RRC Group D Previous Year Paper 44 (Held On: 4 Dec 2018 Shift 2)

RRB Group D • 2018 • 100 questions • 90 minutes • Answer key and solutions

Take this paper as a timed mock test

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CBT

Q1. A train travels at a constant speed and crosses two persons moving in the same direction in 10.8 seconds and 11.4 seconds respectively. The first one was running at the speed of 4.8 km/h while the second one was running at the speed of 6.6 km/h. What is the speed of the train in km/h?

(a) 39.6
(b) 40.2
(c) 38.4
(d) 39.0

Q2. What will be the next term in the following series?

126, 132, 142, 148, ___

(a) 162
(b) 158
(c) 152
(d) 168

Q3. _____ was the summer capital of the British.

(a) Dalhousie
(b) Ooty
(c) Shimla
(d) Darjeeling

Q4. The second equation of motion shows the relationship between position and _____.

(a) Velocity
(b) Time
(c) Displacement
(d) Momentum

Q5. A ladder leads to a window which is 48 feet above the ground on one side of the street (one side). From that place, the ladder reaches the window on the other side of the street (second side) 55 feet above the ground. If the length of that ladder is 73 feet, find the width of the street.

(a) 103 ft
(b) 110 ft
(c) 92 ft
(d) 100 ft

Q6. Consider the following question and decide which statement is sufficient to answer the question.

Question:

Find the value of p.

Statement:

1. $p : p^2 :: p^2 : 1000$
2. $p^2 + 2pn + n^2 = 21$

(a) Either 1 or 2 is sufficient.
(b) Only 1 is sufficient.
(c) Neither 1 nor 2 is sufficient.
(d) Only 2 is sufficient.

Q7. Three pipes A, B and C can fill an empty tank in 15, 10 and 5 minutes respectively. When the tank is empty, the three pipes are opened simultaneously. What is the part of work done by B and C?

(a) 9/11
(b) 12/11
(c) 6/11
(d) 2/11

Q8. What is an international (SI) unit of electric current?

(a) Ohm
(b) Volt
(c) Ohm-meter
(d) Ampere

Q9. Which state of India is the leading producer of rubber?

(a) Kerala
(b) Telangana
(c) Himachal Pradesh
(d) Tamil Nadu

Q10. The mean of the four numbers is 22. The mean of the three smallest numbers is 19. If the data range is 15, what will be the mean of the largest three numbers?

(a) 24
(b) 23
(c) 25
(d) 26

Q11. The height and oblique height of a perpendicular circular cone are $\sqrt{429}$ cm, 25 cm respectively. Find the curve surface area of the cone, assuming the value of π is 22/7.

(a) 1056 cm^2
(b) 1100 cm^2
(c) 1078 cm^2
(d) 1144 cm^2

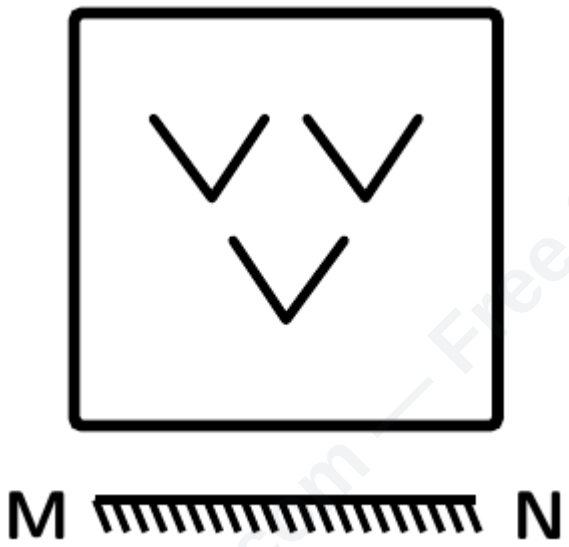
Q12. In which sport Saurabh Chaudhary has recently won a gold medal?

(a) Wrestling
(b) Boxing
(c) Shooting
(d) Swimming

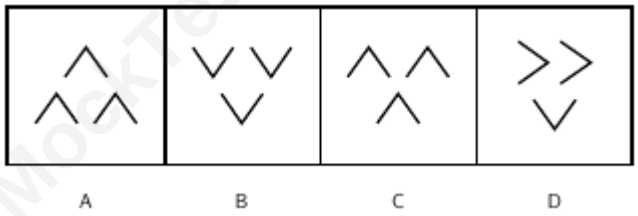
Q13. Select the mirror image for the following image:

Question Image:

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Option Image:



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

Q14. Nida is the son of Fazil. Fazil is Meher's brother. Khaif is Mehar's husband. Meher is _____ of Nida.

(a) Cousin sister
(b) Brother
(c) Uncle
(d) Aunt

Q15. The meaning of positive acceleration is _____.

(a) The velocity of the object is low.
(b) The velocity of the object is constant.
(c) The velocity of an object is zero.
(d) The velocity of the object increases.

Q16. 5.5 kwh = ?

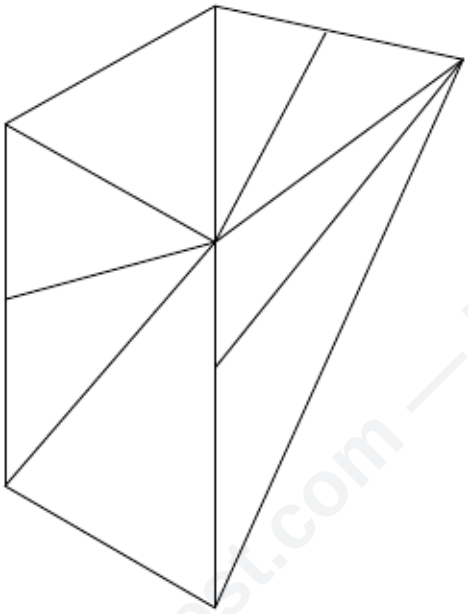
(a) 14.0 × 10^6 J
(b) 19.8 × 106 J
(c) 14.4 × 10^8 J
(d) 14.4 × 10^5 J

Q17. A bacteria has the ability to tolerate excess heat, dryness and toxic chemical substances. This suggests that he may possibly make _____.

(a) Endogenous buds
(b) A wide peptidoglycan wall
(c) Endotoxins
(d) Endospores

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Q18. How many triangles are present in the picture below?



(a) 12
(b) 9
(c) 10
(d) 13

Q19. In which country was the World City Summit 2018 organized?

(a) Japan
(b) Singapore
(c) China
(d) Korea

Q20. In a code language,

Biscuit = 83

Cake = 20

Cookie = 58

In that code language Coffee = ?

(a) 34
(b) 40
(c) 33
(d) 44

Q21. Who was appointed as the Chief Justice of the Madras High Court in March 2017?

(a) Indira Banerjee
(b) Satish. K. Agnihotri
(c) Rajesh Kumar Aggarwal
(d) Sanjay Kishan Kaul

Q22. Consider the statement and the following assumptions and decide which of the assumptions is/are implicit in the statement.

Statement:

As part of the city's beautification campaign, the local municipal body plans to clean up the old lake in the city centre.

Assumptions:

1. If the lakes are well maintained, then add to the beauty of the city and check the water level of that area.
2. The lake is full of dirt.

(a) Only 1 is implicit.

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(b) Only 2 is implicit.
(c) Neither 1 nor 2 is implicit.
(d) Both 1 and 2 are implicit.

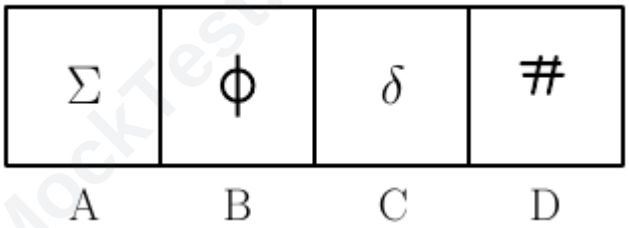
Q23. When is National Hindi Day celebrated in India?

(a) 14 December
(b) 14 June
(c) 14 September
(d) 14 November

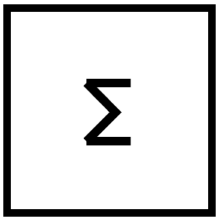
Q24. What will be the value of $96 \div 2^3 \times 3 + 8$?

(a) 132
(b) 3
(c) 44
(d) 12

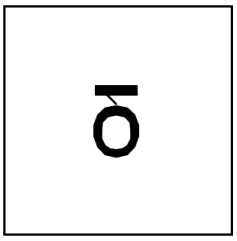
Q25. Please select the odd:



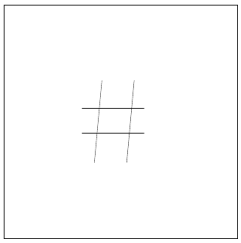
(a)



(b)



(c)



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(d)



Q26. Consider the following question and decide which statement is sufficient to answer the question.

Question:

Find the value of X.

Statement:

I. The sum of squares of two consecutive positive even numbers is 52.

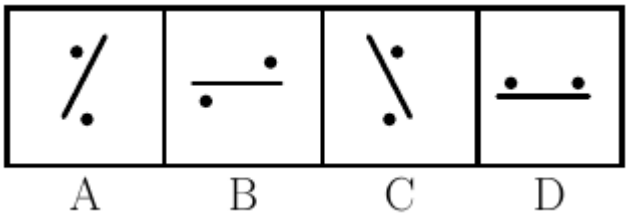
II. The difference of numbers is 2.

(a) Only statement I is sufficient, while statement II alone is not sufficient.
(b) Only statement II is sufficient, whereas statement I alone is not sufficient.
(c) Neither statement I nor II is sufficient.
(d) Statements I and II are both sufficient.

Q27. Who among the following was awarded the Bharat Ratna in 2015?

(a) Rahul Gandhi
(b) Bezwada Wilson
(c) Lal Krishna Advani
(d) Atal Bihari Vajpayee

Q28. Select the odd shape in the given figures.



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

Q29. When you compress a coil spring, you work on it. The latent potential energy is _____.

(a) Zero
(b) Decreased
(c) Unchanged
(d) Increased

Q30. Which of the following states does NOT share its border with Nepal?

(a) Uttarakhand
(b) Himachal Pradesh
(c) Bihar
(d) Uttar Pradesh

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Q31. Which of the following metals are stored in kerosene?

(a) Potassium (K) and Sodium (Na)
(b) Gold (Au) and Silver (Ag)
(c) Silicon (Si) and Mercury (Hg)
(d) Aluminum (Al) and Calcium (Ca)

Q32. Read the given question and decide which of the following statements is sufficient to answer the question.

Question:
Who is the oldest among T, V and W?
Statement:
1. T is older than W.
2. W is the elder sister of V.

(a) Statements 1 and 2 are sufficient.
(b) Only statement 1 is sufficient.
(c) Statements 1 and 2 are both insufficient.
(d) Statement 2 alone is sufficient.

Q33. Which of the following is not a characteristic of a sound wave?

(a) Amplitude
(b) Time period and frequency
(c) Density
(d) Speed

Q34. Based on the electrical conductivity, select the odd one from the following options.

(a) Rubber
(b) Copper
(c) Human Body
(d) Graphite

Q35. If we move the tree branch fast, some leaves are separated from the tree. It is caused by _____.

(a) Velocity
(b) Free fall
(c) Impulse
(d) Inertia

Q36. If NYLON is written as 1425121514, then how will COTTON be written?

(a) 315010623
(b) 5019234
(c) 31520201514
(d) 516891012

Q37. Which of the following quantities specifies its speed with direction?

(a) Displacement
(b) Momentum
(c) Velocity
(d) Force

Q38. In which Indian city is the 'Sahitya Akademi' headquarters located?

(a) Nagpur
(b) Bengaluru
(c) Varanasi
(d) New Delhi

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Q39. According to one statement, two arguments are given. Decide which argument is stronger with respect to the statement.

Statement:

Should the Indian government stop spending large amounts of money on border security?

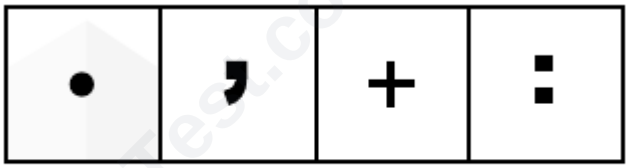
Argument:

I. Yes, it is a waste of public money

II. No, it is a national security issue

(a) Either I or II is strong.
(b) Only II is strong.
(c) Neither I nor II are strong.
(d) Only I is strong.

Q40. Three of the figures given below are similar in a certain way. However, one of these figures is not the same as the other three. Select the figure which is different from others.



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

Q41. The metal is _____ in its original state.:

(a) As a mixture with gourd-metal
(b) As a mixture with other metals
(c) In a free state
(d) As a mixture with compound

Q42. Which of the following is the famous swimming champion?

(a) Gagan Narang
(b) Mirabai Chanu
(c) Deepika Kumari
(d) Sandeep Sejwal

Q43. Which of the following is not an alkali property?

(a) They produce hydrogen ions in water.
(b) They decompose the thick material.
(c) These turn the red litmus blue.
(d) They are slippery, soapy.

Q44. Which one of the following is an polyatomic?

(a) Hydrogen
(b) Argon
(c) Sulfur
(d) Oxygen

Q45. You are given a question and two statements. State which statement is necessary/sufficient to answer the question.

Question:

Nayan has 6 boards of 3 different shapes. Find how many rectangular boards it has?

Statement:

1. The number of rectangular and circular boards is the same.
2. Board is circular.

(a) Statements 1 and 2 are both sufficient.
(b) Statement 2 alone is sufficient.
(c) Statements 1 and 2 are not sufficient.
(d) Only statement 1 is sufficient.

Q46. Sanjay was going in the southeast direction. He suddenly turns 90° right. Which direction is he facing now?

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

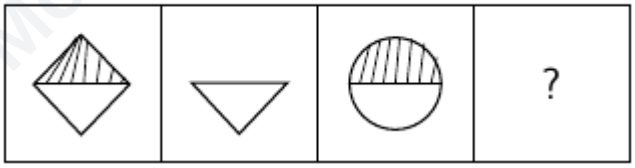
Q47. Which of the following is closest to √2?

(a) 1.41421354
(b) 1.41421357
(c) 1.41421356
(d) 1.41421355

Q48. What figure will come in place of (?) In the given series?

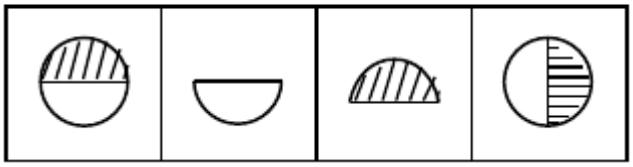
Question figure:

Question figure:



Answer figure:

Answer figure:



A B C D

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

Q49. Which of the following does not form part of the periodic table?

(a) Halogen
(b) Carcinogenic
(c) Lanthanide
(d) Actinide

Q50. Plants contain cytokine, that _____.

(a) Causes the cells to grow perpendicularly.
(b) Aids in cell division
(c) Hinders growth
(d) Help with stem growth

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Q51. In ΔABC, AB = AC, angle C = x and the angle A = (5x - 30)°: find the angle B (in degrees).

(a) 30°
(b) 60°
(c) 80°
(d) 120°

Q52. What will be the interest of 1 year 6 months (in an absolute number of rupees) at 8% annual interest on an amount of Rs. 84,500 (compounded number of rupees) if compounding interest is compounded half-yearly?

(a) Rs. 8,457
(b) Rs. 10,551
(c) Rs. 10,410
(d) Rs. 7,030

Q53. Identify the unequal or different

(a) Odissi
(b) Kathakali
(c) Hip hop
(d) Bharatanatyam

Q54. _____ is the Meridian on which the Indian Standard Time is based.

(a) 81 and 1/2 Degree east longitude
(b) 82 and 1/2 Degree east longitude
(c) 84 and 1/2 Degree east longitude
(d) 83 and 1/2 Degree east longitude

Q55. Which of the following numbers is not a perfect square?

(a) 30625
(b) 38416
(c) 34967
(d) 40804

Q56. The Pyongyang Winter Olympic Games 2018 was held in which country?

(a) South Korea
(b) Greenland
(c) Alaska
(d) Switzerland

Q57. Notice the equation PbO + HCl → PbCl2 + H2O.

The balance of the above equation requires _____ moles of HCl.

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

Q58. A alone can do a piece of work in 20 days while B takes 16 days to do it by himself. It takes them 8 days to complete the work together with C. If C and D can work in 60 days, then how many days will D need to complete the work by himself?

(a) 252
(b) 225
(c) 240
(d) 270

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Q59. 15 months ago Tuhin's age was equal to three times the age of Sambit, who is 6 months older than Soumik. After 5 months from today Tuhin's age will be equal to 2.5 times Soumik's age. What is the sum of their present age?

(a) 15 years 5 months
(b) 15 years 11 months
(c) 15 years 7 months
(d) 15 years 9 months

Q60. Select the option which is related to the first word in the same way as the third term is related to the fourth term.

Arrangement : _____ :: Selection : Combination

(a) Simulation
(b) Manipulation
(c) Permutation
(d) Inclusion

Q61. Square root of which of the following numbers will be an irrational number?

(a) 4235
(b) 7225
(c) 8464
(d) 3136

Q62. The arithmetic mean of the four different natural numbers is 110. If the largest of these four numbers is 135, then what is the maximum possible value of the range of the set of these four numbers?

(a) 97
(b) 96
(c) 98
(d) 95

Q63. A is cleaning a rectangular hall whose entrance is to the east. After entering the room, A starts cleaning to his left. At one stroke, A makes an angle of 180° with the sweep. Which direction is the broom facing now?

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

Q64. What is the wavelength of a sound wave in a medium with a frequency of 840 Hz and a speed of 380 m/s seconds?

(a) 5.45 m
(b) 1.45 m
(c) 0.45 m
(d) 2.45 m

Q65. Find the next letter in the series.

KB, LD, MG, NK, ?

(a) PU
(b) OG
(c) OP
(d) PG

Q66. What is the below poverty line (BPL) percentage in India as per the 2011 census?

(a) 32%
(b) 22%
(c) 42%
(d) 35%

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Q67. To improve internal control of banks, Reserve Bank of India has asked all banks to do what till 30 April 2018?

(a) To connect SWIFT with its Basic Banking Solution (CBS)
(b) To connect RTGS with their Core Banking Solution (CBS)
(c) To connect NEFT with its Basic Banking Solution (CBS)
(d) To connect MICR to their Basic Banking Solution (CBS)

Q68. Which of the following is the square root of 21316?

(a) 154
(b) 136
(c) 146
(d) 134

Q69. Consider the given statements, even if they are at variance with commonly known facts and decide which of the given conclusions logically follows the given statements.

Statement:

No jockey is an ace.

No Ace is a Queen.

Conclusions:

1. No jockey is queen.

2. All queens are jockeys.

(a) Only conclusion 2 follows.
(b) Only conclusion 1 follows.
(c) Neither conclusion 1 nor 2 follows.
(d) Either conclusion 1 or 2 follows.

Q70. Which of the following is not related to the phylum Churnapravara (Mollusca) ?

(a) Snail
(b) Chiton
(c) Octopus
(d) Antidone

Q71. What is the expected molecular mass of sulfur dioxide [SO2]?

(a) 6.4 u
(b) 65 u
(c) 64 u
(d) 6.5 u

Q72. Shakti Sthal is a solar power park, which was recently inaugurated in the following state?

(a) Odisha
(b) Assam
(c) Chhattisgarh
(d) Karnataka

Q73. Who is the first Indian woman to be elected as a judge of the International Tribunal for the Law of the Sea (ITLOS)?

(a) Gyan Sudha Mishra
(b) Ruma Pal
(c) Sujata Manohar
(d) Dr. Neeru Chadha

Q74. What is the capital of Nagaland?

(a) Dispur
(b) Kohima
(c) Gangtok
(d) Imphal

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Q75. The ratio of boys to girls in a school is 8 : 11. If the number of students in the school is 399, then how many boys are there?

(a) 184
(b) 168
(c) 176
(d) 160

Q76. Which is the next term in the given series?

2J, 8M, 26P, _____

(a) 80S
(b) 80T
(c) 81S
(d) 81T

Q77. 1.42 × 0.005 = ?

(a) 0.071
(b) 0.71
(c) 0.00071
(d) 0.0071

Q78. In which year was the glorious Dhyan Chand Award instituted by the Government of India?

(a) 2002
(b) 2010
(c) 2005
(d) 2000

Q79. If $x^2 + 4x - 12 < 0$, which of the following specifies all possible values of 'x'?

(a) $-6 < x < 2$
(b) $x < -6$
(c) $x > 2$
(d) $-2 < x < 6$

Q80. The reproductive parts of _____ are located in the flower.

(a) Pteridophyta
(b) Thalophyta
(c) Angiosperms
(d) Bryophyta

Q81. If immediately before hitting the earth the kinetic energy of a mass of 2 kg is 400 J. At what height was it dropped? (g = 10 m/s², friction is negligible)

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

Q82. 46% of all tickets sold on a single day were purchased by students. If the number of tickets sold on that day was 1250, how many of those tickets were purchased by the students?

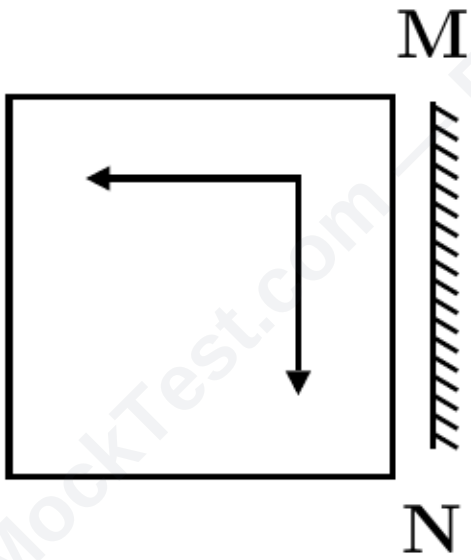
(a) 550
(b) 575
(c) 580
(d) 570

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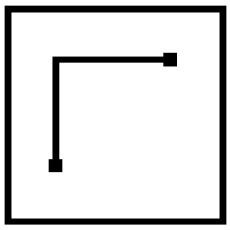
Q83. Which Indian civillian award was given to KJ Yesudas in 2017 for his contribution to Indian music?

(a) Padma Vibhushan
(b) Bharat Ratna
(c) Padma Shri
(d) Padma Bhushan

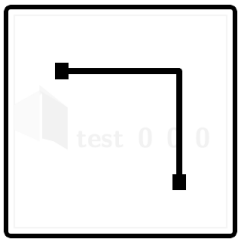
Q84. If the mirror is placed on the MN line, find the mirror image of the given figure.



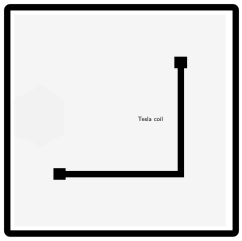
(a)



(b)

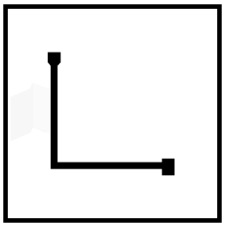


(c)



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(d)



Q85. The cow has the same relation to milk as the tree has with _____.

(a) Stems
(b) Fruit
(c) Wood
(d) Shadow

Q86. A factory outlet has decided to dispose of its old stock by selling each set of cups for Rs. 287 and recovering only the variable cost. If the fixed cost is 18% of the total cost, what was the cost price of each set of cups?

(a) Rs. 320
(b) Rs. 350
(c) Rs. 325
(d) Rs. 340

Q87. $54 \div 3^2 \times 6 + 3 = ?$

(a) 4
(b) 39
(c) 2/3
(d) 54

Q88. Which one of the following is not an alkaline earth metal?

(a) Magnesium
(b) Barium
(c) Sodium
(d) Calcium

Q89. Find the two operations to be converted to correct the following equation.

$((3 \times 10 + 14) \div 4) - 2 = 6$

(a) Multiplication and addition
(b) Division and multiplication
(c) Addition and subtraction
(d) Subtraction and division

Q90. Sperm are temporarily kept in _____.

(a) Epididymis
(b) Vas-deferens
(c) Bladder
(d) Vas Aference

Q91. The most important event of Ashoka's reign, was the victory of Kalinga, _____ in the modern era, which proved to be an important change in his life.

(a) Bihar
(b) Odisha
(c) Jharkhand
(d) Assam

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Q92. Two pipes 'L' and 'K' together fill a tank in 4 hours. Pipe K alone fills it in 5 hours. In how many hours will pipe L fill this tank alone?

(a) 20 hours
(b) 12 hours
(c) 8 hours
(d) 15 hours

Q93. The length and width of a rectangle has been increased by 15% and 10% respectively. What will be the percentage increase in the area of the rectangle?

(a) 26.5%
(b) 30.5%
(c) 20.5%
(d) 25%

Q94. Soda-acid is a salt used in fire extinguishers:

(a) Calcium oxychloride
(b) Sodium Carbonate
(c) Sodium Hydrogen Carbonate
(d) Sodium Hydroxide

Q95. Two arguments 1 and 2 are given before the statement below. You have to decide which of the arguments is/are strong, considering the statement and the arguments given next to it.

Statement:

Should it be mandatory to work after school?

Argument:

1. Yes, it helps to develop life skills.

2. No, not all students are fully mature in dealing with work matters.

(a) Only argument 1 is strong.
(b) Only argument 2 is strong.
(c) Neither 1 nor 2 is strong.
(d) Both 1 and 2 are strong.

Q96. Hitesh can complete a work alone in 24 days and Jinesh can complete the same work in 30 days alone. With the help of Ishaan, they can complete this work in 10 days. In how many days will Ishaan complete this work alone?

(a) 32 days
(b) 36 days
(c) 48 days
(d) 40 days

Q97. HCF of 88 and 220 is:

(a) 8
(b) 22
(c) 44
(d) 11

Q98. Read the given statement and the following conclusions carefully and choose which of the following logically follows the statement.

Statement:

A friend of Meena said, "Meena's mobile has more features than her sister's mobile".

Conclusion:

1. Meena has a sister.

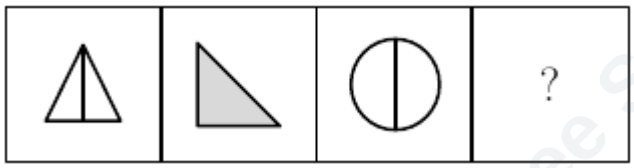
2. Meena's friend is a very close associate of her sister.

(a) Conclusion 2 alone follows.
(b) Conclusion 1 alone follows.

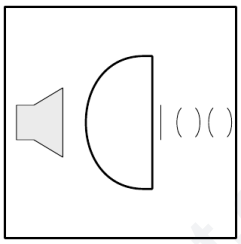
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(c) Both the conclusion follow.
(d) Neither conclusion 1 nor 2 follow.

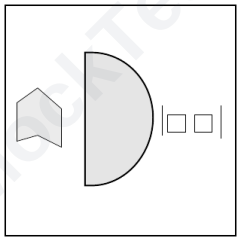
Q99. Select the shape which is related to the third figure in the same way as the second figure is related to the first figure.



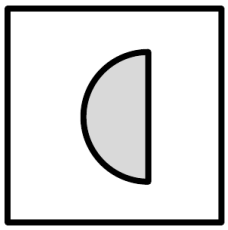
(a)



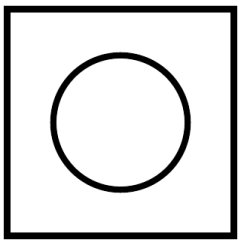
(b)



(c)



(d)



Q100. Sadhana's face was towards the northeast. She turns 45° clockwise and then 180° counterclockwise. In which direction is her face now?

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

ANSWER KEY

1	d	2	b	3	c	4	b	5	a	6	b	7	a	8	d	9	a	10	a
11	b	12	c	13	d	14	d	15	d	16	b	17	d	18	d	19	b	20	b

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

SOLUTIONS

Q1. Answer: (d) 39.0

Shortcut Trick

In same direction, Distance (Length of train) = Relative Speed × Time.

L = (V − 4.8) × 10.8 = (V − 6.6) × 11.4

=> 10.8V − 51.84 = 11.4V − 75.24

=> 0.6V = 23.4

=> V = 23.4 ÷ 0.6 = 39

Therefore The correct answer is 39.0 km/h.

Alternate Method

Given: Speed of first person (S1) = 4.8 km/h, Time (T1) = 10.8 s. Speed of second person (S2) = 6.6 km/h, Time (T2) = 11.4 s.

Formula: Distance = Relative Speed × Time

=> Let Speed of Train be V km/h.

=> (V − 4.8) × (5/18) × 10.8 = (V − 6.6) × (5/18) × 11.4

=> (V − 4.8) × 10.8 = (V − 6.6) × 11.4

=> 10.8V − 51.84 = 11.4V − 75.24

=> 11.4V − 10.8V = 75.24 − 51.84

=> 0.6V = 23.4

=> V = 234 ÷ 6 = 39

Therefore The correct answer is 39.0 km/h.

Additional Information

Relative Speed Concept

When two objects move in the same direction, relative speed = S1 − S2. When they move in opposite directions, relative speed = S1 + S2.

Unit Conversion

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

Train Crossing Person

When a train crosses a stationary or moving person, the distance covered is equal to the length of the train.

Q2. Answer: (b) 158

Given,

126, 132, 142, 148, ___

The pattern followed here is,

126 + 6 = 132

132 + 10 = 142

142 + 6 = 148

148 + 10 = 158

Hence, the correct answer is 158.

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Q3. Answer: (c) Shimla

The correct answer is Shimla.

Key Points

• Sir John Lawrence officially declared Simla the summer capital of the British empire in 1864.

• After independence, the city became the capital of Punjab and was later made the capital of Himachal Pradesh.

• During the British Raj, until 1911, Calcutta was the capital of India.

Additional Information

• King George V proclaimed the transfer of the capital from Calcutta to Delhi at the climax of the 1911 Imperial Durbar on 12 December 1911.

• Now Shimla is the summer capital of Himachal Pradesh.

• Dharamshala is the winter capital of Himachal Pradesh.

• Dalhousie is a high-altitude town spread across 5 hills of Himachal Pradesh.

• Ooty (short for Udhagamandalam) is a resort town in the Western Ghats mountains, in Tamil Nadu state.

• Darjeeling is a town in India's West Bengal state, in the Himalayan foothills.

Q4. Answer: (b) Time

The correct answer is Time.

Key Points

There are three equations of motion that can be used to derive components such as displacement(s), velocity (initial and final), time(t), and acceleration(a).

The following are the three equation of motion:

• First Equation of Motion: $v=u+at$

• Second Equation of Motion: $s=ut+ 1/2\ at^2$

• Third Equation of Motion: $v^2=u^2+2as$

Where the initial velocity is u, acceleration is denoted as a, the time period is denoted as t, the final velocity is denoted as v, and the distance traveled is denoted as s.

Additional Information

Newton's 2nd law states that the rate of change of a body's momentum—the product of its mass and velocity—is proportional to the force applied, and takes place in the direction of the applied force.

Sir Isaac Newton has given three laws to describe the motion of an object. These laws are known as Newton's laws of motion.

1) NEWTON'S FIRST LAW OF MOTION:-

• A body that continues to its state of rest will remain in uniform speed in a straight line unless and until it is compelled by an external force to change its state of rest or of uniform motion.

• Newton's first law recognizes that everybody has some inertia.

• Inertia is an intrinsic property of the body by the virtue of which it resists a change in its state of rest or of uniform motion.

2) NEWTON'S SECOND LAW OF MOTION:-

• The net force applied to a body is equal to the rate of change of momentum.

• For the case of mass, force equals mass times acceleration.

• i.e. F = ma

Where,

• F = force applied

• m = mass and

• a = acceleration.

• Unlike Newton's first law of motion, Newton's second law of motion pertains to the behavior of objects for which all existing forces are unbalanced.

• Newton's second law of motion is more quantitative and is used extensively to calculate what happens in situations involving a force.

3) NEWTON'S THIRD LAW OF MOTION:-

• It states that to every action there will be an equal and opposite reaction.

• i.e. "when one object exerts a force on the other object, the first object experiences a force which is equal in magnitude in the opposite direction of the force which is exerted".

Explanation:-

• According to Newton's second law of motion:

• The rate of change in momentum of an object as produced by a net force is directly proportional
• to the magnitude of the net force, in the same direction as the net applied force.
• For example-
• Suppose an object of mass M, moving along a straight line with an initial velocity u. After a certain time t, it moves with a constant acceleration and the final velocity becomes v.
• So, the initial momentum is given as-
• pi = M × u
• Similarly, the final momentum
• pf = M × v
• The change in momentum is
• pf – pi = (M × v) – (M × u)
• pf – pi = M (v – u)
• The rate of change of momentum with respect to time is proportional to the applied force.
• The applied force is
• F prop. to M (v – u)/t or F prop. to M × a
• a = (v – u)/t = Rate of change of velocity/Time
• F = k × m × a
• k = proportionality constant.
• Therefore, from the second law of motion, we can say that force is the product of mass and acceleration
• i.e F = ma or rate of change of momentum((d p)/(d t)=m(d v)/(d t)).

FORCE:-
• Force is an external cause that is capable of changing the state of rest or motion of a particular object.
• Force is a vector quantity. So it has both magnitude and direction.
• The direction along which a force is applied is known as the direction of the force and the point where force is applied is called the application point.
• Generally, we measure the magnitude of Force by using a spring balance.
• The SI unit of force is Newton (N).

Q5. Answer: (a) 103 ft

Shortcut Trick

Identify Pythagorean Triplets for a hypotenuse of 73.

Triplet 1: $48^2 + x^2 = 73^2$ => $x = \sqrt{(5329 - 2304)} = \sqrt{3025} = 55$.

Triplet 2: $55^2 + y^2 = 73^2$ => $y = \sqrt{(5329 - 3025)} = \sqrt{2304} = 48$.

Total width = x + y = 55 + 48 = 103.

Therefore The correct answer is 103 ft.

Alternate Method

Given:

Height of first window (h1) = 48 ft

Height of second window (h2) = 55 ft

Length of ladder (L) = 73 ft

Formula Used:

Pythagoras Theorem: $Base^2 + Height^2 = Hypotenuse^2$

Calculations:

=> Let distance from first wall to ladder base be x.

=> $x^2 + 48^2 = 73^2$

=> $x^2 = 5329 - 2304 = 3025$

=> $x = \sqrt{3025} = 55$ ft

=> Let distance from second wall to ladder base be y.

=> $y^2 + 55^2 = 73^2$

=> $y^2 = 5329 - 3025 = 2304$

=> y = √2304 = 48 ft

=> Width of the street = x + y = 55 + 48 = 103 ft

Therefore The correct answer is 103 ft.

Additional Information

Pythagorean Triplets

Sets of three positive integers a, b, and c such that $a^2 + b^2 = c^2$. Common triplets include (3,4,5), (5,12,13), (7,24,25), (8,15,17), (48, 55, 73).

Right-Angled Triangle Area

Area = (1/2) × base × height. In this problem, the ladder acts as the hypotenuse for two triangles.

Calculation Shortcut

Use $a^2 - b^2 = (a - b)(a + b)$ for quick subtraction of squares: $73^2 - 48^2 = (73 - 48)(73 + 48) = 25 \times 121 = 3025$.

Q6. Answer: (b) Only 1 is sufficient.

Shortcut Trick

For a proportion a : b :: c : d, the property ad = bc must hold true.

From Statement 1, p × 1000 = p² × p² => 1000p = p^4 => p³ = 1000, which gives p = 10.

From Statement 2, the equation is $(p + n)^2 = 21$, which has two variables and cannot provide a unique value for p.

Since a unique value is found only from the first condition, Statement 1 alone is enough.

Therefore The correct answer is Only 1 is sufficient.

Alternate Method

Given:

Statement 1: $p : p^2 :: p^2 : 1000$

Statement 2: $p^2 + 2pn + n^2 = 21$

Formula Used:

Product of Extremes = Product of Means

Algebraic Identity: $(a + b)^2 = a^2 + 2ab + b^2$

Calculations:

Step 1: Check Statement 1

=> $p \div p^2 = p^2 \div 1000$

=> $1000 \times p = p^2 \times p^2$

=> 1000p = p^4

=> $p^3 = 1000$

=> $p = \sqrt[3]{1000} = 10$

Since we obtained a unique value, Statement 1 is sufficient.

Step 2: Check Statement 2

=> $p^2 + 2pn + n^2 = 21$

=> $(p + n)^2 = 21$

=> $p + n = \sqrt{21}$ or $p + n = -\sqrt{21}$

Since there are two unknown variables (p and n) in one equation, a unique value for p cannot be determined. Thus, Statement 2 is not sufficient.

Therefore The correct answer is Only 1 is sufficient.

Additional Information

Continued Proportion

Three numbers a, b, and c are in continued proportion if a : b :: b : c, which implies $b^2 = ac$, where b is the mean proportional.

Data Sufficiency Rules

To solve for 'n' distinct variables, at least 'n' independent linear equations are required. A single equation with two variables generally yields infinite solutions.

Properties of Ratios

Ratios remain unchanged if both the numerator and denominator are multiplied or divided by the same non-zero number.

Q7. Answer: (a) 9/11

Shortcut Trick

Combined Efficiency of A, B, and C based on LCM (30): 2, 3, and 6.

Total efficiency = 2 + 3 + 6 = 11.

Work done by B and C = Efficiency of (B + C) / Total Efficiency.

Part of work = (3 + 6) / 11 = 9/11.

Therefore The correct answer is 9/11.

Alternate Method

Given: Time taken by Pipe A = 15 min, Pipe B = 10 min, Pipe C = 5 min.

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

Person	Days	Total Work	Efficiency
Pipe A	15	30	2
Pipe B	10	3	
Pipe C	5	6	

=> Total efficiency of A + B + C = 2 + 3 + 6 = 11 units/min.

=> Time taken to fill the tank together = Total Work ÷ Total Efficiency = 30/11 min.

=> Work done by B in 30/11 min = 3 × (30/11) = 90/11 units.

=> Work done by C in 30/11 min = 6 × (30/11) = 180/11 units.

=> Total work done by B and C = (90 + 180) / 11 = 270 / 11 units.

=> Part of work done by B and C = (270/11) ÷ 30 = 9/11.

Therefore The correct answer is 9/11.

Additional Information

Efficiency Concept

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

Pipes and Cisterns

For outlet pipes (leakage), the efficiency is taken as negative in calculations.

Part of Work

The part of work done by a specific group is the ratio of their combined efficiency to the total efficiency of all active pipes.

Q8. Answer: (d) Ampere

The correct answer Ampere.

Key Points

• The ampere, symbol A, is the SI unit of electric current.

• It is defined by taking the fixed numerical value of the elementary charge e to be 1.602 176 634 ×10^(−19) when expressed in unit C, which is equal to A.s.

Additional Information

• The seven SI base units, which are comprised of:

• Length - meter (m)

• Time - second (s)

• Amount of substance - mole (mole)

• Electric current - ampere (A)

• Temperature - kelvin (K)

• Luminous intensity - candela (cd)

• Mass - kilogram (kg)

• Ohm (Ω) is the SI unit of Electric Resistance.

• Volt (V) is the SI unit of Electric Potential.

• Ohmmeter, an instrument for measuring electrical resistance, which is expressed in ohms.

Q9. Answer: (a) Kerala

The correct answer is Kerala.

Key Points

• Kerala is the largest producer of rubber plantation in India.

• Tamil Nadu is the 2nd largest producer of rubber plantations in India.

• The soil of cultivation is suitable for rubber plantation, most of the farmers grow rubber trees rubber has a very good market, it is

easy to grow.

• Traditional rubber-growing states comprising Kerala and Tamil Nadu account for 81% of production.

Additional Information

• The world's leading producer of natural rubber in Thailand, as of 2019.

• In second place in Indonesia.

• John Joseph Murphy came to India at a young age and set up the country's first commercial rubber plantation at Thattekkad near Kothamangalam in 1902.

Q10. Answer: (a) 24

Total Sum of 4 numbers = 22 × 4 = 88

Sum of 3 smallest = 19 × 3 = 57

Largest number = 88 − 57 = 31

Smallest number = 31 − 15 = 16

Mean of 3 largest = (88 − 16) ÷ 3 = 24

Therefore The correct answer is 24.

Shortcut Trick

Total Sum of 4 numbers = 22 × 4 = 88

Sum of 3 smallest = 19 × 3 = 57

Largest number = 88 − 57 = 31

Smallest number = 31 − 15 = 16

Mean of 3 largest = (88 − 16) ÷ 3 = 24

Therefore The correct answer is 24.

Q11. Answer: (b) 1100 cm²

Shortcut Trick

Radius (r) = $\sqrt{(l^2 - h^2)} = \sqrt{(25^2 - (\sqrt{429})^2)} = \sqrt{(625 - 429)} = \sqrt{196} = 14$ cm.

CSA = $\pi rl = (22/7) \times 14 \times 25 = 22 \times 2 \times 25 = 1100$ cm².

Therefore The correct answer is 1100 cm².

Alternate Method

Given: Height (h) = √429 cm, Slant height (l) = 25 cm, π = 22/7.

Formula Used: Slant height $l^2 = r^2 + h^2$; Curved Surface Area (CSA) = πrl.

=> First, calculate the radius (r) of the cone.

=> $r^2 = l^2 - h^2$

=> $r^2 = 25^2 - (\sqrt{429})^2$

=> $r^2 = 625 - 429 = 196$

=> $r = \sqrt{196} = 14$ cm.

=> Curved Surface Area (CSA) = πrl

=> CSA = (22/7) × 14 × 25

=> CSA = 22 × 2 × 25 = 1100 cm².

Therefore The correct answer is 1100 cm².

Additional Information

Total Surface Area of Cone

It is the sum of CSA and base area: TSA = $\pi r(l + r)$.

Volume of Cone

The capacity of a cone is given by $V = (1/3)\pi r^2 h$.

Pythagorean Relation

In a right circular cone, l, h, and r always satisfy $l^2 = r^2 + h^2$.

Q12. Answer: (c) Shooting

The correct answer is Shooting.

Key Points

• Youth Olympics champion and Asian Games gold medallist, 17-year-old Saurabh Chaudhary won the men's gold in 10-meter air pistol in the 63rd National shooting championship in 2020.

• Sarabjot Singh, Abhishek Verma is got 2nd and 3rd positions respectively.

Q13. Answer: (d) A

Given,

When the mirror is placed horizontally the left and right part of the figure remains the same and the changes occur in the top and bottom part of the figure.

Therefore

Hence, the correct answer is A.

Q14. Answer: (d) Aunt

Given,

Nida is the son of Fazil. Fazil is Meher's brother. Khaif is Mehar's husband.

Here we see Meher is Aunt of Nida.

Hence, the correct answer is Aunt.

Q15. Answer: (d) The velocity of the object increases.

The correct answer is The velocity of the object increases.

Key Points

• Velocity describes how position changes and acceleration describes how velocity changes.

• Acceleration is defined to be the rate of change of the velocity.

• Positive acceleration is increasing speed with the direction of travel.

• Negative acceleration is decreasing speed with the direction of travel.

• Uniform acceleration is a freely falling body (since it has a uniform acceleration equal to the acceleration due to the gravity of the earth).

• No acceleration means no change in velocity. For example, an apple thrown in space.

• The thing is moving at a constant velocity relative to an inertial reference frame.

Q16. Answer: (b) 19.8 × 106 J

The correct answer is 19.8 × 10^6 J.

Key Points

• 1 Kwh can be defined as the amount of electrical energy consumed when a 1000 watt electrical appliance is used for an hour.

• So 5.5 Kwh is can be defined as the amount of electrical energy consumed when a 5500-watt electrical appliance is used for an hour.

• 1 Watt = 1 Joule /second.

1 kilowatt hour is 3.6 megajoules.

5.5 kwh = 3.6 × 5.5 = 19.8 mrgajoules = 19.8 × 10^6 J.

Q17. Answer: (d) Endospores

The correct answer is Endospores.

Key Points

• Microorganisms sense and adapt to changes in their environment.

• Endospores can survive environmental assaults that would normally kill the bacterium. These stresses include high temperature, high UV irradiation, desiccation, chemical damage, and enzymatic destruction.

• A variety of different microorganisms form "spores" or "cysts", but the endospores of low G+C Gram-positive bacteria are by far the most resistant to harsh conditions.

Additional Information

• Endotoxin is a type of pyrogen and is a component of the exterior cell wall of Gram-negative bacteria, like E. coli.

• Endotoxin is a lipopolysaccharide or LPS.

• LPS consists of the lipid A portion containing fatty acids and disaccharide phosphates, core polysaccharides, and the O-antigen.

• Peptidoglycan is the basic unit of the cell wall in bacteria, that confers mechanical rigidity to the cell, protects the cytoplasmic membrane, and determines the cell form.

• In Gram-positive bacteria, a thick coat of peptidoglycan combined with teichoic acid constitutes the basic structure of the cell wall.

• Endogenous budding is the process when the bud develops inside the parent body.

• Endogenously developing bud is called a gemmule.

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• It occurs in- freshwater sponges and a few marine sponges.
• They reproduce by sexual and asexual mode.

Q18. Answer: (d) 13

Given,
The number of triangles is,
No. of small triangles = 8
No. of triangles consisting of two small triangles = 3
No. of triangles consisting of three small triangles = 1
No. of triangles consisting of four small triangles = 1
Therefore The total no. of triangles = 13
Hence, the correct answer is 13.

Q19. Answer: (b) Singapore

The correct answer is Singapore.
Key Points
• The 6th edition of the biennial World Cities Summit (WCS-2018) has started in Singapore.
• The 5-day event is co-organized by the Centre for Liveable Cities and the Urban Redevelopment Authority.
• The theme was “Liveable & Sustainable Cities: Embracing the Future through Innovation and Collaboration".
• The motto was how cities can be more liveable and resilient through better governance and planning, technology and social innovations, as well as collaborations with various stakeholders and with other cities.
• This summit was held in conjunction with the Singapore International Water Week (SIWW) and the CleanEnviro Summit Singapore (CESG).
Additional Information
• The 7th World Cities Summit (WCS) will be held from 5 to 9 July 2020 in Singapore.

Q20. Answer: (b) 40

We know,
Given,
Biscuit = 83
Cake = 20
Cookie = 58
The pattern followed here is
the addition of the positional value of the letters is the code for given words.
Hence, the correct answer is 40.

Q21. Answer: (a) Indira Banerjee

The correct answer is Indira Banerjee.
Key Points
• She was elevated as the Chief Justice of the Madras High Court and assumed charge on 5 April 2017.
• She was appointed as a Permanent Judge of the Calcutta High Court on 5 February 2002.
• Then she transferred to the Delhi High Court with effect from 8 August 2016.
Additional Information
• Satish K. Agnihotri is the former Chief Justice of Sikkim High Court.
• He also served as a judge of the Madras High Court.
• Rajesh Kumar Agrawal is the current President of the National Consumer Disputes Redressal Commission (NCDRC).
• He is a former judge of the Supreme Court of India.
• He also served as the Chief Justice of the Madras High Court (24 October 2013 - 17 February 2014).
• Sanjay Kishan Kaul is a Judge of the Supreme Court of India.
• He is former Chief Justice of Madras, Punjab and Haryana High Court.

Q22. Answer: (d) Both 1 and 2 are implicit.

Given,
Statement:

As part of the city's beautification campaign, the local municipal body plans to clean up the old lake in the city center.

Assumptions:

1. If the lakes are well maintained, then it adds to the beauty of the city and checks the water level of that area.

2. The lake is full of dirt.

Here we see both the assumptions are implicit.

Hence, the correct answer is Both 1 and 2 are implicit.

Q23. Answer: (c) 14 September

The correct answer is 14 September.

Key Points

• the World Hindi Diwas, the National Hindi Diwas is observed on September 14 every year.

• It recognizes the day when Hindi was adopted as one of the official languages of India by the Constituent Assembly in 1949.

• Apart from Hindi Diwas, World Hindi Day 2020 is observed on January 10.

• The day commemorates the anniversary of the first World Hindi Conference held in Nagpur on January 10, 1975.

Important Points

• 14 December - National Energy Conservation Day.

• It is celebrated every year by the Bureau of Energy Efficiency (BEE), under the Ministry of Power.

• 14 June - World Blood Donor Day.

• 14 November - Children’s Day.

• It is celebrated to commemorate the birth anniversary of Pt. Jawaharlal Nehru.

• He was born on 14 November 1889.

• Jawaharlal Nehru had immense love, care, and affection for children and so, they call him Chacha Nehru.

Q24. Answer: (c) 44

Concept:

Follow the BODMAS rule to solve this question, as per the order given below,

Calculation:

$96 \div 2^3 \times 3 + 8 = ?$

$\Rightarrow 96 \div 8 \times 3 + 8 = ?$

$\Rightarrow 12 \times 3 + 8 = ?$

$\Rightarrow 36 + 8 = ?$

$\Rightarrow 44 = ?$

Therefore The required value is 44

Q25. Answer: (c) [figure]

Given,

∑, Φ, δ, #

Here we see all are mathematical symbols except #.

Hence, the correct answer is #.

Q26. Answer: (a) Only statement I is sufficient, while statement II alone is not sufficient.

Shortcut Trick

Test squares of consecutive even numbers: $2^2 = 4$, $4^2 = 16$, $6^2 = 36$, $8^2 = 64$.

Observe the sum: 16 + 36 = 52. This uniquely identifies the numbers as 4 and 6.

Statement II (difference is 2) is a universal property of all consecutive even numbers and does not provide a unique value.

Therefore The correct answer is Only statement I is sufficient, while statement II alone is not sufficient.

Alternate Method

Given: Two consecutive positive even numbers.

Formula Used: Sum of squares of n and (n + 2) is $n^2 + (n + 2)^2$.

From Statement I:

$\Rightarrow n^2 + (n + 2)^2 = 52$

$\Rightarrow n^2 + n^2 + 4n + 4 = 52$

$\Rightarrow 2n^2 + 4n - 48 = 0$

=> $n^2 + 2n - 24 = 0$

=> $(n + 6)(n - 4) = 0$

=> n = 4 (Since the number must be a positive even number).

=> The numbers are 4 and 6. Thus, Statement I is sufficient to find the value.

From Statement II:

=> $(n + 2) - n = 2$

=> 2 = 2. This is an identity that holds true for all consecutive even numbers (e.g., 2 and 4, 8 and 10), so no unique value can be determined.

Therefore The correct answer is Only statement I is sufficient, while statement II alone is not sufficient.

Additional Information

Consecutive Even Numbers

These are even integers that follow one another in order, represented as n, n + 2, n + 4, etc., where n is an even integer.

Data Sufficiency

A statement is considered sufficient if it leads to exactly one unique solution for the variable or question asked.

Quadratic Roots

In equations like $n^2 + 2n - 24 = 0$, the roots are found by factoring; only the root satisfying the given constraints (positive even) is accepted.

Q27. Answer: (d) Atal Bihari Vajpayee

The correct answer is Atal Bihari Vajpayee.

Key Points

Bharat Ratna Award Winners: List of Recipients (2015)

Laureates	Brief Description
Atal Bihari Vajpayee	• Parliamentarian for over four decades. - He was elected nine times to the Lok Sabha, twice to the Rajya Sabha. - He served as the Prime Minister of India for three terms; 1996, 1998, 1999–2004. - He was Minister of External Affairs during 1977–79 and was awarded the "Best Parliamentarian" in 1994.
Madan Mohan Malaviya	• Scholar and educational reformer Malaviya is a founder of Akhil Bharatiya Hindu Mahasabha (1906) and Banaras Hindu University and served as the university's vice-chancellor from 1919 till 1938. - He was the President of the Indian National Congress for four terms and was the Chairman of Hindustan Times from 1924 to 1946.

Additional Information

Bharat Ratna Award Winners: List of Recipients (2019)

Laureates	Brief Description
Pranab Mukherjee	• He is an Indian politician who served as the 13th President of India from 2012 until 2017. - He has been a senior leader in the Indian National Congress and has occupied several ministerial portfolios in the Government of India. - Before he was elected President, he was Union Finance Minister from 2009 to 2012.
Nanaji Deshmukh	• He was a social activist from India. He worked in the fields of education, health, and rural self-reliance. - He was a member of RSS, a leader of the Bharatiya Jana Sangh, and also a member of the Rajya Sabha. - He was honored with the Padma Vibhushan in 1999. - India’s first Saraswati Shishu Mandir was established by him at Gorakhpur in 1950.
Bhupen Hazarika	• He was an Indian playback singer, lyricist, musician, singer, poet, and film-maker from Assam, widely known as Sudhakantha. - He got Bharat Ranta (India's highest civilian award) - He received the National Film Award for Best Music Direction in 1975. Recipient of Sangeet Natak Akademi Award (1987), Padmashri (1977), and Padmabhushan (2001), and also awarded with Dada Saheb Phalke Award (1992).

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Q28. Answer: (a) D

Given,

Here we see in all the figures dots are to the either side of the line except in the figure D.

Hence, the correct answer is D.

Q29. Answer: (d) Increased

The correct answer is Increased.

Key Points

• The elastic potential energy is equal to the work done (w) in the spring.

$w = 1/2\ k\ x^2$, where k is the spring constant and x is the change in the length of spring from the normal position to the compressed position.

• This work done is stored in spring as elastic potential energy (PE) when the spring is compressed and hence elastic potential energy increases.

Q30. Answer: (b) Himachal Pradesh

The correct answer is Himachal Pradesh.

Key Points

• Nepal shares a border of about 1850 km with five Indian States - Uttarakhand, Uttar Pradesh, Bihar, West Bengal, and Sikkim.

Important Points

• Nepal (as of May 2022)

• Capital: Kathmandu

• Currency: Nepalese Rupee

• President: Bidya Devi Bhandari.

• Prime Minister: Pushpa Kamal Dahal

• Himachal Pradesh (as of Jan 2023)

• Chief Minister: Sukhwinder Singh Sikhu

• Governor: Rajendra Arlekar

Additional Information

• India shares borders with 09 countries:

• In the north or north-west: China, Bhutan, Nepal, Pakistan, Afghanistan.

• In the east: Bangladesh, Myanmar.

• Water borders: Sri Lanka, Maldives.

Q31. Answer: (a) Potassium (K) and Sodium (Na)

The correct answer is Potassium (K) and Sodium (Na).

• Apart from sodium, potassium, lithium, and cesium metal are stored in kerosene oil as they both can react in air or water.

• These metals are highly reactive to oxygen, carbon dioxide, and moisture present in the air.

• If it is kept in the open air, it easily reacts with the oxygen and catches fire.

• kerosene is a mixture of hydrocarbons, it won't react with it.

• The reaction proceeds as follows (sodium in the example, but it could be any of the Group 1 metals):

$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

Hydrogen gas is formed during the reaction. In more explosive reactions (potassium, rubidium, and cesium).

Q32. Answer: (a) Statements 1 and 2 are sufficient.

Given,

Question:

Who is the largest among T, V and W?

Statement:

1. T is older than W.

2. W is the elder sister of V.

Here we see T is older than W and W is older than V and both the statements are necessary to answer the question.

Therefore T is the oldest.

Hence, the correct answer is Statements 1 and 2 are sufficient.

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Q33. Answer: (c) Density

The correct answer is Density.

Key Points

Sound is energy, not matter or substance. Sound is not a physical thing.

Important Points

• Density is a characteristic property of a substance or matter.

• The density of a substance is the relationship between the mass of the substance and how much space it takes up (volume).

• Density equals the mass of the substance divided by its volume; D = m/v.

• Objects with the same volume but different mass have different densities.

Additional Information

• There are five main characteristics of sound waves: wavelength, amplitude, frequency, time period, and velocity.

• The wavelength of a sound wave indicates the distance that the waves travel before it repeats itself.

• The amplitude of a wave defines the maximum displacement of the particles disturbed by the sound wave as it passes through a medium. A large-amplitude indicates a large sound wave.

• The frequency of a sound wave indicates the number of sound waves produced by each second. Low-frequency sounds produce sound waves less often than high-frequency sounds.

• The time period of a sound wave is the amount of time required to create a complete wave cycle. Each vibration from the sound source produces a wave's worth of sound.

• The velocity of a sound wave determines how fast the wave is moving and is expressed as meters per second.

Q34. Answer: (a) Rubber

Given,

Rubber, Copper, Human Body, Graphite.

Here we see based on the electrical conductivity all are good conductors except Rubber.

Hence, the correct answer is Rubber.

Q35. Answer: (d) Inertia

The correct answer is Inertia.

Key Points

• Newton's first law of motion, which is sometimes called the law of inertia, explains that an object at rest stays at rest, and an object in motion remains in motion with the same velocity unless acted upon by an external force.

• For instance, if the front wheel of a bicycle being ridden at speed hits a large rock, the bike is acted upon by an external force, causing it to stop.

• Unfortunately for the cyclist, he or she will not have been acted upon by the same force and will continue in motion—over the handlebars.

Additional Information

Velocity	**• Velocity is defined as a vector measurement of the rate and direction of motion of an object. - velocity formula when an object moving in a straight line: r = d / t - r is the rate or speed, d is the distance moved, t is the time it takes to complete the movement. - SI unit: meter/second.**
Freefall	• Downward movement under the force of gravity only.
Impulse	• A change in momentum may result from an acceleration or a force or an impulse. - The impulse experienced by an object is always equal to the change in its momentum. - In terms of equations is expressed as Impulse = Force x Time

Q36. Answer: (c) 31520201514

We know,

Given,

NYLON is written as 1425121514.

The pattern followed here is,

Hence, the correct answer is 31520201514.

Q37. Answer: (c) Velocity

The correct answer is Velocity

Key Points

• A vector quantity is specified by its magnitude as well as the direction associated with it.

• For example: - Acceleration, velocity, displacement, and angular velocity.

• Velocity is defined as a vector measurement of the rate and direction of motion of an object.

• velocity formula when an object moving in a straight line: r = d / t

• r is the rate or speed, d is the distance moved, t is the time it takes to complete the movement.

• SI unit: meter/second.

• Other units: mph, ft/s, Km/h.

Additional Information

Displacement	**• Displacement is a vector quantity that refers to "how far out of place an object is". - It is the object's overall change in position.**
Momentum	• Momentum is a vector quantity that is a product of the mass (weight) of a particle and its velocity (speed). - SI unit: kilogram meter per second (kg?m/s). - Newton's 2nd law of motion related to the momentum that is the rate of change of momentum in an object is directly proportional to the force applied.
Force	• Force is defined as a push or pulls exerted on one object by another. - Force measured in Newtons (denoted N, where 1 N is the force required to give a 1 kg mass an acceleration of 1 m/s^2).

Q38. Answer: (d) New Delhi

The correct answer is New Delhi.

Key Points

• New Delhi is the headquarters of Sahitya Akademi.

• The Sahitya Akademi Award is a literary honor, that is conferred by India’s National Academy of Letters, Sahitya Akademi annually to writers of the most outstanding books of literary merit published in any of the 24 listed languages.

• The winners will be honored with a copper plaque and prize money of Rs 1 lakh.

Additional Information

• Sahitya Akademi Award 2019 Winners:

Language	Title & Genre	Author
English	An Era of Darkness (Non-Fiction)	Shashi Tharoor
Hindi	Chheelate Hue Apne Ko (Poetry)	Nand Kishore Acharya
Bengali	Ghumer Darja Thele (Essays)	Chinmoy Guha
Bodo	Akhai Athumniphrai (Poetry)	Phukan Ch. Basumatary
Santhali	Marom (Novel)	Shyam Besra

• It is to be noted Santhali language was used in Rajya Sabha for the first time.

• In 2005 Bodo and Santhali were introduced in Sahitya Akademi Award.

• The first award was given in 1955.

Q39. Answer: (b) Only II is strong.

Given,

Statements:

Should the Indian government stop spending large amounts of money on border security?

Argument:

I. Yes, it is a waste of public money

II. No, it is a national security issue

Here we see only II argument is strong.

Hence, the correct answer is Only II is strong.

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Q40. Answer: (d) C

Given,

Here we see all are punctuations except '+' which is mathematical sign.

Hence, the correct answer is C.

Q41. Answer: (a) As a mixture with gourd-metal

The correct answer is As a mixture with gourd-metal.

Key Points

• Metal is very reactive and unstable. In surroundings, they react with other elements to form compounds to attain stability.

• Metals thus react with sulfides, carbonates, oxygen to form respective minerals.

• Hence they do not occur in the free state.

• The metals that can be found in the free state in nature are gold, silver, platinum, etc.

• Because they are non-reactive metals.

Hint

• A native metal is any metal that is found pure in its metallic form in nature.

• Only gold, silver, copper, and the platinum group occur natively in large amounts.

Q42. Answer: (d) Sandeep Sejwal

The correct answer is Sandeep Sejwal.

Key Points

• Sandeep Sejwal is an Indian swimmer (Senior National Champion).

• He contested in the men's 100 m and 200 m breaststroke events at the 2010 Asian Juniors in Beijing.

• He won the bronze medal in the 2014 Asian games in 50 m breaststroke.

Important Points

Gagan Narang	**• He is an Indian shooter. - He was the first Indian to qualify for the London Olympics and won the Bronze Medal in the Men's 10 m Air Rifle Event at the 2012 Summer Olympics in London.**
Mirabai Chanu	• She is an Indian weightlifter. - She won India’s first gold medal in the Commonwealth Games. - The 23-year-old won her first medal in the 2014 Commonwealth Games, the silver in the women’s 48-kg weight class.
Deepika Kumari	• She is an Indian athlete who competes in the event of archery. - She won a gold medal in the 2010 Commonwealth games. - She won her first World Cup individual stage recurve gold medal in May 2012. - ‘Ladies First’ is a 2017 documentary based on her life.

Q43. Answer: (a) They produce hydrogen ions in water.

The correct answer is They produce hydrogen ions in water.

Key Points

• The alkali metals are a group of chemical elements in the periodic table with the following physical and chemical properties:

• shiny

• soft

• They are slippery, soapy.

• silvery

• They decompose the thick material.

• highly reactive at standard temperature and pressure

• readily lose their outermost electron to form cations with a charge of +1.

• They can all be cut easily with a plastic knife due to their softness, and their shiny surface tarnishes rapidly in air due to oxidation.

• These turn the red litmus blue.

• Because of their high reactivity, alkali metals must be stored under oil to prevent reaction with air.

• In the modern IUPAC nomenclature, the alkali metals comprise the group 1 elements, excluding hydrogen.

• All the alkali metals react with water, with the heavier alkali metals reacting more vigorously than the lighter ones.

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• Hence, option 1 is correct.

Q44. Answer: (c) Sulfur

The correct answer is Sulfur.

Key Points

• Sulfur is polyatomic.
• Sulfur exists as S8
• Hydrogen exists as H_(2.)
• Oxygen exists as O2.
• Any molecule that contains more than 2 atoms is polyatomic.
• Hence Sulfur is polyatomic.
• Hence, option 3 is correct.

Additional Information

• Any molecule that contains more than 2 atoms is polyatomic.
• Polyatomic molecules consist of a stable system (bound state) comprising three or more atoms.
• The molecular formula characterizes different molecules by reflecting their exact number of compositional atoms.

Q45. Answer: (c) Statements 1 and 2 are not sufficient.

Given,

Question:

Nayan has 6 boards of 3 different shapes. Find how many rectangular boards it has?

Statement:

1. The number of rectangular and circular boards is the same.
2. The board is circular.

Here we see by both the statements we cannot find the exact number of rectangular boards.

Hence, the correct answer is Statements 1 and 2 are not sufficient.

Q46. Answer: (d) South-West

Given,

Sanjay was going in the southeast direction. He suddenly turns 90° right.

Hence, the correct answer is South-West.

Q47. Answer: (c) 1.41421356

Shortcut Trick

The value of √2 is a well-known mathematical constant up to several decimal places.

The standard expansion is 1.41421356237...

Comparing with the given options, the value 1.41421356 is the closest approximation.

Therefore The correct answer is 1.41421356.

Alternate Method

Given: √2

Method: Long Division Method for Square Root

=> $1^2 = 1$, Remainder = 1

=> Bringing down 00, divisor becomes 24 (2 × 1 = 2, then append 4); 24 × 4 = 96, Remainder = 4

=> Bringing down 00, divisor becomes 281; 281 × 1 = 281, Remainder = 119

=> Continuing this process for 8 decimal places:

=> √2 ≈ 1.41421356...

=> Comparing the 8th decimal place:

=> Option 1: 1.41421354

=> Option 2: 1.41421357

=> Option 3: 1.41421356

=> Option 4: 1.41421355

Therefore The correct answer is 1.41421356.

Additional Information

Irrational Numbers

Numbers like √2, √3, and π cannot be expressed as simple fractions and have non-terminating, non-recurring decimal expansions.

Pythagoras Constant

The value of √2 is also known as Pythagoras' Constant, representing the length of the hypotenuse of a right-angled triangle with legs of length 1.

Common Square Root Values

√3 ≈ 1.73205081 | √5 ≈ 2.23606797 | √10 ≈ 3.16227766

Q48. Answer: (c) B

Given,

Here we see in the second image shaded part of the figure was removed similarly in the third image shaded part of the figure will be removed.

Therefore The answer figure is

Hence, the correct answer is B.

Q49. Answer: (b) Carcinogenic

The correct answer is Carcinogenic.

Key Points

• Carcinogenic does not form part of the periodic table.

• Hence, option 2 is correct.

Additional Information

• Halogen, any of the six nonmetallic elements that constitute Group 17 (Group XVII) of the periodic table.

• The halogen elements are fluorine (F), chlorine (Cl), bromine (Br), iodine (I), astatine (At), and tennessine (Ts).

• Lanthanoid, also called lanthanide, any of the series of 15 consecutive chemical elements in the periodic table from lanthanum to lutetium (atomic numbers 57–71).

With scandium and yttrium, they make up the rare-earth metals.

• Their atoms have similar configurations and similar physical and chemical behaviour; the most common valences are 3 and 4.

• These elements are also called lanthanide elements.

• Actinides are elements with atomic numbers from 90 to 103 following element Actinium.

• They include naturally occurring elements of thorium, protactinium, and uranium and eleven transuranic i.e., artificially produced by nuclear reactions. Nevertheless, all actinides are radioactive.

• Elements: Thorium; Uranium; Plutonium; Actinium.

Q50. Answer: (b) Aids in cell division

The correct answer is Aids in cell division.

Key Points

• Plants contain cytokine, that aids in cell division.

• They are involved primarily in cell growth and differentiation, but also affect apical dominance, axillary bud growth, and leaf senescence.

• Hence, option 2 is correct.

Additional Information

• Cytokinins (CK) are a class of plant growth substances (phytohormones) that promote cell division, or cytokinesis, in plant roots and shoots.

• They are involved primarily in cell growth and differentiation, but also affect apical dominance, axillary bud growth, and leaf senescence.

Q51. Answer: (a) 30°

Shortcut Trick

In an isosceles triangle (AB = AC), the angles opposite to equal sides are equal.

Since AB = AC, then angle B = angle C = x.

Sum of angles = 180° => (5x − 30) + x + x = 180°.

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7x = 210° => x = 30°.
Since angle B = x, the value of angle B is 30°.
Therefore The correct answer is 30°.
Alternate Method
Given: In ΔABC, AB = AC, angle C = x, and angle A = (5x − 30)°.
Formula Used: Sum of interior angles of a triangle = 180°.
Calculations:
=> In ΔABC, since AB = AC,
=> angle B = angle C (Angles opposite to equal sides are equal)
=> angle B = x
=> angle A + angle B + angle C = 180°
=> (5x − 30) + x + x = 180
=> 7x − 30 = 180
=> 7x = 210
=> x = 30
=> angle B = 30°
Therefore The correct answer is 30°.
Additional Information
Isosceles Triangle Property
In a triangle where two sides are equal, the angles opposite to those sides are also equal. If AB = AC, then angle B = angle C.
Angle Sum Property
The sum of all three interior angles of any triangle is always 180° (angle A + angle B + angle C = 180°).
Exterior Angle Theorem
The exterior angle of a triangle is equal to the sum of the two opposite interior angles.

Q52. Answer: (b) Rs. 10,551

Shortcut Trick
For half-yearly compounding, Rate (r) = 8% ÷ 2 = 4% and Time (n) = 1.5 years × 2 = 3 periods.
Effective rate for 3 periods of 4% = 4 + 4 + 4 + (4×4 + 4×4 + 4×4)/100 + (4×4×4)/10000 = 12.4864%.
Compound Interest = 12.4864% of Rs. 84,500 = 0.124864 × 84,500 = Rs. 10,551.008.
Rounding to the nearest absolute number, we get Rs. 10,551.
Therefore The correct answer is Rs. 10,551.
Alternate Method
Given:
Principal (P) = Rs. 84,500
Annual Rate (R) = 8% per annum
Time (T) = 1 year 6 months = 1.5 years
Since the interest is compounded half-yearly:
=> New Rate (r) = 8% ÷ 2 = 4% per half-year
=> Number of periods (n) = 1.5 × 2 = 3 half-years
Formula Used:
Amount (A) = $P(1 + r/100)^n$
Compound Interest (CI) = A − P
Calculations:
=> $A = 84,500 \times (1 + 4/100)^3$
=> $A = 84,500 \times (1.04)^3$
=> A = 84,500 × 1.124864
=> A = 95,051.008
=> CI = 95,051.008 − 84,500
=> CI = 10,551.008 ≈ Rs. 10,551
Therefore The correct answer is Rs. 10,551.
Additional Information

Compounding Frequencies

For half-yearly, r = R/2 and n = 2T. For quarterly, r = R/4 and n = 4T.

Difference between CI and SI

For 2 years, CI − SI = P(r/100)². For 3 years, CI − SI = P(r/100)² × (3 + r/100).

Effective Rate Formula

For two successive rates a and b, the net effective rate is (a + b + ab/100)%.

Q53. Answer: (c) Hip hop

Given,

Odissi, Kathakali, Hip hop, Bharatanatyam

Here we see all are Indian dance forms except Hip hop.

Hence, the correct answer is Hip hop.

Q54. Answer: (b) 82 and 1/2 Degree east longitude

The correct answer is 82 and 1/2 Degree east longitude.

Key Points

• 82 and 1/2 Degree east longitude is the Meridian on which the Indian Standard Time is based.

• The longitude of 82½° E (82° 30'E) is considered as the standard meridian.

• The local time stated or mentioned at this meridian is considered as the standard time for the whole country.

• This is called the Indian Standard Time (IST).

• Hence, option 2 is correct.

Additional Information

• The standard meridian of India passes through the following states :

• Uttar Pradesh

• Madhya Pradesh

• Chattisgarh

• Orissa

• Andhra Pradesh

• About Standard Meridian

• The Standard Meridian of India having the longitude 82°30’E, which passes through Mirzapur in Uttar Pradesh is considered as the standard time for the whole country

• Standard time is referred to as the synchronization of clocks within a certain geographical area to a single standard time, instead of using solar time or a locally chosen meridian (longitude) to establish a local mean time standard

• A standard meridian is established in every country so that it is the central longitude of the whole country and at the same time is throughout the country.

Q55. Answer: (c) 34967

The solution is in Hindi. Read it online.

Q56. Answer: (a) South Korea

The correct answer is South Korea.

Key Points

• The Pyongyang Winter Olympic Games 2018 was held in South Korea country.

• Hence, option 1 is correct.

Additional Information

• Host city: Pyeongchang, South Korea

• Motto: Passion. Connected.

• Nations: 92

• Athletes : 2,922

• Events: 102 in 7 sports (15 disciplines)

• Opening:9 February

• Closing: 25 February

• Opened by : President Moon Jae-in

• Cauldron: Kim Yun-a

• Stadium: Pyeongchang Olympic Stadium

Important Points

• 2022 Winter Olympics is an international winter multi-sport event that is scheduled to take place from 4 to 20 February 2022, in Beijing and towns in the neighbouring Hebei province, China.

• About South Korea: (2022)

• Capital: Seoul

• Currency: South Korean Won

• President: Yoon Suk-yeol

• Prime Minister: Han Duck-soo

Q57. Answer: (c) 2

The correct answer is 2.

Concept:

• The Law of conservation of mass states that matter can neither be created nor destroyed.

• In a chemical reaction, new compounds different from the starting materials are formed.

• In accordance with the law of conservation of mass, thus the number of atoms of each element in the reactant and product side will be the same.

So, we need to balance the chemical equation.

Calculation:

To balance a chemical reaction:

• Check the number of atoms before and after the reaction.

• Balance the elements one at a time by adding coefficients before them.

• Change the coefficients as required.

• Never change the subscripts.

• PbO + 2HCl → PbCl2+ H2O is the balanced equation.

• The balance of the above equation requires 2 moles of HCl.

Hence, 2 moles is correct.

Additional Information

• Balanced chemical equation:

• A chemical equation in which the number of each type of atom is equal on the two sides of the equation.

Q58. Answer: (c) 240

Shortcut Trick

Let Total Work be LCM(20, 16, 8) = 80 units.

Efficiency of A = 4, B = 5, and A+B+C = 10.

Efficiency of C = 10 − (4 + 5) = 1 unit.

Since C and D take 60 days, total work for that pair is 60 × 1 = 60 units (as C efficiency is 1).

Efficiency of C + D = 80/60 = 4/3. Efficiency of D = 4/3 − 1 = 1/3.

Days for D = 80 ÷ (1/3) = 240 days.

Therefore The correct answer is 240 days.

Alternate Method

Given: A = 20 days, B = 16 days, A+B+C = 8 days, C+D = 60 days.

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

Person	Days	Total Work	Efficiency
A	20	80	4
B	16	5	
A+B+C	8	10	

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

=> Efficiency of C = 10 − 4 − 5 = 1 unit/day

=> Time taken by C alone = 80 ÷ 1 = 80 days

=> For C and D: 1/C + 1/D = 1/60

=> 1/80 + 1/D = 1/60

=> 1/D = 1/60 − 1/80

=> 1/D = (4 − 3) ÷ 240 = 1/240

=> Time taken by D = 240 days

Therefore The correct answer is 240 days.

Additional Information

Combined Work Formula

If two people work together, the time taken is (X × Y) ÷ (X + Y), where X and Y are their individual days.

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken. More efficiency means less time to complete the same work.

Work and Wages

Wages are always distributed in the ratio of the work done or the ratio of efficiencies when they work for the same duration.

Q59. Answer: (d) 15 years 9 months

Shortcut Trick

Let Soumik's present age be x months.

Sambit = x + 6 | Tuhin (15 months ago) = 3 × (x + 6 − 15) = 3x − 27

Tuhin's present age = 3x − 27 + 15 = 3x − 12

Future Equation: (3x − 12 + 5) = 2.5 × (x + 5) => 3x − 7 = 2.5x + 12.5 => 0.5x = 19.5 => x = 39 months

Total Age = (3x − 12) + (x + 6) + x = 5x − 6 = 5(39) − 6 = 195 − 6 = 189 months = 15 years 9 months.

Therefore The correct answer is 15 years 9 months.

Alternate Method

Given: Relation between ages of Tuhin, Sambit, and Soumik at different time intervals.

Formula Used: Age after n years = Present age + n | Age n years ago = Present age − n.

=> Let Soumik's present age = S months.

=> Sambit's present age = S + 6 months.

=> 15 months ago, Sambit's age = (S + 6) − 15 = S − 9 months.

=> 15 months ago, Tuhin's age = 3 × (S − 9) = 3S − 27 months.

=> Tuhin's present age = (3S − 27) + 15 = 3S − 12 months.

=> After 5 months, Tuhin's age = (3S − 12) + 5 = 3S − 7 months.

=> After 5 months, Soumik's age = S + 5 months.

=> According to question: 3S − 7 = 2.5 × (S + 5)

=> 3S − 7 = 2.5S + 12.5 => 0.5S = 19.5 => S = 39 months.

=> Tuhin = 3(39) − 12 = 105; Sambit = 39 + 6 = 45; Soumik = 39.

=> Sum = 105 + 45 + 39 = 189 months.

=> 189 months = 189 ÷ 12 = 15 years 9 months.

Therefore The correct answer is 15 years 9 months.

Additional Information

Age Ratio Problems

If the ratio of ages of A and B is a:b, then their ages can be assumed as ax and bx. The difference between ages remains constant throughout life.

Unit Conversion

To convert months to years, divide by 12. To convert years to months, multiply by 12.

Linear Equations in Ages

Always relate all persons' ages to a single variable (usually the youngest or a common reference) to simplify the calculation.

Q60. Answer: (c) Permutation

Given,

Arrangement : _____ :: Selection : Combination

Here we see selection is related to combination, in the same way arrangement is related to Permutation.

Hence, the correct answer is Permutation.

Q61. Answer: (a) 4235

Shortcut Trick

A number is a perfect square only if its last digit is 1, 4, 5, 6, 9, or 00.

Check the last digits: (1) 5, (2) 5, (3) 4, (4) 6. All could be perfect squares.

Check digital sum: (1) 4+2+3+5 = 14 → 5 | (2) 7+2+2+5 = 16 → 7 | (3) 8+4+6+4 = 22 → 4 | (4) 3+1+3+6 = 13 → 4.

Perfect squares must have digital sums of 1, 4, 7, or 9. Since 4235 has a digital sum of 5, it is not a perfect square.

Therefore The correct answer is 4235.

Alternate Method

Given: Numbers 4235, 7225, 8464, 3136.

Concept: The square root of a non-perfect square is an irrational number.

=> √7225 = 85 (Rational)

=> √8464 = 92 (Rational)

=> √3136 = 56 (Rational)

=> For 4235: $65^2 = 4225$ and $66^2 = 4356$.

=> Since 4225 < 4235 < 4356, 4235 is not a perfect square.

Therefore The correct answer is 4235.

Additional Information

Irrational Numbers

A number that cannot be expressed as a simple fraction p/q. Their decimal expansion is non-terminating and non-recurring.

Digital Sum Rule

The sum of digits of a perfect square is always 1, 4, 7, or 9. If the digital sum is 2, 3, 5, 6, or 8, the number is not a perfect square.

Unit Digit Property

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

Q62. Answer: (a) 97

Shortcut Trick

Sum of 4 numbers = 110 × 4 = 440.

To maximize Range, minimize the smallest number.

Maximize other two numbers as 134 and 133 (distinct and < 135).

Smallest number = 440 − (135 + 134 + 133) = 38.

Max Range = 135 − 38 = 97.

Therefore The correct answer is 97.

Alternate Method

Given: Arithmetic mean of 4 natural numbers = 110, Largest number = 135.

Formula Used: Mean = Sum ÷ Count; Range = Max − Min.

=> Sum of 4 numbers = 110 × 4 = 440

=> Let the numbers be n1 < n2 < n3 < n4 = 135

=> n1 + n2 + n3 + 135 = 440

=> n1 + n2 + n3 = 305

=> To maximize Range (n4 − n1), we must minimize n1

=> To minimize n1, maximize n2 and n3 such that n2 < n3 < 135

=> Max n3 = 134 and Max n2 = 133

=> n1 = 305 − 134 − 133 = 38

=> Max Range = 135 − 38 = 97

Therefore The correct answer is 97.

Q63. Answer: (b) North

Given,

A is cleaning a rectangular hall whose entrance is to the east. After entering the room, A starts cleaning to his left. At one stroke, A makes an angle of 180 ° with the sweep.

Here we see broom is facing North direction.

Hence, the correct answer is North.

Q64. Answer: (c) 0.45 m

The correct answer is 0.45 m.

Key Points

• 0.45 m is the wavelength of a sound wave in a medium with a frequency of 840 Hz and a speed of 380 m/s seconds.

• Speed of the sound wave, v = 380 ms^(-1)

• For a sound wave,

• Speed = Wavelength x Frequency

• wavelength = speed / frequency

• wavelength = 380 / 840

• wavelength = 0.45 m

• Hence, the wavelength of the sound wave is 0.45 m.

• Hence, option 3 is correct.

Q65. Answer: (c) OP

We know,

Given,

KB, LD, MG, NK, ?

The pattern followed here is,

Hence, the correct answer is OP.

Q66. Answer: (b) 22%

The correct answer is 22%.

Key Points

• 22% is the below poverty line (BPL) percentage in India as per the 2011 census.

• Hence, option 2 is correct.

Additional Information

• The proportion of people living below the poverty line (BPL) has come down from 37.2 percent in 2004-05 to 22 percent in 2011-12.

• Below Poverty Line is a benchmark used by the government of India to indicate economic disadvantage and to identify individuals and households in need of government assistance and aid.

• It is determined using various parameters which vary from state to state and within states.

• The present criteria are based on a survey conducted in 2002.

Important Points

• Census of India, 2011:

• Total Population of India was 1,210,193,422.

• The Sex Ratio (females per thousand males) in India was 943.

• The population density was reported at 382 persons per sq. km.

• Total districts covered- 640. Hence, statement 1 is correct.

• Crude Birth Rate- 21.8.

• Crude Death Rate- 7.1 per thousand population

• Infant Mortality Rate was 44 per thousand live births

• Literacy rate of the country- 74.04 per cent. (82.14 for males and 65.46 for females).

• State with the highest literacy- Kerala (94.0%)

• State with the lowest literacy- Bihar (61.8%)

• state with the highest female literacy rate- Kerala (92.1%)

• Census:

• In 1872 AD, the first Non-synchronised Census was done in India during the time of Lord Mayo.

• The first synchronised census in India took place in 1881.

• Since 1901, it has been taking place after every decade.

• Census 2011, is the 15th census and 7th after independence.

• The slogan of Census 2011 is “Our Census, Our Future”.

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Q67. Answer: (a) To connect SWIFT with its Basic Banking Solution (CBS)

The correct answer is To connect SWIFT with its Basic Banking Solution (CBS).

Key Points

• To improve the internal control of banks, the Reserve Bank of India has asked all banks to connect SWIFT with its Basic Banking Solution (CBS) till 30 April 2018.

• Hence, option 1 is correct.

Additional Information

• Reserve Bank of India

• The Reserve Bank of India is India's central bank, responsible for the issue and supply of the Indian rupee and the regulation of the Indian banking system.

• It also manages the country's main payment systems and works to promote its economic development.

• Governor: Shaktikanta Das

• Headquarters: Mumbai, Maharashtra, India

• Established: 1 April 1935; 85 years ago

Q68. Answer: (c) 146

Shortcut Trick

To find the square root of 21316:

The last digit is 6, so the square root must end in 4 or 6.

Ignore the last two digits (16), we are left with 213.

Since $14^2 = 196$ and $15^2 = 225$, the first two digits must be 14.

Check $145^2 = 14 \times 15 \mid 25 = 21025$. Since 21316 > 21025, the answer is 146.

Therefore The correct answer is 146.

Alternate Method

Given: Number = 21316

Method: Long Division Method for Square Root

=> Group the digits in pairs from right: 2, 13, 16

=> 1 × 1 = 1 | Remainder = 1 | New number = 113

=> Double the quotient (1 × 2 = 2) | 24 × 4 = 96 | Remainder = 17 | New number = 1716

=> Double the current quotient (14 × 2 = 28) | 286 × 6 = 1716

=> Remainder = 0

=> Square root = 146

Therefore The correct answer is 146.

Additional Information

Unit Digit Rule

A perfect square ending in 6 always has a square root ending in either 4 or 6.

Estimation Method

Find the nearest perfect square hundreds. $140^2 = 19600$ and $150^2 = 22500$. The value 21316 lies between them.

Ending with 5

Shortcut for squares ending in 5: $(n5)^2 = [n \times (n+1)]$ followed by 25. Example: $145^2 = (14 \times 15)25 = 21025$.

Q69. Answer: (c) Neither conclusion 1 nor 2 follows.

Given,

Statements:

• No jockey is an ace.

• No Ace is a Queen.

Conclusions:

1. No jockey is queen.

2. All queens are jockeys.

The least possible Venn diagram for the given statements is as follows,

Conclusions:

1. No jockey is queen → False (It is possible but not definite)

2. All queens are jockeys → False (It is possible but not definite)

Hence, the correct answer is "Neither conclusion 1 nor 2 follows".

Q70. Answer: (d) Antidone

The correct answer is Antidone.

Key Points

• Antidone is not related to the phylum Churnapravara (Mollusca).

• Hence, option 4 is correct.

Additional Information

• The phylum Mollusca is typically divided into 9 or 10 taxonomic classes of which two are entirely extinct.

• These classes are Aplacophora, Bivalvia, Cephalopoda, Polyplacophora, Gastropoda, Monoplacophora, Pleistomollusca, Rostroconchia, Scaphopoda, Incertae sedis.

• Decapoda is an order of crustaceans within the class Malacostraca.

Q71. Answer: (c) 64 u

The correct answer is 64 u.

Key Points

• 64 u is the expected molecular mass of sulfur dioxide [So2].

• The molar mass of sulfur is 32.1 g/mol, and oxygen is 16.0 g/mol.

• Therefore, the molar mass of sulfur dioxide is 1 × 32.1 + 2 × 16.0] = 64.1 g/mol.

• Hence, option 3 is correct.

Additional Information

• Sulfur dioxide or sulphur dioxide is the chemical compound with the formula SO2.

• It is a toxic gas responsible for the smell of burnt matches.

• It is released naturally by volcanic activity and is produced as a by-product of copper extraction and the burning of fossil fuels contaminated with sulfur compounds.

Q72. Answer: (d) Karnataka

The correct answer is Karnataka.

Key Points

• Shakti Sthal is a solar power park, which was recently inaugurated in the Karnataka state.

• The world's largest solar park, Shakti Sthala, has a capacity of 2,000 MW and has set up at an investment of Rs16,500 crore at Pavagada in Karnataka's Tumakuru district.

• Hence, option 4 is correct.

Additional Information

• The first phase of the Rs16,500 crore park called “Shakti Sthala" will generate 600MW.

• It is part of the “Karnataka Solar Policy 2014-2021" which aims to decrease dependence on traditional power sources and move to environmentally friendly ones to meet the growing power needs of the state.

• The solar park is also part of the Siddaramaiah-led Congress government’s “Nava Karnataka Nirmana" (building a new Karnataka) campaign.

Q73. Answer: (d) Dr. Neeru Chadha

The correct answer is Dr. Neeru Chadha.

Key Points

• Dr. Neeru Chadha is the first Indian woman to be elected as a judge of the International Tribunal for the Law of the Sea (ITLOS).

• Hence, option 4 is correct.

Additional Information

• Ms. Chadha, an eminent lawyer, and the first Indian woman to become the chief legal adviser in the ministry of external affairs won the election yesterday to the International Tribunal for the Law of the Sea (ITLOS) for a nine-year term from 2017 to 2026.

• Ms. Chadha got 120 votes, the highest in the Asia Pacific group, and was elected in the first round of voting itself.

• The candidate from Indonesia got 58 votes, Lebanon 60, and Thailand 86.

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Q74. Answer: (b) Kohima

The correct answer is Kohima.

Key Points

• Kohima is the capital of Nagaland.

• Dispur is the capital of the Indian state of Assam.

• Dispur, a locality of Guwahati, became the capital of Assam in 1973.

• Gangtok is the capital of the mountainous northern Indian state of Sikkim.

• Imphal is the capital city of the Indian state of Manipur.

• Hence, option 2 is correct.

Additional Information

• Nagaland

• Capital: Kohima (Executive Branch)

• Governor: Jagdish Mukhi

• Chief minister: Neiphiu Rio

• Kohima, situated in the south at an altitude of 1444m above sea level, is the capital city of Nagaland.

• Sharing its borders with Dimapur and Peren District in the West, Zunheboto and Phek District in the East, Manipur State in the South, and Wokha District in the North.

Q75. Answer: (b) 168

Shortcut Trick

Total ratio parts = 8 + 11 = 19 units.

Given 19 units = 399 students.

1 unit = 399 ÷ 19 = 21 students.

Number of boys = 8 units = 8 × 21 = 168.

Therefore The correct answer is 168 boys.

Alternate Method

Given:

Ratio of Boys to Girls = 8 : 11

Total number of Students = 399

Calculations:

=> Let the number of boys be 8x and girls be 11x.

=> Total students = 8x + 11x = 19x

=> 19x = 399

=> x = 399 ÷ 19

=> x = 21

=> Number of boys = 8 × 21

=> Number of boys = 168

Therefore The correct answer is 168 boys.

Additional Information

Ratio and Proportion

A ratio compares two quantities. If a total amount T is divided in the ratio a:b, the parts are [a/(a+b)] × T and [b/(a+b)] × T.

Unitary Method in Ratios

Find the value of one unit by dividing the total value by the sum of ratio terms, then multiply by the specific term required.

Percentage Conversion

To find the percentage of boys in the school: (Ratio of boys / Total ratio) × 100 => (8/19) × 100 ≈ 42.1%.

Q76. Answer: (a) 80S

We know,

Given,

2J, 8M, 26P, ____

The pattern followed here is,

Hence, the correct answer is the 80S.

Q77. Answer: (d) 0.0071

Calculation:

1.42 × 0.005 = ?

=> (142/100) × (5/1000) = ?

=> 710/100000 = ?

=> 0.0071 = ?

Therefore The value of ? is 0.0071

Q78. Answer: (a) 2002

The correct answer is 2002.

Key Points

• Dhyan Chand Award

• The award was first given in 2002, to those sportspersons who have contributed to sports by their performance and continue to contribute to the promotion of sports even after their retirement from active sporting career.

• It is the lifetime achievement sporting honor of the Republic of India.

• The award is named after Dhyan Chand (1905–79), an Indian field hockey player who scored more than 1000 goals during a career that spanned over 20 years from 1926 to 1948.

• Hence, option 1 is correct.

Additional Information

• The first recipients of the award were Shahuraj Birajdar (Boxing), Ashok Diwan (Hockey), and Aparna Ghosh (Basketball), who was honored in 2002.

• Usually conferred upon not more than three sportspersons in a year, a few exceptions have been made (2003, 2012–2013, and 2018–2020) when more recipients were awarded.

Q79. Answer: (a) –6 < x < 2

Shortcut Trick

For a quadratic inequality in the form ax2 + bx + c < 0 where a > 0, the solution always lies between the roots of the corresponding equation.

Roots of x2 + 4x − 12 = 0 are found by factors (x + 6)(x − 2) = 0 => x = −6 and x = 2.

Since the inequality is < 0, the value of x must be between −6 and 2.

Therefore The correct answer is −6 < x < 2.

Alternate Method

Given Inequality: x2 + 4x − 12 < 0

Method: Factorization Method

=> x2 + 6x − 2x − 12 < 0

=> x(x + 6) − 2(x + 6) < 0

=> (x + 6)(x − 2) < 0

=> For the product of two terms to be negative, one must be positive and the other must be negative.

=> Case 1: (x + 6) > 0 and (x − 2) < 0

=> x > −6 and x < 2

=> This gives the interval: −6 < x < 2

=> Case 2: (x + 6) < 0 and (x − 2) > 0

=> x < −6 and x > 2 (This is impossible as a number cannot be less than −6 and greater than 2 simultaneously).

Therefore The correct answer is −6 < x < 2.

Additional Information

Nature of Roots

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

Quadratic Inequality Rules

If (x − a)(x − b) < 0 (where a < b), then a < x < b. If (x − a)(x − b) > 0, then x < a or x > b.

Sum and Product of Roots

For ax2 + bx + c = 0, the Sum of roots = −b/a and the Product of roots = c/a.

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Q80. Answer: (c) Angiosperms

The correct answer is Angiosperms.

Key Points

• The reproductive parts of Angiosperms are located in the flower.
• Angiosperms are vascular plants.
• They have stems, roots, and leaves.
• Unlike gymnosperms such as conifers and cycads, angiosperm's seeds are found in a flower.
• Angiosperm eggs are fertilized and developed into a seed in an ovary that is usually found in a flower.
• Hence, option 3 is correct.

Additional Information

As a plant's reproductive part, a flower contains a stamen (male flower part) or pistil (female flower part), or both, plus accessory parts such as sepals, petals, and nectar glands.

• The stamen is the male reproductive organ.
• It consists of a pollen sac (anther) and a long supporting filament.
• Sepals are small, green, leaflike structures located at the base of a flower.
• They protect the flower bud. Collectively, the sepals are called a calyx.
• The pistil is a plant's female part.
• It generally is shaped like a bowling pin and is located in the flower's center.

It consists of a stigma, style, and ovary.

Q81. Answer: (c) 20 m

The correct answer is 20 m.

Important Points

• Concept:
• When the body is released from a height then all the potential energy will be converted to kinetic energy.
• Hence, Assuming base as a reference
• P.E.+0=K.E.+0
• P.E.= mgh=400J
• Here, m=2kg and g=10 m/s²
• mgh=400
• 2*10*h=400
• h=20 m

Q82. Answer: (b) 575

Shortcut Trick

Break down 46% of 1250 into simpler parts.

46% of 1250 = (50% − 4%) of 1250

50% of 1250 = 625

1% of 1250 = 12.5 → 4% = 12.5 × 4 = 50

Required value = 625 − 50 = 575

Therefore The correct answer is 575 tickets.

Alternate Method

Given:

Total number of tickets sold = 1250

Percentage of tickets purchased by students = 46%

Formula Used:

Value = (Percentage ÷ 100) × Total Value

Calculations:

=> Number of student tickets = 46% of 1250

=> Number of student tickets = (46 ÷ 100) × 1250

=> Number of student tickets = 0.46 × 1250

=> Number of student tickets = 46 × 12.5

=> Number of student tickets = 575

Therefore The correct answer is 575 tickets.

Additional Information

Percentage Change

To find a percentage of a number, multiply the number by the percentage expressed as a fraction or decimal: (P/100) × Total.

Base Conversion

x% of y is always equal to y% of x. For example, 46% of 1250 = 1250% of 46.

Fractional Equivalents

Common percentages like 25% = 1/4, 50% = 1/2, and 75% = 3/4 can speed up mental math significantly.

Q83. Answer: (a) Padma Vibhushan

The correct answer is Padma Vibhushan.

Key Points

• K. J. Yesudas is a multilingual singer, singing Indian classical music, devotional, light music, and Film songs.

• His commercially published recordings span multiple genres.

• He was awarded the Padma Shri in 1975, the Padma Bhushan in 2002, and the Padma Vibhushan (second-highest civilian award) in 2017 by the Government of India for his contributions towards the arts.

• Hence, option 1 is correct.

Additional Information

• Padma Shri is the fourth-highest civilian award in the Republic of India, after the Bharat Ratna, the Padma Vibhushan, and the Padma Bhushan.

• It is awarded by the Government of India every year on India's Republic Day.

• Established: 1954

• The Bharat Ratna is the highest civilian award of the Republic of India.

• Instituted on 2 January 1954, the award is conferred in recognition of exceptional service/performance of the highest order, without distinction of race, occupation, position, or sex.

Q84. Answer: (a) [figure]

Given,

In the mirror image, the top and bottom part of the figure remains the same and left and right part interchanges.

Therefore

Hence, the correct answer is

Q85. Answer: (b) Fruit

The correct answer is fruits.

Key Points

• The cow has the same relation to milk as the tree has with fruits.

• Hence, option 2 is correct.

Additional Information

• Milk is a nutrient-rich liquid food produced by the mammary glands of mammals.

• It is the primary source of nutrition for young mammals, including breastfed human infants before they are able to digest solid food.

• Early-lactation milk is called colostrum, which contains antibodies that strengthen the immune system and thus reduces the risk of many diseases.

• It holds many other nutrients, including protein and lactose.

• Interspecies consumption of milk is not uncommon, particularly among humans, many of whom consume the milk of other mammals.

Q86. Answer: (b) Rs. 350

Shortcut Trick

Let the Total Cost Price be 100%.

Fixed Cost = 18%, therefore Variable Cost = 100% − 18% = 82%.

Given, Selling Price = Variable Cost = Rs. 287.

82% => Rs. 287.

100% => (287 ÷ 82) × 100 = 3.5 × 100 = Rs. 350.

Therefore The correct answer is Rs. 350.

Alternate Method

Given: Selling Price (SP) = Rs. 287, Fixed Cost = 18% of Total Cost (TC).

Formulas: Total Cost = Fixed Cost + Variable Cost | CP = SP ÷ (Variable Cost %)

=> Let the Cost Price (CP) of each set be x.

=> Fixed Cost = 0.18x.

=> Variable Cost = x − 0.18x = 0.82x.

=> According to the question, SP = Variable Cost.

=> 287 = 0.82x.

=> x = 287 ÷ 0.82 = 350.

Therefore The correct answer is Rs. 350.

Additional Information

Fixed and Variable Costs

Fixed costs remain constant regardless of production volume, while variable costs change in direct proportion to the number of units produced.

Break-even Point

A situation where Total Revenue equals Total Cost. In this specific problem, the outlet sells at a loss equivalent to its fixed costs.

Q87. Answer: (b) 39

Concept used:

Follow the BODMAS rule as given below to solve this question

Calculation:

$54 \div 3^2 \times 6 + 3 = ?$

=> $54 \div 9 \times 6 + 3 = ?$

=> $6 \times 6 + 3 = ?$

=> $36 + 3 = ?$

=> $39 = ?$

Therefore The value of ? is 39

Q88. Answer: (c) Sodium

The correct answer is Sodium.

Key Points

• Sodium is not an alkaline earth metal.

• Alkaline earth metals are group II elements like calcium, magnesium, Barium, and strontium

• Hence, option 3 is correct.

Additional Information

• The elements of Group 2 include beryllium, magnesium, calcium, strontium, barium, and radium.

• These elements with the exception of beryllium are commonly known as alkaline earth metals.

• These elements are called Alkaline Earth metals because of two reasons:

• Their oxides exist in the earth’s crust and are very stable to heat.

• Their oxides and hydroxides show basic (alkaline) natures.

• Beryllium fulfills the first criterion but not the second one since its oxides and hydroxides show amphoteric behavior, rather than alkaline.

Q89. Answer: (c) Addition and subtraction

Calculation:

$((3 \times 10 + 14) \div 4) – 2 = 6$

Option 1:

Multiplication and addition

((3 + 10 × 14) ÷ 4) – 2 = 33.75

Option 2:

Division and multiplication

((3 ÷ 10 × 14) × 4) – 2 = 55.2

Option 3:

Addition and subtraction

((3 × 10 – 14) ÷ 4) + 2 = 16/4 + 2 = 6

Option 4:

Subtraction and division

((3 × 10 + 14) – 4) ÷ 2 = (44 – 4) ÷ 2 = 20

Therefore Option 3 is correct

Q90. Answer: (a) Epididymis

The correct answer is Epididymis.

Key Points

• Sperm are temporarily kept in Epididymis.

• Each sperm cell takes between 65-75 days to form and around 300 million are produced every day.

• Inside the testes, sperm is made in structures called the seminiferous tubules.

• At the top and to the back of each testicle (testis) is the epididymis, which stores sperm.

• Hence, option 1 is correct.

Additional Information

• In mammals, sperm cells are produced in the seminiferous tubules of each testis.

• These sperm cells leave the testes and pass into a larger coiled tube known as the epididymis.

• The sperm cells attain maturity in the epididymis.

• The sperm cells are stored in this structure till they are ejaculated.

• During ejaculation, the sperms pass from the epididymis into the vas deferens and are ejaculated with the semen through the penis.

-

Q91. Answer: (b) Odisha

The correct answer is Odisha.

Key Points

• The most important event of Ashoka's reign was the victory of Kalinga, Odisha in the modern era, which proved to be an important change in his life.

• Hence, option 2 is correct.

Additional Information

• War with Kalinga

• Ashoka conquered Kalinga in the 9th year of his reign.

• Kalinga was a modern Odisha.

• Ashoka decided to attack Kalinga due to its strategic location.

• Kalinga war was a horrifying event as it was mentioned in the 13th Rock Edict of Ashoka.

• Approximately, hundred and fifty thousand people were wounded while a hundred thousand people were killed in the course of the war.

• This horrific event deeply impacted Ashoka and led to a change in his heart.

• He vowed to never fight a war.

• He preferred now Dhammavijay over Dig-Vijay.

Q92. Answer: (a) 20 hours

Shortcut Trick

Product-Difference Shortcut: Time taken by Pipe L = (Product of times) ÷ (Difference of times)

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=> Time = (5 × 4) ÷ (5 − 4)
=> Time = 20 ÷ 1 = 20 hours.
Therefore The correct answer is 20 hr.
Alternate Method
Given:
Time taken by (L + K) = 4 hours
Time taken by K alone = 5 hours
Total Work = LCM of 4 and 5 = 20 units

Person	Days	Total Work	Efficiency
Pipe L + K	4	20	5
Pipe K	5	4	

Calculations:
=> Efficiency of Pipe L = (Efficiency of L + K) − (Efficiency of K)
=> Efficiency of Pipe L = 5 − 4 = 1 unit/hr
=> Time taken by Pipe L = Total Work ÷ Efficiency
=> Time = 20 ÷ 1 = 20 hours
Therefore The correct answer is 20 hr.
Additional Information
Combined Work Formula
If two pipes fill a tank in x and y hours respectively, together they fill it in (x × y) ÷ (x + y) hours.
Pipes and Cisterns Efficiency
Inlet pipes have positive efficiency, while outlet (leakage) pipes have negative efficiency.
Relation between Time and Efficiency
Efficiency is inversely proportional to time taken. If time ratio is a:b, efficiency ratio is b:a.

Q93. Answer: (a) 26.5%

Shortcut Trick
Apply the successive percentage change formula: Net % Change = x + y + (x × y)/100
Where x = 15% and y = 10%.
Net Increase = 15 + 10 + (15 × 10)/100
Net Increase = 25 + 1.5 = 26.5%
Therefore The correct answer is 26.5%.
Alternate Method
Given: Increase in length = 15%, Increase in width = 10%.
Formula: Area of rectangle = length × width.
=> Let the original length be 100 units and width be 100 units.
=> Original Area = 100 × 100 = 10,000 sq units.
=> New length = 100 + 15% of 100 = 115 units.
=> New width = 100 + 10% of 100 = 110 units.
=> New Area = 115 × 110 = 12,650 sq units.
=> Increase in Area = 12,650 − 10,000 = 2,650 sq units.
=> Percentage Increase = (2,650 ÷ 10,000) × 100 = 26.5%.
Therefore The correct answer is 26.5%.
Additional Information
Successive Percentage Decrease
If values decrease, use negative signs in the formula: Net % Change = −x −y + (xy)/100.
Area of Circle Change
If the radius of a circle increases by r%, the area increases by [2r + r²/100]%.
Ratio Method
For 15% (3/20) and 10% (1/10) increases, the area ratio is (20 × 10) : (23 × 11) = 200 : 253, representing a 26.5% increase.

Q94. Answer: (c) Sodium Hydrogen Carbonate

The correct answer is Sodium Hydrogen Carbonate.

Key Points

• Soda-acid fire extinguishers comprise sodium bicarbonate or Sodium Hydrogen Carbonate and sulphuric acid.
• It is the most efficient house-hold fire extinguisher.
• It consists of a strong iron vessel with a side discharge nozzle.
• The iron vessel is filled with a sodium bicarbonate solution.
• Hence, option 3 is correct.

Additional Information

• The working principle of any fire extinguisher is based on the following three conditions:
• cooling of the combustible material below its ignition temperature
• cutting off the air supply
• cooling the combustible material simultaneously while cutting off the air supply.
• Reaction
• There is a solution of sodium bicarbonate in water in the fire extinguisher and sulphuric acid in a different bottle within it.
• The sulphuric acid is combined with sodium bicarbonate solution and creates an amount of carbon dioxide gas when the fire extinguisher is operated by turning the knob on it.
• Carbon dioxide gas is not combustible, nor does it endorse combustion.
• It is heavier than air and cuts off the air's supply of oxygen, thus extinguishing the flames.
• The following reaction takes place
• $2NaHCO3+H2SO4 \rightarrow Na2SO4+2H2O+2CO2$

Q95. Answer: (d) Both 1 and 2 are strong.

Given,

Statement:

Should it be mandatory to work after school?

Arguments:

1. Yes, it helps to develop life skills.

2. No, not all students are fully mature in dealing with work matters.

Here we see both the arguments are strong, as both the arguments follow the statement.

Hence, the correct answer is Both 1 and 2 are strong.

Q96. Answer: (d) 40 days

Shortcut Trick

Let Total Work = LCM(24, 30, 10) = 120 units.

Efficiency of Hitesh = 120 ÷ 24 = 5 units/day.

Efficiency of Jinesh = 120 ÷ 30 = 4 units/day.

Combined efficiency (Hitesh + Jinesh + Ishaan) = 120 ÷ 10 = 12 units/day.

Efficiency of Ishaan = 12 − (5 + 4) = 3 units/day.

Time for Ishaan = 120 ÷ 3 = 40 days.

Therefore The correct answer is 40 days.

Alternate Method

Given: Time taken by Hitesh = 24 days, Jinesh = 30 days, All together = 10 days.

Formula Used: Total Work = Time × Efficiency

Person	Days	Total Work	Efficiency
Hitesh	24	120	5
Jinesh	30	4	
H + J + I	10	12	

=> Efficiency of Hitesh (H) = 5

=> Efficiency of Jinesh (J) = 4

=> Efficiency of H + J + Ishaan (I) = 12

=> 5 + 4 + Efficiency of I = 12

=> Efficiency of I = 12 − 9 = 3

=> Time taken by Ishaan alone = 120 ÷ 3 = 40 days.

Therefore The correct answer is 40 days.

Additional Information

Total Work Concept

Total work is usually assumed as the LCM of the individual time taken by different persons to simplify calculations.

Efficiency Relationship

Efficiency is inversely proportional to the time taken to complete the work (Efficiency = 1/Time).

Combined Work Formula

If A, B, and C work together, their combined efficiency is the sum of their individual efficiencies.

Q97. Answer: (c) 44

Shortcut Trick

Identify the difference between the two numbers: 220 − 88 = 132.

The HCF must be a factor of this difference (132).

Check the options for the largest factor of 132 that also divides 88 and 220.

44 × 2 = 88 and 44 × 5 = 220.

Therefore The correct answer is 44.

Alternate Method

Given: Numbers are 88 and 220.

Method Used: Prime Factorization Method.

=> Prime factorization of 88 = 2 × 2 × 2 × 11 = $2^3 \times 11^1$

=> Prime factorization of 220 = 2 × 2 × 5 × 11 = $2^2 \times 5^1 \times 11^1$

=> HCF is the product of the lowest powers of common prime factors.

=> Common factors are 2 and 11.

=> HCF = $2^2 \times 11^1$

=> HCF = 4 × 11 = 44

Therefore The correct answer is 44.

Additional Information

Highest Common Factor (HCF)

Also known as GCD (Greatest Common Divisor), it is the largest positive integer that divides each of the integers without a remainder.

Relation between HCF and LCM

For any two numbers 'a' and 'b', HCF(a, b) × LCM(a, b) = a × b.

Division Method for HCF

Divide the larger number by the smaller number and repeat the process using the remainder as the new divisor until the remainder is zero.

Q98. Answer: (b) Conclusion 1 alone follows.

The statement of Meena's friend mentions Meena's sister.

Therefore, conclusion 1 follows.

However, the statement does not imply any closeness between Meena's friend and her sister.

Therefore, conclusion 2 does not follow.

Hence, only conclusion 1 follows.

Q99. Answer: (b) [figure]

Given,

Here we see the 1^(st) image has two parts and in the 2^(nd) image only the right part of the 1st is shown that to shaded. Similarly, in the 3^(rd) image, the circle is divided into two parts. Therefore, in the 4^(th) image only shaded the right part of the circle will be shown.

Therefore The shape that will replace the question mark (?) is

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Hence, the correct answer is

Q100. Answer: (a) West

Given,

Sadhana's face was towards the northeast. She turns 45° clockwise and then 180° counterclockwise.

Therefore

Here we see Sadhana's face at final position is towards West.

Hence, the correct answer is West.

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