RRC Group D Previous Year Paper 40 (Held On: 15 Oct 2018 Shift 2)

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

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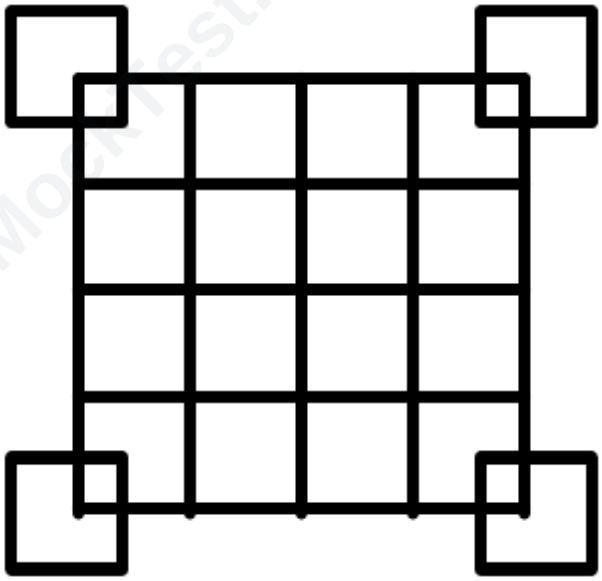
Practise under exam conditions, then review your answers after you submit.

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CBT

Q1. Count the number of squares in the following figure:



(a) 36
(b) 38
(c) 42
(d) 40

Q2. Which of the following national political parties have the clock as its party symbol ?

(a) All India Trinamool Congress
(b) Indian National congress
(c) Nationalist Congress Party
(d) Bahujan Samaj Party

Q3. Which of the following statements is/are true of the speed of sound in different media at 25°C?

A. In Aluminium, the speed of sound is 6220 m/s.
B. In Nickel speed of sound 6040 m/s.

(a) Only B is true
(b) Both A and B are true
(c) Only A is true
(d) Neither A nor B is true

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Q4. Which of the phenomena mentioned in the options is NOT explained by the universal law of gravitation?

(a) The motion of the moon around the earth
(b) The tides are due to the moon and the sun
(c) The force that binds us to the earth
(d) The motion of sun around the planets

Q5. Which of the following metals can form an amphoteric oxide?

(a) Al
(b) Cu
(c) Ca
(d) Na

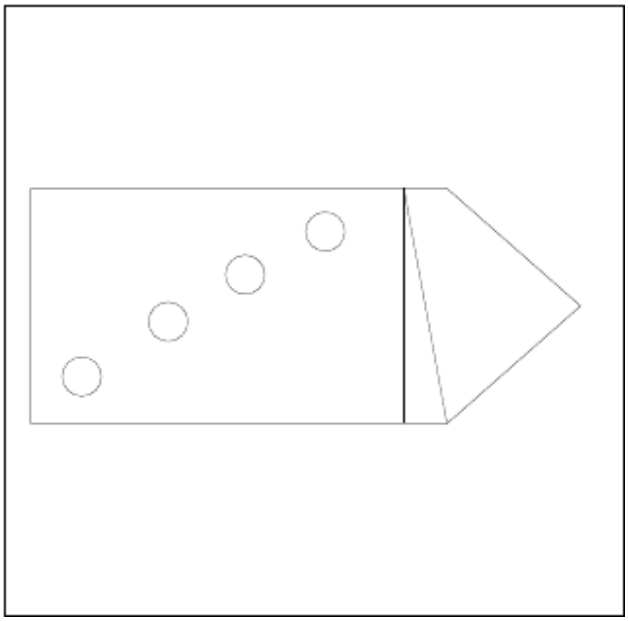
Q6. India is divided into _____ physiographical regions.

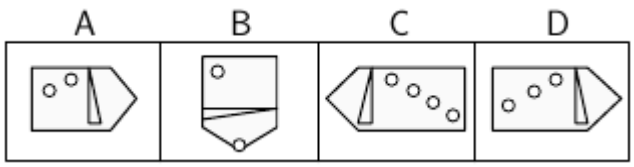
(a) 6
(b) 7
(c) 4
(d) 5

Q7. Find the energy possessed by an object of mass 14 kg when it is at a height of 5 m above the ground Given g = 9.8 ms^(-2)

(a) 528 J
(b) 668 J
(c) 686 m
(d) 686 J

Q8. Which of the options bears the closest resemblance to the following figure?





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

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Q9. A tank has two inlets and an outlet. The inlets fill up the tank in 6 hours and 8 hours individually and outlet empties it in 10 hours. If the inlets are opened for an hour and closed and then all the three taps are opened together, how much time will it take to fill up remaining tank?

(a) 75/23 hours
(b) 72/23 hours
(c) 85/23 hours
(d) 82/23 hours

Q10. Raju has Rs. 210 in the form of coins, 20% of the coins are in Rs. 5, 25% in Rs. 10, 15% in Rs. 2 and the remaining ones in Rs. 1 denominations. Find the number of Rs. 1 coins.

(a) 20
(b) 25
(c) 22
(d) 24

Q11. _____ was the court poet of Harshavardhana.

(a) Bilhana
(b) Jayadeva
(c) Chand Bardai
(d) Banabhatta

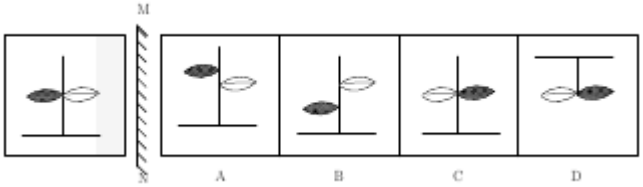
Q12. King Ashoka was the son of _____ who belonged to the Maurya dynasty.

(a) Bimbisara
(b) Chandragupta Maurya
(c) Chandragupta II
(d) Bindusara

Q13. The LCM of 94, 188 and 235 is:

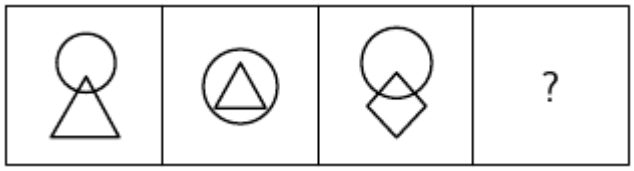
(a) 705
(b) 1880
(c) 940
(d) 470

Q14. Choose the mirror image for the following figure:



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

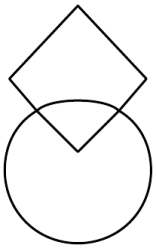
Q15. Find the next figures for the given series



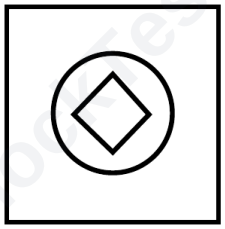
(a)



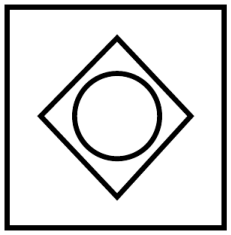
(b)



(c)



(d)



Q16. Find the median of the given data set:

42, 45, 58, 87, 45, 54, 65, 12, 25, 25, 59, 60

(a) 49.5
(b) 59.5
(c) 54
(d) 45

Q17. Ratio of ages of father and son is 3 : 1. The product of their ages is 147. What is the sum of their ages?

(a) 32
(b) 36
(c) 28
(d) 35

Q18. Travelling at 66 km/h, Piyali reaches a place 5 minutes early. If she travelled at 54 km/h, she would have been 3 minutes late. What is the distance Piyali had to travel?

(a) 39.2 km
(b) 40.2 km
(c) 39.6 km
(d) 40.8 km

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Q19. Find the next letter in the series:

F, J, I, M, L, P, ?

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

Q20. In the nineteenth century, _____ came up with the idea of evolution of species by natural selection.

(a) Johann Mendel
(b) Johann Dobereiner
(c) John Dalton
(d) Charles Darwin

Q21. Rajan can finish a certain task in 6 days. Bhavesh takes 8 days to complete the same task. Charan takes as long as Rajan and Bhavesh would take working together. How long will it take Bhavesh and Charan to complete the work together?

(a) 22/5 days
(b) 27/5 days
(c) 23/5 days
(d) 24/5 days

Q22. Who is the Chief Minister of Sikkim as of August 2018?

(a) Biplab Deb
(b) Pavan Kumar Chamling
(c) Conrad Sangma
(d) Manik Sarkar

Q23. The rate of doing work or the rate of transfer of energy is called _____.

(a) Force
(b) Work done
(c) Momentum
(d) Power

Q24. Name the young CEO of the South India-based idli batter company ID Special Foods Pvt. Ltd. who was recently invited to address the students of Harvard University.

(a) Anand Sattanathan
(b) Sunny Varkey
(c) PC Mustafa
(d) RC Subramoniam

Q25. An elevator descends into a mine shaft at the rate of 7.5 m/minute. If it descends from 35 m above the ground, how long will it take to reach the mine that is 430 m below ground?

(a) 57.33 Minutes
(b) 66 Minutes
(c) 62 Minutes
(d) 52.67 Minutes

Q26. 1 Joule = _____

(a) 1 N × 1 cm
(b) 1 Pa × 1 m
(c) 1 W × 1 m
(d) 1 N × 1 m

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Q27. In each question below is given a statement followed by two assumptions numbered I and II. You have to consider the statement and the following assumptions and decide which of the assumptions is implicit in the statement.

Statement: “I would like to do survey on the healthiest breakfast available in India” X says to Y.

Assumptions:

I. The healthiest breakfast in India can be found out with a survey

II. X possess skills and competencies to do such survey.

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

Q28. Which of the conclusions can be concluded on the basis of given statements?

Statements:

1. Some autos are scooters.

2. All scooters are cycles.

Conclusions:

I. Some autos are cycles.

II. No scooter is auto.

(a) Both I and II follow
(b) Only I follows
(c) Either I or II follows
(d) Only II follows

Q29. Which of the following is the smallest fraction?

3/15, 5/20, 8/64, 25/1000

(a) 3/15
(b) 5/20
(c) 25/1000
(d) 8/64

Q30. Four words have been given below of which three are alike in some way and one is different. Choose the odd one out.

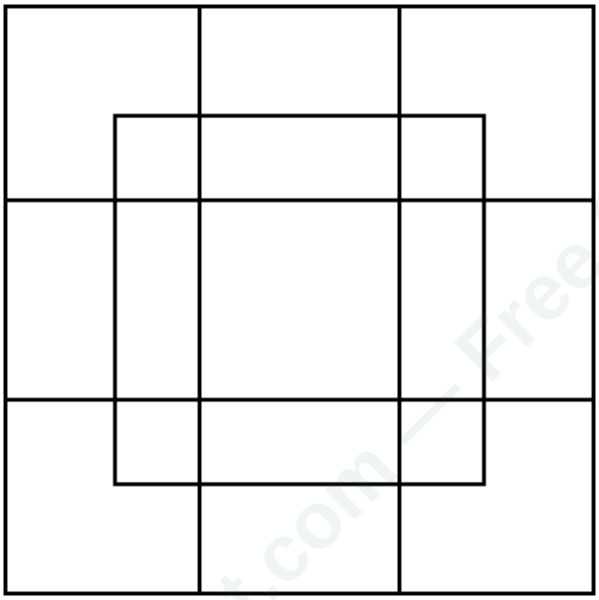
(a) Oxygen
(b) Platinum
(c) Silver
(d) Gold

Q31. A can do a work in 12 days and B can do it in 18 days. They started working together, but A leaves 3 days before the work gets over. For how many days did the two work together?

(a) 6
(b) 5
(c) 7
(d) 7.2

Q32. Find the number of squares in the figure

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(a) 24
(b) 25
(c) 19
(d) 23

Q33. The difference between a positive fraction and its reciprocal is 639/160. What is the fraction under consideration?
(a) 15/8
(b) 16/5
(c) 32/5
(d) 13/8

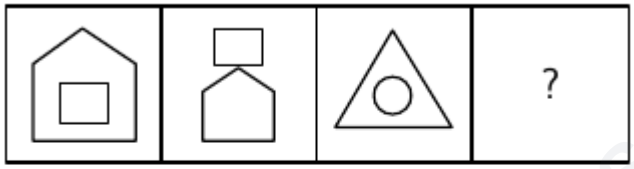
Q34. 2/9 the people in a restaurant are adults. If there are 65 more children than adults, then how many children are there in the restaurant?
(a) 91
(b) 81
(c) 117
(d) 26

Q35. Consider the following question and decide whether the statements are sufficient to answer the question.
Question:
In a box, there are packets of three different sizes. How many packets are there in the box?
Statements:
1. Half of all the packets are of medium size.
2. There are six big packets.
3. There are twice the amount of small packets than there are big packets.
(a) Statement 1 and 3 are sufficient
(b) Statement 1, 2 and 3 together are sufficient
(c) None of the statement are sufficient
(d) Statement 1 and 2 are sufficient

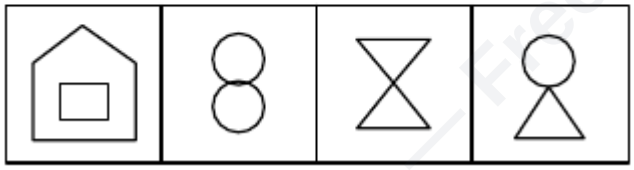
Q36. Find the next figure for the given series:

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Problem figures:



Answer figures:



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

Q37. Which of the following states hosted the 7^(th) edition of the Rashtriya Sanskriti Mahotsav (RSM)?
(a) Kerala
(b) Karnataka
(c) Tamil Nadu
(d) Andhra Pradesh

Q38. Modern periodic table has:
(a) 18 groups and 7 periods
(b) 8 periods 7 groups
(c) 7 periods 8 groups
(d) 7 groups and 18 periods

Q39. During uniform motion of an object along a straight line, its _____ remains constant with time.
(a) acceleration
(b) deceleration
(c) force
(d) velocity

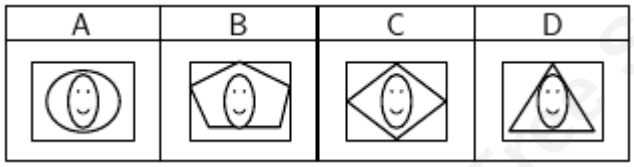
Q40. _____ is the transition of a substance directly from the solid to the gas phase without passing through the intermediate liquid phase.
(a) Sublimation
(b) Evaporation
(c) Condensation
(d) Liquidation

Q41. A soldier is walking in North direction for 2 km, then he turns left and walks for 3 km and then turns left and continues walking. Which direction is he walking now?
(a) East
(b) South
(c) North
(d) West

Q42. A man takes leave on every first Friday of the month. His official leave is on Sunday. There is no other holidays. On which date of the year 2017, 17^(th) holiday will be?
Note: Consider 1^(st) January 2017 is Monday.
(a) 31^(st) March 2017

(b) 6^(th) April 2017
(c) 7^(th) April 2017
(d) 1^(st) April 2017

Q43. Find the odd one out:



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

Q44. What denotes offering several products for sale as one combined product?
(a) Advertisement
(b) Product mix
(c) Product bundling
(d) Differentiation

Q45. Cutaneous respiration takes place in -
(a) Earthworm
(b) Fish
(c) Man
(d) Birds

Q46. Each question given below consists of a statement, followed by two arguments numbered I and II. You have to decide which of the arguments is a 'strong' argument.

Statement: Should education be made free for children till 14 years of age?

Arguments:

I. Yes, this will help to stop forced child labour in the country.

II. No, free things does not carry a value.

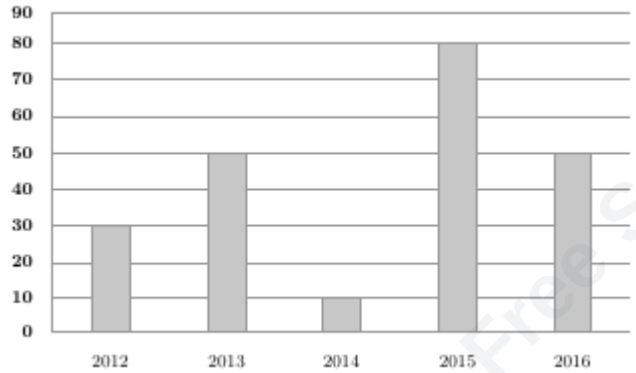
(a) Only argument II is strong
(b) Neither I nor II is strong
(c) Only argument I is strong
(d) Both I and II are strong.

Q47. How is Rajan's father's only brother's father related to Rajan?
(a) Paternal Grandfather
(b) Son
(c) Father
(d) Uncle

Q48. Which of the following persons has not served as the Chief Minister of Uttar Pradesh?
(a) N. D. Tiwari
(b) Govind Ballabh Pant
(c) Sarojini Naidu
(d) Chandra Bhanu Gupta

Q49. The following Bar graph shows information of the results in the national level entrance exam by the institute "ABC" for the last 5 years.

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In the year 2015, how many ranks were scored from institute ABC

(a) 90
(b) 80
(c) 60
(d) 70

Q50. What is the change in velocity / Time taken = ?

(a) Momentum
(b) Displacement
(c) Speed
(d) Acceleration

Q51. The number of foreign tourist arrivals in an island nation is recorded as follows. Which month is the second least visited month?

Months	Number of Tourist
January	2,000
February	1,500
March	2,500
April	3,000
May	2,000
June	1,000

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

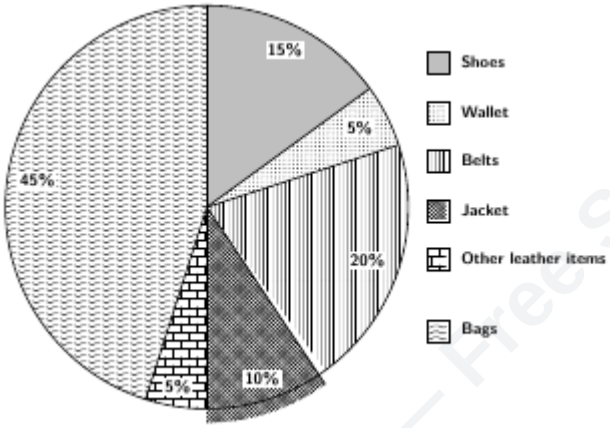
Q52. P 3 R I M J 3 Q % W @ / N $ E 5 X Y 1 # 8

How many symbols in the above arrangement is / are immediately preceded by a letter and immediately NOT followed by a number?

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

Q53. The following pie diagram shows the revenue of the company ABC, which manufactures the leather products. The total revenue of the company for the year 2015 was Rs. 3,628,000.

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How much revenue was made with the sale of bags & shoes in 2015?

(a) Rs. 27210
(b) Rs. 1088400
(c) Rs. 544200
(d) Rs. 2176800

Q54. Which are the two chemicals that are used in black and white photography?

(a) AgCl and AgBr
(b) AgNO3 and AgBr
(c) AgBr and AgI
(d) AgCl and AgNO3

Q55. Which of the following in Biology is the energy currency of cells?

(a) ADP
(b) PTA
(c) PAD
(d) ATP

Q56. When Magnesium ribbon burns with a dazzling white flame and then in which coloured powder it changes into?

(a) white
(b) yellow
(c) grey
(d) black

Q57. What is the Compound Interest on Rs. 20,000 at 12% interest for 1 year, compounded half-yearly?

(a) Rs. 2,982
(b) Rs. 2,742
(c) Rs. 2,472
(d) Rs. 4,274

Q58. Who won the man of the match award in the 2018 ICC Under-19 Cricket World Cup finals?

(a) Ishan Porel
(b) Manjot Kalra
(c) Ankul Roy
(d) Shiva Singh

Q59. If $x/(x^2-1)=A/(x-1)+B/(x+1)$, then find A and B.

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

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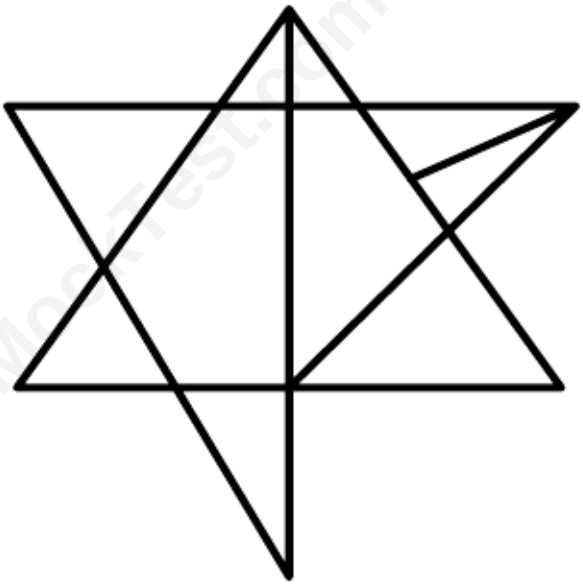
Q60. If $3x^2 + ax + 4$ is perfectly divisible by $x - 5$, then the value of a is:

(a) -12
(b) -5
(c) -15.8
(d) -15.6

Q61. One of the roots of the equation $x^2 - 12x + k = 0$ is $x = 3$. The other root is:

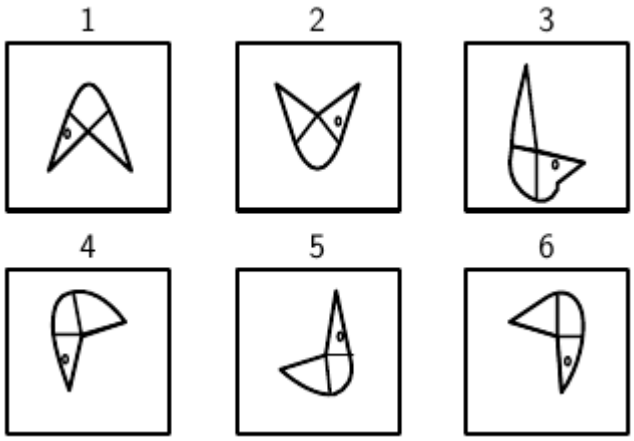
(a) $x = -4$
(b) $x = 9$
(c) $x = 4$
(d) $x = -9$

Q62. How many triangles are there in the following figure?



(a) 18
(b) 11
(c) 17
(d) 16

Q63. Identify the dissimilar object from the below given objects.



(a) 2
(b) 3
(c) 5
(d) 1

Q64. Who is the founder chairman of Pallium India, a palliative care NGO, who is a Padma Shri and often referred to as the 'father of palliative care in India'?

(a) Sanduk Ruit
(b) Bhakti Yadav
(c) MR Rajagopal
(d) Rani Bang

Q65. 18.3% of 60 is 54.9% of _____.

(a) 20
(b) 30
(c) 40
(d) 45

Q66. India's first National Wildlife Genetic Resource Bank was inaugurated by:

(a) Dr Harsh Vardhan
(b) Rajnath Singh
(c) Narendra Modi
(d) Ramkumar Kovind

Q67. A son's present age is two-fifths of his mother's age. After 8 years, he will be one half of his mother's age. What is his mother's age now?

(a) 40
(b) 50
(c) 42
(d) 36

Q68. An object travels 30 m in 4 s and then another 70 m in 6 s. What is the average speed of the object?

(a) 8 ms^2
(b) 10 ms
(c) 10 ms^(-1)
(d) 8 ms^(-1)

Q69. An oil container is 3/5 full. When 20 litres of oil is used from it, it is 7/12 full. Find the capacity of the container?

(a) 1000 litres
(b) 1600 litres
(c) 1200 litres
(d) 1400 litres

Q70. "Mohiniyattam" is a dance form popular in which of the following state?

(a) Karnataka
(b) Telangana
(c) Rajasthan
(d) Kerala

Q71. Neel is the only son of Jay's father's only sister. Jay and Neel are _____.

(a) cousins
(b) niece
(c) nephew
(d) siblings

Q72. Which of the following is the capital of Belarus?

(a) Baku
(b) Minsk
(c) Moroni
(d) Brussels

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Q73. How much work is done in moving a charge of 4 C across two points having a P.D of 10 V?

(a) 40 J
(b) 0.4 J
(c) 2.5 J
(d) 4 J

Q74. Muscle / muscular tissue is responsible for _____ in our body.

(a) growth
(b) movements
(c) breathing
(d) drinking

Q75. Which is the host country of World Environment Day 2018?

(a) India
(b) England
(c) Pakistan
(d) China

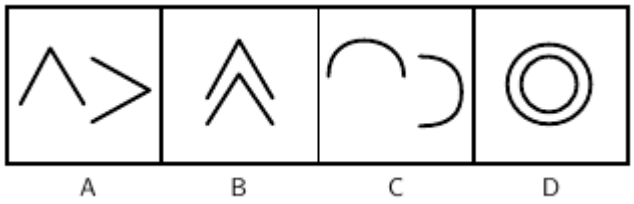
Q76. What is the LCM of 36, 40 and 660?

(a) 6780
(b) 1320
(c) 3960
(d) 1845

Q77. _____ has very low melting point.

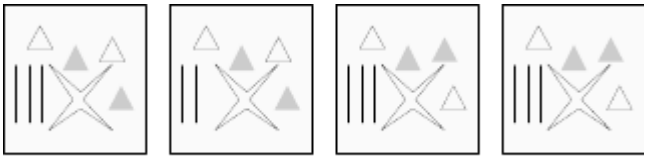
(a) Ba
(b) Na
(c) Ga
(d) K

Q78. Find the odd figure out:



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

Q79. The figure that does not belong to the group is:



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

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Q80. In a triangle angle B = 90° and angle A = 30° then $\sin^2 A - \cos^2 A + \tan^2 A$:

(a) – 3/12
(b) 1/6
(c) 2/6
(d) – 1/6

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

Statement:

I. No seats are cushions.

II. Some cushions are pillows.

Conclusions:

1. Some seats are pillows.

2. Some cushions are seats.

(a) Conclusion 2 alone follows.
(b) Conclusion 1 alone follows.
(c) Neither 1 nor 2 follows.
(d) Both 1 and 2 follows.

Q82. Pipe A and pipe B can fill up a tank in 40 min and 80 min respectively. Both the pipes are opened simultaneously for some time and pipe B is closed. If the total time to fill up the tank is 30 minutes, then how long the pipe B was open for?

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

Q83. A man buys 7 bats and 6 balls for Rs. 3,800. Later, he buys 3 bats and 5 balls for Rs. 1,750. What is the cost (in Rs.) of a bat and a ball separately?

(a) Bat: 510, Ball: 40
(b) Bat: 480, Ball: 70
(c) Bat: 500, Ball: 50
(d) Bat: 490, Ball: 60

Q84. Dobereiner made the first observations on _____ as a catalyst.

(a) Au
(b) Ni
(c) Ag
(d) Pt

Q85. When an object is placed beyond the centre of curvature of a concave mirror, the image will be formed:

(a) Beyond C
(b) Between F and C
(c) At C
(d) At focus

Q86. If + stands for ×, – for ÷, × for – and ÷ for +, find the value of 32 + 26 – 2 × 7 ÷ 12:

(a) 420
(b) 421
(c) 400
(d) 315

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Q87. Which of the following pairs is NOT a pair of twin primes?

(a) 197, 199
(b) 167, 169
(c) 137, 139
(d) 107, 109

Q88. As of 2018, who is the Chief Economic Advisor of India?

(a) Arvind Virmani
(b) Raghuram Rajan
(c) Arvind Subramanian
(d) Kaushik Basu

Q89. The female germ-cells or eggs are made in the:

(a) Ovaries
(b) Uterus
(c) Cervix
(d) Vagina

Q90. The formula unit mass of $CaCl_2$ is:

(a) 105 u
(b) 111 u
(c) 121 u
(d) 100 u

Q91. Who was the prime minister of India during the Pokhran-II nuclear tests held in 1998?

(a) Rajeev Gandhi
(b) Manmohan Singh
(c) A. B. Vajpayee
(d) P. V. Narasimha Rao

Q92. Vijaya is Arun’s sister. David is Rakesh’s brother. Rakesh is Vijaya’s son. How is David related to Vijaya?

(a) Nephew
(b) Father
(c) Son
(d) Brother

Q93. If today is TUESDAY. After 63 days, it will be:

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

Q94. Who was the Indian para-athlete to have been awarded the Rajiv Gandhi Khel Ratna in 2017?

(a) Devendra Jhajharia
(b) Mariyappan Thangavelu
(c) Deepa Malik
(d) Varun Bhati

Q95. Which team won the Ranji Trophy in the year 2017?

(a) Tamilnadu
(b) Delhi
(c) Vidarbha
(d) Haryana

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Q96. Given below is a statement followed by two assumptions numbered I and II. You have to consider the statement and the following assumptions and decide which of the assumptions is implicit in the statement.

Statement: "This bank gives the best interest rates on home loans", claims a private bank.

Assumptions:

I. Bank gives low interest on home loan to attract customers.

II. There are many people who take home loans.

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

Q97. Two arguments have been given after one statement you have two decide which argument is strong with respect to the given statement.

Statement:

Should there be stray dogs in the colonies?

Arguments:

I. Yes, they are free and non-violent. Sometimes when their population increases, municipality catches them.

II. No, it is proven that they are dangerous.

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

Q98. Identify Indian author Aditi Khorana's 2017 book, which is a retelling of an Indian folk tale?

(a) 'A Life of Adventure and Delight'
(b) 'The Library of Fates'
(c) 'No Other World'
(d) 'A Crown of Wishes'

Q99. Which law states the relationship between the potential difference across a conductor and the current flowing through it?

(a) Newton's law
(b) Faraday's law
(c) Ohm's law
(d) Joules law

Q100. 16 g oxygen contains _____ atoms of oxygen.

(a) 6.022 × 10^(-23)
(b) 6.022×10^{23}
(c) 6.022×10^{22}
(d) 6.022 × 10^(-22)

ANSWER KEY

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

71	a	72	b	73	a	74	b	75	a	76	c	77	c	78	a	79	d	80	d
81	c	82	d	83	c	84	d	85	b	86	b	87	b	88	c	89	a	90	b
91	c	92	c	93	b	94	a	95	c	96	a	97	b	98	b	99	c	100	b

SOLUTIONS

Q1. Answer: (b) 38

The number of squares in the given figure is,

Hence, “38” is the correct answer.

Q2. Answer: (c) Nationalist Congress Party

The correct answer is the Nationalist Congress Party.

Nationalist Congress Party:

• Founded- 25 May 1999.

• Founder- Sharad Pawar, P.A. Sangma, and Tariq Anwar.

• Party Philosophy- Progressivism, Populism, Secular democracy, Gandhian secularism, Egalitarianism, Social justice, Federalism, Social conservatism, Nationalism.

• Election Symbol- Clock.

• Student wing- Nationalist Student Congress.

All India Trinamool Congress:

• Founded- January 1998

• Founder- Mamata Banerjee

• Party Philosophy- Secularism and populism.

• Election Symbol- Twin flowers in the grass.

• Student wing- Trinamool Chhatra Parishad.

Indian National Congress:

• Founded- 1885.

• Founder- Allan Octavian (A.O) Hume.

• Party Philosophy- Indian Nationalism (Liberal nationalism), Social democracy, Democratic socialism, Gandhian socialism, Progressivism.

• Student wing- National Students Union of India (NSUI).

• Election Symbol- The hand.

Bahujan Samaj Party:

• Founded- April 14, 1984.

• Founder- Kanshi Ram.

• Party Philosophy- Human rights, Social equality, Secularism, Social justice, Self-respect.

• Election Symbol- Elephant.

Q3. Answer: (a) Only B is true

The correct answer is option 1.

• In Nickel speed of sound 6040 m/s.

• In Aluminium, the speed of sound is 6420 m/s.

Important Points

Speed of Sound in Different Media:

• The speed of sound in the air is 331 m/s^(–1) at 0ºC and 344 m/s^(–1) at 22ºC.

• It depends on the type of the medium through which it is traveling.

• It depends on the temperature and pressure of that medium.

• Speed of sound Decrease- when it passes from the solid to the gaseous state of a given medium.

• Speed of sound Increase- In any medium, when temperature and humidity increase.

• Speed of Sound- Solid > Liquid > Gases

Key Points

Speed of sound in different media at 25ºC

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State	Substance	Speed in m/s
Solids	Aluminum	6420
Nickel	6040	
Steel	5960	
Iron	5950	
Brass	4700	
Glass (flint)	3980	
Liquid	Water (sea)	1531
Water (distilled)	1498	
Ethanol	1207	
Methanol	1103	
Gases	Hydrogen	1284
Helium	965	
Air	346	
Oxygen	316	
Sulfur Dioxide	213	

Q4. Answer: (d) The motion of sun around the planets

The correct answer is The motion of the sun around the planets.

• The universal law of Gravitation- Every particle in the universe attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between them.

• Sir Isaac Newton discovered Gravity.

Key Points

The phenomenons explained by the universal law of gravitation:

• The force that binds us to the earth.

• The motion of the moon around the earth.

• The motion of planets around the Sun.

• The tides due to the moon and the Sun.

Q5. Answer: (a) Al

The correct answer is Al (Aluminum).

Key Points

• An amphoteric oxide is an oxide that can act as either an acid or base in a reaction to produce salt and water.

• Amphoterism depends on the oxidation states available to a chemical species. Because metals have multiple oxidation states, they form amphoteric oxides and hydroxides.

• Metals that display amphoterism include copper, zinc, lead, tin, beryllium, and aluminum.

• Al_2O_3 is an amphoteric oxide. When reacted with HCl, it acts as a base to form the salt $AlCl_3$. When reacted with NaOH, it acts as an acid to form $NaAlO_2$.

Q6. Answer: (a) 6

The correct answer is 6.

India is divided into 6 physiographical regions

• The Himalayan Mountains

• The Northern Plains

• The Peninsular Plateau

• The Indian Desert

• The Coastal Plains

• The Islands

Source: https://ncert.nic.in/textbook/pdf/iess102.pdf

Key Points

Some important facts:

• The folds of the Great Himalayas are asymmetrical in nature.

• The core of this part of Himalayas is composed of granite.

• The outermost range of the Himalayas is called the Shiwaliks.

• The Western Ghats are higher than the Eastern Ghats.

• The Eastern Ghats are discontinuous and irregular and dissected by rivers draining into the Bay of Bengal.

Q7. Answer: (d) 686 J

The correct answer is 686J.

Explanation:

• At height (h) = 5m

• Mass of the object (m) = 14 kg

• Acceleration due to gravity (g)= 9.8 ms-2

• Potential Energy = m*g*h

=14*5*9.8 = 686J

• Joule (J) is the S.I unit of energy.

Q8. Answer: (a) C

The pattern followed is,

The figure has four circles and a right-angle triangle inside it.

Similarly,

There are four circles and a right angle triangle in figure C.

Figure C resembles the given figure.

Hence, option 1 is the correct answer.

Q9. Answer: (c) 85/23 hours

Shortcut Trick

Let Total Work (Capacity) = LCM(6, 8, 10) = 120 units.

Efficiencies: Inlet A = 20, Inlet B = 15, Outlet C = −12.

Work done in 1st hour by A & B = 20 + 15 = 35 units.

Remaining work = 120 − 35 = 85 units.

Combined efficiency (A + B + C) = 20 + 15 − 12 = 23 units/hr.

Therefore The correct answer is 85/23 hr.

Alternate Method

Tap Type	Time (hr)	Total Capacity	Efficiency
Inlet A	6	120	20
Inlet B	8	15	
Outlet C	10	−12	

=> Work done by Inlet A and Inlet B in 1 hour = 20 + 15 = 35 units.

=> Remaining Capacity of the tank = 120 − 35 = 85 units.

=> Combined efficiency when all three taps are opened = 20 + 15 − 12 = 23 units/hr.

=> Time required to fill the remaining tank = Remaining Capacity ÷ Combined Efficiency

=> Time = 85/23 hr.

Therefore The correct answer is 85/23 hr.

Additional Information

Pipes and Cisterns Concept

Inlet efficiency is taken as positive, while outlet (leakage) efficiency is taken as negative. Total work is usually the LCM of individual times.

Work and Time Relation

Time = Total Work ÷ Net Efficiency. If the net efficiency is negative, the tank will be emptied.

Q10. Answer: (a) 20

Shortcut Trick

Let the total number of coins be 100 units.

Value = (20 × 5) + (25 × 10) + (15 × 2) + (40 × 1) = 100 + 250 + 30 + 40 = 420 units.

Given 420 units = Rs. 210 => 1 unit = 0.5.

Number of Rs. 1 coins = 40 units = 40 × 0.5 = 20.

Therefore The correct answer is 20 coins.

Alternate Method

Given: Total amount = Rs. 210. Percentages of coins: Rs. 5 = 20%, Rs. 10 = 25%, Rs. 2 = 15%.

Step 1: Calculate the remaining percentage for Rs. 1 coins.

=> Remaining % = 100% − (20% + 25% + 15%) = 100% − 60% = 40%.

Step 2: Let the total number of coins be x.

=> Total Value = (0.20x × 5) + (0.25x × 10) + (0.15x × 2) + (0.40x × 1) = 210

=> 1.00x + 2.50x + 0.30x + 0.40x = 210

=> 4.20x = 210

=> x = 210 ÷ 4.2 = 50

Step 3: Find the number of Rs. 1 coins.

=> Number of Rs. 1 coins = 40% of 50 = 0.40 × 50 = 20

Therefore The correct answer is 20 coins.

Additional Information

Ratio of Value

The total value is the sum of (Number of coins × Face value of each coin). If ratios are given, always multiply the coin ratio by the denomination value.

Denomination Conversion

Ensure all units are in the same currency (all in Rupees or all in Paise). Rs. 1 = 100 Paise.

Q11. Answer: (d) Banabhatta

The correct answer is Banabhatta.

Explanation:

• Banabhatta was the court poet of king Harshavardhana.

• Banabhatta wrote Harshvardhan's biography Harshacharita in Sanskrit.

• He describes his association with Thanesar in his biography.

About Banabhatta:

• A great poet of India, Banabhatta was born around the 7th century in a village in India.

• He was born in Pritikuta village, which was situated on the banks of Hiranyavahu.

• He was born to Chitrabhanu and Rajadevi and he was a family of Vatsyayana gotra.

• This poetic genius wrote one of the most famous and earliest novels, known as Kadambari. It is a biographical work of Harsha and Kadambari.

About other options:

• Bilhana:

• He was a Sanskrit writer and a well-known Kashmiri poet.

• He was born in Kavi Bilhana in the middle of the 11th century.

• Jayadeva:

• Jayadeva was born in the middle of the 12th century and his birthplace was Kendubilwa.

• He was the author of the Sanskrit poem 'Gita Govinda'. He is known for his epic poem 'Gita Govinda', which depicts the divine love of Krishna and his consort, Radha. This poem, which presents the view that Radha is greater than Hari, is considered an important text in the Bhakti movement of Hinduism.

• Sri Jayadeva was famous in Orissa, especially at Puri Dham for his composition of 'Gita Govinda'. His father's name was Bhojadeva and his mother's name was Radha Devi. His wife's name was Padmabati.

• Chand Bardai:

• Chand Bardai was an Indian poet. He composed Prithviraj Raso, an epic poem in Brajbhasa about the life of king Prithviraj

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Chauhan.

Q12. Answer: (d) Bindusara

The correct answer is Bindusara.

Explanation:

• King Ashoka was the son of Bindusara, who belonged to the Maurya dynasty.

• Bindusara was the second Mauryan emperor of India.

• He was the son of Chandragupta Maurya, the founder of the Mauryan dynasty.

About other options:

• Chandragupta Maurya:

• Chandragupta Maurya, known as Sandrakottos to the Greeks, was the founder of the Maurya Dynasty (4th-2nd century BCE) and is credited with the setting up of the first pan-Indian empire.

• Aided by his mentor and later minister Chanakya or Kautilya (c. 4th century BCE), he set up a vast centralized empire, details of whose functioning, society, military, and economy are well preserved in Kautilya's Arthashastra.

• Chandragupta II:

• He was the next great Gupta emperor after his father Samudragupta (335/350 - 370/380 CE).

• He came to be known by his title Vikramaditya (Sanskrit: "Sun of Power").

• He carried on the legacy of Samudragupta and contributed his share towards sustaining an extensive empire that carved out a place for itself in history.

• Bimbisara:

• He was a king of the Magadha Kingdom who is credited with establishing imperial dominance in the Indian subcontinent.

• Son of a minor king called Bhattiya, he belonged to the Haryanka Dynasty, which is said to be the second imperial dynasty of Magadha.

Q13. Answer: (c) 940

Shortcut Trick

Identify the highest common factor: All numbers are multiples of 47.

94 = 47 × 2, 188 = 47 × 4, 235 = 47 × 5.

LCM = 47 × LCM(2, 4, 5) = 47 × 20.

LCM = 940.

Therefore The correct answer is 940.

Alternate Method

Given: Numbers are 94, 188, and 235.

Formula Used: Prime Factorization Method for LCM.

=> $94 = 2^1 \times 47^1$

=> $188 = 2^2 \times 47^1$

=> $235 = 5^1 \times 47^1$

=> $LCM = 2^2 \times 5^1 \times 47^1$

=> LCM = 4 × 5 × 47

=> LCM = 20 × 47 = 940.

Therefore The correct answer is 940.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is divisible by each of the given numbers. It is calculated by taking the highest power of every prime factor present.

HCF and LCM Relation

For two numbers a and b, the product of the numbers is equal to the product of their HCF and LCM: a × b = HCF(a, b) × LCM(a, b).

Prime Factorization

Expressing a number as a product of prime numbers to easily find common divisors or multiples.

Q14. Answer: (c) C

The mirror image of the given figure is,

Hence, option 3 is the correct answer.

Q15. Answer: (c) [figure]

The pattern followed is,

In the first figure the circle is placed on top of a triangle and in the second figure the triangle is inside the circle.

Similarly,

In the third figure the circle is on top of rhombus.

And,

In the fourth figure the rhombus should be inside the circle.

The figure that will come next in the pattern is,

Hence, option 3 is the correct answer.

Q16. Answer: (a) 49.5

Shortcut Trick

Arrange the given 12 numbers in ascending order: 12, 25, 25, 42, 45, 45, 54, 58, 59, 60, 65, 87.

Since the total number of terms (N = 12) is even, the median is the average of the two middle terms (6^(th) and 7^(th) terms).

The 6^(th) term is 45 and the 7^(th) term is 54.

Median = (45 + 54) ÷ 2 = 49.5.

Therefore The correct answer is 49.5.

Alternate Method

Given:

Data set: 42, 45, 58, 87, 45, 54, 65, 12, 25, 25, 59, 60

Total number of observations (N) = 12

Formula Used:

When the total number of observations (N) is even:

Median = [(N/2)^(th) term + (N/2 + 1)^(th) term] ÷ 2

Calculations:

=> First, arrange the given data set in ascending order:

12, 25, 25, 42, 45, 45, 54, 58, 59, 60, 65, 87

=> Here, the total number of terms N = 12, which is even.

=> The 6^(th) term (N/2) = 45

=> The 7^(th) term (N/2 + 1) = 54

=> Median = (6^(th) term + 7^(th) term) ÷ 2

=> Median = (45 + 54) ÷ 2

=> Median = 99 ÷ 2 = 49.5

=> Thus, the median of the given data set is 49.5.

=> Option (1) is correct because the calculated median is 49.5.

=> Option (2) is incorrect because 59.5 does not represent the average of the two middle terms.

=> Option (3) is incorrect because 54 is only the 7^(th) term, not the average of the two middle terms.

=> Option (4) is incorrect because 45 is only the 6^(th) term, not the average of the two middle terms.

Therefore The correct answer is 49.5.

Additional Information

Median for Odd Number of Terms

If the total number of observations (N) is odd, the median is the middlemost term, which is the ((N + 1)/2)^(th) term after arranging the data in ascending or descending order.

Mean (Arithmetic Average)

Mean is the sum of all observations divided by the total number of observations: Mean = (Sum of all terms) ÷ N.

Mode

Mode is the value that appears most frequently in a data set. A data set can have one mode, more than one mode, or no mode at all.

Empirical Relationship

For a moderately skewed distribution, the relationship between mean, median, and mode is: Mode = 3 × Median − 2 × Mean.

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Q17. Answer: (c) 28

Ratio of ages of father and son is 3 : 1.

Let their ages be measured in terms of x.

So, present age of father is 3x and that of son is x.

The product of their ages is 147.

(3x) × (x) = 147

→ $3x^2 = 147$

→ $x^2 = 49$

→ x = 7

Sum of their ages = 3 × (7) + 7 = 28

Hence, '28' is the correct answer.

Q18. Answer: (c) 39.6 km

Shortcut Trick

Distance = [Product of Speeds ÷ Difference of Speeds] × Total Time Difference

Product of Speeds = 66 × 54

Difference of Speeds = 66 − 54 = 12 km/h

Time Difference = 5 min early + 3 min late = 8 min = 8/60 hours

Distance = (66 × 54 / 12) × (8 / 60) = 39.6 km

Therefore The correct answer is 39.6 km.

Alternate Method

Given:

Speed1 (S1) = 66 km/h, Speed2 (S2) = 54 km/h

Time Difference (Δt) = 5 + 3 = 8 minutes = 8/60 hours

Formula Used:

Distance (D) = (S1 × S2 × Δt) ÷ (S1 − S2)

Calculations:

=> D = (66 × 54 × 8/60) ÷ (66 − 54)

=> D = (66 × 54 × 2) ÷ (12 × 15)

=> D = (3564 × 2) ÷ 180

=> D = 7128 ÷ 180

=> D = 39.6 km

Therefore The correct answer is 39.6 km.

Additional Information

Time Difference Calculation

When comparing early and late arrivals, the total time difference is the sum of both (Early + Late). If both cases are early or both are late, the difference is the subtraction of values.

Speed-Time Inversely Proportional

For a constant distance, the ratio of speeds is inversely proportional to the ratio of times taken: S1/S2 = T2/T1.

Average Speed Formula

For equal distances covered at different speeds S1 and S2, Average Speed = 2 × S1 × S2 ÷ (S1 + S2).

Q19. Answer: (c) O

The pattern followed is,

Hence, "O" is the correct answer.

Q20. Answer: (d) Charles Darwin

The correct answer is Charles Darwin.

Explanation:

• Theory of evolution by natural selection was proposed by Charles Darwin and Alfred Russel Wallace in the nineteenth century.

• The theory of evolution by natural selection, first formulated in Darwin's book "On the Origin of Species" in 1859.

• Charles Darwin was born on 12 February 1809, in Shrewsbury, and died 19 April 1882.

About other options:

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• Johann Mendel:

• Gregor Mendel, in full Gregor Johann Mendel, was born on 22 July 1822 and died on 6 January 1884.

• He was botanist, teacher, and Augustinian prelate, the first person to lay the mathematical foundation of the science of genetics, in what came to be called Mendelism.

• Johann Dobereiner:

• Johann Wolfgang Döbereiner was born on 13 December 1780 and died on 24 March 1849.

• He was the German chemist whose observation of similarities among certain elements anticipated the development of the periodic system of elements.

• John Dalton:

• John Dalton was born on September 5 or 6, 1766, and died on 27 July 1844.

• He was an English meteorologist and chemist, a pioneer in the development of modern atomic theory.

Q21. Answer: (a) 22/5 days

Shortcut Trick

Efficiency of Rajan (R) = 4 units/day and Bhavesh (B) = 3 units/day (taking Total Work = 24).

Efficiency of Charan (C) = Efficiency of (R + B) = 4 + 3 = 7 units/day.

Efficiency of (B + C) = 3 + 7 = 10 units/day.

Time taken by (B + C) = Total Work ÷ Combined Efficiency = 24 ÷ 10 = 2.4 days.

Therefore The correct answer is 2(2)/(5) days.

Alternate Method

Given:

Time taken by Rajan = 6 days

Time taken by Bhavesh = 8 days

Formula Used:

Total Work = LCM of individual days

Efficiency = Total Work ÷ Time

Person	Days	Total Work	Efficiency
Rajan	6	24	4
Bhavesh	8	3	

Calculations:

=> Total Work = LCM(6, 8) = 24 units

=> Efficiency of Rajan = 24 ÷ 6 = 4 units/day

=> Efficiency of Bhavesh = 24 ÷ 8 = 3 units/day

=> Efficiency of Charan = Efficiency of (Rajan + Bhavesh) = 4 + 3 = 7 units/day

=> Combined Efficiency of (Bhavesh + Charan) = 3 + 7 = 10 units/day

=> Time taken by (Bhavesh + Charan) = 24 ÷ 10 = 12/5 = 2(2/5) days

Therefore The correct answer is 2(2)/(5) days.

Additional Information

Combined Efficiency Rule

When two people work together, their combined efficiency is the sum of their individual efficiencies. Efficiency is inversely proportional to time.

Work and Wages

Wages are distributed in the ratio of the work done by each individual, which is the same as the ratio of their efficiencies if they work for the same duration.

Pipes & Cisterns

Similar logic applies to pipes where an inlet pipe has positive efficiency and an outlet pipe has negative efficiency.

Q22. Answer: (b) Pavan Kumar Chamling

The correct answer is Pavan Kumar Chamling.

Key Points

• Explanation:

• Pawan Kumar Chamling was born on 22 September 1949 and he is an Indian politician.

• He was the Founder and President of the Sikkim Democratic Front, which governed the state for five successive terms since 1994.

• He was born in Yangang, in South Sikkim to a Nepali parent's Ash Bahadur Chamling and Ash Rani Chamling.

Important Points

• Incumbent CM of Sikkim Prem Singh Tamang since 27 May 2019.

Additional Information

• About Sikkim:

• Capital: Gangtok.

• State Animal: Red Panda.

• State Bird: Blood Pheasant.

• State Flower: Noble dendrobium.

Q23. Answer: (d) Power

The correct answer is Power.

• Power:- A Measure of the rate of doing work or transferring energy

• Power= Work/ Time= Force x Displacement/Time

• Its SI Unit is Watt.

• Watt:-Watt is Joule Per Second. (J/s).

Extra Facts:-

Force:-

• A-Force is a push or pulls upon an object resulting from the object's interaction with another object. Whenever there is an interaction between two objects, there is a Force upon each of the objects.

• F= m x a where F= Force, m= mass of object and a= acceleration

• SI Unit:- Newton

Work Done:-

• It is a measure of energy transfer that occurs when an object is moved over a distance by an external force at least part of which is applied in the direction of the displacement.

• W= fd where W= Work, f= force and d= displacement

• SI Unit:- Joule.

Momentum:-

• Momentum is generally defined as " Mass in Motion". All objects have mass, so if an object is moving then it has momentum- it has its mass in motion.

• P= m x v where P= Momentum, m= mass and V= velocity

• SI Unit:- Kg m/s.

Q24. Answer: (c) PC Mustafa

The correct answer is PC Mustafa.

• PC Mustafa is an entrepreneur who is CEO and Cofounder of a Company called ID Special Foods Pvt. Ltd.

• The Company employed more than 2000 younger from ruler India to feed millions of Indians Healthy and preservative-free Idli and Dosa Batter including other foods on a daily basis.

• ID Special Foods Pvt. Ltd. is a leading food industry that is providing several flavors of Idli and Dosa.

• The company was established in 2006 by Mustafa and his cousins who started operating ID (Idli, Dosa) from 550 Square Feet.

• PC Mustafa did B.Tech in Computer Science from NIT.

• He got an MBA Degree from IIM Bangalore.

Extra Facts:-

Sunny Varkey:-

• He is the founder and chairman of Global Advisory and Educational Management firm GEMS, Education.

RC Subramoniam:-

• He is the Managing Director at Tenneco Automotive Private Limited, Pune.

Q25. Answer: (c) 62 Minutes

Shortcut Trick

Total Distance to travel = Initial height + Depth below ground = 35 + 430 = 465 m.

Time Taken = Total Distance ÷ Speed = 465 ÷ 7.5.

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=> 4650 ÷ 75 = 62 minutes.

Therefore The correct answer is 62 min.

Alternate Method

Given:

Initial position = +35 m (above ground level)

Final position = −430 m (below ground level)

Speed of descent = 7.5 m/min

Calculations:

=> Total vertical distance = |Initial position − Final position|

=> Distance = |35 − (−430)| = |35 + 430| = 465 m

=> Time = Distance ÷ Speed

=> Time = 465 ÷ 7.5

=> Time = 4650 ÷ 75

=> Time = 62 min

Therefore The correct answer is 62 min.

Additional Information

Relative Position and Integers

In vertical movement, positions above a reference point (ground) are taken as positive integers, while positions below are taken as negative integers. The distance is the absolute difference between these values.

Time, Speed, and Distance Formula

The fundamental relation is Time = Distance ÷ Speed. Ensure all units are consistent (e.g., meters and meters per minute) before performing division.

Q26. Answer: (d) 1 N × 1 m

The correct answer is 1 N x 1 m.

Key Points

• 1 Joule = 1 N x 1 m.

• 1 Joule is equal to the energy transferred to an object when a force of one Newton acts on that object in the direction of the force's motion through a distance of one meter.

Additional Information

Power:-

• Power is the amount of energy transferred or converted per unit of time.

• SI Unit of Power is Watt.

Energy:-

• It is defined as the capacity of doing work.

• It may exist in potential, kinetic, thermal, electrical, chemical, nuclear or other various forms.

• SI unit of Energy is Joule.

Q27. Answer: (a) Both I and II are implicit.

According to the given statement,

Assumption I: This is implicit, because the survey is being conducted on healthiest breakfast in India, and the healthiest can be found from the survey.

Assumption II: Since, X possesses such skills, only then he is ready to conduct a survey, so this is also implicit.

Hence, “both I and II” are implicit.

Q28. Answer: (b) Only I follows

The least possible Venn diagram is,

Conclusion I: Some autos are cycles → True (This is definitely true)

Conclusion II: No scooter is auto → False (This is definitely false)

Hence, “only I” follows.

Q29. Answer: (c) 25/1000

CALCULATION:

Considering the given values

3/15 = 1/5 = 0.2,

5/20 = 1/4 = 0.25

8/64 = 1/8 = 0.125

25/1000 = 1/40 = 0.025

So, 0.25 > 0.20 > 0.125 > 0.025

Therefore 25/1000 is the smallest fraction.

Q30. Answer: (a) Oxygen

Platinum, Silver and Gold are metals.

Whereas,

Oxygen is a gas, which is the life supporting component of the air.

Hence, “oxygen” is the odd one.

Q31. Answer: (a) 6

Shortcut Trick

Total Work = LCM(12, 18) = 36 units.

Efficiency of A = 3, Efficiency of B = 2.

If A leaves 3 days before, add A's 3-day work to total: 36 + (3 × 3) = 45.

Total time = 45 ÷ (3 + 2) = 9 days.

Together working time = Total time − Days A was absent = 9 − 3 = 6 days.

Therefore The correct answer is 6 days.

Alternate Method

Given: Time taken by A = 12 days, Time taken by B = 18 days.

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

Person	Days	Total Work	Efficiency
A	12	36	3
B	18	2	

=> Let the total work be completed in x days.

=> A worked for (x − 3) days and B worked for x days.

=> Work by A + Work by B = 36

=> 3(x − 3) + 2x = 36

=> 3x − 9 + 2x = 36

=> 5x = 45 => x = 9 days.

=> Number of days they worked together = (x − 3) = 9 − 3 = 6 days.

Therefore The correct answer is 6 days.

Additional Information

Leaving Before Completion

When a person leaves n days before completion, add their n days of work to the total work and divide by the sum of efficiencies of all people involved.

Work and Efficiency Relation

Efficiency is inversely proportional to the time taken to complete a task. Ratio of time A:B = x:y → Ratio of efficiency A:B = y:x.

Combined Work Formula

If two people can do a work in X and Y days respectively, they together take (X × Y) ÷ (X + Y) days to complete the work.

Q32. Answer: (d) 23

The number of squares in the given figure is,

Hence, “23” is the correct answer.

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Q33. Answer: (c) 32/5

Shortcut Trick

Convert the mixed fraction to an improper fraction: 6 39/160 = (160 × 6 + 39) / 160 = 999/160.

The denominator 160 is the product of the numerator and denominator of the target fraction (x/y − y/x = (x²−y²)/xy).

Check options for product xy = 160: (1) 15 × 8 = 120; (2) 16 × 5 = 80; (3) 32 × 5 = 160.

Verify 32/5: (32/5) − (5/32) = (1024 − 25) / 160 = 999/160. This matches the given value.

Therefore The correct answer is 32/5.

Alternate Method

Given: Difference between positive fraction and its reciprocal = 6 39/160.

Formula: Let the fraction be x. The equation is x − 1/x = 999/160.

=> (x² − 1) / x = 999 / 160

=> 160x² − 160 = 999x

=> 160x² − 999x − 160 = 0

=> 160x² − 1024x + 25x − 160 = 0

=> 32x(5x − 32) + 5(5x − 32) = 0

=> (32x + 5)(5x − 32) = 0

=> Since x is a positive fraction, 5x − 32 = 0

=> x = 32/5

Therefore The correct answer is 32/5.

Additional Information

Reciprocal Property

If a fraction is defined as a/b, its reciprocal is b/a. The product of a fraction and its reciprocal is always 1.

Fraction Difference Formula

The difference between a fraction x/y and its reciprocal y/x is given by (x² − y²) / xy.

Quadratic Roots

For the equation ax² + bx + c = 0, roots can be found using factorisation or the quadratic formula x = (−b ± √(b² − 4ac)) / 2a.

Q34. Answer: (a) 91

Shortcut Trick

Let total people be 9 units.

Adults = 2 units | Children = 9 − 2 = 7 units.

Difference (7 − 2) = 5 units → 65 children.

1 unit = 13 children.

Children = 7 × 13 = 91.

Therefore The correct answer is 91.

Alternate Method

Given:

Fraction of adults = 2/9

Difference between children and adults = 65

Calculations:

=> Let total people = x

=> Adults = 2x/9

=> Children = x − 2x/9 = 7x/9

=> 7x/9 − 2x/9 = 65

=> 5x/9 = 65

=> x = (65 × 9) ÷ 5 = 13 × 9 = 117

=> Number of children = 7/9 × 117 = 7 × 13 = 91

Therefore The correct answer is 91.

Additional Information

Ratio and Proportion

When a fraction a/b is given, we can assume the total as 'b' units and the specific part as 'a' units to simplify calculations.

Percentage Change

To find the percentage of children, calculate (Children/Total) × 100. In this case, (7/9) × 100 ≈ 77.78%.

Unitary Method

Always equate the given absolute difference to the difference in parts/units to find the value of one unit.

Q35. Answer: (b) Statement 1, 2 and 3 together are sufficient

According to the given information,

Statement 1: This statement alone is insufficient since we cannot determine the number of packets.

Statement 2: This statement alone is also insufficient since information of about big packets is only given in this statement.

Statement 3: This statement alone is also not sufficient, since information about smaller and larger packets is only given in this statement.

Combining the three,

From statement 2, there are 6 big packets.

From statement 3,

There are twice the amount of smaller packets than there are larger packets.

And,

From statement 1, it is mentioned that half of all packets are the medium packets.

Combining all the three, we can find the number of packets in the box.

Hence, “statement 1, 2 and 3 together” are sufficient.

Q36. Answer: (c) D

The pattern followed is,

In the first figure, the square is inside the pentagon and in the second figure the square is on the pentagon.

Similarly,

In the third figure, the circle is inside the triangle.

And,

In the fourth figure, the circle should be on the triangle.

The figure which will come next in the pattern is,

Hence, option 3 is the correct answer.

Q37. Answer: (b) Karnataka

The Correct Answer is Karnataka.

• The 7^(th) edition of the Rashtriya Sanskriti Mahotsav (RSM) under the Ek Bharat Shreshtha Bharat matrix, was held in Karnataka on January 14, 2018.

• The event organized by the Ministry of Culture continued till 20^(th) January.

• The state paired with Karnataka was Uttarakhand.

• The event was inaugurated by Minister of Parliamentary Affairs Ananth Kumar in the presence of Minister of State for Culture Mahesh Sharma.

• Rashtriya Sanskriti Mahotsav aims to celebrate national integration and the idea of unity in the diversity of the country. It celebrates the rich culture and heritage of India.

• It covers events including art forms from classical and folk, Music and Dance, theatre to literature, and Visual Arts.

Other Facts:-

Rashtriya Sanskriti Mahotsav held at different places:-

Year	Place
2015	New Delhi
2016	New Delhi
2017	Ahemdabad
2019	Jabalpur

Q38. Answer: (a) 18 groups and 7 periods

The correct answer is 18 Groups and 7 Periods.

• Modern Periodic Table has 18 Groups and 7 Periods.

• It has 118 Elements.

• Each of the tables has a vertical row is called groups. Elements in groups have similar chemical and physical properties because they have the same number of outer electrons.

• Each of the tables has horizontal rows is called periods. During a period, a gradual change in chemical properties occurs from one element to another.

• It was given by Dmitri Mendeleev.

• The Structure of it is like a bird Grid.

• The Modern Periodic table is used to organize all the known elements.

• Advantages of Modern Periodic Table:-

• It is easier to remember the properties of an element if its position in the periodic table is known.

• It made the study of Chemistry Systematic and Easy.

Modern Periodic Table:-

Q39. Answer: (d) velocity

CONCEPT:

• Uniform motion: The motion of an object in which the object travels in a straight line and its velocity remains constant along that line as it covers equal distances in equal intervals of time, irrespective of the duration of the time.

• Example: Ball moving on a frictionless surface with constant velocity.

• Non-uniform motion: The motion of an object in which the object travels with varied speed and it does not cover the same distance in equal time intervals, irrespective of the time interval duration.

• Example: The motion of a train

EXPLANATION:

• During the uniform motion of an object along a straight line, the velocity remains constant with time. Hence option 4 is correct.

Additional Information

• In the uniform motion, the change in velocity of the object for any time interval is zero. This means in the case of uniform motion, the rate of change of velocity, i.e. acceleration is equal to zero.

Q40. Answer: (a) Sublimation

Sublimation is the phase transition of a substance directly from the solid to the gas phase without passing through the intermediate liquid phase. Sublimation is an endothermic process that occurs at temperatures and pressures below a substance's triple point in its phase diagram.

Q41. Answer: (b) South

Drawing the diagram according to the given information,

He is facing towards south now.

Hence, “south” is the correct answer.

Q42. Answer: (b) 6^(th) April 2017

1^(st) January 2017 – Monday

2^(nd) January 2017 – Tuesday

3^(rd) January 2017 – Wednesday

4^(th) January 2017 – Thursday

5^(th) January 2017 – Friday

6^(th) January 2017 – Saturday

7^(th) January 2017 – Sunday

Day + 7 days = same day.

Since 2017 is not a leap year, there will be 28 days in February.

In January leaves are = 5^(th) January (1^(st) Friday), 7^(th) January (Sunday), 14^(th) January (Sunday), 21^(st) January (Sunday), 28^(th) January (Sunday). Total = 5

In February leaves are = 2^(nd) February (1^(st) Friday), 4^(th) February, 11^(th) February, 18^(th) February, 25^(th) February. Total = 5

In March leaves are = 2^(nd) March (1^(st) Friday), 4^(th) March, 11^(th) March, 18^(th) March, 25^(th) March. Total = 5.

In April leaves are = 1^(st) April, 6^(th) April (1^(st) Friday).

Hence, 17^(th) holiday will be on 6^(th) April 2017.

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Q43. Answer: (b) A

The pattern followed is,

In all the given figures, except figure A, the figure inside the square is formed with the help of lines.

Whereas,

In figure A, there is a circle immersed in a square.

Hence, option 2 is the odd one.

Q44. Answer: (c) Product bundling

In marketing, product bundling is offering several products for sale as one combined product. It is a common feature in many imperfectly competitive product markets. Industries engaged in the practice include telecommunications, financial services, health care, and information

Q45. Answer: (a) Earthworm

• Cutaneous respiration takes place in earthworms.

• Cutaneous respiration is Gas exchange that occurs via the skin or body surface of animals

Type of respiration	Meaning	Example
Cutaneous	Gas exchange that occurs via the skin or body surface of animals	Earthworms, frogs
pulmonary respiration	The gas exchange occurs via the alveoli in the lungs.	amphibians, reptiles, birds and mammals
Branchial respiration	An animal's intake of oxygen using gills.	aquatic arthropods and molluscs

Q46. Answer: (c) Only argument I is strong

According to the given statement,

Assumption I: Because of the higher fee in the schools some children drop out from schools and work as labour. If education is made free then child labour will be reduced. Hence, this is implicit.

Assumption II: This is not implicit, because education is the topic talked about in the statement, not about all free things.

Hence, “only assumption I” is implicit.

Q47. Answer: (a) Paternal Grandfather

Drawing the family tree,

Rajan’s father’s only brother’s father is the paternal grandfather to Rajan.

Hence, “paternal grandfather” is the correct answer.

Q48. Answer: (c) Sarojini Naidu

• Sarojini Naidu was the first female governor of Uttar Pradesh.

• Sarojini Naidu never took over as the Chief Minister of Uttar Pradesh.

• Sarojini Naidu is also called the Nightingale of India.

• Pandit Govind Ballabh Pant was the first Chief Minister of Uttar Pradesh.

• Narayan Dutt Tiwari was the former Chief Minister of Uttar Pradesh and Uttarakhand.

• Chandra bhanu Gupta was also the Chief Minister of Uttar Pradesh state three times.

Q49. Answer: (b) 80

From the given Bar Graph we can say that,

In the year 2015,

=> Ranks scored from institute “ABC” = 80

Q50. Answer: (d) Acceleration

The correct answer is Acceleration.

• The change in the velocity with respect to time in a movable object is called Acceleration.

• Formulated by a = Velocity/ Time taken.

• It is a Vector Quantity.

• Unit of this is(meter/ second^2).

Momentum

• Momentum is determined by the product of the mass of the object and its velocity.
• It is a vector quantity.
• The formula is M = mass x velocity.
• SI unit is m/s (meter/ second).

Speed

• Distance covered in a unit time is called Speed.
• It is a Scaler quantity.
• SI unit is meter/second.
• The formula is v = Distance covered/ taken time.

Displacement

• When a body covered the distance from one position to another position, then the minimum distance between the initial and final position of the body is called displacement.
• It is a vector quantity.
• Its SI unit is meter.
• Displacement can be positive, negative or zero.
• Displacement can be zero but distance can never be zero.

Q51. Answer: (c) February

From the given table, Arranging number of tourists in descending order:
3000 (April), 2500 (March), 2000 (January and May), 1500 (February) and 1000 (June)
The second least visited month was February with 1500 tourists

Q52. Answer: (c) 3

According to the given information,
Symbol should be immediately preceded by a letter, but immediately not followed by a number.
Number of times the condition satisfied is:
P 3 R I M J 3 Q % W @ / N $ E 5 X Y 1 # 8
Q %
W @
N $
Hence, “3” is the correct answer.

Q53. Answer: (d) Rs. 2176800

GIVEN:
Total revenue = Rs. 3,628,000
Sale of bag = 45%
Sale of shoes = 15%
CALCULATION:
From the given pie chart we can say that,
When manufacturing = 100%, Total revenue = Rs. 3,628,000
100% = Rs. 3,628,000
=> 1% = Rs. 36280
Total revenue by bag and shoes = 60%,
=> 60% = 60 × 36280
Therefore Total revenue by bag and shoes = Rs. 2176800

Q54. Answer: (a) AgCl and AgBr

The correct answer is AgCl and AgBr.
• AgCl, AgBr, AgF and AgI are known as Silver Halides.
• A silver halide is one of the chemical compounds that can form between the element silver and one of the halogens.
• Silver halides are light-sensitive chemicals.

Silver Nitrate (AgNO3)

• Silver Nitrate is an inorganic chemical with antiseptic activity.

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• It appears as a colourless or white crystalline solid becoming black on exposure to light or organic material.
• In its solid form, silver nitrate is coordinated in a trigonal planar arrangement.

Uses:

• Type of pesticide used to destroy or inhibit the growth of disease-causing mechanisms.
• Related to all forms of cleaning/washing, including cleaning products used in the home, laundry detergents.
• Drug product, or related to the manufacturing of drugs.

Key Points

Uses of Silver Halides.

Halide Name	Uses
Silver Chloride(AgCl)	Medicines and silver salts are used in photographic films, electroplating and polishing mirrors and in making alloys.
Silver Bromide (AgBr)	Use in photography. In infrared applications. light-sensitive eyeglasses, and semiconductors
Silver Iodide (AgI)	Used for weather modification applications. In cloud seeding. As an antiseptic material and a photosensitive material in photography.
Silver Floride (AgF)	Includes food packaging, paper plates, cutlery, small appliances. For preventing, destroying or mitigating pests.

Q55. Answer: (d) ATP

The correct answer is ATP.

ATP(Adenosine Triphosphate):

• It is the organic compound composed of the phosphate groups, adenine, and the sugar ribose.
• These molecules provide energy for various biochemical processes in the body.
• That is why it is called Energy Currency of the Cell.
• The ATP molecule was discovered in the year 1929 by German chemist Karl Lohmann.
• These ATP molecules are synthesized by Mitochondria, therefore it is called the powerhouse of the cell.
• In the year 1948, Scottish biochemist Alexander Todd was the first person to synthesized the ATP molecule.

ADP(Adenosine diphosphate):

• Adenosine diphosphate (ADP), is an important organic compound in metabolism and is essential to the flow of energy in living cells.
• It is essential in photosynthesis and glycolysis.
• It is the end-product when adenosine triphosphate ATP loses one of its phosphate groups.
• The energy released in the process is used to power up many vital cellular processes.
• ADP reconverts to ATP by the addition of a phosphate group to ADP.

Q56. Answer: (a) white

The correct answer is white.

• When a piece of magnesium ribbon is ignited, light and heat are produced.
• The oxidation or combustion of magnesium in the air has long been used as a source of intense light in photography and for other photochemical reactions.
• After burning magnesium, it gives some ash.
• The colour of the ash is white when it burns.

Q57. Answer: (c) Rs. 2,472

Shortcut Trick

For half-yearly compounding, the rate becomes half and time becomes double.

New Rate = 12% ÷ 2 = 6% per period; Periods (n) = 1 × 2 = 2.

Net Effective Interest Rate for 2 periods = x + y + (xy ÷ 100) => 6 + 6 + (6 × 6 ÷ 100) = 12.36%.

Compound Interest = 20,000 × 12.36% = Rs. 2,472.

Therefore The correct answer is Rs. 2,472.

Alternate Method

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Given: Principal (P) = Rs. 20,000 | Annual Rate (R) = 12% | Time (T) = 1 year.
Formula Used: Compound Interest (CI) = $P[(1 + r/100)^n - 1]$
=> Interest rate for half-year (r) = 12% ÷ 2 = 6%
=> Number of conversion periods (n) = 1 × 2 = 2 periods
=> Amount (A) = $20,000 \times (1 + 6/100)^2$
=> $A = 20,000 \times (1.06) \times (1.06)$
=> $A = 20,000 \times 1.1236$ = Rs. 22,472
=> Compound Interest (CI) = Amount − Principal
=> CI = 22,472 − 20,000 = Rs. 2,472
Therefore The correct answer is Rs. 2,472.
Additional Information
Half-Yearly Compounding Rule
When interest is compounded half-yearly, the annual rate is divided by 2 and the time in years is multiplied by 2.
Successive Percentage Formula
For two periods, the net interest rate can be found using the formula: Net % = $r + r + (r^2 \div 100)$.
Difference between CI and SI
For 2 periods, the difference between CI and SI is given by: $CI - SI = P(r/100)^2$.

Q58. Answer: (b) Manjot Kalra

The correct answer is Manjot Kalra.
• Manjot Kalra made a century in the final match to help Indian team to clinch the title.
• He made 101 not out in 102 balls.
• He made this century against Australia.
Facts about U-19 World Cup 2018.
• It was organised in New Zealand.
• Won by India (4th time).
• Runner up was Australia.
Key Points
Titles in the U-19 World Cup:

Title	Player name	Country
Player of the series	Shubhman Gill	India
Most Runs	Alick Athanaze	West Indies
Most Wickets	1.Ankush Roy 2. Qais Ahmed 3. Faizal Jamakhandi	India Bangladesh Canada (All of these bowlers got equal 14 wickets)
Player of the Match (Final)	Manjot Kalra	India

Q59. Answer: (b) 1/2, 1/2

$x/(x^2-1)=A/(x-1)+B/(x+1)$
=> $x/(x^2-1)=(A(x+1)+B(x-1))/(x^2-1)$
=> $x = Ax + A + Bx - B$
=> $x = x(A + B) + (A - B)$
On comparing
$A + B = 1$ ---(1)
$A - B = 0$ ---(2)
From equation (1) and equation (2)
$A = 1/2$ and $B = 1/2$

Q60. Answer: (c) -15.8

Shortcut Trick
By the Remainder Theorem, if (x − 5) is a factor, then P(5) = 0.
Substitute x = 5 directly into the polynomial: $3(5)^2 + 5a + 4 = 0$.

75 + 5a + 4 = 0 => 5a = −79.

a = −79 ÷ 5 = −15.8.

Therefore The correct answer is −15.8.

Alternate Method

Given:

Polynomial P(x) = $3x^2 + ax + 4$

Divisor = x − 5

Formula Used:

The Factor Theorem states that if a polynomial P(x) is perfectly divisible by (x − k), then the remainder P(k) must be equal to 0.

Calculations:

=> Let x − 5 = 0 => x = 5

=> $P(5) = 3(5)^2 + a(5) + 4 = 0$

=> 3(25) + 5a + 4 = 0

=> 75 + 5a + 4 = 0

=> 79 + 5a = 0

=> 5a = −79

=> a = −79 ÷ 5

=> a = −15.8

Therefore The correct answer is −15.8.

Additional Information

Factor Theorem

A special case of the remainder theorem which states that a polynomial f(x) has a factor (x − a) if and only if f(a) = 0.

Remainder Theorem

When a polynomial f(x) is divided by a linear divisor (x − a), the remainder is given by the value f(a).

Synthetic Division

A shorthand method of polynomial division, especially when dividing by a linear factor, to quickly find quotients and remainders.

Q61. Answer: (b) x = 9

Shortcut Trick

The sum of roots for a quadratic equation $x^2 − 12x + k = 0$ is given by −b/a = −(−12)/1 = 12.

Let the roots be α and β, where α = 3.

α + β = 12 => 3 + β = 12.

β = 12 − 3 = 9.

Therefore The correct answer is x = 9.

Alternate Method

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

Formula Used: For any quadratic equation $ax^2 + bx + c = 0$, the Sum of Roots (α + β) = −b/a.

=> Comparing $x^2 − 12x + k = 0$ with $ax^2 + bx + c = 0$:

=> a = 1, b = −12, and c = k.

=> Sum of roots = −(−12) / 1 = 12.

=> Let the two roots be α and β.

=> Given that α = 3.

=> 3 + β = 12.

=> β = 12 − 3.

=> β = 9.

Therefore The correct answer is x = 9.

Additional Information

Sum and Product of Roots

For a quadratic equation $ax^2 + bx + c = 0$, the sum of roots is −b/a and the product of roots is c/a.

Nature of Roots

The nature is determined by the Discriminant (D) = $b^2 − 4ac$. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Formation of Quadratic Equation

If the roots α and β are known, the equation is formed as $x^2 - (\alpha + \beta)x + (\alpha \times \beta) = 0$.

Q62. Answer: (c) 17

The number of triangles in the given figure is,

Hence, “17” is the correct answer.

Q63. Answer: (b) 3

The pattern followed is:

1) The given figure is rotating 180° in clock wise direction in 1st figure to 2nd and 4^(th) to 5^(th) figure.

2) And 2^(nd) and 5^(th) figures are flipped vertically.

1st figure to 2^(nd) figure and 3^(rd) figure;

Similarly,

4^(th) to 5^(th) and 5^(th) to 6^(th) figure;

But,

In the 3^(rd) figure it does not follow the pattern.

Hence, option 2 is dissimilar from the given options.

Q64. Answer: (c) MR Rajagopal

The correct answer is MR Rajagopal.

Key Points

MR Rajagopal

• Born- Trivantpuram, Kerla

• He is known as the father of palliative care in India.

• In 1993, he founded the Pain and Palliative Care Society (PPCS) in Medical College, Calicut, Northern Kerala.

• He has been working tirelessly since 1993 to integrate palliative care across medical health institutions.

• In 2018, he has been honored by Padma Shri.

• "Hippocratic"- A documentary film based on Dr. M R Rajagopal's life.

Additional Information

Palliative Care

• It is an approach that improves the quality of life of patients and their families facing the problem associated with a life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems.

Bhakti Yadav

• She was the first female Doctor from Indore.

• She had been honored by Padam Shri.

Sanduk Ruit

• He is an ophthalmologist from Nepal.

• He is one of the founders of the Tilganga Institute of Ophthalmology.

Rani Bang

• She is a social activist and researcher working in the field of community health, in Maharastra.

• She has been honored by Padam Shri.

Q65. Answer: (a) 20

Shortcut Trick

Since the percentage values are multiples, use the inverse ratio property.

Ratio of percentages = 18.3 : 54.9 = 1 : 3

Therefore, the ratio of values must be 3 : 1

As 3 units = 60, then 1 unit = 20

Therefore The correct answer is 20.

Alternate Method

Given: 18.3% of 60 = 54.9% of x

Formula Used: Percentage calculation (a% of b = c% of d)

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=> (18.3 ÷ 100) × 60 = (54.9 ÷ 100) × x
=> 18.3 × 60 = 54.9 × x
=> x = (18.3 × 60) ÷ 54.9
=> x = 60 ÷ (54.9 ÷ 18.3)
=> x = 60 ÷ 3
=> x = 20
Therefore The correct answer is 20.
Additional Information
Percentage Equality Rule
If a% of B = c% of D, then the product a × B must always equal c × D, allowing for quick cancellation of the denominator 100.
Commutative Property
Remember that x% of y is always equal to y% of x. This property can often simplify complex-looking decimal calculations.

Q66. Answer: (a) Dr Harsh Vardhan

The correct answer is Dr Harsh Vardhan.
National Wildlife Genetic Resource Bank :
• Increase the collection of genetic resources from wildlife through collaboration with zoos in India.
• Help in protecting inia's biodiversity and environment.
Others Facts:

Name	Post
Dr Harsh Vardhan	Minister of Health and Family Welfare
Rajnath Singh	Minister of Defence of India
Narendra Modi	Prime minister of India
Droupadi Murmu	President of India

Q67. Answer: (a) 40

Let, the age of son be x and the age of mother be y
It is given that the son's present age is two-fifths of his mother's age.
x = 2/5y ----(i)
After 8 Years, the son will be one half of his mother's age
x + 8 = 1/2(y + 8)
x = y/2 + 4 - 8
x = y/2 - 4 ----(ii)
On solving eq (i) and eq(ii)
Hence, the age of the mother is 40 years now.
Given, A son's present age is two-fifths of his mother's age.
Then, we let the age of the mother = 5x, and the age of son = 2x
After 8 years, he will be one-half of his mother's age.
Then, Mother = 5x + 8 and Son = 2x + 8
(5x + 8) × (1 / 2) = 2x + 8
5x + 8 = 4x + 16
5x - 4x = 16 - 8
x = 8
So, the age of son = x = 8 years
The age of mother = 5x = 5 × 8 = 40 years

Q68. Answer: (c) 10 ms^(-1)

Shortcut Trick
Average Speed = Total Distance ÷ Total Time
Total Distance = 30 m + 70 m = 100 m
Total Time = 4 s + 6 s = 10 s

Average Speed = 100 ÷ 10 = 10 ms^(−1)
Therefore The correct answer is 10 ms^(−1).
Alternate Method
Given:
Distance 1 (d1) = 30 m, Time 1 (t1) = 4 s
Distance 2 (d2) = 70 m, Time 2 (t2) = 6 s
Formula Used:
Average Speed = (Total Distance Covered) ÷ (Total Time Taken)
Calculations:
=> Total Distance = d1 + d2 = 30 + 70 = 100 m
=> Total Time = t1 + t2 = 4 + 6 = 10 s
=> Average Speed = 100 / 10
=> Average Speed = 10 ms^(−1)
Therefore The correct answer is 10 ms^(−1).
Additional Information
Average Speed with Equal Distance
If an object covers two equal distances at speeds v1 and v2, the average speed is given by (2 × v1 × v2) ÷ (v1 + v2).
Units of Speed
To convert speed from km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.
Uniform Motion
In uniform motion, the average speed of an object is equal to its actual speed at any point in time.

Q69. Answer: (c) 1200 litres

Shortcut Trick
Let the total capacity be the LCM of denominators (5, 12) = 60 units.
Initial quantity = 3/5 × 60 = 36 units.
Final quantity = 7/12 × 60 = 35 units.
Difference = 36 − 35 = 1 unit → 20 litres.
Total capacity = 60 units = 60 × 20 = 1200 litres.
Therefore The correct answer is 1200 litres.
Alternate Method
Given: Initial fraction = 3/5, Oil used = 20 litres, Final fraction = 7/12.
Formula: Capacity × (Initial fraction − Final fraction) = Quantity used.
=> Let the total capacity be 'C'.
=> (3/5)C − 20 = (7/12)C
=> (3/5)C − (7/12)C = 20
=> [(36 − 35) / 60]C = 20
=> (1/60)C = 20
=> C = 20 × 60
=> C = 1200
Therefore The correct answer is 1200 litres.
Additional Information
Fraction Comparison
To find the difference between two fractions, always equate the denominators by taking their Least Common Multiple (LCM).
Capacity Calculation
The actual quantity of a substance in a container is the product of its fractional part and the total capacity.
Unitary Method
In ratio-based problems, if 1 unit represents a specific value, the total value is found by multiplying the total units by that specific value.

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Q70. Answer: (d) Kerala

The correct answer is Kerala.

• Mohiniyattam is a dance form of Kerala.

• Mohiniyattam is one of the eight classical dance of India.

Key Points

Classical Dance of India:

Classical dance	State
Bharatnatyam	Tamilnadu
Kathak	North India State
Kuchipudi	Andhra Pradesh
Odissi	Odisha
Kathakali	Kerala
Sattriya	Assam
Manipuri	Manipur
Mohiniyattam	Kerala

Q71. Answer: (a) cousins

Drawing the family tree,

Jay and Neel are cousins.

Hence, “cousins” is the correct answer.

Q72. Answer: (b) Minsk

The correct answer is Minsk.

• Minsk is the capital of Belarus.

• Belarus Currency- Belarusian ruble.

Key Points

Others Facts:

Capital	Country	Currency
Baku	Azerbaijan	Azerbaijan Manat
Moroni	Comoros	Comoro Franc
Brussels	Belgium	Euro

Q73. Answer: (a) 40 J

The correct answer is 40 J.

Explanation

• Moving Charge= 4 C (Q)

• Two points having a P.D (V)= 10 V

• Work= W

W= VQ

W= 10v x 4C= 40 J

Q74. Answer: (b) movements

The correct answer is movements.

Explanation:

• Muscle tissue is a soft tissue that makes up most of the tissues in the muscles of the human muscular system.

• It is the only type of tissue that has cells with the ability to contract.

• This tissue can be used to move bones, compress chambers, or squeeze various organs.

• There are three major types of muscle tissues in the human body:

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• Skeletal muscle tissue:

• Skeletal muscle is the most common type of muscle tissue in the human body. To move bones in opposite directions, skeletal muscles often consist of pairs of muscles that work in opposition to one another to move bones in different directions at joints.

• Skeletal muscle fibres are bundled together in units called muscle fascicles, which are bundled together to form individual skeletal muscles. Skeletal muscles also have connective tissue supporting and protecting the muscle tissue.

• Smooth muscle tissue:

• Smooth muscle is muscle tissue in the walls of internal organs and other internal structures such as blood vessels.

• When smooth muscles contract, they help the organs and vessels carry out their functions. When smooth muscles in the stomach wall contract, for example, they squeeze the food inside the stomach, helping to mix and churn the food and break it into smaller pieces. This is an important part of digestion.

• Contractions of smooth muscles are involuntary, so they are not under conscious control. Instead, they are controlled by the autonomic nervous system, hormones, neurotransmitters, and other physiological factors.

• Cardiac muscle tissues:

• Cardiac muscle is found only in the wall of the heart. It is also called myocardium.

• When cardiac muscle contracts, the heartbeats and pumps blood. Contractions of cardiac muscle are involuntary. They are controlled by electrical impulses from specialized cardiac muscle cells in an area of the heart muscle called the sinoatrial node.

Q75. Answer: (a) India

The correct answer is India.

Explanation:

• World Environment Day is a UN Environment-led global event, the single largest celebration of our environment each year, which takes place on June 5 and is celebrated by thousands of communities worldwide.

• India is the global host of 2018 World Environment Day.

• The theme of World Environment Day is “Beat Plastic Pollution”.

• The theme “Beat Plastic Pollution”, urges governments, industry, communities, and individuals to come together and explore sustainable alternatives and urgently reduce the production and excessive use of single-use plastic polluting our oceans, damaging marine life, and threatening human health.

Additional Information

• Plastic Pollution facts:

• Every year the world uses up to 5 trillion plastic bags.

• Each year, at least 13 million tonnes of plastic end up in the oceans, the equivalent of a full garbage truck every minute.

• In the last decade, we produced more plastic than in the whole last century.

• 50 per cent of the plastic we use is single-use or disposable.

• We buy 1 million plastic bottles every minute.

• Plastic makes up 10% of all of the waste we generate.

Q76. Answer: (c) 3960

Shortcut Trick

Identify the highest power of all prime factors present in 36, 40, and 660.

$36 = 2^2 \times 3^2$

$40 = 2^3 \times 5$

$660 = 2^2 \times 3 \times 5 \times 11$

$LCM = 2^3 \times 3^2 \times 5 \times 11 = 8 \times 9 \times 5 \times 11 = 3960$.

Therefore The correct answer is 3960.

Alternate Method

Given: Numbers are 36, 40, and 660.

Formula Used: LCM (Least Common Multiple) using the Division Method.

=> Divide the numbers by the smallest prime factor (2): 18, 20, 330

=> Divide again by 2: 9, 10, 165

=> Divide again by 2: 9, 5, 165

=> Divide by 3: 3, 5, 55

=> Divide by 3: 1, 5, 55

=> Divide by 5: 1, 1, 11

=> Divide by 11: 1, 1, 1

=> LCM = 2 × 2 × 2 × 3 × 3 × 5 × 11

=> LCM = 8 × 9 × 55 = 72 × 55 = 3960

Therefore The correct answer is 3960.

Additional Information

LCM and HCF Relationship

For two numbers A and B, Product of numbers = LCM × HCF.

LCM of Fractions

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

HCF of Fractions

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

Q77. Answer: (c) Ga

The correct answer is Ga.

Explanation:

• Gallium has a very low melting point of 29.76°C.

• Gallium is a soft, silvery metal used primarily in electronic circuits, semiconductors, and light-emitting diodes (LEDs).

• It is also useful in high-temperature thermometers, barometers, pharmaceuticals, and nuclear medicine tests.

• The largest producers of gallium are Australia, Russia, France, and Germany.

• Atomic number (number of protons in the nucleus): 31

• Atomic symbol (on the periodic table of the elements): Ga

• Atomic weight (average mass of the atom): 69.723

• Phase at room temperature: solid

• Boiling point: 3,999 F (2,204 C)

• Number of isotopes (atoms of the same element with a different number of neutrons): 24 whose half-lives are known

• Most common isotopes: Two stable Ga-69 (natural abundance 60.1 per cent) and Ga-71 (natural abundance 39.9 per cent).

Key Points

About other options:

Atomic Symbol	Name of Metal	Melting Point (°C)	Atomic Number
Ba	Barium	727	56
Na	Sodium	97.81	11
K	Potassium	63.5	19

Q78. Answer: (a) D

The pattern followed is,

The figures A, B and C are open figures.

Whereas,

Figure D is a circle, which is a closed figure.

Hence, option 1 is the odd figure.

Q79. Answer: (d) B

The pattern followed is,

The figures A, C and D have the same base figure which is surrounded by other symbols.

Whereas,

Figure B has one line missing.

Hence, option 4 does not belong to the group.

(Note: In original paper this question has discrepancy. The extra shaded triangle in the figure D in question are to be changed. The empty triangle will be as per the figure given above.)

Mistake Points

Figure D is not the odd one out. Figure B is the odd one out as figure B has one line missing.

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Q80. Answer: (d) – 1/6

Shortcut Trick

Directly substitute angle A = 30° into the expression: $\sin^2 30° - \cos^2 30° + \tan^2 30°$.

Value substitution: $(1/2)^2 - (\sqrt{3}/2)^2 + (1/\sqrt{3})^2$

Calculation: $1/4 - 3/4 + 1/3 = -2/4 + 1/3 = -1/2 + 1/3 = -1/6$.

Therefore The correct answer is $-1/6$.

Alternate Method

Given: In triangle ABC, angle B = 90° and angle A = 30°.

Formula Used: Standard trigonometric values: $\sin 30° = 1/2$, $\cos 30° = \sqrt{3}/2$, $\tan 30° = 1/\sqrt{3}$.

The expression to evaluate is $\sin^2 A - \cos^2 A + \tan^2 A$.

=> Expression = $(\sin 30°)^2 - (\cos 30°)^2 + (\tan 30°)^2$

=> Expression = $(1/2)^2 - (\sqrt{3}/2)^2 + (1/\sqrt{3})^2$

=> Expression = $1/4 - 3/4 + 1/3$

=> Expression = $(1 - 3)/4 + 1/3$

=> Expression = $-2/4 + 1/3$

=> Expression = $-1/2 + 1/3$

=> Expression = $(-3 + 2)/6$

=> Expression = $-1/6$

Therefore The correct answer is $-1/6$.

Additional Information

Trigonometric Identities

Fundamental identities include $\sin^2\theta + \cos^2\theta = 1$ and $1 + \tan^2\theta = \sec^2\theta$.

Double Angle Relation

The term $(\sin^2 A - \cos^2 A)$ is equal to $-(\cos^2 A - \sin^2 A)$, which simplified is $-\cos 2A$.

Standard Values at 30°

For $\theta = 30°$: $\sin\theta = 0.5$, $\cos\theta = 0.866$, $\tan\theta = 0.577$.

Q81. Answer: (c) Neither 1 nor 2 follows.

The least possible Venn diagram is,

Conclusion 1: Some seats are pillows → False (This is definitely false)

Conclusion 2: Some cushions are seats → False (This is definitely false)

Hence, “neither 1 nor 2” follows.

Q82. Answer: (d) 20 min

Shortcut Trick

Let Total Work be 80 units (LCM of 40 and 80).

Efficiency of A = 2 units/min and Efficiency of B = 1 unit/min.

Pipe A worked for the entire 30 minutes, filling 30 × 2 = 60 units.

Remaining 80 − 60 = 20 units were filled by pipe B.

Time for pipe B = 20 ÷ 1 = 20 minutes.

Therefore The correct answer is 20 min.

Alternate Method

Person	Days	Total Work	Efficiency
Pipe A	40 min	80 units	2 units/min
Pipe B	80 min	1 unit/min	

Given: Total time taken to fill the tank = 30 minutes.

Calculations:

=> Pipe A was open for the entire duration of 30 minutes.

=> Work done by Pipe A = Efficiency × Time = 2 × 30 = 60 units.

=> Remaining work to be done by Pipe B = Total Work − Work by A = 80 − 60 = 20 units.

=> Time for which Pipe B was open = Remaining Work ÷ Efficiency of B

=> Time = 20 ÷ 1 = 20 minutes.

Therefore The correct answer is 20 min.

Additional Information

Total Work Concept

Total work is usually taken as the LCM of the individual times to simplify calculations into integers.

Pipes and Cisterns

If a pipe fills a tank in x hours, its efficiency is 1/x. For outlet pipes, efficiency is taken as negative.

Efficiency Formula

Efficiency = Total Work ÷ Time Taken. Total Work = Efficiency × Total Time.

Q83. Answer: (c) Bat: 500, Ball: 50

Shortcut Trick

Option Verification Method: Check the given options in the first condition (7 bats + 6 balls = Rs. 3,800).

For Option (3): (7 × 500) + (6 × 50) = 3500 + 300 = Rs. 3,800.

Check second condition: (3 × 500) + (5 × 50) = 1500 + 250 = Rs. 1,750.

Both conditions are satisfied by Option (3).

Therefore The correct answer is Bat: Rs. 500, Ball: Rs. 50.

Alternate Method

Given: 7 bats + 6 balls = Rs. 3,800 and 3 bats + 5 balls = Rs. 1,750.

Formula Used: Linear Equations in two variables (Substitution or Elimination).

=> Let cost of 1 bat be x and cost of 1 ball be y.

=> 7x + 6y = 3800 --- (i)

=> 3x + 5y = 1750 --- (ii)

=> Multiply (i) by 5 and (ii) by 6:

=> 35x + 30y = 19000

=> 18x + 30y = 10500

=> Subtracting: 17x = 8500 => x = 500

=> Substitute x = 500 in (ii): 3(500) + 5y = 1750 => 1500 + 5y = 1750 => 5y = 250 => y = 50

Therefore The correct answer is Bat: Rs. 500, Ball: Rs. 50.

Additional Information

Linear Equations in Two Variables

Equations of the form ax + by + c = 0 represent a straight line. Solving a pair of such equations finds the point of intersection.

Elimination Method

Make the coefficients of one variable equal by multiplying the equations with suitable constants, then add or subtract to eliminate that variable.

Unitary Cost Calculation

Total cost = (Quantity1 × Price1) + (Quantity2 × Price2). This forms the basis of business math word problems.

Q84. Answer: (d) Pt

The correct answer is Pt.

Key Points

• Dobereiner made the first observation on platinum as a catalyst.

• Catalyst is the substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change.

• Each of Dobereiner's triads was a group of three elements.

• The appearance and reactions of the elements in a triad were similar to each other.

• He showed that in each triad the mean of the lightest and heaviest atomic weights approximated the atomic weight of the middle element.

Additional Information

• Dobereiner's triads grouped elements with similar chemical properties.

• Consider lithium, sodium, and potassium, for example.

• These elements all react with water at room temperature.

• They react with chlorine to form compounds with similar formulas: LiCl, NaCl, and KCl.

• They combine with hydrogen to form compounds with similar formulas: LiH, NaH, and KH.

• They form hydroxides with similar formulas: LiOH, NaOH, and KOH.

Q85. Answer: (b) Between F and C

The correct answer is between F and C.

• When an object is placed beyond the centre of curvature of a concave mirror, the image will be formed between the focus and centre of curvature.

Additional Information

Centre of Curvature:-

• The Centre of a circle which passes through a curve at a given point and has the same tangent and curvature at that point.

Focus:-

• In geometrical optics, a focus also called an image point, is the point where light rays originating from a point on the object converge. Although the focus is conceptually a point, physically the focus has a spatial extent, called the blur circle.

Diagrams:-

Q86. Answer: (b) 421

By decoding given information:

•	•	×	÷
Means			
×	÷	•	•

The original equation is,

32 + 26 – 2 × 7 ÷ 12

Rearranging the symbols,

32 × 26 ÷ 2 – 7 + 12

Using BODMAS rule,

32 × 13 – 7 + 12

= 416 – 7 + 12

= 428 – 7

= 421

Hence, “421” is the correct answer.

Q87. Answer: (b) 167, 169

Shortcut Trick

A pair of twin primes consists of two prime numbers that differ by exactly 2.

Check the numbers in each pair for primality: 169 is a perfect square (13 × 13 = 169).

Since 169 is a composite number, the pair (167, 169) is not a pair of twin primes.

Therefore The correct answer is 167, 169.

Alternate Method

Given: Pairs of numbers (197, 199), (167, 169), (137, 139), (107, 109).

Definition: Twin primes are prime numbers p and q such that q − p = 2.

Step-by-step verification:

=> Option 1: 197 and 199. Both are prime numbers and 199 − 197 = 2. (Twin Primes)

=> Option 2: 167 and 169. 167 is prime, but 169 = 13 × 13. (Not a Prime)

=> Since 169 is composite, (167, 169) is NOT a twin prime pair.

=> Option 3: 137 and 139. Both are prime numbers and 139 − 137 = 2. (Twin Primes)

=> Option 4: 107 and 109. Both are prime numbers and 109 − 107 = 2. (Twin Primes)

Therefore The correct answer is 167, 169.

Additional Information

Twin Primes

Pairs of prime numbers that have a difference of 2 are called twin primes. For example: (3, 5), (5, 7), (11, 13).

Prime and Composite Numbers

A prime number has exactly two factors (1 and itself). A composite number has more than two factors.

Co-prime Numbers

Two numbers are said to be co-prime if their Highest Common Factor (HCF) is 1. All twin primes are co-prime, but not all co-primes are twin primes.

Q88. Answer: (c) Arvind Subramanian

The Correct Answer is Arvind Subramanian.

• The Chief Economic Advisor of India in 2018 was Arvind Subramanian.

• He is CEA from 14 October 2014 to 20 June 2018.

• The Chief Economic Adviser (CEA) is a post in the Government of India and is equivalent to the rank of Secretary to the Government of India.

• The CEA is the ex-officio cadre controlling authority of the Indian Economic Service. The CEA is head of the Economic Division of the Department of Economic Affairs, Ministry of Finance, Government of India.

• Current Chief Economic Advisor of India:- Krishnamurthy Subramanian.

Extra Facts:-

Name	Time Period
Arvind Virmani	2007-2009
Raghuram Rajan	2012-2013
Kaushik Basu	2009-2012

Q89. Answer: (a) Ovaries

The correct answer is Ovaries.

• The female germ-cells or eggs are made in the Ovaries.

• Ovaries are female gonads-the primary female reproductive organs.

• These glands have three important functions:-

• They secrete hormones,

• They protect the eggs a female gives birth

• They release eggs for possible fertilization

Uterus:-

• The Uterus is a hollow muscular organ located in the female pelvis between the bladder and rectum. Once the egg has left the ovary it can be fertilized and implant itself in the lining of the uterus. The main function of the uterus is to nourish the developing fetus prior to birth.

Cervix:-

• The cervix is the lower part of the Uterus. The Cervix forms a canal that opens into the vagina, which leads to the outside of the body.

Vagina:-

• The vagina is a closed muscular canal that extends from the vulva - the outside of the female genital area - to the neck of the uterus.

Q90. Answer: (b) 111 u

The correct answer is 111 u.

• The formula unit mass of $CaCl_2$ is 111 u.

• Atomic Mass of Ca= 40

• Atomic Mass of Chlorine= 35.5 x2 = 71

• Formula Unit Mass = 40+71= 111.

• Formula unit mass is defined as the sum of the mass of all the atoms each multiplied by atomic masses that are present in the empirical formula of a compound.

• Cacl2 or calcium chloride is also known as Ice Bite.

Q91. Answer: (c) A. B. Vajpayee

The correct answer is A.B.Vajpayee.

• The Prime minister of India during the Pokhran-II nuclear tests held in 1998 was Atal Bihari Vajpayee.

• He was an Indian Statesman who served three terms as the Prime Minister of India, first for a term of 13 days in 1996, then for a period of 13 months from 1998 to 1999, followed by a full term from 1999 to 2004.

• Born:- 25 December 1924
• Died:- 16 August 2018
Key Points
Extra Facts:-

Name	Time Period
Rajeev Gandhi (6^(th) PM)	1984 to 1989
Manmohan Singh (13^(th) PM)	2004 to 2014
P.V. Narasimha Rao (9^(th) PM)	1991 to 1996

Q92. Answer: (c) Son

Drawing the family tree,
David is the son of Vijaya.
Hence, “son” is the correct answer.

Q93. Answer: (b) Tuesday

Considering today is Tuesday,
A week consists of 7 days.
63 days is equal to 9 weeks.
Exactly after 63 days, that is 9 weeks, it will be a Tuesday.
Hence, “Tuesday” is the correct answer.

Q94. Answer: (a) Devendra Jhajharia

The correct answer is Devendra Jhajharia.
• In 2017 Rajiv Gandhi Khel Ratna award was given to Devendra Jhajharia (para-athlete) and Sardara Singh (Hockey).
Key Points
Devendra Jhajharia is an Indian Para Olympic Javelin thrower.
• He is the first India to win two gold medals at Para Olympics.
• He won gold in 2004 and the 2016 Para Olympics.
• He is also the only Para Athlete to be awarded Padma Shri.
• Murlikant Petkar was first Indian Para Athelete to win gold medal at Para Olympics.
Varun Singh Bhati is a para high jumper from India.
• He has won several medals in international events.
• He won bronze at 2016 Summer Paralympic Games and 2017 World Para Athletics Championships.
Mariyappan Thangavelu is an Indian para-athlete.
• He won a gold medal in the 2016 Rio Para Olympics.
• He is a Para Olympic high jumper.
• He was awarded Rajiv Gandhi Khel Ratna for 2020.
Deepa Malik is an Indian para-athlete.
• She is the first Indian woman to win a medal in the Para Olympic games.
• She won a silver medal in the 2016 summer Para Olympics in shot put.
Shakshi Malik is an Indian freestyle wrestler from Haryana.
• She won a bronze medal in the 2016 Summer Olympics.
• She is the first female wrestler from Inda to win a gold medal at Olympics.
Additional Information
Raji Gandhi Khel Ratna Award.
• It was instituted in 1991.
• This is the highest sporting award given by the Ministry of Youth Affairs and Sports.
• It is given for the spectacular and most outstanding performance in the field of sports by a sportsperson over a period of four years.
• The winner of the Rajiv Khel Ratna Award gets a reward of 7.5 lac rupees.
• Vishwanathan Anand was the first recipient of the award.

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• The Rajiv Gandhi Khel Ratna Award can be given a maximum of three persons in a year.
• But in 2016, shuttler P V Sindhu, gymnast Dipa Karmakar, shooter Jitu Rai, and wrestler Sakshi Malik had received this award.

Q95. Answer: (c) Vidarbha

The correct answer is Vidarbha.
Key Points
The Ranji Trophy
• The Ranji Trophy is India's first-class domestic cricket competition.
• Regional and state cricket associations of the country take part in this tournament.
• The competition is named after Ranjit Singhji, the first Indian player who participated in international cricket from India.
• The first edition of Ranji Trophy was organized in 1934.
• Mumbai has won the Ranji Trophy title for 41 times, while Vidarbha has won this title twice.

Q96. Answer: (a) Both I and II are implicit.

According to the given information,
Assumption I: This is implicit, because the customers get attracted to the banks which will give low interest rates.
Assumption II: Schemes like low interest rates are introduced by the banks because many people take home loans.
Hence, this is implicit.
Hence, “both I and II” are implicit.

Q97. Answer: (b) Both I and II are strong

Argument 1: This is strong, because when the population of these dogs increases, the municipality people will take them away.
Argument 2: This is also strong, because they are dangerous.
Hence, “both 1 and 2” are strong.

Q98. Answer: (b) ‘The Library of Fates’

The correct answer is ‘The Library of Fates’.
• ‘The Library of Fates’ is a book authored by Aditi Khorana which is a retelling of an Indian romantic folktale.
Other books by Aditi Khorana include-
• Mirror in the sky (2016).
• Liferaft (2019).
Key Points
• 'A Life of Adventure and Delight' is authored by Akhil Sharma.
Other books by Akhil Sharma includes:
• Cosmopolitan: Faber Stories.
• An Obedient Father.
• Family Life.
• 'A Crown of Wishes' is a book authored by Roshani Chokshi.
Other books by the author include:
• The Glided Wolves.
• Star touched queen.
• Aru Shah & The Song of Death.
• 'No Other World' is a novel by Rahul Mehta.
• Other books authored by him include - Quarantine: Stories (2010).

Q99. Answer: (c) Ohm’s law

The correct answer is Ohm's law.
• The relationship between the potential difference across a conductor and current flowing through it is determined by Ohm's law.
• Ohm's law states that potential difference across a conductor is directly proportional to the current flowing through it.
$V \alpha I$
i.e. $V = IR$
V = Potentioal difference
I = Current
R = Resistance. (constant)

Key Points

Newton's Laws.

• Newton's laws of motion relate an object's motion to the forces acting on it.

• He gave three laws of motion -

• The first law states that an object will not change its motion unless an external force acts on it.

• The second law states that force experienced is proportional to its mass times acceleration.

• The Third law of motion states that every action has an equal and opposite reaction.

Faraday's Law of Induction

• It states that induced voltage in a circuit is proportional to the rate of change over time of magnetic flex through that circuit.

Joule's law of heating

• This law states that when the current (I) passes through a conductor of resistance (R) for time (t) then heat produced by the conductor is equal to the product of the square of the current, the resistance, and time.

$H = I^2Rt$ joules

H = heat produced

I = current

R = Resistance

t = time

The unit is Joules.

Q100. Answer: (b) 6.022×10^{23}

The correct answer is 6.022×10^{23}.

• This is called the Avogadro Numbers.

• Avogadro's number, number of units in one mole of any substance (defined as its molecular weight in grams).

• It is equal to $6.02214076 \times 10^{23}$.

• The units may be electrons, atoms, ions, or molecules, depending on the nature of the substance and the character of the reaction.

• It is based on Avogadro's law.

• This law states that under the same conditions of temperature and pressure, equal volumes of different gases contain an equal number of molecules.

• This empirical relation can be derived from the kinetic theory of gases under the assumption of a perfect (ideal) gas.

• The law is approximately valid for real gases at sufficiently low pressures and high temperatures.

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