RRC Group D Previous Year Paper 54 (Held On: 11 Oct 2018 Shift 2)

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

Take this paper as a timed mock test

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

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

1 question is in Hindi and not printed here. Each one links to the online version, where you can read it.

CBT

Q1. 23 × 33 = 759, then what is 0.00759 ÷ 3.3?

(a) 0.023
(b) 0.0023
(c) 2.3
(d) 0.23

Q2. Identify the organization which does not belong to the given group -

(a) UBI
(b) SBI
(c) PNB
(d) ONGC

Q3. Which of the following gas is used to fill electric bulb?

(a) H2 and N2
(b) Ar and H2
(c) N2 and O2
(d) Ar and N2

Q4. Who has played the lead role in the movie 'Dangal' released in 2016?

(a) Shahrukh khan
(b) Sharman Joshi
(c) Aamir Khan
(d) R Madhavan

Q5. The current flowing through a resistor is inversely proportional to its _____.

(a) Potential difference
(b) Resistance
(c) Electrical charge
(d) Heat

Q6. Select the item which does not belong to the following group -

(a) Zinc
(b) Neon
(c) Helium
(d) Xenon

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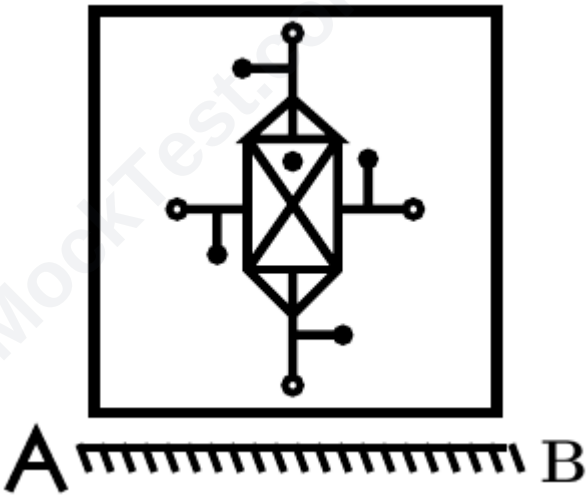
Q7. In a code language SPANNER is written as GCDJJBS, how will NEAR be written in that code language?

(a) JBDS
(b) DGPS
(c) JBGK
(d) BJCP

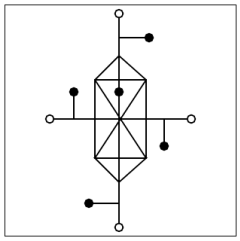
Q8. A car falls from a mountain road and comes to the ground in 0.8 seconds. (Let's say g = 10 ms^(-2)). What will be its speed when it hits the ground?

(a) 5 ms^(-1)
(b) 4 ms^(-1)
(c) 01 ms^(-1)
(d) 8 ms^(-1)

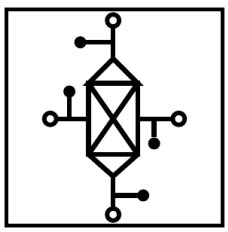
Q9. The mirror image of the above figure with respect to the line AB is -



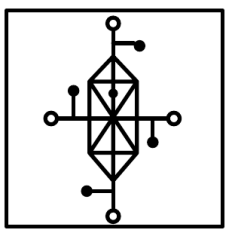
(a)



(b)

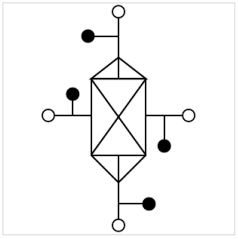


(c)



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(d)



Q10. Identify the odd one from the following -

A	D	O	U
1	4	15	23
A	B	C	D

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

Q11. Read the given statements and conclusions carefully and choose which of the following logically follows from the statement.

Statement :

I. Some tissues are weak.

II. Some weak are bones.

Conclusion :

1. Some weak are tissues.

2. Some bones are tissues.

(a) Both conclusions 1 and 2 follow
(b) Only conclusion 2 follows
(c) Only conclusion 1 follows
(d) Neither conclusion 1 nor 2 follows

Q12. The mass of an object is 10 kg. What would be its weight on earth? (g = 10 ms^(-2))

(a) 100 Pa
(b) 100N
(c) 100 kg
(d) 100 W

Q13. The formula for the mirror is -

(a) 1/f + 1/u = 1/v
(b) 1/f + 1/v = 1/u
(c) 1/u + 1/v = 1/f
(d) 1/u - 1/v = 1/f

Q14. Which of the following has a triple bond?

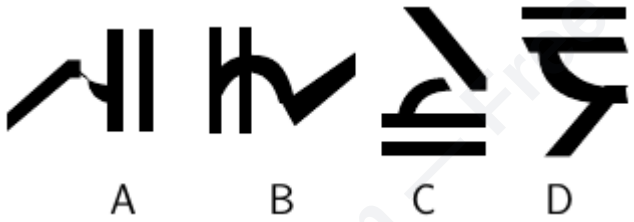
(a) Propene
(b) Propanol
(c) Propanoic acid
(d) Propyne

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Q15. Who is the Executive Director and CEO of HCL?

(a) Kiran Nadar
(b) Shiv Nadar
(c) Arjun Malhotra
(d) Roshni Nadar

Q16.



Identify the figure which does not belong to this group -

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

Q17. What is the measurement of the mass of an object called?

(a) Acceleration
(b) Inertia
(c) Impulse
(d) Speed

Q18. Who was given the 'Best Actress' award at the Filmfare Awards 2017?

(a) Shraddha Kapoor
(b) Alia Bhatt
(c) Anushka Sharma
(d) Deepika Padukone

Q19. Which of the following statement is true?

A. Firmness: According to the type of matter, the size of a substance depends on the position of its particles. For example, solids have a fixed shape while liquids acquire their vessel shape and gases have no shape.

B. Size: This is the property of a substance in which its volume decreases under high pressure. This property is found in gases.

(a) Only A is true
(b) Both A and B are true
(c) Only B is true
(d) Both A and B are false

Q20. Two inlet pipes can fill a tank in 5 and 7 hours respectively. And one outlet pipe can empty this full tank in 14 hours. If all the three pipes are opened simultaneously in a completely empty tank, then in how much time will it take to fill the tank completely?

(a) 411/13 hours
(b) 511/13 hours
(c) 313/19 hours
(d) 52/13 hours

Q21. In January 2016, All India Radio (AIR) launched a non-traditional audio broadcast channel via the Internet, which is readily available through 'Free Dish' for experts in the arts, especially classical music-both Karnataka and Hindustani. What is this channel known as?

(a) Big fm
(b) Radio Mirchi

(c) Ragam
(d) Taal

Q22. Sunayata is facing west direction. It rotates 45° counterclockwise and 135° clockwise. In which direction is she facing now?
(a) South
(b) East
(c) West
(d) North

Q23. Two parallel chords of a circle of radius 10 cm are on the opposite sides of the center and if the chords are at distances 6 cm and 8 cm from the centers, then the difference of the lengths of the chords is
(a) 3 cm
(b) 4 cm
(c) 5 cm
(d) 7 cm

Q24. A person buys land for Rs. 3 lakh. He sells 25% of it at 25% loss and 40% at 25% profit. For how much should he sell the rest of the child plot to make a total profit of 15%?
(a) Rs. 1,37,500
(b) Rs. 1,38,750
(c) Rs. 1,34,500
(d) Rs. 1,45,000

Q25. Out of the _____ Upanishads, _____ Upanishads are considered to be the main -
(a) 108, 11
(b) 116, 22
(c) 100, 12
(d) 99, 10

Q26. Below the statement are given followed by two assumptions numbered I and II. Considering the statement and assumptions, you have to decide which of the assumptions is/are implicit in the statement.

Statement:

Ramu makes a train reservation in April to travel in May.

Assumptions:

I. Rail reservation can be done one month in advance.

II. There are many trains from Mumbai to Hyderabad.

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

Q27. In which of the following activities do voluntary muscles work?

A. jumping of frogs

B. movement of food in the stomach

C. heartbeat

D. hand writing

(a) B and C
(b) A, B and C
(c) A and D
(d) Only C

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Q28. The relative mass of CO is -

(a) 28
(b) 44
(c) 12
(d) 16

Q29. Medini alone can paint an entire wall in 16 days, while Yuki takes three times as long. In how many days will they paint half the wall if they work together?

(a) 12
(b) 3
(c) 6
(d) 9

Q30. What is the square root of 8281?

(a) 81
(b) 91
(c) 89
(d) 99

Q31. Who was appointed as the Ambassador of India to the Republic of Peru in 2017?

(a) M Subbaraidu
(b) Arup Kumar Saha
(c) Sandeep Chakraborty
(d) Poornima Ramakrishna

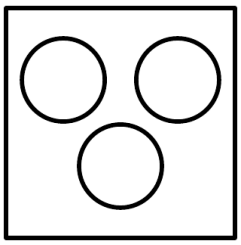
Q32. The circumference of a circle is 15 cm more than its diameter. Find the radius of the circle.

(a) 7 cm
(b) 3.5 cm
(c) 4 cm
(d) 8 cm

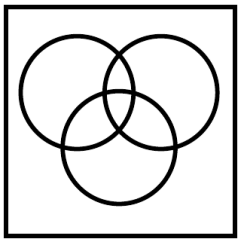
Q33. Select the appropriate Venn diagram for the following words.

shoes, grass, mobile

(a)

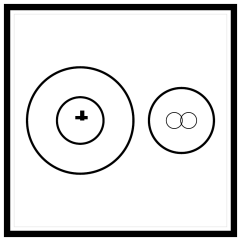


(b)

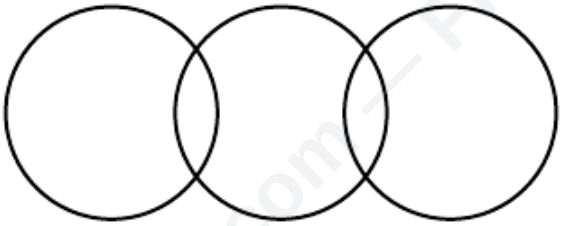


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(c)



(d)



Q34. In which of the following years the Battle of Panipat was fought?

(a) 1626
(b) 1706
(c) 1526
(d) 1500

Q35. What is the tenure of Lok Sabha members?

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

Q36. _____ has 1 to 3 electrons in its outermost shell.

(a) Non-metal
(b) Metal
(c) Halogen
(d) Metalloid

Q37. Which of the following can be produced by regeneration and budding?

(a) Planaria
(b) Hydra
(c) Amoeba
(d) Yeast

Q38. In the modern periodic table, the _____ period consists of only gasses.

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

Q39. For what value of p will the following equations have only one solution?

$2x + 3y = -5$ and $2x + py = 2$

(a) The only value of p is 3
(b) all values of p can be
(c) The value of p is any number other than 3
(d) The only value of p is 2

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Q40. What is the area of the triangle with vertices (3, 5), (-2, 0) and (6, 4)?

(a) 20 square unit
(b) 7 square unit
(c) 10 square unit
(d) 14 square unit

Q41. In which district of Uttarakhand the Ministry of Drinking Water and Sanitation has launched a community-owned drinking water program 'Gangotri Swachh Iconic Place Project and Swajal'?

(a) Pauri Garhwal
(b) Uttarkashi
(c) Haridwar
(d) Udham Singh Nagar

Q42. Name the country, which became the third-largest country in terms of domestic air traffic in March 2017?

(a) India
(b) Japan
(c) Russia
(d) England

Q43. Name the captain who has won three consecutive IPL titles?

(a) Virat Kohli
(b) Mahendra Singh Dhoni
(c) Rohit Sharma
(d) Gautam Gambhir

Q44. The following table gives the average prices per quarter of vegetables over 2 years. In which quarter was the difference in price maximum?

	price per kg (in Rs.) year 1	price per kg (in Rs.) year 2
quarter 1	36	40
quarter 2	80	80
quarter 3	65	40
quarter 4	43	40

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

Q45. _____ was awarded the Scientific and Engineering Academy Award at the Oscar Scientific and Technical Awards 2018 held in February 2018 in Los Angeles, California.

(a) Vikas Sathe
(b) Vikram Sathe
(c) Vijay Sathe
(d) Vinay Sathe

Q46. Which is the lowest Altitude in India?

(a) Wayanad
(b) Kuttanad
(c) Chettinad
(d) Indira Point

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Q47. Two liquids A and B are mixed in a bucket in the ratio 7 : 5. If 9 liters of the mixture is replaced by 10 liters of liquid B, the ratio of both the liquids becomes 7 : 9. How many liters of liquid A was in the bucket?

(a) 25
(b) 22.75
(c) 31
(d) 21

Q48. Pointing to a photograph, Naina says, "He is the son of the only son of my maternal grandmother." To whom is she pointing?

(a) Friend
(b) Brother
(c) Maternal Uncle
(d) Cousin

Q49. If ÷ means ×, × means +, + means -, - means ÷, then find the value of the following equation-

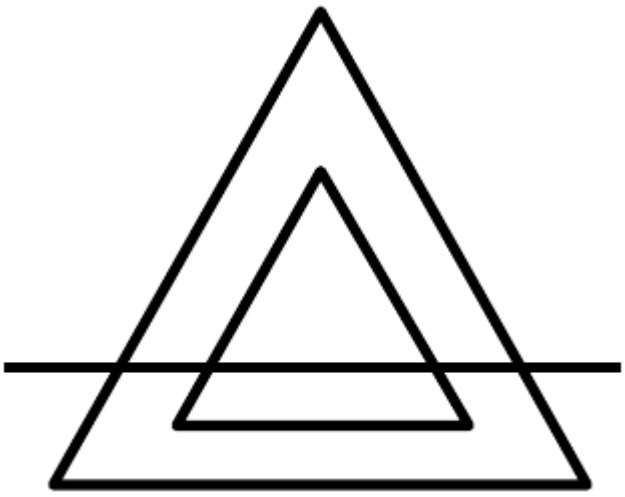
31 × 5 + 16 - 4 ÷ 92

(a) -300
(b) 320
(c) -332
(d) 350

Q50. Which of the following scientist had acquired Indian citizenship?

(a) JBS Haldane
(b) Charles Darwin
(c) Harold C. Urey
(d) Stanley N. miller

Q51. Find the number of triangles in the following figure.



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

Q52. Mani deposits Rs. 12,500 in a bank and it becomes Rs. 15,500 in 6 years at simple interest. What is the rate of interest?

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

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Q53. Find the next term of the following series -

B16, D25, F36, H49, ?

(a) K115
(b) L80
(c) J64
(d) M25

Q54. The sum of the prime numbers between 90 to 100 will be-

(a) 97
(b) 198
(c) 291
(d) 386

Q55. A question and two statements are given. Which statement(s) is/are necessary/sufficient to answer the question.

Question:

There are 10 bars of 2 different weights. What is their total weight?

Statement:

1. Half the weight of one fifth of 10 bars is 2 kg.
2. Of the remaining bars, one-fourth of the bar's weight is 0.5 kg.

(a) Statements 1 and 2 together are sufficient
(b) Statement 1 alone is sufficient
(c) Statements 1 and 2 together are not sufficient
(d) Statement 2 alone is sufficient

Q56. Which of the following is NOT a plantation crop?

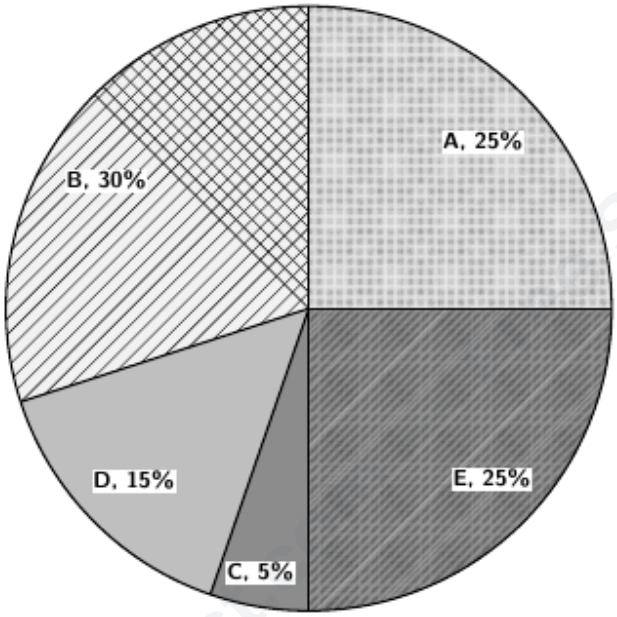
(a) Tea
(b) Coffee
(c) Cashew
(d) Millet

Q57. Which of the following is NOT correct about the cerebrum?

(a) It consists of two parts, which are called cerebral hemispheres.
(b) It is the largest part of the brain, about 80%.
(c) It forms the fore, apex and side of the brain
(d) The cerebrum coordinates muscle activity.

Q58. The pie chart given below shows the information about Tire Manufacture statistics for various companies in India during the year 2017. If the total number of tires manufactured by different companies in India was 1,80,000 units in the year 2017, which company manufactured the maximum number of tyres?

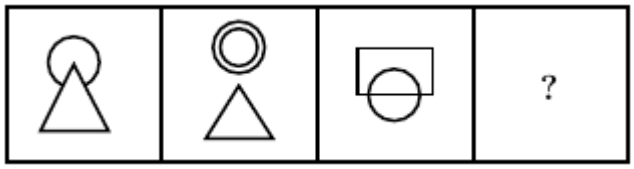
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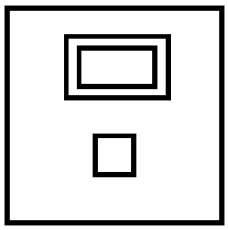
(a) D
(b) B
(c) C
(d) A

Q59. If 3√5 + √125 = 17.85, then what is the value of √80 + 7√5?
(a) 33.3
(b) 24.53
(c) 22.0
(d) 22.3

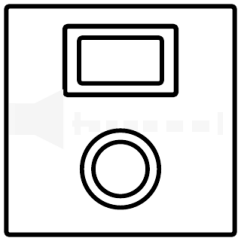
Q60. Find the next picture of the following sequence -



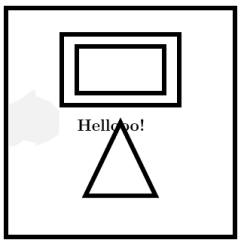
(a)



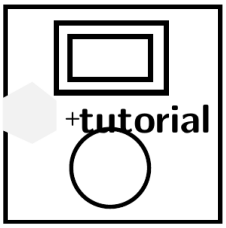
(b)



(c)



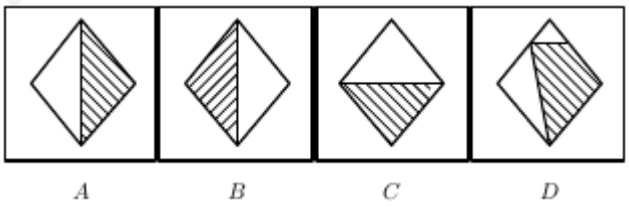
(d)



Q61. Who is the present Attorney General of India?

(a) G. E. Vahanvati
(b) Milon K. Banerjee
(c) R venkatramani
(d) Mukul Rohatgi

Q62. Identify the odd one out of the following -



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

Q63. Starfish belongs to the _____ group.

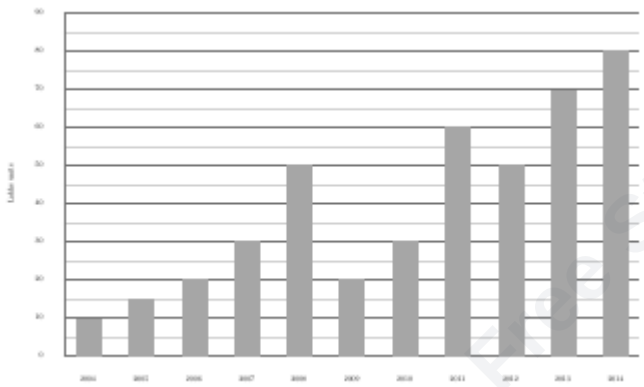
(a) Echinodermata
(b) Annelida
(c) Porifera
(d) Nematoda

Q64. The image formed on the retina of the human eye is-

(a) Real and inverted
(b) Virtual and inverted
(c) Real and erect
(d) Virtual and erect

Q65. The following bar graph shows the information of Personal Computers sold by Company 'XYZ' in the last 10 years-

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How many million personal computers were sold by Company XYZ in 2012?

(a) 10
(b) 5
(c) 4
(d) 6

Q66. Below the statement are given followed by two assumptions numbered I and II. You have to decide which of the assumptions is/are implicit in the statement by considering the statement and the assumptions that follow.

Statement:

He catches a bus to Hyderabad on Wednesday to attend an event held on Saturday at his aunt's house in Hyderabad.

Assumptions:

I. He will reach Hyderabad on Thursday.

II. He is trying to reach Hyderabad before the event ends.

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

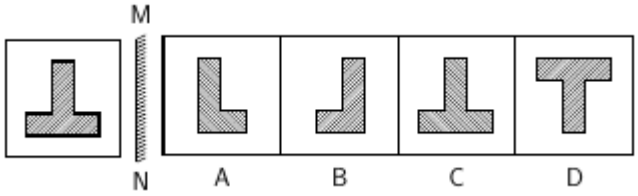
Q67. In November 2017, India's Ritu Phogat won a silver medal in the Under 23 Senior World Wrestling Championship held in Poland. She has won the silver in the _____ category.

(a) 50 Kilogram
(b) 58 Kilogram
(c) 45 Kilogram
(d) 48 Kilogram

Q68. Which of the following basic elements is NOT from the class of alkali metals?

(a) Potassium
(b) Rubidium
(c) Sodium
(d) Calcium

Q69. Select the mirror image of the figure given below -



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

Q70. The side length of a rhombus is √5 cm and its area is 4 cm². What will be the sum of the lengths of its diagonals?

(a) 5 cm
(b) 6 cm
(c) 8 cm
(d) 7 cm

Q71. Satyawart Kadian is associated with which of the following sports?

(a) Hockey
(b) Kabbadi
(c) Football
(d) Wrestling

Q72. The difference between simple interest and compound interest on Rs. 20,000 in two years is Rs. 800. What is the annual rate of interest?

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

Q73. Read the given statements and conclusions carefully and choose which of the statements logically follows from the conclusions.

Statement:

Nayan joined the local football team in 2014 as a player which helped the team win three consecutive championships between 2016 and 2018 for the first time ever.

Conclusion:

I. Nayan has helped the team reach new heights.

II. Nayan is a successful football player.

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

Q74. Ramakant cycles at the speed of 10 km/hr and walks at the speed of 3 km/hr. Ramakant takes 8 hours to cover a distance of 45 km. How many of these kilometers were covered by cycle?

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

Q75. You want to increase the size of a cubical box by increasing its dimensions by half of the original size. Which of the following statements about the volume of the newly formed box is correct after the size of the box is increased?

(a) This is 337.5% of the volume of the original box.
(b) This is 112.5% of the volume of the original box.
(c) It is 450% of the volume of the original box.
(d) It is 150% of the volume of the original box.

Q76. An object of mass 14 kg is moving with a velocity of 5 ms^(-1). Find the kinetic energy contained in the object?

(a) 180.5 J
(b) 17.5 J
(c) 175 ms
(d) 175 J

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Q77. If the pH of a salt is 7, then this salt is _____.

(a) Strong acid and weak base
(b) Strong acid and strong base
(c) Weak acid and weak base
(d) Weak acid and strong base

Q78. Old alluvial soil is known as _____.

(a) Bhangar
(b) Regur
(c) Clayey
(d) Khadar

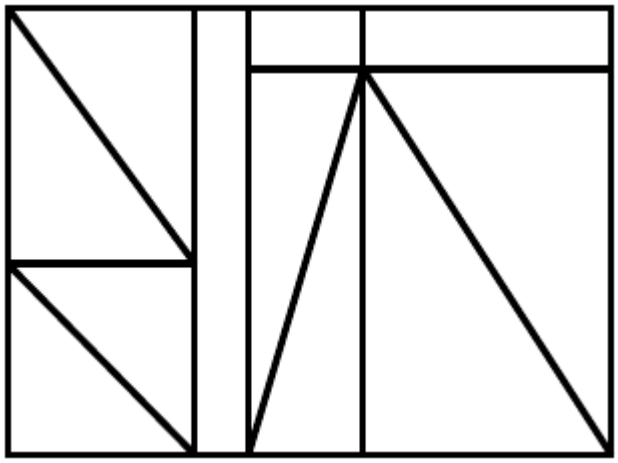
Q79. If X is the number of leap years in an interval of 100 years, then what will be the value of X - 1?

(a) 25
(b) 22
(c) 23
(d) 24

Q80. Anjali borrowed Rs. 22,500 for 2 years at 6% simple interest per annum and on the same day she lent this amount to Ashok with compound interest at the same rate of interest and for the same time. How much loss or profit will she make?

(a) 73 Profit
(b) 73 Loss
(c) 81 Loss
(d) 81 Profit

Q81. How many right angled triangles are there in the following figure?



(a) 5
(b) 3
(c) 8
(d) 4

Q82. (2 + 5) × 4 + (4/2) = ?

(a) 30
(b) 16
(c) 42
(d) 20

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Q83. Who became the first Indian to win the prestigious Pritzker Prize for his outstanding lifelong contribution to architecture, in March 2018?

(a) Satish Gujral
(b) Raj Rewal
(c) Balakrishna Doshi
(d) Charles Correa

Q84. Energy can neither be created nor destroyed, but it can be converted into one another. It is called _____-

(a) Law of perpetual energy
(b) Law of conservation of energy
(c) Law of entropy
(d) Law of conservation of mass

Q85. Mary takes 30 minutes to do one round of a rectangular garden. Sila takes 45 minutes to make one round of the same garden. One day at 9 o'clock in the morning both of them started walking in the same direction from the same point. At what time will they meet again at the starting point?

(a) 10:45 am
(b) 10:00 am
(c) 11:00 am
(d) 10:30 am

Q86. A's mother is B's sister and C's daughter. D is son of B and brother of E. How is C related to E?

(a) Uncle
(b) Grandmother or grandfather
(c) Grandfather
(d) Grandmother

Q87. Which of the following does NOT belong to the group?

(A) Crocodile
(B) Tortoise
(C) Boat
(D) Fish

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

Q88. What is the valence power (potential) of an element called?

(a) Atomicity
(b) Atomic mass
(c) Normality
(d) Valency

Q89. Seema has 15 pencils on Monday. Her brother gives her 5 more pencils on Tuesday, takes 3 pencils from her on Wednesday. She gets 7 pencils from a friend on Thursday. If her brother gives her 5 more pencils on Friday, then how many pencils will she have on Saturday?

(a) 27
(b) 37
(c) 29
(d) 39

Q90. A 5 m long stair, with a stable base on the street, can lead to two windows 4 m and 3 m high, located on the other side of the road. What is the width of the road?

(a) 6.2 m
(b) 6 m

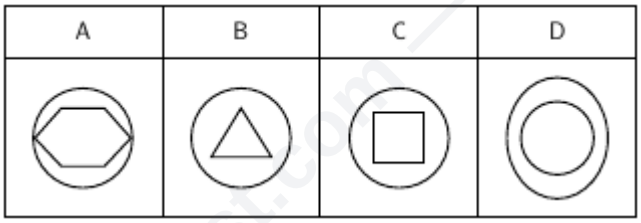
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(c) 7 m
(d) 5.5 m

Q91. The minute hand in a clock moves by _____ minutes in an hour -
(a) 55
(b) 10
(c) 35
(d) 25

Q92. This question is in Hindi. Read it online.

Q93. Identify the odd one -



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

Q94. Kishan covered a distance of 96 km by cycle at a certain speed. If he cycled 4 km slower per hour, he would have taken an extra 2 hours to reach the destination. What is the speed in km/h at which Kishan actually cycled?
(a) 12
(b) 18
(c) 16
(d) 15

Q95. What is the SI unit of acceleration?
(a) ms^(-1)
(b) ms
(c) sm^(-1)
(d) ms^(-2)

Q96. Hydro-Electric Project; Arun-III is in which country?
(a) Nepal
(b) India
(c) Sri Lanka
(d) Bangladesh

Q97. What does the odometer of an automobile measure?
(a) Distance
(b) Speed
(c) Pressure
(d) Smell

Q98. Find the next letter pair of the following series -
VG, TH, RJ, PM, ?
(a) NQ
(b) NC
(c) QZ
(d) QV

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Q99. The l.c.m. of numbers 108, 135 and 162 is P; Then find the value of P ÷ 4?

(a) 1620
(b) 400
(c) 405
(d) 602

Q100. If the weather is very humid, you will have to remove the emitted gas through a dry tube containing _____.

(a) Ca(OH)2
(b) NaCl
(c) NaOH
(d) CaCl2

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) 0.0023

Concept used:

0.0a = a/100

Calculation:

(759/100000) × (10/33)

=> 23/10000

=> 0.0023

Therefore Required answer is 0.0023

Q2. Answer: (d) ONGC

The logic followed here is:

i) UBI → Union Bank of India

ii) SBI → State Bank of India

iii) PNB → Punjab National Bank

iv) ONGC → Oil and Natural Gas Corporation.

Here, UBI, SBI, PNB are banking institutions where as ONGC is an institution which deals in oil and natural gas and other petroleum products.

Hence, 'ONGC' is does not belong to the group.

Q3. Answer: (d) Ar and N2

The correct answer is Ar and n2.

Key Points

• Ar and n2 gas is used to fill the electric bulb.

• Filling a bulb with an inert gas slows down the evaporation of the tungsten filament compared to operating it in a vacuum.

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• This allows for greater temperatures and therefore greater efficacy with less reduction in filament life.

Additional Information

• Argon is a commonly used gas, used to fill incandescent light bulbs. It increases the bulb life by preventing the tungsten filament from deteriorating too quickly.

• Other gases such as helium, neon nitrogen, and krypton are also used in lightning.

• Inert gases are reactive towards the burning filament of the bulb. Therefore we have to use either inert gases like Argon or inactive nitrogen.

Important Points

• In 1878, Thomas Edison began serious research into developing a practical incandescent lamp and on October 14, 1878, Edison filed his first patent application for Improvement In Electric Lights.

Q4. Answer: (c) Aamir Khan

The correct answer is Aamir Khan.

Key Points

• Aamir Khan played the lead role in the movie 'Dangal' released in 2016.

• Aamir Khan was honoured with the Best Actor Award in 2017 at Filmfare Awards.

• He was awarded for his film Dangal for his role as Mahavir Singh Phogat.

Additional Information

• Alia Bhatt was awarded Best Actress for her film Udta Punjab.

• Best Film was won by film Dangal.

• Nitesh Tiwari won Best Director for the film Dangal.

Q5. Answer: (b) Resistance

The correct answer is Resistance.

Key Points

• The current flowing through a resistor is inversely proportional to its resistance.

• Resistance is a measure of the opposition to current flow in an electrical circuit.

• Resistance is measured in ohms, symbolized by the Greek letter omega (Ω).

• Ohms are named after Georg Simon Ohm (1784-1854), a German physicist who studied the relationship between voltage, current, and resistance.

Additional Information

• The resistance formula is as follows:

• Resistance = voltage drop across a resistor/ current flowing through a resistor.

• R = V/I R = resistance (Ohms, Ω) V = voltage difference which is between the two ends of a resistor (Volts, V).

Important Points

Q6. Answer: (a) Zinc

The logic followed here is:

• Neon, Helium, and Xenon are noble gases or inert gases whereas Zinc is a metal.

Hence, Zinc does not belong to the group.

Additional Information

• Neon (Ne), Helium(He), and Xenon (Xe) belong to group 18.

• Zinc (Zn) is brittle and silvery greyish in colour. It belongs to group 12 of the periodic table.

Q7. Answer: (a) JBDS

The logic followed here is:

Here the code for SPANNER is as follows:

Alphabet	**S**	**P**	**A**	**N**	**N**	**E**	**R**
Code	G	C	D	J	J	B	S

Similarly,

NEAR is coded as

Alphabet	**N**	**E**	**A**	**R**

Code	J	B	D	S

Hence, NEAR will be written as 'JBDS' in the given code language.

Q8. Answer: (d) 8 ms^(-1)

The correct answer is 8 ms-1

Key Points

• Solution:

• Here, u = 0, t = 0.8 s, g = 10 m / s 2.

• v = u + g t = 0 + 10 × 0.8

• 8

• 8 ms-1 is the speed when it hits the ground.

Q9. Answer: (a) [figure]

The logic followed here is:

Hence, option 1 is the correct answer.

Q10. Answer: (c) D

The logic followed here is:

The place value of A is 1, D is 4, O is 15 and U is 21.

In each of the given figure the alphabet and its place value are given except U and 23 in figure D.

Hence, figure D is the odd one from the given figures.

Q11. Answer: (c) Only conclusion 1 follows

The least possible Venn diagram is as follows:

Conclusion :

1. Some weak are tissues.→ True (as some tissues are weak)

2. Some bones are tissues. → False(as it is possible but not definite).

Hence, only conclusion 1 follows.

Q12. Answer: (b) 100N

The correct answer is 100N.

Key Points

• The mass of an object is 10 kg. Its weight on earth is 100N.

• The weight of a body is a product of its mass and acceleration due to gravity on earth.

• Weight varies with location depending upon the acceleration due to gravity.

Additional Information

• Solution details:

• w=mg

• (Here m=10kg,)

• g=10m/s2)

• w=10×10kgm/s2

• w=100N

• Therefore, the weight of the object on earth will be 100N.

Q13. Answer: (c) 1/u + 1/v = 1/f

The correct answer is 1/u + 1/v = 1/f.

Key Points

• In ray optics, The object distance, image distance, and Focal length are related as 1/u + 1/v = 1/f.

• The relation between the focal length of the mirror, the distance of the object, and the distance of the image are known as the mirror formula.

Additional Information

• A highly polished surface, such as a mirror, reflects most of the light falling on it. Reflection is governed by the following laws:

• The angle of incidence is equal to the angle of reflection, and

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• The incident ray, the normal to the mirror at the point of incidence, and the reflected ray, all lie in the same plane.
• Types of the mirror:
• Plane Mirror
• Concave Mirror
• Convex Mirror

Q14. Answer: (d) Propyne

The correct answer is propyne.

Key Points

• Propyne (methylacetylene) is an alkyne with the chemical formula CH 3C≡CH.
• It is a component of MAPD gas - along with its isomer propadiene (allene), which was commonly used in gas welding.
• Propyne contains three carbon atoms and four hydrogen atoms in the above structure.
• Carbon-1 is attached to one hydrogen atom through a single bond (sigma bond) and carbon-1 is attached to carbon-2 through a triple bond (one sigma bond and two pi bonds).

Additional Information

• When three pairs of electrons are shared between two carbon atoms, a triple bond is formed between the two carbon atoms.
• A triple bond is made of two pi bonds and one sigma bond.
• Examples of compounds with triple bonds include nitrogen gas, cyanide ion, acetylene, and carbon monoxide.

Q15. Answer: (d) Roshni Nadar

The correct answer is Roshni Nadar.

Key Points

• Roshni Nadar is the Executive Director and CEO of HCL.
• Roshni Nadar Malhotra is the only child of HCL's founder, billionaire industrialist, and philanthropist Shiv Nadar.
• She has featured in The World's 100 Most Powerful Women list compiled and released by Forbes in 2017, 2018, and 2019.
• She is also the richest woman in India, according to IIFL Wealth Hurun India Rich List (2019).
• She established The Habitats Trust in 2018, which aims to work toward protecting India's natural habitats and its indigenous species.

Additional Information

• As of now, C Vijayakumar is CEO of HCL and he has appointed in October 2016.
• C Vijayakumar joined HCL Technologies in 1994 in the founding startup team of Comnet as a senior technical engineer.

Important Points

Person Name	Details
Kiran Nadar	• Kiran Shiv Nadar is an Indian art collector and philanthropist. - Kiran is the wife of Shiv Nadar, the founder of HCL Technologies, and is a trustee of the Shiv Nadar Foundation and the founder of the Kiran Nadar Museum of Art.
Shiv Nadar	• Shiv Nadar is an Indian billionaire industrialist and philanthropist. - He is the founder and chairman emeritus of HCL Technologies Limited and the Shiv Nadar Foundation.
Arjun Malhotra	• Arjun Malhotra is an Indian entrepreneur, industrialist and philanthropist. - In 1975, Malhotra co-founded HCL Group, where he served as vice-chairman. - He also founded TechSpan and served as chief executive officer of US-based firm Headstrong after the two companies merged.

Q16. Answer: (d) D

The logic followed here is:

The main figure is

Figure A: the above figure is rotated 90 degrees to the right.

Figure B: the above figure is rotated 90 degrees to the left.

Figure C: the above figure is rotated 180 degrees to the right.

Figure D: this is a mirror image of the above image. Only figure D cannot be obtained by rotation of the main figure.

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Hence, figure D does not belong to the group.

Q17. Answer: (b) Inertia

The correct answer is Inertia.

Key Points

• The measurement of the mass of an object is called Inertia.

• Inertia is the resistance of any physical object to any change in its velocity. This includes changes to the object's speed or direction of motion.

• Inertia is a passive property and does not enable a body to do anything except oppose such active agents as forces and torques.

Additional Information

Important Points

Name	Details
Acceleration	• acceleration, the rate at which velocity changes with time, in terms of both speed and direction. - A point or an object moving in a straight line is accelerated if it speeds up or slows down. - Acceleration is defined as the change in the velocity vector in a time interval, divided by the time interval.
Impulse	• Impulse in Physics is a term that is used to describe or quantify the effect of force acting over time to change the momentum of an object. - It is represented by the symbol J and is usually expressed in Newton-seconds or kg m/s.
Speed	• Speed can be thought of as the rate at which an object covers distance. - A fast-moving object has a high speed and covers a relatively large distance in a given amount of time, while a slow-moving object covers a relatively small amount of distance in the same amount of time.

Q18. Answer: (b) Alia Bhatt

The correct answer is Alia Bhatt.

Key Points

• Alia Bhatt was given the 'Best Actress award at the Filmfare Awards 2017.

• She won this award for the role of Bauria in the movie Udta Punjab.

Additional Information

Category	Winner
Best Film	Dangal
Best Director	Nitesh Tiwari for Dangal
Best Actor	Aamir Khan for Dangal
Best Supporting Actor	Rishi Kapoor for Kapoor and Sons
Best Supporting Actress	Shabana Azmi for Neerja

Q19. Answer: (a) Only A is true

The correct answer is Only A is true.

Key Points

• State of Matter:

• Three states of matter exist – solid, liquid, and gas. Solids have a definite shape and volume. Liquids have a definite volume, but take the shape of the container. Gases have no definite shape or volume.

• The firmness of a solid is due to the forces holding atoms or molecules together.

• The particles in a solid are close together.

• Hence, statement A is True.

• Compressibility:

• It is the property of a substance in which its volume decreases under high pressure and it is called Compressibility, not size.

• This property is found in gases.

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• Gases are highly compressible.
• Hence, statement B is Incorrect.

Q20. Answer: (c) 313/19 hours

Shortcut Trick
Let Total Work = LCM(5, 7, 14) = 70 units.
Efficiency of Pipe 1 = 70 ÷ 5 = 14 units/hr.
Efficiency of Pipe 2 = 70 ÷ 7 = 10 units/hr.
Efficiency of Outlet Pipe = −(70 ÷ 14) = −5 units/hr.
Combined Efficiency = 14 + 10 − 5 = 19 units/hr.
Time required = 70 ÷ 19 = 3(13/19) hr.
Therefore The correct answer is 3(13/19) hr.
Alternate Method

Person/Pipe	Time (hr)	Total Work	Efficiency
Pipe A (Inlet)	5	70	14
Pipe B (Inlet)	7	10	
Pipe C (Outlet)	14	−5	

Calculations:
=> Total capacity of the tank = LCM of 5, 7, and 14 = 70 units.
=> Net efficiency when all pipes are open = Efficiency of A + Efficiency of B − Efficiency of C
=> Net efficiency = 14 + 10 − 5 = 19 units/hr.
=> Time taken to fill the tank = Total Capacity ÷ Net Efficiency
=> Time = 70 ÷ 19
=> Time = 3(13/19) hours.
Therefore The correct answer is 3(13/19) hr.
Additional Information
Inlet and Outlet Pipes
An Inlet pipe performs positive work (filling), while an Outlet pipe (leak) performs negative work (emptying).
Pipes and Cisterns Formula
If a pipe fills a tank in x hours and another empties it in y hours, the net work in one hour is (1/x − 1/y).
Total Work Concept
Total work is always assumed to be the LCM of individual time durations to simplify calculations into integers.

Q21. Answer: (c) Ragam

The correct answer is Ragam.
Key Points
• In January 2016, All India Radio (AIR) launched a non-traditional audio broadcast channel via the Internet, which is readily available through 'Free Dish' for experts in the arts, especially classical music-both Karnataka and Hindustani. It is known as Ragam.
• The channel was launched by Prasar Bharati Chairman Surya Prakash and it will be uplinked from AIR Bengaluru station.
• 'Raagam' will be active round-the-clock and can be downloaded from under the mobile application-All India Radio Live.
Additional Information

Radio Channel	Established in Year
Big FM	2006
Radio Mirchi	1993
Taal	Taal Radio is a Hindi Fm radio having broadcasting from the United States.

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Q22. Answer: (d) North

The diagrammatic representation of the given data is as follows

Hence, Sunayata is facing 'North' direction now.

Q23. Answer: (b) 4 cm

Shortcut Trick

Radius (r) = 10 cm. Distances from center = 6 cm and 8 cm.

Using Pythagorean triplets (6, 8, 10):

Half of Chord 1 = $\sqrt{(10^2 - 6^2)}$ = 8 cm => Chord 1 = 16 cm.

Half of Chord 2 = $\sqrt{(10^2 - 8^2)}$ = 6 cm => Chord 2 = 12 cm.

Difference = 16 − 12 = 4 cm.

Therefore The correct answer is 4 cm.

Alternate Method

Given: Radius (r) = 10 cm, Distance of first chord (d1) = 6 cm, Distance of second chord (d2) = 8 cm.

Formula Used: Length of a chord = $2 \times \sqrt{(r^2 - d^2)}$, where r is the radius and d is the distance from the center.

=> Length of the first chord (AB) = $2 \times \sqrt{(10^2 - 6^2)}$

=> AB = $2 \times \sqrt{(100 - 36)} = 2 \times \sqrt{64} = 2 \times 8 = 16$ cm

=> Length of the second chord (CD) = $2 \times \sqrt{(10^2 - 8^2)}$

=> CD = $2 \times \sqrt{(100 - 64)} = 2 \times \sqrt{36} = 2 \times 6 = 12$ cm

=> Difference in lengths = 16 cm − 12 cm = 4 cm

Therefore The correct answer is 4 cm.

Additional Information

Perpendicular Bisector Property

The perpendicular drawn from the center of a circle to a chord always bisects the chord into two equal segments.

Distance between Parallel Chords

If two parallel chords are on opposite sides of the center, the distance between them is d1 + d2. If they are on the same side, the distance is |d1 − d2|.

Chord Length and Distance

As the distance of a chord from the center increases, the length of the chord decreases. The longest chord is the diameter (distance = 0).

Q24. Answer: (b) Rs. 1,38,750

Shortcut Trick

Assume the total area is 100 units. CP = 3,00,000.

Total profit needed = 15% of 100 = +15 units.

Part 1: 25% area at 25% loss => 25 × (−0.25) = −6.25 units.

Part 2: 40% area at 25% profit => 40 × 0.25 = +10 units.

Current net profit = −6.25 + 10 = +3.75 units. Remaining profit needed = 15 − 3.75 = 11.25 units.

Remaining area = 100 − 25 − 40 = 35%. SP of remaining part = CP of remaining + profit needed = (35% of 3,00,000) + (11.25% of 3,00,000).

SP of remaining = (46.25 ÷ 100) × 3,00,000 = 1,38,750.

Therefore The correct answer is Rs. 1,38,750.

Alternate Method

Given → Total CP = 3,00,000 | Overall Profit = 15% | Plot divided into 25%, 40%, and 35%.

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

=> Total SP required = 3,00,000 × 1.15 = 3,45,000.

=> SP1 (25% area) = (0.25 × 3,00,000) × 0.75 = 75,000 × 0.75 = 56,250.

=> SP2 (40% area) = (0.40 × 3,00,000) × 1.25 = 1,20,000 × 1.25 = 1,50,000.

=> Sum of SP1 and SP2 = 56,250 + 1,50,000 = 2,06,250.

=> SP of remaining plot = Total SP − (SP1 + SP2) = 3,45,000 − 2,06,250 = 1,38,750.

Therefore The correct answer is Rs. 1,38,750.

Additional Information

Weighted Average Method

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For problems involving parts of a whole, use (w1p1 + w2p2 + w3p3) = W_(total)P_(total) where w is the weight and p is the profit/loss percentage.

Profit and Loss on Cost Price

Unless stated otherwise, profit or loss percentage is always calculated on the Cost Price (CP).

Q25. Answer: (a) 108, 11

The correct answer is 108, 11.

Key Points

• Out of the 108 Upanishads, 11 Upanishads are considered to be the main.

• The word Upanishad means to sit down near someone and denotes a student sitting near his guru to learn.

Additional Information

• The 11 Upanishads that are predominant are called “Mukhya Upanishads“.

• The 11 Mukhya Upanishads are:

• Aitareya Upanishad

• Brhadaranyaka Upanishad

• Taittiriya Upanaishad

• Chandogya Upanishad

• Kena Upanisahda

• Īsa Upanishad

• Śvetasvatara Upanishad

• Kathopnishad

• Muktika Upnishad

• Maandūkya

• Praśna

Q26. Answer: (a) only assumption I is implicit

• Since Ramu has made a train reservation in April, one month in advance for his travel plan in May, it indicates that it is possible to do rail reservations one month in advance.

• Thus, assumption I is implicit.

• Assumption II talks about trains from Mumbai to Hyderabad which is not mentioned or suggested anywhere in the statement, thus it is not implicit.

Hence the correct answer is option 1.

Q27. Answer: (c) A and D

The correct answer is A and D.

Key Points

• The Jumping of frogs is the activity of voluntary muscles as it is controlled by skeletal muscles.

• Pumping of the heart is involuntary, i.e., it is controlled by cardiac muscles.

• Writing with the hand is voluntary muscles action.

• The movement of chocolate in your intestine is involuntary muscles.

• Heartbeat is an activity of involuntary muscles.

Additional Information

• Voluntary muscles are long, multinucleated cells, containing sarcomeres arranged into bundles.

• They play an important role in allowing the body to move by contracting and relaxing and their actions are mainly under the control of the somatosensory nervous system.

• Involuntary muscles are striated and branched in the case of cardiac muscle.

• The actions of involuntary muscles are mainly controlled by the autonomic nervous system in the body.

Q28. Answer: (a) 28

The correct answer is 28.

Key Points

• The relative mass of CO is 28g.

• The relative formula mass of a substance, shown in grams, is called one mole of that substance. So one mole of carbon monoxide has a mass of 28 g, and one mole of sodium oxide has a mass of 62 g.

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• The element Cobalt belongs to group VIII of the periodic table. It is similar to iron and nickel in their physical properties.

• Cobalt is found in plants and animals, air, water, soil, and rocks.

• It may also enter into another environment through wind-blown dust or by rainwater washing down cobalt-containing soil and rock.

Q29. Answer: (c) 6

Shortcut Trick

Medini = 16 days, Yuki = 16 × 3 = 48 days.

Together they complete full wall in (16 × 48) ÷ (16 + 48) = (16 × 48) ÷ 64 = 12 days.

Time to paint half the wall = 12 ÷ 2 = 6 days.

Therefore The correct answer is 6 days.

Alternate Method

Given:

Time taken by Medini = 16 days

Time taken by Yuki = 3 × 16 = 48 days

Person	Days	Total Work	Efficiency
Medini	16	48 units	3
Yuki	48	1	

Calculations:

=> Total Efficiency of Medini and Yuki = 3 + 1 = 4 units/day

=> Half the work = 48 ÷ 2 = 24 units

=> Time taken to complete half work = 24 ÷ 4 = 6 days

Therefore The correct answer is 6 days.

Additional Information

Time and Work Relation

Efficiency is inversely proportional to the time taken. If A is 3 times as efficient as B, A takes 1/3^(rd) the time taken by B.

Combined Work Formula

If two people can complete a task in X and Y days respectively, they together complete it in (X×Y)÷(X+Y) days.

Work and Efficiency

Work Done = Efficiency × Time. For partial work, simply multiply the total time by the required fraction.

Q30. Answer: (b) 91

Given:

8281

Concept used:

Prime factorisation of a number

Calculation:

Prime factorisation of 8281 = 7 × 7 × 13 × 13

So, √8281 = 7 × 13

=> 91

Therefore Square root of 8281 is 91

Q31. Answer: (a) M Subbaraidu

The correct answer is M Subbaraidu.

Key Points

• Shri M. Subbarayudu was appointed as the next Ambassador of India to the Republic of Peru in 2017.

• He joined the Indian Forest Service in the year 1994.

• He has served at the Ministry of External Affairs, New Delhi as Deputy Secretary in the Central Europe Division and Joint Secretary in charge of Development Partnership Administration.

Additional Information

Person	Description

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Arup Kumar Saha	He was the second secretary to Peru.
Sandeep Chakraborty	He had earlier served as India's Ambassador to Peru and Deputy High Commissioner in Dhaka.

Q32. Answer: (b) 3.5 cm

Shortcut Trick

Use the direct relationship between Circumference (C) and Diameter (D): C − D = 15

Substituting πD − D = 15 => D(π − 1) = 15

D(22/7 − 1) = 15 => D(15/7) = 15

D = 7 cm => Radius (r) = D/2 = 3.5 cm

Therefore The correct answer is 3.5 cm.

Alternate Method

Given:

Circumference − Diameter = 15 cm

Formula Used:

Circumference (C) = 2πr

Diameter (D) = 2r

Calculations:

=> 2πr − 2r = 15

=> 2r(π − 1) = 15

=> 2r(22/7 − 1) = 15

=> 2r(15/7) = 15

=> 2r = (15 × 7) ÷ 15

=> 2r = 7

=> r = 7 ÷ 2

=> r = 3.5 cm

Therefore The correct answer is 3.5 cm.

Additional Information

Circumference of Circle

It is the perimeter or boundary length of the circle, calculated as 2πr or πd.

Area of Circle

The total space enclosed within the boundary of a circle, given by the formula Area = πr^2.

Relation between Radius and Diameter

The diameter is always twice the length of the radius (D = 2r).

Q33. Answer: (a) [figure]

The logic followed here is as follows:

Shoes, Grass and Mobile are all three unrelated words.

In other words,

No shoes is Grass

No Grass is Mobile.

No Mobile is Shoes.

Therefore, the best possible venn diagram representation is as follows:

Hence, the above diagram is the correct answer.

Q34. Answer: (c) 1526

The correct answer is 1526.

Key Points

• The first battle of Panipat was fought in 1526.

• The First Battle of Panipat, on 21 April 1526, was fought between the invading forces of Babur and the Lodi dynasty.

• It took place in North India and marked the beginning of the Mughal Empire from 1526 to 1857 and the end of the Delhi Sultanate.

• Battles of Panipat, (1526, 1556, 1761), three military engagements, important in the history of northern India, fought at Panipat.

Additional Information

• Ibrahim Lodi lost the fight and it denoted the start of the Mughal Empire and the finish of the Delhi Sultanate in India.

• Babur used modern tactics of warfare and introduced the deadly combination of Tulghuma and Araba.

• Tulghuma meant the division of the army into the left, right, and center units, while Araba referred to the carts used to launch cannon fire.

Important Points

• Panipat:

• Panipat is a historic city in Haryana, India.

• The city is famous in India as the City of Weavers and Textile City. It is also known as the cast-off capital due to being the global center for recycling textiles.

• Panipat district was carved out from the erstwhile Karnal district on 1 November 1989.

• On 24 July 1991, it was again merged with Karnal district. On 1 January 1992, it again became a separate district.

Q35. Answer: (d) 5 Years

The correct answer is 5 Years.

Key Points

• 5 years is the tenure of Lok Sabha members.

• Lok Sabha is composed of representatives of the people chosen by direct election on the basis of adult suffrage.

• The term of a member of parliament of Lok Sabha (dissolved) is five years from the date appointed for its first meeting.

• During a state of emergency, the term however can be extended by the Parliament of India by law for a period not exceeding one year at a time.

Additional Information

• On 26 January 1950, the Indian constitution came into force and the first general elections (under the new constitution) were held in 1951-1952.

• The 1st Lok Sabha was constituted on 17 April 1952 and had 489 constituencies, thereby the first set of elected members of parliament of Lok Sabha in India.

• The maximum permitted strength of members of parliament in the Lok Sabha is 550.

• The first instance of a member of parliament equivalent in India dates back to 9 December 1946, the day the Constituent Assembly of India was formed with the purpose of drafting a constitution for India.

Important Points

• As per Article 93 of the Indian Constitution, the Lok Sabha has a Speaker and a Deputy Speaker.

Q36. Answer: (b) Metal

The correct answer is Metal.

Key Points

• Metal has 1 to 3 electrons in its outermost shell.

• Metals usually have 1, 2, or 3 electrons in their valence shell.

• A valence shell means the outermost shell of an atom containing the valence electrons.

• The greater the number of shells and the lesser the number of valence electrons, the greater is the reactivity of the metal.

Additional Information

• The atom of every element has different electronic configurations.

• For example, Sodium Atomic no.=11

• Therefore electronic configuration of Sodium is 2 8 1.

Important Points

• Electron shell diagram:

Q37. Answer: (b) Hydra

The correct answer is Hydra.

Key Points

• Hydra can reproduce by the process of regeneration and budding.

• Hydra is a small freshwater organism. They are native to temperate and tropical regions.

• When the food is plentiful the asexual reproduction occurs in hydra.

• The process is done by producing buds in the body wall. It grows as a mini form of adult and breaks apart when gets mature.

• Hydra goes through tissue regeneration when injured. If the hydra is cut in half, each part will regenerate as a whole new hydra. This regeneration occurs without the cell division process.

Additional Information

• Yeast:

• While most yeasts reproduce by budding, some also reproduce by fission.

• Plasmodium:

• Plasmodium reproduces both by sexual and asexual methods.

• Planaria:

• Planaria reproduces by methods like fragmentation and spontaneous dropping tails.

• Amoeba:

• An amoeba often called an amoeboid, is a type of cell or unicellular organism which has the ability to alter its shape, primarily by extending and retracting pseudopods.

Important Points

Structure of Hydra:

Q38. Answer: (b) 1

The correct answer is 1.

Key Points

• In the modern periodic table, period 1 consists of only gases.

• There are only two elements in the first period: hydrogen and helium.

• Period 1 elements follow the duet rule, they only need two electrons to complete their valence shell.

• The modern Periodic law can be stated as: “The physical and chemical properties of the elements are periodic functions of their atomic numbers”

Additional Information

Period	Elements
2	lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, and neon.
3	sodium, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, and argon.
4	scandium (Sc), titanium (Ti), vanadium (V), chromium (Cr), manganese (Mn), iron (Fe), cobalt (Co), nickel (Ni), copper (Cu), and zinc (Zn).

Q39. Answer: (c) The value of p is any number other than 3

Shortcut Trick

For a unique solution (only one solution), the ratio of coefficients of x and y must be unequal.

Condition: $a1/a2 \neq b1/b2$

Here, a1 = 2, b1 = 3 and a2 = 2, b2 = p.

$\Rightarrow 2/2 \neq 3/p$

$\Rightarrow 1 \neq 3/p \Rightarrow p \neq 3$.

Therefore The correct answer is any number other than 3.

Alternate Method

Given:

Equation 1: $2x + 3y = -5$

Equation 2: $2x + py = 2$

Formula Used:

For a system of equations $a1x + b1y + c1 = 0$ and $a2x + b2y + c2 = 0$ to have only one solution, the lines must be intersecting.

Condition: $a1/a2 \neq b1/b2$

Calculations:

Comparing equations with the standard form:

$\Rightarrow a1 = 2, b1 = 3, c1 = 5$

$\Rightarrow a2 = 2, b2 = p, c2 = -2$

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Applying the Unique Solution condition:

=> a1/a2 ≠ b1/b2

=> 2/2 ≠ 3/p

=> 1 ≠ 3/p

=> p ≠ 3

This means the value of p can be any real number except 3.

Therefore The correct answer is any number other than 3.

Additional Information

Infinite Many Solutions

A system has infinite solutions if the lines are coincident: a1/a2 = b1/b2 = c1/c2.

No Solution

A system has no solution if the lines are parallel: a1/a2 = b1/b2 ≠ c1/c2.

Consistency of Equations

A system is consistent if it has at least one solution (unique or infinite) and inconsistent if it has no solution.

Q40. Answer: (c) 10 square unit

Shortcut Trick

Shift one vertex to the origin (0, 0) by subtracting its coordinates from all vertices.

Subtracting (−2, 0) from (3, 5), (−2, 0), and (6, 4) gives (5, 5), (0, 0), and (8, 4).

Area = 1/2 |(x1 × y2) − (x2 × y1)| = 1/2 |(5 × 4) − (8 × 5)|

Area = 1/2 |20 − 40| = 1/2 |−20| = 10 square units.

Therefore The correct answer is 10 square unit.

Alternate Method

Given: Vertices of the triangle are A(3, 5), B(−2, 0), and C(6, 4).

Formula Used: Area = 1/2 |x1(y2 − y3) + x2(y3 − y1) + x3(y1 − y2)|

=> Area = 1/2 |3(0 − 4) + (−2)(4 − 5) + 6(5 − 0)|

=> Area = 1/2 |3 × (−4) + (−2) × (−1) + 6 × 5|

=> Area = 1/2 |−12 + 2 + 30|

=> Area = 1/2 |20|

=> Area = 10 square units.

Therefore The correct answer is 10 square unit.

Additional Information

Collinear Points

If the area of a triangle formed by three points is zero, then the points are collinear (lie on the same straight line).

Q41. Answer: (b) Uttarkashi

The correct answer is Uttarkashi.

Key Points

• 'Gangotri Swachh Iconic Place Project and Swajal' was launched in the Uttarkashi district of Uttarakhand.

• The Union Ministry of Drinking Water and Sanitation has launched the Gangotri Swachh Iconic Place project and Swajal.

• The project will create cleanliness, provide basic amenities to the people of Ganga bank villages, and will also generate employment.

Additional Information

• The SIP (Swachh Iconic Place) is a drive under the Swachh Bharat Mission and aims to improve the sanitation and cleanliness of the 100 most iconic places in the country.

• The project was launched by Uma Bharti (Union Minister - 2018).

• This project is being coordinated by the:

• Department of Drinking Water and Sanitation (DDWS),

• Ministry of Jal Shakti in association with the Ministry of Housing and Urban Affairs (MoHUA),

• Ministry of Tourism,

• Ministry of Culture

• and the concerned State/UT governments.

Q42. Answer: (a) India

The correct answer is India.

Key Points

• India became the third-largest country in terms of domestic air traffic in March 2017.

• India's domestic air passenger traffic stood at 100 million in 2016 and was behind only the US (719 million) and China (436 million).

• India acquired the third spot globally by unseating Japan, which flew 97 million domestic passengers in 2016.

Additional Information

• The aviation sector is one of the 25 sectors which has been there under the Make in India scheme.

• Area wise Indira Gandhi International airport (New Delhi) is the biggest airport in India.

• IGI is also the busiest airport in India. In FY 20-21 this airport handled approx 22,583,736 passengers.

Q43. Answer: (c) Rohit Sharma

The correct answer is Rohit Sharma.

Key Points

• The Mumbai Indians captain Rohit Sharma has won three consecutive IPL titles.

• Rohit Sharma was born on 30 April 1987, Nagpur, Maharashtra, India.

• Rohit Sharma is an Indian international cricketer who captains the India national cricket team in ODIs and T20Is.

• In November 2013, during Sachin Tendulkar's farewell series, Sharma made his Test debut at Eden Gardens in Kolkata.

• Sharma joined the Indian Premier League (IPL) in 2008 when he was signed by the Deccan Chargers franchise.

• In the 2011 auction, he was sold for US$2 million to the Mumbai Indians.

Additional Information

Person Name	Details
Virat Kohli	• Virat Kohli is an Indian cricketer and the captain of the Indian national cricket team in Tests. - He plays for Delhi in domestic cricket and Royal Challengers Bangalore in the Indian Premier League. - In 2017, Kohli was honored with the Padma Shri award and in 2013 the Arjuna award.
Mahendra Singh Dhoni	• Mahendra Singh Dhoni is a former international cricketer who captained the Indian national cricket team in limited-overs formats from 2007 to 2017 and in Test cricket from 2008 to 2014. - In 2018 Dhoni was honored with Padma Bhushan. - In 2009 Dhoni was honored with Padma Shri and 2007-08 Major Dhyan Chand Khel Ratna.
Gautam Gambhir	• Gautam Gambhir is an Indian politician and former cricketer, who has played all formats of the game. - He is a current member of the Lok Sabha since 2019. - He set up community kitchens in 2017 through the Foundation in Patel Nagar, Delhi.

Important Points

• In 2015, Rohit Sharma was honored with Arjuna Award.

• In 2020, Rohit Sharma was honored with Major Dhyan Chand Khel Ratna.

Q44. Answer: (d) quarter 3

According to the table,

In quarter 3 price difference = 65 - 40 = 25

Therefore In quarter 3 price difference was the highest

Q45. Answer: (a) Vikas Sathe

The correct answer is Vikas Sathe.

Key Points

• Vikas Sathe was awarded the Scientific and Engineering Academy Award at the Oscar Scientific and Technical Awards 2018 held in February 2018 in Los Angeles, California.

• Sathe and his team received the award for his contribution towards conceptualization, designing, engineering, and the implementation of the 'Shotover K1 Camera System' during his stint at Shotover Camera Systems in Queenstown, New Zealand.

• Vikas Sathe is a Pune-born Indian engineer.

Additional Information

• About Shotover K1 Camera System

• The Shotover K1 Camera System is a camera mount that is used for aerial filming.

• The six-axis stabilized aerial camera mount can be attached to the base of a helicopter, which carries the camera and lens.

• The primary function of the camera mount is to ensure steady footage by eliminating any vibration from reaching the camera.

Q46. Answer: (b) Kuttanad

The correct answer is Kuttanad.

Key Points

is the lowest Below to sea level of India.

Kuttanad is a region that covers the Alappuzha, Kottayam, and Pathanamthitta Districts, in the state of Kerala.

The region has the lowest altitude in the country and is one of the rarest places in the world where farming is carried on around 1.2 to 3.0 meters (4 to 10 ft) below sea level.

Paddy is the major cultivation done in the Kuttanad region.

Additional Information

Important places of India

The highest point of India

Kanchenjunga.

The lowest Altitude of India

Kuttanad.

The coldest point of India

Dras, Union Territory of Ladakh

The hottest point of India

Jaisalmer, Rajasthan.

The driest point of India

Leh, Union Territory of Ladakh

The wettest point of India

Mawsynram, Meghalaya

Important Points

Place

Details

Wayanad

Wayanad, the green paradise is nestled among the mountains of the Western Ghats, forming the border world of the greener part of Kerala.

Wayanad was a part of the Malabar District until 31 March 1877.

During British Raj, Wayanad was a Taluk in the erstwhile Malabar District.

Chettinad

Chettinad is a region located mainly in the Sivaganga district historically ruled by the Ramnad kingdom of Pandya Nadu and has a small portion extending into the Pudukottai District in Tamil Nadu, India.

In the 19th and early 20th centuries, many residents of Chettinad were trading in South and Southeast Asia, particularly Burma, Ceylon, Vietnam, and Malaysia.

Indira Point

Indira Points refers to the southernmost tip of Great Nicobar Island which is also the Southernmost point of India.

The point was formerly known as Pygmalion Point and Parsons Point.

The Indira Point lighthouse was commissioned into service on 30 April 1972.

Q47. Answer: (b) 22.75

Shortcut Trick

Initial Ratio A : B = 7 : 5. Let common factor be x.

Remaining A after 9L removal = 7x − 9 × (7/12) and B after 10L addition = 5x − 9 × (5/12) + 10.

New ratio: [7x − 5.25] / [5x + 6.25] = 7 / 9.

Solving: 9(x − 0.75) = 5x + 6.25 => 4x = 13 => x = 3.25.

Initial quantity of A = 7 × 3.25 = 22.75 liters.

Therefore The correct answer is 22.75 liters.

Alternate Method

Given: Initial Ratio A : B = 7 : 5. Replace 9 liters of mixture with 10 liters of liquid B. Final Ratio = 7 : 9.

Step 1: Amount of A removed = 9 × (7 / 12) = 5.25 liters.

Step 2: Amount of B removed = 9 × (5 / 12) = 3.75 liters.

Step 3: Let initial quantities be 7x and 5x.

=> (7x − 5.25) / (5x − 3.75 + 10) = 7 / 9

=> (7x − 5.25) / (5x + 6.25) = 7 / 9

=> 9(7x − 5.25) = 7(5x + 6.25)

=> 63x − 47.25 = 35x + 43.75

=> 28x = 91

=> x = 91 / 28 = 3.25

Step 4: Initial quantity of A = 7x = 7 × 3.25 = 22.75 liters.

Therefore The correct answer is 22.75 liters.

Additional Information

Mixture Replacement Rule

When a quantity of mixture is removed, the ratio of liquids remains the same in the remaining mixture.

Alligation Method

Used for finding the proportions in which two or more ingredients at given prices/concentrations are mixed.

Concentration Formula

Final Concentration = Initial Concentration × $[1 − (\text{Removed Volume} / \text{Total Volume})]^n$ (valid for repeated replacements).

Q48. Answer: (d) Cousin

Preparing the family tree using the following symbols:

Hence, the person in the photograph is the Cousin of Naina.

Q49. Answer: (c) -332

Given:31 × 5 + 16 - 4 ÷ 92

On decoding the given equation:

Code	÷	×	•	•
Meaning	×	•	•	÷

31 × 5 + 16 - 4 ÷ 92

→ 31 + 5 - 16 ÷ 4 × 92

→ 31 + 5 - 4 × 92

→ 31 + 5 - 368

→ 36 - 368

→ - 332

Hence, '- 332 ' is the correct answer.

Q50. Answer: (a) JBS Haldane

The correct answer is JBS Haldane.

Key Points

• JBS Haldane:

• Haldane was a professed socialist, Marxist, atheist, and humanist whose political dissent led him to leave England in 1956 and live in India, becoming a naturalized Indian citizen in 1961.

• JBS Haldane was born on 5 November 1892 was a British scientist.

• Haldane's article on abiogenesis in 1929 introduced the primordial soup theory, which became the foundation for the concept of the chemical origin of life.

• Haldane was one of the three major figures to develop the mathematical theory of population genetics, along with Ronald Fisher and Sewall Wright.

Additional Information

Person Name	Details
Charles Darwin	• Charles Robert Darwin was an English naturalist, geologist, and biologist, best known for his contributions to the science of evolution. - His proposition that all species of life have descended from common ancestors is now widely accepted and considered a fundamental concept in science.
Harold C. Urey	• Harold Clayton Urey was an American physical chemist whose pioneering work on isotopes earned him the Nobel Prize in Chemistry in 1934 for the discovery of deuterium.
Stanley N. miller	• Stanley Lloyd Miller was an American chemist who made landmark experiments in the origin of life by demonstrating that a wide range of vital organic compounds can be synthesized by fairly simple chemical processes from inorganic substances.

Important Points

• Constitutional Provisions for Indian citizenship Articles are:

• The Constitution does not define the term ‘citizen’ but details of various categories of persons who are entitled to citizenship are given in Part 2 (Articles 5 to 11).

• Article 5: It provided for citizenship on commencement of the Constitution.

• Article 6: It provided rights of citizenship of certain persons who have migrated to India from Pakistan.

• Article 7: Provided Rights of citizenship of certain migrants to Pakistan.

• Article 8: Provided Rights of citizenship of certain persons of Indian origin residing outside India.

• Article 9: Provided that if any person voluntarily acquired the citizenship of a foreign State will no longer be a citizen of India.

• Article10: It says that every person who is or is deemed to be a citizen of India under any of the foregoing provisions of this Part shall, subject to the provisions of any law that may be made by Parliament, continue to be such citizen.

• Article 11: It empowers Parliament to make any provision with respect to the acquisition and termination of citizenship and all matters relating to it.

Q51. Answer: (c) 4

The triangles in the given figure are as shown below.

Hence, there are 4 triangles in the given figure.

Q52. Answer: (a) 4%

Shortcut Trick

Total Simple Interest for 6 years = Rs. 15,500 − Rs. 12,500 = Rs. 3,000

Interest for 1 year = 3,000 ÷ 6 = Rs. 500

Rate of Interest (R) = (Annual Interest ÷ Principal) × 100

R = (500 ÷ 12,500) × 100 = 4%

Therefore The correct answer is 4%.

Alternate Method

Given:

Principal (P) = Rs. 12,500

Amount (A) = Rs. 15,500

Time (T) = 6 years

Formula Used:

1. Simple Interest (SI) = Amount − Principal

2. SI = (P × R × T) ÷ 100

Calculations:

=> SI = 15,500 − 12,500 = 3,000

=> 3,000 = (12,500 × R × 6) ÷ 100

=> 3,000 = (125 × R × 6)

=> 3,000 = 750 × R

=> R = 3,000 ÷ 750

=> R = 4%

Therefore The correct answer is 4%.

Additional Information

Simple Interest Definition

Interest calculated only on the initial Principal amount throughout the entire period. SI = (P × R × T) ÷ 100.

Relationship between A, P, and SI

Total Amount (A) is the sum of Principal (P) and Interest (I). A = P + SI = P(1 + RT/100).

Rate of Interest

The annual percentage of Principal paid as interest. R = (SI × 100) ÷ (P × T).

Q53. Answer: (c) J64

The logic followed here is:

Hence, 'J64' is the next term in the given series.

Q54. Answer: (a) 97

Shortcut Trick

Identify prime numbers between 90 and 100.

Numbers to check: 91 (7×13), 92 (even), 93 (3×31), 94 (even), 95 (5×19), 96 (even), 97 (prime), 98 (even), 99 (3×33).

Only 97 is a prime number in this range.

Sum = 97.

Therefore The correct answer is 97.

Alternate Method

Given: Range of numbers from 90 to 100.

Formula Used: Definition of a prime number (a number greater than 1 that has no positive divisors other than 1 and itself).

=> List numbers: 91, 92, 93, 94, 95, 96, 97, 98, 99.

=> Check divisibility for 91: 91 ÷ 7 = 13 (Composite)

=> Check divisibility for 93: 93 ÷ 3 = 31 (Composite)

=> Check divisibility for 97: Not divisible by 2, 3, 5, 7 (Prime)

=> Only prime number found = 97.

=> Sum = 97.

Therefore The correct answer is 97.

Additional Information

Prime Numbers 1-100

There are exactly 25 prime numbers between 1 and 100. The only even prime number is 2.

Divisibility Rule of 3

A number is divisible by 3 if the sum of its digits is divisible by 3 (e.g., 9+3=12, so 93 is composite).

Co-prime Numbers

Two numbers are co-prime if their Highest Common Factor (HCF) is 1.

Q55. Answer: (c) Statements 1 and 2 together are not sufficient

Shortcut Trick

To find the total weight, we need the values of two distinct weights and the number of bars for each.

From Statement 1: 1/2 × (2 bars) = 2 kg => Weight of 1 bar = 2 kg.

From Statement 2: 1/4 × (Weight of bar) = 0.5 kg => Weight of 1 bar = 2 kg.

Since both statements provide the same weight value (2 kg), they contradict the requirement of 2 different weights.

Even if combined, we lack the value of the second distinct weight and the count of each.

Therefore The correct answer is Statements 1 and 2 together are not sufficient.

Alternate Method

Given: Total bars = 10, Number of distinct weights = 2.

Step-by-step Analysis:

From Statement 1:

=> Number of bars = 1/5 × 10 = 2 bars

=> 1/2 × (Weight of 2 bars) = 2 kg

=> Weight of 2 bars = 2 × 2 = 4 kg

=> Weight of one bar (w1) = 4 ÷ 2 = 2 kg

From Statement 2:

=> 1/4 × (Weight of a remaining bar) = 0.5 kg

=> Weight of one bar (w2) = 0.5 × 4 = 2 kg

Evaluation:

=> If w1 = 2 kg and w2 = 2 kg, there is only 1 unique weight, which contradicts 2 different weights.

=> We do not have the weight of the second category of bars or the distribution of how many bars are of which weight.

Therefore The correct answer is Statements 1 and 2 together are not sufficient.

Additional Information

Data Sufficiency Principles

A question is solvable only when the number of independent equations matches the number of unknown variables (Weights and Quantities).

Weighted Average Formula

Total Weight = (n1 × w1) + (n2 × w2), where n is the count and w is the individual weight.

Logical Constraint Check

Always verify if the derived values satisfy the constraints mentioned in the question (e.g., different weights).

Q56. Answer: (d) Millet

The correct answer is Millet.

Key Points

• Millet is not a plantation crop.

• Plantation Agriculture is a term used to describe a form of agriculture where the output is sold for commercial purposes, not for personal consumption.

• It usually involves a large area growing a singular crop over a long duration.

• This type of agriculture is mainly found in tropical and subtropical areas of the world.

• Plantation Agriculture requires a large amount of labour and capital.

• Some of the examples of plantation crops include:

• Arecanut (betel nut),

• cardamom,

• cashew,

• cocoa,

• coconut,

• coffee,

• oil palm,

• rubber, and

• tea

Additional Information

• The term plantation crop refers to those crops which are cultivated on an extensive scale in contiguous area, owned and managed by an individual or a company.

• Coconut, cashew nut, cocoa, areca nut, oil palm, and palm yrah come under the Ministry of Agriculture while tea, coffee, and rubber are dealt by Ministry of Commerce.

• Leading plantation crops producing states:

Q57. Answer: (d) The cerebrum coordinates muscle activity.

The correct answer is The cerebrum coordinates muscle activity.

Key Points

• The cerebrum is the largest part of the brain, constituting about 80% of it.

• It consists of the cerebral cortex and other subcortical structures.

• A deep cleft divides the cerebrum longitudinally into two halves, which are termed the left and right cerebral hemispheres.

• It forms the anterior, superior and lateral sides of the brain i.e., the fore, apex and side of the brain respectively.

• The cerebrum is responsible for thinking, intelligence, consciousness, and memory.

• It is also responsible for interpreting touch, hearing, and vision.

• The forebrain consists of the cerebrum, thalamus, and hypothalamus.

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Additional Information

• The Cerebellum controls things like posture, balance, muscular activity, and more.

• If the cerebellum is damaged, it could affect balance, slow movements, or produce tremors or shaking.

• The cerebellum is the second largest part of the brain, located in the posterior portion of the medulla and pons.

Q58. Answer: (b) B

According to the pie chart,

We can see company B manufactured 30% in the year 2017 which is the highest among others,

Therefore Company B manufactured the maximum number of tires.

Q59. Answer: (b) 24.53

Given:

$3\sqrt{5} + \sqrt{125} = 17.85$

Calculation:

$3\sqrt{5} + \sqrt{125} = 17.85$

$\Rightarrow 3\sqrt{5} + 5\sqrt{5} = 17.85$

$\Rightarrow 8\sqrt{5} = 17.85$

Now solve

$\Rightarrow \sqrt{80} + 7\sqrt{5} = \sqrt{(16 \times 5)} + 7\sqrt{5}$

$\Rightarrow 4\sqrt{5} + 7\sqrt{5} = 11\sqrt{5}$

$\Rightarrow 11\sqrt{5} = 17.85 \times (11\sqrt{5}/8\sqrt{5})$

$\Rightarrow 11\sqrt{5} = 17.85 \times (11/8)$

$\Rightarrow 11\sqrt{5} = 24.53$

Therefore The value of $\sqrt{80} + 7\sqrt{5}$ is 24.53.

Q60. Answer: (d) [figure]

The logic followed here is:

• Here, there are two images a circle and a triangle intersecting each other in figure 1.

• In the next step both the images move apart and a circle is transformed into two concentric circles.

Similarly,

• In figure 3, two images, a rectangle and a circle intersecting each other are given.

• In the next step, both the images move apart and the figure which is on the upper side i.e. rectangle is transformed into two concentric rectangles.

Hence, the next picture in the given series will be the figure given in option 4.

Q61. Answer: (c) R venkatramani

The correct answer is R venkatramani

Note;

• This question was asked in PYP. Therefore options were given according to that year.

• The current Attorney General of India is Hon'ble Shri R venkatramani

Key Points

• R venkatramani is the current Attorney General of India

• During the time the question was asked the Attorney Genral K k Venugoapal.

Additional Information

• Attorney General of India:

• Attorney General of India is appointed by the President of India under Article 76.

• Article 76 and 78 deal with the Attorney General of India.

• He holds office during the pleasure of the President

• The constitution has not fixed the remuneration of the AG.

• He should be qualified to be appointed a judge of the Supreme Court

• The Attorney General of India is the highest law officer in the country

• The current Attorney General is K. K. Venugopal.

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• K. K. Venugopal is the 15th Attorney General of India.

• The current Attorney General of India (16th) - R Venkataramani (1^(st) Oct. 2022).

Q62. Answer: (c) D

The logic followed here is:

• In each figure A, B, and C, the image is divided into two equal parts and one of the parts is shaded whereas, in figure D more than half of the figure is shaded.

Hence, figure D is the odd one out of the given figures.

Q63. Answer: (a) Echinodermata

The correct answer is Echinodermata.

Key Points

• Starfish belongs to the phylum Echinodermata group.

• Echinodermata are so named owing to their spiny skin (from the Greek “echinos” meaning “spiny” and “dermos” meaning “skin”).

• Echinodermata are exclusively marine organisms. Sea stars, sea cucumbers, sea urchins, sand dollars, and brittle stars are all examples of echinoderms.

Additional Information

Phylum	Description
Annelida	• Annelida includes Earthworms, Leeches, Blister worms, etc. - They are triploblastic, bilaterally symmetrical schizocoelomate protostomes. - In Annelida, the body is divided into three regions: prostomium, trunk, and pygidium.
Porifera	• Porifera includes organisms with holes. Example - (a) Sycon (b) Euspongia (c) Spongilla. - They are commonly called sponges.
Nematoda	• Their body is bilaterally symmetrical and triploblastic. They are cylindrical in shape. - Examples - ascarids (Ascaris), filariasis, hookworms, pinworms (Enterobius), and whipworms (Trichuris trichiura)

Q64. Answer: (a) Real and inverted

The correct answer is Real and inverted.

Key Points

• The image formed on the retina of the human eye is real and inverted.

• The retina comprises specialized cells that are sensitive to light, known as rod and cone cells.

• These cells get stimulated and send signals to the brain which turns them into erect images that allow us to see.

Additional Information

• The lens system of an eye forms an image on a light-sensitive screen known as the retina.

• Light enters the eye through a thin membrane known as the cornea.

• Behind the cornea, there is a structure, known as the iris. It has a major function to control the size of the pupil.

Q65. Answer: (b) 5

According to the bar graph,

In 2012 total of 50 Lakhs computers were sold

1 million = 10 lakhs

so 50 lakhs = 5 millions

Therefore 5 million personal computers were sold by Company XYZ in 2012

Q66. Answer: (c) Only assumption II is implicit.

• The statement says that he got on a bus on Wednesday, to go to Hyderabad.

• Thus it cannot be determined whether he reached Hyderabad on the very same day, or the next day or exactly when. Thus, assumption I is not implicit.

• Since it is given that he caught the bus to go to Hyderabad for an event that was on Saturday, it is safe to assume that he would try to reach there before the event ends. Thus, Assumption II is implicit.

Hence the correct answer is option 3.

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Q67. Answer: (d) 48 Kilogram

The correct answer is 48 kilogram.

Key Points

• In November 2017, India's Ritu Phogat won a silver medal in the Under 23 Senior World Wrestling Championship held in Poland. She has won the silver in the 48 kg category.

• She lost against Turkish Wrestler Demirhan in the final and won the Silver medal.

• Ritu had won the National championship in Indore in 2017. She also won a bronze medal at the Asian Championships in May 2017.

Additional Information

• Ritu Phogat is also a female wrestler who won a gold medal at the 2016 Commonwealth Wrestling Championship.

• In November 2016, she won the gold medal at the 2016 Commonwealth Wrestling Championship in Singapore in the 48 kg category.

• In October 2016, Phogat won her second consecutive title at the annual National Wrestling Championships.

Q68. Answer: (d) Calcium

The correct answer is Calcium.

Key Points

• Calcium is not from the class of alkali metals.

• Calcium (Ca) is one of the alkaline-earth metals of Group 2 (IIa) of the periodic table.

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

• It is the most abundant mineral in the body, and it is vital for bone health.

• Humans need calcium to build and maintain strong bones, and 99% of the body's calcium is in the bones and teeth.

Additional Information

• Alkali elements are Lithium(Li), Sodium(Na), Potassium (K), Rubidium (Rb), Cesium (Cs) and Francium (Fr) occupying successive periods from first to seven.

• The compounds are called alkali metals because when they react with water they usually form alkalies which are nothing but strong bases that can easily neutralize acids.

• Alkali metals belong to the s-block elements occupying the leftmost side of the periodic table.

Q69. Answer: (b) C

The mirror image of the given figure is as follows:

Hence, the mirror image of the given figure will be answer figure C.

(Note: In original paper this question has discrepancy. The lines within the figure D in question had to be changed. The lines will be as per the figure given above.)

Q70. Answer: (b) 6 cm

Shortcut Trick

Product of diagonals (d1 × d2) = 2 × Area = 2 × 4 = 8.

Sum of squares of diagonals ($d1^2 + d2^2$) = 4 × $side^2$ = 4 × 5 = 20.

Using identity: $(d1 + d2)^2 = (d1^2 + d2^2) + 2(d1 \times d2)$.

$(d1 + d2)^2 = 20 + 2(8) = 36$.

Sum of diagonals (d1 + d2) = √36 = 6 cm.

Therefore The correct answer is 6 cm.

Alternate Method

Given:

Side length of rhombus (a) = √5 cm

Area of rhombus (A) = 4 cm^2

Formula Used:

Area of rhombus = 1/2 × d1 × d2

Relation between side and diagonals: $4a^2 = d1^2 + d2^2$

Calculations:

=> 4 = 1/2 × d1 × d2

=> d1 × d2 = 8

=> $4 \times (\sqrt{5})^2 = d1^2 + d2^2$

=> 4 × 5 = $d1^2 + d2^2$

=> $d1^2 + d2^2 = 20$

=> $(d1 + d2)^2 = d1^2 + d2^2 + 2d1d2$

=> $(d1 + d2)^2 = 20 + 2 \times 8$

=> $(d1 + d2)^2 = 36$

=> $d1 + d2 = \sqrt{36} = 6$ cm

Therefore The correct answer is 6 cm.

Additional Information

Rhombus Diagonals

The diagonals of a rhombus bisect each other at right angles (90°), forming four congruent right-angled triangles.

Area Formula

The area of a rhombus can be calculated as Base × Height or 1/2 × Product of Diagonals.

Side-Diagonal Relation

The sum of the squares of the diagonals is equal to four times the square of the side: $d1^2 + d2^2 = 4a^2$.

Q71. Answer: (d) Wrestling

The correct answer is Wrestling.

Key Points

• Satyawart Kadian is associated with wrestling sports.

• He was born on 9th November 1993, in Rohtak, Haryana, India.

• The Achievements of Satyawart Kadian:

• A bronze medal in the 100 kg category at the 2010 Youth Olympic Games, held in Singapore.

• Earned a bronze medal in the 96 kg category at the World Junior Championships in 2013 that took place in Sofia.

• Bagged silver and a bronze medal in the 97 kg category at the Commonwealth Games and Asian Championships of 2014.

• Won the title at the 1st Rustam-e-International tournament which was held at Jammu in 2015.

• Clinched a gold medal in the 97 kg category at the Commonwealth Championships of 2016, held in Singapore.

• Claimed a bronze medal in the 97 kg category at the 2019 Asian Championships.

Additional Information

Sports Name	Details
Hockey	• Hockey is a term used to denote various types of both summer and winter team sports which originated on either an outdoor field, sheet of ice, or dry floor such as in a gymnasium. - The first Hockey Association was formed in the UK in 1876 and drew up the first formal set of rules.
Kabbadi	• Kabaddi is a contact team sport. - It was introduced about 4000 years ago in Tamil Nadu, India. Played between two teams of seven players. - Kabaddi was played as a demonstration event at the First Asian Games in 1951, and again in 1982, before becoming a medal event for the first time in 1990.
Football	• Football is a family of team sports that involve, to varying degrees, kicking a ball to score a goal. - In football, only the goalkeeper is permitted to handle the ball and may do so only within the penalty area surrounding the goal. -
Wrestling	• Wrestling is a combat sport involving grappling-type techniques such as clinch fighting, throws and takedowns, joint locks, pins, and other grappling holds. - The three basic types of wrestling contest are the belt-and-jacket, catch-hold, and lose styles.

Q72. Answer: (d) 20%

Shortcut Trick

For a period of 2 years, the difference (D) between CI and SI is given by: $D = P \times (R/100)^2$.

=> $800 = 20{,}000 \times (R/100)^2$

=> $(R/100)^2 = 800 \div 20{,}000 = 4 \div 100$

=> $R/100 = \sqrt{(4/100)} = 2/10$

=> R = 20%

Therefore The correct answer is 20%.

Alternate Method

Given: Principal (P) = Rs. 20,000, Time (T) = 2 years, Difference (D) = Rs. 800.

Formula Used: Difference for 2 years = $P \times (R/100)^2$

=> $800 = 20,000 \times (R/100)^2$

=> $800 \div 20,000 = (R/100)^2$

=> $8 \div 200 = (R/100)^2$

=> $4 \div 100 = (R/100)^2$

=> $(2/10)^2 = (R/100)^2$

=> $R/100 = 2/10$

=> $R = (2 \times 100) \div 10 = 20$

Therefore The correct answer is 20%.

Additional Information

CI and SI Difference for 3 Years

The formula for the difference between CI and SI for 3 years is $D = P(R/100)^2 \times (3 + R/100)$.

Effective Rate of Interest

For 2 years at R%, the effective Simple Interest rate is 2R% and the effective Compound Interest rate is $(2R + R^2/100)\%$.

Relation for 2 Years

The difference (D) between CI and SI for 2 years is also equal to the interest calculated on the first year's interest: $D = (SI \times R) \div 200$.

Q73. Answer: (b) Both conclusions follow

From the given statement, it is clear that Nayan joined the local football team in 2014, and that he helped the team to win 3 championships.

• Winning the 3 championships between 2016 and 2018 for the first time ever can be said to have led the team to reach new heights because it is mentioned that his Nayan's joining had helped the team win. Thus, conclusion I follows.

• Helping the team win 3 championships is not possible unless you are a good player. Winning a championship because of a player indicates that he has made a significant contribution. Nayan has been accredited for the teams' 3 victories. Winning directly implies success. So we can say that conclusion II follows.

Thus the correct answer is option 2.

Q74. Answer: (c) 30

Shortcut Trick

Average Speed = $45 \div 8 = 5.625$ km/hr

Using Alligation on speeds: $(10 - 5.625) : (5.625 - 3) = 4.375 : 2.625$

Ratio of Time (Walking : Cycling) = $4.375 : 2.625 = 5 : 3$

Total time 8 hours divided in 5:3 → Cycling time = 3 hours

Cycling distance = 10 km/hr × 3 hours = 30 km

Therefore The correct answer is 30 km.

Alternate Method

Given: Cycling speed (S1) = 10 km/hr, Walking speed (S2) = 3 km/hr, Total Time (T) = 8 hours, Total Distance (D) = 45 km.

Formula Used: Distance = Speed × Time

=> Let time spent cycling be 't' hours. Then walking time = $(8 - t)$ hours.

=> $(10 \times t) + 3 \times (8 - t) = 45$

=> $10t + 24 - 3t = 45$

=> $7t = 45 - 24$

=> $7t = 21$

=> $t = 3$ hours

=> Distance covered by cycle = Speed × Time = $10 \times 3 = 30$ km

Therefore The correct answer is 30 km.

Additional Information

Alligation Rule for Speed

When alligation is applied to speeds, the resulting ratio is always the ratio of the time taken for each part of the journey.

Average Speed Formula

Average Speed = Total Distance traveled ÷ Total Time taken.

Distance Equation

D = (S1 × T1) + (S2 × T2), where T1 + T2 = Total Time.

Q75. Answer: (a) This is 337.5% of the volume of the original box.

Shortcut Trick

Original dimension 100% increases by 50% (half), becoming 150% or 1.5 times.

Volume is proportional to the cube of the dimension (side³).

New Volume = $(1.5)^3$ × Original Volume = 3.375 × Original Volume.

Percentage = 3.375 × 100 = 337.5%.

Therefore The correct answer is 337.5%.

Alternate Method

Given: Original side of cubical box = a. Increase in dimension = a/2.

Formula Used: Volume of cube = side³ | Percentage = (New/Original) × 100.

=> Original Side = a

=> New Side = a + a/2 = 1.5a

=> Original Volume (V1) = a^3

=> New Volume (V2) = $(1.5a)^3 = 3.375a^3$

=> Percentage of original volume = (V2 / V1) × 100

=> Percentage = $(3.375a^3 / a^3) \times 100 = 337.5\%$

Therefore The correct answer is 337.5%.

Additional Information

Volume Scaling

If the linear dimensions of a 3D object are multiplied by a factor k, the volume is multiplied by k^3.

Surface Area Scaling

If the linear dimensions are multiplied by k, the surface area is multiplied by k^2 (e.g., $1.5^2 = 2.25$ or 225%).

Percentage Increase in Volume

Percentage increase = [(New Volume − Original Volume) / Original Volume] × 100 = 237.5%.

Q76. Answer: (d) 175 J

The correct answer is 175 J.

Concept:

• Kinetic energy (K.E): The energy possessed by a body by the virtue of its motion is called kinetic energy.

The expression for kinetic energy is given by:

$KE = 1/2mv^2$

Where m = mass of the body and v = velocity of the body

• Momentum (p): The product of mass and velocity is called momentum.

Momentum (p) = mass (m) × velocity (v)

The relationship between the kinetic energy (KE or k) and Linear momentum is given by:

As we know,

$KE = 1/2mv^2$

Divide numerator and denominator by m, we get

$KE = 1/2(m^2v^2)/m = 1/2((mv)^2)/m = 1/2(p^2)/m$ [p = mv]

Therefore $KE = 1/2(p^2)/m$

$p = \sqrt{2mKE}$

Calculation:

Given, Mass = 14 kg

velocity = 5 ms-1

We know that,

Kinetic energy = $1/2 \times mv^2$

Kinetic energy = 1/2 × 14 × 5² = 7 × 25 = 175 J

Q77. Answer: (b) Strong acid and strong base

The correct answer is Strong acid and strong base.

Key Points

• Strong acid and strong base neutralise each other and make a neutral salt solution which carry pH 7.

• For example NaOH strong base mix with Strong Acid HCl form a neutral salt NaCl.

• This is an ordinary salt used in cooking.

• Salts of a strong acid and a strong base are neutral with pH value of 7.

• On the other hand, salts of a strong acid and weak base are acidic with pH value of less than 7

• and those of a strong base and weak acid are basic in nature, with pH value of more than 7.

Additional Information

• pH is defined as the negative logarithm of H+ ion concentration. Hence the meaning of the name pH is justified as the power of hydrogen.

• Solutions having a value of pH ranging 0 to 7 on the pH scale are termed as acidic and the value of pH ranging 7 to 14 on the pH scale are known as basic solutions.

• Pure water has a pH value of 7.

• The basicity decreases as the value of pH decreases from 14 to 7.

Q78. Answer: (a) Bhangar

The correct answer is Bhangar.

Key Points

• Old alluvial soil is known as Bhangar and is full of Kankars (lime nodules).

• The Bhangar is the older alluvium along the river beds forming terraces higher than the floodplain.

• Bhangar contains fossils of animals like rhinoceros, hippopotamus, elephants, etc.

• This type of soil is found in mountainous regions. This type of soil is found in huge amount in the North Indian Plains.

Additional Information

Type of soil	Description
Regur	• The parent material for most of the black soil is the volcanic rocks that were formed in the Deccan Plateau (Deccan and the Rajmahal trap). - It is also known as black soil.
Clay	• Clay Soil is a heavy soil type that benefits from high nutrients.
Khadar	• The Khadar is composed of newer alluvium and forms the flood plains along the river banks. - A new layer of alluvium is deposited by river floods almost every year. It is very fertile.

Q79. Answer: (c) 23

Shortcut Trick

Number of leap years in 100 years is either 24 or 25.

In a standard 100-year interval (like 1 to 100), the 100^(th) year is usually not a leap year unless divisible by 400.

Commonly, X = 24 (e.g., years 1801−1900).

Calculation: X − 1 = 24 − 1 = 23.

Therefore The correct answer is 23.

Alternate Method

Given: Interval of 100 years.

=> A year is a leap year if divisible by 4, but century years must be divisible by 400.

=> In any 100-year block, there are at most 25 multiples of 4.

=> Case 1: If the century year is not divisible by 400 (e.g., 1900), X = 24.

=> Case 2: If the century year is divisible by 400 (e.g., 2000), X = 25.

=> Looking at options, if X = 24, then X − 1 = 23.

=> Looking at options, if X = 25, then X − 1 = 24.

=> Since 23 is provided and standard 100-year intervals (like a century) usually have 24 leap years:

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=> X − 1 = 24 − 1 = 23.

Therefore The correct answer is 23.

Additional Information

Leap Year Rule

A year is a leap year if it is divisible by 4, except for century years which must be divisible by 400.

Odd Days in a Century

100 years contain 5 odd days (76 ordinary years + 24 leap years).

Leap Century

A century like 400, 800, 1200, 1600, 2000 is a leap century and contains 25 leap years.

Q80. Answer: (d) 81 Profit

Shortcut Trick

Profit/Difference between Compound Interest (CI) and Simple Interest (SI) for 2 years = P × (R/100)²

Given Principal (P) = Rs. 22,500 and Rate (R) = 6%

Difference = 22500 × (6/100) × (6/100) = 22500 × 36/10000

Difference = 2.25 × 36 = 81

Since CI is always greater than SI for the same period and rate, it is a Profit.

Therefore The correct answer is 81 Profit.

Alternate Method

Given: Principal (P) = Rs. 22,500, Time (T) = 2 years, Rate (R) = 6% per annum.

Formula Used: SI = (P × R × T)/100 | CI = P × [(1 + R/100)^T − 1]

Step 1: Calculate Simple Interest (Borrowing)

=> SI = (22500 × 6 × 2) ÷ 100

=> SI = 225 × 12 = Rs. 2,700

Step 2: Calculate Compound Interest (Lending)

=> CI = 22500 × [(1 + 6/100)² − 1]

=> CI = 22500 × [(1.06)² − 1]

=> CI = 22500 × [1.1236 − 1]

=> CI = 22500 × 0.1236 = Rs. 2,781

Step 3: Calculate Profit

=> Profit = CI − SI

=> Profit = 2781 − 2700 = Rs. 81

Therefore The correct answer is 81 Profit.

Additional Information

Difference between CI and SI for 2 years

The difference is always calculated as P × (r/100)².

Difference between CI and SI for 3 years

The formula is P × (r/100)² × (3 + r/100).

Effective Rate of Compound Interest

For 2 years at rate r%, the effective CI rate is r + r + (r × r)/100.

Q81. Answer: (c) 8

The right angled triangles in the given figure are as shown below.

Hence, there are 8 right-angled triangles in the given figure.

Q82. Answer: (a) 30

Concept Used:

Follow the BODMAS rule according to the table given below:

Calculation:

(2 + 5) × 4 + (4/2) = ?

=> 7 × 4 + 4/2 = ?

=> 28 + 4/2 = ?

=> 28 + 2 = ?

=> 30 = ?

Therefore The value of ? is 30

Q83. Answer: (c) Balakrishna Doshi

The correct answer is Balakrishna Doshi.

Key Points

• Balakrishna Doshi became the first Indian to win the prestigious Pritzker Prize for his outstanding lifelong contribution to architecture, in March 2018.

• He was awarded the year's Pritzker Prize for being able to interpret architecture and transform it into buildings that respect Eastern culture.

• Pritzker Prize is regarded as architecture's equivalent to the Nobel Prize.

Additional Information

About Pritzker award:

• Pritzker award is awarded each year to a living architect/s for significant achievement, was established by the Pritzker family of Chicago through their Hyatt Foundation in 1979.

• It is granted annually and is often referred to as “architecture’s Nobel” and “the profession’s highest honor.”

• The award consists of $100,000 (US) and a bronze medallion.

• The award is conferred on the laureate/s at a ceremony held at an architecturally significant site throughout the world.

Q84. Answer: (b) Law of conservation of energy

The Correct Answer is Option 2. Law of conservation of energy

Key Points

• The law of conservation of energy states, "Energy can neither be created nor destroyed, but it can be converted from one form to another."

• The law of conservation of energy states that "In a closed system, that is, a system that is isolated from its surroundings, the total energy of the system remains constant."

Q85. Answer: (d) 10:30 am

Shortcut Trick

To find when two people meet at the starting point, calculate the LCM of their individual times.

LCM of 30 and 45 = 90 minutes.

90 minutes = 1 hour 30 minutes.

Meeting time = 9:00 am + 1 hour 30 minutes = 10:30 am.

Therefore The correct answer is 10:30 am.

Alternate Method

Given: Time taken by Mary = 30 minutes, Time taken by Sila = 45 minutes, Starting time = 9:00 am.

Formula Used: Time to meet at starting point = LCM(Time1, Time2, ...)

=> Prime factors of 30 = $2 \times 3 \times 5$

=> Prime factors of 45 = $3^2 \times 5$

=> LCM = $2 \times 3^2 \times 5 = 2 \times 9 \times 5 = 90$ minutes

=> Convert minutes to hours: $90 \div 60 = 1.5$ hours = 1 hour 30 minutes

=> Meeting time = 9:00 am + 1 hour 30 minutes = 10:30 am

Therefore The correct answer is 10:30 am.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is divisible by both numbers. It is used to solve problems involving events that repeat at different intervals.

Circular/Closed Path Meeting

Time to meet anywhere on track = Distance ÷ Relative Speed. Time to meet at starting point = LCM of individual times taken for one full round.

Relative Speed

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

Q86. Answer: (b) Grandmother or grandfather

Preparing the family tree using the following symbols:

• A's mother is B's sister and C's daughter.

• D is the son of B and brother of E.

Here, gender of C is not specified. Therefore, C can be either grandfather or grandmother of E.

Hence, 'Grandmother or grandfather' is the correct answer.

Q87. Answer: (b) C

The correct answer is Boat.

Key Points

• The class Reptilia comprises three major groups of extant vertebrates turtles, crocodilians, and squamates (lizards and snakes).

• Reptiles are cold-blooded vertebrates. (Vertebrates have backbones.) They have dry skin covered with scales or bony plates and usually lay soft-shelled eggs.

• Reptiles are air-breathing vertebrates covered in special skin made up of scales, bony plates, or a combination of both.

Additional Information

• A boat is a watercraft of a large range of types and sizes, but generally smaller than a ship, which is distinguished by its larger size, shape, cargo or passenger capacity, or its ability to carry boats.

• Small boats are typically found on inland waterways such as rivers and lakes, or in protected coastal areas.

Q88. Answer: (d) Valency

The correct answer is Valency.

Key Points

• The valence power (potential) of an element is called valency.

• The valence is known as an element’s combining power. Some elements vary in their ability to interact with other elements, depending on the nature of the reaction.

• Valency is the combining capacity of an element.

• The number of electrons donated or accepted by an atom of an element so as to have an electronic configuration of the nearest noble gas is called its valency.

Additional Information

Q89. Answer: (c) 29

Shortcut Trick

Net change in pencils = (+ 5 − 3 + 7 + 5) = + 14 pencils

Final count on Saturday = Initial count + Net change

Final count = 15 + 14 = 29 pencils

Therefore The correct answer is 29.

Alternate Method

Given: Initial Pencils = 15

=> Pencils on Tuesday = 15 + 5 = 20

=> Pencils on Wednesday = 20 − 3 = 17

=> Pencils on Thursday = 17 + 7 = 24

=> Pencils on Friday = 24 + 5 = 29

=> On Saturday, Seema will have the same amount as Friday evening.

Therefore The correct answer is 29.

Additional Information

Addition and Subtraction Logic

Items received are treated as positive integers (+) and items given away are treated as negative integers (−).

Net Change Method

Sum up all the changes first to find the resultant value before applying it to the initial quantity.

Q90. Answer: (c) 7 m

Shortcut Trick

Apply Pythagorean Triplets directly for the two right-angled triangles formed by the stair.

For height 4 m and hypotenuse 5 m: Base1 = $\sqrt{(5^2 - 4^2)}$ = 3 m.

For height 3 m and hypotenuse 5 m: Base2 = $\sqrt{(5^2 - 3^2)} = 4$ m.

Width of road = Base1 + Base2 = 3 + 4 = 7 m.

Therefore The correct answer is 7 m.

Alternate Method

Given: Length of stair (Hypotenuse) = 5 m. Height of window 1 = 4 m. Height of window 2 = 3 m.

Formula Used: Pythagoras Theorem: Hypotenuse^2 = Base^2 + Perpendicular^2

=> Let the distance from the foot of the stair to the first wall be x and to the second wall be y.

=> For the first wall: $5^2 = x^2 + 4^2$

=> $25 = x^2 + 16$

=> $x^2 = 25 - 16 = 9$ => $x = 3$ m

=> For the second wall: $5^2 = y^2 + 3^2$

=> $25 = y^2 + 9$

=> $y^2 = 25 - 9 = 16$ => $y = 4$ m

=> Width of the road = x + y = 3 + 4 = 7 m

Therefore The correct answer is 7 m.

Additional Information

Pythagorean Triplets

Common sets of three integers that satisfy $a^2 + b^2 = c^2$, such as (3, 4, 5), (5, 12, 13), and (8, 15, 17).

Right-Angled Triangle Area

The area of a right-angled triangle is given by Area = 1/2 × Base × Height.

Q91. Answer: (a) 55

The logic followed here is:\

• In one minute, minute hand moves = 360/ 60 = 6º

• In one hour, hour hand moves = 360/ 12 = 30º

• In one minute hour hand moves = 30/60 = 1/2º

• So, the relative distance between both the hands in one minute = 6º - 1/2º = 5 1/2 º

• In other words, in one minute, the minute hand gains 5 1/2 º more than hour hand.

• In one hour the gain will be = 5 1/2 º × 60 = 330º

• In other words, the minute hand will gain [330/6 = 55] 55 minutes to the hour hand. or the minute hand moves by 55 minutes in an hour.

Hence, '55' is the correct answer.

Q92. Answer: (a)

The given statement asks whether student organizations should be banned or not.

• Argument I suggests that students and organizations are two separate entities.

• It claims that banning is the only way to put a stop to the aggression of the organizations.

• However, there is a cause for every problem. There must be a reason behind the aggression of student organisations.

• Addressing the concerns of the organization would be one of the ways as well as a good choice instead of taking an extreme step like banning them.Therefore, argument I is not strong.

• Argument II is strong because it is a democratic right of the students to form organizations and banning them will be against these rights. Thus, only argument II is strong.

So, the correct answer is option 1.

Q93. Answer: (b) D

The logic followed here is:

• In each figure A, B and C there are two images; a circle and a polygon present within the circle.

• Also, both the images are different. Whereas, in figure D there are two images but both are same i.e circle.

Hence, figure D is the odd one.

Q94. Answer: (c) 16

Shortcut Trick

Use the product of speed formula: Distance = [S1 × S2 / (S1 − S2)] × Time Difference

Let Actual Speed = s. Then New Speed = s − 4.

96 = [s × (s − 4) / 4] × 2 => 192 = s(s − 4).

Factorize 192 into two numbers with a difference of 4: 16 × 12 = 192.

Therefore The correct answer is 16 km/h.

Alternate Method

Given: Total Distance = 96 km, Speed Reduction = 4 km/h, Time Increase = 2 hours.

Formula Used: Time = Distance ÷ Speed

=> Case 1 Time (T1) = 96/s

=> Case 2 Time (T2) = 96/(s − 4)

=> T2 − T1 = 2

=> 96/(s − 4) − 96/s = 2

=> 96 [(s − (s − 4)) / (s(s − 4))] = 2

=> 96 × 4 / (s^2 − 4s) = 2

=> 384 = $2s^2$ − 8s

=> s^2 − 4s − 192 = 0

=> (s − 16)(s + 12) = 0

=> s = 16 (since speed cannot be negative).

Therefore The correct answer is 16 km/h.

Additional Information

Average Speed

If a person covers two equal distances at speeds x and y, the average speed is 2xy/(x + y).

Speed-Time Inversity

For a constant distance, speed is inversely proportional to time (S1/S2 = T2/T1).

Relative Speed

When two objects move in the same direction, relative speed is S1 − S2. In opposite directions, it is S1 + S2.

Q95. Answer: (d) ms^(-2)

The correct answer is ms-2.

Key Points

• SI unit of acceleration is ms-2.

• Acceleration is defined as the rate of change of velocity with respect to time.

• A body's acceleration is the final result of all the forces being applied to the body, as defined by Newton's second law.

• Acceleration is a vector quantity that is described as the frequency at which a body's velocity changes. It is also the second derivative of position with respect to time or it is the first derivative of velocity with respect to time.

Key Points

• SI unit and Formula:

• The S.I unit for acceleration is meter per second square or m/s2.

• Mathematically acceleration is denoted as a= Change in velocity / Time taken.

Additional Information

• The types of acceleration are:

• Uniform acceleration: When an object is traveling in a straight line with an increase in velocity at equal intervals of time, then the object is said to be in uniform acceleration. The free-falling of an object is an example of uniform acceleration.

• Non-uniform acceleration: When an object is traveling with an increase in velocity but not at equal intervals of time is known as non-uniform acceleration. Bus moving or leaving from the bus stop is an example of non-uniform acceleration.

• Instantaneous acceleration: The acceleration of an object at any instant of time is known as instantaneous acceleration.

Q96. Answer: (a) Nepal

The correct answer is Nepal.

Key Points

• The Arun-III hydropower plant is being developed on the Arun River in Sankhuwasabha District of Province 1, East Nepal.

• It is an export-oriented project with a power generation capacity of 900MW.

• The estimated to cost more than $1.6bn, the hydropower plant will produce 4,018.87 million units of electricity a year.

Additional Information

• It is being developed on a build-own-operate and transfer (BOOT) basis by Satluj Jal Vidyut Nigam (SJVN).

• SJVN was established in 2013 with an aim to plan, promote, organize and execute the Arun-III power plant.
• The hydropower plant construction commenced in May 2018 and completion is scheduled for 2023.

Q97. Answer: (a) Distance

The correct answer is Distance.

Key Points

• An odometer is a device that is used for measuring the distance traveled by a vehicle.
• The odometer is usually situated in the vehicle's dashboard.
• The word "odometer" is derived from two Greek words meaning path and measure.
• Odometer is also used by people who construct roads and survey lands.

Additional Information

Device	Description
Speedometer	It is the device used in a vehicle to measure the speed of that vehicle.
Barometer	It is a scientific instrument used to measure atmospheric pressure, also called barometric pressure.
Olfactometer	It is an instrument used to detect and measure odor dilution

Q98. Answer: (a) NQ

The place value table is as follows:

The logic followed here is:

Hence, 'NQ' will be the next letter pair of the given series

Q99. Answer: (c) 405

Shortcut Trick

Identify common factors: All numbers 108, 135, and 162 are multiples of 27.

Numbers: 27×4, 27×5, 27×6.

LCM (P) = 27 × LCM(4, 5, 6) = 27 × 60 = 1620.

Value required = P ÷ 4 = 1620 ÷ 4 = 405.

Therefore The correct answer is 405.

Alternate Method

Given: Numbers 108, 135, and 162. LCM = P.

Formula Used: Prime Factorization for LCM.

=> Prime factorization of 108 = $2^2 \times 3^3$

=> Prime factorization of 135 = $3^3 \times 5^1$

=> Prime factorization of 162 = $2^1 \times 3$^4

=> LCM (P) = 2^(max(2,0,1)) × 3^(max(3,3,4)) × 5^(max(0,1,0))

=> P = $2^2 \times 3$^4 × 5 = 4 × 81 × 5 = 1620

=> P ÷ 4 = 1620 ÷ 4 = 405

Therefore The correct answer is 405.

Additional Information

LCM (Least Common Multiple)

Smallest positive integer divisible by all numbers in the set. Calculated by product of highest powers of all prime factors.

HCF and LCM Relation

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

LCM of Fractions

LCM of fractions = LCM of Numerators ÷ HCF of Denominators.

Q100. Answer: (d) CaCl2

The correct answer is CaCl2.

Key Points

• If the weather is very humid, you will have to remove the emitted gas through a dry tube containing anhydrous calcium chloride

CaCl_(2.)

• Anhydrous CaCl2 absorbs moisture to keep the gas in the dry state

• Calcium Chloride is a hygroscopic salt i.e. it absorbs moisture from the surroundings.

Additional Information

Gas	Description
Ca(OH)2	Calcium hydroxide, also called slaked lime, Ca(OH)2, is obtained by the action of water on calcium oxide.
NaCl	Sodium chloride (NaCl), also known as salt, is an essential compound our body uses to: absorb and transport nutrients. maintain blood pressure.
NaOH	Sodium hydroxide (Na OH), also known as lye or caustic soda, is a caustic metallic base. It is used to produce soaps, rayon, paper, products that explode, dyes, and petroleum products.

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