RRC Group D Previous Year Paper 53 (Held On: 5 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. Which of these objects does not have kinetic energy?

(a) Blowing wind
(b) Raised hammer
(c) Rolling stone
(d) Moving bullet

Q2. _____ reacts vigorously with water to form slaked lime.

(a) $CaCl_2$
(b) CaO
(c) $CaCO_3$
(d) $Ca(OH)_2$

Q3. Ohm-m is the unit of _____.

(a) Resistivity
(b) Electric current
(c) Charge
(d) Resistor

Q4. The Battle of Ghaghra was fought in the year _____.

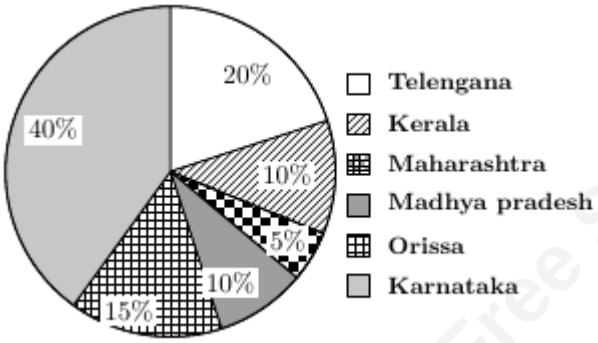
(a) 1523
(b) 1529
(c) 1525
(d) 1526

Q5. 18 ÷ 1/8 of {11 + 16 - (10 + 7 - 6+8)} = ?

(a) 6
(b) 9
(c) 18
(d) 3

Q6. Study the following pie chart and select the answers that follow the questions. The given pie chart shows the sales details of a mobile company in different states.

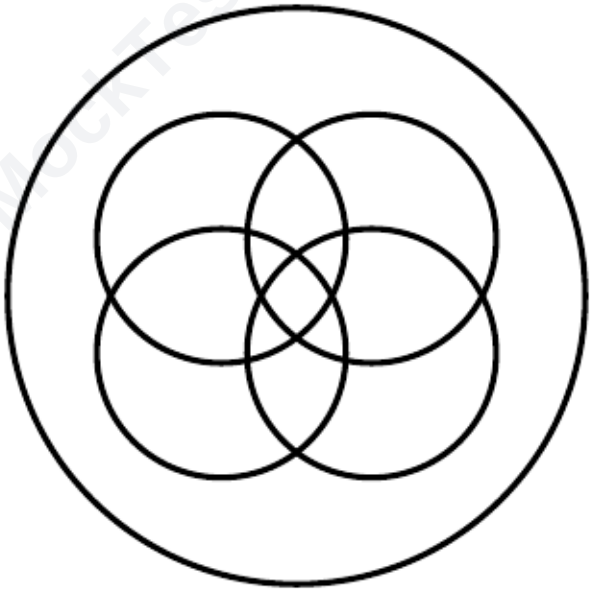
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If a total of 120 million units of mobile phones were sold, then how many units were sold (in millions) in Karnataka region?

(a) 48
(b) 56
(c) 12
(d) 24

Q7. Find the number of circles in the figure?



(a) 5
(b) 10
(c) 8
(d) 3

Q8. Which Indian anti-hunger activist was awarded the Queen's Young Award in England in 2017?

(a) Ruchi Nadkarni
(b) Ankit Kavanna
(c) Rashi Anand
(d) Mamraj Agrawal

Q9. Arrange the following ratios in descending order, which number will be last?

11:14, 17:21, 5:7, 2:3

(a) 17:21
(b) 5:7
(c) 2:3
(d) 11:14

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Q10. The Principal has selected 13 students to form the student council of which 7 are boys and 6 are girls. 5 students are to be selected of which at least 3 are boys. In what ways can the students be selected?

(a) 765
(b) 760
(c) 768
(d) 756

Q11. Who was conferred with the Padma Bhushan award in the 2018 Sports (Cricket) category?

(a) MS Dhoni
(b) Sachin Tendulkar
(c) Anil Kumble
(d) Irrfan Pathan

Q12. What would you call the air pressure?

(a) Evaporation
(b) Condensation
(c) Atmospheric Pressure
(d) Temeprature

Q13. 40 men can complete a piece of work in 6 days. In how many days will 36 men complete the same work?

(a) 6 2/3
(b) 7 2/3
(c) 8 3/4
(d) 8 2/3

Q14. For which of these states, the National Mission for Clean Ganga (NMCG) has approved five 'Namami Gange' programs worth Rs. 295.01 crore?

(a) West Bengal, Uttar Pradesh and Jharkhand
(b) Maharashtra, Bihar and Jharkhand
(c) Tamil Nadu, Karnataka and Kerala
(d) Andhra Pradesh, Telangana and Kerala

Q15. Who was the first Indian to win the Nobel Prize?

(a) Rabindranath Tagore
(b) Mahatma Gandhi
(c) Amartya Sen
(d) C. V. Raman

Q16. Who among the following kings got the Brihadeshwara temple built at Thanjavur?

(a) Aaraajit
(b) Raja Chola
(c) Uttam Chola
(d) Vijayalaya Chola

Q17. In a Mendelian test, tall pea plants with violet flowers and short flowers with white flowers were used for breeding. All the flowers of their progeny were violet in color but about half of the plants were small in stature. This shows that the genetic composition of tall plants can be represented as_____.

(a) TtWW
(b) TTww
(c) TtWw
(d) TTWW

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Q18. Seventeen years from now, Chetna's age will be twice that of Mahim. Five years ago today, Mahim's age was one year less than 1/3 of Chetna's age. What is the present age of Chetna?

(a) 65 years
(b) 63 years
(c) 67 years
(d) 61 years

Q19. The electronic configuration of an element is 2, 8, 5, then find its number of protons?

(a) 8
(b) 15
(c) 2
(d) 5

Q20. The sum of a fraction and its reciprocal is 2 25/66. The greater of the two numbers is-

(a) 1 15/22
(b) 1 5/6
(c) 1 20/33
(d) 1 5/11

Q21. Who was honored with the 'Social Entrepreneur of the Year' award at the 7th Asian Awards in London?

(a) Ajay Singh
(b) Rashesh Shah
(c) Nitin Kamath
(d) Nisha Dutt

Q22. Where is Angel Falls located?

(a) Venezuela
(b) Brazil
(c) United States of America
(d) China

Q23. Read the given statements and conclusions carefully and find which of the conclusions logically follows from the statement-

Statements:

1. All glass are sand.

2, All sand is earth.

Conclusion:

1. All glass is earth.

2. Some earth are sand.

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

Q24. Reconstitution of a divisor is $1/(5 + 3\sqrt{2})$ = ?

(a) $(5 - 2\sqrt{3})/12$
(b) $(5 + 2\sqrt{3})/12$
(c) $(5 - 3\sqrt{3})/12$
(d) $(5 - 3\sqrt{2})/7$

Q25. Lichen Plant belongs to _____ Division

(a) Bryophyta
(b) Thallophyta
(c) Pteridophyta

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(d) Angiosperm

Q26. Of the two pipes that fill a tank, one pipe works 1.5 times efficiently than the other. If both these pipes work together with a discharge pipe which alone can empty the tank in 12 hours, then the empty tank can be filled in 28 hours. In how much time will the less efficient pipe alone fill the empty tank?

(a) 21
(b) 18
(c) 24
(d) 15

Q27. The force (f) is inversely proportional to the square of 'd', if the factor of 4 in 'd' is increased, then F becomes _____ times smaller.

(a) 1/16
(b) 1/2
(c) 1/8
(d) 1/4

Q28. The LCM of 5, 180, and 24 is:

(a) 3
(b) 6
(c) 540
(d) 360

Q29. Consider the given statements to be true even if they seem to be at variance with commonly known facts and decide which of the given conclusions logically follows from the given statements-

Conclusion:

1. Some tomatoes are hot.
2. All the peas are hot.

Conclusion:

1. Some hot are peas.
2. Some hot are tomatoes.

(a) Either 1 or 2 follows.
(b) Both 1 and 2 follow.
(c) Only 1 follows.
(d) Only 2 follows.

Q30. When the barometric readings suddenly decrease, it indicates that the weather _____.

(a) will be very warm.
(b) Will be very pleasant.
(c) Will be very cold.
(d) Will be very stormy.

Q31. The measure of each interior angle of a normal pentagon is _____.

(a) 180°
(b) 108°
(c) 115°
(d) 120°

Q32. Who inaugurated the 'World Hindi Secretariat' in Mauritius in 2018?

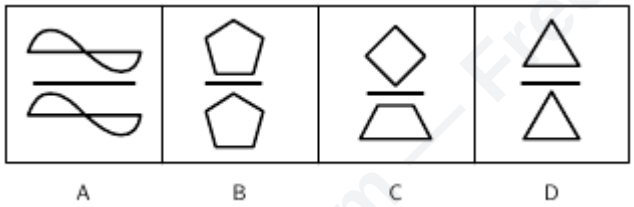
(a) Venkaiah Naidu
(b) Ramnath Kovind
(c) Narendra Modi
(d) Rajnath Singh

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Q33. A vehicle at 40 km/h can complete its journey in 7 hours. If the same distance is to be covered in 5 hours, what should be the speed of the vehicle?

(a) 46 km/h
(b) 56 km/h
(c) 50 km/h
(d) 60 km/h

Q34. Find a different figure from the given figures-

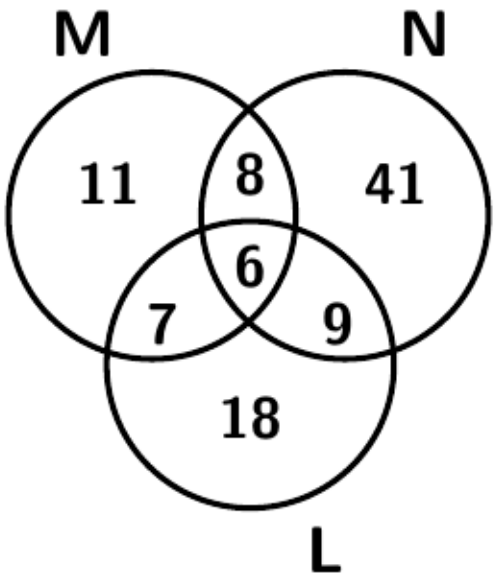


(a) A
(b) B
(c) C
(d) D

Q35. A sum at the end of 3 3/4 years at 6% simple interest per annum yields a total amount of Rs. 2,940. What was the amount invested?

(a) Rs. 2,350
(b) Rs. 2,400
(c) Rs. 2,550
(d) Rs. 2,600

Q36. The diagram shows the three games M, N and L played by the students in a class. Total students who played only one game are:



(a) 71
(b) 75
(c) 70
(d) 72

Q37. In the modern periodic table, Silicon (Z = 14) is placed between ___ and _____.

(a) Be & C
(b) Al & P
(c) Be & N

(d) Al & S

Q38. A car was bought for Rs. 16,000. Its value is reduced by 10% per annum. What will be the value after 2 years?

(a) Rs. 12060
(b) Rs. 12960
(c) Rs. 12000
(d) Rs. 12900

Q39. How is Manohar's father's sister's daughter related to him?

(a) Aunt
(b) Grandmother
(c) Mother
(d) Cousin

Q40. Which type of animals are called Hatching animals?

(a) Newborn Baby
(b) Newborn
(c) Oviparous
(d) Star Fish

Q41. $110 \div [53 - \{4^3 - (37 - 136 \div 17 \times 2)\}] = ?$

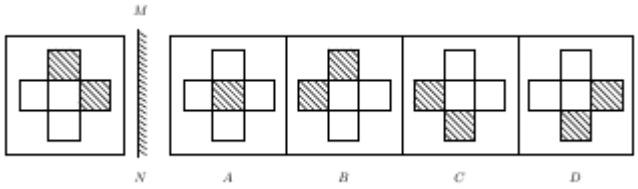
(a) 5
(b) 22
(c) 11
(d) 10

Q42. Select the alternative which has the same relation to the third word as the second word is to the first word.

Repair : Edit :: Modify :

(a) Change
(b) Cancel
(c) Leave
(d) Bend

Q43. Select the mirror image of the figure given below.



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

Q44. A worker takes a 15 kg piece from the ground and puts it on his head, 1.0 m above the ground. Calculate the work done by him on the goods. (g = 10 ms^(-2))

(a) 155 J
(b) 150 J
(c) 140 J
(d) 100 N

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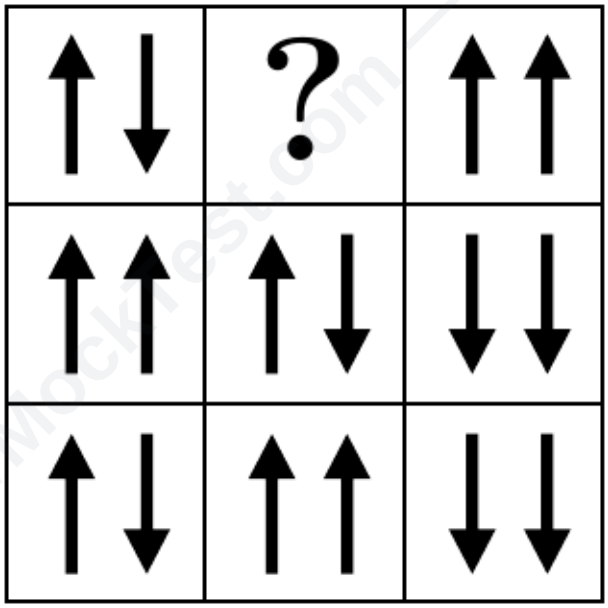
Q45. Which of the following statement(s) is/are true?

A. Hardness: It is the property of matter to allow volume reduction under high pressure and this property is shown by gases.

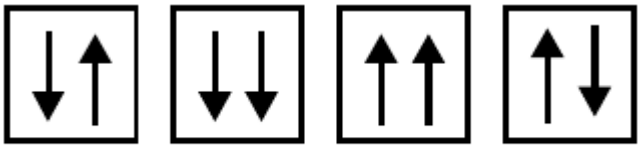
B. Shape: It is the property of a substance that flows easily and allows it to change its shape under external force and this property is exhibited by both liquids and gases.

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

Q46.



From the given alternatives, select the figure which can be substituted for the question mark.



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

Q47. Which alphanumeric set follows the given series?

S-81, ?, O-49, M-36, K-25

(a) K-40
(b) Q-68
(c) Q-64
(d) V-75

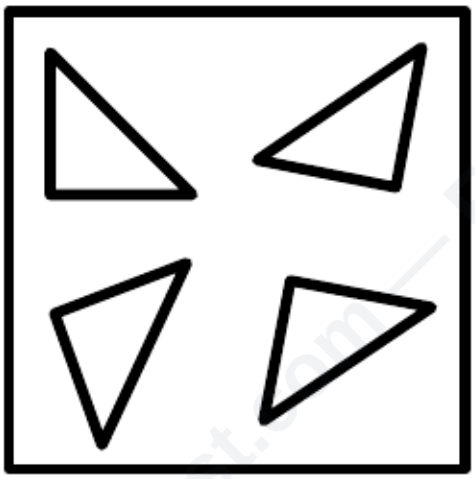
Q48. Which of the following mixtures of carbon has the highest temperature of liquefaction and boiling?

(a) Acetic Acid
(b) Chloroform
(c) Ethanol
(d) Methane

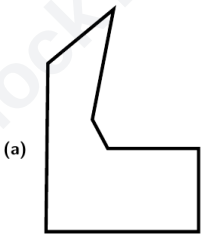
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Q49. Consider the following figure (X), figures a, b, c, and d the figure that can be formed by the pieces of figure (X)-

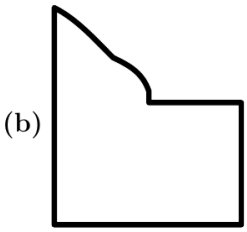
X



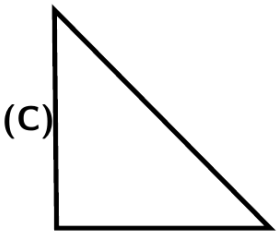
(a)



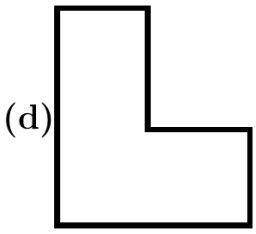
(b)



(c)



(d)



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Q50. A survey found that 45% of the employees work in company A, 45% work in company B and 10% work in both the companies. If 20% of the population does not work, then what is the total number of employees working in company A, given that the total population is 400?

(a) 140
(b) 133
(c) 160
(d) 144

Q51. The Gobi Desert separates the borders of the two countries. One of them one is China. Which is the other country?

(a) United States
(b) Mongolia
(c) India
(d) Afghanistan

Q52. Who replaced Pahlaj Nihalani as Censor Board Chief in 2017?

(a) Shabana Azmi
(b) Prasoon Joshi
(c) Javed Akhtar
(d) Anurag Basu

Q53. Sneha got an average of 25 marks in 16 exams. Priyal got an average of 23 marks but appeared in only 12 examinations. What is the average marks obtained by Priyal in the remaining 4 examinations to be equal to Sneha's performance?

(a) 25
(b) 27
(c) 31
(d) 29

Q54. Just as the second term is related to the first term, in the same way the third term is related to

Assam : Dispur :: Andhra Pradesh : _____

(a) Amravati
(b) Trivandrum
(c) Kolkata
(d) Mumbai

Q55. The incomplete dissolution of a substrate in the absence of oxygen is called _____.

(a) Differential respiration
(b) Anoxic respiration
(c) Oxygenation
(d) Vascular respiration

Q56. _____ is the most ductile metal.

(a) Cu
(b) Al
(c) Au
(d) Zn

Q57. Read the given data and answer the questions given below-

L, M, N, O and P are five friends who are sitting in a circular table and facing towards the centre. N suddenly sits to the left of P. L sits between O and P. Who is sitting between M and L?

(a) N
(b) P
(c) O
(d) O & N

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Q58. Which of the following became the first bank in India to offer instant PPF account facility?

(a) HDFC Bank
(b) Kotak Mahindra Bank
(c) KYB
(d) ICICI Bank

Q59. A current of 0.8 A is drawn by a filament of an electric bulb in 5 minutes. Find the amount of electric charge flowing through the circuit.

(a) 240 C
(b) 4 C
(c) 40 C
(d) 24 C

Q60. Find the value of the following equation-

$((469 + 144)^2 - (469 - 144)^2)/(2(469 \times 144)) = ?$

(a) -2
(b) -1
(c) 1
(d) 2

Q61. Which of these airports ranked first in the Customer Satisfaction Index (CSI) Survey 2017?

(a) Trichy International Airport
(b) Swami Vivekananda Airport, Raipur
(c) Indira Gandhi Airport, Delhi
(d) Chhatrapati Shivaji International Airport, Mumbai

Q62. Pranitha goes in the north direction, then takes a right turn, again takes a right turn and then takes a left turn. In which direction is Pranitha going now?

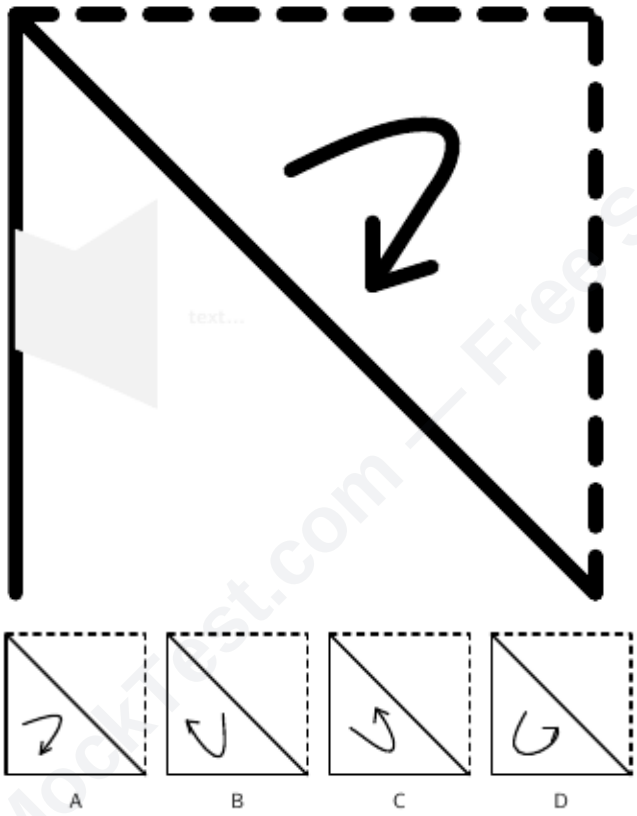
(a) East
(b) West
(c) South
(d) North

Q63. A force of 20 N is acting on an object. If the object is displaced through 4 m in the direction of the force, then the work done is-

(a) 80 W
(b) 80 Pa
(c) 80 N
(d) 80 J

Q64. When it is folded on the dotted line, which pattern will be the same as the sheet?

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

Q65. What is the name of the bank which is currently using Ranveer Singh as his celebrity endorser to open a bank account named as '811'.

(a) Kotak Mahindra Bank
(b) State Bank of India
(c) ICICI Bank
(d) Indian Bank

Q66. Below are given two assumptions numbered I and II next to the description of each question. You have to decide which of these assumptions are implicit in the description, considering the description and the assumptions that follow.

Description-

"This place is the best for a holiday."

Anita told her husband Ram.

Assumptions-

I. The vacation spot should be cool and pleasant.

II. Ram is a male.

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

Q67. Keerthana pointing to Naveen said "He is the only son of my mother's mother." How is Naveen related to Kirthana?

(a) Cousin
(b) Brother
(c) Uncle

(d) Father

Q68. Find the next letter of the series-

D, E, G, J, ?

(a) Q
(b) N
(c) O
(d) S

Q69. The sound of human voice is produced from the vocal cord by _____.

(a) Transfer
(b) Stir
(c) Shivering
(d) Speed

Q70. Here a question is followed by two arguments. Judge as to which of the following is logical with the question?

Question:

Is there any way to avoid the chaos in the vegetable wholesale market?

Arguments:

I. Yes, people should be polite and help each other by giving way.

II. No, the traditional market roads are narrow and it is difficult to keep them clean everyday. Also the traffic is increasing day by day.

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

Q71. 6 7 4 8 5 8 8 4 8 3 2 5 8 6 7 8 3 8

Study the number sequence above. If the first and second, third, and fourth terms of the sequence are interchanged, then how many 8s are there which will not be divisible by the numbers on their left and right?

(a) 0
(b) 3
(c) 1
(d) 2

Q72. If 15th February 2018 was Thursday, then what will be the day on 18th April 2019?

(a) Wednesday
(b) Tuesday
(c) Monday
(d) Thursday

Q73. October 18, 2003 was a Saturday. Which day will be on 18th October 2005?

(a) Sunday
(b) Friday
(c) Monday
(d) Tuesday

Q74. Which of the following will not result in a recurring decimal?

(a) 10/30
(b) 12/30
(c) 14/30
(d) 8/30

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Q75. Select the correct statement about India from the following

(a) India is a divine country.
(b) India is a secular country.
(c) India has a fixed state religion.
(d) Justice is given only to the Indians living in the country.

Q76. The molecular formula of calcium oxide is _____.

(a) Ca2O2
(b) CaO
(c) CaO2
(d) Ca2O

Q77. You are given a question and two statements. Decide which of the statements are necessary or sufficient to answer the question.

Question:

How is X related to Y?

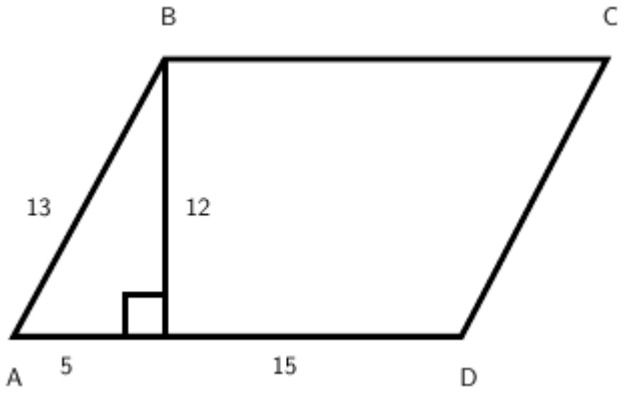
Statement:

1. Y has two sisters U and V.

2. X's mother is the sister of U's father.

(a) Only 1 is sufficient while the other alone is not enough.
(b) 1 and 2 together is sufficient.
(c) Either statement 1 alone or 2 alone is sufficient.
(d) Only 2 is sufficient while the first alone is not enough.

Q78. What is the area of the parallelogram in the figure given below?



(a) 260
(b) 240
(c) 180
(d) 160

Q79. The _____ of plant tissue does not hold living protoplasma at maturity.

(a) trachea
(b) dorsal tissue
(c) hard tissue
(d) gross

Q80. You are given a question and three statements. Which is/are necessary/sufficient to answer the questions.

Question:

What is Asha's total monthly income?

Statement:

I. Asha's basic income is Rs. 100 more than that of Mala who works in her office.

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II. Mala's basic income is Rs. 1,550 per month.

III. Mala took out additional allowance of Rs. 2,000 per month from her income which is Rs. 50 less than Asha's income.

(a) Only II is sufficient.
(b) Only I is enough.
(c) Only I and II are sufficient.
(d) All I, II and III are sufficient.

Q81. Read the following statement(s) and conclusion(s) carefully and select the conclusions which logically follow from the statements.

Statement:

The government had proposed to reduce 50% from the present syllabus of NCERT.

Conclusion:

I. The government's proposal has been rejected.

II. The government's proposal will be implemented soon.

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

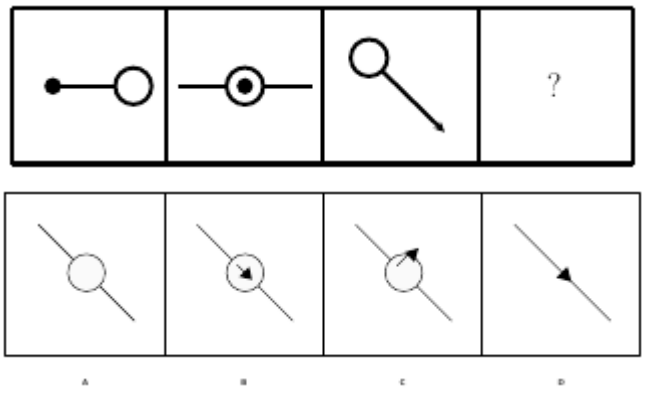
Q82. Who has written the book 'Cricket My Style'?

(a) Kapil Dev
(b) Anil Kumble
(c) Sunil Gavaskar
(d) Ravi Shastri

Q83. Heart muscles are _____.

(a) Logical, non-branched multiple-nuclei and single-nuclei
(b) Cylindrical, branched and single-nuclei
(c) Cylindrical, non-branched and single-nuclei
(d) Truncated, non-branched and single-nucleated

Q84. Select the figure which completes the given series-



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

Q85. Which app was launched by Union Minister Piyush Goyal to monitor the coal-dispatch process?

(a) RAKSHAK
(b) SEVA
(c) UMANG
(d) iCOAL

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Q86. Amod and Pramod working alone can paint a wall in 15 and 24 days respectively. They start working together, but Amod leaves 11 days before the completion of the work. How many days did it take to complete this work?

(a) 16
(b) 17
(c) 15
(d) 18

Q87. Who among the following won the Best Female Playback Singer award at the 64th National Film Awards 2017?

(a) Sunidhi Chauhan
(b) Iman Chakraborty
(c) Neha Kakkar
(d) Shreya Ghoshal

Q88. If a = 1, then what is the value of $15a^3 - (3a^3 - 1) - (4a^4 + a^3 - 3) + (a^3 - 1)$?

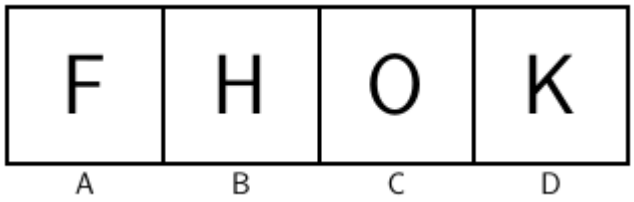
(a) 1
(b) 17
(c) 10
(d) 11

Q89. What is the least common multiple of two co-prime numbers X and Y?

(a) XY
(b) (X.Y)/2
(c) 1
(d) X/Y

Q90. This question is in Hindi. Read it online.

Q91. Find the odd one out.



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

Q92. Imran was born on 9 January 2015, while Irfan was born 549 days later. On which date Irfan was born?

(a) 9 July 2016
(b) 10 July 2016
(c) 11 July 2016
(d) 12 July 2016

Q93. Based on the following table, in which months the number of screws produced was more than the average number of screws produced in each month?

Month	Number of Screws Produced (in thousands)
January	200
February	300
March	250
April	250

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May	230
June	270

(a) June only
(b) February and June
(c) January and February
(d) May and June

Q94. Which of the following pairs do not have the same units?
(a) Speed and Velocity
(b) Work and Energy
(c) Distance and Displacement
(d) Force and Pressure

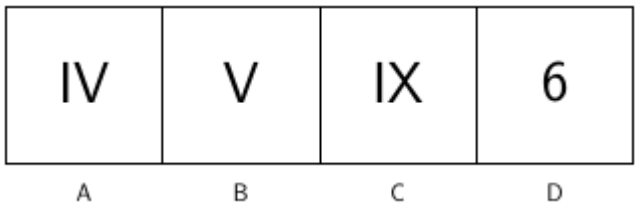
Q95. A wave travelling with a speed of 500 ms^(-1) has a wavelength of 20 m. The time interval will be _____.
(a) 4 s
(b) 25 s
(c) 0.05 s
(d) 0.04 s

Q96. Vennam Jyothi Surekha is associated with which of the following sports?
(a) Table Tennis
(b) Archery
(c) Cricket
(d) Basket Ball

Q97. The weight of an object on earth is 60 N. What would be its weight on the Moon?
(a) 10 N
(b) 10 kg
(c) 60 kg
(d) 60 N

Q98. The ratio between two numbers is 11 : 18. If 4 is added to both the numbers, then the ratio between them becomes 13 : 20. Original numbers are _____.
(a) 21, 36
(b) 26, 21
(c) 22, 36
(d) 32, 33

Q99. Select different of these.



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

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Q100. A 25 g bullet is fired horizontally with a velocity of 150 ms^(-1) from a pistol of 2 kg. What is the expected velocity of the pistol?

(a) • 1.25 ms^(-1)
(b) • 1.5 ms-1
(c) • 2.0 ms-1
(d) • 1.87 ms-1

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) Raised hammer

The correct answer is Raised hammer.

Key Points

• Raised hammer doesn't possess kinetic energy.

• The kinetic energy of a body is the energy possessed by the body due to its motion. Since every point of the hammer is at rest. The kinetic energy of the hammer is zero.

• The gravitational potential energy of a body is the energy that varies depending on the height or position of the body. Since hammers are at non-zero height from the ground, its P.E. is non-zero.

Additional Information

• Kinetic energy, a form of energy that an object or a particle has by reason of its motion.

• If work, which transfers energy, is done on an object by applying a net force, the object speeds up and thereby gains kinetic energy.

• Kinetic energy is a property of a moving object or particle and depends not only on its motion but also on its mass.

• Potential energy is the energy held by an object because of its position relative to other objects, stresses within itself, its electric charge, or other factors.

Q2. Answer: (b) CaO

The correct answer is CaO..

Key Points

• CaO reacts vigorously with water to form slaked lime.

• Calcium hydroxide, also called slaked lime, Ca(OH)2, is obtained by the action of water on calcium oxide.

• When mixed with water, a small proportion of it dissolves, forming a solution known as limewater, the rest remaining as a suspension called milk of lime(Calcium hydroxide).

Additional Information

• Calcium hydroxide (traditionally called slaked lime) is an inorganic compound with the chemical formula Ca(OH)2.

• It is a colorless crystal or white powder and is produced when quicklime (calcium oxide) is mixed or slaked with water.

• It has many names including hydrated lime, caustic lime, builders' lime, slaked lime, cal, and pickling lime.

• Calcium hydroxide is used in many applications, including food preparation.

• Limewater, also called milk of lime, is the common name for a saturated solution of calcium hydroxide.

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Q3. Answer: (a) Resistivity

The correct answer is Resistivity.

Key Points

• Ohm-m is the unit of resistivity.

• Ohm-Meter (ohm-m) is a unit in the category of Electric resistivity.

• It is also known as the ohm meter.

• This unit is commonly used in the SI unit system.

• Ohm-Meter (ohm-m) has a dimension of MLT^(-3)I^(-2)where M is mass, L is length, T is time, and I is electric current.

Additional Information

• Resistance is the opposition that a substance offers to the flow of electric current.

• It is represented by the uppercase letter R.

• The standard unit of resistance is the ohm, sometimes written out as a word, and sometimes symbolized by the uppercase Greek letter omega:

• When an electric current of one ampere passes through a component across which a potential difference (voltage) of one volt exists, then the resistance of that component is one ohm.

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

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

• Resistance also depends on the material of the conductor.

Q4. Answer: (b) 1529

The correct answer is 1529.

Key Points

• The Battle of Ghaghra was fought in the year 1529.

• The Battle of Ghaghra, fought in 1529, was a major battle for the conquest of India by the Mughal Empire.

• It followed the first Battle of Panipat in 1526 and the Battle of Khanwa in 1527.

Additional Information

• Battle of Khatauli

• The Battle of Khatoli was fought in 1518 between the Lodi dynasty under Ibrahim Lodi and the Kingdom of Mewar under Rana Sanga, during which Mewar emerged victoriously.

• Battle of Gagron

• The Battle of Gagron was fought in 1519 between Sultan Mahmud Khalji II of Malwa and Rana Sanga of Mewar.

• The conflict took place in Gagron and resulted in Sanga's victory, with him taking Mahmud captive and annexing significant territory.

• Battle of Bayana

• The Battle of Bayana (1527) was a rare setback for Babur after his victory at Panipat on 21 April 1526.

• Although this victory gave Babur control of Delhi and Agra, many other fortified places refused to accede to his authority.

Q5. Answer: (a) 6

Given:

18 ÷ 1/8 of {11 + 16 - (10 + 7 - 6+8)} = ?

Concept used:

This is the concept of VBODMAS

V – Viniculum or Bar (–) i.e first you have to perform the mathematical operation under a bar, then go for removing brackets

B – Brackets (order to remove brackets for simplification: 1st () circular / smaller brackets, 2nd { } Curly or flower brackets and finally [] square brackets.

O – Of (After removing brackets, then go for operation having ‘Of”.in complex expression

D – Next do Division

M – Multiplication

A – then Addition follows finally

S – Subtraction.

Calculation:

18 ÷ 1/8 of {11 + 16 - (10 + 7 - 6+8)} = ?

=> 18 ÷ 1/8 of {11 + 16 - (10 + 7 - 14)} = ?

=> 18 ÷ 1/8 of {11 + 16 - 3} = ?

=> 18 ÷ 1/8 × 24 = ?

=> 18 ÷ 3

=> 6

Therefore Answer is 6

Q6. Answer: (a) 48

According to the question,

Total units sold was 120 million

Unit sold in Karnataka = 120 × 2/5

=> 48

Therefore 48 million were sold in the Karnataka region

Q7. Answer: (a) 5

The number of circles in the above figure is as follows:-

There is a total of 5 circles in the above figure which are labelled as 1, 2, 3, 4, and 5.

Hence, "option 1" is the correct answer.

Q8. Answer: (b) Ankit Kavanna

The correct answer is Ankit Kavanna.

Key Points

• Ankit Kavanna is an Indian anti-hunger activist and he was awarded the Queen's Young Award in England in 2017.

• Anti-hunger activist Ankit Kawatra was awarded the Queen’s Young Leaders Award for 2017 at a ceremony in the Buckingham Palace here.

• The award recognizing the 25-year-old’s exceptional work towards solving hunger and malnutrition in India was presented to him by Queen Elizabeth II.

Additional Information

• Mr. Kawatra is the founder of Feeding India, an organization that aims to eradicate hunger and food wastage in India.

• Kawatra started Feeding India in 2014 with just 5 people, which now works in 43 cities across India with 4,500 volunteers.

• The foundation is currently serving 80 lakh meals to the needy.

• Queen's Young Award Launched in 2014, The Queen's Young Leader Award recognizes and honors exceptional people aged 18-29 across the Commonwealth, who are leading in their communities and using their skills to transform lives. are using it.

Q9. Answer: (c) 2:3

Given:

11:14, 17:21, 5:7, 2:3

Concept used:

Lowest Common Multiple

Calculation:

By writing the ratios in fraction form, we get

11/14, 17/21, 5/7, 2/3

LCM of denominators of fractions (3, 21, 14, 7)

=> LCM(3, 21, 14, 7) = 42

By converting the given ratio as equivalent, we get

11/14 × 3/3 = 33/42

17/21 × 2/2 = 34/42

5/7 × 6/6 = 30/42

2/3 × 14/14 = 28/42

From above, writing the above fractions in descending order,

34/42, 33/42, 30/42, 28/42

or

17/21, 11/14, 5/7, 2/3

Therefore The last ratio will be 2/3 or 2 : 3.

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Q10. Answer: (d) 756

Shortcut Trick

Total ways = (3 Boys × 2 Girls) + (4 Boys × 1 Girl) + (5 Boys × 0 Girls)

= (^7C3 × ^6C2) + (^7C4 × ^6C1) + (^7C5 × ^6C0)

= (35 × 15) + (35 × 6) + (21 × 1)

= 525 + 210 + 21 = 756

Therefore The correct answer is 756 ways.

Alternate Method

Given: 7 boys and 6 girls. Total 13 students. Select 5 students with at least 3 boys.

Formula: ⁿC_r = n! / [r!(n − r)!]

=> Case 1 (3 Boys, 2 Girls): ^7C3 × ^6C2 = [(7 × 6 × 5) / (3 × 2 × 1)] × [(6 × 5) / (2 × 1)] = 35 × 15 = 525

=> Case 2 (4 Boys, 1 Girl): ^7C4 × ^6C1 = ^7C3 × 6 = 35 × 6 = 210

=> Case 3 (5 Boys, 0 Girls): ^7C5 × ^6C0 = ^7C2 × 1 = [(7 × 6) / (2 × 1)] × 1 = 21 ×

Q11. Answer: (a) MS Dhoni

The correct answer is MS Dhoni.

Key Points

• MS Dhoni was conferred with the Padma Bhushan award in the 2018 Sports (Cricket) category.

• Dhoni has been the recipient of many awards, including the ICC ODI Player of the Year award in 2008 and 2009 (the first player to win the award twice), the Rajiv Gandhi Khel Ratna award in 2007, and the Padma Shri, India's fourth-highest civilian honour in 2009.

• Dhoni-led India to two World Cup triumphs in the inaugural ICC World Twenty20 held in South Africa in September 2007 and the 2011 ICC ODI World Cup.

Additional Information

• The Padma Awards are conferred on the recommendations made by the Padma Awards Committee, which is constituted by the Prime Minister every year.

• The nomination process is open to the public.

• Even self-nomination can be made.

• These awards are presented by the President of India at a ceremonial function held at Rashtrapati Bhawan.

Q12. Answer: (c) Atmospheric Pressure

The correct answer is Atmospheric Pressure.

Key Points

• Air pressure can be called atmospheric pressure.

• The air around us has weight, and it presses against everything it touches.

• That pressure is called atmospheric pressure, or air pressure.

• It is the force exerted on a surface by the air above it as gravity pulls it to Earth.

Additional Information

• Atmospheric pressure is commonly measured with a barometer.

• In a barometer, a column of mercury in a glass tube rises or falls as the weight of the atmosphere changes.

• An atmosphere (atm) is a unit of measurement equal to the average air pressure at sea level at a temperature of 15 degrees Celsius (59 degrees Fahrenheit).

• One atmosphere is 1,013 millibars or 760 millimeters (29.92 inches) of mercury.

• Condensation is the process where water vapor becomes liquid.

• It is the reverse of evaporation, where liquid water becomes a vapor.

• Condensation happens one of two ways:

• Either the air is cooled to its dew point or it becomes so saturated with water vapor that it cannot hold any more water or it becomes so saturated with water vapor that it cannot hold any more water.

Q13. Answer: (a) 6 2/3

Shortcut Trick

Apply M1D1 = M2D2

40 × 6 = 36 × D2

D2 = (40 × 6) ÷ 36 = 40 ÷ 6 = 20 ÷ 3

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D2 = 6 (2)/(3) days

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

Alternate Method

Given:

Initial men (M1) = 40 men

Initial days (D1) = 6 days

Final men (M2) = 36 men

Formula Used:

Total Work = Men × Days

Calculations:

=> Total Work = 40 × 6 = 240 units

=> Required Days (D2) = Total Work ÷ M2

=> D2 = 240 ÷ 36

=> D2 = 20 ÷ 3

=> D2 = 6 (2)/(3) days

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

Additional Information

Chain Rule Formula

For work involving efficiency and hours: (M1×D1×H1×E1)/W1 = (M2×D2×H2×E2)/W2.

Inverse Proportion

In Time and Work, the number of men is inversely proportional to the number of days taken to complete the work.

Work and Wages

Wages are distributed in the ratio of the work done by each individual, which is Efficiency × Time.

Q14. Answer: (a) West Bengal, Uttar Pradesh and Jharkhand

The correct answer is West Bengal, Uttar Pradesh and Jharkhand.

Key Points

• The National Mission for Clean Ganga (NMCG) has approved five 'Namami Gange' programs worth Rs. 295.01 crores for the states West Bengal, Uttar Pradesh, and Jharkhand.

• The National Ganga River Basin Authority (NGRBA) has taken a convergent and comprehensive approach to meet the challenges faced by the Ganga through four distinct areas, namely, wastewater management, solid waste management, industrial pollution, and riverfront development.

Additional Information

• ‘Namami Gange Programme’, is an Integrated Conservation Mission, approved as ‘Flagship Programme’ by the Union Government in June 2014 with a budget outlay of Rs. 20,000 Crore to accomplish the twin objectives of effective abatement of pollution, conservation, and rejuvenation of National River Ganga.

• Its implementation has been divided into Entry-Level Activities (for immediate visible impact), Medium-Term Activities (to be implemented within 5 years of time frame), and Long-Term Activities (to be implemented within 10 years).

Q15. Answer: (a) Rabindranath Tagore

The correct answer is Rabindranath Tagore.

Key Points

• Rabindranath Tagore was the first Indian to win the Nobel Prize.

• Rabindranath Tagore was the first Indian to get a Nobel Prize in 1913 for his work in Literature.

• He won the award for "his profoundly sensitive, fresh and beautiful verse, by which, with consummate skill, he has made his poetic thought, expressed in his own English words, a part of the literature of the West".

Additional Information

• Esther Duflo, Abhijit Banerjee, and Michael Kremer were awarded the Nobel Prize in Economics in 2019.

• They were awarded "for their experimental approach to alleviating global poverty".

• Esther Duflo is the youngest person to be awarded the Nobel prize in economics.

• Gerty Theresa Cori was the third woman to win a Nobel Prize in science.

• She is the first woman to be awarded the Nobel Prize in Physiology or Medicine for her vital role in the "discovery of the course of the catalytic conversion of glycogen".

• Maria Goeppert Mayer got the Nobel prize in Physics for proposing the nuclear shell model of the atomic nucleus.

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• She was the second woman to win a Nobel Prize in physics.

• The first was Marie Curie.

Important Points

• The Nobel Prize in Physics for the year 2020 was awarded to three astrophysicists Roger Penrose from the UK, Reinhard Genzel from Germany, and Andrea Ghez from the USA.

• Emmanuelle Charpentier of France and Jennifer A Doudna of the USA have been awarded the 2020 Nobel Prize in Chemistry for developing CRISPR/Cas9 genetic scissors, one of gene technology's sharpest tools.

• The 2020 Nobel Peace Prize has been awarded to the World Food Programme (WFP), a United Nations (UN) agency, for its efforts to combat hunger, bettering conditions for peace in conflict-affected areas, and preventing the use of hunger as a weapon of war and conflict.

• American economists, Paul Milgrom, and Robert Wilson have been awarded the Sveriges Riksbank Prize in Economic Sciences, 2020 for their work on commercial auctions.

• The Nobel Prize in Literature 2020 has been awarded to the USA poet Louise Glück "for her unmistakable poetic voice that with austere beauty makes individual existence universal."

Q16. Answer: (b) Raja Chola

The correct answer is Raja Chola.

Key Points

• Raja Chola got the Brihadeshwara temple built at Thanjavur.

• This South Indian style is most fully realized both in scale and detail in the Brihadeshwara temple built between 1003 and 1010 by the Chola king Rajaraja I.

• Built by Tamil king Raja Raja Chola I between 1003 and 1010 AD, the temple is a part of the UNESCO World Heritage Site known as the "Great Living Chola Temples", along with the Chola dynasty era Gangaikonda Cholapuram temple and Airavatesvara temple.

Additional Information

• Rajaraja I, born Arulmoli Varman, often described as Rajaraja the Great, was a Chola emperor and was the most powerful king in the south at his time chiefly remembered for reinstating the Chola power and ensuring its supremacy in south India and the Indian Ocean.

• Brihadishvara Temple locally known as Thanjai Periya Kovil, and also called Rajarajeswaram, is a Hindu temple dedicated to Shiva located on the South Bank of the Cauvery river in Thanjavur, Tamil Nadu.

Q17. Answer: (a) TtWW

Concept-

• Mendel proposed two general rules to consolidate his understanding of inheritance in monohybrid crosses.

• Today these rules are called the Principles or Laws of Inheritance the First Law or Law of Dominance and the Second Law or Law of Segregation.

• According to the law of dominance.

• Characters are controlled by discrete units called factors.

• Factors occur in pairs.

• In a dissimilar pair of factors, one member of the pair dominates the other.

Explanation-

• The dihybrid cross involves two characters in a single plant.

• The parent pea plants are of two types.

• Tall plants with violet flowers.

• Short plants with white flowers.

• So, the genotype of the parents could be-

• Tall plants with violet flowers: TTWW or TtWw

• Short plants with white flowers: ttww

• Since all the progeny bore violet flowers, it implies that the tall plant with violet flowers has genotype 'WW' for violet flower color.

• Since the progeny acquired is both tall and short, the parent plant was not a pure tall plant and carry genes that determine the short height of the plant.

• Therefore, the genotype of the plant with respect to height would be 'Tt'.

So, if a cross is carried out between a tall parent with violet flowers (TtWW) and a short parent with white flowers (ttww), the progeny obtained is TtWw (8) : ttWw (8).

Mistake Points

• Please note that in pea plants violet colour of flowers is dominant over white colour.

• Also, the violet colour character has been denoted here by "W" and not "V" (which is the initial letter of the dominant character).

• It is important to remember which character is dominant over which, irrespective of the letters that are used to denote it in the cross.

Additional Information

• Law of Segregation

• This law is based on the fact that the alleles do not show any blending and that both the characters are recovered as such in the F2 generation though one of these is not seen at the F1 stage.

• Though the parents contain two alleles during gamete formation, the factors or alleles of a pair segregate from each other such that a gamete receives only one of the two factors.

• Of course, a homozygous parent produces all gametes that are similar while a heterozygous one produces two kinds of gametes each having one allele with equal proportion.

Q18. Answer: (a) 65 years

Shortcut Trick

Let Chetna's present age be C and Mahim's be M.

From option 1: If C = 65, then 5 years ago, C = 60. Mahim was (1/3 × 60) − 1 = 19.

So, M present = 19 + 5 = 24. After 17 years, C = 82 and M = 41.

Since 82 is exactly twice of 41, the condition is satisfied.

Therefore The correct answer is 65 years.

Alternate Method

Given:

Let C = Chetna's present age and M = Mahim's present age.

Equation 1 (17 years later): C + 17 = 2(M + 17)

=> C + 17 = 2M + 34

=> C − 2M = 17 → (i)

Equation 2 (5 years ago): M − 5 = 1/3(C − 5) − 1

=> M − 5 = (C − 5 − 3) / 3

=> 3M − 15 = C − 8

=> 3M − C = 7 → (ii)

Adding (i) and (ii):

=> (C − 2M) + (3M − C) = 17 + 7

=> M = 24 years

Substitute M = 24 in (i):

=> C − 2(24) = 17

=> C − 48 = 17

=> C = 65 years

Therefore The correct answer is 65 years.

Additional Information

Linear Equations in Ages

Problems involving ages are solved by translating "years ago" as subtraction and "hence/later" as addition to the present age variables.

Age Ratio Method

If the difference between ages is constant, the ratio of ages changes over time. Always ensure the absolute difference between two people's ages remains the same across all time periods.

Q19. Answer: (b) 15

The correct answer is 15.

Key Points

• If the electron configuration of an element is 2, 8, 5, then the number of protons is 15.

• Total no. of electrons = 2 + 8 + 5 = 15

• No. of electrons in an atom = No. of protons = Atomic No. = 15

Additional Information

• The atomic number or proton number (symbol Z) of a chemical element is the number of protons found in the nucleus of every atom of that element.

• The atomic number uniquely identifies a chemical element.

• It is identical to the charge number of the nucleus.

Q20. Answer: (b) 1 5/6

Given:

The sum of a fraction and its reciprocal is 2 25/66

Calculation:

Let the fraction be (x/y) (Denote this by 'a')

Sum of the fraction (a) and its reciprocal (1/a) = 2 25/66

$a + (1/a) = 157/66$

$\Rightarrow (a^2 + 1)/a = 157/66$

$\Rightarrow 66a^2 - 157a + 66 = 0$

$\Rightarrow 66a^2 - 121a - 36a + 66 = 0$

$\Rightarrow 11a(6a - 11) - 6(6a - 11) = 0$

$\Rightarrow (11a - 6)(6a - 11) = 0$

$\Rightarrow a = 11/6$ or $6/11$

Greater is 11/6 = 1 5/6

Therefore Required answer is 1 5/6

Q21. Answer: (d) Nisha Dutt

The correct answer is Nisha Dutt.

Key Points

• Nisha Dutt was honored with the 'Social Entrepreneur of the Year' award at the 7th Asian Awards in London.

• Nisha Dutt, the CEO of Intellecap, has been honoured with the "Social Entrepreneur of the Year" award at The 7th Asian Awards in London in recognition of her work in making Intellecap a globally known enterprise that focuses on social capital. With this.

• Dutt has become the first Indian woman leader to be honoured with this award.

• Her key contribution has been integrating technology with challenges of healthcare, financial services, incubation, and conceptualizing programs such as Innovations Labs and Credit-tree.

Additional Information

• The Asian Awards is an annual awards ceremony for the global Asian community that takes place in the United Kingdom, in 14 categories including business, philanthropy, entertainment, culture and sport.

• In 2010 and 2011, the awards were open only to those born in or directly from India, Sri Lanka, Pakistan or Bangladesh. From 2013, they were expanded to include all people of South, East and Southeast Asian descent.

• The tenth edition of the awards will take place in 2022 due to the COVID-19 pandemic.

• Awarded for Honouring Asian Excellence

• Presented by Paul Sagoo

• First awarded in 2010

Q22. Answer: (a) Venezuela

The correct answer is Venezuela.

Key Points

• Angel Falls is located in Venezuela.

• Angel Fall is the world's tallest uninterrupted waterfall, with a height of 979 meters (3,212 ft) and a plunge of 807 m (2,648 ft).

• The waterfall drops over the edge of the Auyán-tepui mountain in the Canaima National Park a UNESCO World Heritage site.

• The height figure, 979 m (3,212 ft), mostly consists of the main plunge but also includes about 400 meters (1,300 ft) of sloped cascade and rapids below the drop and a 30-meter (98 ft) high plunge downstream of the talus rapids.

• The falls are along a fork of the Río Kerepacupai Merú which flows into the Churún River, a tributary of the Carrao River, itself a tributary of the Orinoco River.

Additional Information

Waterfall	River
Dudhsagar	Mandavi

Duduma	Machhkund
Gokak	Ghatprabha
Jog	Sharavati

Q23. Answer: (a) Both 1 and 2 follow.

The least possible Venn diagram is as follows:

Conclusion:

1. All glass is earth. → Follows (as shown in the above Venn diagram, the entire part of glass is inside earth)

2. Some earth are sand.→ Follows (as shown in the above Venn diagram, some part inside earth is sand)

Hence, the correct answer is "Both 1 and 2 follow."

Q24. Answer: (d) (5 - 3√2)/7

Shortcut Trick

Identify the conjugate of the denominator: $(5 + 3\sqrt{2}) \rightarrow (5 - 3\sqrt{2})$.

Calculate the denominator value using the difference of squares: $5^2 - (3\sqrt{2})^2$.

Denominator = 25 − 18 = 7.

Place the conjugate over the calculated denominator.

Therefore The correct answer is $(5 - 3\sqrt{2})/7$.

Alternate Method

Given: Fraction = $1 / (5 + 3\sqrt{2})$

Formula Used: Rationalization involves multiplying the numerator and denominator by the conjugate (a − b) of the denominator (a + b), utilizing the identity $(a + b)(a - b) = a^2 - b^2$.

Calculations:

$\Rightarrow [1 \times (5 - 3\sqrt{2})] / [(5 + 3\sqrt{2}) \times (5 - 3\sqrt{2})]$

$\Rightarrow (5 - 3\sqrt{2}) / [(5)^2 - (3\sqrt{2})^2]$

$\Rightarrow (5 - 3\sqrt{2}) / (25 - 18)$

$\Rightarrow (5 - 3\sqrt{2}) / 7$

Therefore The correct answer is $(5 - 3\sqrt{2})/7$.

Additional Information

Rationalizing Factor (Conjugate)

For a denominator of the form $(a + \sqrt{b})$, the rationalizing factor is $(a - \sqrt{b})$. Multiplying these results in a rational number $a^2 - b$.

Difference of Squares Identity

The identity $(a + b)(a - b) = a^2 - b^2$ is the fundamental tool used to eliminate surds from the denominator of a fraction.

Handling Coefficients in Surds

When squaring a term like $(3\sqrt{2})$, remember to square both parts: $(3\sqrt{2})^2 = 3^2 \times (\sqrt{2})^2 = 9 \times 2 = 18$.

Q25. Answer: (b) Thallophyta

The correct answer is Thallophyta.

Key Points

• Lichen Plant belongs to Thallophyta Division.

• Thallophyta is a division of the plant kingdom including primitive forms of plant life showing a simple plant body.

• Including unicellular to large algae, fungi, lichens.

• The first ten phyla are referred to as thallophytes.

• They are simple plants without roots stems or leaves.

Additional Information

• Bryophytes are called "amphibians of the plant kingdom" because they are terrestrial plants but require water to end their life cycle at the time of sexual reproduction.

• Pteridophytes are the first terrestrial vascular plants. Carolus Linnaeus classified them under the group cryptogamae. The word ‘pteridophytes’ comes from Greek word Pteron meaning feather and phyton meaning plants.

• Angiosperms are a type of vascular plant that bears both flowers and fruits. These types of plants also have spores enclosed in the ovary. The ovule, once fertilized, develops into a seed that later matures into a fruit.

Q26. Answer: (a) 21

Shortcut Trick

Efficiency ratio of pipes A : B = 1.5 : 1 = 3 : 2. Combined efficiency = 5 units.

Net filling rate = (Combined A+B) − Discharge pipe = Total Work / 28.

Let Total Work be 84 units (LCM of 12 and 28). Discharge efficiency = 84 ÷ 12 = 7 units/hr.

Net efficiency = 84 ÷ 28 = 3 units/hr. => (A+B) − 7 = 3 => A+B = 10 units/hr.

Ratio 3:2 implies A = 6, B = 4. Less efficient B fills tank in 84 ÷ 4 = 21 hours.

Therefore The correct answer is 21 hours.

Alternate Method

Given: Efficiency of Pipe 1 = 1.5 × Efficiency of Pipe 2. Discharge pipe (C) empties in 12 hours. Combined filling time (A+B+C) = 28 hours.

Formula Used: 1/T_(net) = 1/T_A + 1/T_B − 1/T_C; Efficiency prop. to 1/Time.

Person	Days/Hours	Total Work	Efficiency
Combined (A+B−C)	28	84	3
Discharge (C)	12	7	

Calculations:

=> Efficiency of (A + B) − Efficiency of C = 3

=> Efficiency of (A + B) − 7 = 3

=> Total Efficiency of A + B = 10 units/hr.

=> Given ratio of efficiency A : B = 1.5 : 1 = 3 : 2.

=> Efficiency of less efficient pipe (B) = [2 / (3 + 2)] × 10 = 4 units/hr.

=> Time taken by pipe B alone = Total Work ÷ Efficiency of B = 84 ÷ 4 = 21 hours.

Therefore The correct answer is 21 hours.

Additional Information

Pipes & Cisterns Efficiency

Efficiency is inversely proportional to time. If Pipe A is 'k' times efficient as Pipe B, then Time taken by A = (Time taken by B) / k.

Net Work Done

When filling and emptying pipes work together, the net rate is the difference: Net Rate = (Sum of Filling Rates) − (Sum of Emptying Rates).

Q27. Answer: (a) 1/16

The correct answer is 1 over 16.

Key Points

• Gravitational force is inversely proportional to the square of the distance between two bodies.

• $F = 1/(d^2)$

• $F = 1/(4^2)$

• If the factor of 4 in 'd' is increased, then F becomes 1 over 16 times smaller.

Additional Information

• Newton's law says that F = mg, where F is the weight and M is the mass, and G, is the acceleration due to gravity but since the gravity on Moon is much less than Earth.

• The weight of an object will be Different.

• The formula that links mass and the gravitational field strength is:

• gravity force = mass × gravitational field strength (g)

• This is when:

• gravity force is measured in newtons (N)

• mass is measured in kilograms (kg)

• gravitational field strength (g) is measured in newtons per kilogram (N/kg).

Q28. Answer: (d) 360

Shortcut Trick

Identify the highest power of prime factors in the given numbers.

Numbers: 5, 180 (36 × 5), 24 (8 × 3)

Highest powers: 2^3 (from 24), 3^2 (from 180), 5^1 (from 5 or 180)

LCM = 8 × 9 × 5 = 360

Therefore The correct answer is 360.

Alternate Method

Given: Numbers 5, 180, and 24.

Formula Used: LCM is the product of the highest powers of all prime factors involved in the numbers.

Prime Factorization:

=> 5 = 5^1

=> 180 = 2 × 2 × 3 × 3 × 5 = $2^2 \times 3^2 \times 5^1$

=> 24 = 2 × 2 × 2 × 3 = $2^3 \times 3^1$

Calculations:

=> List all prime factors: 2, 3, 5

=> Take highest power of 2: $2^3 = 8$

=> Take highest power of 3: $3^2 = 9$

=> Take highest power of 5: $5^1 = 5$

=> LCM = 8 × 9 × 5

=> LCM = 72 × 5 = 360

Therefore The correct answer is 360.

Additional Information

LCM and HCF Relationship

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

HCF (Highest Common Factor)

HCF is the product of the lowest powers of common prime factors. For 5, 180, and 24, the HCF is 1 as there is no common factor for all three.

LCM of Fractions

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

Q29. Answer: (b) Both 1 and 2 follow.

The possible Venn diagram is given below:-

Conclusion:

1. Some hot are peas. → True (All the peas are hot, then some hot are peas is also correct.)

2. Some hot are tomatoes. → True (Some tomatoes are hot, then some hots are tomatoes is also correct.)

Hence, "option 2" is the correct answer.

Q30. Answer: (d) Will be very stormy.

The correct answer is Will be very stormy.

Key Points

• When the barometric readings suddenly decrease, it indicates that the weather will be very stormy.

• A sudden fall in the barometric reading is an indication of a storm.

• As the barometer measures changes in air pressure, therefore at the onset of a storm, low pressure occurs, which in turn would lead to rapid or violent movement of air from the high-pressure areas.

Additional Information

• Atmospheric pressure is commonly measured with a barometer.

• In a barometer, a column of mercury in a glass tube rises or falls as the weight of the atmosphere changes.

• An atmosphere (atm) is a unit of measurement equal to the average air pressure at sea level at a temperature of 15 degrees Celsius (59 degrees Fahrenheit).

• Condensation is the process where water vapor becomes liquid.

• It is the reverse of evaporation, where liquid water becomes a vapor.

Q31. Answer: (b) 108°

Shortcut Trick

For any regular polygon with n sides, each exterior angle is calculated as 360° ÷ n.

For a pentagon, n = 5. Therefore, each exterior angle = 360° ÷ 5 = 72°.
Since the interior angle and exterior angle at a vertex are supplementary, their sum is 180°.
Each interior angle = 180° − 72° = 108°.
Therefore The correct answer is 108°.
Alternate Method
Given: A normal (regular) pentagon.
Formula Used: Each interior angle of a regular polygon = [(n − 2) × 180°] ÷ n, where n is the number of sides.
=> For a pentagon, the number of sides n = 5.
=> Sum of all interior angles = (5 − 2) × 180°
=> Sum = 3 × 180° = 540°
=> Since it is a regular pentagon, all interior angles are equal.
=> Measure of each interior angle = 540° ÷ 5
=> Each interior angle = 108°
Therefore The correct answer is 108°.
Additional Information
Sum of Interior Angles
The sum of the interior angles of a polygon with n sides is given by the formula (n − 2) × 180°.
Exterior Angle Property
For any convex polygon, the sum of all exterior angles (one at each vertex) is always 360°.
Regular Polygon Definition
A regular polygon is both equilateral (all sides are equal) and equiangular (all angles are equal).
Supplementary Angles
The interior angle and its corresponding exterior angle at any vertex of a polygon always add up to 180°.

Q32. Answer: (b) Ramnath Kovind

The correct answer is Ramnath Kovind.
Key Points
• Ramnath Kovind inaugurated the 'World Hindi Secretariat' in Mauritius in 2018.
• President Ram Nath Kovind inaugurated the World Hindi Secretariat building in Mauritius on the third day of his visit to the country.
• He also launched the World Hindi Secretariat's logo, an Early Digital Learning Programme as well unveiled foundation stones of a social housing project and a large ENT hospital being built with Indian assistance.
Additional Information
• The World Hindi Secretariat is fully financed by the Government of India and provided a grant of Rs. 33 crore.
• Land for it was given by the Government of Mauritius.
• Prime Minister Narendra Modi had laid the foundation stone of this building during his visit in 2015.
• The aim of the secretariat is to present Hindi as the common man’s language, Janbhasha, in front of the world.
• Hindi as a language has played an important role in culture and society building in both India and Mauritius.
• Indian diaspora in Mauritius has played a huge role in the spread of Hindi.

Q33. Answer: (b) 56 km/h

Shortcut Trick
Since Distance is constant, Speed is inversely proportional to Time.
Time ratio = 7 : 5
Speed ratio = 5 : 7
Given: 5 units = 40 km/h => 1 unit = 8 km/h
Required speed (7 units) = 7 × 8 = 56 km/h
Therefore The correct answer is 56 km/h.
Alternate Method
Given:
Initial Speed (S1) = 40 km/h
Initial Time (T1) = 7 hours
New Time (T2) = 5 hours

Formula Used:
Distance = Speed × Time
Calculations:
=> Total Distance = S1 × T1
=> Total Distance = 40 × 7 = 280 km
=> Required Speed (S2) = Total Distance ÷ T2
=> Required Speed = 280 ÷ 5
=> Required Speed = 56 km/h
Therefore The correct answer is 56 km/h.
Additional Information
Inverse Variation
When distance is constant, speed and time are inversely proportional: S1 × T1 = S2 × T2.
Average Speed
For the same distance covered at two different speeds x and y, Average Speed = 2xy ÷ (x + y).
Unit Conversion
To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Q34. Answer: (c) C

The pattern followed is,
In figures A, B, and D there are same figures present on the upper and lower sides.
Whereas,
In figure C, upper figure is a rhombus while lower figure is a trapezium
Hence, "option 3" is the correct answer.

Q35. Answer: (b) Rs. 2,400

Shortcut Trick
Effective Rate of Interest for 3.75 years = 6% × 3.75 = 22.5%
Total Amount in percentage = 100% (Principal) + 22.5% (Interest) = 122.5%
According to the question, 122.5% = Rs. 2,940
Principal (100%) = (2940 ÷ 122.5) × 100 = 24 × 100 = Rs. 2,400
Therefore The correct answer is Rs. 2,400.
Alternate Method
Given:
Total Amount (A) = Rs. 2,940
Rate of Interest (R) = 6% per annum
Time (T) = 3¾ years = 15/4 years = 3.75 years
Formula Used:
Amount (A) = P + SI = P + (P × R × T) ÷ 100
Calculations:
=> 2940 = P + (P × 6 × 3.75) ÷ 100
=> 2940 = P + (P × 22.5) ÷ 100
=> 2940 = P + 0.225P
=> 2940 = 1.225P
=> P = 2940 ÷ 1.225
=> P = (2940 × 1000) ÷ 1225
=> P = 2400
Therefore The correct answer is Rs. 2,400.
Additional Information
Simple Interest Formula
The basic formula for Simple Interest (SI) is (P × R × T) ÷ 100, where P is the Principal, R is the rate, and T is the time in years.
Relationship between Amount and Principal
The Total Amount (A) is the sum of the Principal and Interest earned: A = P × [1 + (R × T) ÷ 100].

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Direct Principal Calculation

When the Amount is given, the Principal can be directly calculated as P = (100 × A) ÷ (100 + R × T).

Q36. Answer: (c) 70

The Venn diagram is given below:-

The shaded part is the total number of students who played only one game.

From game M students who played only one game = 11

From game N students who played only one game = 41

From game L students who played only one game = 18

Then the total number of students who played only one game = 11 + 41 + 18 = 70

So, 70 students played only one game.

Hence, "option 3" is the correct answer.

Q37. Answer: (b) Al & P

The correct answer is Al & P.

Key Points

• In the modern periodic table, Silicon (Z = 14) is placed between Al and P.

• Silicon has an atomic number 14 and the outer electronic configuration is $3s^2$ $3ps^2$.

• It is placed at the 3rd Period and 14th Group number.

Additional Information

• Silicon, the second most abundant element on earth, is an essential part of the mineral world.

• Its stable tetrahedral configuration makes it incredibly versatile and is used in various ways in our everyday lives.

• Found in everything from spaceships to synthetic body parts, silicon can be found all around us, and sometimes even in us.

• Silicon is a crystalline semi-metal or metalloid.

• It is a group 14 element in the same periodic group as carbon but chemically behaves distinctly from all of its group counterparts.

• Silicon shares the bonding versatility of carbon, with its four valence electrons, but is otherwise a relatively inert element.

Q38. Answer: (b) Rs. 12960

Shortcut Trick

Net depreciation for 2 years at 10% per annum = 10 + 10 − (10 × 10) / 100 = 19%.

Remaining value = 100% − 19% = 81% of initial value.

Value after 2 years = 16000 × 81 / 100 = 160 × 81 = 12960.

Therefore The correct answer is Rs. 12960.

Alternate Method

Given:

Initial Value (P) = Rs. 16,000

Depreciation Rate (R) = 10%

Time (n) = 2 years

Formula Used:

Value after n years = $P \times (1 - R / 100)^n$

Calculations:

=> Value after 1st year = 16000 − (10 / 100) × 16000

=> Value after 1st year = 16000 − 1600 = Rs. 14,400

=> Value after 2nd year = 14400 − (10 / 100) × 14400

=> Value after 2nd year = 14400 − 1440 = Rs. 12,960

Therefore The correct answer is Rs. 12960.

Additional Information

Successive Depreciation

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

Appreciation Formula

If the value of an item increases annually, use $A = P(1 + R / 100)^n$.

Scrap Value

The value of an asset at the end of its useful life after continuous depreciation is known as its Scrap Value.

Q39. Answer: (d) Cousin

The family tree is given below:-

• Manohar's father's sister's daughter is the cousin of Manohar.

• Hence, "option 4" is the correct answer.

Key Points

• Manohar's father's sister's daughter related to him as cousin.

• Manohar's father's sister is Manohar's Aunt.

• Therefore Manohar's Aunt's daughter is Manohar's cousin.

Q40. Answer: (c) Oviparous

The correct answer is Oviparous.

Key Points

• Oviparous animals are called Hatching animals.

• Oviparous animals are born by hatching out of an egg.

• Oviparous animals are those that reproduce by laying eggs.

• They include animals like birds, most reptiles, most amphibians, fish, and the majority of arthropods.

Additional Information

• Viviparous Animals

• The Latin term for viviparous is also known as 'viviparous'. It means 'to give life' or 'to bring alive'. Animals that can give birth to young are called viviparous animals.

• Examples: Marine animals such as whales, dolphins, dogs, cats and humans.

• Oviparous Animals

• In the case of oviparous animals, the primary process of fertilization takes place internally. The mothering parent produces the eggs. The eggs are not retained inside the mother’s body throughout embryonic development.

• Examples: Mostly amphibians, reptiles, birds, insects, molluscs, arachnids, and monotremes are examples of oviparous animals.

Q41. Answer: (a) 5

Given:

$110 \div [53 - \{4^3 - (37 - 136 \div 17 \times 2)\}] = ?$

Concept:

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

Calculation:

$110 \div [53 - \{4^3 - (37 - 136 \div 17 \times 2)\}] = ?$

$\Rightarrow 110 \div [53 - \{64 - (37 - 136 \div 34)\}] = ?$

$\Rightarrow 110 \div [53 - \{64 - (37 - 4)\}] = ?$

$\Rightarrow 110 \div [53 - \{64 - (37 - 4)\}] = ?$

$\Rightarrow 110 \div [53 - \{64 - 33\}] = ?$

$\Rightarrow 110 \div [53 - 31] = ?$

$\Rightarrow 110 \div 22 = ?$

$\Rightarrow 5 = ?$

Therefore The value of ? is 5.

Q42. Answer: (a) Change

The logic followed here is:

Repair is the synonym of edit.

Similarly,

Modify is the synonym of change.

Word	Synonym
Cancel	Scrap
Leave	Withdraw from
Bend	Curve

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Hence, the correct answer is "option (1)".

Q43. Answer: (a) B

The correct mirror image of the given figure when the mirror is held at the side is:-

Hence, "option 1" is the correct answer.

Q44. Answer: (b) 150 J

The correct answer is 150 J.

Key Points

• Given,

• Mass(m) = 15 kg

• Gravity (g) = 10 ms^(-2)

• Height (h) = 1 m

• Work = m*g*h

• Work = 15 * 10 *1

• Work = 150 J

Additional Information

• Newton's law says that F=mg, where F is the weight and M is the mass, and G, is the acceleration due to gravity but since the gravity on Moon is much less than Earth.

• The weight of an object will be Different.

• The formula that links mass and the gravitational field strength is:

• gravity force = mass × gravitational field strength (g)

• This is when:

• gravity force is measured in newtons (N)

• mass is measured in kilograms (kg)

• gravitational field strength (g) is measured in newtons per kilogram (N/kg)

Q45. Answer: (a) Both A and B are false.

The correct answer is Both A and B are false.

• Both A and B are false.

Key Points

• Hardness is a material's resistance to localized plastic deformation.

• From ultra-hard materials like diamond and boron-carbide to various ceramics and hard metals, to soft metals, polymers, and soft tissues, hardness is measured.

• Hardness is only one mechanical property to consider; other properties such as toughness and strength must also be taken into account, as hard materials have poor toughness and are readily fractured.

• In contrast to other attributes such as colour, texture, or material type, a shape is an object's external boundary, contour, or external surface.

• The volume and shape of a solid are both defined.

• Although a liquid has a defined volume, it lacks a defined shape.

• Gas doesn't have a defined volume or shape.

Important Points

• Fluidity is the property of a substance to easily flow and allow a change in its shape under external forces and this property is exhibited by both liquids and gases.

• Compressibility is the property of matter to allow compression under high pressure and the gases show this property.

Q46. Answer: (a) B

Given series -

The pattern followed here is:

• In each row, there are three pairs of arrows.

• First pair: 2 upward-facing arrows

• Second pair: 2 downward-facing arrows.

• Third pair: First arrow facing upward and second arrow facing downward.

• In the given figure, the pair of downward-facing arrows is missing in the third row.

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Hence, "option 1" is the correct answer.

Note:

• A discrepancy was found in this question in the original exam of 2018. Therefore, we have altered the question figure to create a correct one.

Q47. Answer: (c) Q-64

The alphabet template is given below:-

The logic followed here is:

Hence, "option 3" is the correct answer.

Q48. Answer: (a) Acetic Acid

The correct answer is Acetic acid.

Key Points

• Acetic acid has the highest temperature of liquefaction and boiling.

• Acetic acid has a higher boiling point based on molecular weight and lower Surface tension due to its higher polarity related to the water; since its higher intermolecular force.

• In general boiling point increases with compound molecular weight.

• So, acetic acid has a higher boiling point based on molecular weight and lower Surface tension due to its higher polarity related to the water; since its higher intermolecular force.

• ethanol has one oxygen atom and acetic acid contains two oxygen atom so therefore acetic acid forms more H-bonds (hydrogen bonds) then that of ethanol with its neighboring molecules and a network of more and strong Hydrogen bonding is present in acetic acid.

Additional Information

• Liquefaction of gases is a physical conversion of a gas into a liquid state (condensation).

• The liquefaction of gases is a complicated process that uses various compressions and expansions to achieve high pressures and very low temperatures, using, for example, turboexpanders.

• Liquefaction processes are used for scientific, industrial and commercial purposes.

• The boiling point of a liquid varies according to the applied pressure; the normal boiling point is the temperature at which the vapour pressure is equal to the standard sea-level atmospheric pressure.

• At sea level, water boils at 100° C (212° F).

HintChloroform do not has H-Bond. So boiling point of Chloroform is lower.

Q49. Answer: (c) [figure]

The logic followed here is:

• Figure (X) has four triangles.

• Therefore, we can create figure X using figure (c).

Hence, "option 3" is the correct answer.

Q50. Answer: (d) 144

Shortcut Trick

Total population = 400

Working population = 80% of 400 = 320

Employees in Company A = 45% of Working population

Employees in Company A = 0.45 × 320 = 144

Therefore The correct answer is 144.

Alternate Method

Given:

Total population = 400

Non-working population = 20%

Percentage of working population = 100% − 20% = 80%

Calculations:

=> Total number of working employees = 80% of 400

=> Total working employees = (80/100) × 400 = 320

=> Percentage of employees in Company A = 45% (of the working group)

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=> Number of employees in Company A = 45% of 320

=> Number of employees in Company A = (45/100) × 320

=> Number of employees in Company A = 0.45 × 320 = 144

Therefore The correct answer is 144.

Additional Information

Venn Diagram for Sets

For two sets A and B, n(A U B) = n(A) + n(B) − n(A ∩ B). This represents the total individuals in either group.

Percentage Calculations

To find x% of a value Y, use the formula (x/100) × Y. Always identify the correct base value before applying the percentage.

Complementary Percentage

If p% of a population does not belong to a category, then (100 − p)% belongs to that category.

Q51. Answer: (b) Mongolia

The correct answer is Mangolia.

Key Points

• The Gobi Desert is a large desert or brushland region in East Asia.

• It covers parts of Northern and Northeastern China and of Southern Mongolia.

• The desert basins of the Gobi are bounded by the Altai Mountains and the grasslands and steppes of Mongolia on the north, by the Taklamakan Desert to the west, by the Hexi Corridor and Tibetan Plateau to the southwest and by the North China Plain to the southeast.

• The Gobi is notable in history as the location of several important cities along the Silk Road.

• The Gobi is a rain shadow desert, formed by the Tibetan Plateau blocking precipitation from the Indian Ocean from reaching the Gobi territory.

• It is the sixth-largest desert in the world and the second-largest in Asia after the Arabian Desert.

Additional Information

Name of Park	Place
a. Desert National Park	Jaisalmer
b. Talchhapar	Churu
c. Phulwari Ki Nal	Udaipur
d. Bandh Baretha	Bharatpur

Q52. Answer: (b) Prasoon Joshi

The correct answer is Prasoon Joshi.

Key Points

• Prasoon Joshi replaced Pahlaj Nihalani as Censor Board Chief in 2017.

• Pahlaj Nihalani, who turned the censor board into a precinct of serial controversy, has been sacked as the organisation's chairman.

• His successor is famous lyricist-adman Prasoon Joshi, while actor Vidya Balan joins the board.

Additional Information

• Colleagues of Mr Nihalani had accused him of treating the Central Board of Film Certification (CBFC) like his personal fiefdom, while filmmakers and critics accused him of demanding irrational cuts and moral policing.

• The Central Board of Film Certification is a statutory film-certification body in the Ministry of Information and Broadcasting of the Government of India.

• It is tasked with "regulating the public exhibition of films under the provisions of the Cinematograph Act 1952."

Q53. Answer: (c) 31

Shortcut Trick

Priyal's deficit in 12 exams = 12 × (25 − 23) = 24 marks.

This deficit of 24 marks must be recovered in the remaining 4 exams.

Extra marks needed per exam = 24 ÷ 4 = 6 marks.

Required average marks for Priyal = Target Average + Extra = 25 + 6 = 31.

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Therefore The correct answer is 31 marks.

Alternate Method

Given:

Sneha's average in 16 exams = 25 marks

Priyal's average in 12 exams = 23 marks

Formula Used:

Total Marks = Average × Number of Exams

Calculations:

=> Total marks obtained by Sneha = 16 × 25 = 400 marks

=> Current total marks of Priyal = 12 × 23 = 276 marks

=> Marks required by Priyal to equal Sneha = 400 − 276 = 124 marks

=> Number of remaining examinations for Priyal = 16 − 12 = 4

=> Required average for remaining exams = 124 ÷ 4 = 31 marks

Therefore The correct answer is 31 marks.

Additional Information

Weighted Average Formula

Used when two groups are combined: Average_(total) = (n1x1 + n2x2) ÷ (n1 + n2).

Sum of Observations

Total Sum = Average × Number of items. If the average increases, the new item added must be greater than the original average.

Net Deviation Concept

The sum of deviations from the average is always zero. Total Deficit = Total Surplus relative to the mean.

Q54. Answer: (a) Amravati

The logic followed here is:

Dispur is the capital of Assam.

Similarly,

Amravati is the capital of Andhra Pradesh.

Trivandrum is the capital of Kerala, Kolkata is the capital of West Bengal, and Mumbai is the capital of Maharashtra.

Hence, "option 1" is the correct answer.

Q55. Answer: (b) Anoxic respiration

The correct answer is Anoxic respiration.

Key Points

• The incomplete dissolution of a substrate in the absence of oxygen is called anoxic respiration.

• Anoxic conditions involve environments in which molecular or free oxygen (O2) is absent, though bound oxygen may be present.

• “Anoxic” refers to the state of the environment rather than microorganisms and their processes.

Additional Information

• Anaerobic respiration is the type of respiration through which cells can break down sugars to generate energy in the absence of oxygen.

• This is in contrast to the highly efficient process of aerobic respiration, which relies on oxygen to produce energy.

• Anaerobic respiration is respiration using electron acceptors other than molecular oxygen.

• Although oxygen is not the final electron acceptor, the process still uses a respiratory electron transport chain.

Q56. Answer: (c) Au

The correct answer is Au.

Key Points

• Au is the most ductile metal.

• Ductility is the property of being drawn into wire.

• It is a permanent strain that accompanied fracture in a tension test.

• It is a desirable property in machine components that are subjected to unanticipated overloads or impact loads.

• The ductility of the metals decreases as the temperature increases because metals become weak at increasing temperatures.

Additional Information

• Aluminium is called green metal because it is a very environmentally friendly metal.

• Recycling this material saves 95% of the energy required to produce aluminium from raw materials.
• It is called as green metal as it is environment friendly because of its properties like :
• High durability
• Lightweight
• Malleability strength
• Corrosion-free
• Do not catch fire
• It can be easily recycled

Q57. Answer: (c) O

Five friends:- L, M, N, O, and P

Facing:- Centre

N suddenly sits to the left of P.

L sits between O and P.

Therefore, O is sitting between M and L

Hence, "option 3" is the correct answer.

Q58. Answer: (d) ICICI Bank

The correct answer is ICICI Bank.

Key Points

• ICICI Bank became the first bank in India to offer an instant PPF account facility.
• ICICI Bank says it is the first lender in the country to introduce a fully digital and paperless procedure for opening a PPF account.
• Private lender ICICI Bank has launched a digital service to allow customers to open a PPF account online, eliminating the need for furnishing paper documents.
• The digital service will enable customers to open a public provident fund (PPF) account instantly and in a completely online and paperless manner.

Additional Information

• ICICI Bank Limited is an Indian multinational bank and financial services company with its corporate office in Mumbai, Maharashtra.
• It offers a wide range of banking products and financial services for corporate and retail customers through a variety of delivery channels and specialized subsidiaries in the areas of investment banking, life, non-life insurance, venture capital, and asset management.
• The bank has a network of 5,275 branches and 15,589 ATMs across India and has a presence in 17 countries.
• The bank has subsidiaries in the United Kingdom and Canada; branches in the United States, Singapore, Bahrain, Hong Kong, Qatar, Oman, Dubai International Finance Centre, China, and South Africa as well as representative offices in United Arab Emirates, Bangladesh, Malaysia, and Indonesia.

Q59. Answer: (a) 240 C

The correct answer is 240 C.

Key Points

• A current of 0.8 A is drawn by a filament of an electric bulb in 5 minutes.
• Let us assume the amount of electric charge flowing through the circuit as 'q'.
• 1 min = 60 sec
• 5 min = 5 × 60 = 300 sec
• We know that,
• I = q/t, where I stands for the current, q stands for the amount of electric charge flowing, and t stands for time.
• $q = I \times t$
• $q = 0.8 \times 300$
• $q = 240$ C
• Hence the amount of electric charge flowing through the circuit is 240 C.

Q60. Answer: (d) 2

Shortcut Trick

Identify the standard algebraic identity: $(a + b)^2 - (a - b)^2 = 4ab$.

Here, a = 469 and b = 144.

The given expression is (4ab) ÷ (2ab).

By simplification, the ratio is 4 ÷ 2 = 2.

Therefore The correct answer is 2.

Alternate Method

Given:

First term (a) = 469

Second term (b) = 144

Formula Used:

$(a + b)^2 = a^2 + b^2 + 2ab$

$(a - b)^2 = a^2 + b^2 - 2ab$

Calculations:

=> Numerator = $(469 + 144)^2 - (469 - 144)^2$

=> Numerator = $(469^2 + 144^2 + 2 \times 469 \times 144) - (469^2 + 144^2 - 2 \times 469 \times 144)$

=> Numerator = $469^2 + 144^2 + 2 \times 469 \times 144 - 469^2 - 144^2 + 2 \times 469 \times 144$

=> Numerator = $4 \times 469 \times 144$

=> Denominator = $2 \times (469 \times 144)$

=> Expression = $(4 \times 469 \times 144) \div (2 \times 469 \times 144)$

=> Value = $4 \div 2 = 2$

Therefore The correct answer is 2.

Additional Information

Sum of Squares Identity

$(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$. This is used when the middle sign is positive.

Difference of Squares

$a^2 - b^2 = (a + b)(a - b)$. This identity is fundamental for factoring quadratic expressions.

Cubic Identities

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ and $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

Q61. Answer: (b) Swami Vivekananda Airport, Raipur

The correct answer is Swami Vivekananda Airport, Raipur.

Key Points

• Swami Vivekananda Airport, Raipur ranked first in the Customer Satisfaction Index (CSI) Survey 2017.

• Swami Vivekananda Airport, Raipur, Chhattisgarh, has topped the charts in the Customer Satisfaction Index Survey among 49 airports in India.

• The airport achieved 4.84 scores in a five-point scale index in the latest CSI survey conducted by an independent agency for the period of Jan- June 2017 followed by Udaipur, Amritsar, and Dehradun airports which have scored 4.75, 4.74 and 4.73 respectively.

Additional Information

• The Customer Satisfaction Index (CSI) is a versatile analytical tool for measuring customer satisfaction with a product, service, or company.

• It stands that only the satisfied customer tends to repeatedly return to their favourite brand and also convey their positive experience to others

• Raipur airport is the 28th busiest airport in India by passenger traffic and 31st busiest by aircraft movement.

• High-level maintenance of infrastructure and passenger facilities, the green ambience, state-of-the-art technology, and courteous staff ensuring passenger satisfaction have resulted in Raipur getting the recognition for the third consecutive time in the past two years.

Q62. Answer: (a) East

Given that:-

Pranitha goes in the north direction, then takes a right turn, again takes a right turn, and then takes a left turn.

The figure is given below:-

Pranitha going east direction now.

Hence, "option 1" is the correct answer.

Q63. Answer: (d) 80 J

The correct answer is 80 J.

Key Points

• Given,

• Force (f) =20 N

• displacement (s) = 4 m

• Work=Force×Displacement

• Work = 20N×4m

• Work = 80 J

Additional Information

• Work is done whenever a force moves something over a distance.

• Energy transferred = work done

• = force x distance moved in the direction of the force.

• Displacement is an example of a vector quantity.

• Distance is an example of a scalar quantity.

• A vector is any quantity with both magnitude and direction.

Q64. Answer: (a) D

When it is folded on the dotted line, then the pattern will be the same as the sheet given below:-

Hence, "option 1" is the correct answer.

Q65. Answer: (a) Kotak Mahindra Bank

The correct answer is Kotak Mahindra Bank.

Key Points

• Kotak Mahindra bank is currently using Ranveer Singh as his celebrity endorser to open a bank account named '811'.

• Kotak Mahindra Bank has signed Ranveer Singh as its brand ambassador.

• It also had signed Vinay Pathak, as the brand mascot of the company.

• The process of opening 811 accounts was a five-minute task sitting at home since everything is done online.

• It also provided the Kotak 811 account holder with a virtual debit card.

Additional Information

• Kotak Mahindra Bank Limited is an Indian banking and financial services company headquartered in the city of Mumbai, India.

• It is India's third-largest private sector bank by assets and by market capitalization as of November 2021.

• It offers banking products and financial services for corporate and retail customers in the areas of personal finance, investment banking, life insurance, and wealth management.

• As of February 2021, the bank has 1600 branches and 2519 ATMs.

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

• Assumption 1 says that the vacation spot should be cool and pleasant which is out of the context. The description only talks about the place being good for holidays.

• Assumption 2 suggests that Ram is the husband of Anita which implies that Ram has to be a male.

• Thus Assumption II is correct.

Hence, option 1 is the correct answer.

Q67. Answer: (c) Uncle

The family tree is given below:-

Naveen is the uncle of Kirthana.

Hence, "option 3" is the correct answer.

Q68. Answer: (b) N

The alphabet template is given below:-

The logic followed here is:

Hence, "option 2" is the correct answer.

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Q69. Answer: (c) Shivering

The correct answer is Shivering.

Key Points

• The sound of the human voice is produced from the vocal cord by shivering.

• The vocal folds (vocal cords) are attached within the larynx to the largest of the laryngeal cartilages known as the thyroid cartilage or "Adam's apple".

• The vocal folds produce sound when they come together and then vibrate or shiver as air passes through them during the exhalation of air from the lungs.

• This vibration produces a sound wave for your voice.

Additional Information

• In order for the sound to be clear and not raspy or hoarse, the vocal folds must vibrate together symmetrically and regularly.

• The rate of vibration determines the pitch of the voice.

• When the voice is hoarse, the vocal folds may not be closing fully, or may not be vibrating symmetrically.

• The larynx, or voice box, is located in the neck and performs several important functions in the body.

• The larynx is involved in swallowing, breathing, and voice production.

• Sound is produced when the air which passes through the vocal cords causes them to vibrate and create sound waves in the pharynx, nose and mouth.

Q70. Answer: (d) Only I is logical.

The question talks about a way to avoid chaos in the vegetable market.

• Argument I suggests that if people are polite and they make way for each other, the chaos can be avoided which is logically correct. If people are mutually giving space to others, there won't be any chaos happening.

• Argument II suggests that avoiding chaos won't be possible because the roads there are narrow and cannot be kept clean. It is not logical to claim that roads cannot be cleaned daily. Municipal workers can be appointed to maintain basic cleanliness. Also, the problem of narrow roads can be resolved if they are widened. Traffic management can help reduce chaos caused by traffic. So, argument II does not sound logical.

Hence the correct answer is option 4.

Q71. Answer: (d) 2

Given that:-

6 7 4 8 5 8 8 4 8 3 2 5 8 6 7 8 3 8

• If the first and second, third, and fourth terms of the sequence are interchanged, then:-

7 6 8 4 5 8 8 4 8 3 2 5 8 6 7 8 3 8

There are two (5 8 6, 7 8 3) 8s that will not be divisible by the numbers on their left and right number.

Hence, "option 4" is the correct answer.

Q72. Answer: (d) Thursday

The correct answer is Thursday.

• The year 2018 is not a leap year.

• So, 15th February 2019 will be a Friday.

• The year 2019 is not a leap year so there are 28 days in February.

• So the number of days after 15th February 2019 to 18th April 2019 are 13 + 31 + 18 = 62

• Number of odd days in 62 days = 6

• Thus, on 18th April 2019, the day will be Friday + 6 days = Thursday.

• Hence, "option 4" is the correct answer.

Q73. Answer: (d) Tuesday

The correct answer is Tuesday.

• The year 2003 is not a leap year.

• So, 18th October 2003 will be a Saturday.

• The year 2004 is a leap year so there are 29 days in February.

• The year 2005 is not a leap year so there are 28 days in February.

• So the number of days from 18th October 2003 to 18th October 2005 is 366 + 365 = 731

• Number of odd days in 731 days = 3

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• Thus, on October 18, 2003, the day will be Saturday + 3 days = Tuesday.

• Hence, "option 4" is the correct answer.

Q74. Answer: (b) 12/30

Concept used:

Recurring decimal - When a digit starts repeating itself after the decimal.

Calculation:

=> 10/30 = 0.333333.....

=> 12/30 = 0.4

=> 14/30 = 0.466666.....

=> 8/30 = 0.266666....

Therefore 12/30 is not a recurring decimal

Q75. Answer: (b) India is a secular country.

The correct answer is India is a secular country.

Key Points

• India is a secular state which means that it is not based on any religion.

• India is called a secular state because it does not have any state religion and people are free to practice any religion of their choice.

• Hence statement 2 is correct.

• Religion in India is characterized by a diversity of religious beliefs and practices.

• The Indian subcontinent is the birthplace of four of the world's major religions: namely Hinduism, Buddhism, Jainism, and Sikhism.

• Religious diversity and religious tolerance are established by the law; the Constitution of India defines freedom of religion as a fundamental right and holds India to be a secular state.

• So India has not had a fixed state religion and India is not a divine country.

• Hence option 1 and option 3 are not correct.

• As per the Indian constitution, everyone is equal in front of the law and Indian law applies equally to all citizens of the country irrespective of their race, caste, religion, gender etc.

• Hence statement 4 is incorrect.

Q76. Answer: (b) CaO

The correct answer is CaO.

Key Points

• Calcium oxide (CaO), commonly known as quicklime or burnt lime, is a widely used chemical compound.

• It is a white, caustic, alkaline, crystalline solid at room temperature.

• Formula: CaO

• IUPAC ID: Oxocalcium

• Molar mass: 56.0774 g/mol

• Melting point: 2,572 °C

• Density: 3.34 g/cm³

• Soluble in: Water, Glycerol

Additional Information

• Calcium oxide appears as an odourless, white or grey-white solid in the form of hard lumps.

• A strong irritant to skin, eyes and mucous membranes.

• Used in insecticides and fertilizers.

• Calcium oxide is a member of the class of calcium oxides of calcium and oxygen in a 1:1 ratio.

• It has a role as a fertilizer.

Q77. Answer: (b) 1 and 2 together is sufficient.

The family tree is given below:-

1. Y has two sisters U and V.

• Here, there is no information given about X. Therefore, statement 1 alone is not sufficient.

2. X's mother is the sister of U's father.

• No information is given about Y. Therefore, statement 2 alone is not sufficient.

From statements 1 and 2 together then:-

• Here, statements 1 and 2 together are sufficient.

• X is the cousin of Y.

Hence, "option 2" is the correct answer.

Q78. Answer: (b) 240

Shortcut Trick

Area of a parallelogram is calculated as Base × Height.

From the figure, the base is 20 and the corresponding height is 12.

Area = 20 × 12 = 240.

Therefore The correct answer is 240.

Alternate Method

Given:

Base (b) = 20

Height (h) = 12

Formula Used:

Area of Parallelogram = Base × Height

Calculations:

=> Area = b × h

=> Area = 20 × 12

=> Area = 240

Therefore The correct answer is 240.

Additional Information

Properties of Parallelogram

Opposite sides are equal and parallel. Opposite angles are equal, and diagonals bisect each other.

Perimeter of Parallelogram

The perimeter is 2 × (sum of adjacent sides), similar to a rectangle.

Area using Sine of Angle

If two adjacent sides are 'a' and 'b' with an included angle θ, Area = a × b × sin(θ).

Q79. Answer: (c) hard tissue

The correct answer is hard tissue.

Key Points

• The hard tissue of plant tissue does not hold living protoplasm at maturity.

• The protoplasm is the living part of a cell that is surrounded by a plasma membrane.

• In cell biology, the cytoplasm is all of the material within a eukaryotic cell, enclosed by the cell membrane, except for the cell nucleus.

• The material inside the nucleus and contained within the nuclear membrane is termed the nucleoplasm.

Additional Information

• Mature sclerenchyma cells are usually dead cells that have heavily thickened secondary walls containing lignin.

• The cells are rigid and nonstretchable and are usually found in nongrowing regions of plant bodies, such as the bark or mature stems.

• Sclerenchyma is one of the three types of ground, or fundamental, tissue in plants; the other two types are parenchyma (living thin-walled tissue) and collenchyma (living support tissue with irregular walls).

• Sclerenchyma cells occur in many different shapes and sizes, but two main types occur:

• fibres and sclereids.

Q80. Answer: (d) All I, II and III are sufficient.

Shortcut Trick

To find Asha's total income, we need both her basic income and additional allowance.

From Statement I and II: Asha's basic = Rs. 1,550 + Rs. 100 = Rs. 1,650.

From Statement III: Asha's allowance = Rs. 2,000 + Rs. 50 = Rs. 2,050.

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Total Income = Basic + Allowance = Rs. 1,650 + Rs. 2,050 = Rs. 3,700.

Since components from all statements are required, all are sufficient together.

Therefore The correct answer is All I, II and III are sufficient.

Alternate Method

Given:

Mala's Basic Income = Rs. 1,550 (from Statement II)

Asha's Basic Income = Mala's Basic + Rs. 100 (from Statement I)

Mala's Allowance = Rs. 2,000 (from Statement III)

Asha's Allowance = Mala's Allowance + Rs. 50 (from Statement III)

Formula Used:

Total Monthly Income = Basic Income + Additional Allowance

Calculations:

=> Using Statement II: Mala's Basic = Rs. 1,550

=> Using Statement I and II: Asha's Basic = 1,550 + 100 = Rs. 1,650

=> Using Statement III: Mala's Allowance = Rs. 2,000

=> Since Mala's allowance (2,000) is Rs. 50 less than Asha's, Asha's Allowance = 2,000 + 50 = Rs. 2,050

=> Total Monthly Income of Asha = 1,650 + 2,050 = Rs. 3,700

=> All statements are mandatory to reach the final sum.

Therefore The correct answer is All I, II and III are sufficient.

Additional Information

Data Sufficiency Rules

In data sufficiency, you must determine if the information provided in the statements is enough to answer the question uniquely, without necessarily calculating the final value.

Salary Components

Gross Monthly Income is generally the sum of Basic Pay, Dearness Allowance (DA), House Rent Allowance (HRA), and other miscellaneous allowances.

Logical Connectives

Phrases like 'more than' or 'less than' indicate a comparison between two entities, requiring the value of the reference entity (in this case, Mala) to find the target (Asha).

Q81. Answer: (d) Neither 1 nor 2 follow.

• The statement only tells us that a proposal was made by the government at some point in time to reduce the present syllabus of NCERT. This is understood due to the usage of the words "had proposed".

• However, the final status of the proposal is not discussed in the statement.

• Therefore, neither of the conclusions follow.

Hence, option 4 is the correct answer.

Note: The official question had a discrepancy. We have rephrased the question to make it logically correct.

Q82. Answer: (a) Kapil Dev

The correct answer is Kapil Dev.

Key Points

• Kapil Dev has written the book 'Cricket My Style'.

• Kapil Dev has written three autobiographical works.

• By God's Decree came out in 1985 and Cricket my style in 1987.

• He released his most recent autobiography, titled Straight from the Heart in 2004.

• Kapil Dev Ramlal Nikhanj born 6 January 1959) is a former Indian cricketer.

• He was a fast-medium bowler and a hard-hitting middle-order batsman.

• He led India to win its first Cricket World Cup title in 1983. He was named by Wisden as the Indian Cricketer of the Century in 2002.

Important Points

Sports Personalities	Book
Anil Kumble	Wide Angle: Candid Moments from My Playing Days

Sunil Gavaskar	Sunny Days
Ravi Shastri	Stargazing: The Players in My Life

Additional Information

• Books by Arundhati Roy

• The Algebra of Infinite Justice

• The God of Small Things

• The Ministry of Utmost Happiness

• The book 'Lockdown Liaisons' authored by Shobhaa De and Published by Simon and Schuster.

• Lockdown Liaisons is a collection of short stories, from the varying perspectives of both men and women, young and old, brave and cowardly, cheerful and weighed down.

• Books by Anil Kumble

• Wide Angle: Candid Moments from My Playing Days.

Q83. Answer: (b) Cylindrical, branched and single-nuclei

The correct answer is Cylindrical, branched and single-nuclei.

Key Points

• Heart muscles are Cylindrical, branched and single-nuclei.

• Cardiac muscle fibres are long, branched cells, shaped like cylinders joined end-to-end, with one or two nuclei located centrally.

• The fibres are separated by collagenous tissue that supports the capillary network of cardiac tissue.

Additional Information

• The myofilaments of cardiac muscle are arranged in a similar pattern to skeletal muscle, resulting in cross-striations.

• The fibres are crossed by linear bands called intercalated discs.

• These structures have two important roles.

• Firstly, they provide attachment points that provide the tissue with a characteristic branched pattern.

• Secondly, they allow cardiac muscle tissue to function as a functional syncytium.

• Essentially, the contractile stimuli are propagated from one cell to the next one, resulting in a synchronous contraction of the entire tissue section.

Q84. Answer: (d) B

The logic followed here is:

• The second figure is formed by combining the endpoints of the arrow in the first figure. The combined part is in the middle of the second figure. Here, the solid dot is inserted inside the hollow circle.

• Similarly, the fourth figure is formed by combining the endpoints of the arrow in the third figure. The combined part is in the middle of the fourth figure. Here, the arrow is inserted inside the hollow circle.

Hence, "figure B" is the correct answer.

Q85. Answer: (b) SEVA

The correct answer is SEVA.

Key Points

• SEVA app was launched by Union Minister Piyush Goyal to monitor the coal-dispatch process.

• Union Minister of State for Power, Coal, New and Renewable Energy and Mines Piyush Goyal recently launched the Saral Eindhan Vitaran Application (SEVA) aiming to facilitate the industry's connection with the coal companies by proving information on coal dispatch.

• The application helps track coal dispatch to 118 power plants through Fuel Supply Agreement (FSA), dispatch through special forward E-Auction and Bridge Linkage from over 200 dispatch points.

Additional Information

• Unified Mobile Application for New-age Governance, is a mobile app, a Digital India initiative of the Ministry of Electronics and Information Technology, by the Government of India for access to central and state government services.

• The app supports 13 Indian languages and is available for Android, iOS and Windows.

• Rakshak is an emergency application for the android platform, an app with 24x7 support for emergencies.

Q86. Answer: (a) 16

Shortcut Trick

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Let the total work be 120 units (LCM of 15 and 24).

Efficiency: Amod = 8, Pramod = 5.

If Amod had not left, he would have done 11 × 8 = 88 additional units.

Total adjusted work = 120 + 88 = 208 units.

Total days = Adjusted work ÷ Combined efficiency = 208 ÷ (8 + 5) = 16 days.

Therefore The correct answer is 16 days.

Alternate Method

Given: Time taken by Amod = 15 days, Time taken by Pramod = 24 days.

Formula Used: Total Work = Efficiency × Time

Person	Days	Total Work	Efficiency
Amod	15	120	8
Pramod	24	5	

=> Let the total time to complete the work be x days.

=> Amod worked for (x − 11) days and Pramod worked for x days.

=> 8 × (x − 11) + 5 × x = 120

=> 8x − 88 + 5x = 120

=> 13x = 120 + 88

=> 13x = 208

=> x = 208 ÷ 13

=> x = 16

Therefore The correct answer is 16 days.

Additional Information

Leaving Before Completion

When a person leaves 'n' days before completion, add their (n × efficiency) to the total work and divide by the combined efficiency of the original group.

Work and Wages

Wages are always distributed in the ratio of work done by each person, which is proportional to (Efficiency × Time).

LCM Method for Total Work

Using the Least Common Multiple of individual days as the total work unit simplifies calculations by avoiding fractions.

Q87. Answer: (b) Iman Chakraborty

The correct answer is Iman Chakraborty.

Key Points

• Iman Chakraborty won the Best Female Playback Singer award at the 64th National Film Awards 2017.

• Iman Chakraborty is an Indian singer.

• Chakraborty won the National Film Award for Best Female Playback Singer in the year 2017 for her Bengali song "Tumi Jake Bhalobasho" from Praktan film.

• Accordingly, She is one of the few singers who have won a national award for the debut film song in India.

Additional Information

• The National Film Awards is the most prominent film award ceremony in India.

• Established in 1954, it has been administered, along with the International Film Festival of India and the Indian Panorama, by the Indian government's Directorate of Film Festivals since 1973.

• Every year, a national panel appointed by the government selects the winning entry, and the award ceremony is held in New Delhi, where the President of India presents the awards.

• This is followed by the inauguration of the National Film Festival, where the award-winning films are screened for the public.

Q88. Answer: (d) 11

Shortcut Trick

Directly substitute the value a = 1 into the given expression to get the result quickly.

=> 15(1)³ − (3(1)³ − 1) − (4(1)^4 + (1)³ − 3) + ((1)³ − 1)

=> 15 − 2 − (5 − 3) + 0

=> 15 − 2 − 2 = 11

Therefore The correct answer is 11.

Alternate Method

Given: a = 1

Expression: $15a^3 - (3a^3 - 1) - (4a^4 + a^3 - 3) + (a^3 - 1)$

Method: Simplify the polynomial expression by combining like terms and then substitute the variable value.

=> Open the brackets: $15a^3 - 3a^3 + 1 - 4a^4 - a^3 + 3 + a^3 - 1$

=> Rearrange according to the powers of a: $-4a^4 + (15a^3 - 3a^3 - a^3 + a^3) + (1 + 3 - 1)$

=> Simplified expression: $-4a^4 + 12a^3 + 3$

=> Substitute a = 1: $-4(1)^4 + 12(1)^3 + 3$

=> Value = $-4 + 12 + 3 = 11$

Therefore The correct answer is 11.

Additional Information

BODMAS Rule

Always prioritize Brackets and Orders (exponents) before performing basic addition or subtraction in algebraic expressions.

Like Terms

Only terms with the same variable and the same exponent (e.g., all a^3 terms) can be added or subtracted together.

Sign Convention

When a minus sign is outside a bracket, the sign of every term inside the bracket must be changed when the bracket is removed.

Q89. Answer: (a) XY

Shortcut Trick

For any two co-prime numbers, the Highest Common Factor (HCF) is always 1.

Using the property: Product of two numbers = HCF × LCM

X × Y = 1 × LCM

=> LCM = XY

Therefore The correct answer is XY.

Alternate Method

Given: Two co-prime numbers X and Y.

Concept: Co-prime numbers are those numbers that have only 1 as their common factor.

=> Let the two numbers be X and Y.

=> Since X and Y are co-prime, HCF(X, Y) = 1.

=> Formula: Product of numbers = HCF × LCM

=> X × Y = 1 × LCM

=> LCM = XY

Therefore The correct answer is XY.

Additional Information

Definition of Co-prime Numbers

Two numbers are said to be co-prime if their Highest Common Factor (HCF) is 1. Example: (8, 9), (15, 16).

Fundamental Property of HCF and LCM

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

LCM of Prime Numbers

Since all prime numbers are co-prime to each other, the LCM of any set of prime numbers is simply their product.

Q90. Answer: (d)

• The given statement says that this detergent cleans better than "other detergents" which means more than one detergents are present in the market.

• So the first assumption is implicit.

• The second assumption 'No other detergents clean better.' is implicit since the statement means that this detergent cleans better than "all" the others, thus there is no other detergent that cleans better than this one.

• So assumption II is also implicit.

Hence, option 4 is the correct answer.

Q91. Answer: (b) C

The logic followed here is:

In figure A, B, and D there are three lines are present but in figure C only one line is present.

figure C is different from others.

Hence, "option 2" is the correct answer.

Q92. Answer: (c) 11 July 2016

• Imran was born on 9th January 2015.

• Irfan was born 549 days later:-

• 2015 is not a leap year so 365 days in 2015.

• So, remaining days = 549 - 365 = 184 days

• 2016 is the leap year.

• So, January = 22 days, February = 29 days, March = 31 days, April = 30 days, May = 31 days, June = 30 days.

• Remaining days in July = 184 - (22 + 29 + 31 + 30 + 31 + 30) = 184 - 173 = 11

• So, Irfan was born on 11th July 2016.

• Hence, "option 3" is the correct answer.

Q93. Answer: (b) February and June

Formula used:

Average number of screws produced each month = Sum of screws/No of months

Calculation:

Sum of screws produced during 6 months = 200 + 300 + 250 + 250 + 230 + 270

=> 1500 (in thousands)

Average number screws produced each month = 1500/6 = 250 (in thousands)

Therefore The months in which number of screws produced was more than the average number of screws (250) are February (300) and June(270).

Q94. Answer: (d) Force and Pressure

The correct answer is Force and Pressure.

Key Points

• The standard SI unit of force is Newton (N) and the unit of pressure is Pascal (P).

• The standard SI unit of work and energy is Joule (J).

• The standard SI unit of distance and displacement is Metre (m).

• The standard SI unit of speed and velocity is Metres per sec (ms^(-1)).

Additional Information

Speed	Velocity
Speed is the time rate at which an object is moving along a path	Velocity is the rate and direction of an object's movement.
Scaler quantity	vector quantity
Speed can never be negative or zero.	Velocity can be zero, negative, or positive.

Q95. Answer: (d) 0.04 s

The correct answer is 0.04 s.

CONCEPT:

• Wave: It can be defined as the transport of energy without the transport of matter.

• The properties of waves are:

• Wavelength (λ): The distance between two crests or troughs of a wave is known as wavelength. One wavelength equals the distance between two consecutive crests.

• Frequency (f): The number of oscillations or the number of waves passes a given point in one sec. Its SI unit is Hertz.

• Time period (T): The time taken by the wave to complete one cycle.

• The relation between velocity, wavelength and frequency and time-period of wave is

=> f = 1/T = v/λ [where f = frequency, T = time period, v = velocity of wave, λ = wavelenght]

Calculation:

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Given:

Speed = 500 m/s

λ = 20 m

We know,

=> f = 1/T = v/λ

=> T = λ / v

=> T = 20/ 500 = 0.04 s

Additional Information

• The intensity of the sound :

• Sound intensity, also known as acoustic intensity, is defined as the power carried by sound waves per unit area in a direction perpendicular to that area.

• The SI unit of intensity, which includes sound intensity, is the watt per square meter (W/m2).

• Sound intensity is not the same physical quantity as sound pressure.

• The loudness of the sound :

• Loudness refers to how loud or soft a sound seems to a listener.

• The loudness of sound is determined, in turn, by the intensity of the sound waves.

• Intensity is a measure of the amount of energy in sound waves.

• The unit of intensity is the decibel (dB).

• The wavelength of the sound :

• The wavelength of a sound, therefore, is the distance between adjacent identical parts of a sound wave.

• Just as the distance between adjacent crests in a transverse wave is one wavelength.

• the distance between adjacent compressions in a sound wave is also one wavelength.

Q96. Answer: (b) Archery

The correct answer is Archery.

Key Points

• Vennam Jyoti Surekha is associated with archery.

• Jyothi Surekha Vennam is a right-handed Indian archer.

• At the age of 4, she was entered in the Limca Book of Records after crossing the Krishna River three times with a distance of 5 km in three hours, 20 minutes and six seconds.

• In various national and international competitions, she bagged 98 medals.

• 2015 Asian Archery Championships: Women Individual.

• Arjuna Awards in the year 2017

• Won two Bronze medals in World Archery Championship in Hertogenbosch in 2017.

Additional Information

List – I (Sports)	**List -II (Players associated with these sports)**
A. Cricket	1. Hanuma Vihari
B. Badminton	2. HS Prannoy
C. Hockey	3. Krishna B Pathak
D. Tennis	4. Saketh Myneni

Q97. Answer: (a) 10 N

The correct answer is 10 N.

Key Points

• The weight of the object on the surface of the moon will be 10 N.

• Given that

• Weight of the object on the earth surface (We) = 60 N

• sing the concept

• Weight of the object on the moon (Wm) = 1/6 * We

• Wm = 1/6 * 60 = 10 N

• An object weighs 60 N when measured on the surface of the earth.

• Its weight on the surface of the Moon will be 10 N.

Additional Information

• The weight of an object on Earth and the Moon is different because Earth's gravity is much great than the Moon's gravity.

• Newton's law says that F=mg, where F is the weight and M is the mass, and G, is the acceleration due to gravity but since the gravity on Moon is much less than Earth.

• The weight of an object will be Different.

• The formula that links mass and the gravitational field strength is:

• gravity force = mass × gravitational field strength (g)

• This is when:

• gravity force is measured in newtons (N)

• mass is measured in kilograms (kg)

• gravitational field strength (g) is measured in newtons per kilogram (N/kg)

Q98. Answer: (c) 22, 36

Shortcut Trick

Initial Ratio = 11 : 18 (Difference = 7 units)

Final Ratio = 13 : 20 (Difference = 7 units)

Since the difference between ratio terms is constant, we look at the change in parts: 13 − 11 = 2 units.

Given: 2 units = 4 → 1 unit = 2.

Original numbers = 11 × 2 and 18 × 2.

Therefore The correct answer is 22, 36.

Alternate Method

11x

18x

• 4

• 4

Ratio becomes 13 : 20

Given: Ratio of two numbers = 11 : 18. Value added = 4. New Ratio = 13 : 20.

Formula Used: (11x + 4) / (18x + 4) = 13 / 20

=> 20 × (11x + 4) = 13 × (18x + 4)

=> 220x + 80 = 234x + 52

=> 234x − 220x = 80 − 52

=> 14x = 28

=> x = 2

=> First number = 11x = 11 × 2 = 22

=> Second number = 18x = 18 × 2 = 36

Therefore The correct answer is 22, 36.

Additional Information

Ratio Balancing Method

If the difference between ratios is not equal, multiply the ratios by the difference of the other ratio to balance them before comparing parts.

Proportion Rule

If a : b = c : d, then product of extremes (ad) is always equal to the product of means (bc).

Cross Multiplication Method

Used for problems where different values are added/subtracted: (Initial Ratio Parts) × (Final Ratio) with added values to find the constant unit.

Q99. Answer: (c) D

The logic followed here is:

In figures A, B, and C are Roman numerals but figure D is not.

So, figure D is different from others.

Hence, "option 3" is the correct answer.

Q100. Answer: (d) • 1.87 ms-1

The correct answer is - 1.87 ms-1.

Key Points

• Given Mass of bullet, m1 = 25 g = 0.025 kg
• Mass of pistol, m2 = 2 kg
• The initial velocity of the bullet (u1) and pistol, u2 = 0
• The final velocity of the bullet, v1 = 150 ms-1
• Let the recoil velocity of the pistol be v
• The total momentum of the pistol and bullet is zero before the fire (because both are at rest)
• The total momentum of the pistol and bullet after it is fired is
• = (0.025 kg * 150 ms^(-1)) + (2 kg * v ms^(-1))
• On calculation, we get,
• = (3.75 + 2v) kg ms-1
• Total momentum after the fire = Total momentum before the fire
• 3.75 + 2v = 0
• 2v = -3.75
• v = -3.75/2
• v = -1.875 m/s
• Hence, the recoil velocity of the pistol is -1.875 m/s.

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