RRB ALP CBT-I 2024 Official Paper (Held On: 28 Nov, 2024 Shift 2) (Previous Year Paper)

RRB Group D • 2024 • 75 questions • 60 minutes • Answer key and solutions

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STAGE I (CBT I)

Q1. The length of the base of a triangle is equal to the perimeter of a square whose diagonal is $7\sqrt{2}$ cm and the corresponding height of the triangle is equal to the length of a side of the square whose area is 169 sq cm. The area (in sq cm) of the triangle is:

(a) 152
(b) 182
(c) 156
(d) 130

Q2. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?

LNR, MOS, NPT, OQU, ?

(a) PVR
(b) VRP
(c) PRV
(d) VPR

Q3. The Public Examinations (Prevention of Unfair Means) Act, 2024 that aims to prevent unfair means in public examinations and common entrance tests held across the country, came into effect in which month of 2024?

(a) August
(b) June
(c) May
(d) July

Q4. If each vowel in the word ENGLISH is changed to the letter following it in the English alphabetical order and each consonant is changed to the letter preceding it in the English alphabetical order, then which letter will be in the second position from the left in the new group of letters thus formed?

(a) J
(b) M
(c) F
(d) R

Q5. When white light is dispersed by a glass prism into seven colours, out of the following colours which colour will be deviated the least?

(a) Indigo
(b) Yellow
(c) Blue
(d) Green

Q6. As per Women, Business and the Law 2024 (WBL2024), India scores ____ out of 100.0.

(a) 71.4
(b) 74.4
(c) 70.4
(d) 75.4

Q7. ICICI Bank has partnered with which of the following agencies in October 2024 to provide instant credit on UPI for pre-approved customers, offering up to Rs. 2 lakh credit with a 45-day repayment period?

(a) Google Pay
(b) PhonePe
(c) BharatPe
(d) Paytm

Q8. What are the basic building units of organisms?

(a) Cells
(b) Bones
(c) Fibres
(d) Tissues

Q9. For how many days will the Ashtalakshmi Mahotsav be celebrated in December 2024?

(a) Four days
(b) One day
(c) Two days
(d) Three days

Q10. Seven people, A, B, C, D, E, F and G are sitting in a straight line, facing north.

Only two people sit to the left of F. F sits second to the right of G. E sits second to the right of F. C sits fourth to the right of B. D sits second to the left of C. A sits an immediate right of C.

How many people sit between B and G?

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

Q11. When an object falls under gravity, the object experiences:

(a) an acceleration
(b) a deceleration
(c) a force only when it hits the surface of the earth
(d) no external force

Q12. When an iron nail is dipped into a copper sulphate solution, which substance gets displaced?

(a) Copper
(b) Copper Sulphate
(c) Sulphate
(d) Iron

Q13. What is the path of an object when it is in uniform motion?

(a) A circle
(b) A straight line
(c) A parabola
(d) An ellipse

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Q14. An object is placed between the focus and the pole of a concave mirror, the image formed will be:

(a) Real, inverted and enlarged
(b) Real, inverted and diminished
(c) Virtual, erect and diminished
(d) Virtual, erect and enlarged

Q15. Select the pair which follows the same pattern as that followed by the two set of pairs given below. Both pairs follow the same pattern.

WGN : ZDQ

IUZ : LRC

(a) PXH: LCD
(b) CAT: FXW
(c) URL: STI
(d) DMV: HHZ

Q16. 3 pencils and 5 pens together cost Rs. 101, whereas 5 pencils and 3 pens together cost Rs. 91. The cost of 2 pencils and 2 pens together is:

(a) Rs. 45
(b) Rs. 36
(c) Rs. 48
(d) Rs. 32

Q17. In a country, 55% of the population are females. 80% of the male population is literate. What percentage of females are literate if the total literacy rate is 58%?

(a) 55%
(b) 40%
(c) 45%
(d) 20%

Q18. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and decide which conclusion(s) logically follow(s) from the given statements.

Statements:

All kites are monkeys.

All monkeys are ants

Conclusions:

(I) Some ants are kites.

(II) Some monkeys are not kites.

(a) Neither conclusion (I) nor (II) follows.
(b) Only conclusion (II) follows.
(c) Only conclusion (I) follows.
(d) Both conclusions (I) and (II) follow. 2

Q19. The power of a body can be measured in both Kilowatt (KW) as well as Watt(W). Then the value of 1 KW in terms of Watt is:

(a) 10
(b) 1000
(c) 10000
(d) 100

Q20. Study the following table and answer the question.

The table shows the number of people who visited hill stations A and B in the years from 2011 to 2013.

Year	A	B

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2011	777	566
2012	675	289
2013	470	978

What is the absolute difference between the number of people who visited hill station A in the year 2011 to the number of people who visited hill station B in the same year?

(a) 211
(b) 102
(c) 112
(d) 312

Q21. Who became the first woman fighter pilot to join the elite 18 'Flying Bullets' squadron in 2024?

(a) Bhawana Kanth
(b) Mohana Singh
(c) Avani Chaturvedi
(d) Shivangi Singh

Q22. Anthony starts from Point A and drives 9 km towards West. He takes a left turn, drives 3 km, turns left again and drives 13 km. He then takes a right turn and drives 2 km. He takes a final right turn, drives 4 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90 deg)

(a) 5 km towards the North
(b) 13 km towards the West
(c) 9 km towards the North
(d) 7 km towards the South

Q23. How many medals were secured by India in Paris Olympics 2024?

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

Q24. In colloids, which of the following is a correct example of foam?

(a) Pumice
(b) Mist
(c) Jelly
(d) Fog

Q25. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?

UZW, TYV, SXU, RWT, ?

(a) SQV
(b) QSV
(c) SVQ
(d) QVS

Q26. What is the position of the apical meristematic tissue in a plant body?

(a) At the growing tips of the stems and roots
(b) Near to the root region only
(c) On the lateral side of the stem and roots
(d) Near the node

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Q27. Find the simple interest on Rs. 3,000 as a sum borrowed at 4% per year rate of interest for 5 years.

(a) Rs. 400
(b) Rs. 800
(c) Rs. 600
(d) Rs. 300

Q28. The present ages of three persons are in ratio 4 : 5 : 6. Eight years ago, the sum of their ages was 51. Find the present age of the eldest person.

(a) 28 years
(b) 30 years
(c) 45 years
(d) 36 years

Q29. Refer to the following number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) 9 # 1 2 @ 8 $ 7 & 3 Ω & % 4 6 * £ 5 (Right)

How many such symbols are there, each of which is immediately preceded by an even number but not immediately followed by an odd number?

(a) Zero
(b) Two
(c) One
(d) More than two

Q30. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and decide which conclusion(s) logically follow(s) from the given statements.

Statements:

Some parrots are monkeys.

Some bears are monkeys.

Conclusions:

(I) All bears are parrots.

(II) Some monkeys are not bears.

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

Q31. What compound is formed when dilute hydrochloric acid is added to a beaker containing a small amount of copper oxide?

(a) Copper (IV) Chloride
(b) Copper (II) Chloride
(c) Copper (III) Chloride
(d) Copper (I) Chloride

Q32. The work done in moving a charge +Q across two points having a potential difference K is:

(a) QK
(b) 2QK
(c) QK/4
(d) QK/2

Q33. Where was the Fifth Global Standards Symposium (GSS-24) held?

(a) Bengaluru
(b) Chennai
(c) New Delhi

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(d) Mumbai

Q34. A scheme like 'Buy 5, Get 6' on the same kind of articles with the same marked price offers a _____ discount

(a) 20%
(b) 16 2/3 %
(c) 11 1/9%
(d) 17.50%

Q35. A vendor sold 10 toffees for a rupee, thereby gaining 20%. How many did he buy for a rupee?

(a) 6
(b) 12
(c) 10
(d) 8

Q36. Which of the following options gives the correct expression for y, when $(\cos^2 A)/(1 - \sin A) = y$, and $\sin A \neq 1$?

(a) cscA
(b) secA+tanA
(c) sinA+1
(d) cosA+1

Q37. Metabolic activities that generate nitrogenous waste material in human being are removed by:

(a) the vascular system
(b) the excretory system
(c) the circulatory system
(d) the respiratory system

Q38. In this question, two statements, I and II, have been given. These statements maybe independent causes, or effects of independent causes or a common cause. One of the statements maybe the effect of the other statement. Read both the statements and select the correct answer.

I. Most teachers of school X have left the school and joined school Y.

II. The football team of school X has won the champion's trophy in the inter-city football championship.

(a) Both I and II are independent causes.
(b) Both I and II are effects of independent causes.
(c) II is the cause and I is its possible effect.
(d) I is the cause and II is its possible effect.

Q39. Which of the following options should come in place of the question mark (?) in the given series?

7, 13, 25, ?, 97, 193

(a) 39
(b) 49
(c) 32
(d) 35

Q40. All 36 people are standing in a row, facing north. Aman is 11^(th) from the left end, while Pratha is 12^(th) from the right end.

How many people are there between Aman and Pratha?

(a) 18
(b) 15
(c) 10
(d) 13

Q41. The smallest natural number that must be multiplied with 1083 to make it a perfect square is

(a) 3
(b) 11
(c) 2

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(d) 4

Q42. Select the correct statement(s).

A. Testosterone brings about changes in appearance seen in boys at the time of puberty.

B. Progesterone brings about changes in appearance seen in boys at the time of puberty.

(a) Both the statements are false.
(b) Both the statements are true.
(c) Statement B is true but A is false.
(d) Statement A is true but B is false.

Q43. Particles of matter are continuously moving because of _____.

(a) potential energy
(b) size of particles
(c) kinetic energy
(d) intermixing of particles

Q44. Which of the following is a prime number?

(a) 437
(b) 373
(c) 161
(d) 221

Q45. Based on the English alphabetical order, three of the following four letter cluster pairs are alike in a certain way and thus form a group. Which pair does NOT belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter cluster)

(a) BF-AE
(b) DH-CG
(c) XB-YC
(d) TX-SW

Q46. In a certain code language, ‘GLOBE’ is coded as ‘84315’, ‘GRADE’ is coded as ‘89265’, and ‘BAKED’ is coded as ‘12756’. What is the code for ‘R’ in the given code language?

(a) 9
(b) 8
(c) 6
(d) 2

Q47. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which pair does not belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) AK - VH
(b) YI - TD
(c) SC - NX
(d) LV - GQ

Q48. I walk at a speed of 10 km/h and reach the destination in 2 hrs, exactly on time. If I increase my speed by 5 km/h, how early would I reach my destination?

(a) 50 min
(b) 20 min
(c) 40 min
(d) 30 min

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Q49. Which of the following is obtained by subtracting $x^2 - y^2$ from $y^2 - x^2$?

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

Q50. If 48 : x :: x : 75, and x > 0, then what is the value of x?

(a) 51
(b) 57
(c) 63
(d) 60

Q51. Seven people, A, B, C, D, E, F and G are sitting in a straight line, facing north.

Only two people sit to the left of D. F sits second to the left of D. G sits second to the right of E. E sits second to the right of D. A sits second to the left of B. A is not an immediate neighbour of F.

Who sits at the extreme right end of the line?

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

Q52. Identify the simplest compound formed by carbon that is used widely as fuel.

(a) Methyl
(b) Methane
(c) Ethane
(d) Propane

Q53. In the female reproductive organ of flower, the swollen bottom part is the ____, middle elongated part is the ____, and the terminal part that may be sticky is the stigma.

(a) style, ovary
(b) ovary, style
(c) bud, style
(d) zygote, pollen tube

Q54. _____ was awarded the Green Energy Champion Award for 2023-24 at a meeting hosted by the Indian Wind Power Association in Coimbatore on 18 August 2024.

(a) Uttar Pradesh
(b) Andhra Pradesh
(c) Gujarat
(d) Kerala

Q55. Which of the following statements is INCORRECT about ‘nature of a carbon compound’?

(a) Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation.
(b) Compounds of carbon having double or triple bonds between their carbon atoms are called unsaturated compounds.
(c) Compounds of carbon are only formed with oxygen.
(d) Compounds of carbon, which are linked by only single bonds between the carbon atoms, are called saturated compounds.

Q56. NCPJ is related to PFTO in a certain way based on the English alphabetical order. In the same way, QAVB is related to SDZG. To which of the following options is UIND related, following the same logic?

(a) VKRJ
(b) VMRJ
(c) XLSI
(d) WLRI

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Q57. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘×’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘−’, what will come in place of the question mark ‘?’ in the following equation?

34D54C18A18B324 = ?

(a) 202
(b) 204
(c) 404
(d) 304

Q58. In a certain code language,

‘A # B’ means ‘A is the mother of B’,

‘A – B’ means ‘A is the brother of B’,

‘A × B’ means ‘A is the wife of B’,

and ‘A = B’ means ‘A is the father of B’.

How is N related to S if ‘N – P # S × T

(a) Father's mother
(b) Father's brother
(c) Mother's brother
(d) Father's father's brother

Q59. Refer to the following number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) # 1 * £ 5 $ 8 $ 4 2 & % 6 7 & @ 3 Ω 9 (Right)

How many such symbols are there, each of which is immediately preceded by a number and also immediately followed by a symbol?

(a) More than two
(b) Zero
(c) Two
(d) One

Q60. If A means +, B means −, C means ×, D means ÷, then what will come in place of the question mark (?) in the following equation?

91 D 13 B 4 A 3 C 2 = ?

(a) 8
(b) 9
(c) 7
(d) 10

Q61. Which of the following teams was the winner of 2nd edition of Women's Premier League?

(a) Royal Challengers Bangalore (Bengaluru)
(b) UP Warriorz
(c) Delhi Capitals
(d) Mumbai Indians

Q62. In a certain code language, ‘CODE’ is coded as ‘5739’ and ‘LEGS’ is coded as ‘4256’. What is the code for ‘E’ in the given code language?

(a) 6
(b) 5
(c) 2
(d) 9

Q63. Consider a long current carrying solenoid. If Rahul plots the magnetic field lines inside this long current carrying solenoid, then it appears:

(a) denser at the ends
(b) denser to increase from one end to another

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(c) uniform at all points
(d) denser in the middle

Q64. The average of the prime numbers between 11 and 30, both excluded, is:
(a) 20.2
(b) 20.3
(c) 19.6
(d) 19.5

Q65. Identify the INCORRECT sentence(s).

a. Some organisms use simple food material obtained from inorganic sources in the form of carbon dioxide and water.

b. Other organisms utilise complex substances which are broken down into simpler ones before they can be used for the upkeep and growth of the body.

c. Heterotrophic organisms include plants.

(a) Only c
(b) Only a
(c) Only b and c
(d) Only a and b

Q66. A and B can together complete a piece of work in 5 days. They worked together for 4 days and then B left. After another 2 days, A completed the remaining work. In how many days can A complete the entire work alone?
(a) 20
(b) 10
(c) 15
(d) 5

Q67. In the following number pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is the same as that on the right side of ::?

(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.)

X : 793 :: 679 : Y

(a) X = 974, Y = 498
(b) X = 848, Y = 519
(c) X = 886, Y = 443
(d) X = 923, Y = 481

Q68. The average of 70 values is 40. If each value is multiplied by 20, what will be the changed average?
(a) 800
(b) 60
(c) 90
(d) 1400

Q69. Which of the following numbers represent the atomic mass of calcium?
(a) 32 u
(b) 16 u
(c) 40 u
(d) 14 u

Q70. If, in the quadrilateral JKLM, the measures of the angles J, K, L, and M are in the ratio 2 : 3 : 5 : 6, then the quadrilateral is a:
(a) Kite
(b) Parallelogram

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(c) Trapezium
(d) Square

Q71. If the number 6484a6 is divisible by 8, then find the least value of a.
(a) 0
(b) 7
(c) 3
(d) 1

Q72. Using π = 22/7, find the total surface area of a closed cylinder having a base radius of 70 m and height of 110 m.
(a) 79,200 m²
(b) 82,400 m²
(c) 82,500 m²
(d) 78,500 m²

Q73. What is the name of the project launched by the Ministry of Culture in 2024 to showcase India's artistic heritage through public art installations?
(a) Project BHARATI
(b) Project KALA
(c) Project SANSKRITI
(d) Project PARI

Q74. Two students appeared in an examination. One of them secured 9 marks more than the other and his marks were 56% of the sum of their marks. The marks obtained by them were:
(a) 41 and 32
(b) 43 and 34
(c) 42 and 33
(d) 39 and 30

Q75. In the following number pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is the same as that on the right side of ::?

(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.)

X : 826 :: 723 : Y
(a) X=593, Y=941
(b) X=542, Y=1007
(c) X=604, Y=1018
(d) X=518, Y=984

ANSWER KEY

1	b	2	c	3	b	4	b	5	b	6	b	7	b	8	a	9	d	10	d
11	a	12	a	13	b	14	d	15	b	16	c	17	b	18	c	19	b	20	a
21	b	22	a	23	d	24	a	25	d	26	a	27	c	28	b	29	b	30	c
31	b	32	a	33	c	34	b	35	b	36	c	37	b	38	b	39	b	40	d
41	a	42	d	43	c	44	b	45	c	46	a	47	a	48	c	49	a	50	d
51	c	52	b	53	b	54	b	55	c	56	d	57	d	58	c	59	a	60	b
61	a	62	b	63	c	64	a	65	a	66	b	67	a	68	a	69	c	70	c
71	d	72	a	73	d	74	c	75	b										

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SOLUTIONS

Q1. Answer: (b) 182

Shortcut Trick

Base of triangle = 4 × (Diagonal of square / √2) = 4 × 7 = 28 cm.

Height of triangle = √(Area of square) = √169 = 13 cm.

Area of triangle = 1/2 × Base × Height = 1/2 × 28 × 13 = 182 sq cm.

Therefore The correct answer is 182 sq cm.

Alternate Method

Given:

Diagonal of Square1 = 7√2 cm

Area of Square2 = 169 sq cm

Formula Used:

Side of square = Diagonal / √2

Perimeter of square = 4 × Side

Area of square = $(Side)^2$

Area of triangle = (1/2) × base × height

=> Side of Square1 = 7√2 / √2 = 7 cm

=> Perimeter of Square1 = 4 × 7 = 28 cm

=> Base (b) of triangle = 28 cm

=> Side of Square2 = √169 = 13 cm

=> Height (h) of triangle = 13 cm

=> Area of triangle = (1/2) × 28 × 13

=> Area = 14 × 13 = 182 sq cm

Therefore The correct answer is 182 sq cm.

Additional Information

Square Properties

Relationship between side (a) and diagonal (d): $d = a\sqrt{2}$. Area = $a^2 = d^2/2$.

Area of Triangle (Heron's Formula)

For a triangle with sides a, b, and c: Area = $\sqrt{[s(s-a)(s-b)(s-c)]}$, where semi-perimeter $s = (a + b + c)/2$.

Equilateral Triangle

Area of an equilateral triangle with side 'a' is $(\sqrt{3} / 4) \times a^2$ and height is $(\sqrt{3} / 2) \times a$.

Q2. Answer: (c) PRV

The logic followed here is:

Hence, "Option 3" is the correct answer.

Q3. Answer: (b) June

The correct answer is June

Key Points

• The Public Examinations (Prevention of Unfair Means) Act, 2024, aimed at preventing unfair practices in public examinations and common entrance tests across India, came into effect on June 21, 2024.

• The Act was introduced in the Lok Sabha on February 5, 2024, passed by both houses of Parliament by February 9, 2024, and received presidential assent on February 12, 2024.

• The Act comprehensively defines "unfair means" to include:

• Leaking or attempting to leak question papers or answer keys.

• Assisting candidates during examinations through unauthorized communication or providing solutions.

• Tampering with computer systems or networks related to the examination process.

• Impersonating or facilitating impersonation of candidates.

• Conducting fake examinations or issuing counterfeit documents.

• Altering official records to manipulate merit lists or rankings.

• Penalties:

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• Imprisonment ranging from three to ten years, depending on the severity of the offence.

• Fines up to Rs. 1 crore for organised malpractices.

Additional Information

• Issues Related to the Public Examination Bill 2024

• Concerns include the implementation challenges of new technologies, potential state-level resistance to a uniform framework, and ensuring the central regulatory authority functions without bias. Additionally, there are worries about the Bill's impact on the already overburdened judicial system with cases of examination malpractices.

• Discretion to State Governments: Since the said bill is of model draft nature, disparities in its implementation across states are possible. This situation can make its implementation on the ground difficult.

• Creative Loopholes in Sanctions: Provisions like fines on service providers appear to be loose, looking like an eyewash and can easily be dodged by the defaulters.

• Clarity of National Technical Committee: There is no defined guidance on what will constitute the national technical committee and what will be its mandate. This has the potential of creating a committee which might not be of much value in framing security protocols.

• Stringency That Is Legally Challenged: The stringency of measures, including non-bailability and non-compoundability, may run into a legal challenge on the basis of the principles of proportionality and adherence to the principles of natural justice.

Q4. Answer: (b) M

Given word: 'ENGLISH'

After applying the specified transformations:

Original letter	**E**	**N**	**G**	**L**	**I**	**S**	**H**
Transformed letter	F	M	F	K	J	R	G

Second alphabet from the left end is: M,

Hence, the correct answer is "Option 2".

Q5. Answer: (b) Yellow

The correct answer is Yellow.

Key Points

• When white light passes through a prism, it is dispersed into its constituent colours, a phenomenon known as dispersion.

• The seven colours produced are red, orange, yellow, green, blue, indigo, and violet, each having a different wavelength.

• The deviation of light depends on the wavelength; shorter wavelengths (violet, indigo) are deviated more than longer wavelengths (red).

• Among the given options, yellow light has a longer wavelength compared to indigo, blue, and green.

• As a result, yellow light will experience the least deviation out of the provided options when dispersed by a prism.

Additional Information

• Dispersion of Light

• Dispersion occurs because different colours of light travel at different speeds in a medium, leading to different angles of refraction.

• Refractive Index

• The refractive index of a material varies with the wavelength of light, causing the separation of colours in a prism.

• Application in Optics

• Dispersion is utilized in various optical instruments and technologies, such as spectrometers and prisms used in science and industry.

Q6. Answer: (b) 74.4

The correct answer is 74.4

Key Points

• According to the World Bank's Women, Business, and the Law (WBL) 2024 report, India scored 74.4 out of 100.0.

• This score indicates that India has a strong legal foundation for women.

• The WBL report is a yearly publication by the World Bank Group that measures the legal rights of women in different countries.

• The WBL 2024 report ranked India 113th out of 190 countries.

Additional InformationIndicators Covered:

• Mobility: Measures women’s freedom to travel and move independently.

• Workplace: Evaluates laws prohibiting discrimination in employment.
• Pay: Assesses whether laws mandate equal pay for equal work.
• Marriage: Looks at women's rights in marriage, including domestic violence laws.
• Parenthood: Reviews support for working mothers, including maternity and parental leave.
• Entrepreneurship: Measures the ease of starting and running businesses as women.
• Assets: Reviews women's legal rights to own and manage property.
• Pension: Analyzes laws ensuring women have access to retirement benefits.

Q7. Answer: (b) PhonePe

The correct answer is Phone Pe

Key Points

• In October 2024, ICICI Bank partnered with PhonePe to offer instant credit on UPI for pre-approved customers.
• The credit line is available for up to Rs. 2 lakh with a repayment period of 45 days
• This facility can be used for purchasing high-ticket items like electronics, travel, and hotel bookings
• It can also be used for bill payments

Additional Information

• ICICI
• ICICI Bank stands for Industrial Credit and Investment Corporation of India.
• ICICI was formed in 1955.
• The objective was to create a development financial institution for providing medium-term and long-term project financing to Indian businesses.
• Headquarters: Mumbai.
• PhonePe
• PhonePe is an Indian digital payments and financial services company headquartered in Bengaluru, Karnataka, India
• It was founded in December 2015 by Sameer Nigam, Rahul Chari and Burzin Engineer

Q8. Answer: (a) Cells

The correct answer is Cells.

Key Points

• Cells are the basic structural and functional units of all living organisms.
• They can exist as independent single-celled organisms or as part of a multicellular organism.
• Cells carry out essential processes such as metabolism, energy conversion, and reproduction.
• There are two main types of cells: prokaryotic cells, which do not have a defined nucleus, and eukaryotic cells, which have a defined nucleus and organelles.
• Cells are composed of various organelles that perform specific functions necessary for the cell's survival and proper functioning.

Additional Information

• Tissues
• Tissues are groups of similar cells that work together to perform a specific function.
• There are four basic types of tissues in animals: epithelial, connective, muscle, and nervous tissues.
• Organs
• Organs are structures made up of different types of tissues that work together to perform specific functions within an organism.
• Examples include the heart, lungs, and brain in animals, and roots, stems, and leaves in plants.
• Organ Systems
• Organ systems are groups of organs that work together to perform complex functions necessary for the survival of the organism.
• Examples of organ systems in animals include the circulatory system, respiratory system, and digestive system.

Q9. Answer: (d) Three days

The correct answer is Three days

Key Points

• The Ashtalakshmi Mahotsav 2024 was a three-day cultural festival held from December 6th to 8th, 2024, at Bharat Mandapam, Pragati Maidan, New Delhi.
• This inaugural event celebrated the rich cultural heritage and economic potential of Northeast India's eight states—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura—collectively known as the 'Ashtalakshmi'.

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• Over 250 artisans and entrepreneurs showcased handicrafts, handlooms, and agri-horticultural products, with a special focus on 34 Geographical Indication (GI)-tagged items

• The fusion of contemporary design with traditional textiles, showcasing Muga silk gowns and Eri silk stoles.

Additional Information

• The first ever Ashtalakshmi Mahotsav aims to offer a dynamic stage for showcasing Northeast India's vibrant textile sector, tourism opportunities, traditional craftsmanship, and distinctive Geographical Indication (GI) tagged products.

• It will serve as a celebration of the region's cultural wealth while focusing on its strategic importance in India's future development.

• The festival has been conceptualized as an annual event that will continue to honor the diversity and cultural richness of Northeast India, propelling the region towards further economic advancement.

• The Mahotsav will also emphasize the significance of infrastructure development in Northeast India and its transformative impact.

• The region's improved connectivity, industrial growth, and ongoing development in sectors like transport, energy, and digital infrastructure are poised to enhance its strategic role in India's growth story and open new opportunities for trade and business

Q10. Answer: (d) None

Given: Seven people, A, B, C, D, E, F and G are sitting in a straight line, facing north.

1) Only two people sit to the left of F.

2) F sits second to the right of G.

3) E sits second to the right of F.

4) C sits fourth to the right of B.

5) D sits second to the left of C.

6) A sits an immediate right of C.

Thus, according to the final arrangement, no person sit between B and G.

Hence, "Option 4" is the correct answer.

Q11. Answer: (a) an acceleration

The correct answer is an acceleration.

Key Points

• When an object falls under gravity, it experiences an acceleration due to the gravitational force exerted by the Earth.

• This acceleration is called gravitational acceleration and is denoted by 'g', which is approximately 9.8 m/s^2 near the Earth's surface.

• Gravitational acceleration acts on all objects equally, regardless of their masses.

• The direction of the acceleration is towards the center of the Earth.

• During free fall, the only force acting on the object is gravity, making it an ideal example of uniformly accelerated motion.

Additional Information

• Gravitational Force

• Gravitational force is the attractive force between two masses.

• It is one of the four fundamental forces of nature.

• The strength of the gravitational force between two objects depends on their masses and the distance between them.

• Free Fall

• Free fall is the motion of a body where gravity is the only force acting upon it.

• In a vacuum, all objects fall at the same rate regardless of their mass.

• Terminal Velocity

• Terminal velocity is the constant speed that a freely falling object eventually reaches when the resistance of the medium prevents further acceleration.

• At terminal velocity, the force of gravity is balanced by the drag force of the medium.

Q12. Answer: (a) Copper

The correct answer is Copper.

Key Points

• When an iron nail is dipped into a copper sulphate solution, a displacement reaction occurs.

• In this reaction, iron (Fe) displaces copper (Cu) from copper sulphate ($CuSO_4$) solution because iron is more reactive than copper.

• The chemical equation for this reaction is: Fe + CuSO4 → FeSO4 + Cu.
• As a result, iron forms iron sulphate (FeSO4) and copper is displaced from the solution.
• This type of reaction is an example of a single displacement reaction, where a more reactive metal displaces a less reactive metal from its compound.

Additional Information

• Reactivity Series
• The reactivity series is a list of metals arranged in order of their reactivity, from highest to lowest.
• Metals higher in the series can displace metals lower in the series from their compounds in solution.
• Displacement Reactions
• These reactions involve a more reactive element displacing a less reactive element from its compound.
• Displacement reactions are commonly used in metal extraction and refining processes.
• Examples of Displacement Reactions
• Zinc displacing copper from copper sulphate solution: Zn + CuSO4 → ZnSO4 + Cu.
• Magnesium displacing hydrogen from hydrochloric acid: Mg + 2HCl → MgCl2 + H2.

Q13. Answer: (b) A straight line

The correct answer is A straight line.

Key Points

• In uniform motion, an object travels equal distances in equal intervals of time.
• The velocity of the object remains constant throughout the motion.
• The path of an object in uniform motion is a straight line because the direction does not change.
• Uniform motion implies that there is no acceleration involved in the movement of the object.
• This type of motion is an ideal concept often used in physics to simplify complex motion scenarios.

Additional Information

• Non-uniform Motion
• In non-uniform motion, the object travels unequal distances in equal intervals of time.
• This type of motion involves changes in speed and/or direction, leading to acceleration.
• Accelerated Motion
• In accelerated motion, the velocity of the object changes over time.
• This can involve an increase or decrease in speed and can also include changes in direction.
• Circular Motion
• In circular motion, an object moves along the circumference of a circle.
• This type of motion involves a constant change in direction, leading to centripetal acceleration.

Q14. Answer: (d) Virtual, erect and enlarged

The correct answer is Virtual, erect and enlarged.

Key Points

• When an object is placed between the focus (F) and the pole (P) of a concave mirror, the image formed is virtual.
• The image is erect, meaning it is upright and not inverted.
• The image is enlarged, appearing larger than the object.
• This type of image is formed behind the mirror.
• The rays appear to diverge from a point behind the mirror, leading to the virtual image formation.

Additional Information

• Real Image
• A real image is formed when light rays actually converge at a point.
• It is always inverted and can be projected onto a screen.
• Concave Mirror
• A concave mirror is a mirror with a surface that curves inward like a bowl.It can form real and virtual images depending on the object's position relative to the focus and center of curvature.
• Convex Mirror
• A convex mirror has a surface that curves outward.
• It always forms virtual, erect, and diminished images regardless of the object's position.

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Q15. Answer: (b) CAT: FXW

The logic followed here is:

Given:

WGN : ZDQ

And,

IUZ : LRC

So, checking each option one by one:

Option 1) PXH: LCD

Option 2) CAT: FXW

Option 3) URL: STI

Option 4) DMV: HHZ

Thus, out of all the options, 'CAT: FXW' follows the same logic as given.

Hence, "Option 2" is the correct answer.

Q16. Answer: (c) Rs. 48

Shortcut Trick

Add the two equations: (3 + 5) Pencils + (5 + 3) Pens = Rs. 101 + Rs. 91

8 Pencils + 8 Pens = Rs. 192

To find the cost of 2 pencils and 2 pens, divide the total by 4:

(8 Pencils + 8 Pens) ÷ 4 = Rs. 192 ÷ 4 = Rs. 48

Therefore The correct answer is Rs. 48.

Alternate Method

Given:

Cost of 3 pencils and 5 pens = Rs. 101

Cost of 5 pencils and 3 pens = Rs. 91

Let the cost of one pencil be x and one pen be y.

=> 3x + 5y = 101 --- (Equation 1)

=> 5x + 3y = 91 --- (Equation 2)

Adding both equations:

=> (3x + 5x) + (5y + 3y) = 101 + 91

=> 8x + 8y = 192

=> 8(x + y) = 192

=> x + y = 192 ÷ 8 = 24

Now, to find the cost of 2 pencils and 2 pens:

=> 2(x + y) = 2 × 24

=> 2x + 2y = 48

Therefore The correct answer is Rs. 48.

Additional Information

Symmetric Linear Equations

Equations of the form ax + by = m and bx + ay = n are called symmetric equations. They are best solved by adding and subtracting them to find (x + y) and (x − y) values.

Unitary Cost Calculation

Total Cost ÷ Total Quantity gives the average cost per unit, which helps in finding costs for multiple units of a combined set.

Elimination Method

A general method where you multiply equations by constants to make the coefficients of one variable equal, then subtract to eliminate it.

Q17. Answer: (b) 40%

Shortcut Trick

Using the Alligation Method:

Ratio of Male to Female = 45 : 55 = 9 : 11

Let Female literacy be x%.

(80 − 58) ÷ (58 − x) = 11 ÷ 9

22 ÷ (58 − x) = 11 ÷ 9 => 2 × 9 = 58 − x

18 = 58 − x => x = 40%

Therefore The correct answer is 40%.

Alternate Method

Given:

Total Population = 100 (Assumption)

Females = 55% of 100 = 55

Males = 100 − 55 = 45

Total Literacy Rate = 58% of 100 = 58

Male Literacy Rate = 80% of 45

Calculations:

=> Total Literate people = 100 × (58 ÷ 100) = 58

=> Literate Males = 45 × (80 ÷ 100) = 36

=> Literate Females = Total Literates − Literate Males

=> Literate Females = 58 − 36 = 22

=> Female Literacy % = (Literate Females ÷ Total Females) × 100

=> Female Literacy % = (22 ÷ 55) × 100

=> Female Literacy % = (2 ÷ 5) × 100 = 40%

Therefore The correct answer is 40%.

Additional Information

Weighted Average Concept

The total percentage is the weighted average of the subgroups: Average_(Total) = (n1a1 + n2a2) ÷ (n1 + n2).

Percentage to Fraction Conversion

Fractions like 2/5 = 40%, 1/5 = 20%, and 3/5 = 60% are essential for solving data interpretation and percentage problems quickly.

Base Change Property

Always identify the correct base (denominator). Here, literacy rate for females is calculated with respect to the total female population, not the total population.

Q18. Answer: (c) Only conclusion (I) follows.

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

Conclusions:

(I) Some ants are kites → Follow (As all kites are monkeys and all monkeys are ants. As whole kites comes in monkeys which whole comes in ants, therefore it is true.)

(II) Some monkeys are not kites → Does not follow (As all kites are monkeys. As whole kites comes in monkeys, therefore it is false.)

Therefore Here, Only conclusion (I) follows.

Hence, the correct answer is "Option 3".

Q19. Answer: (b) 1000

The correct answer is Option 2 (1000).

Key Points

• The unit of power is the Watt (W), named after James Watt.

• 1 Kilowatt (KW) is equivalent to 1000 Watts (W).

• The prefix 'kilo-' denotes a factor of 1000.

• Power is the rate at which energy is transferred or converted.

• Common applications of Kilowatts include measuring the power output of engines and the power consumption of electrical appliances.

Additional Information

• Horsepower

• Another unit of power is horsepower (HP), commonly used to measure the power of engines.

• 1 horsepower is approximately equal to 745.7 Watts.

• Megawatt

• 1 Megawatt (MW) is equivalent to 1,000,000 Watts.

• Megawatts are often used to measure the output of power plants or the power consumption of large facilities.
• Electrical Power Measurement
• Electrical power is often measured in Kilowatt-hours (kWh).
• 1 Kilowatt-hour is the amount of energy consumed by a 1000-Watt appliance running for one hour.

Q20. Answer: (a) 211

Calculation:
Number of people who visited hill station A in 2011 = 777
Number of people who visited hill station B in 2011 = 566
Absolute difference = |777 - 566| = 211
The absolute difference between the number of people who visited hill station A and hill station B in 2011 is 211.

Q21. Answer: (b) Mohana Singh

The correct answer is Mohana Singh
Key Points
• Squadron Leader Mohana Singh became the first woman fighter pilot to join the Indian Air Force's (IAF) 18 "Flying Bullets" squadron in 2024.
• The "Flying Bullets" squadron operates the LCA Tejas, India's Indigenous fighter jet
• Mohana Singh is one of the first female fighter pilots in India.
• She was part of the "Tarang Shakti" exercise in Jodhpur, where she flew in the LCA Tejas fighter jet.
• During the exercise, she instructed the Army and Navy Vice Chiefs on the flight.
• The exercise was a message of support for Make in India.
Additional Information
• Avani Chaturvedi
• One of India’s first three women fighter pilots.
• Commissioned in June 2016 in the Indian Air Force (IAF).
• First Indian woman to fly a solo fighter jet (MiG-21 Bison) in 2018.
• Born in Rewa, Madhya Pradesh.
• Graduate from the Indian Air Force Academy, Hyderabad.
• Shivangi Singh
• First woman fighter pilot to join the IAF's Rafale squadron in 2020.
• Part of the prestigious "Golden Arrows" Squadron.
• Hails from Varanasi, Uttar Pradesh.
• Commissioned in 2017 and previously flew MiG-21 Bisons.
• Bhawana Kanth
• One of India’s first three women fighter pilots.
• Commissioned in June 2016 in the IAF.
• Became combat-ready in May 2019, flying MiG-21 Bison.
• Born in Begusarai, Bihar.
• First woman fighter pilot to take part in the Republic Day parade flypast in 2021.

Q22. Answer: (a) 5 km towards the North

Given:
Anthony starts from Point A and drives 9 km towards West.
He takes a left turn, drives 3 km, turns left again and drives 13 km.
He then takes a right turn and drives 2 km.
He takes a final right turn, drives 4 km and stops at Point P.
Thus, Anthony should drive (3 km + 2 km) 5 km in the north direction in order to reach Point A again.
Hence, "Option 1" is the correct answer.

Q23. Answer: (d) Six

The correct answer is Six
Key Points

• India won six medals at the 2024 Paris Olympics, including one silver and five bronze.
• This was India's second-highest medal haul at the Olympics.
• India's medal winners included Manu Bhaker, Swapnil Kusale, Aman Sehrawat, Neeraj Chopra, and Sarabjot Singh.
• Manu Bhaker won India's first medal, a bronze, in the women's 10 m air pistol event.
• She was the first Indian woman to win an Olympic shooting medal.
• Swapnil Kusale won India's third bronze in the men's 50m rifle 3 positions shooting event.
• He was the first Indian to win this event.
• India's men's hockey team also contributed to India's medal haul.

Additional Information

• India competed at the 2024 Summer Olympics in Paris, France, held from 26 July to 11 August 2024.
• The country made its debut at the 1900 Summer Olympics.
• Indian athletes have appeared at every edition of the Summer Olympic Games since 1920 and the Paris Games edition marked India's 26th appearance at the Summer Olympics.
• India won six medals including a silver and five bronze to be ranked 71st amongst the 206 NOCs that participated in the Olympics.

Q24. Answer: (a) Pumice

The correct answer is Pumice.

Key Points

• Pumice is a correct example of foam in colloids.
• Foam is a type of colloid where gas is dispersed in a solid or liquid medium.
• Pumice forms when gas bubbles are trapped in solidified lava, creating a porous structure.
• This porous nature of pumice makes it light and able to float on water.
• Other examples of foam include whipped cream (gas in liquid) and Styrofoam (gas in solid).

Additional Information

• Mist
• Mist is an example of a colloid where liquid droplets are dispersed in a gas (air).
• It is commonly seen when tiny water droplets are suspended in the air, reducing visibility.
• Jelly
• Jelly is a colloid where a liquid is dispersed in a solid medium.
• It is a semi-solid substance used in various food products.
• Fog
• Fog is similar to mist but consists of larger water droplets dispersed in the air.
• It is a dense layer of water droplets that decreases visibility significantly.

Q25. Answer: (d) QVS

The logic followed here is:

Hence, "Option 4" is the correct answer.

Q26. Answer: (a) At the growing tips of the stems and roots

The correct answer is At the growing tips of the stems and roots.

Key Points

• The apical meristematic tissue is located at the growing tips of the stems and roots of a plant.
• It is responsible for the primary growth of the plant, which results in an increase in length.
• These tissues contain actively dividing cells that contribute to the elongation of the plant.
• The apical meristem is crucial for the formation of new organs such as leaves, flowers, and roots.
• It plays a significant role in the development and growth of the plant, ensuring continuous growth at the tips.

Additional Information

• Lateral Meristems
• These are found on the lateral sides of stems and roots.
• Lateral meristems are responsible for the secondary growth, which increases the girth of the plant.
• Intercalary Meristems
• These are located at the base of leaves or internodes.

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• They help in the regrowth of grasses and elongation of internodes.
• Root Cap
• A protective structure that covers the tip of a root.
• It protects the apical meristem as the root pushes through the soil.

Q27. Answer: (c) Rs. 600

Shortcut Trick
Total interest percentage = Rate × Time
Net Interest % = 4% × 5 = 20%
Simple Interest = 20% of Rs. 3,000 = (20 ÷ 100) × 3,000
Simple Interest = Rs. 600
Therefore The correct answer is Rs. 600.
Alternate Method
Given:
Principal (P) = Rs. 3,000
Rate (R) = 4% per year
Time (T) = 5 years
Formula Used:
Simple Interest (SI) = (P × R × T) ÷ 100
Calculations:
=> SI = (3000 × 4 × 5) ÷ 100
=> SI = (3000 × 20) ÷ 100
=> SI = 30 × 20
=> SI = Rs. 600
Therefore, the calculated value matches Option (3).
Therefore The correct answer is Rs. 600.
Additional Information
Simple Interest (SI)
Simple interest is calculated only on the initial principal amount. Formula: SI = P × R × T ÷ 100.
Total Amount
The total sum paid at the end of the duration is Principal + Interest. Amount (A) = P + SI = P(1 + RT/100).
Interest Rate Units
The Rate (R) and Time (T) must be in the same time units (e.g., both per year or both per month) before calculation.

Q28. Answer: (b) 30 years

Shortcut Trick
Current Sum of ages = 51 + (3 persons × 8 years) = 75 years.
Total ratio parts = 4 + 5 + 6 = 15 units.
15 units = 75 years → 1 unit = 5 years.
Present age of eldest person (6 units) = 6 × 5 = 30 years.
Therefore The correct answer is 30 years.
Alternate Method
Given:
Ratio of present ages = 4 : 5 : 6
Sum of ages 8 years ago = 51
Formula Used:
Present Sum = Past Sum + (Number of Persons × Time Gap)
=> Let the present ages be 4x, 5x, and 6x.
=> Sum of their ages 8 years ago = (4x − 8) + (5x − 8) + (6x − 8) = 51
=> 15x − 24 = 51
=> 15x = 51 + 24
=> 15x = 75

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=> x = 75 ÷ 15 = 5

=> Present age of eldest person = 6x = 6 × 5 = 30 years.

Therefore The correct answer is 30 years.

Additional Information

Ratio and Age Relationship

When a ratio a:b is given for present ages, the actual ages are taken as ax and bx. After n years, the ages become (ax + n) and (bx + n).

Sum of Ages over Time

The sum of ages for 'k' persons increases or decreases by (k × n) after or before 'n' years respectively.

Constant Age Difference

The numerical difference between the ages of two individuals remains constant regardless of the number of years passed or gone by.

Q29. Answer: (b) Two

Given: (Left) 9 # 1 2 @ 8 $ 7 & 3 Ω & % 4 6 * £ 5 (Right)

Here, We need to find the symbols that are immediately preceded by an even number and not immediately followed by an odd number.

Required pattern: Even Number - Symbol - Not Odd Number

(Left) 9 # 1 2 @ 8 $ 7 & 3 Ω & % 4 6 * £ 5 (Right)

So, there are two such symbols in the series '2 @ 8' and '6 * £'.

Hence, the correct answer is "Option 2".

Q30. Answer: (c) Neither conclusion (I) nor (II) follows.

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

Conclusions:

(I) All bears are parrots → Does not follow (As some parrots are monkeys and some bears are monkeys. So it is possible but not definite.)

(II) Some monkeys are not bears → Does not follow (As some bears are monkeys. So it is possible but not definite.)

Therefore Here, Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 3".

Q31. Answer: (b) Copper (II) Chloride

The correct answer is Copper (II) Chloride.

Key Points

• Copper oxide reacts with hydrochloric acid to form copper (II) chloride.
• The chemical equation for the reaction is: CuO + 2HCl → CuCl2 + H2O.
• Copper (II) chloride is a compound where copper is in the +2 oxidation state.
• This reaction is a typical acid-base reaction where copper oxide acts as a base.
• The solution formed is usually blue-green due to the presence of copper (II) ions.

Additional Information

• Copper (I) Chloride
• This is a compound where copper is in the +1 oxidation state.
• It has different properties compared to copper (II) chloride, such as color and solubility.
• Oxidation States of Copper
• Copper commonly exhibits +1 and +2 oxidation states in its compounds.
• The +2 oxidation state is more stable in aqueous solutions.
• Acid-Base Reactions
• These reactions involve the transfer of protons (H^+ ions) from the acid to the base.
• Metal oxides reacting with acids typically form a salt and water.

Q32. Answer: (a) QK

The correct answer is QK.

Key Points

• The work done in moving a charge in an electric field is given by the product of the charge and the potential difference.

• In this case, the charge is +Q and the potential difference is K.
• The formula for work done (W) is: W=Q?V
• Here, substituting the given values, W=Q?K
• Therefore, the work done in moving the charge +Q across two points with potential difference K is QK

Additional Information

Electric Potential (V)

• Electric potential is the amount of electric potential energy per unit charge at a point in an electric field.
• It is measured in volts (V).

Electric Field (E)

• An electric field is a region around a charged particle where a force would be experienced by other charges.
• It is measured in newtons per coulomb (N/C) or volts per meter (V/m).

Potential Difference (V)

• The potential difference (voltage) between two points is the work done to move a unit charge from one point to another.
• It is a measure of the energy difference per unit charge between two points in an electric field.

Q33. Answer: (c) New Delhi

The correct answer is New Delhi

Key Points

• The Fifth Global Standards Symposium (GSS-24) was inaugurated by Mr. Jyotiraditya M. Scindia, Minister of Communications and Development of North Eastern Region, at the Bharat Mandapam, New Delhi marking a historic event for the Asia-Pacific region.1
• The theme for GSS-24 was “Charting the Next Digital Wave: Emerging Technologies, Innovation, and International Standards”.
• ITU, established in 1865, is the oldest UN-specialized agency for Information and Communication Technologies.
• The focus was on the role of international standards in advancing emerging digital technologies and fostering sustainable development.

Additional Information

• The Global Standards Symposium (GSS) is an important platform established for discussions and coordination in the field of international standards.
• Its main objective is to bring together global policymakers, innovators, and decision-makers to foster cooperation in the field of standards.
• The Past Four GSS Dates, Locations, and Themes:

Serial No.	Date	Location	Theme
GSS-24	October 14, 2024	New Delhi, India	"Charting the Next Digital Wave: Emerging Technologies, Innovation, and International Standards" (gss.itu.int)
GSS-20	February 28, 2022	Geneva, Switzerland	"International standards to enable the digital transformation and achieve the Sustainable Development Goals (SDGs)" (itu.int)
GSS-16	October 24, 2016	Hammamet, Tunisia	"Security, Privacy, and Trust in Standardization" (itu.int)
GSS-12	November 18, 2012	Dubai, UAE	"Security, Privacy, and Trust in Standardization"

• The GSS-24, held on October 14, 2024, in New Delhi, India, focused on the theme "Charting the Next Digital Wave: Emerging Technologies, Innovation, and International Standards". Over 1,500 global leaders, innovators, and experts participated, discussing the digital revolution and cooperation in the field of standards

Q34. Answer: (b) 16 2/3 %

Shortcut Trick

In a 'Buy X, Get Y' scheme where Y is the total number of articles received, the Free Articles = Y − X.

Discount % = (Free Articles ÷ Total Articles) × 100

Here, Free articles = 6 − 5 = 1 article.

Total articles received = 6 articles.
Discount % = (1 ÷ 6) × 100 = 16 2/3 %.
Therefore The correct answer is 16 2/3 %.
Alternate Method
Given:
Offer = 'Buy 5, Get 6'
Total items received by the customer = 6
Items paid for by the customer = 5
Formula Used:
Discount % = [(Marked Price − Selling Price) ÷ Marked Price] × 100
Let the Marked Price (MP) of each article be Rs. 1.
=> Total MP of 6 articles = 6 × 1 = Rs. 6.
=> Customer pays for 5 articles, so Selling Price (SP) = 5 × 1 = Rs. 5.
=> Discount Amount = MP − SP = 6 − 5 = Rs. 1.
=> Discount % = (Discount ÷ MP) × 100
=> Discount % = (1 ÷ 6) × 100
=> Discount % = 16 2/3 %.
Therefore The correct answer is 16 2/3 %.
Additional Information
Buy X Get Y Free Scheme
When Y articles are given free on the purchase of X articles, the Discount % = [Y ÷ (X + Y)] × 100.
Relationship between MP and CP
MP ÷ CP = (100 + Profit %) ÷ (100 − Discount %), which helps find the markup over cost price.
Successive Discounts
If two discounts a% and b% are applied, the single equivalent discount = [a + b − (a × b) ÷ 100]%.

Q35. Answer: (b) 12

Shortcut Trick
For a fixed expenditure of Rs. 1, Price and Quantity are inversely proportional.
Price Ratio (CP : SP) = 100% : 120% = 5 : 6
Quantity Ratio (CP : SP) = 6 : 5
Given Selling Quantity (5 units) = 10 toffees => 1 unit = 2
Cost Quantity (6 units) = 6 × 2 = 12 toffees
Therefore The correct answer is 12 toffees.
Alternate Method
Given: Selling Price (SP) of 10 toffees = Rs. 1, Profit = 20%
Formula Used: Cost Price (CP) = SP × [100 / (100 + Gain%)]
=> SP of 1 toffee = Rs. 1/10
=> CP of 1 toffee = (1/10) × [100 / (100 + 20)]
=> CP of 1 toffee = (1/10) × (100 / 120) = (1/10) × (5 / 6)
=> CP of 1 toffee = 1 / 12
=> Number of toffees bought for Rs. 1 = 1 / (1/12) = 12
Therefore The correct answer is 12 toffees.
Additional Information
Inverse Relation Rule
When the amount spent is constant, Price × Quantity = Constant. Thus, if price increases by a factor, quantity decreases by the same factor.
Profit/Loss Percentage
The percentage profit or loss is always calculated on the Cost Price (CP) unless stated otherwise. Formula: Profit% = [(SP − CP) / CP] × 100.
Unitary Method in Profit and Loss
It is often easier to find the price or cost of one unit (1 toffee, 1 kg, etc.) to avoid confusion when quantities vary between buying

and selling.

Q36. Answer: (c) sinA+1

Shortcut Trick

Apply the fundamental Trigonometric Identity $\cos^2 A = 1 - \sin^2 A$ in the numerator.

Express the numerator as a product of factors: $(1 - \sin A)(1 + \sin A)$.

Cancel out the common term $(1 - \sin A)$ from both the numerator and denominator.

The resulting simplified expression for y is $1 + \sin A$.

Therefore The correct answer is $\sin A + 1$.

Alternate Method

Given: $y = \cos^2 A / (1 - \sin A)$

Formula Used: $\cos^2 A = 1 - \sin^2 A$ and $a^2 - b^2 = (a - b)(a + b)$

$\Rightarrow y = (1 - \sin^2 A) / (1 - \sin A)$

$\Rightarrow y = ((1 - \sin A) \times (1 + \sin A)) / (1 - \sin A)$

$\Rightarrow y = 1 + \sin A$

Therefore The correct answer is $\sin A + 1$.

Additional Information

Pythagorean Identities

Basic identities in trigonometry include $\sin^2 A + \cos^2 A = 1$, $1 + \tan^2 A = \sec^2 A$, and $1 + \cot^2 A = \text{cosec}^2 A$.

Algebraic Simplification

The identity for the difference of two squares, $a^2 - b^2 = (a - b)(a + b)$, is frequently used to simplify trigonometric fractions.

Domain of Expression

For a fraction to be defined, the denominator must not be zero. Here, $1 - \sin A \neq 0$ implies $\sin A \neq 1$, which means $A \neq 90°$.

Q37. Answer: (b) the excretory system

The correct answer is the excretory system.

Key Points

- The excretory system is responsible for the removal of nitrogenous waste materials from the body.
- It includes organs such as the kidneys, ureters, bladder, and urethra.
- The kidneys filter blood to remove waste products, which are then excreted as urine.
- Urea, a major nitrogenous waste product, is produced in the liver and excreted by the kidneys.
- The excretory system also helps in maintaining the body's fluid and electrolyte balance.

Additional Information

- Vascular System
- This system consists of vessels that carry blood and lymph through the body.
- It includes arteries, veins, and capillaries.
- Circulatory System
- This system circulates blood through the body, delivering oxygen and nutrients to cells and removing waste products.
- The heart is a central component of the circulatory system.
- Respiratory System
- This system is responsible for the exchange of gases between the body and the environment.
- It includes organs such as the lungs, trachea, and diaphragm.

Q38. Answer: (b) Both I and II are effects of independent causes.

Statements:

I. Most teachers of school X have left the school and joined school Y.

II. The football team of school X has won the champion’s trophy in the inter-city football championship.

Statement I is the effect - it is possible that the teachers left for reasons like better pay or management issues at school X.

Statement II is the effect - The football team’s victory could be due to their training and performance

Therefore, both statements are independent effects of different causes and are not directly related to each other.

Hence, Option 2 is correct because both statements are independent effects of different causes.

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Q39. Answer: (b) 49

The logic followed here is:

Hence, "Option 2" is the correct answer.

Q40. Answer: (d) 13

Given: 36 people are standing in a straight row facing the north.

1) Aman is standing 11th from the left end.

2) Pratha is standing 12th from the right end.

So, the number of people standing between Aman and Pratha:

= Total people - (Position of Aman from left + Position of Pratha from right)

= 36 - (11 + 12)

= 36 - 23 = 13.

So, there are '13' people standing between Aman and Pratha.

Hence, the correct answer is "Option 4".

Q41. Answer: (a) 3

Shortcut Trick

Analyze the prime factorization of the given number:

$1083 = 3 \times 361 = 3^1 \times 19^2$

For a number to be a perfect square, all prime factors must have even exponents.

Since 3 has an odd exponent (1), it must be multiplied by 3 to make its exponent even (2).

Therefore The correct answer is 3.

Alternate Method

Given:

Number = 1083

Formula Used:

A natural number is a perfect square if and only if each of its prime factors can be grouped into equal pairs.

Calculations:

=> Resolving the number 1083 into its prime factors:

=> $1083 \div 3 = 361$

=> $361 = 19 \times 19 = 19^2$

=> So, the prime factorization is: $1083 = 3^1 \times 19^2$

=> Here, the prime factor 19 is paired, but the prime factor 3 is not paired.

=> To make it a perfect square, we must multiply the number by 3 to complete the pair of 3.

=> New number = $1083 \times 3 = 3249 = (3 \times 19)^2 = 57^2$ (which is a perfect square)

=> Therefore, the smallest natural number to be multiplied is 3.

Therefore The correct answer is 3.

Additional Information

Perfect Square Condition

A natural number is a perfect square if and only if all the exponents in its prime factorization are even. For example, N = p1^(2a) × p2^(2b) is always a perfect square.

Division to Make a Perfect Square

The smallest number by which a given number must be divided to make it a perfect square is the product of all its unpaired prime factors. This value is mathematically identical to the smallest multiplier required.

Square Root of a Large Number

The square root of a perfect square represented in prime factor form N = a^(2x) × b^(2y) is calculated as √N = a^x × b^y.

Q42. Answer: (d) Statement A is true but B is false.

The correct answer is Statement A is true but B is false.

Key Points

• Testosterone is the primary male sex hormone responsible for the development of male reproductive tissues and secondary sexual characteristics such as increased muscle and bone mass, and the growth of body hair.

• Testosterone levels rise significantly during puberty, leading to the changes in appearance seen in boys.

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• Progesterone is a female sex hormone involved in the menstrual cycle, pregnancy, and embryogenesis.
• Progesterone does not play a role in the changes seen in boys during puberty.
• Therefore, statement A is correct and statement B is incorrect.

Additional Information

• Estrogen
• Estrogen is the primary female sex hormone responsible for the development and regulation of the female reproductive system and secondary sexual characteristics.
• It plays a crucial role in the menstrual cycle and reproductive system.
• Growth Hormone
• Also known as somatotropin, it stimulates growth, cell reproduction, and cell regeneration in humans and other animals.
• It is important for physical growth and development, especially during puberty.
• Follicle-stimulating hormone (FSH)
• FSH is involved in the regulation of the development, growth, pubertal maturation, and reproductive processes of the body.
• In males, FSH stimulates the production of sperm.

Q43. Answer: (c) kinetic energy

The correct answer is kinetic energy.

Key Points

• Particles of matter are always in a state of motion, which is attributed to their kinetic energy.
• Kinetic energy is the energy that particles possess due to their movement.
• The movement of particles is more pronounced at higher temperatures because the kinetic energy increases with temperature.
• Even in solids, where particles are closely packed, they vibrate in place due to their kinetic energy.
• In liquids and gases, particles move more freely and randomly, demonstrating greater kinetic energy compared to solids.

Additional Information

• Potential Energy
• Potential energy is the stored energy of an object due to its position or state.
• It is not responsible for the movement of particles in matter.
• Intermixing of Particles
• Intermixing of particles, or diffusion, occurs due to the kinetic energy of particles.
• This process is a result of particles moving and spreading out to occupy available space.
• Size of Particles
• The size of particles does not directly influence their movement.
• Kinetic energy is the primary factor affecting the motion of particles, regardless of their size.

Q44. Answer: (b) 373

Shortcut Trick

To identify a prime number, check its divisibility by prime numbers up to its square root (√n).

For 373, √373 ≈ 19.3. Primes to check: 2, 3, 5, 7, 11, 13, 17, and 19.

Checking 373: It is not divisible by any of these primes (e.g., 373 ÷ 17 = 21.94, 373 ÷ 19 = 19.63).

Since no prime factor exists up to 19.3, 373 is a prime number.

Therefore The correct answer is 373.

Alternate Method

Given: Numbers (1) 437, (2) 373, (3) 161, (4) 221.

Formula Used: A Prime Number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Calculations:

=> For 161: 161 ÷ 7 = 23 (Divisible by 7, hence Composite)

=> For 221: 221 ÷ 13 = 17 (Divisible by 13, hence Composite)

=> For 437: 437 ÷ 19 = 23 (Divisible by 19, hence Composite)

=> For 373: √373 ≈ 19.3. Primes are 2, 3, 5, 7, 11, 13, 17, 19. None divide 373.

=> Therefore, 373 has no factors other than 1 and 373.

Therefore The correct answer is 373.

Additional Information

Definition of Prime Number

A prime number is a positive integer greater than 1 that is divisible only by 1 and itself (e.g., 2, 3, 5, 7, 11...).

Composite Number

A composite number has at least one divisor other than 1 and itself. Every composite number can be factored into primes.

Checking for Primes (√n Method)

To determine if n is prime, test its divisibility by all primes p such that $p^2 \leq n$. If no such p divides n, then n is prime.

Co-prime Numbers

Two numbers are co-prime if their Highest Common Factor (HCF) is 1, regardless of whether the numbers themselves are prime.

Q45. Answer: (c) XB-YC

The logic followed here is:

Option 1) BF-AE

Option 2) DH-CG

Option 3) XB-YC

Option 4) TX-SW

Thus, out of all the options 'XB-YC' is the odd one out.

Hence, "Option 3" is the correct answer.

Q46. Answer: (a) 9

The logic followed here is:

‘GLOBE’ is coded as ‘84315’

‘GRADE’ is coded as ‘89265’

‘BAKED’ is coded as ‘12756’

Thus, code for 'R' is '9'.

Hence, "Option 1" is the correct answer.

Q47. Answer: (a) AK - VH

The logic followed here is:

Option 1) AK - VH

Option 2) YI - TD

Option 3) SC - NX

Option 4) LV - GQ

Thus, out of all the options 'AK - VH' is the odd one out.

Hence, "Option 1" is the correct answer.

Q48. Answer: (c) 40 min

Shortcut Trick

Ratio of Speeds (S1 : S2) = 10 : (10 + 5) = 10 : 15 = 2 : 3

Since Distance is constant, Time ratio is the inverse: (T1 : T2) = 3 : 2

Original Time (3 units) = 2 hours = 120 minutes

Reduction in Time = 3 − 2 = 1 unit => 120 ÷ 3 = 40 minutes

Therefore The correct answer is 40 min.

Alternate Method

Given: Initial speed = 10 km/h, Time = 2 hours, Speed increase = 5 km/h.

Formula: Distance = Speed × Time | Time = Distance ÷ Speed

=> Total Distance = 10 km/h × 2 hours = 20 km

=> New Speed = 10 + 5 = 15 km/h

=> New Time taken = 20 ÷ 15 = 4/3 hours

=> Converting to minutes = (4/3) × 60 = 80 minutes

=> Original Time = 2 × 60 = 120 minutes

=> Time saved (Early reach) = 120 − 80 = 40 minutes

Therefore The correct answer is 40 min.

Additional Information

Inverse Proportionality of Speed and Time

When the distance is constant, speed is inversely proportional to time (S prop. to 1/T). If speed increases by a factor, time decreases by the same reciprocal factor.

Unit Conversion

To convert speed from km/h to m/s, multiply by 5/18. To convert hours to minutes, multiply by 60.

Average Speed

For two equal distances covered at speeds x and y, the average speed is given by (2xy) ÷ (x + y).

Q49. Answer: (a) $-2(x^2-y^2)$

Shortcut Trick

Identify terms: Let A = $x^2 - y^2$ and B = $y^2 - x^2$.

Required calculation: B − A.

Calculation: $(y^2 - x^2) - (x^2 - y^2) = y^2 - x^2 - x^2 + y^2 = 2y^2 - 2x^2$.

Factorizing: $2y^2 - 2x^2 = -2(x^2 - y^2)$.

Therefore The correct answer is $-2(x^2 - y^2)$.

Alternate Method

Given:

Expression to be subtracted: $(x^2 - y^2)$

Expression from which to subtract: $(y^2 - x^2)$

Formula:

Difference = (Term 2) − (Term 1)

Calculations:

=> Result = $(y^2 - x^2) - (x^2 - y^2)$

=> Result = $y^2 - x^2 - x^2 + y^2$

=> Result = $(y^2 + y^2) + (-x^2 - x^2)$

=> Result = $2y^2 - 2x^2$

=> Taking −2 as a common factor: $-2(x^2 - y^2)$

Therefore The correct answer is $-2(x^2 - y^2)$.

Additional Information

Rules for Subtracting Polynomials

To subtract one algebraic expression from another, change the sign (from + to − or − to +) of every term in the expression being subtracted and then add the like terms.

Distributive Property of Signs

The negative sign outside a bracket affects all terms inside: −(a − b) = −a + b and −(a + b) = −a − b.

Like Terms

Addition and subtraction are only possible between like terms, which are terms that have the same variables raised to the same powers.

Q50. Answer: (d) 60

Shortcut Trick

When three numbers are in continued proportion a : x :: x : b, x is the mean proportional.

Direct formula: $x = \sqrt{(a \times b)}$

$x = \sqrt{(48 \times 75)} = \sqrt{(3600)}$

x = 60

Therefore The correct answer is 60.

Alternate Method

Given: Proportion 48 : x :: x : 75 and x > 0.

Formula Used: Product of Extremes = Product of Means

=> 48 : x = x : 75

=> 48 / x = x / 75

=> x × x = 48 × 75

=> $x^2 = 3600$

=> $x = \sqrt{3600}$

=> x = 60

Therefore The correct answer is 60.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is defined as √(ab).

Third Proportional

If a : b :: b : c, then c is the third proportional to a and b, calculated as $c = b^2 / a$.

Fourth Proportional

If a : b :: c : d, then d is the fourth proportional, calculated as d = (b × c) / a.

Q51. Answer: (c) G

Given: Seven people, A, B, C, D, E, F and G are sitting in a straight line, facing north.

1) Only two people sit to the left of D.

2) E sits second to the right of D.

3) F sits second to the left of D.

4) G sits second to the right of E.

5) A sits second to the left of B.

6) A is not an immediate neighbour of F.

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

Thus, according to the final arrangement, G sits at the extreme right end of the line.

Hence, "Option 3" is the correct answer.

Q52. Answer: (b) Methane

The correct answer is Methane.

Key Points

• Methane is the simplest hydrocarbon with the chemical formula CH4.

• It is a primary component of natural gas, making it a widely used fuel.

• Methane is a colorless, odorless gas under standard temperature and pressure conditions.

• It is used in residential heating, cooking, and electricity generation.

• Methane has a high energy content per unit of mass, making it an efficient fuel source.

Additional Information

• Ethane

• Ethane is a hydrocarbon with the formula C2H6, used as a petrochemical feedstock.

• It is less commonly used as fuel compared to methane.

• Propane

• Propane, with the formula C???H8, is used as fuel for heating, cooking, and in vehicles.

• It is stored as a liquid in pressurized tanks.

• Butane

• Butane, C4H10, is used in lighters, portable stoves, and as a propellant in aerosol sprays.

• It is also a component of liquefied petroleum gas (LPG).

Q53. Answer: (b) ovary, style

The correct answer is ovary, style.

Key Points

• The female reproductive organ of a flower is called the pistil, which is composed of the ovary, style, and stigma.

• The ovary is the swollen bottom part of the pistil, which contains the ovules and is responsible for the development of seeds after fertilization.

• The style is the middle elongated part of the pistil, which connects the ovary to the stigma and serves as a pathway for pollen tubes to reach the ovules.

• The stigma is the terminal part of the pistil that is often sticky, allowing it to capture and hold pollen grains for fertilization.

• The arrangement and structure of the pistil play a crucial role in the reproductive process of flowering plants.

Additional Information

• Pollination

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• Pollination is the transfer of pollen from the male anther to the female stigma of a flower.
• It can occur through various agents such as wind, water, insects, birds, and other animals.
• Fertilization
• Fertilization is the fusion of male and female gametes, resulting in the formation of a zygote.
• In flowering plants, fertilization occurs after successful pollination and pollen tube growth.
• Fruit and Seed Development
• After fertilization, the ovary develops into a fruit, and the ovules develop into seeds.
• Fruits protect the seeds and aid in their dispersal to new locations for germination.

Q54. Answer: (b) Andhra Pradesh

The correct answer is Andhra Pradesh

Key Points

• Andhra Pradesh has been awarded the Green Energy Champion Award for 2023-24 at a meeting hosted by the Indian Wind Power Association in Coimbatore
• The award was received by M Kamalakar Babu, Managing Director and Chief Executive Officer of AP Solar Power Corporation Limited, who accepted it on behalf of the State from Lalith Bohra, joint secretary of the Union Ministry of New and Renewable Energy.
• In his acceptance speech, Kamalakar Babu credited Chief Minister N. Chandrababu Naidu for prioritizing renewable energy during his earlier tenure from 2014 to 2019
• This award is a reflection of the state's commitment to sustainable energy and its future goals to continue leading the renewable energy transformation in India.

Additional Information

• India has the fourth-largest installed wind power capacity in the world
• As of 30 September 2024, the total installed wind power capacity was 47.36 gigawatts (GW)
• Wind power capacity is mainly spread across the southern, western, and northwestern states.
• Wind power installations occupy only 2% of the wind farm area facilitating rest of the area for agriculture, plantations, etc
• Wind power plants are also capable to provide fast frequency response in ramping up falling grid frequency.

Q55. Answer: (c) Compounds of carbon are only formed with oxygen.

The correct answer is option 3.

Key Points

• Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation.
• Compounds of carbon having double or triple bonds between their carbon atoms are called unsaturated compounds.
• Compounds of carbon, which are linked by only single bonds between the carbon atoms, are called saturated compounds.
• Carbon compounds can form strong bonds with other elements such as hydrogen, oxygen, nitrogen, and halogens. Thus, statement 3 is incorrect.
• Carbon compounds can exist in various forms, including chains, branched chains, and rings.

Additional Information

• Alkanes
• These are saturated hydrocarbons with single bonds between carbon atoms.
• They follow the general formula C_nH_(2n+2).
• Alkenes
• These are unsaturated hydrocarbons with at least one double bond between carbon atoms.
• They follow the general formula C_nH_(2n).
• Alkynes
• These are unsaturated hydrocarbons with at least one triple bond between carbon atoms.
• They follow the general formula C_nH_(2n-2).

Q56. Answer: (d) WLRI

The logic followed here is:

NCPJ is related to PFTO

And,

QAVB is related to SDZG

Similarly,

UNND is related to

Hence, "Option 4" is the correct answer.

Q57. Answer: (d) 304

Given Equation: 34 D 54 C 18 A 18 B 324 = ?

BODMAS Rule:

Decoding the given information:

Alphabet	A	B	C	D
Meaning	÷	×	•	–

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

=> 34 - 54 + 18 ÷ 18 × 324

=> 34 - 54 + 1 × 324

=> 34 - 54 + 324

=> 34 - 54 + 324

=> 34 + 270

=> 304

Hence, the correct option is "Option 4".

Q58. Answer: (c) Mother's brother

Decoding symbols:

	A is			
Symbol	#	–	x	=
Meaning	Mother	Brother	Wife	Father
	to B			

Given: N – P # S × T

N – P → N is the brother of P.

P # S → P is the mother of S.

S × T → S is the wife of T.

Thus, N is S's mother's brother or maternal uncle.

Hence, the correct answer is "Option 3".

Q59. Answer: (a) More than two

Given series:

1 * £ 5 $ 8 $ 4 2 & % 6 7 & @ 3 Ω 9

Condition to be checked:

Symbols which are immediately preceded by a number and also immediately followed by another symbol.

Number → Symbol → Symbol

Checking the given series:

1 * £ 5 $ 8 $ 4 2 & % 6 7 & @ 3 Ω 9

Thus there are three such patterns (1 * £, 2 & %, 7 & @) that follow the above condition.

Hence, the correct answer "Option 1".

Mistake Points

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

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

Q60. Answer: (b) 9

Given Equation: 91 D 13 B 4 A 3 C 2 = ?

BODMAS Rule:

Decoding the given information:

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Alphabet	A	B	C	D
Meaning	•	−	×	÷

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

=> 91 ÷ 13 − 4 + 3 × 2

=> 7 − 4 + 3 × 2

=> 7 − 4 + 6

=> 3 + 6

=> 9

Hence, the correct option is "Option 2".

Q61. Answer: (a) Royal Challengers Bangalore (Bengaluru)

The correct answer is Royal Challengers Bangalore (Bengaluru)

Key Points

• The Royal Challengers Bengaluru (RCB) won the second season of the Women's Premier League (WPL) in 2024.

• The team defeated Delhi Capitals in the final.

• Smriti Mandhana captains the RCB team.

• The matches were held in Bengaluru and Delhi.

• The Board of Control for Cricket in India (BCCI) organizes the league

Additional Information

• The Women's Premier League, also known as WPL, and the Tata WPL for sponsorship reasons, is a women's Twenty20 cricket franchise league in India.

• It is owned and operated by the Board of Control for Cricket in India

• The first season, played in March 2023, saw the Mumbai Indians winning the inaugural title

• The league's structure is based on the structure of the IPL

Q62. Answer: (b) 5

The logic followed here is:

‘CODE’ is coded as ‘5739’

‘LEGS’ is coded as ‘4256’

Thus, code for 'E' is '5'.

Hence, "Option 2" is the correct answer.

Q63. Answer: (c) uniform at all points

The correct answer is uniform at all points.

Key Points

• In a long current-carrying solenoid, the magnetic field inside is uniform and parallel to the axis of the solenoid.

• The magnetic field lines inside the solenoid are equally spaced, indicating a constant magnetic field.

• The field outside the solenoid is weak and non-uniform compared to the field inside.

• The strength of the magnetic field inside a solenoid is directly proportional to the number of turns per unit length and the current passing through the solenoid.

• For an ideal long solenoid, the edge effects are negligible, and the magnetic field is considered uniform throughout the length of the solenoid.

Additional Information

• Magnetic Field Lines

• These are imaginary lines used to represent the strength and direction of a magnetic field.They emerge from the north pole and merge at the south pole of a magnet.

• The density of the lines indicates the strength of the magnetic field.

• Electromagnetism

• It is the interaction between electricity and magnetism.

• A current-carrying conductor generates a magnetic field around it.

• Electromagnets are widely used in various applications like motors, transformers, and relays.

• Solenoid Applications

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• Solenoids are used in devices that require controlled magnetic fields, such as electromechanical relays and solenoid valves.
• They are also used in magnetic resonance imaging (MRI) machines.
• Solenoids are integral components in many industrial applications, including automation and control systems.

Q64. Answer: (a) 20.2

Shortcut Trick
Identify prime numbers between 11 and 30: 13, 17, 19, 23, 29.
Total count of numbers = 5.
Sum of these numbers = 13 + 17 + 19 + 23 + 29 = 101.
Average = Total Sum ÷ Count = 101 ÷ 5 = 20.2.
Therefore The correct answer is 20.2.
Alternate Method
Given: Range of numbers between 11 and 30 (both excluded).
Formula Used: Average = (Sum of all observations) ÷ (Total number of observations)
Step-by-step Calculation:
=> Prime numbers in the given range = {13, 17, 19, 23, 29}
=> Sum = 13 + 17 + 19 + 23 + 29
=> Sum = 30 + 19 + 23 + 29
=> Sum = 101
=> Number of terms (n) = 5
=> Average = 101 ÷ 5
=> Average = 20.2
Therefore The correct answer is 20.2.
Additional Information
Definition of Prime Number
A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.
Properties of Averages
If each number in a set is increased by a constant 'k', the average also increases by 'k'.
First 10 Prime Numbers
The sequence of the first ten prime numbers is 2, 3, 5, 7, 11, 13, 17, 19, 23, 29.

Q65. Answer: (a) Only c

The correct answer is Only c.
Key Points
• The statement "Heterotrophic organisms include plants" is incorrect. Plants are generally autotrophic organisms, meaning they produce their own food through photosynthesis.
• Heterotrophic organisms are those that cannot synthesize their own food and rely on other organisms for nutrition.
• Examples of heterotrophic organisms include animals, fungi, and many bacteria.
• Autotrophic organisms, such as plants, algae, and some bacteria, use light or chemical energy to synthesize food from inorganic substances.
• The other statements (a and b) correctly describe the nutritional modes of organisms.
Additional Information
• Autotrophic Nutrition
• Involves the use of simple inorganic substances to produce food.
• Photosynthesis is a common example, where plants convert carbon dioxide and water into glucose and oxygen using sunlight.
• Heterotrophic Nutrition
• Involves consuming complex organic substances for nutrition.
• Includes various modes such as holozoic, saprophytic, and parasitic nutrition.
• Mixotrophic Nutrition
• Some organisms exhibit both autotrophic and heterotrophic modes of nutrition.
• Examples include certain protists and some plants like Venus flytrap.

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Q66. Answer: (b) 10

Shortcut Trick

A and B finish the work in 5 days, so in 4 days, they complete 4/5 of the total work.

Remaining work = 1 − 4/5 = 1/5.

A completes this 1/5 work in 2 days.

Total time for A alone = 2 × 5 = 10 days.

Therefore The correct answer is 10 days.

Alternate Method

Given: Time taken by (A + B) = 5 days, time worked together = 4 days, time taken by A to finish remaining work = 2 days.

Formula: Total Work = Efficiency × Time

Person	Days	Total Work	Efficiency
A + B	5	5 units	1 unit/day
A	10	0.5 unit/day	

=> Let Total Work = LCM(5) = 5 units.

=> Efficiency of (A + B) = 5 ÷ 5 = 1 unit/day.

=> Work completed by (A + B) in 4 days = 4 × 1 = 4 units.

=> Remaining work = 5 − 4 = 1 unit.

=> A completes 1 unit in 2 days.

=> Efficiency of A = 1 ÷ 2 = 0.5 units/day.

=> Time taken by A alone = 5 ÷ 0.5 = 10 days.

Therefore The correct answer is 10 days.

Additional Information

Relationship between Time and Efficiency

Efficiency is inversely proportional to the time taken. If the ratio of time is x : y, then the ratio of efficiency is y : x.

Work and Wages

Wages are generally distributed among workers in the ratio of their efficiencies or the actual work done by each person.

Combined Work Formula

If A can do a piece of work in x days and B in y days, then together they can do it in (x × y) ÷ (x + y) days.

Q67. Answer: (a) X = 974, Y = 498

The logic followed here is:

Given: X : 793 :: 679 : Y

So, checking each option one by one:

Option 1) X = 974, Y = 498 → 974 : 793 :: 679 : 498

974 - 793 = 679 - 498

181 = 181 (LHS = RHS)

Option 2) X = 848, Y = 519 → 848 : 793 :: 679 : 519

848 - 793 = 679 - 519

55 ≠ 160 (LHS ≠ RHS)

Option 3) X = 886, Y = 443 → 886 : 793 :: 679 : 443

886 - 793 = 679 - 443

93 ≠ 236 (LHS ≠ RHS)

Option 4) X = 923, Y = 481 → 923 : 793 :: 679 : 481

923 - 793 = 679 - 481

130 ≠ 198 (LHS ≠ RHS)

Hence, "Option 1" is the correct answer.

Q68. Answer: (a) 800

Shortcut Trick

If each value in a data set is multiplied by a constant k, the average of the set is also multiplied by k.

Here, the Initial Average is 40 and each value is multiplied by 20.

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New Average = Initial Average × 20

New Average = 40 × 20 = 800.

Therefore The correct answer is 800.

Alternate Method

Given:

Total number of values (n) = 70

Average of these values = 40

Formula Used:

Average = (Sum of all values) ÷ (Total number of values)

=> Sum of 70 values = Average × n

=> Initial Sum = 40 × 70 = 2800

=> If each value is multiplied by 20, the New Sum = (x1 × 20) + (x2 × 20) + ... + (x70 × 20)

=> New Sum = 20 × (x1 + x2 + ... + x70) = 20 × 2800 = 56000

=> New Average = New Sum ÷ 70

=> New Average = 56000 ÷ 70 = 800

Therefore The correct answer is 800.

Additional Information

Addition and Subtraction Rule

If a constant k is added to or subtracted from every value in a set, the new average will be (Old Average + k) or (Old Average − k) respectively.

Division Rule

If every value in a set is divided by a non-zero constant k, the new average will be (Old Average ÷ k).

Combined Average

The average of two groups with n1 and n2 elements and averages A1 and A2 is (n1A1 + n2A2) ÷ (n1 + n2).

Q69. Answer: (c) 40 u

The correct answer is 40 u.

Key Points

• The atomic mass of an element is the weighted average mass of the atoms in a naturally occurring sample of the element.

• Calcium is a chemical element with the symbol Ca and atomic number 20.

• The atomic mass of calcium is approximately 40 u (atomic mass units).

• Calcium is an essential element for living organisms, particularly in cell physiology.

• It is the fifth most abundant element in the Earth's crust.

Additional Information

• Magnesium

• Magnesium is a chemical element with the symbol Mg and atomic number 12.

• It has an atomic mass of approximately 24.305 u.

• Phosphorus

• Phosphorus is a chemical element with the symbol P and atomic number 15.

• It has an atomic mass of approximately 30.974 u.

• Potassium

• Potassium is a chemical element with the symbol K and atomic number 19.

• It has an atomic mass of approximately 39.098 u.

Q70. Answer: (c) Trapezium

Shortcut Trick

The ratio of angles J : K : L : M is 2 : 3 : 5 : 6.

Sum of ratio parts = 2 + 3 + 5 + 6 = 16 parts.

Since the total sum of angles is 360°, then 16 parts = 360° → 1 part = 22.5°.

Check co-interior angle sums: J + M = (2 + 6) × 22.5° = 180° and K + L = (3 + 5) × 22.5° = 180°.

When co-interior angles sum to 180°, the sides JK and ML are parallel.

A quadrilateral with only one pair of parallel sides is defined as a Trapezium.

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Therefore The correct answer is Trapezium.

Alternate Method

Given: The measures of the angles J, K, L, and M of quadrilateral JKLM are in the ratio 2 : 3 : 5 : 6.

Formula Used: Sum of all interior angles of a quadrilateral = 360°.

Calculations:

=> Let the angles be 2x, 3x, 5x, and 6x.

=> 2x + 3x + 5x + 6x = 360°

=> 16x = 360°

=> x = 22.5°

=> Angle J = 2 × 22.5° = 45°

=> Angle K = 3 × 22.5° = 67.5°

=> Angle L = 5 × 22.5° = 112.5°

=> Angle M = 6 × 22.5° = 135°

=> Observe the sum of adjacent angles: J + M = 45° + 135° = 180°.

=> Similarly, K + L = 67.5° + 112.5° = 180°.

=> Since the sum of co-interior angles is 180°, the side JK is parallel to ML.

=> Because only one pair of opposite sides is parallel and the other sides (JM and KL) are not parallel (J + K ≠ 180°), the quadrilateral is a Trapezium.

Therefore The correct answer is Trapezium.

Additional Information

Properties of a Trapezium

A Trapezium is a quadrilateral with at least one pair of parallel sides. The angles on the same side of the non-parallel legs are supplementary (sum to 180°).

Sum of Angles in Polygons

For any polygon with n sides, the sum of internal angles is given by (n − 2) × 180°. For a quadrilateral (n=4), the sum is 2 × 180° = 360°.

Parallel Line Properties

If a transversal intersects two lines such that the sum of co-interior angles is 180°, then the two lines are parallel.

Q71. Answer: (d) 1

Shortcut Trick

For a number to be divisible by 8, the last three digits must be divisible by 8.

The last three digits of 6484a6 are 4a6.

Testing the least value from the options: If a = 0, then 406 ÷ 8 = 50.75 (Not divisible).

Next least value: If a = 1, then 416 ÷ 8 = 52 (Perfectly divisible).

Therefore The correct answer is 1.

Alternate Method

Given:

Number: 6484a6

Divisor: 8

Formula Used:

A number is divisible by 8 if the number formed by its last three digits (hundreds, tens, and units place) is exactly divisible by 8.

Calculations:

=> The last three digits are 4a6, which can be written as 400 + 10a + 6.

=> Since 400 is already divisible by 8 (400 ÷ 8 = 50), we only need to check 10a + 6.

=> For a = 0: 10(0) + 6 = 6 (Not divisible by 8).

=> For a = 1: 10(1) + 6 = 16 (Divisible by 8: 16 ÷ 8 = 2).

=> Since we need the least value, a = 1 is the first digit that satisfies the condition.

Therefore The correct answer is 1.

Additional Information

Divisibility by 4

A number is divisible by 4 if the last two digits of the number are divisible by 4.

Divisibility by 16

A number is divisible by 16 if the last four digits of the number are divisible by 16.

Divisibility by Powers of 2

For any integer n, a number is divisible by 2^n if its last n digits are divisible by 2^n.

Q72. Answer: (a) 79,200 m²

Shortcut Trick

Direct formula for Total Surface Area of a closed cylinder: $2\pi r(r + h)$

Substitute values: TSA = 2 × (22/7) × 70 × (70 + 110)

=> TSA = 440 × 180

=> TSA = 79,200 m²

Therefore The correct answer is 79,200 m².

Alternate Method

Given:

Base Radius (r) = 70 m

Height (h) = 110 m

Value of π = 22/7

Formula Used:

Total Surface Area (TSA) = Curved Surface Area + 2 × Base Area

TSA = $2\pi rh + 2\pi r^2 = 2\pi r(h + r)$

Calculations:

=> TSA = 2 × (22/7) × 70 × (110 + 70)

=> TSA = 2 × 22 × (70 ÷ 7) × 180

=> TSA = 44 × 10 × 180

=> TSA = 440 × 180

=> TSA = 79,200 m²

Therefore The correct answer is 79,200 m².

Additional Information

Curved Surface Area (CSA)

The lateral surface area or CSA of a cylinder includes only the side walls and is given by $2\pi rh$.

Volume of a Cylinder

The space occupied by a cylinder is its volume, calculated as Base Area × Height = $\pi r^2 h$.

Hollow Cylinder TSA

For a hollow cylinder with outer radius R and inner radius r, TSA = $2\pi Rh + 2\pi rh + 2\pi(R^2 - r^2)$.

Base Area

Since the base is a circle, the area of one circular base is πr^2.

Q73. Answer: (d) Project PARI

The correct answer is Project PARI

Key Points

• The project launched by the Ministry of Culture in 2024 to showcase India's artistic heritage through public art installations is called "Project PARI" (Public Art of India).

• The project aims to enhance the public art scene in India by displaying art installations across various public spaces.

• The initiative is spearheaded by the Ministry of Culture, Government of India.

• Project PARI was launched on the occasion of the 46th World Heritage Committee Meeting held in New Delhi.

Additional Information

• Project BHARATI

• The Main Focus is the Preservation and promotion of Indian cultural heritage, languages, and traditions.

• The Goal is to digitally document, archive, and showcase India's rich cultural diversity.

• It collaborates with cultural institutions, use of modern technology for virtual exhibitions, and preservation of intangible cultural assets.

• Launched by: Ministry of Culture, Government of India.

• Project KALA

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• The main Focus is Promoting Indian art, especially visual arts, through various outreach programs and exhibitions.
• The Goal is to create a digital platform for artists and connect them with global audiences.
• Key Aspects: Virtual art galleries, workshops, and artist grants.
• Launched by: National Gallery of Modern Art (NGMA), Ministry of Culture.
• Project SANSKRITI
• The main Focus is to Revive and support traditional Indian crafts, art forms, and cultural practices.
• The Goal is To provide a sustainable ecosystem for artisans, craftsmen, and traditional performers across the country.
• Key Aspects: Craft fairs, training programs, and employment opportunities for artisans.
• Launched by: Ministry of Textiles, Government of India.

Q74. Answer: (c) 42 and 33

Shortcut Trick
Let the total marks of both students be 100%.
One student secured 56% of the total, so the other secured 100% − 56% = 44%.
Difference in percentage = 56% − 44% = 12%.
Given difference = 9 marks. Therefore 12% ≡ 9 marks → 1% = 0.75 marks.
Marks are: 56 × 0.75 = 42 and 44 × 0.75 = 33.
Therefore The correct answer is 42 and 33.
Alternate Method
Given: Difference between marks = 9. Higher marks = 56% of the sum of marks.
Let the marks obtained by the two students be x and (x − 9).
According to the question:
=> x = 56% of [x + (x − 9)]
=> x = 0.56 × (2x − 9)
=> x = 1.12x − 5.04
=> 1.12x − x = 5.04
=> 0.12x = 5.04
=> x = 5.04 ÷ 0.12 = 504 ÷ 12
=> x = 42
Marks of the second student = 42 − 9 = 33.
Therefore The correct answer is 42 and 33.
Additional Information
Percentage to Fraction Conversion
To simplify calculations, convert 56% to a fraction: 56/100 = 14/25. This means if the sum is 25 units, the marks are 14 units.
Ratio Method
If Student A gets 56 units and the sum is 100, the ratio of marks A:B is 56:(100 − 56) = 56:44 = 14:11. Difference = 3 units = 9 marks, so 1 unit = 3 marks.
Linear Equations
Always define the variable based on the total sum or the larger value to keep the multiplication factors positive and manageable.

Q75. Answer: (b) X=542, Y=1007

The logic followed here is:
Given: X : 826 :: 723 : Y
So, checking each option one by one:
Option 1) X=593, Y=941 → 593 : 826 :: 723 : 941
593 - 826 = 723 - 941
-233 ≠ -218 (LHS ≠ RHS)
Option 2) X=542, Y=1007 → 542 : 826 :: 723 : 1007
542 - 826 = 723 - 1007
-284 = -284 (LHS = RHS)
Option 3) X=604, Y=1018 → 604 : 826 :: 723 : 1018
604 - 826 = 723 - 1018

-222 ≠ -295 (LHS ≠ RHS)

Option 4) X=518, Y=984 → 518 : 826 :: 723 : 984

518 - 826 = 723 - 984

-308 ≠ -261 (LHS ≠ RHS)

Hence, "Option 2" is the correct answer.

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