she turns right again and walks 43 m. How far and in which direction is she now from her home? (All turns are 90 degree turns only)

(a) 45 m, North
(b) 16 m, South
(c) 18 m, North
(d) 18 m, South

Q94. How and when is oxygen produced as a waste product in plants?

(a) By respiration during the day
(b) By respiration during the night
(c) By photosynthesis during the night
(d) By photosynthesis during the day

Q95. What was the achievement of Dobereiner's triads?

(a) First attempt to relate the properties of elements with atomic mass.
(b) First attempt to study the size of atoms.
(c) First attempt to study the atomicity of molecules.
(d) First attempt to study the colour of elements.

Q96. A can count 100 eggs in 4 minutes while B can count the same number of eggs in 5 minutes. How much time will be required if they work together to count 450 eggs?

(a) 15 min
(b) 10 min
(c) 5 min
(d) 20 min

Q97. An item costs Rs. 2,000 less than Rs. 5,000. The dealer offers a discount of 10% and the retailer further offers a discount of 5% on its CP. The final SP for the customer is :

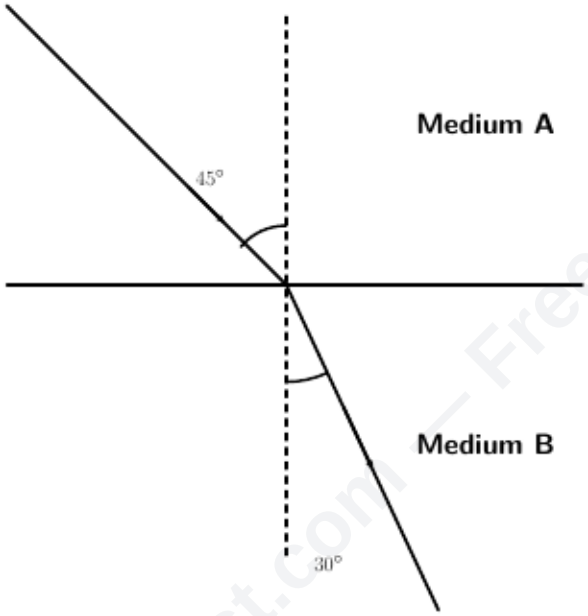
(a) Rs. 3,454
(b) Rs. 1,987
(c) Rs. 2,565
(d) Rs. 2,878

Q98. Who among the following is considered as the founder of Islam?

(a) Prophet Noah
(b) Prophet Yusuf
(c) Prophet Muhammad
(d) Prophet Abraham

Q99. The path of a ray of light incident on an interface separating two media is shown in the figure below. The refractive index of medium B would be? Consider medium A to be air.

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(a) 2 √2
(b) 1/√2
(c) √2
(d) 1/2√2

Q100. Which of the following falls under Article 51 A of the Indian Constitution?
(a) Promotion of International peace and security
(b) Fundamental rights
(c) Fundamental Duties
(d) Cultural and Education Rights

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) C

The correct answer is 'C'.

Key Points

• Phloem transports synthesized food from the leaves to the rest of the plant body.

• The transport of water along with food from one part of a plant to another is called as translocation.

C

Additional Information

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• The phloem transports food materials to the following parts of the plant:
• Roots:
• Sugars and other organic compounds produced in the leaves are transported to the roots through the phloem.
• These nutrients are essential for the growth and metabolism of root tissues.
• Shoots and Stems:
• Phloem carries sugars and other organic substances from the leaves to the stems and shoots of the plant.
• These nutrients are utilized for growth, maintenance, and various metabolic processes in these plant parts.
• Flowers:
• Phloem transports sugars and other necessary compounds to the developing flowers.
• These nutrients are crucial for flower development and the production of seeds and fruits.
• Fruits:
• As the fruits develop, the phloem transports sugars from the leaves to the fruiting structures.
• This process ensures the availability of energy and nutrients for fruit growth and maturation.

Q2. Answer: (c) MLQBO

The pattern followed here is:
'GLEPK' is written as 'DIBMH'
And,
'QRYHN' is written as 'NOVEK'
Similarly,
'POTER' will be written as: ?
Hence, 'POTER' will be written in that language as 'MLQBO'.

Q3. Answer: (a) 5^9

Given:
53 × 54 × 52 = ?
Concept used:
As per the rule of Indices:
a^b × a^c = a^((b + c))
Calculation:
According to the question,
Applying the rule of indices,
$5^3 \times 5^4 \times 5^2$; =5^((3+4+2)); =5^9
Hence, the correct answer is 5^9.

Q4. Answer: (b) 22

The correct answer is '22'.
Key Points
• 8th schedule: It lists the official languages of the Republic of India. Part XVII of the Indian constitution deals with the official languages in Articles 343 to 351.
• The Eighth Schedule to the Constitution consists of the following 22 languages: Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Malayalam, Manipuri, Marathi, Nepali, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu, Urdu, Bodo, Santhali, Maithili, and Dogri.
• Of these languages, 14 were initially included in the Constitution.
• The Sindhi language was added in 1967.
• Thereafter three more languages viz., Konkani, Manipuri, and Nepali were included in 1992.
• Subsequently, Bodo, Dogri, Maithili, and Santhali were added in 2004.
Thus, it is concluded that 22 languages are listed in the 8th Schedule of the Indian Constitution.

Q5. Answer: (b) Neither assumption I nor II is implicit

Given:
Statement :
Essay writing is an art. It requires an understanding of the subject as well as a command over the language to be able to write a good essay.

Assumptions:

I. Essays cannot be written without complete mastery over the subject → False (As it requires an understanding of the subject as well as a command over the language to be able to write a good essay. It is not necessary to have mastery over the subject to write an essay.)

II. Anyone with a good command over the language write a good essay → False (Good command over the language is one of the important requirements but subject understanding is also required to write a good essay.)

Hence, the correct answer is 'Neither assumption I nor II is implicit '.

Q6. Answer: (c) 746 W

The correct answer is '746W'.

Key Points

• Power is defined as the rate of doing work.

• The SI unit of power is the watt.

• Most common unit of power is horsepower (h).

• 1 hp is equivalent to 746 watts.

• 1 hp = 746 × watts

Additional Information

• Other SI units of Energy:

Unit	Joule	Calories	BTU	Kilowatt-hour
Joule	1	0.2390	0.000948	2.77778 x 10^(-7)
Calorie	4.187	1	0.00397	1.16279 10^(-6)
BTU	1055	252	1	0.000293
Kilowatt-hour	3.6 x 10^6	8.6 x 10^5	3412	1

Q7. Answer: (c) 2400 √10

Shortcut Trick

Ratio of numbers = 5 : 6 : 8

Sum of squares of ratio parts = $5^2 + 6^2 + 8^2 = 25 + 36 + 64 = 125$ units²

Value of 125 units² = 1250 => 1 unit² = 10 => 1 unit = √10

Product of numbers = $(5 \times 6 \times 8) \times (\text{unit})^3 = 240 \times (\sqrt{10})^3 = 240 \times 10\sqrt{10} = 2400\sqrt{10}$

Therefore The correct answer is 2400√10.

Alternate Method

Given: Ratio of three numbers = 5 : 6 : 8; Sum of squares = 1250

Formula Used: $(ax)^2 + (bx)^2 + (cx)^2 = S$; Product = $(ax) \times (bx) \times (cx)$

=> Let the numbers be 5x, 6x, and 8x.

=> $(5x)^2 + (6x)^2 + (8x)^2 = 1250$

=> $25x^2 + 36x^2 + 64x^2 = 1250$

=> $125x^2 = 1250$

=> $x^2 = 10$ => $x = \sqrt{10}$

=> Product = $5x \times 6x \times 8x = 240x^3$

=> Product = $240 \times (\sqrt{10})^3 = 240 \times 10\sqrt{10} = 2400\sqrt{10}$

Therefore The correct answer is 2400√10.

Additional Information

Compound Ratio

The compound ratio of a : b and c : d is found by multiplying the corresponding terms: $(a \times c) : (b \times d)$.

Duplicate Ratio

The duplicate ratio of a : b is $a^2 : b^2$. Similarly, the triplicate ratio is $a^3 : b^3$.

Mean Proportional

The mean proportional between two numbers a and b is $\sqrt{(a \times b)}$.

Q8. Answer: (b) Shaili Singh

The correct answer is 'Shaili Singh'.

Key Points

• India's Shaili Singh won the silver medal in the women's long jump at the World Athletics U20 Championships in Nairobi with a best attempt of 6.59m.

• She came agonizingly close to the gold medal, falling short by just 0.01m.

• Sweden's Maja Askag won the gold Medal with a best effort of 6.60m.

• Ukraine's Mariia Horielova took the bronze medal.

• It was India's second silver medal -- and third overall -- at this year's edition of the U20 Championships.

Q9. Answer: (d) West Bengal

The correct answer is 'West Bengal'.

Key Points

• West Bengal has a total of 42.45% of India’s mangrove cover, followed by Gujarat at 23.66%, and A&N Islands at 12.39%.

• All around the country, Gujarat showed a maximum increase in mangrove forest cover of 37 sq.

1. West Bengal (2114 sq km),

2. Gujrat (1140 sq km),

3. A&N Islands (617 sq km),

4. Andhra Pradesh (404 sq km)

5. Maharashtra (304 sq km)

Additional InformationMangrove Forest:

• In tropical and subtropical regions of the world, the mangrove forest dominates the coastlines and is an essential component of the forest ecosystem.

• Mangrove is the crossroad, where oceans, freshwater, and land meet.

• There are 54–75 species of true mangroves, which are taxonomically distinct from their terrestrial counterparts and exclusively occur in the intertidal zones of coastlines.

Q10. Answer: (a) Only conclusions II, III and IV follow.

Statements:

1. All couriers are shipments.

2. All shipments are transports.

3. No haul is transport.

Conclusions:

I. No transport is shipment. → False (Because some part of transport is contained in shipments.

II. All couriers are transports.→ True (As all couriers are shipments and all shipments are transports. So, all couriers are contained in transports.)

III. Some transports are shipments. → True (From the above Venn diagram we can conclude that some part of transport is contained in shipments.)

IV. No courier is haul. → True (As no haul is transport and the courier is contained in transport. So, no courier is haul.)No part of courier is contained in haul.

Hence, the correct answer is Only conclusions II, III and IV follow.

Q11. Answer: (b) cosec θ - cot θ

Shortcut Trick

Rationalize the numerator: Multiply and divide the expression inside the square root by (1 − cos θ).

√[(1 − cos θ)² ÷ (1 − cos² θ)] = (1 − cos θ) ÷ sin θ.

Separating the terms: (1/sin θ) − (cos θ/sin θ) = cosec θ − cot θ.

Therefore The correct answer is cosec θ − cot θ.

Alternate Method

Given: Expression = √[(1 − cos θ) / (1 + cos θ)]

Formula Used: 1 − cos² θ = sin² θ | cosec θ = 1/sin θ | cot θ = cos θ/sin θ

=> √[(1 − cos θ) × (1 − cos θ) / (1 + cos θ) × (1 − cos θ)]

=> √[(1 − cos θ)² / (1 − cos² θ)]

=> √[(1 − cos θ)² / sin² θ]

=> (1 − cos θ) / sin θ

=> (1 / sin θ) − (cos θ / sin θ)

=> cosec θ − cot θ

Therefore The correct answer is cosec θ − cot θ.

Additional Information

Trigonometric Identities

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

Reciprocal Relations

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

Conjugate Multiplication

When simplifying radical expressions involving (1 ± cos θ) or (1 ± sin θ), multiplying by the conjugate helps eliminate the square root.

Q12. Answer: (b) 234

The logic followed here is:

$(\text{First number})^2 + 9$: second number

Thus, the missing number is 234.

Hence, the required answer is '234'.

Q13. Answer: (b) Only conclusion II follows

Statements :

(I) All donkeys are zebras.

(II) Some bulls are cats.

(III) Some donkeys are apes.

Venn Diagram:

Conclusions :

(I) Some zebras are bulls → False (As from the above Venn diagram it is clear that there is no direct relation between zebras and bulls. So, we can not conclude anything about their relation.)

(II) Some zebras are apes → True (As all donkeys are zebras and some donkeys are apes. So some zebras are apes.)

(III) Some donkeys are cats → False (As there is no direct relation given between donkeys and cats. So, we can not conclude anything about their relation.)

Hence, "Only conclusion II follows" is correct.

Q14. Answer: (c) 12 years

Shortcut Trick

Age difference is always constant (25 years).

Sum 5 years ago = 39 years → Present sum = 39 + 5 + 5 = 49 years.

Present age of younger person (son) = (Sum − Difference) ÷ 2

Son's age = (49 − 25) ÷ 2 = 24 ÷ 2 = 12 years.

Therefore The correct answer is 12 years.

Alternate Method

Given:

Present age difference between Father and Son = 25 years.

Sum of ages 5 years ago = 39 years.

Let my Present Age be x years.

Father's Present Age = x + 25 years.

Sum of ages 5 years ago:

=> (x − 5) + (x + 25 − 5) = 39

=> 2x + 15 = 39

=> 2x = 39 − 15

=> 2x = 24

=> x = 12

Therefore The correct answer is 12 years.

Additional Information

Constant Age Difference

The difference between the ages of two individuals always remains constant regardless of the number of years passed or future years.

Age Sum Calculation

If the sum of ages of 'n' people is S, then after 't' years, their sum will be S + (n × t).

Ratio of Ages

Unlike the difference, the ratio of ages changes over time as years are added or subtracted from both terms.

Q15. Answer: (a) S

Given:

There are six persons P, Q, R, S, T, and U each having different weights.

1) Only two persons are lighter than Q

=> _ < _ < Q < _ < _ < _

2) U has the second-highest weight among all

=> _ < _ < Q < _ < U < _

3) P has more weight than U,

=> _ < _ < Q < _ < U < P

4) S has more weight than Q.

=> _ < _ < Q < S < U < P

5) The weight of R is less than the weight of T.

=> R < T < Q < S < U < P

From the above arrangement, it is clear that among all the six persons S has the third highest weight.

Hence, the third highest weight among all six persons is 'S'.

Q16. Answer: (a) E

Given:

• A, B, C, D, E and F were six friends playing games around a circular table.

• They were standing facing the centre of the table.

(1.) E was standing to the immediate left of A.

(2.) B was at the immediate right of A.

(3.) C was second to the left of F.

(4.) There were exactly two people between D and A.

Now, it is clearly shown that E is immediately right to F.

Hence, the correct answer is E.

Q17. Answer: (d) 11

Given:

• Manoj is standing on 11^(th) position from front

• Shahin is standing on 7^(th) position from back

• Total of 30 people are standing in the queue facing north.

According to the given information, a diagram is shown below:

Calculation:

Number of people standing after Manoj = 30 - 11 = 19

Number of people between Shahin and Manoj = 19 - 7 = 12

As Neeraj is standing exactly in front of Shahin so including one position = 12 - 1 = 11

Hence, the number of people standing between Neeraj and Manoj is "11".

Q18. Answer: (c) 1

Shortcut Trick

By definition, co-prime numbers are numbers that have no common factor other than 1.

Therefore, the Highest Common Factor (HCF) of any group of co-prime numbers is always 1, regardless of how many numbers are in the set.

For any set of 10 co-prime numbers, HCF = 1.

Therefore The correct answer is 1.

Alternate Method

Given: A set of 10 co-prime numbers.

Formula / Definition Used: Two or more numbers are said to be co-prime if their Highest Common Factor (HCF) is 1.

=> Let the set of 10 co-prime numbers be {a1, a2, a3, ..., a10}.

=> Since they are co-prime to each other, they do not share any common prime factors.

=> The only common divisor for all the 10 numbers is 1.

=> HCF(a1, a2, a3, ..., a10) = 1.

Therefore The correct answer is 1.

Additional Information

Co-prime Numbers

Two numbers need not be prime numbers themselves to be co-prime. For example, 8 and 9 are composite numbers, but they are co-prime because HCF(8, 9) = 1.

LCM of Co-prime Numbers

The Least Common Multiple (LCM) of any set of co-prime numbers is always equal to the product of those numbers.

Consecutive Numbers

Any two consecutive integers are always co-prime, meaning HCF(n, n + 1) = 1.

Q19. Answer: (a) Y < S

W > F ≥ S ≥ T Given:

Statement: H = W > F ≥ S ≥ T > Y

Let us check each option:

Conclusions:

(i) Y < S → True (Because Y is smaller than T and T is smaller and equals to S. So, we can say that Y is smaller than S.)

(ii) W < T → False (As W > F ≥ S ≥ T, from the expression we can say that W > T.)

(iii) H < F → False (As H = W > F from the expression we can say that H > F.)

(iv) T ≥ F → False (As F ≥ S ≥ T from the expression we can say that F ≥ T.)

Hence, Y < S is the correct conclusion.

Q20. Answer: (b) 95

Shortcut Trick

For a continued proportion a : b :: b : c, the third proportional is c = $b^2 \div a$.

For x: x = $12^2 \div 9 = 144 \div 9 = 16$.

For y: y = $42^2 \div 28 = (42 \times 42) \div 28 = 1764 \div 28 = 63$.

Value of 2x + y = 2(16) + 63 = 32 + 63 = 95.

Therefore The correct answer is 95.

Alternate Method

Given: 9 : 12 :: 12 : x and 28 : 42 :: 42 : y

Formula Used: Product of extremes = Product of means (ad = bc)

=> $9 \times x = 12 \times 12$

=> 9x = 144

=> $x = 144 \div 9 = 16$

=> $28 \times y = 42 \times 42$

=> 28y = 1764

=> $y = 1764 \div 28 = 63$

=> $2x + y = 2 \times 16 + 63$

=> 2x + y = 32 + 63 = 95

Therefore The correct answer is 95.

Additional Information

Continued Proportion

Three quantities a, b, and c are in continued proportion if a/b = b/c, where b is the mean proportional and $b^2 = ac$.

Fourth Proportional

In the proportion a : b :: c : d, the term d is called the fourth proportional and is calculated as d = (b × c) ÷ a.

Mean Proportional

The mean proportional between two numbers a and b is given by √(a × b).

Q21. Answer: (d) 2-ethyl pentane

The correct answer is '2 ethyl pentane'.

Key Points

Hexane is an organic compound, a straight-chain alkane with six carbon atoms with the molecular formula C6H14.

Molecular structure of given atoms as below.

So, 2-ethyl pentane has 7 carbon atoms with C7H16.

Hence 2-ethyl pentane is not an isomer of haxane.

Q22. Answer: (b) Israel

The correct answer is 'Israel'.

Key Points

• India and Israel have launched a commemorative logo to mark the 30th anniversary of the establishment of diplomatic ties between the two countries.

• The logo was unveiled virtually at an online event in the presence of the Ambassador of Israel to India Naor Gilon and the Indian envoy to Israel, Sanjeev Singla.

Q23. Answer: (c) 14 units

Shortcut Trick

Since AB || QP, ΔRAB ~ ΔRQP by AA similarity => AB/PQ = RB/RP.

RP = RB + BP = x/2 + x + 1 = (3x + 2)/2.

x / (x + 10) = (x/2) / ((3x + 2)/2) = x / (3x + 2).

x + 10 = 3x + 2 => 2x = 8 => x = 4.

PQ = x + 10 = 4 + 10 = 14 units.

Therefore The correct answer is 14 units.

Alternate Method

Given: AB || QP, AB = x, PQ = x + 10, RB = x/2, BP = x + 1.

Formula Used: In similar triangles, the ratio of corresponding sides is equal.

In ΔRAB and ΔRQP:

=> angle R = angle R (Common angle)

=> angle RAB = angle RQP (Corresponding angles as AB || QP)

=> ΔRAB ~ ΔRQP (By AA Similarity Criterion)

=> AB / PQ = RB / RP

=> RP = RB + BP = x/2 + (x + 1) = (3x + 2) / 2

=> x / (x + 10) = (x/2) / ((3x + 2) / 2)

=> x / (x + 10) = x / (3x + 2)

=> 3x + 2 = x + 10

=> 2x = 8

=> x = 4

=> PQ = x + 10 = 4 + 10 = 14 units

Therefore The correct answer is 14 units.

Additional Information

AA Similarity Criterion

If two angles of one triangle are equal to two angles of another triangle, then the two triangles are similar and their corresponding sides are in the same ratio.

Basic Proportionality Theorem (BPT)

If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Ratio of Areas of Similar Triangles

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The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides: Area(Δ1)/Area(Δ2) = (s1/s2)².

Q24. Answer: (b) Two

Given word: LAMENT

Arranging it alphabetically it follows:

Thus, only two letters' positions will remain unchanged.

Hence, the correct answer is "Two".

Q25. Answer: (d) Virtual and highly diminished

The correct answer is 'Virtual and highly diminished'.

Key Points The images formed by the concave lens are always upright, virtual and smaller than the object.

hence, Virtual and highly diminished characteristics of the image formed.

Additional InformationConcave lens

• A concave lens is a lens that diverges a straight light beam from the source to a diminished, upright, virtual image.

• It can form virtual images.

• Concave lenses have at least one surface curved inside.

• A concave lens is also known as a diverging lens because it is shaped round inwards at the centre and bulges outwards through the edges, making the light diverge.

Q26. Answer: (b) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

The correct answer is '$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$'.

Key Points

• Bleaching powder is Calcium oxychloride ($CaOCl_2$). It is prepared by passing chlorine gas over dry slaked lime($Ca(OH)_2$).

• Reaction: $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

Additional InformationUses :

• For bleaching cotton and linen in textile industry

• As an oxidising agent in a chemical industry.

• For disinfecting water.

Q27. Answer: (d) 91

Shortcut Trick

Ratio of numbers = 7 : 3

Difference in ratio units = 7 − 3 = 4 units

Given difference = 52 => 4 units = 52

1 unit = 52 ÷ 4 = 13

Greater number (7 units) = 7 × 13 = 91

Therefore The correct answer is 91.

Alternate Method

Given:

Ratio of numbers = 7 : 3

Difference = 52

Calculations:

=> Let the numbers be 7x and 3x.

=> 7x − 3x = 52

=> 4x = 52

=> x = 52 ÷ 4

=> x = 13

=> Greater number = 7x = 7 × 13

=> Greater number = 91

Therefore The correct answer is 91.

Additional Information

Ratio and Proportion

If two quantities are in the ratio a : b, they can be represented as ax and bx, where x is the highest common factor (HCF).

Unitary Method in Ratios

To find a value, calculate the value of 1 unit by dividing the given total/difference by its corresponding ratio sum/difference.

Sum of Numbers

If the sum is required for ratio a : b, it is calculated as (a + b) × x. In this case, Sum = (7 + 3) × 13 = 130.

Q28. Answer: (a) North-west

Given:

• Anita is standing facing the north direction

• she turns 135° anticlockwise.

• After that, she turns 90° clockwise.

Diagram on the basis of given information,

From the above diagram, Anita is facing now in the 'North-West direction'.

Hence, 'North-west' is the correct answer.

Q29. Answer: (d) 2 Ω

Given:

Formula used:

Equivalent resistance for the resistors connected in series is given by simply adding the values of resistance

R = R1 + R2 + …

Equivalent resistance for the resistors connected in parallel is given by adding the reciprocals of resistances

1/R = 1/R1+ 1/R2+.....

Calculation:

Firstly, finding resistance for the triangle. In the triangle two resistances in the two sides is connected end to end then these two resistances are in series then the resistance be,

R= 3 +3 = 6 Ω

Now the base of the triangle and the equivalent resistance i.e. Re, are in parallel then the resistance b

1/Re = 1/6+ 1/3

=> Re = 2Ω

so, equivalent resistance between points A and B is '2Ω '.

Q30. Answer: (b) C T D S A T K U

Given table:

Number/Symbol	5	6	8	3	%	#	7
Codes	U	S	C	K	D	T	A

According to given condition,

S. no.	Condition	Result
i	If the first element is an odd number and the last element is an even number.	Then the codes for these two (the first and the last elements) are to be interchanged.
ii	If the second element is a symbol and the fifth element is an even number.	Then the codes for these two (the second and the fifth elements) are to be interchanged.
iii	If the third element is a number and the fourth element is a symbol.	Then both these elements (the third and the fourth elements) are to be coded as W.

Given: 5 # % 6 7 # 3 8

The code for 5 # % 6 7 # 3 8 is “U T D S A T K C”.

But, here the first condition is followed by the given cluster number and symbols. So the codes for these two (the first and the last elements) are to be interchanged.

Thus, the code for 5 # % 6 7 # 3 8 becomes “C T D S A T K U”.

Hence, the correct answer is “C T D S A T K U”.

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Q31. Answer: (a) Only Statement I is Correct.

The correct answer is 'Only statement I is Correct'.

Key PointsDoebereiner's law of triads:

• When elements are arranged in order of increasing atomic masses, groups of three elements(triads), having similar chemical properties are obtained.(thus statement II is incorrect).

• The atomic mass of the middle elements of the triad being equal to the arithmetic mean of the atomic masses of the other two elements.

• For example: Alkali metal group (Dobereiner's triad) : Lithium is the 1st element, sodium is the middle element whereas potassium is the 3rd element of the triad.

Q32. Answer: (c) One

Given word: DIRECT.

When the alphabet are arranged according to the English alphabetical order.

DIRECT → CDEIRT

As we can see only T doesn't change its position.

Hence, the correct answer is "One".

Q33. Answer: (b) 73rd

The correct answer is '73rd'.

Key Points

The Constitution (73rd Amendment) Act, 1992 has added a new part IX consisting of 16 Articles and the Eleventh Schedule to the Constitution.

• 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 73 amendment act is the constitutional amendment act on Panchayat Raj Institutions.

Additional Information

• The constitution 74th Amendment Act 1992, relating to Municipalities (Urban Local Government) was passed by the parliament in 1992.

• The Constitution 64th Amendment Bill introduced by the prime minister in the Lok Sabha to provide constitutional status to Panchayati raj institutions (PRIs) has attracted unusually strong comments.

• The 46th Amendment of the Constitution made it possible for the State to levy Sales Tax on the price of the goods and materials used in works contracts as if there was a sale of such goods and materials.

Q34. Answer: (b) Credit control

The incorrect answer is 'Credit control.'

Key Points

Deficits:

• The revenue deficit is targeted at 5.1% of GDP in 2021-22, which is lower than the revised estimate of 7.5% in 2020-21 (3.3% in 2019-20).

• The fiscal deficit is targeted at 6.8% of GDP in 2021-22, down from the revised estimate of 9.5% in 2020-21 (4.6% in 2019-20).

• The primary Deficit in 2021-22 is 2.8% of GDP.

• The government aims to steadily reduce the fiscal deficit to 4.5% of GDP by 2025-26.

Additional Information

Budget Highlights

Expenditure:

• The government proposes to spend Rs 34,83,236 crore in 2021-22. As per the revised estimates, the government spent Rs 34,50,305 crore in 2020-21, 13% higher than the budget estimate.

Receipts:

• The receipts (other than borrowings) are expected to be Rs 19,76,424 crore in 2021-22, which is 23% higher than the revised estimates for 2020-21.

• In 2020-21, revised estimates for receipts were 29% lower than budget estimates.

• Given the impact due to COVID-19, it is useful to see the growth from 2019-20, an annual increase of 6%.

GDP growth:

• Nominal GDP is expected to grow at of 14.4% (i.e., real growth plus inflation) in 2021-22.

Ministry allocations:

• Among the top 13 ministries with the highest allocations, the highest annual increase over 2019-20 is observed in the Ministry of Jal Shakti (64%), followed by the Ministry of Consumer Affairs, Food and Public Distribution (48%), and the Ministry of Communications (31%).

Q35. Answer: (d) Dhruv Sitwala

The correct answer is 'Dhruv Sitwala'.

Key Points

• Indian cueist Pankaj Advani has defeated Dhruv Sitwala to win his eighth title at the 19th Asian 100 UChampionship 2022.

• It was held in Doha, Qatar.

• Overall this is Advani's 24th international title and 8th Advani had held off the stiff challenge of Pauk Sa of Myanmar to secure a spot in the final.

Q36. Answer: (d) d

The correct answer is 'd'.

Key Points

The basic differences between plants and animals are:

Sr. no	Plants	Animals
1.	Do not move	Move in search of food, mate and shelter
2.	Most tissues are dead	Most tissues are in living
3.	Need less energy	Need more energy
4.	Asexual reproduction	Sexual Reproduction
5.	Tip of root and stem support growth	growth supported by organ systems of body

Thus, out of all, statement d is not correct.

Additional Information

• The plant kingdom and animal kingdom are two major classifications in the biological classification system.

• Cellular Structure:

• Plants are generally composed of eukaryotic cells, which means their cells have a nucleus and membrane-bound organelles.

• Animals also have eukaryotic cells, but some animal groups, such as sponges, have simpler cellular structures compared to most plants.

• Nutrition:

• Plants are autotrophs, meaning they can produce their own food through photosynthesis.

• Animals are heterotrophs and cannot produce their own food. They obtain nutrients by consuming other organisms or organic matter.

• Mobility:

• Plants are typically rooted in the ground and are sessile organisms.

• Animals, on the other hand, are generally mobile and have various locomotion strategies, ranging from walking and swimming to flying.

• Reproduction:

• Plants reproduce through a combination of sexual and asexual reproduction.

• Animals also reproduce sexually.

• Body Organization:

• Plants often have a modular body structure with repeated units, such as leaves, stems, and roots.

• Animals have a more diverse range of body plans, including specialized tissues, organs, and organ systems.

Q37. Answer: (a) 12

Shortcut Trick

Identify the diagonals of the quadrilateral ABCD:

Diagonal d1 (AC) lies on the y-axis (x = 0) from A(0, −2) to C(0, 4) => Length = 4 − (−2) = 6 units.

Diagonal d2 (BD) lies on the line y = 1 from D(−2, 1) to B(2, 1) => Length = 2 − (−2) = 4 units.

Since the diagonals are perpendicular (one is vertical and the other is horizontal):

Area = (1/2) × d1 × d2 = (1/2) × 6 × 4 = 12 square units.

Therefore The correct answer is 12 square units.

Alternate Method

Given:

Vertices of the quadrilateral ABCD are A(0, −2), B(2, 1), C(0, 4), and D(−2, 1).

Formula Used:

Area of a quadrilateral with vertices (x1, y1), (x2, y2), (x3, y3), and (x4, y4) is given by the Shoelace Formula:

Area = (1/2) × |(x1y2 + x2y3 + x3y4 + x4y1) − (y1x2 + y2x3 + y3x4 + y4x1)|

Calculations:

Substitute the coordinates into the formula:

=> (x1, y1) = (0, −2)

=> (x2, y2) = (2, 1)

=> (x3, y3) = (0, 4)

=> (x4, y4) = (−2, 1)

Calculate the first sum (x_iy_(i+1)):

=> Sum1 = (0 × 1) + (2 × 4) + (0 × 1) + (−2 × −2)

=> Sum1 = 0 + 8 + 0 + 4 = 12

Calculate the second sum (y_ix_(i+1)):

=> Sum2 = (−2 × 2) + (1 × 0) + (4 × −2) + (1 × 0)

=> Sum2 = −4 + 0 − 8 + 0 = −12

Now, calculate the area of the quadrilateral:

=> Area = (1/2) × |Sum1 − Sum2|

=> Area = (1/2) × |12 − (−12)|

=> Area = (1/2) × |12 + 12|

=> Area = (1/2) × 24 = 12 square units

Therefore The correct answer is 12 square units.

Additional Information

Area of a Rhombus / Kite

If the diagonals of a quadrilateral are perpendicular to each other, its area is always given by Area = (1/2) × d1 × d2, where d1 and d2 are the lengths of the diagonals.

Shoelace Formula (Gauss's Area Formula)

A mathematical algorithm to determine the area of a simple polygon whose vertices are described by ordered pairs in the plane: Area = (1/2) × |∑ (x_iy_(i+1) − x_(i+1)y_i)|.

Distance Formula

The distance between two points (x1, y1) and (x2, y2) is given by d = √((x2 − x1)² + (y2 − y1)²).

Q38. Answer: (d) (i) - (c), (ii) - (b), (iii) - (a)

The correct answer is '(i) - (c), (ii) - (b), (iii) - (a)'.

Key Points Red cabbage leaves:

• Red cabbage indicator is a purple-coloured solution that is used to test whether substances are acid or base.

• Red cabbage that is often found in homes can be used to prepare a solution that acts as a natural pH indicator.

• The cabbage basically contains a pigment molecule called flavin or anthocyanin that changes colour depending on the acidity of the solution.

Methyl orange:

• Methyl orange is used as an indicator. It shows colour changes in acid, base and neutral substance.

• Methyl orange is a weak base.

• Methyl orange indicator is used in the strong acid weak base titration.
• The colour change of methyl orange depends upon the pH of the solution.
• In acidic medium means pH below 3.0 it shows red colour.
• In the range 3.0 - 4.5 pH, Methyl orange is of orange colour and in basic medium shows yellow colour.

Onion, clove:

• Vanilla, clove and onion are olfactory indicators.
• An olfactory indicator is a substance whose smell varies depending on whether it is mixed with an acidic or a basic solution.

Hence the table should be :

	A		B
i.	red cabbage leaves	a.	natural acid base indictor
ii.	methyl orange	b.	acid base indictor
iii.	Onion, clove	c.	olfactory indicator

Q39. Answer: (b) 50%

Given:

Number of bicycles sold in 2013 = 45,000

Number of bicycles sold in 2017 = 90,000

Calculation:

45,000 = x/100×90000

x= 45000/900

x = 50%

Hence, the bicycles sold in 2013 are approximately 50% of the number of bicycles sold in 2017.

Q40. Answer: (b) Manikaran

The correct answer is 'Manikaran'.

Key Points

• Geothermal energy is energy from the shallow ground hot water and hot rock found some miles or deeper to the extremely high temperatures of molten rock called Magma.
• Manikaran geothermal field extends from Harihar temple at the entrance of the village to the confluence of the Parbati River with the Brahmaganga Nala.
• At Manikaran, thermal springs generally emerge either from joints in quartzites or through the overburden of the terrace gravel deposits.
• The hot springs in Manikaran have been used for recreational purposes.
• The springs are in the form of spouts and pools, with temperatures as much as 96°C.
• Bubbling activity is also noticeable in some springs.

Additional Information

• The six most promising geothermal energy sites in India
• Tattapani in Chhattisgarh
• Puga in Jammu & Kashmir
• Cambay Graben in Gujarat
• Manikaran in Himachal Pradesh
• Surajkund in Jharkhand
• Chhumathang in Jammu & Kashmir

Q41. Answer: (d) electromagnetic induction

The correct answer is 'electromagnetic induction'.

Key Points

• AC generators work on the principle of Faraday’s law of electromagnetic induction, which states that electromotive force – EMF or voltage – is generated in a current-carrying conductor that cuts a uniform magnetic field.
• This can either be achieved by rotating a conducting coil in a static magnetic field or rotating the magnetic field containing the stationary conductor.
• The preferred arrangement is to keep the coil stationary because it is easier to draw induced alternating current from a stationary

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armature coil than from a rotating coil.

• The generated EMF depends on the number of armature coil turns, magnetic field strength, and the speed of the rotating field.

Additional InformationAC generator:

• AC generator is a machine that converts mechanical energy into electrical energy.

• The AC Generator's input supply is mechanical energy supplied by steam turbines, gas turbines and combustion engines.

• The output is alternating electrical power in the form of alternating voltage and current.

Q42. Answer: (a) Manasi

Given,

• Eight friends Kriti, Durga, Manasi, Surya, Tahira, Vritti, Ahana, and Yoshita are sitting around a square table in such a way that four friends are sitting on the corners of the table while the other four are sitting at the exact centre of sides of the table. All are facing the centre of the table.

• Surya is sitting at the third place to right of Durga.

• Only Tahira is between Kriti and Durga.

• Manasi is second to left of Durga.

• Only Vritti is sitting between Surya and Yoshita. Yoshita is second to left of Ahana. Vritti is second to left of Manasi.

So, Manasi is sitting third to the left of Tahira.

Hence, the correct answer is Manasi.

Q43. Answer: (d) 98

Shortcut Trick

Ratio of chocolates = 7 : 5

Difference in ratio units = 7 − 5 = 2 units

Given, 2 units = 28 chocolates → 1 unit = 14 chocolates

Larger box (7 units) = 7 × 14 = 98

Therefore The correct answer is 98.

Alternate Method

Given:

Ratio of chocolates in two boxes = 7 : 5

Difference between chocolates = 28

Let the number of chocolates in the boxes be 7x and 5x.

=> 7x − 5x = 28

=> 2x = 28

=> x = 28 ÷ 2

=> x = 14

Number of chocolates in the larger box:

=> 7 × 14 = 98

Therefore The correct answer is 98.

Additional Information

Ratio and Proportion

A Ratio compares two quantities. If a : b is the ratio, the actual values can be represented as ax and bx where x is a common multiplier.

Finding Total Quantity

To find the total number of items, multiply the sum of ratio parts (7 + 5 = 12) by the value of one unit (14). Total = 12 × 14 = 168.

Comparison of Parts

Value of any part = (Given Difference ÷ Difference in Ratio Units) × Required Ratio Unit.

Q44. Answer: (b) Saturday

Given:

• Six girls decided to record a video of their talks, one on each separate day of the same week. Sunday will be a rest day.

• P said Friday will suit her.

• U will start the process and record on Monday.

• S will record immediately before T. T selected Thursday.

• Q will record on a day exactly between the days of U and S.

So, R will record the video on Saturday.

Hence, the correct answer is Saturday.

Q45. Answer: (b) 95

The pattern followed here is shown below:

Hence, "95" will replace the question mark (?) in the given series.

Q46. Answer: (d) 30

The logic followed here is,

Hence, "30" will replace the question mark (?) in the given series.

Q47. Answer: (a) (4, 33, 7)

The logic followed here is:

Middle term = (Third term)² - (First term)²

(1, 8, 3)

$8 = (3)^2 - (1)^1$

8 = 9 - 1

8 = 8

And,

(2, 21, 5)

$21 = (5)^2 - (2)^2$

21 = 25 - 4

21 = 21

Similarly,

(4, 33, 7)

$33 = (7)^2 - (4)^2$

33 = 49 -16

33 =33

Thus, "(4, 33, 7)" set in which the numbers are related in the same way as the numbers of the following sets.

Hence, the correct answer is (4, 33, 7).

Q48. Answer: (b) 21 √15 m²

Shortcut Trick

Calculate semi-perimeter s = (12 + 14 + 16) ÷ 2 = 21 m.

Use Heron's Formula: Area = √[s(s−a)(s−b)(s−c)]

Area = √[21 × (21−12) × (21−14) × (21−16)] = √[21 × 9 × 7 × 5]

Area = √[7 × 3 × 3 × 3 × 7 × 5] = 7 × 3 × √[3 × 5] = 21√15 m².

Therefore The correct answer is 21√15 m².

Alternate Method

Given:

Sides of the triangle: a = 12 m, b = 14 m, c = 16 m

Formula Used:

Area of triangle = √[s(s−a)(s−b)(s−c)], where s is the semi-perimeter.

=> Semi-perimeter (s) = (a + b + c) ÷ 2

=> s = (12 + 14 + 16) ÷ 2 = 42 ÷ 2 = 21 m

=> Area = √[21 × (21 − 12) × (21 − 14) × (21 − 16)]

=> Area = √[21 × 9 × 7 × 5]

=> Area = √[3 × 7 × 3 × 3 × 7 × 5]

=> Area = 3 × 7 × √[3 × 5]

=> Area = 21√15 m²

Therefore The correct answer is 21√15 m².

Additional Information

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Heron's Formula

It is used to find the area of any triangle when all three sides are known: Area = √[s(s−a)(s−b)(s−c)].

Right-Angled Triangle Area

Area = 1/2 × Base × Height. Applicable when the height is perpendicular to the base.

Equilateral Triangle Area

Area = (√3 / 4) × side². All sides must be of equal length.

Q49. Answer: (a) 3^(rd)

The correct answer is '3^(rd)'.

Key Points

• India ranked third globally in an average annual net gain in forest area between 2010 to 2020.

• According to the Economic Survey 2021-22, India has increased its forest area significantly over the past decade, adding an average of 2,66,000 hectares (ha) of additional forest area, every year during the period.

• In other words, it has added approximately 0.38% of the 2010 forest area every year between 2010 to 2020.

• According to the India State of Forest Report 2021 (ISFR), in 2021, the total forest and tree cover in India is 80.9 million hectares, which is 24.62% of the geographical area of the country. It was 24.56% of the total geographical area as per the 2019 report.

Q50. Answer: (a) 7

The Correct answer is '7'.

Key Points

• The original Constitution of 1950 envisaged a Supreme Court with a Chief Justice and 7 puisne Judges - leaving it to Parliament to increase this number.

• In the early years, all the Judges of the Supreme Court sat together to hear the cases presented before them.

• As the work of the Court increased and arrears of cases began to cumulate, Parliament increased the number of Judges from 8 in 1950 to 11 in 1956, 14 in 1960, 18 in 1978, 26 in 1986, 31 in 2009, and 34 in 2019 (current strength).

Q51. Answer: (d) Conclusions II and III follow

Statements:

I. All grasses are shrubs.

II. All roots are fruits.

III. All fruits are flowers.

Conclusions :

(I) All grasses are flowers → False (As there is no direct relation between grasses and flowers. So, we can not conclude anything about their relationship.)

(II) All roots are flowers → True (As all roots are fruits and all fruits are flowers. So, all roots will be flowers)

(III) Some flowers are fruits → True (As all fruits are flowers. So, Some flowers will be fruits.)

Hence, "Conclusion II and III follows" is the correct answer.

Q52. Answer: (c) International Monetary Fund (IMF)

The correct answer is 'International Monetary Fund.'

Key Points

• World Economic Outlook Report-

• A Survey by the IMF(International Monetary Fund) staff usually published twice a year.

• It presents analyses of global economic developments during the near and medium term.

• IMF

• After the Second World Conflict, the IMF and the World Bank were established to help rebuild nations that had been devastated by war.

• At a meeting at Bretton Woods, New York, the two organisations decided to establish themselves.

• They are referred to as the Bretton Woods twins as a result.

• The 189 nations that make up the IMF's nearly global membership are in charge of it and are responsible to them. The IMF was established in 1945.

• Its main goal is to maintain the stability of the global monetary system, which regulates exchange rates and facilitates international trade between nations and their inhabitants.

• In 2012, the mandate of the Fund was revised to include all macroeconomic and financial sector challenges that have an impact

on global stability.

• IMF publish 2 reports-

• Global Financial Stability Report

• World Economic Outlook.

Q53. Answer: (c) 3/2 R

The correct answer is 3/2 R.

Key Points

• The resistance of a wire with length l and cross-sectional area A is given as

• R = ρl/A

• l = Length, A = Area, ρ = Resistivity of the material of resistance which depends upon material and temperature and not on dimensions of wire.

• The volume of wire is given as the product of its length (l) and the cross-sectional area (A) is given as

• V = l × A

• • When the wire is stretched its volume remains the same.

• Therefore l1A1 = l2 A2

• Calculation:

• Given:

• 2l2 = l1

• 3A2= A1

• R2 = ρl2/A2

• R2 = ρ3l1/2A1

• R2 = 2/3R1

• So, R2= 3/2 R

Q54. Answer: (a) Ferns

The correct answer is 'Ferns'.

Key Points

• Spore formation is a method of asexual reproduction.

• Plants like ferns, moss, fungi reproduce by this method.

• Spores are unicellular reproductive bodies present in a sac called sporangia.

• Rhizopus is a saprophytic fungus and grows on substrates like bread, jelly, leather, decaying vegetables, and fruits.

• It is commonly called ‘Bread mold’.

Additional Information

• Yeast:

• Yeasts are eukaryotic, single-celled microorganisms classified as members of the fungus kingdom.

• The first yeast originated hundreds of millions of years ago, and at least 1,500 species are currently recognized.

• They are estimated to constitute 1% of all described fungal species.

• Amoeba:

• Amoeba is a unicellular organism that has the ability to change its shape.

• They are usually found in water bodies such as ponds, lakes and slow-moving rivers.

• Sometimes, these unicellular organisms can also make their way inside the human body and cause various illnesses.

• A German naturalist named August Johann Rösel von Rosenhof who discovered a specimen and made detailed illustrations of the same in 1755.

• Mango:

• A mango is an edible stone fruit produced by the tropical tree Mangifera indica.

• It is believed to have originated between northwestern Myanmar, Bangladesh, and northeastern India.

• Depending on the cultivar, mango fruit varies in size, shape, sweetness, skin color, and flesh color, which may be pale yellow, gold, green, or orange.

• Mango is the national fruit of India, Pakistan and the Philippines.

• The mango tree is the national tree of Bangladesh.

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Q55. Answer: (b) Raja Ram Mohan Roy

The correct answer is 'Raja Ram Mohan Roy'.

Key Points

• Brahmo Samaj was a monotheistic section of Hinduism founded by Raja Ram Mohun Roy in 1828.

• Brahmo Samaj Movement is one of the significant reform movements in India that aims to bring a renaissance to Bengal by fighting against the prevailing evil practices in the society, particularly the practice of Sati and the caste system, and emphasizing the educational, religious, and social reform.

Important Points The major objectives of Brahmo Samaj are as follows-

• Opposition to idolatry.

• Abolishing practice of sati.

• Stopping child marriage and polygamy.

• We are raising voices against the degraded states of widows.

• Propagation of western and modern thoughts in society.

• It aims at purifying the concept of Hinduism and preaching monotheism.

• Focusing on meditation, prayers, and reading of the scriptures.

Q56. Answer: (a) Odisha

The correct answer is 'Odisha.'

Key Points

• Odisha Chief Minister Naveen Patnaik launched Mukhyamantri Vayu Swasthya Seva (air health services).

• With this scheme, it became one of the first states to provide air ambulance facilities for the poor in rural interior areas.

• The people of tribal-dominated districts such as Malkangiri, Nabarangpur, Nuapada, and Kalahandi will be able to get better healthcare services free of cost.

Q57. Answer: (c) 5 hours

Shortcut Trick

Distance in first 2 hours = 60 × 2 = 120 km

Distance in next 2 hours = (60 + 15) × 2 = 75 × 2 = 150 km

Total distance after 4 hours = 120 + 150 = 270 km

Remaining distance = 360 − 270 = 90 km

Speed for next slot = 75 + 15 = 90 km/h; Time for 90 km = 90 ÷ 90 = 1 hour

Total time = 2 + 2 + 1 = 5 hours

Therefore The correct answer is 5 hr.

Alternate Method

Given: Initial speed = 60 km/h, Distance = 360 km, speed increases by 15 km/h every 2 hours.

Formula Used: Distance = Speed × Time

=> Distance covered in Slot 1 (0 to 2 hours) = 60 × 2 = 120 km

=> Speed in Slot 2 (2 to 4 hours) = 60 + 15 = 75 km/h

=> Distance covered in Slot 2 = 75 × 2 = 150 km

=> Total distance covered in 4 hours = 120 + 150 = 270 km

=> Remaining distance = 360 − 270 = 90 km

=> Speed in Slot 3 (after 4 hours) = 75 + 15 = 90 km/h

=> Time to cover remaining distance = 90 ÷ 90 = 1 hour

=> Total Time = 2 + 2 + 1 = 5 hours

Therefore The correct answer is 5 hr.

Additional Information

Arithmetic Progression in Speed

When speed increases by a fixed amount at regular intervals, the distances covered in each interval form an Arithmetic Progression (A.P.). Total distance is the sum of terms in that A.P.

Average Speed

Average Speed = Total Distance ÷ Total Time. In this case, Average Speed = 360 ÷ 5 = 72 km/h.

Relative Speed

For two bodies moving in the same direction, relative speed is the difference (S1 − S2); for opposite directions, it is the sum (S1 +

S2).

Q58. Answer: (d) They are not soluble in an organic solvent.

The incorrect option is They are not soluble in an organic solvent.

Key Points

• Property of Covalent compound:

• Covalent bonding does not result in the formation of new electrons.

• Covalent bonds rarely break spontaneously after it is formed.

• Covalent bonds are directional where the atoms that are bonded showcase specific orientations relative to one another.

• Most compounds having covalent bonds exhibit relatively low melting points and boiling points.

• Compounds with covalent bonds usually have lower enthalpies of vaporization and fusion.

• Compounds formed by covalent bonding don't conduct electricity due to the lack of free electrons.

• Covalent compounds are not soluble in water but soluble in organic solutions.

Additional Information

• Covalent Compounds:

• A covalent bond is a chemical bond that involves the sharing of electrons to form electron pairs between atoms.

• These electron pairs are known as shared pairs or bonding pairs.

• The stable balance of attractive and repulsive forces between atoms, when they share electrons, is known as covalent bonding

• The compound has a covalent bond known as a covalent compound.

Q59. Answer: (a) $2x^2 + 3x - 2 = 0$

Shortcut Trick

From x2 + x − 2 = 0, Sum (a + b) = −1 and Product (ab) = −2.

New root 1 = 1/a + 1/b = (a + b) / ab = −1 / −2 = 1/2.

New root 2 = ab = −2.

Sum of new roots = 1/2 + (−2) = −3/2; Product = 1/2 × (−2) = −1.

Equation: x2 − (−3/2)x + (−1) = 0 => 2x2 + 3x − 2 = 0.

Therefore The correct answer is 2x2 + 3x − 2 = 0.

Alternate Method

Given: Quadratic equation x2 + x − 2 = 0 with roots a and b.

Formula Used: For Ax2 + Bx + C = 0, Sum = −B/A and Product = C/A. New equation = x2 − (Sum of new roots)x + (Product of new roots) = 0.

=> a + b = −1 / 1 = −1

=> ab = −2 / 1 = −2

=> Let the new roots be α and β.

=> α = 1/a + 1/b = (a + b) / ab = −1 / −2 = 1/2

=> β = ab = −2

=> Sum of new roots (α + β) = 1/2 + (−2) = −3/2

=> Product of new roots (αβ) = (1/2) × (−2) = −1

=> Required equation: x2 − (α + β)x + αβ = 0

=> x2 − (−3/2)x + (−1) = 0

=> x2 + 3x/2 − 1 = 0

=> 2x2 + 3x − 2 = 0

Therefore The correct answer is 2x2 + 3x − 2 = 0.

Additional Information

Nature of Roots

The nature is determined by the discriminant (D) = B2 − 4AC. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Sum and Product of Roots

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

Formation of Quadratic Equation

If α and β are given roots, the equation is x2 − (α + β)x + αβ = 0.

Symmetric Functions of Roots

Expressions like a2 + b2 can be written as (a + b)2 − 2ab to solve using coefficients.

Q60. Answer: (a) XOVZM

The position of the alphabet is given as,

The pattern followed here is the opposite series i.e.,

• 1^(st) alphabet → 26^(th) alphabet i.e. A → Z

• 2^(nd) alphabet → 25th alphabet i.e. B → Y

• 3^(rd) alphabet → 24th alphabet i.e. C → X

• And so on till 13^(th) alphabet → 14th alphabet i.e. M → N

Given:

BEING : YVRMT : : PRIDE : KIRWV : : CLEAN : ?

BEING : YVRMT : : PRIDE : KIRWV : : CLEAN : ?

Similarly,

BEING : YVRMT : : PRIDE : KIRWV : : CLEAN : ?

Hence, the correct answer is "XOVZM".

Q61. Answer: (b) f

The correct answer is 'f'.

Key Points

• Lens: The transparent curved surface which is used to refract the light and make an image of any object placed in front of it is called a lens.

• Convex lens: A lens having two spherical surfaces, bulging outwards is called a double convex lens (or simply convex lens).

• It is thicker in the middle as compared to the edges.

• Convex lenses converge light rays and hence, convex lenses are also called converging lenses.

• Nature, position, and relative size of the image formed by a convex lens for various positions of the object:-

Position of the object	Position of the image	The relative size of the image	Nature of the image
At infinity	At focus F2	Highly diminished, point-sized	Real and inverted
Beyond 2F1	Between F2 and 2F2	Diminished	Real and inverted
At 2F1	At 2F2	Same size	Real and inverted
Between F1 and 2F1	Beyond 2F2	Enlarged	Real and inverted
At focus F1	At infinity	Infinitely large or highly enlarged	Real and inverted
Between focus F1 and optical center O	On the same side of the lens as the object	Enlarged	Virtual and erect

Q62. Answer: (a) A pair of interior angles on the same side of the transversal have the same measure.

Shortcut Trick

When parallel lines are intersected by a transversal, the following properties hold:

1. Corresponding angles are equal.

2. Alternate interior angles are equal.

3. Vertically opposite angles are always equal.

4. Interior angles on the same side are supplementary (sum = 180°), not necessarily equal.

They are equal only if the transversal is perpendicular (90° + 90° = 180°).

Therefore The correct answer is A pair of interior angles on the same side of the transversal have the same measure.

Alternate Method

Given: Two parallel lines (m and n) and a transversal (t).

Formula Used: Sum of consecutive interior angles = 180°.

=> Let the transversal intersect the parallel lines at an angle θ.

=> The interior angles on the same side are θ and (180° − θ).

=> For these angles to be equal, θ = 180° − θ.

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=> 2θ = 180° => θ = 90°.

=> Since the transversal can intersect at any angle, θ is not always 90°.

=> Therefore, the angles are supplementary but not necessarily equal.

Therefore The correct answer is A pair of interior angles on the same side of the transversal have the same measure.

Additional Information

Consecutive Interior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary (sum = 180°).

Corresponding Angles Postulate

When two parallel lines are cut by a transversal, the resulting corresponding angles are always equal in measure.

Alternate Interior Angles Theorem

When two parallel lines are cut by a transversal, the alternate interior angles are equal.

Q63. Answer: (d) 88

Concept:

The minute hand covers 360° in an hour and 6° in a minute.

The hour hand covers 30° in an hour and 0.5° in a minute.

Calculation:

Let the number of minutes be x

Starting from midnight i.e. 12 o clock at the midnight, the first time the difference between the two hands would be 90° is:

6x = 0.5x + 90°

=> 5.5x = 90°

=> x = 180/11 minutes

The next time the difference between the two hands would be 90° is when the minute hand would have moved 180° away from the hour hand or the difference between both hands would have been 270°.

6x = 0.5x + 270

=> 5.5x = 270

=> x = 540/11 minutes

Thus, the difference between two consecutive moments where both hands form a right angle is:

=> 540/11-180/11=360/11 minutes

Thus, the two hands form a right angle after every 360/11 minutes.

Total number of minutes in two days = 48 × 60 = 2880 minutes.

Number of times the two hands will form a right angle in a day = 2880 ÷ (360/11)

=> (2880 × 11) ÷ 360

=> 8 × 11 = 88 times

Hence, the two hands will form right angle "88 times" in two days.

Alternate Method

The hour and minute hands makes right angle 2 times in 1 hour, and 22 times in every 12 hours(because, because they don't makes right angle exactly at 60'clock and 12 o'clock).

So, Here, two days = 48 hours.

Therefore, in 48 hours 22 × 4 = 88 times.

Q64. Answer: (b) Pops

The correct answer is 'Pops'.

Key Points

• Paytm Money has introduced India’s first intelligent messenger.

• The company has launched ‘Pops’, with which users can receive specific information related to their stocks, analysis about their portfolio, market news, and important market movements in an easy-to-consume format, all in one place.

• Paytm Money has partnered with InvestorAi to offer stock recommendations.

Important Points

• The platform will also serve as a marketplace to offer sophisticated stock recommendations, news insights, and other services.

• Paytm Money is partnering with InvestorAi to offer stock recommendations based on signals generated using artificial intelligence.

• The company has also partnered with Daily Brief, which simplifies news by parsing through multiple sources and offering key

takeaways.

Q65. Answer: (d) The Sun

The Correct Answer is 'The Sun'.

Key Points

• Pongal is celebrated at the same time every year, at the start of the Tamil month, Thai.

• It is dedicated to the Hindu sun god, the Surya, and corresponds to Makar Sankranti, the harvest festival under many regional names celebrated throughout India.

Additional Information

Days	Name	Importance
First-Day	Bhogi Pandigai	It honors the rain-god, Indra
Second-Day	Surya/ Thai Pongal	It corresponds to Makar Sankranti, which marks the start of the sun's six-month journey north and warm weather.
Third-Day	Mattu Pongal	It is dedicated to the worship of cows.
Fourth-Day	Katya Pongal	The feeding of birds is considered auspicious on this day.

Q66. Answer: (a) Rs. 35,000

Shortcut Trick

Ratio of cost of Printer to Television = 2 : 1

Difference in ratio parts = 2 − 1 = 1 unit

According to the question, 1 unit = Rs. 35,000

Cost of Television = 1 unit = Rs. 35,000

Therefore The correct answer is Rs. 35,000.

Alternate Method

Given:

Difference in cost = Rs. 35,000

Cost of Printer = 2 × Cost of Television

Calculations:

=> Let the cost of the Television be x

=> Cost of the Printer = 2x

=> Difference in cost = Printer − Television

=> 35,000 = 2x − x

=> x = 35,000

=> Cost of Television = Rs. 35,000

Therefore The correct answer is Rs. 35,000.

Additional Information

Ratio and Comparison

When one value is twice another, the ratio is 2:1. The difference between them is exactly equal to the smaller value (2x − x = x).

Linear Equations

To solve for an unknown, translate the verbal description into a mathematical equation like T = P − 35000 and substitute known relationships.

Percentage Relationship

If A is twice B, then A is 100% more than B, or A is 200% of B.

Q67. Answer: (d) Do not overuse air conditioning or heating systems.

The correct answer is 'Do not overuse air conditioning or heating system.'

Key Points

• Air conditioning or heating system mainly work on Electricity and the requirement for electricity is high in comparison to other devices.

• we obtain electricity which is primarily produced from coal and petroleum fuels.

• to conserve such fuels we need to use less electricity.
• to use less electricity, which one of the many ways is by not overusing air conditioning or heating system.

Q68. Answer: (b) 24.3

Given:
0.0486 ÷ 0.002
Calculation:
0.0486over0.002
= (486×10^(-4))/(2×10^(-3))
=243×10^(-1)
=24.3
Hence, the required value is '24.3'.

Q69. Answer: (d) 75 km/h

Shortcut Trick
For two equal distances, Average Speed = (2 × S1 × S2) ÷ (S1 + S2)
Average Speed = (2 × 60 × 100) ÷ (60 + 100)
Average Speed = 12000 ÷ 160 = 75 km/h
Therefore The correct answer is 75 km/h.
Alternate Method
Given:
Speed from P to Q (S1) = 60 km/h
Speed from Q to P (S2) = 100 km/h
Formula Used:
Average Speed = Total Distance ÷ Total Time
Let the distance between P and Q be LCM(60, 100) = 300 km.
=> Time taken from P to Q (t1) = 300 ÷ 60 = 5 hours
=> Time taken from Q to P (t2) = 300 ÷ 100 = 3 hours
=> Total Distance = 300 + 300 = 600 km
=> Total Time = 5 + 3 = 8 hours
=> Average Speed = 600 ÷ 8 = 75 km/h
Therefore The correct answer is 75 km/h.
Additional Information
Average Speed for Different Distances
When distances are unequal, calculate total distance and total time separately: Avg Speed = (d1 + d2 + ...) ÷ (t1 + t2 + ...).
Harmonic Mean
Average speed is the harmonic mean of individual speeds when the distances covered at each speed are equal.
Relative Speed
For objects moving in the same direction, relative speed is |S1 − S2|. For opposite directions, it is (S1 + S2).

Q70. Answer: (c) Both the statements are true.

The correct answer is 'Both the statements are true'.
Key Points
• Reduction Reaction:
• Reduction is a half-reaction in which a chemical species reduces its oxidation number by gaining electrons.
• Reduction is the gain of electrons or a decrease in the oxidation state of a chemical or atoms within it.
• Reduction reactions involve:
• Addition of hydrogen:
• 2N + 3H → 2NH3 (reduction of nitrogen)
• Addition of electropositive element:
• SnCl2 + 2HgCl2 → SnCl4 + Hg2Cl2 (reduction of mercuric chloride)
• Removal of oxygen:
• ZnO + C → Zn + CO (reduction of zinc oxide)

• Removal of electronegative element:

• $2FeCl_3 + H_2 \rightarrow 2FeCl_2 + 2HCl$ (reduction of ferric chloride)

Q71. Answer: (b) Tenth Five Year Plan

The correct answer is the 'Tenth Five Year Plan.'

Key Points

• The government launched a time-bound plan under Bharat Nirman in 2005 for implementation during the four-year period, 2005–09.

• The first half of the programme was in the Tenth Plan period and the second half coincides with the first two years of the Eleventh Plan period (2007–12).

• The objective of the Bharat Nirman Programme is to impart a sense of urgency to create rural infrastructure under various schemes which form part of the Bharat Nirman Programme.

• The tenth five-year plan was focused on the infrastructure sector such as power, transport and communication

Q72. Answer: (a) Both (ii) and (iii)

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

Key Points

• Magnetic lines of force of a magnet shows the direction in which a magnetic material will be aligned when placed at the location.

• Magnetic field lines for a bar magnet are as shown in the diagram.

• Properties of magnetic lines of force are:

• They are continuous closed curves.

• They originate from the North Pole and terminate at the South Pole.

• Two lines do not intersect each other.

• They are crowded where the magnetic field is strong, i.e. near the poles.

Q73. Answer: (c) Ministry of External Affairs

The correct answer is 'Ministry of External Affairs'.

Key Points

• The Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Amendment Bill, 2022 was introduced in Lok Sabha on April 5, 2022, by External Affairs Minister Dr. S Jaishankar.

• The Bill amends the Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005.

• The Act 2005 prohibits unlawful activities (such as manufacturing, transport, or transfer) related to weapons of mass destruction and their mean of delivery.

• Weapons of mass destruction are biological, chemical, or nuclear weapons.

Q74. Answer: (d) Both (a) and (c)

The correct answer is Both (a) and (c).

Key Points

• Lens: The transparent curved surface used to refract the light and make an image of any object placed in front of it is called a lens.

• Convex lens: A lens having two spherical surfaces, bulging outwards is called a double convex lens (or simply convex lens).

• It is thicker in the middle as compared to the edges.

• Convex lenses converge light rays; convex lenses are also called converging lenses.

• The lens formula is given by:

$1/v - 1/u = 1/f$

Where V = Distance of image from the optical centre, U = Distance of object from the optical centre.

• Depending upon the situation convex lens produces real and virtual images.

• The minimum distance between the and the real image in a convex lens is 4f. Hence option 4 is the answer.

Additional Information

• Nature, position, and relative size of the image formed by a convex lens for various positions of the object:-

Position of the object	Position of the image	The relative size of the image	Nature of the image
At infinity	At focus F2	Highly diminished, point-sized	Real and inverted
Beyond 2F1	Between F2 and 2F2	Diminished	Real and inverted

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At 2F1	At 2F2	Same size	Real and inverted
Between F1 and 2F1	Beyond 2F2	Enlarged	Real and inverted
At focus F1	At infinity	Infinitely large or highly enlarged	Real and inverted
Between focus F1 and optical center O	On the same side of the lens as the object	Enlarged	Virtual and erect

Q75. Answer: (b) 49/9

Given:

2.666 ... + 2.77 ...

Calculation:

Let x = 2.666666... ----(1)

Multiply by 10 on both sides,

=> 10x = 26.666... ----(2)

Subtracting equation 2 from 1, we get,

=> 9x = 24

=> x=24/9

Now

Let y = 2.7777..... ------ (3)

Multiply by 10 on both sides,

=> 10y = 27.7.... -------(4)

Subtracting equation 4 from 3, we get,

=> 9x = 25

=> y=25/9

=> x+y=24/9+25/9

=> x+y=49/9

Hence, the required answer is ' 49/9 '.

Q76. Answer: (a) V W B R S M W

Given: B M Q V M W B V M W B V

Let's check each option:

1. VWBRSMW

2. VWBVSWM

3. VWVRSMR

4. VWVRRMW

Hence, by placing option 1 in the series we obtain a definite pattern "BVMW-Q, R, S, T".

Q77. Answer: (c) 6 and 9

Given: 7 × 8 + 9 - 6 ÷ 3 = 59

Now, let's check ach option,

1. If we interchange 8 and 9,

Then equation becomes,

7 × 9 + 8 - 6 ÷ 3 = 59.

On solving this with BODMAS rule we get,

=> 7 × 9 + 8 - 6 ÷ 3 = 59

=> 7 × 9 + 8 - 2 = 59

=> 63 + 8 - 2 = 59

=> 71 - 2 = 59

=> 69 ≠ 59

2. If we interchange 7 and 3,

Then equation becomes,

3 × 8 + 9 - 6 ÷ 7 = 59.

On solving this with BODMAS rule we get,

3 × 8 + 9 - 6 ÷ 7 = 59

3 × 8 + 9 - 0.86 = 59

24 + 9 - 0.86 = 59

33 - 0.86 = 59

32.14 ≠ 59

3. If we interchange 6 and 9,

Then equation becomes,

7 × 8 + 6 - 9 ÷ 3 = 59.

On solving this with BODMAS rule we get,

7 × 8 + 6 - 9 ÷ 3 = 59

7 × 8 + 6 - 3 = 59

56 + 6 - 3 = 59

62 - 3 = 59

59 = 59

4. If we interchange 3 and 6,

Then equation becomes,

7 × 8 + 9 - 3 ÷ 6 = 59

On solving this with BODMAS rule we get,

7 × 8 + 9 - 3 ÷ 6 = 59

7 × 8 + 9 - 0.5 = 59

56 + 9 - 0.5 = 59

75 - 0.5 = 59

74.5 ≠ 59

Hence, two numbers should be interchanged to make the given equation correct is 6 and 9.

Q78. Answer: (d) T

Given:

• P, Q, R, S, T, U and V live on seven different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2, and so on till the topmost floor is numbered 7.

• U lives on the top floor.

• Only two persons live between T and Q. Q is on floor number 3.

• V lives on the floor immediately above P's floor.

• S lives on the floor immediately above R's floor. Q lives on the floor immediately below R's floor.

So, T lives on floor number 6.

Therefore, the correct answer is option 4.

Q79. Answer: (a) Knowing about their body changes, teenagers start making fun of each other

The incorrect answer is 'Knowing about their body changes, teenagers start making fun of each other'.

Key PointsSex education:

• Sex education is an educational principle that raises awareness about various sexual changes and processes in the body.

• Its goal is to raise awareness about sexually transmitted diseases, safe sex practices and sexual abuse.

• Knowledge about changes taking place during puberty.

• Sex education is essential in schools because it informs students about reproductive health, related organs, adolescence, and sexually transmitted diseases.

• It also raises awareness in order to protect people from misconceptions about various sex-related issues.

• Discouraging various myths and misconceptions among youth.

Q80. Answer: (d) 11

The correct answer is '11'.

Key Points

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• Intensified Mission Indradhanush 4.0 will have three rounds and will be conducted in 416 districts (including 75 districts identified for Azadi ka Amrit Mahotsav) across 33 States/UTs in the country.

• IMI 4.0 was organized by the Union Ministry of Health and Family Welfare in February 2022, with an aim to increase full immunization coverage under UIP.

• In the first round (Feb-April 2022), 11 states will conduct IMI 4.0.

• These 11 states are Assam, Uttarakhand, Gujarat, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, and Chhattisgarh.

Additional InformationMission Indradhanush (MI):

• It was launched to fully immunize more than 89 lakh children who are either unvaccinated or partially vaccinated under UIP.

• It provides vaccination against 12 Vaccine-Preventable Diseases (VPD) i.e. diphtheria, Whooping cough, tetanus, polio, tuberculosis, hepatitis B, meningitis and pneumonia, Haemophilus influenzae type B infections, Japanese encephalitis (JE), rotavirus vaccine, pneumococcal conjugate vaccine (PCV) and measles-rubella (MR).

Q81. Answer: (d) x = 9

Shortcut Trick

For any Quadratic Equation $ax^2 + bx + c = 0$, the Sum of Roots is given by $-b/a$.

In the equation $x^2 - 12x + k = 0$, the sum of roots = $-(-12)/1 = 12$.

Given that one root is 3, let the other root be x_2.

$3 + x_2 = 12 \Rightarrow x_2 = 12 - 3 = 9$.

Therefore The correct answer is x = 9.

Alternate Method

Given: The equation is $x^2 - 12x + k = 0$ and one root is x = 3.

Since x = 3 is a root, it must satisfy the Quadratic Equation:

$\Rightarrow (3)^2 - 12(3) + k = 0$

$\Rightarrow 9 - 36 + k = 0$

$\Rightarrow -27 + k = 0$

$\Rightarrow k = 27$

Now, substitute the value of k back into the original equation:

$\Rightarrow x^2 - 12x + 27 = 0$

To find the roots, we factorize the expression by splitting the middle term:

$\Rightarrow x^2 - 9x - 3x + 27 = 0$

$\Rightarrow x(x - 9) - 3(x - 9) = 0$

$\Rightarrow (x - 3)(x - 9) = 0$

$\Rightarrow x - 3 = 0$ or $x - 9 = 0$

$\Rightarrow x = 3$ or $x = 9$

Since one root is already given as 3, the other root must be 9.

Therefore The correct answer is x = 9.

Additional Information

Sum and Product of Roots

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

Nature of Roots

The term $D = b^2 - 4ac$ is called the Discriminant. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Factor Theorem

If x = r is a root of a polynomial f(x) = 0, then (x − r) is a factor of that polynomial.

Q82. Answer: (b) 2

Shortcut Trick

For a number to be divisible by 90, it must be divisible by 10 (last digit y = 0) and 9 (sum of digits divisible by 9).

The number is 115x0. Sum of digits = 1 + 1 + 5 + x + 0 = 7 + x.

For 7 + x to be divisible by 9, x must be 2.

Thus, x + y = 2 + 0 = 2.

Therefore The correct answer is 2.

Alternate Method
Given: The five-digit number is 115xy and it is divisible by 90.
Formula Used: Divisibility by 90 => Divisibility by both 9 and 10.
=> Divisibility by 10: A number is divisible by 10 only if its unit digit is 0.
=> Therefore, y = 0.
=> The number becomes 115x0.
=> Divisibility by 9: A number is divisible by 9 if the sum of its digits is a multiple of 9.
=> Sum of digits = 1 + 1 + 5 + x + 0 = 7 + x.
=> For 7 + x to be divisible by 9, the possible values for 7 + x are 9, 18, 27, etc.
=> Since x is a single digit, 7 + x = 9 => x = 2.
=> Calculating the required value: x + y = 2 + 0 = 2.
Therefore The correct answer is 2.
Additional Information
Divisibility Rule for 9
A number is divisible by 9 if the sum of its digits is divisible by 9.
Divisibility Rule for 10
A number is divisible by 10 if its last digit (unit digit) is 0.
Composite Divisibility
If a number is divisible by two co-prime numbers a and b, then it is also divisible by their product (a × b).

Q83. Answer: (d) 6.8

Shortcut Trick
Identify the Modal Class with the maximum frequency: 12 (Class: 6-8).
Apply Mode formula: L + [(f1 − f0) / (2f1 − f0 − f2)] × h
Mode = 6 + [(12 − 8) / (24 − 8 − 6)] × 2
Mode = 6 + (4 / 10) × 2 = 6 + 0.8 = 6.8.
Therefore The correct answer is 6.8.
Alternate Method
Given:
Class intervals and frequencies: 2-4 (10), 4-6 (8), 6-8 (12), 8-10 (6), 10-12 (4).
Formula Used:
Mode = L + [(f1 − f0) / (2f1 − f0 − f2)] × h
Calculations:
=> Maximum frequency (f1) = 12, which corresponds to class 6-8.
=> Lower limit of modal class (L) = 6.
=> Frequency of class preceding (f0) = 8.
=> Frequency of class succeeding (f2) = 6.
=> Class width (h) = 8 − 6 = 2.
=> Mode = 6 + [(12 − 8) / (2 × 12 − 8 − 6)] × 2
=> Mode = 6 + [4 / (24 − 14)] × 2
=> Mode = 6 + (4 / 10) × 2
=> Mode = 6 + 0.4 × 2
=> Mode = 6 + 0.8 = 6.8
Therefore The correct answer is 6.8.
Additional Information
Empirical Relationship
The relationship between the three measures of central tendency is: Mode = 3 Median − 2 Mean.
Modal Class Definition
The Modal Class is the class interval that has the highest frequency in a grouped frequency distribution.
Bimodal Data
A data set is called Bimodal if it contains two distinct values or classes that have the highest and equal frequency.

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Q84. Answer: (a) Rs. 192

Shortcut Trick

The effective rate for simple interest is calculated as R × T.

Effective Rate = 5% × 3 = 15%

Simple Interest = 15% of Rs. 1,280

SI = 0.15 × 1280 = Rs. 192

Therefore The correct answer is Rs. 192.

Alternate Method

Given:

Principal (P) = Rs. 1,280

Rate of Interest (R) = 5% p.a.

Time (T) = 3 years

Formula Used:

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

Calculations:

=> SI = (1280 × 5 × 3) ÷ 100

=> SI = (1280 × 15) ÷ 100

=> SI = 19200 ÷ 100

=> SI = Rs. 192

Therefore The correct answer is Rs. 192.

Additional Information

Compound Interest Formula

The total amount (A) in compound interest is $A = P(1 + r/100)^n$, where n is the number of years.

SI vs CI for 2 Years

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

Effective Annual Rate

For SI, the total interest rate is simply R × T, whereas for CI, it follows the successive percentage change rule.

Q85. Answer: (c) 10%

Shortcut Trick

Identify the Marked Price (MP) as Rs. 10,490 and Selling Price (SP) as Rs. 9,441.

Calculate the Discount Amount: 10,490 − 9,441 = 1,049.

Determine the Discount Percentage using the ratio of discount to MP.

Discount% = (1,049 ÷ 10,490) × 100 = 1/10 × 100 = 10%.

Therefore The correct answer is 10%.

Alternate Method

Given → Marked Price (MP) = Rs. 10,490, Selling Price (SP) = Rs. 9,441.

Formulas → Discount = MP − SP | Discount% = (Discount ÷ MP) × 100.

=> Discount = 10,490 − 9,441 = 1,049.

=> Discount% = (1,049 ÷ 10,490) × 100.

=> Discount% = 0.1 × 100 = 10%.

Therefore The correct answer is 10%.

Additional Information

Marked Price and Discount

The Marked Price (MP) is the price listed on the product. Discount is always calculated on the MP unless stated otherwise.

Selling Price Calculation

Selling Price (SP) can be calculated as MP × (100 − Discount%) ÷ 100.

Q86. Answer: (c) 25 : 23

Given:

Total number of units sold by Mr. P = 80 + 30 + 50 + 90

= 250

Total number of units sold by Mr. Q = 60 + 40 + 70 + 60
= 230
Concept used:
Ratio of units sold by Mr. P and Mr. Q
Total number of units sold by Mr. P : Total number of units sold by Mr. Q
Calculation:
= 250 : 230
= 25 : 23
Hence, the correct answer is '25 : 23 '.

Q87. Answer: (d) 6

Decoding the information,

Sign	•	•	×	÷
Means	÷	•	•	×

Given:
[{(23 × 15) - (1 ÷ 4)} + (2 - 2)] ÷ 2
After replacing the signs and using the BODMAS rule:
[{(23 - 15) + (1 × 4)} ÷(2+2)] × 2; =[{(8) + (4)} ÷(4)] × 2; =[12÷4]×2; =3×2; =6
Hence, the correct answer is "6".

Q88. Answer: (c) Soil

The incorrect answer is 'Soil'.
Key PointsBiotic component:
• Biotic components are the living things that have a direct or indirect influence on other organisms in an environment.
• For example plants(flower, tree etc), animals (frog ,birds, cow etc), and microorganisms (insects) and their waste materials.
Additional InformationAbiotic component:
• Abiotic components of an ecosystem include all chemical and physical elements i.e. non-living components.
• Abiotic components can vary from region to region, from one ecosystem to another.
• They mainly take up the role of life supporter.
• They determine and restrict the population growth, number, and diversity of biotic factors in an ecosystem.
• Hence, they are called limiting factors.
• For example, soil, light, temperature etc.

Q89. Answer: (b) 82

Decoding the information,

Sign	•	•	÷	×
Means	•	÷	×	•

Given:
12 ÷ 6 + 28 - 7 × 14 = ?
After replacing the signs and using the BODMAS rule,
12 × 6 - 28 ÷ 7 + 14; =12×6-4+14; =72-4+14; =86-4; =82
Hence, the required answer is "82".

Q90. Answer: (c) Ca

The correct answer is 'Calcium'.
Key Points
• Calcium (Ca) is the most reactive metal amongst these.
• An element's reactivity decreases while going down the reactivity series.
• Reactivity of metals: K > Na > Ca > Mg > Al > Zn > Fe > Pb > Cu
• Gold, silver and copper are the least reactive metals and they are also known as noble metals.
Additional Information

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• Reactivity series:
• The reactivity series is a list of metals arranged in descending order of their activities.
• Because they are easily oxidized, the metals near the top of the reactivity range are powerful reducing agents.
• These metals discolor and corrode quickly.
• The reactivity series data can be used to determine if a metal can displace another in a single displacement reaction.

Q91. Answer: (d) 2

Given:
(Left) 158 438 182 325 230 (Right)
If 5 is added to the first digit of every number
Condition: (First digit) ÷ (Second digit) = Whole number
According to the question,
The pattern followed here is the first digit of number is exactly divisible by second digit.
Thus, there are two sets of numbers in which the first digit is divisible by the second digit.
Hence, the correct answer is "2".

Q92. Answer: (d) Number 4

The correct answer is 'Number 4'.
Key Points
Cerebrum
• The cerebrum is the largest part of the brain.
• It consists of the cerebral cortex and other subcortical structures.
• It is composed of two cerebral hemispheres that are joined together by heavy, dense bands of fibre called the corpus callosum.
Midbrain:
• It is the middle part of the brain and is located between the thalamus and pons.
• The midbrain is also known as the mesencephalon. It connects pons to the forebrain. It forms the brain stem along with the hindbrain.
• It is the smallest part of the brainstem and is around 2 cm in length.
• The midbrain consists of the centre for visual and auditory reflexes.
• It is involved in the processing of visual and auditory information, regulates eye movement and pupil dilation and regulating muscle movement and motor control.
Forebrain
• Largest part of the brain It is the anterior part of the brain.
• The forebrain parts include: Cerebrum, Hypothalamus, Thalamus
• Forebrain Function: Controls the reproductive functions, body temperature, emotions, hunger and sleep.
• The largest among the forebrain parts is the cerebrum. It is also the largest part of all vertebrate brains
Spinal cord
• spinal cord is the long, cylindrical structure that connects your brain and lower back.
• It contains tissues, fluids and nerve cells.
• A bony column of vertebrae surrounds and protects your spinal cord.
• spinal cord helps carry electrical nerve signals throughout your body.

Q93. Answer: (d) 18 m, South

Given:
• Janhvi starts walking from her home and goes 45 m towards the west.
• She then turns right and walks 32 m.
• Then, she tums right and walks 88 m.
• After that, she turns right and walks 50 m.
• Finally, she turns right again and walks 43 m.
Drawing the diagram according to the given information,

Thus, now, Janhvi is 18 m away and in the south direction from her home.
Hence, the correct answer is 18 m, South.

Q94. Answer: (d) By photosynthesis during the day

The correct answer is 'By photosynthesis during the day'.

Key PointsPhotosynthesis:

• Glucose is the energy that plants require to grow and produce flowers and fruit.

• After photosynthesis, plants use the glucose they need right away and store the remainder for later.

• Because plants don't use oxygen, they release it as a waste product through the same pores they used to take in carbon dioxide during day.

• This is very helpful for humans and other animals who breathe the oxygen that plants release into the atmosphere.

Q95. Answer: (a) First attempt to relate the properties of elements with atomic mass.

The correct answer is 'First attempt to relate the properties of elements with atomic mass'.

Key Points

Dobereiner's Law of Triads:

• Dobereiner arranged the elements in a group of three (tri meaning three) elements.

• The group of three elements was made such that the atomic mass of the middle element of the triad was approximately equal to the arithmetic mean (average) of the atomic masses of the other two elements of that triad when arranged in their increasing order of atomic mass.

• This law was proposed by a German chemist called Johann Wolfgang Dobereiner in 1817.

• Examples: Triad of Lithium, Sodium, and Potassium:

Q96. Answer: (b) 10 min

Shortcut Trick

Rate of A = 100/4 = 25 eggs/min

Rate of B = 100/5 = 20 eggs/min

Combined Rate = 25 + 20 = 45 eggs/min

Time for 450 eggs = 450 ÷ 45 = 10 minutes

Therefore The correct answer is 10 min.

Alternate Method

Given:

A counts 100 eggs in 4 min | B counts 100 eggs in 5 min | Total eggs to count = 450

Formula Used:

Total Time = Total Work ÷ Combined Efficiency

Person	Time (for 100 eggs)	Work (Eggs)	Efficiency (Eggs/min)
A	4 min	100	100 ÷ 4 = 25
B	5 min	100 ÷ 5 = 20	

=> Efficiency of A = 25 eggs/min

=> Efficiency of B = 20 eggs/min

=> Combined Efficiency (A + B) = 25 + 20 = 45 eggs/min

=> Total eggs to be counted = 450

=> Time Required = 450 ÷ 45

=> Time Required = 10 minutes

Therefore The correct answer is 10 min.

Additional Information

Work Rate Principle

Rate of work is inversely proportional to time taken. Total Work = Rate × Time.

Combined Efficiency

When two entities work together, their rates (efficiencies) are additive: R_(total) = R1 + R2.

Time and Work Relation

If A can do a work in 'x' days and B in 'y' days, together they do it in (x × y) ÷ (x + y) days for the same amount of work.

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Q97. Answer: (c) Rs. 2,565

Shortcut Trick

Initial Cost (MP) = 5,000 − 2,000 = 3,000.

Net discount multiplier = (100 − 10)% × (100 − 5)% = 0.9 × 0.95 = 0.855.

Final SP = 3,000 × 0.855 = 2,565.

Therefore The correct answer is Rs. 2,565.

Alternate Method

Given → Initial Price = Rs. (5,000 − 2,000), First Discount = 10%, Second Discount = 5%.

Formulas: SP = MP × (100 − D1)% × (100 − D2)% | Successive Discount = a + b − (ab ÷ 100).

=> Price before discounts = 5,000 − 2,000 = 3,000.

=> Price after Dealer Discount (10%) = 3,000 − (10% of 3,000) = 3,000 − 300 = 2,700.

=> This 2,700 becomes the Cost Price (CP) for the retailer.

=> Price after Retailer Discount (5%) = 2,700 − (5% of 2,700) = 2,700 − 135 = 2,565.

Therefore The correct answer is Rs. 2,565.

Additional Information

Successive Discounts

When two or more discounts are applied one after another, the effective discount is calculated on the reduced price. Net Discount % = a + b − (ab/100).

Marked Price (MP)

It is the price printed on the label of an article. Discounts are always calculated on the Marked Price unless stated otherwise.

Q98. Answer: (c) Prophet Muhammad

The correct answer is 'Prophet Muhammad'.

Key Points

• The rise of Islam is intrinsically linked with the Prophet Muhammad.

• It was believed by Muslims to be the last in a long line of prophets that includes Moses and Jesus.

• Because Muhammad was the chosen recipient and messenger of the word of God through the divine revelations,

• Muslims from all walks of life strive to follow his example.

• After the holy Qur'an, the sayings of the Prophet (hadith) and descriptions of his way of life (sunna) are the most important Muslim texts.

Q99. Answer: (c) √2

Calculation:

The angle of incident and the angle of refraction are the angles which the incident ray and the refracted ray make with the normal.

Therefore The angle of incidence ° = 45°

Angle of refraction 30°

so i = angle of incidence = 45°, r = angle of refraction = 30°

By Snell's law

sin i μ1 = sin r μ2

sin i × 1 = sin r μ2 [Because The refractive index of air is taken as 1]

μ2 = sin i / sin r = sin 45° /sin 30° = √2

Q100. Answer: (c) Fundamental Duties

The correct answer is 'Fundamental Duties.'

Key Points

• The 42nd Amendment Act of 1976 added 10 Fundamental Duties to the Indian Constitution. 86th Amendment Act 2002 later added 11th Fundamental Duty to the list.

• Swaran Singh Committee in 1976 recommended Fundamental Duties, the necessity of which was felt during the internal emergency of 1975-77.

Additional InformationFundamental Duties:

• The fundamental duties which were added by the 42nd Amendment Act of the Constitution in 1976, in addition to creating and promoting culture, also strengthen the hands of the legislature in enforcing these duties vis-a-vis the fundamental rights.

• The list of 11 Fundamental Duties under article 51-A to be obeyed by every Indian citizen is given in the table below:

1. Abide by the Indian Constitution and respect its ideals and institutions, the National Flag, and the National Anthem

2. Cherish and follow the noble ideals that inspired the national struggle for freedom.
3. Uphold and protect the sovereignty, unity, and integrity of India.
4. Defend the country and render national service when called upon to do so.
5. Promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic, and regional or sectional diversities and renouncing practices derogatory to the dignity of women.
6. Value and preserve the rich heritage of the country's composite culture.
7. Protect and improve the natural environment including forests, lakes, rivers, and wildlife, and have compassion for living creatures.
8. Develop scientific temper, humanism, and the spirit of inquiry and reform.
9. Safeguard public property and abjure violence.
10. Strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavor and achievement.
11. Provide opportunities for education to his child or ward between the age of six and fourteen years.

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