RRC Group D Previous Year Paper 23 (Held On: 19 Sept 2018 Shift 2)

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

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CBT

Q1. To change a temperature from the Kelvin scale to the Celsius-scale, you have to :

(a) multiply the given temperature by 273
(b) divide the given temperature by 273
(c) subtract 273 from the given temperature
(d) add 273 to the given temperature

Q2. The sum of the lengths of the edges of a cube is equal to three-fifths of the perimeter of a square. If the numerical value of the volume of the cube is equal to the numerical value of the area of the square, the perimeter of the square is:

(a) 360 units
(b) 480 units
(c) 500 units
(d) 300 units

Q3. Read the statements below followed by two arguments.

Statement:

Should Yoga be made compulsory in schools?

Arguments:

1. Yes, it would help in overall development of a child, both physically and mentally

2. No, parents will not object to their children learning Yoga

Which argument(s) of the below is/are strong in the context of the statement?

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

Q4. Consider a planet whose mass and radius are one-third the mass and radius of the Earth. If g is the value of acceleration due to gravity on the earth, then its value on the planet will be__

(a) 9g
(b) 3g
(c) 1/9 g
(d) 1/3 g

Q5. During the free fall of an object, which of the following energies increases at any point in its path?

(a) Mechanical energy
(b) Chemical energy
(c) Potential energy
(d) Kinetic energy

Q6. Uma arranges for a terrace party. She divides the total expected expenditure into 5 broad segments. Here is the distribution:

Expense Segments	%Expense
1	30
2	20
3	10
4	25
5	15

If she spends Rs. 850 on segment 3, what will be her total expense on segment 2 and segment 5?

(a) Rs. 1795
(b) Rs. 2975
(c) Rs. 1175
(d) Rs. 1275

Q7. In the last ten years, FDI inflows are highest in which sector of India?

(a) Services
(b) food processing
(c) Telecommunications
(d) Pesticides

Q8. Mahima started a journey 12 minutes late and as a result, had to drive @54 km/hr instead of @45 km/hr to reach on time. Find the distance covered during the journey.

(a) 67.5 km
(b) 75 km
(c) 90 km
(d) 54 km

Q9. 0.047619, when written as a vulgar fraction, is equal to

(a) 1/19
(b) 1/23
(c) 1/17
(d) 1/21

Q10. Name the country which will host the 2019 Combined World cup for shooting?

(a) Sri Lanka
(b) Nepal
(c) Pakistan
(d) India

Q11. Consider the following question and statements and decide which of the statements is sufficient to answer the question.

What is the total weight of 10 boxes of Mangoes? Each of them weighs equal.

Statements:

1. One-third of each boxes weight is 12 kg

2. Total weight of 6 boxes is 72 kg more than the total weight of 4 boxes

(a) Statement 1 and 2 are not sufficient
(b) Statement 1 alone is sufficient
(c) Statement 2 alone is sufficient
(d) Either of the statements 1 or 2 is sufficient

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Q12. Which assumptions are implied from the below statement

Statement: “The real impact of water crisis would be felt in 2 years,” Says the Panchayat chief.

Assumptions:

I. The water level has started depleting

II. Water bodies need maintenance

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

Q13. The kinetic energy of the particles is maximum in the case of _____.

(a) liquids
(b) gases
(c) solids
(d) plasma

Q14. Read the statements and conclusions below.

Statements:

No cats are lions

All lions are majestic animals

Conclusions:

1. All majestic animals are lions
2. Some majestic animals are lions
3. No majestic animal is cat

Which conclusion(s) follow (s) the given statement?

(a) Only conclusion 1 follows
(b) Only conclusion 3 follow
(c) All the conclusions follow
(d) Only conclusion 2 follows

Q15. To push which initiative is the Govt. of India planning ‘rent a roof policy’?

(a) To Promote Foreign Travellers and Students
(b) To Promote Solar Power Generation
(c) To Abolish Homelessness
(d) To Promote Hospitality

Q16. Who won the Golden Glove Award at the 2018 FIFA World Cup event?

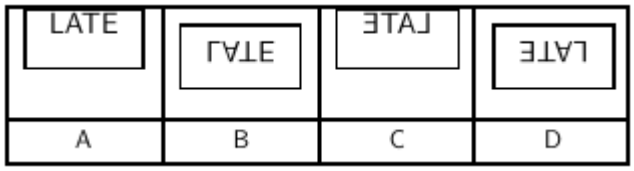
(a) Rani Patricio
(b) Hugo Lloris
(c) Thibaut Courtois
(d) Fernando Muslera

Q17. From a cloth store, 15 customers bought an orange dress, 15 bought red dress, 20 bought a blue dress, 2 bought all the three coloures and 8 bought at least two of these. How many bought at least one dress from the store?

(a) 25
(b) 39
(c) 40
(d) 45

Q18. What is the lateral mirror image of LATE?

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

Q19. If the number x3208 is divisible by 3, what can be the face value of x?
(a) 6
(b) 5
(c) 4
(d) 3

Q20. Which State Election Commission had decided in January 2017 to print voters list in Urdu as well?
(a) Bihar
(b) Himachal Pradesh
(c) Punjab
(d) Uttar Pradesh

Q21. Why does a stone thrown up into the sky fall back to the earth?
(a) Work done by the object pulls it down towards the Earth.
(b) There exists a centripetal force that pulls it down towards the Earth.
(c) There is a downward pressure that pulls it down towards the Earth.
(d) There exists a force that pulls it down towards the Earth.

Q22. A car is moving at a high speed. Which energy does it possess?
(a) Potential energy
(b) Frictional energy
(c) Gravitational force
(d) Kinetic energy

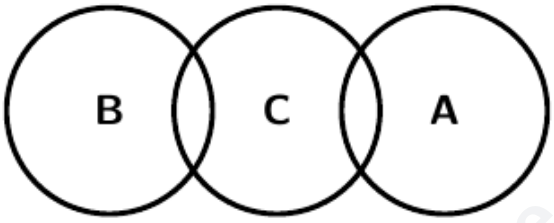
Q23. When did the British make English the medium of instruction in India?
(a) 1835
(b) 1834
(c) 1836
(d) 1833

Q24. Find the next term in the below series.
3E, 9G, 27I,
(a) 80K
(b) 81L
(c) 80L
(d) 81K

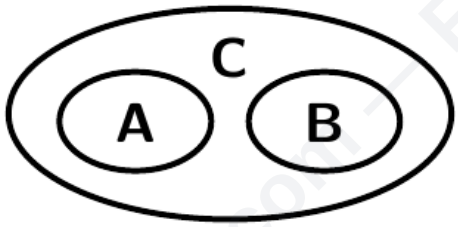
Q25. Which of the following correctly represents the relationship between
1. Woollen sweater
2. Cotton
3. Wool

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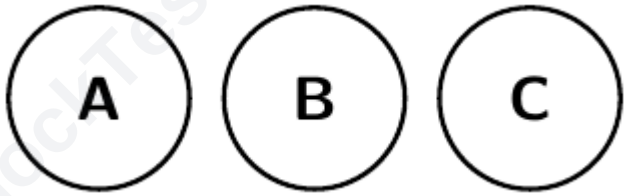
(a)



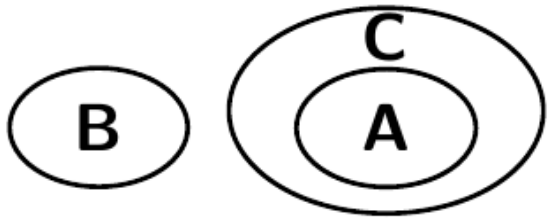
(b)



(c)



(d)



Q26. _____ is used as a fuel in cars with petrol.

(a) Ethanol
(b) Alcohol
(c) Benzene
(d) Butane

Q27. Three identical resistors, each of 6, are connected in parallel. The equivalent resistance of the combination will be _____.

(a) 6Ω
(b) 18Ω
(c) 2Ω
(d) 3Ω

Q28. Solder is an alloy of _____.

(a) Cu and Sn
(b) Ni, Cu and Zn
(c) Cu and Zn
(d) Pb and Sn

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Q29. Pratyay bought a set of cups for 195, but then had to sell it later to clear old stocks for 171.6 What is the loss percentage?

(a) 12
(b) 14
(c) 13
(d) 15

Q30. A and B can complete a task together in 15 days, while A alone can complete it in 18.75 days. They start working together but A leaves 12.5 days before the completion of the work. For how many days did A and B work together?

(a) 10
(b) 13.75
(c) 12.5
(d) 11.25

Q31. Which of the fractions given below, when added to 13/5, gives 1?

(a) • 8/15
(b) – 7/5
(c) – 26/10
(d) – 48/30

Q32. When a ray of light travels from a denser medium to a rarer medium, the ray will:

(a) slow down and bend away from the normal
(b) slow down and bend towards the normal
(c) speed up and bend away from the normal
(d) speed up and bend towards the normal

Q33. Who portrayed the character of Allauddin Khilji in the controversial movies 'Padmavat'?

(a) Ranbir Kapoor
(b) Shahid Kapoor
(c) Rana Daggubati
(d) Ranveer Singh

Q34. The elements present in any one group have the same_____.

(a) atomic size
(b) number of valence electrons
(c) atomic number
(d) atomic mass number

Q35. The mean score of three students in a test out of 45 is 38. Two new students take the test. What is the lowest mark that can be obtained by the newcomer who scores less than the other new student for the overall average of the five students to rise to 40?

(a) 40
(b) 42
(c) 41
(d) 43

Q36. The initial ratio of sugar and flour in a recipe was 17:28 With 27 kg of the recipe, Sunita added more flour to make the sugar to flour ratio 2:5 How much flour did Sunita later add?

(a) 8.1 Kg
(b) 8.5 Kg
(c) 8.7 Kg
(d) 8. Kg

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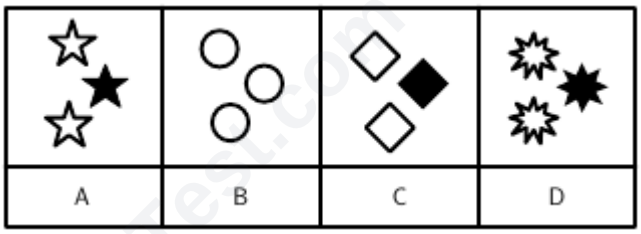
Q37. The LCM of 112, 72 and 90 is?

(a) 7560
(b) 2520
(c) 5040
(d) 3780

Q38. As the pH value increases from 7 to 14, it represents:

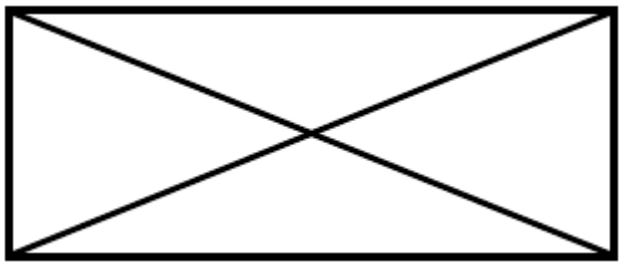
(a) an increase in the OH- ion concentration
(b) no change in the H+ ion concentration
(c) an increase in the H+ ion concentration
(d) a decrease in the OH- ion concentration

Q39. Find the odd one out.



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

Q40. How many right angled triangles are there in this figure?



(a) 4
(b) 6
(c) 7
(d) 8

Q41. An object travels northwards with a constant velocity. The net force acting on the object will be

(a) towards the south
(b) towards the east
(c) zero
(d) towards the north

Q42. Which of the below does not belong to this group?

A) Broccoli
B) Carrot
C) Ridge gourd
D) Bitter gourd

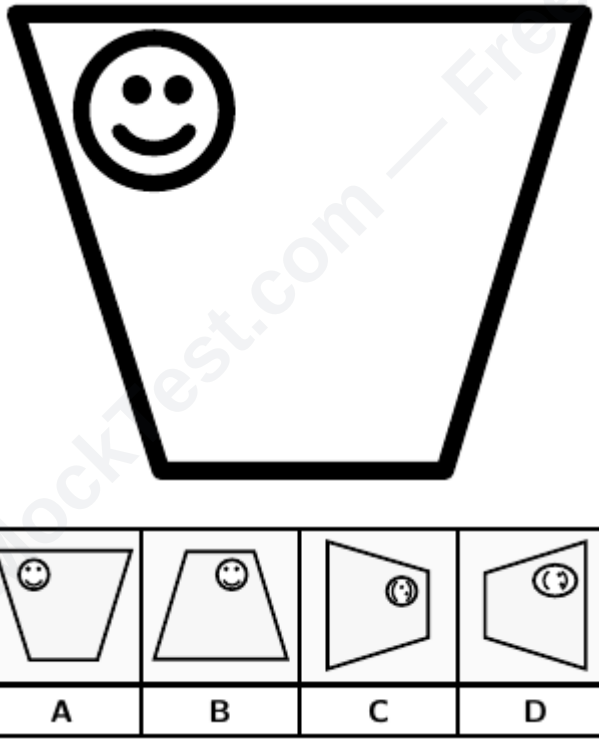
(a) A
(b) B
(c) D
(d) C

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Q43. An object travel 18 m in 4 s and then another 16 m in 2 s. What is the average speed of the object?

(a) 5067 s^(-1)
(b) 6.67 ms^(-1)
(c) 5.67 m
(d) 5.67 ms^(-1)

Q44. Which pattern, of the ones shown in the below options, resembles closest to:



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

Q45. Shoes are related to Legs in the same way Gloves are related to:

(a) Hands
(b) Wrists
(c) Knees
(d) Head

Q46. Consider the given statements to be true even if they seem to be at variance with the commonly known facts and decide which of the given conclusions logically follow (s) from the statements.

Statements:

All dresses are clothes.

All clothes are yarns.

Conclusions:

1. All dresses are yarns.
2. Some yarns are clothes.

(a) Only conclusion 2 follows
(b) Only conclusion 1 follows.
(c) No conclusions follow.
(d) All the conclusions follow.

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Q47. What sport is Limba Ram known for?

(a) Boxing
(b) Archery
(c) Wrestling
(d) Athletics

Q48. Which state government has recently set up toll-free helpline number '14417' to provide information to students

(a) Rajasthan
(b) Tamil Nadu
(c) Gujarat
(d) Kerala

Q49. A source of 6 V maintains a current of 0.5 A in a resistor. The power supplied by the source to the source to the resistor will be _____.

(a) 0.5 W
(b) 3.0 W
(c) 1.0 W
(d) 1.5 W

Q50. The Maharashtra government launched the Asmita Yojana on the occasion of_____.

(a) International Cancer Day
(b) International Men's Day
(c) International Aids Day
(d) International Women's Day

Q51. Tooth decay starts when the pH of the mouth is:

(a) in the range 5.5 – 6.5
(b) less than 5.5
(c) is in the range of 8 - 9
(d) is in the range of 6.5 – 7.5

Q52. Find the next term in the below series.

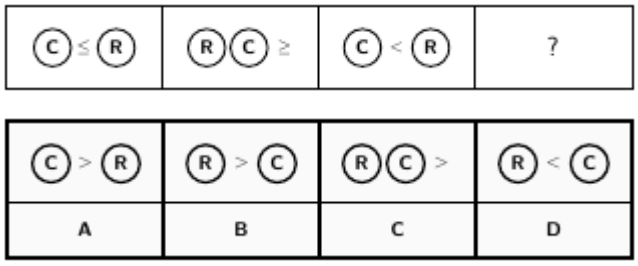
25, 31, 38, 46, _____.

(a) 58
(b) 55
(c) 54
(d) 60

Q53. The transmission of traits, physical or mental, from parents to offspring is called____

(a) Progeny
(b) heredity
(c) evolution
(d) variation

Q54. What will come in the place of question mark in the below series?



(a) C
(b) A

(c) B
(d) D

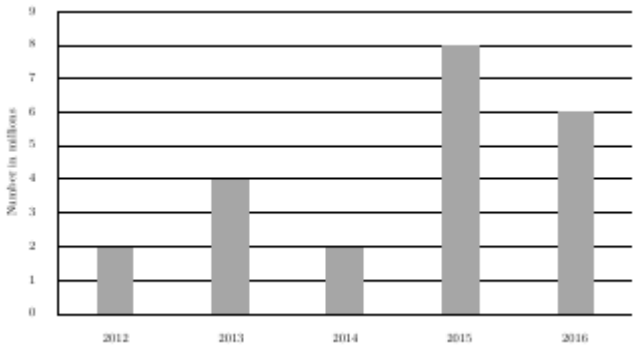
Q55. Which tissue helps in the transportation of the material away from the photosynthetic parts of the plants?
(a) Xylem vessels
(b) Meristematic tissue
(c) phloem
(d) Ground tissue

Q56. Puni is the daughter of Avani and Amit is the son of Avani's brother. How is Amit's father related to Puni?
(a) Brother
(b) Father
(c) Cousin
(d) Uncle

Q57. The third Indian Council for Cultural Relations (ICCR) distinguished Indologist award for the year 2017 was awarded to _____.
(a) Kamil Zvelebil
(b) Professor Hiroshi Marui
(c) Bettina Baumer
(d) Madeleine Biardeau

Q58. Who launched the Pulse Polio programme for 2018?
(a) Ram Nath Kovind
(b) Narendra Modi
(c) Venkaiah Naidu
(d) Ahmed Ansari

Q59. The given date below shows information about the manufacturing of engine vehicles for a company "ABC" over the last 5 years.



In which year was the production of engines were the highest?
(a) 2016
(b) 2015
(c) 2014
(d) 2012

Q60. Which of the following is the chief banker to the Government of India?
(a) Punjab National Bank
(b) State Bank of India
(c) Reserve Bank of India
(d) Bank of India

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Q61. Consider the given statements and decide which of the conclusions logically follow follow from the statements.

Statement:

All laptops are electronics.

All electronics emit radiation.

Conclusions:

1. All laptops emit radiation.

2. Some radiation is due to electronics.

(a) None of the conclusions follow
(b) Only conclusion 2 follows
(c) All the conclusions follow
(d) Only conclusion 1 follows

Q62. One pipe can fill an empty cistern in 7.8 hours while another can drain the cistern when full in 19.5 hours. Both the pipes were turned on when the cistern was half-empty. How long will it take for the cistern to be full?

(a) 3.9 hours
(b) 7.8 hours
(c) 6.5 hours
(d) 5.2 hours

Q63. 17 trainees can do as much work as 4 experts can do in a day. It takes 12 experts and 9 trainees 5 days to dig a pond. How many trainees will one need alongside 4 experts to dig a similar pool in 15 days?

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

Q64. Indicate the wrong pair among the following:

(a) Khatri – Iron
(b) Kashmir - Saffron
(c) Moradabad – Brass
(d) Surat – Diamonds

Q65. The boundary line between India and China is called ____

(a) Radcliffe Line
(b) Line of Control
(c) Palk Strait
(d) McMahon line

Q66. Who is the author of the book ‘Jinnah Often Came to Our House”?

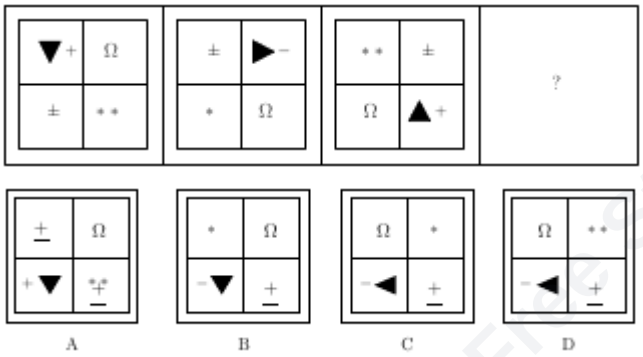
(a) Kiran Doshi
(b) Sunita Narain
(c) Dinanath Gopal Tendulkar
(d) Sowvendra Shekhar

Q67. Who was conferred with the 2018 Padma Shri award in the field of Art-Acting from Maharashtra?

(a) SS Rathore
(b) Lakshmi Kutty
(c) Manoj Joshi
(d) Subhashini Mistry

Q68. Which figure follows next in the below series?

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

Q69. The seed of a plant contains the future plant in the form of a/an _____.

(a) embryo
(b) ovule
(c) stigma
(d) ovary

Q70. Shiva switched on a bulb at 1 : 37 : 39 hours and switched it off on the same day at 11 : 28 : 32 hours. For how long was the bulb in switched-on mode?

(a) 10 hours 09 mins 54 secs
(b) 9 hours 09 mins 06 secs
(c) 9 hours 50 mins 53 secs
(d) 12 hours 40 mins 07 secs

Q71. What is the square root of 11881?

(a) 111
(b) 109
(c) 119
(d) 101

Q72. Read the given statement and the following conclusions carefully and select which of the conclusions logically follow (s) from the statement.

Statement:

“Monkey is the funniest of all animals, as they mimic human behaviour”, says Z to A.

Conclusions:

I. Z is amazed at monkeys’ behaviour.

II. A likes monkeys.

(a) Conclusion I alone follows.
(b) Neither conclusion I nor II follows.
(c) Both the conclusions follow
(d) Conclusion II alone follows.

Q73. If, in a code language, LIQUID is written as PMUYMH, then how SPACE would be written in that code language?

(a) WTBGI
(b) WEIGH
(c) TEGIW
(d) WTEGI

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Q74. In a test, Chitra secured 58.5 marks that were also equivalent to obtaining 78% marks. How many marks was the test out of?

(a) 85
(b) 65
(c) 80
(d) 75

Q75. Which of the following scientists suggested a mechanism for organic evolution in his book “Origin of Species”.

(a) Carl Woese
(b) Ernst Haeckel
(c) Robert Whittaker
(d) Charles Darwin

Q76. _____was the founder of the City of Agra.

(a) Sikandar Lodi
(b) Abraham Lodi
(c) Mumtaz Mahal
(d) Shah Jahan

Q77. Consider the given statement and decide which of the following assumptions is are implicit in the statement.

Statement:

“Mobile phones are addictive”, Y said to Z.

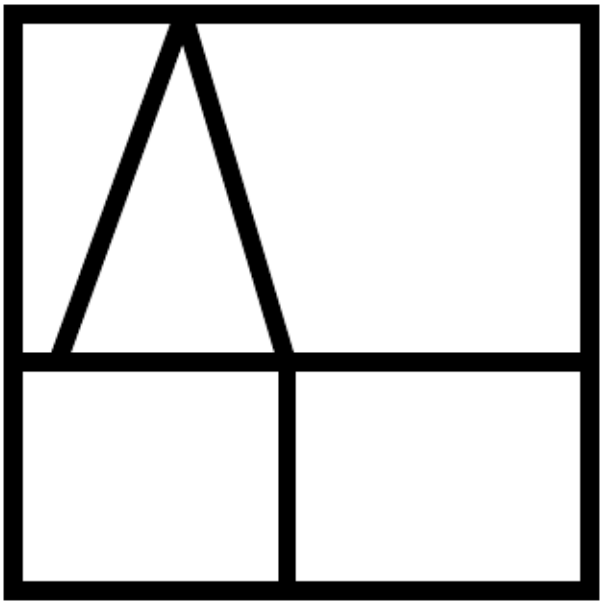
Assumptions:

I. Mobile phones have many attractive features and games.

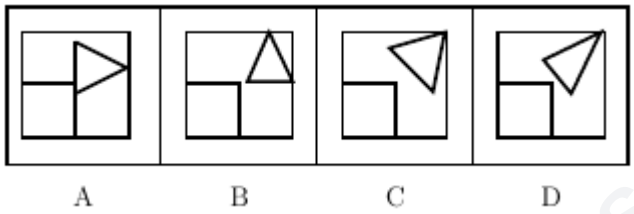
II. People spend more time with their mobile phones.

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

Q78. Which pattern, of the ones shown in the below options, resembles closest to:



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

Q79. The product of two numbers is 0.646 and one of the numbers is 1.7 what is the other number?
(a) 0.38
(b) 0.038
(c) 3.8
(d) 38

Q80. Read the statement below along with two conclusions.
Statement: Naina looks at Sunita and compliments her looks.
Conclusions:
I. Sunita is more beautiful than Naina
II. Naina is impressed by Sunita's dressing sense
Which conclusion(s) follow (s) the given statement?
(a) Conclusion I alone follows
(b) Neither I nor II follows
(c) Both the conclusions follow
(d) Conclusion II alone follows

Q81. In July 2018, which country was formally announced as the 69^(th) shareholder of the European Bank for Reconstruction and Development (EBRD)?
(a) India
(b) Pakistan
(c) Sri Lanka
(d) Germany

Q82. The mean of the three numbers is 21. The range of this data set is 19 while the difference between the two smallest numbers is 5. Greatest of the three numbers is
(a) 28
(b) 32
(c) 26
(d) 29

Q83. An object is placed in front of a concave mirror at a point between its curvature and focus. The image will be formed at:
(a) A point between the focus and the centre of curvature
(b) The centre of curvature
(c) A point beyond the centre of curvature
(d) The focus

Q84. 2/3 of my current age is the same as 3/4 of that of one of my cousins'.
My age three years ago will be his age four hence. My current age is _____ years.
(a) 81
(b) 42
(c) 63

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(d) 72

Q85. Which of the Following Does not Belong to this group?

A.Mauve

B.Purple

C.Green

D.Pole

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

Q86. Which period of the modern periodic table has the minimum number of shells?

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

Q87. Which of the following classification of elements is based on atomic numbers?

(a) Dobereiner's Triads
(b) Modern periodic table
(c) Newland's Octaves
(d) Mendeleev's periodic table

Q88. If $2x^2 + ax + b$, when divided by $x – 3$, leaves a remainder of 31, $x^2 + bx + a$, when divided by $x – 3$, leaves a remainder of 24, then $a + b$ equals.

(a) 7
(b) -7
(c) 23
(d) -23

Q89. Pavan sold an item at a loss of 12.5% If he could have sold it for Rs. 56 more, he would have made a profit 22.5% What should be the selling price of the item to make a profit of 25%?

(a) Rs. 200
(b) Rs. 185
(c) Rs. 182
(d) Rs. 190

Q90. Nanu and Ninu start cycling early in the morning in the opposite direction to each other. Nanu goes in the direction of Sun. After sometime, Nanu takes a left turn and Ninu takes a right turn. They are now travelling parallel to each other. Towards which direction are they moving?

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

Q91. Two objects A and B are moving with the same velocity. The mass of object A is twice that of B. The ratio of the kinetic energy of A to that of B, (K_A/k_B) will be ____.

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

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Q92. 140 ÷ [61 – {36 – (40 – 60 ÷ 12 × 6)}] = ?

(a) 2
(b) 5
(c) 4
(d) 10

Q93. Goitre is caused due to the deficiency of _____.

(a) iodine
(b) iron
(c) sodium
(d) calcium

Q94. The number of diagonals in a 27-sided polygon is

(a) 325
(b) 320
(c) 322
(d) 324

Q95. The time duration that would elapse between 12:46 p.m. of 15^(th) July 2019 and 12:38 p.m. of 16^(th) July 2020 is

(a) 367 days 8 mins
(b) 366 days 8 mins
(c) 366 days 23 hours 52 mins
(d) 365 days 23 hours 52 mins

Q96. Which of the following India State Political parties is led by Omar Abdullah?

(a) Jammu & Kashmir State Conference
(b) Jammu & Kashmir National Panthers Party
(c) Jammu & Kashmir National Conference
(d) Jammu and Kashmir People's DemocraticParty

Q97. 77 ÷ [46 – {66 – (52 – 63 ÷ 9 × 3)}] = ?

(a) 5
(b) 6
(c) 11
(d) 7

Q98. What is the next term in the below series?

3T, 3A, 6S, 6B, 12R, 12C,?

(a) 24T
(b) 24Q
(c) 24S
(d) 24U

Q99. A company's expenditure heads are given as follows (all figures are in lakhs of rupees)

Year	Salary	Bonus	Taxes	Interest On loans
Year 1	200	10	70	20
Year 2	200	10	70	22
Year 3	450	10	120	20

The total expenditure of Year 1 was approximately what percent of the total expenditure of Year 3?

(a) 50%
(b) 5%
(c) 100%

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(d) 0.5%

Q100. If sec θ + tan θ = 12.5, then sec θ – tan θ = ?

(a) 0.4
(b) 1
(c) 0.8
(d) 0.08

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) subtract 273 from the given temperature

CONCEPT:

Celsius scale:

• In this scale, a lower fixed point (ice point) is designated as 0° and the upper fixed point (steam point) is designated as 100°.

• The temperature measured on this scale was all in degree Celsius (° C).

Fahrenheit scale:

• On this scale of the temperature scale, the melting point of ice is considered to be 32° F and boiling point of water is 212° F.

• The change in temperature of 1° F corresponds to a change of less than 1° C on the Celsius scale.

Kelvin scale:

• We also know the Kelvin temperature scale as the thermodynamic scale.

• On the Kelvin scale, the boiling point of the water is considered to be 373 K and its freezing point is 273 K

• Whereas it was assumed that at 0 K there is no relative motion of particles,

• The change in temperature of 1° K corresponds to a change of less than 1° C on the Celsius scale.

Whereas all these units of temperatures are related to each other by the following relationship:

(F - 32)/9 = C/5 = (K - 273)/5

Here,

The temperature in degree Celsius scale = C

The temperature in degree Kelvin scale = K

The temperature in degree Fahrenheit scale = F

EXPLANATION:

Whereas the relation between degree Celsius and Kelvin scale can be expressed as:

K - 273 = C

So, to change the temperature from the Kelvin scale to Celsius you have to subtract 273 from the given temperature.

The correct answer is Option 3.

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Q2. Answer: (c) 500 units

Shortcut Trick

Let edge of cube be a and side of square be s.

Sum of 12 edges = 12a = (3/5) × 4s => 12a = 12s/5 => s = 5a.

Given: Volume of cube = Area of square => $a^3 = s^2$.

Substitute s = 5a => $a^3 = (5a)^2$ => $a^3 = 25a^2$ => a = 25.

Perimeter of square = 4s = 4 × (5 × 25) = 4 × 125 = 500 units.

Therefore The correct answer is 500 units.

Alternate Method

Given:

Number of edges in a cube = 12

Perimeter of square = 4 × s

Relation 1: 12a = (3/5) × 4s

=> 12a = 12s / 5

=> a = s / 5 => s = 5a

Relation 2: Volume of cube = Area of square

=> $a^3 = s^2$

Calculations:

=> $a^3 = (5a)^2$

=> $a^3 = 25a^2$

=> a = 25 units

=> s = 5 × 25 = 125 units

=> Perimeter of square = 4s = 4 × 125

=> Perimeter = 500 units

Therefore The correct answer is 500 units.

Additional Information

Cube Properties

A cube has 12 edges, 8 vertices, and 6 faces. Total Surface Area = $6a^2$ and Lateral Surface Area = $4a^2$.

Square Properties

For a square of side s, the diagonal is $s\sqrt{2}$. The area can also be expressed as (Diagonal^2)/2.

Volume and Area Units

When numerical values are equated, we ignore the units (cube units vs square units) and solve as a pure algebraic equation.

Q3. Answer: (a) Only argument I is strong

(Argument –)

Yes, it would help in overall development of a child, both physically and mentally.

The argument points out the benefits of practicing yoga.

Therefore, argument I is strong.

Parents will not object means they will support if school make yoga compulsory for students.

A decision cannot be considered right just because it is supported by parents.

Therefore, argument II is not strong.

Hence, only argument I is strong.

Q4. Answer: (b) 3g

• Given- A planet whose mass and radius are one-third the mass and radius of the earth and g is the value of acceleration due to gravity on the earth.

• Acceleration due to gravity- It is the acceleration of free-fall of the object under the influence of the gravity of the planet.

• Please see the formula for calculating acceleration due to gravity:-

• $g=GM/R^2$. G= Gravitational constant, M= Mass of the earth, R=Radius of the earth.

• To find the value of g for the given planet, we can put the values with respect to the planet earth-

$g'=G(M/3)/(R/3)^2$.

• g' of the given planet would be $3GM/R^2$.

It is clear that g' (acceleration due to gravity of a given planet) is three times the g(acceleration due to gravity of the earth).

• g'=3g.

Q5. Answer: (d) Kinetic energy

• During the free fall of an object, Kinetic energy increases at any point in its path.

• Please note that energy can neither be created nor be destroyed. It only changes from one form to another.

• The kinetic energy is the energy possessed by an object by virtue of being in motion.

• Gravitational potential energy is the energy which an object possesses because of its position in a gravitational field. The higher the object, the more is the gravitational potential energy and the lower the object, the less is the gravitational potential energy.

• When an object falls from a height, the kinetic energy increases and gravitational Potential energy decreases. Hence, the conservation of energy is there.

• If an object is thrown upwards, the kinetic energy would decrease and gravitational Potential energy would increase. Hence, the conservation of energy is again there.

Q6. Answer: (b) Rs. 2975

Let, her total expense = Rs 100x

Therefore Expenditure on segment 3 = Rs (100x × 10/100) = Rs 10x

Therefore Expenditure on segment 2 = Rs (100x × 20/100) = Rs 20x

Therefore Expenditure on segment 5 = Rs (100x × 15/100) = Rs 15x

According to the question,

=> 10x = 850

=> x = 85

Therefore Total expense on segment 2 and segment 5 = Rs (20x + 15x) = Rs (35 × 85) = Rs 2975

Q7. Answer: (a) Services

• In the last ten years, FDI inflows are highest in the Services sector of India.

• FDI- Foreign Direct Investments. These investments are made by an individual or a company residing in one country into another company located in a different country.

• These investments not only bring money but also skills, technology and knowledge.

• As per the Department for Promotion of Industry and Internal Trade, the services sector (financial, banking, insurance, non-financial / business, outsourcing, R&D, etc) received 17.66 % (Rs. 462,114.07) of the total FDI received in the country from April 2000 to December 2019.

• The IT services stands at second at 9.54% (Rs. 266,385.18) and telecommunications sectors stands at third highest FDI at 8.13% (218,047.28).

• As per Ministry of Commerce, Investment outreach activities are being carried out for enhancing international cooperation and promoting FDI in the country.

Q8. Answer: (d) 54 km

Shortcut Trick

Speed ratio (Original : New) = 45 : 54 = 5 : 6

Time ratio (Original : New) = 6 : 5 (since distance is constant)

Difference in ratio parts = 6 − 5 = 1 unit

1 unit = 12 minutes = 12/60 = 1/5 hours

Original time = 6 units = 6 × (1/5) = 1.2 hours

Distance = Speed × Time = 45 × 1.2 = 54 km

Therefore The correct answer is 54 km.

Alternate Method

Given:

Original Speed (S1) = 45 km/hr

Increased Speed (S2) = 54 km/hr

Time difference (Δt) = 12 minutes = 12/60 hours = 0.2 hours

Formula Used:

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

Calculations:

=> D = [(45 × 54) ÷ (54 − 45)] × 0.2

=> D = [2430 ÷ 9] × 0.2

=> D = 270 × 0.2

=> D = 54 km

Therefore The correct answer is 54 km.

Additional Information

Constant Distance Relation

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

Time-Speed-Distance Formula

Distance = Speed × Time. Always ensure units are consistent (convert minutes to hours if speed is in km/hr).

Average Speed for Constant Distance

If a journey covers the same distance at two different speeds x and y, Average Speed = 2xy/(x + y).

Q9. Answer: (d) 1/21

=> 0.047619047619...

=> 47619/999999

=> 1/21

Q10. Answer: (d) India

• India was scheduled to be hosting the 2019 Combined World cup for shooting.

• It was to take place in New Delhi and Baku (Azerbaijan). It had earlier been postponed from March to May.

• However, due to pandemic COVID-19, this event has now been cancelled.

• Combined World Cup comprised the three categories — shotgun, rifle and pistol. It was a qualifying event for the 2020 Tokyo Olympic.

• The Tokyo Olympics 2020 has been postponed. The Opening Ceremony of the games is expected to be held on 23 July 2021 as per official notification.

• Tokyo 2020 mascot is Miraitowa. It embodies both the old and the new style. This name is chosen to promote a future full of eternal hope in the hearts of people all over the world.

Q11. Answer: (d) Either of the statements 1 or 2 is sufficient

Shortcut Trick

From Statement 1: 1/3 of weight = 12 kg → 1 box = 36 kg. Sufficient to find total.

From Statement 2: Difference between 6 and 4 boxes is 2 boxes. If 2 boxes = 72 kg, then 1 box = 36 kg. Sufficient to find total.

Since both statements independently provide the weight of one box, either is enough.

Therefore The correct answer is Either of the statements 1 or 2 is sufficient.

Alternate Method

Given: There are 10 boxes of mangoes, each weighing an equal amount. Let the weight of one box be x kg.

Analysis of Statement 1:

=> (1 ÷ 3) × x = 12

=> x = 12 × 3 = 36 kg

=> Total weight of 10 boxes = 10 × 36 = 360 kg. (Sufficient)

Analysis of Statement 2:

=> Weight of 6 boxes = Weight of 4 boxes + 72

=> 6x = 4x + 72

=> 6x − 4x = 72

=> 2x = 72

=> x = 36 kg

=> Total weight of 10 boxes = 10 × 36 = 360 kg. (Sufficient)

Conclusion: Since each statement alone provides the value of x, they are individually sufficient.

Therefore The correct answer is Either of the statements 1 or 2 is sufficient.

Additional Information

Unitary Method

It is a technique for solving a problem by first finding the value of a single unit (one box), and then finding the necessary value by multiplying the single unit value.

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Data Sufficiency Strategy

In Data Sufficiency, always check statements individually first. If both are individually sufficient, the answer is 'Either'. If only one is, that statement is the answer.

Algebraic Modeling

Total Quantity = Number of items × Quantity per item. Ensure all units (kg, g) are consistent during calculation.

Q12. Answer: (b) Both assumptions I and II are implicit

(Implicit - suggested though not directly expressed)

Water crisis can be considered as a consequence of depletion of water level.

Therefore, assumption I is implicit

The statement by the Panchayat chief is an indirect suggestion that the water bodies need maintenance.

Therefore, assumption II is implicit

Hence, both assumptions I and II are implicit.

Q13. Answer: (d) plasma

• The kinetic energy of the particles is maximum in the case of Plasma.

• There are four fundamental states of matter-Solid, Liquid, Gas and Plasma.

• Plasmas are made up of atoms in which some electrons or all of the electrons have been taken away and positively charged nuclei (ions) roam freely. It can be produced in the laboratory by heating a gas to an extremely high temperature.

• The kinetic energy is the energy possessed by an object by virtue of being in motion.

• The kinetic energy is maximum in plasma because particles can move freely with almost no force of attraction to tie them down.

Q14. Answer: (d) Only conclusion 2 follows

The least possible Venn diagram is:

1. All majestic animals are lions → False (It is possible but not definite)

2. Some majestic animals are lions → True (All lions are majestic animals)

3. No majestic animal is cat → False (It is possible but not definite)

Hence, only conclusion 2 follows.

Q15. Answer: (b) To Promote Solar Power Generation

• To Promote Solar Power Generation, the Govt. of India has planned ‘rent a roof policy’.

• Under this, solar developers rent rooftop space to install a PV array. The developers offer to lease PV array to each household and then feed the solar power to the grid.

• The Central Government planned to generate 40 gigawatts of power from solar rooftop projects by 2022. However, the target is unlikely to be met.

• The country installed rooftop capacity of only 1,896 MW in 2019 taking the total rooftop capacity to 5.5 GW.

• In 2019, 380 MW was added. However, it was expected that 1 GW of open access projects would come up in 2020. But because of pandemic-COVID 19, the plans are halted.

Q16. Answer: (c) Thibaut Courtois

• Thibaut Courtois won the Golden Glove Award at the 2018 FIFA World Cup event.

• He is from Belgium. He was awarded for being the best goalkeeper of the tournament.

• Harry Kane -Golden Boot award

• Luka Modric- Golden Ball award

• Fair Play Award-Spain

• Best Young Player Award- Kylian Mbappé

Q17. Answer: (c) 40

Shortcut Trick

Total (At least one) = n(A) + n(B) + n(C) − [n(A∩B) + n(B∩C) + n(C∩A)] + n(A∩B∩C)

Sum of individuals = 15 + 15 + 20 = 50

Sum of intersections (exactly two + all three) = At least two = 8

Total = 50 − 8 − 2 = 40 (since exactly 2 + 2 × all three is subtracted in standard formula adjustment)

Therefore The correct answer is 40.

Alternate Method

Let Orange = O, Red = R, and Blue = B.

Given: n(O) = 15, n(R) = 15, n(B) = 20.

Given: Customers who bought all three = n(O∩R∩B) = 2.

Given: Customers who bought at least two = 8.

=> (Exactly two) + (All three) = 8

=> Exactly two = 8 − 2 = 6.

=> Total (At least one) = [n(O) + n(R) + n(B)] − [Sum of exactly two + 2 × (all three)]

=> Total = (15 + 15 + 20) − [6 + 2(2)] is not the direct path; use: Total = Individual Sum − [Sum of pairs] + All three.

=> Sum of pairs = (Exactly two) + 3 × (All three) = 6 + 3(2) = 12.

=> Total = 50 − 12 + 2 = 40.

Therefore The correct answer is 40.

Additional Information

Venn Diagram for Three Sets

n(A U B U C) = n(A) + n(B) + n(C) − n(A∩B) − n(B∩C) − n(C∩A) + n(A∩B∩C).

At least two formula

At least two = (Exactly two) + (Exactly three). This counts the common regions between circles.

Exactly one formula

Exactly one = Total (At least one) − (At least two).

Q18. Answer: (d) C

The image of an object as seen in a mirror is its mirror reflection or mirror image. In such an image, the right side of the object appears on the left side and vice versa. A mirror-image is therefore said to be laterally inverted and the phenomenon is called the lateral inversion.

The lateral mirror image of the word ‘LATE’ is shown below:

Hence, figure ‘C’ is the correct answer.

Q19. Answer: (b) 5

Shortcut Trick

For a number to be divisible by 3, the sum of its digits must be divisible by 3.

Sum of given digits = x + 3 + 2 + 0 + 8 = 13 + x

Check options for (13 + x) to be a multiple of 3:

If x = 5, Sum = 13 + 5 = 18 (which is divisible by 3).

Therefore The correct answer is 5.

Alternate Method

Given: The number is x3208 and it is divisible by 3.

Divisibility Rule of 3: A number is divisible by 3 if the sum of all its digits is a multiple of 3.

=> Sum of digits = x + 3 + 2 + 0 + 8

=> Sum = x + 13

=> For the number to be divisible by 3, (x + 13) must be 15, 18, 21, etc.

=> If x + 13 = 15, then x = 2 (Not in options)

=> If x + 13 = 18, then x = 5 (Available in options)

=> If x + 13 = 21, then x = 8 (Not in options)

Therefore The correct answer is 5.

Additional Information

Divisibility by 9

Similar to the rule for 3, a number is divisible by 9 if the sum of its digits is divisible by 9.

Face Value vs Place Value

The face value of a digit is the digit itself, regardless of its position in the number.

Divisibility by 6

A number is divisible by 6 if it satisfies the divisibility rules of both 2 (even number) and 3 (sum of digits divisible by 3).

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Q20. Answer: (d) Uttar Pradesh

• Uttar Pradesh had decided in January 2017 to print voters list in Urdu as well.

• There were almost 46 constituencies in Uttar Pradesh where Assembly elections took place and the voters' list was printed in urdu as well.

• Please note that it was the first time the State Election Commission decided to include Urdu. Usually, there are English and Hindi.

• It is believed that western Uttar Pradesh has large pockets of Muslim population.

• However, in the case of a dispute, the Hindi version of the rolls was held as authentic.

• Uttar Pradesh CM- Yogi Adityanath

• Uttar Pradesh Governor- Anandiben Patel

Q21. Answer: (d) There exists a force that pulls it down towards the Earth.

• A stone thrown up into the sky falls back to the earth because there exists a force that pulls it down towards the Earth.

• This force is nothing but gravity. It is always attracting the object towards it

• As per Newton's first law of motion, "an object either remains at rest or continues to move at a constant velocity, unless acted upon by an external force".

• When an object is thrown up, it can not remain in motion as the force of gravity acts on it and since it is an attractive force; object comes down.

• This is the reason that the stone will decelerate (slow down) till it reaches a maximum height and then starts accelerating towards the surface of the earth.

Q22. Answer: (d) Kinetic energy

• A car is moving with a high speed. It possesses Kinetic energy.

• The kinetic energy is the energy possessed by an object by virtue of being in motion.

• Kinetic energy (joules) = 1/2 x mass (kg) x velocity^2 (m/s).

• Even a small change in velocity can increase the Kinetic energy to a large extent.

• Potential energy- It is the energy possessed by an object by virtue of its position.

Q23. Answer: (a) 1835

• In 1835, British made English the medium of instruction in India.

• William Bentinck, the Governor-General of India and Lord Macaulay decided to introduce English in India.

• The English Education Act 1835 was a legislative Act made by Lord William Bentinck.

• Wood's Dispatch, 1854 is considered as the "Magna Carta of English Education in India". It contained a comprehensive plan for spreading education in India. It was recommended that English should be the language of medium to teach in schools and colleges.

Q24. Answer: (d) 81K

The logic is:

Hence, '81K' is the correct answer.

Q25. Answer: (d) [figure]

The Venn diagram that correctly represents the relationship between Woolen sweater, Cotton and Wool is shown below:

Woollen sweater is made of wool. Cotton is used to make clothes. There is no common relation between cotton and woollen sweater or cotton and wool.

Hence, option '4' is the correct answer.

Q26. Answer: (a) Ethanol

• Ethanol is used as a fuel in cars with petrol.

• Ethanol(ethyl alcohol) has a chemical formula of C2H6O.

• It is produced by microbial fermentation of the sugar.

• Ethanol without water can be blended with petrol in varying quantities in order to reduce the consumption of petroleum fuels, as well as to reduce air pollution.

• Ethanol provides high quality, high octane for exceptional engine performance and reduced emission.

• Other uses of ethanol- cosmetics and beauty products, sanitizers, food additives,etc.

Q27. Answer: (c) 2Ω

• Three identical resistors, each of 6, are connected in parallel. The equivalent resistance of the combination will be 2 Ω.
• When the resistors are connected in parallel connection, the equivalent resistance is
• 1/R= 1/R1 +1/R2 +1/R3
• 1/R=1/6 + 1/6 +1/6
• 1/R= 3/6
• 1/R=1/2
• Equivalent resistance in this case is 2Ω.

Q28. Answer: (d) Pb and Sn

• Solder is an alloy of Pb and Sn.
• Soldering is a process of joining different types of metals together. Solder is a metal alloy which is melted by using a hot iron. The iron is heated to temperatures above 600 degrees fahrenheit which then is cooled to create a strong bond.
• Copper and Zinc make hard solder.
• Tin and Lead make soft solder.
• Other metals used in Soldering- antimony, bismuth, brass, indium, tin or silver.

Q29. Answer: (a) 12

Shortcut Trick
Ratio of Cost Price (CP) to Selling Price (SP) = 195 : 171.6
Simplify ratio: 1950 : 1716 => 325 : 286 (dividing by 6) => 25 : 22 (dividing by 13).
Loss in units = 25 − 22 = 3 units.
Loss percentage = (3 ÷ 25) × 100 = 12%.
Therefore The correct answer is 12%.
Alternate Method
Given: CP = 195, SP = 171.6
Formulas: Loss = CP − SP | Loss% = (Loss ÷ CP) × 100
=> Calculate Loss Amount: 195 − 171.6 = 23.4
=> Apply Loss Percentage formula: (23.4 ÷ 195) × 100
=> (2340 ÷ 195) = 12%
Therefore The correct answer is 12%.
Additional Information
Loss and Profit Calculation
Profit or Loss is always calculated on the Cost Price (CP) unless stated otherwise in the question.
Percentage Conversion
To convert a fraction to a percentage, multiply by 100. For example, a loss of 1/5 of CP is (1/5) × 100 = 20%.

Q30. Answer: (c) 12.5

Shortcut Trick
Let the total work be 75 units (LCM of 15 and 18.75).
Combined efficiency of A + B = 75 ÷ 15 = 5 units/day.
Efficiency of A alone = 75 ÷ 18.75 = 4 units/day => Efficiency of B alone = 5 − 4 = 1 unit/day.
In the last 12.5 days, only B worked => Work done by B = 12.5 × 1 = 12.5 units.
Remaining work done by A and B together = 75 − 12.5 = 62.5 units => Days worked together = 62.5 ÷ 5 = 12.5 days.
Therefore The correct answer is 12.5 days.
Alternate Method
Given:
Time taken by A and B together = 15 days
Time taken by A alone = 18.75 days (or 75/4 days)
Time for which A left before completion = 12.5 days

Person	Days	Total Work	Efficiency
A + B	15	75	75 ÷ 15 = 5

A	18.75	75 ÷ 18.75 = 4	

Calculations:

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

=> Efficiency of B = 5 − 4 = 1 unit/day

=> Work done by B alone in the last 12.5 days = 12.5 × 1 = 12.5 units

=> Remaining work done by A and B together = 75 − 12.5 = 62.5 units

=> Number of days A and B worked together = 62.5 ÷ 5 = 12.5 days

Therefore The correct answer is 12.5 days.

Additional Information

Total Work LCM Method

Taking the LCM of the individual times as the total work simplifies calculations by converting fractional work rates into whole-number efficiencies.

Work Left Before Completion Trick

When a person leaves 'x' days before completion, the work done in those last 'x' days is calculated using only the remaining person's efficiency.

Q31. Answer: (d) – 48/30

Let, the fraction = x

According to the question,

=> x + 13/5 = 1

=> x = 1 – 13/5

=> x = (5 – 13)/5

=> x = − 8/5

Therefore The fractions = – 8/5 = − (8 × 6)/(5 × 6) = − 48/30

Q32. Answer: (c) speed up and bend away from the normal

CONCEPT:

• Refraction: When a ray of light passes from one medium to another it suffers a change in direction at the boundary of two media is called refraction.

• The change in direction because the speed of light travels at different speeds in different mediums. Refractive Index of a medium defines that it is denser or rarer

• Snell’s law of refraction: “The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant, for the light of a given colour and for the given pair of media”.

(Sin i)/(Sin r) = n2/n1=constant

Where n2 and n1 are the refractive indexes of the two mediums 2 and 1 respectively.

Explanation:

As explained above,

• Snell’s Law: “The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant, for the light of a given colour and for the given pair of media”.

• And how much the light ray refracts can be calculated as per Snell’s Law.

• Refraction is the bending of the path of a light wave as it passes from one media to another media. It is caused by the change in speed experienced by the light ray.

• When a ray of light travels from a denser medium to a rarer medium, the ray will speed up and bend away from the normal.

• Hence option 3 is correct among all

Extra points :

The angle of refraction for the different condition can be expressed as

• When a light ray passes from a rarer medium to a denser medium, the angle of incidence is greater than the angle of refraction, because the light ray bends towards the normal.

• When a light ray passes from a denser medium to a rarer medium, the angle of incidence is smaller than the angle of refraction, because the light ray bends away from the normal.

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Q33. Answer: (d) Ranveer Singh

• Ranveer Singh portrayed the character of Allauddin Khilji in the controversial movies 'Padmavat'.
• Director- Sanjay Leela Bhansali
• Actress- Deepika Padukone (played Rani Padmavati)
• Supporting Actor- Shahid Kapoor (played Ratan Singh)

Q34. Answer: (b) number of valence electrons

The correct answer is number of valence electrons
• The elements present in any one group have the same number of valence electrons.
• Valence electron is an outer shell electron with an atom. These electrons participate in the formation of a chemical bond.
• Number of valence electrons decide whether an element is electronegative or electropositive in nature.
• Atomic size gradually decreases from left to right across a period of elements.
• Atomic number increases down a group.

Q35. Answer: (c) 41

Shortcut Trick
Total score of 5 students = 40 × 5 = 200
Total score of 3 students = 38 × 3 = 114
Sum of 2 new students = 200 − 114 = 86
To minimize one score, maximize the other to the highest possible mark (45).
Lowest mark = 86 − 45 = 41
Therefore The correct answer is 41.
Alternate Method
Given:
Mean of 3 students = 38 | Total students = 5 | New Mean = 40 | Maximum marks = 45
Step 1: Calculate the total marks of the initial 3 students.
=> Total3 = 3 × 38 = 114
Step 2: Calculate the total marks of all 5 students.
=> Total5 = 5 × 40 = 200
Step 3: Find the combined score of the two newcomers (S1 and S2).
=> S1 + S2 = Total5 − Total3
=> S1 + S2 = 200 − 114 = 86
Step 4: To find the lowest mark for S1 (where S1 < S2), we must assume S2 is the maximum possible score.
=> Maximum marks allowed = 45
=> S1 + 45 = 86
=> S1 = 86 − 45 = 41
Therefore The correct answer is 41.
Additional Information
Average (Mean) Formula
Average = (Sum of all observations) ÷ (Number of observations). To find the total sum, use Sum = Average × Count.
Weighted Average
When two groups are combined, the new average is (n1x1 + n2x2) ÷ (n1 + n2), where n is the count and x is the average of each group.
Minimizing/Maximizing Variables
In a fixed sum, to minimize one variable, all other variables must be maximized according to the given constraints.

Q36. Answer: (c) 8.7 Kg

Shortcut Trick
Initial Ratio of Sugar : Flour = 17 : 28 (Total units = 17 + 28 = 45)
Given 45 units = 27 kg → 1 unit = 27 ÷ 45 = 0.6 kg
To keep Sugar constant at 17 units, multiply final ratio (2 : 5) by 8.5 → 17 : 42.5
Extra Flour added = 42.5 − 28 = 14.5 units
Quantity of added Flour = 14.5 × 0.6 = 8.7 kg

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Therefore The correct answer is 8.7 kg.

Alternate Method

Given: Initial Sugar : Flour = 17 : 28, Total Weight = 27 kg, Final Ratio = 2 : 5.

=> Total initial units = 17 + 28 = 45 units

=> Quantity of Sugar = (17 ÷ 45) × 27 = 10.2 kg

=> Quantity of Flour = (28 ÷ 45) × 27 = 16.8 kg

=> Let added Flour be x kg. New ratio of Sugar : Flour is 2 : 5

=> 10.2 ÷ (16.8 + x) = 2 ÷ 5

=> 5 × 10.2 = 2 × (16.8 + x)

=> 51 = 33.6 + 2x

=> 2x = 51 − 33.6 = 17.4

=> x = 17.4 ÷ 2 = 8.7 kg

Therefore The correct answer is 8.7 kg.

Additional Information

Ratio Constant Property

When one component is added to a mixture, the quantity of the other component remains unchanged. Use this to equate the constant part across different ratios.

Unitary Method in Ratios

Always find the value of 1 unit by dividing the total weight by the sum of ratio parts (Total weight ÷ (a + b)).

Q37. Answer: (c) 5040

Shortcut Trick

Identify the highest powers of prime factors for each number.

112 = 2^4 × 7

72 = $2^3 \times 3^2$

90 = $2 \times 3^2 \times 5$

LCM = 2^4 × $3^2 \times 5 \times 7 = 16 \times 9 \times 35 = 5040$

Therefore The correct answer is 5040.

Alternate Method

Given: Numbers are 112, 72, and 90.

Formula Used: Prime Factorization Method for finding LCM (Least Common Multiple).

=> Prime factors of 112 = 2 × 2 × 2 × 2 × 7 = 2^4 × 7^1

=> Prime factors of 72 = 2 × 2 × 2 × 3 × 3 = $2^3 \times 3^2$

=> Prime factors of 90 = 2 × 3 × 3 × 5 = $2^1 \times 3^2 \times 5^1$

=> LCM = Product of the highest power of all prime factors involved.

=> LCM = 2^4 × $3^2 \times 5^1 \times 7^1$

=> LCM = 16 × 9 × 5 × 7

=> LCM = 144 × 35

=> LCM = 5040

Therefore The correct answer is 5040.

Additional Information

LCM and HCF Relationship

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

HCF (Highest Common Factor)

The HCF is the product of the lowest powers of common prime factors. For 112, 72, and 90, the common factor is 2^1, so HCF = 2.

LCM of Fractions

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

Q38. Answer: (a) an increase in the OH- ion concentration

- As the pH value increases from 7 to 14, it represents an increase in the OH- ion concentration.
- pH scale determines the acidity or basicity of the solution.
- The pH value below 7 represents that solution is acidic and above 7 represents that solution is basic.

• The pH of pure water at room temperature is 7. It means it is neither acidic nor basic, it is neutral.

• The pH value of Battery Acid is zero which means it is highly acidic. The pH value of Liquid drain cleaner is 14 which means it is highly basic.

Q39. Answer: (b) B

All option except 'B' has one of the images shaded, while option B has no image shaded.

Hence, option B is the odd one out.

Q40. Answer: (a) 4

The number of right-angled triangles in the figure is shown below:

Hence, the figures has total 4 right-angled triangles.

Q41. Answer: (c) zero

The correct answer is Option 3, i.e Zero.

Key Points

• An object travels northwards with a constant velocity. The net force acting on the object will be zero.

• Please note that constant velocity means there is no acceleration. (Acceleration literally means change in velocity).

• As per Newton's second law of motion, Force= mass x acceleration.

• As acceleration = zero.

• Net acting force is also zero.

Q42. Answer: (b) B

• Carrot does not belong to the group of given options.

• Carrot is a root vegetable whereas Broccoli, Ridge gourd and bitter gourd are found well above the roots.

• We eat the taproot part of the carrot plant. The roots contain high quantities of alpha- and beta-carotene, and are a good source of vitamin K and vitamin B6.

• Broccoli is from a family of Cabbage. It is a great source of vitamins K and C.

• Ridge gourd-It is called Turai in hindi. It is extremely rich in dietary fibre.

• Bitter gourd- It belongs to the gourd family and is closely related to zucchini, squash, pumpkin, and cucumber. It in maintaining blood sugar levels

Q43. Answer: (d) 5.67 ms^(-1)

Shortcut Trick

Total distance = 18 m + 16 m = 34 m

Total time = 4 s + 2 s = 6 s

Average speed = Total distance ÷ Total time = 34 ÷ 6 = 5.666...

Therefore The correct answer is 5.67 ms^(−1).

Alternate Method

Given:

Distance 1 (d1) = 18 m

Time 1 (t1) = 4 s

Distance 2 (d2) = 16 m

Time 2 (t2) = 2 s

Formula Used:

Average Speed = Total Distance ÷ Total Time

Calculations:

=> Total Distance = d1 + d2 = 18 + 16 = 34 m

=> Total Time = t1 + t2 = 4 + 2 = 6 s

=> Average Speed = 34 ÷ 6

=> Average Speed = 5.6666... ms^(−1)

=> Average Speed ≈ 5.67 ms^(−1)

Therefore The correct answer is 5.67 ms^(−1).

Additional Information

Average Speed

It is the total distance traveled by the object in a particular time interval divided by the total time taken.

Uniform Motion

When an object covers equal distances in equal intervals of time, it is said to be in uniform motion.

SI Unit of Speed

The SI unit of speed is meter per second (m/s or ms^(−1)).

Q44. Answer: (a) D

In the question figure, the small figure inside the trapezium is present at the corner, near to the longer side of the trapezium.

So answer figures B and C are eliminated as the small figure inside the trapezium in these two figures are present near to the shorter side of the trapezium.

Now, in answer figures A and D, there is a slight difference, through which we will find out the correct answer.

The small figure inside the trapezium in the question figures, is not a complete circle, it's like an oval shape, while in answer figure A, the small figure inside the trapezium is a perfect circle and in figure D, the small figure inside the trapezium is oval in shape

So clearly answer figure D bears the closest resemblance to the question figure.

Hence, answer figure D is the correct answer.

Q45. Answer: (a) Hands

The relation is:

Shoes are related to Legs → We put on the shoes in our legs.

Similarly,

We put on the gloves in our hands.

Hence, 'hands' is the correct answer.

Q46. Answer: (d) All the conclusions follow.

The least possible Venn diagram is:

1. All dresses are yarns. → True (as shown in the figure)

2. Some yarns are clothes. → True (all clothes are yarns)

Hence, all the conclusions follow.

Q47. Answer: (b) Archery

- Limba Ram is known for Archery.
- He represented India in many international competitions (including three Olympics games).
- He is famous for equalling an archery world record in 1992 at the Asian Archery Championships in Beijing.
- He was also appointed as National Archery Coach for 2010 Commonwealth Games.
- However in 1996, he suffered from shoulder injury and he has not been able to get his efficiency back.
- He is also a recipient of the Arjuna award in 1991 and Padma Shri Award in 2012.

Q48. Answer: (b) Tamil Nadu

- Tamil Nadu State Government had set up toll-free helpline number '14417' to provide information to students.
- This is a 24 hour toll free helpline number. It provides information on education and offers guidance to students.
- It was launched by Chief Minister of Tamil Nadu- K Palaniswami.
- The Education Guidance Centre was set up at the Secretariat that also offers information relating to school and other academic institutes owned by the government.
- Tamil Nadu Capital- Chennai
- Tamil Nadu Governor- Banwarilal Purohit

Q49. Answer: (b) 3.0 W

- Given- A source of 6 V maintains a current of 0.5 A in a resistor.
- What is required to be found?- Power
- Power= Voltage x Current
- Power= 6 X 0.5 = 3 Watts.
- Other formulas for power= $R \times I^2 = V^2 / R$

Q50. Answer: (d) International Women's Day

• The Maharashtra government launched the Asmita Yojana on the occasion of International Women's Day.

• This scheme was launched by then Maharastra CM Devendra Fadnavis And Akshay Kumar.

• Under this scheme, sanitary napkins are provided at a discounted rate. It was announced that rural school girls could avail sanitary napkin packet for just Rs. 5 and rural women could get the same at a subsidised rate of Rs. 24 and Rs. 29.

• International Women's Day is celebrated each year on 8^(th) March.

• Theme 2020: I am Generation Equality: Realizing Women's Rights

• International Cancer Day : 4^(th) February

• International Men's Day : 19^(th) November

• International Aids Day : 1^(st) December

Q51. Answer: (b) less than 5.5

• Tooth decay starts when the pH of the mouth is less than 5.5.

• pH scale is used to specify how much acidic or basic the solution is. If the pH value of solution is less than 7, it is acidic. If the pH value is more than 7, it is basic.

• In the given case, if pH of the mouth gets less than 5.5, it means that our mouth is very acidic.

• The acid in our mouth has started to attack the enamel of our teeth and has started to corrode it. The sugar and food particles which get stuck in teeth are degraded by Bacteria and acid is produced as a result.

• Please note that enamel of teeth is made up of calcium phosphate which is the hardest substance in the body.

• Saliva has a pH normal range of 6.2-7.6 .Normal resting pH of mouth does not fall below 6.3.

Q52. Answer: (b) 55

The logic is:

Hence, '55' is the correct answer.

Q53. Answer: (b) heredity

• The transmission of traits, physical or mental, from parents to offspring is called heredity.

• Every member of a species has a set of genes an offspring inherits that set of genes from both parents. The combination of the genetic material of each parent is called genotype.

• The features are passed to other generations by DNA. It encodes genetic information.

• The DNA is copied before a cell divides through mitosis. Hence, each of the resulting two cells inherit the DNA sequence.

• A portion of a DNA molecule that specifies a single functional unit is called a gene.

• Please note that heredity can exist through asexual reproduction as well as sexual reproduction.

Q54. Answer: (a) C

Given series:

In 1st figure, 'less than equals to' sign is present, in 2^(nd) figure, ''greater than equals to' sign is present, in 3^(rd) figure, 'less than' sign is present, so following the same pattern, in '?' figure, '>' i.e, 'greater than' sign will be present and the position of 'R' and 'C' will be similar as in 2^(nd) figure, because in 1^(st) and 3^(rd) figure, the position of 'R' and 'C' is same.

All these conditions are satisfied by option C figure.

Hence, option C is the correct answer.

Q55. Answer: (c) phloem

• Phloem tissue helps in the transportation of the material away from the photosynthetic parts of the plants.

• This tissue is composed of various specialized cells called sieve tubes, companion cells, phloem fibres, and phloem parenchyma cells. It conducts foods made in the leaves to all other parts of the plant.

• Xylem vessels- These are long tubes and formed by end to end union of a large number of short, wide, lignified dead cells. Nucleus and cytoplasm are absent in these cells. Xylem vessels and tracheids for xylem tissue which helps in transportation of water and minerals within a plant.

• Meristematic tissue-It contains living cells with varied shapes. The cells divide actively to form specialized structures such as buds of leaves and flowers, tips of roots, etc. These tissues help plants to increase in length and achieve thickness.

• Ground tissue- The plant tissue which are neither dermal nor vascular are called Ground tissue. It is responsible for storing the carbohydrates produced by the plant. Parenchyma cells and Sclerenchyma cells are Ground Tissue.

Q56. Answer: (d) Uncle

The family tree diagram is shown below:

So, Amit's father is either paternal or maternal uncle of Puni.

Uncle is the option given to us.

Hence, 'Uncle' is the correct answer.

Q57. Answer: (b) Professor Hiroshi Marui

• The third Indian Council for Cultural Relations (ICCR) distinguished Indologist award for the year 2017 was awarded to Professor Hiroshi Marui.

• Professor Hiroshi Marui is a Japanese. He was awarded for making significant contributions to Indology or academic study of the history and cultures, languages, and literature of India.

• President Ram Nath Kovind conferred the award at Rashtrapati Bhavan.

• Professor Hiroshi had worked on Indian philosophy and Buddhist Studies for many decades.

• Indian Council for Cultural Relations is an autonomous government body. It was founded in 1950 by Maulana Abul Kalam Azad who was the independent India's first Education Minister.

• The organisation actively participates in the formulation and implementation of policies and programmes pertaining to India's external cultural relations; to promote cultural exchanges with other countries and people, etc.

Q58. Answer: (a) Ram Nath Kovind

• President Ram Nath Kovind launched the Pulse Polio programme for 2018.

• The programme was launched on the eve of the National Immunization Day (16^(th) March).

• Under this programme, it was decided that more than 17 crore children of less than five years across the country would be given polio drops as part of the drive of the Government of India to sustain polio eradication from the country.

• It was emphasised that our country needs to maintain the population immunity and sensitive surveillance till polio is eradicated globally.

• The Government introduced the injectable Inactivated Polio Vaccine (IPV) into its routine immunization program in order to maintain the immunity against polio infection.

Q59. Answer: (b) 2015

As per the given graph, production of engines highest in 2015 = 8 million

Q60. Answer: (c) Reserve Bank of India

• The Reserve Bank of India is the chief banker to the Government of India.

Important Points

• It was established on April 1, 1935, in accordance with the Reserve Bank of India Act, 1934.

• It controls the monetary and important banking policies of the Indian government. RBI is also known as banker's bank.

• RBI is entrusted with many crucial responsibilities- regulating the issue of Banknotes, securing monetary stability in India, modernising the monetary policy framework to meet economic challenges.

• RBI also promotes and performs promotional functions to support national banking and financial objectives.

• RBI also indirectly curbs inflation by setting its policy rate conducive to the monetary environment.

Q61. Answer: (c) All the conclusions follow

1. All laptops emit radiation. → Follows (As, all laptops are electronics and all electronics emit radiation)

2. Some radiation is due to electronics. → Follows (As, all laptops are electronics and all electronics emit radiation)

Hence, all the conclusions follow.

Q62. Answer: (c) 6.5 hours

Shortcut Trick

Net rate of filling = 1/7.8 − 1/19.5

Total time to fill full cistern = (7.8 × 19.5) ÷ (19.5 − 7.8) = 152.1 ÷ 11.7 = 13 hours

Since the cistern is half-empty, it needs to fill the remaining 1/2 of its capacity.

Time required = 13 × (1/2) = 6.5 hours

Therefore The correct answer is 6.5 hr.

Alternate Method

Given: Filling pipe time = 7.8 hours, Draining pipe time = 19.5 hours, Initial state = Half-empty.

Let the Total Capacity of the cistern be the LCM of 7.8 and 19.5.

Pipe	Time (hr)	Total Work (units)	Efficiency
Inlet (A)	7.8	39	39 ÷ 7.8 = 5
Outlet (B)	19.5	39 ÷ 19.5 = −2	

=> Combined efficiency of (A + B) = 5 − 2 = 3 units/hr

=> Amount of water to be filled = 39 × (1/2) = 19.5 units

=> Time taken = Work to be done ÷ Combined Efficiency

=> Time taken = 19.5 ÷ 3 = 6.5 hours

Therefore The correct answer is 6.5 hr.

Additional Information

Pipes and Cisterns Logic

Filling rates are taken as positive (+), while leakage or draining rates are taken as negative (−).

Combined Rate Formula

If an inlet fills in 'x' hours and an outlet empties in 'y' hours, net time = (x × y) ÷ (y − x).

Work and Time Relationship

Time is inversely proportional to efficiency: Time = Work ÷ Efficiency.

Q63. Answer: (a) 3

Shortcut Trick

Efficiency ratio of 1 Expert (E) to 1 Trainee (T) is 17 : 4.

Total work = (12 × 17 + 9 × 4) × 5 = (204 + 36) × 5 = 240 × 5 = 1200 units.

Required efficiency for 15 days = 1200 ÷ 15 = 80 units/day.

Efficiency of 4 Experts = 4 × 17 = 68. Remaining efficiency = 80 − 68 = 12 units.

Number of Trainees = 12 ÷ 4 = 3 trainees.

Therefore The correct answer is 3 trainees.

Alternate Method

Given: 17 trainees (T) = 4 experts (E) efficiency. Work done by 12E + 9T in 5 days.

Formula Used: Total Work = (M1 × E1 + M2 × E2) × D

=> 4E = 17T => E/T = 17/4. Let Efficiency of E = 17 and T = 4.

=> Total Work = (12 × 17 + 9 × 4) × 5 = (204 + 36) × 5 = 1200 units.

=> Let the number of required trainees be x.

=> (4 × 17 + x × 4) × 15 = 1200

=> (68 + 4x) = 1200 ÷ 15

=> 68 + 4x = 80

=> 4x = 80 − 68 = 12

=> x = 3

Therefore The correct answer is 3 trainees.

Additional Information

Man-Days Formula

Total Work (W) = Men × Efficiency × Days. For constant work, (M1E1)D1 = (M2E2)D2.

Efficiency Substitution

When different categories of workers are involved, always equate their total work rates to find individual efficiency ratios (e.g., 4E = 17T) before calculating total work.

Q64. Answer: (a) Khatri – Iron

• The given options are a pair of Places in India and what is predominantly found in that place.

• A high quality saffron (a spice derived from the crocus flower) is found in Kashmir. The quality found here is considered the best in the world.

• Moradabad is known as the Brass city of India. The city is famous for its brass handicrafts industry. It is in Uttar Pradesh.

• Surat city is a hub for diamond cutting and polishing. Many raw diamonds from the world are sent here for polishing. It is a city in Gujarat.

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• However, Khatri (as given in the first option) is not a name of the place in India. Khatri is a hindu caste. That is why, Khatri-Iron is a wrong pair.

Q65. Answer: (d) McMahon line

McMahon Line	**• This is a boundary line between India and China. - It was proposed by Henry McMahon (British colonial administrator) at the 1914 Simla Convention which was signed between British and Tibetan representatives. - However, China does not accept this demarcation.**
Radcliffe Line	• This is a boundary line between India and Pakistan. - It was demarcated by Sir Cyril Radcliffe who was the head of Border Commissions. - He was commissioned to equitably divide 4,50,000 km sq of territory with 88 million people.
Line of Control	• It is the line where the region of Kashmir is divided for the purpose of military control. - This is not a legally recognized international boundary. - The other region of Kashmir is occupied by Pakistan.
Palk Strait	• It is a strait that divides Tamil Nadu in India and Jaffna District of Sri Lanka. - It connects the Bay of Bengal in the northeast with Palk Bay in the southwest.

Q66. Answer: (a) Kiran Doshi

• Kiran Doshi is the author of the book “Jinnah Often Came to Our House”.

• This book is about the lives of upper-class Muslims in Bombay at the turn of the 19th century.

• Kiran Doshi is a retired Indian diplomat. He received The Hindu Prize for the best work of fiction published in India, 2016.

• Books by Sunita Narain-Excreta matters, Conflicts Of Interest: My Journey Through India's Green Movement, etc.

• Books by Dinanath Gopal Tendulkar- Gandhi in Champaran, Eight books-Mahatma: Life of Mohandas Karamchand Gandhi,etc.

• Books by Sowvendra Shekhar- Jwala Kumar and the Gift of Fire: Adventures in Champakbagh, The Adivasi Will Not Dance, etc.

Q67. Answer: (c) Manoj Joshi

• Manoj Joshi was conferred with the 2018 Padma Shri award in the field of Art-Acting from Maharashtra.

• He is an Indian film and television actor. He has acted in more than 60 films and he has given many theatrical performances.

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

• The 2018 list included 3 Padma Vibhushan, 9 Padma Bhushan and 73 Padma Shri Awardees.

Q68. Answer: (d) C

Given series:

Solution figure:

There are one/two stars in alternate steps. Therefore, we eliminate A and D.

The triangle is rotating by 90^0 in the anticlockwise direction.

Therefore, B is eliminated.

Hence, C is the correct answer.

Q69. Answer: (a) embryo

The correct answer is embryo.

• The seed of a plant contains the future plant in the form of a/an embryo.

• The seed embryo is the part of a seed or bud that contains the earliest forms of roots, stem, and leaves of plants.

• Most of the plant embryo develops from the apical cell.

• The embryo later develops after a fertilized adult plant flowers.

• The ovule is part of the female reproductive organ in seed plants.

• The stigma is important in reproduction. It receives pollen. When pollen reaches the stigma, it begins to grow a tube through the style called a pollen tube and it eventually reaches the ovary.

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Q70. Answer: (c) 9 hours 50 mins 53 secs

Shortcut Trick

Subtract Starting Time from Ending Time using borrowing logic.

11 hr 28 min 32 sec − 1 hr 37 min 39 sec

Subtracting seconds: 32 − 39 (borrow 1 min) → 92 − 39 = 53 sec.

Subtracting minutes: 27 − 37 (borrow 1 hr) → 87 − 37 = 50 min.

Subtracting hours: 10 − 1 = 9 hr.

Therefore The correct answer is 9 hr 50 min 53 sec.

Alternate Method

Given:

Switch on time = 01:37:39

Switch off time = 11:28:32

Calculations:

=> Total duration = Off time – On time

=> 11 hr 28 min 32 sec − 1 hr 37 min 39 sec

=> Since 32 < 39, borrow 1 min (60 sec): 32 + 60 = 92 sec. (92 − 39 = 53 sec)

=> Since 27 < 37, borrow 1 hr (60 min): 27 + 60 = 87 min. (87 − 37 = 50 min)

=> Remaining hours: 10 − 1 = 9 hr

Therefore The correct answer is 9 hr 50 min 53 sec.

Additional Information

Time Conversions

1 hour = 60 minutes and 1 minute = 60 seconds. To convert hours to seconds, multiply by 3600.

Subtraction with Borrowing

When subtracting time, if the top number is smaller, borrow 60 from the next higher unit (min or hr).

24-Hour Format

Always ensure both times are in the same format (AM/PM or 24-hour) before performing calculations.

Q71. Answer: (b) 109

the square root of 11881

=> √11881

=> √(109 × 109)

=> 109

Q72. Answer: (a) Conclusion I alone follows.

Z finds monkey funnier than ‘all animals’ due to its similarities with human behaviour.

Thus, we can conclude that he is amazed with the monkey’s behaviour.

Therefore, conclusion I follows.

However, the point of view of A about the monkeys finds no mention in the given statement.

Therefore, conclusion II does not follow.

Hence, conclusion I alone follows.

Q73. Answer: (d) WTEGI

The logic is:

Similarly,

Hence, ‘WTEGI’ is the correct answer.

Q74. Answer: (d) 75

Shortcut Trick

Identify that 78% of the total marks is equal to 58.5 marks.

Calculation: 1% = 58.5 ÷ 78 = 0.75

Total marks (100%) = 0.75 × 100 = 75

Therefore The correct answer is 75 marks.

Alternate Method

Given:

Marks secured by Chitra = 58.5

Percentage equivalent = 78%

Formula used:

Total Marks = (Marks Obtained ÷ Percentage Secured) × 100

Calculations:

=> Let the Total Marks be x.

=> 78% of x = 58.5

=> (78 ÷ 100) × x = 58.5

=> x = (58.5 × 100) ÷ 78

=> x = 5850 ÷ 78

=> x = 75

Therefore The correct answer is 75 marks.

Additional Information

Percentage Change

Percentage change = (Difference ÷ Original Value) × 100. Useful for comparing two different test scores.

Base Value Concept

In marks calculation, the 'Out of' value always represents the 100% base value.

Conversion Shortcut

To find the total when a percentage is known, simply multiply the value by the reciprocal of the fraction (e.g., 58.5 × 100/78).

Q75. Answer: (d) Charles Darwin

• Charles Darwin suggested a mechanism for organic evolution in his book “Origin of Species”.

• As per Darwin’s theory, the mechanism of evolution begins with the variation which exists among organisms within a species.

• The individuals in one generation are qualitatively different from the other generation.

• The evolution of species results from the differential rates of survival and reproduction of the various types, hence, the relative frequencies of the types change over the period of time.

• As per Darwin, Evolution is a sorting process.

Q76. Answer: (a) Sikandar Lodi

• Sikandar Lodhi was the founder of the City of Agra.

• It was founded in the 16^(th) century and Sikander shifted the capital from Delhi to Agra.

• Bahlul Khan Lodhi founded the Lodhi dynasty and overthrew the Sayyid dynasty.

• Ibrahim Lodhi was the last ruler of the Lodhi dynasty.

• He was overthrown by Babur in the first battle of Panipat in 1526.

Q77. Answer: (a) Only II is implicit.

(Implicit - suggested though not directly expressed)

The statement doesn’t suggest anything about the features of mobile phones.

Therefore, assumption I is not implicit.

Addiction means a condition of being addicted to a particular substance or activity, and when we get addicted to something we spend time or money for it. The statement says ‘Mobile phones are addictive’, which means it makes a suggestion that people spend more time with their mobile phones.

Therefore, assumption II is implicit.

Hence, only II is implicit.

Q78. Answer: (d) A

The pattern followed here is:

When we rotate the given figure 90° Clockwise direction.

Thus, only figure A resembles closest to the given figure.

Hence, the correct answer is "Option 4".

Alternate MethodIn the figures B, C, and D, no vertex of the triangle touches the lines.

Therefore, they are eliminated.

Hence, A is the correct answer.

Q79. Answer: (a) 0.38

Shortcut Trick

To find the other number, divide the total product by the known number.

Other number = 0.646 ÷ 1.7

Ignore the decimal points first: 646 ÷ 17 = 38.

The product has 3 decimal places and the divisor has 1; so the answer must have (3 − 1) = 2 decimal places.

Adjusting 38 to 2 decimal places gives 0.38.

Therefore The correct answer is 0.38.

Alternate Method

Given:

Product of two numbers = 0.646

One of the numbers = 1.7

Method Used: Basic Arithmetic Division

=> Other number = Product ÷ First Number

=> Other number = 0.646 ÷ 1.7

=> Other number = (646/1000) ÷ (17/10)

=> Other number = (646/1000) × (10/17)

=> Other number = (646 × 10) / (1000 × 17)

=> Other number = 6460 / 17000

=> Other number = 646 / 1700

=> Other number = 38 / 100

=> Other number = 0.38

Therefore The correct answer is 0.38.

Additional Information

Multiplication of Decimals

When multiplying two decimals, the number of decimal places in the product is the sum of the decimal places in the factors.

Division of Decimals Rule

To divide by a decimal, move the decimal point in the divisor to the right to make it a whole number, and move the decimal point in the dividend the same number of places.

Relationship between Product and Factors

If Product = A × B, then A = Product ÷ B and B = Product ÷ A. This is used to find missing values in multiplication equations.

Q80. Answer: (b) Neither I nor II follows

The statement does not provide any information to compare the looks of Naina and Sunita.

Therefore, conclusion I does not follow.

Naina compliments Sunita for her ‘looks’.

In this context, ‘Looks’ means appearance.

Appearance can be related to the person’s facial expressions, hair, skin tone, clothes etc.

Thus, it need not be exactly the dressing sense of Sunita that impressed Naina.

Therefore, conclusion II does not follow.

Hence, neither I nor II follows.

Q81. Answer: (a) India

• India was formally announced as the 69^(th) shareholder of the European Bank for Reconstruction and Development in July 2018.

• European Bank for Reconstruction and Development was founded in 1991. It is an international financial institution.

• All the existing EBRD shareholders voted India unanimously for the position.

• The EBRD promotes environmentally sustainable development and does not finance activities or projects related to the tobacco industry, defense, certain alcoholic products, stand-alone gambling facilities, or substances banned by international law.

• President- Suma Chakrabarti

• HQ-London, UK

Q82. Answer: (b) 32

Shortcut Trick

Sum of three numbers = Mean × 3 = 21 × 3 = 63.

Let the numbers be x, x + 5 (smallest difference), and x + 19 (range).

Sum: x + (x + 5) + (x + 19) = 63 => 3x + 24 = 63.

3x = 39 => x = 13.

Greatest number = 13 + 19 = 32.

Therefore The correct answer is 32.

Alternate Method

Given:

Mean of 3 numbers = 21

Range (Greatest − Smallest) = 19

Difference between two smallest numbers = 5

Let the three numbers be x, y, and z, where x ≤ y ≤ z.

=> Mean = (x + y + z) ÷ 3 = 21

=> x + y + z = 63 --- (Equation 1)

=> Range = z − x = 19 => z = x + 19 --- (Equation 2)

=> Smallest difference = y − x = 5 => y = x + 5 --- (Equation 3)

Substitute y and z from Equations 2 and 3 into Equation 1:

=> x + (x + 5) + (x + 19) = 63

=> 3x + 24 = 63

=> 3x = 63 − 24

=> 3x = 39

=> x = 13 (Smallest Number)

=> Greatest number (z) = x + 19 = 13 + 19 = 32

Therefore The correct answer is 32.

Additional Information

Arithmetic Mean

The average of a set of numbers, calculated by dividing the total sum of elements by the number of elements: Mean = Σx ÷ n.

Statistical Range

The difference between the highest (maximum) and the lowest (minimum) values in a data set: Range = Max − Min.

Median of 3 Numbers

When three numbers are arranged in ascending order, the middle number is the median of the data set.

Q83. Answer: (c) A point beyond the centre of curvature

The correct answer is Option 3.

CONCEPT:

Different positions of the object and their image by a concave mirror:

Position of the object (Concave mirror)	Position of image	size of the image in comparison to the object	Nature of image
At Infinity	At focus	Highly diminished	Real, inverted
Between Infinity and the centre of curvature	Between the focus and centre of curvature	Diminished	Real, inverted
At the centre of curvature	At the centre of curvature	Of the same size	Real, inverted
At focus	At Infinity	Highly enlarged	Real, inverted
Between the focus and centre of curvature	Between the centre of curvature and infinity	Enlarged	Real, inverted

EXPLANATION:

• An object is placed in front of a concave mirror at a point between its curvature and focus. The image will be formed at a point beyond the center of curvature. So option 3 is correct.

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Important Points

Q84. Answer: (c) 63

Let my current age be X and one of cousins age be Y.

Two third of my age is three fourth of my cousins age. That means,

(2/3) X = (3/4)Y

8 X - 9 Y = 0

My three years ago age is his age after four years

X - 3 = Y + 4

X - Y = 7

By solving these two equations we get,

X = 63 and Y = 56

So my current age will be 63 years.

Q85. Answer: (a) D

Mauve is a pale purple color named after the mallow flower.

Purple and Green are also Colors.

Pole is not a color.

Hence, "Pole" does not belong to this group.

Q86. Answer: (a) 3

• In the options given, third period of the modern periodic table has the minimum number of shells.

• A period is a horizontal row of the periodic table and there are seven periods in the periodic table.

• The third period includes- Sodium, Magnesium, Aluminium, Silicon, Phosphorus, Sulphur, Chlorine, and Argon (atomic number 11 to atomic number 18).

• Sodium and Magnesium are members of the s-block of the periodic table. From aluminium to Argon are members of the p-block of the periodic table.

Q87. Answer: (b) Modern periodic table

• Modern periodic table of elements is based on atomic numbers. Atomic number is the number of protons in an atom.

• Johann Döbereiner in 1817 stated that many of the known elements could be arranged by their similarities into groups of three triads. He singled out triads of the elements lithium, sodium and potassium as well as chlorine, bromine and iodine.

• John Newlands in 1864 suggested that the elements arranged in order of atomic weight showed properties similar to those of the elements placed at eight places ahead.

• In 1869, Mendeleev completed the first draft of his periodic charts. He included 63 known elements arranged according to increasing atomic weight and left spaces for undiscovered elements at that time. His periodic table showed repetition in the properties of the elements at certain regular intervals. Henry Moseley later suggested arranging the elements according to their atomic Number rather than their Atomic mass.

Q88. Answer: (a) 7

Shortcut Trick

By Remainder Theorem, substituting x = 3 in both expressions gives the remainders.

Equation 1: $3a + b = 31 - 2(3)^2 = 13$

Equation 2: $a + 3b = 24 - (3)^2 = 15$

Add both equations: $4a + 4b = 13 + 15 = 28$

Divide by 4: $a + b = 7$

Therefore The correct answer is 7.

Alternate Method

Given:

Polynomial $P1(x) = 2x^2 + ax + b$ | Divisor = $x - 3$ | Remainder = 31

Polynomial $P2(x) = x^2 + bx + a$ | Divisor = $x - 3$ | Remainder = 24

Formula Used:

According to the Remainder Theorem, if a polynomial f(x) is divided by $(x - k)$, the remainder is f(k).

Calculations:

For P1(x) at x = 3:

=> $2(3)^2 + a(3) + b = 31$

=> $18 + 3a + b = 31$

=> $3a + b = 13$ — (i)

For P2(x) at x = 3:

=> $(3)^2 + b(3) + a = 24$

=> $9 + 3b + a = 24$

=> $a + 3b = 15$ — (ii)

Adding equations (i) and (ii):

=> $(3a + b) + (a + 3b) = 13 + 15$

=> $4a + 4b = 28$

=> $4(a + b) = 28$

=> $a + b = 28 \div 4$

=> $a + b = 7$

Therefore The correct answer is 7.

Additional Information

Remainder Theorem

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

Factor Theorem

If the remainder f(a) is exactly 0, then (x − a) is a perfect factor of the polynomial f(x).

Division Algorithm

The relationship between parts of division is: Dividend = (Divisor × Quotient) + Remainder.

Q89. Answer: (a) Rs. 200

Shortcut Trick

Net percentage difference between 12.5% loss and 22.5% profit = 12.5% + 22.5% = 35%.

According to the question, 35% of CP = Rs. 56.

Required selling price for 25% profit = 125% of CP.

Value of 125% = (56 ÷ 35) × 125.

Value = 1.6 × 125 = Rs. 200.

Therefore The correct answer is Rs. 200.

Alternate Method

Given: Initial loss = 12.5%, New profit = 22.5%, Increase in SP = Rs. 56, Target profit = 25%.

Formulas: SP = CP × (100 ± P/L)% | Profit = SP − CP.

=> Let the Cost Price (CP) be 100 units.

=> Initial SP = 100 − 12.5 = 87.5 units.

=> New SP = 100 + 22.5 = 122.5 units.

=> Difference = 122.5 − 87.5 = 35 units.

=> 35 units = Rs. 56 => 1 unit = 56 ÷ 35 = 1.6.

=> Target SP (25% profit) = 125 units = 125 × 1.6 = Rs. 200.

Therefore The correct answer is Rs. 200.

Additional Information

Profit and Loss Percentage

When an object is sold at a loss of L% and then at a profit of P%, the total difference in price is equivalent to (L + P)% of the Cost Price.

Selling Price Calculation

To find the Selling Price for a desired profit, use: SP = CP × (100 + Gain%) ÷ 100.

Q90. Answer: (b) North

So, both of them are heading towards north.

Hence, ‘north’ is the correct answer.

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Q91. Answer: (b) 2

• Given- Two objects A and B are moving with the same velocity. The mass of object A is twice that of B.

• To find- The ratio of the kinetic energy of A to that of B.

• Kinetic energy in an object exists due to virtue of its motion.

• The formula for kinetic energy is-1/2 x m x v^2.

• The velocity for both the objects are the same = v.

• Mass of object A= Twice of mass of object B

• Ma=2Mb

• Ratio of the kinetic energy of A to that of B, (K_A/k_B)= ½ x 2 x Mb x v^2/ ½ x Mb x v^2

• Ratio = 2/1 = 2

Q92. Answer: (c) 4

140 ÷ [61 – {36 – (40 – 60 ÷ 12 × 6)}]

=> 140 ÷ [61 – {36 – (40 – 5 × 6)}]

=> 140 ÷ [61 – {36 – (40 –30)}]

=> 140 ÷ [61 – {36 – 10}]

=> 140 ÷ [61 – 26]

=> 140 ÷ 35

=> 4

Q93. Answer: (a) iodine

• Goitre is caused due to the deficiency of Iodine.

• Goitre is the abnormal enlargement of thyroid gland.It can also be caused due to over- or underproduction of thyroid hormones or to nodules in the gland itself.

• Deficiency of iron causes Anaemia. It is the decrease in the number of red blood cells.

• Deficiency of sodium causes Hyponatremia. It can happen from excess fluid in the body relative to a normal amount of sodium. A loss of sodium and body fluid caused by chronic conditions like kidney or congestive heart failure can also cause it.

• Deficiency of calcium means Hypocalcemia. It occurs when calcium levels in the blood are low. If deficiency continues to exist for a long time, it can lead to dental changes, cataracts, alterations in the brain, and osteoporosis.

Q94. Answer: (d) 324

Shortcut Trick

Number of diagonals in an n-sided polygon = n(n − 3) ÷ 2

Given n = 27

Diagonals = 27 × (27 − 3) ÷ 2

Diagonals = 27 × 24 ÷ 2 = 27 × 12 = 324

Therefore The correct answer is 324.

Alternate Method

Given:

Number of sides (n) = 27

Formula Used:

Number of diagonals = $^nC2 - n$

Calculations:

=> Number of diagonals = [27 × (27 − 1) / 2] − 27

=> Number of diagonals = [27 × 26 / 2] − 27

=> Number of diagonals = [27 × 13] − 27

=> Number of diagonals = 351 − 27

=> Number of diagonals = 324

Therefore The correct answer is 324.

Additional Information

Sum of Interior Angles

The sum of all interior angles of an n-sided polygon is given by (n − 2) × 180°.

Each Exterior Angle

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For a regular polygon, each exterior angle = 360° ÷ n.

Triangle Diagonals

A triangle (n=3) is the only polygon with zero diagonals as 3(3−3)/2 = 0.

Q95. Answer: (c) 366 days 23 hours 52 mins

1 year = 365 days

2020 is a leap year and a leap year has 1 day extra i.e, it has 366 days.

Number of days between 12:46 p.m. of 15^(th) July 2019 and 12:38 p.m. of 16^(th) July 2020 = 366 days.

Number of hours between 12:46 p.m. of 15^(th) July 2020 and 12:38 p.m of 16^(th) July 2020 = 23 hours 52 minutes.

So, total time duration = 366 days 23 hours 52 mins.

Hence, '366 days 23 hours 52 mins' is the correct answer.

Q96. Answer: (c) Jammu & Kashmir National Conference

• Jammu& Kashmir National Conference was led by Omar Abdullah.

• Omar is the former Chief Minister of Jammu and Kashmir.

• Sheikh Abdullah founded this political party. This party had advocated for the autonomy of former jammu and kashmir state.

• Farooq Abdullah (father of Omar) succeeded Sheikh Abdullah.

• The party won the maximum number of seats, and formed a coalition government with the Congress party in 2008 elections.

• However, Congress broke its alliance with JKNC during the 2014 Jammu and Kashmir Legislative Assembly election and the party lost.

Q97. Answer: (d) 7

77 ÷ [46 – {66 – (52 – 63 ÷ 9 × 3)}]

=> 77 ÷ [46 – {66 – (52 – 7 × 3)}]

=> 77 ÷ [46 – {66 – (52 – 21)}]

=> 77 ÷ [46 – {66 – 31}]

=> 77 ÷ [46 – 35]

=> 77 ÷ 11

=> 7

Q98. Answer: (b) 24Q

The logic is:

Given series: 3T, 3A, 6S, 6B, 12R, 12C,?

Split the series as their position, i.e, even and odd position.

Odd series: 3T, 6S, 12R, ?

Even series: 3A, 6B, 12C

Hence, '24Q' is the correct answer.

Q99. Answer: (a) 50%

Total expenditure of year 1 = (200 + 10 + 70 + 20) = Rs 300 lakhs

Total expenditure of year 3 = (450 + 10 + 120 + 20) = Rs 600 lakhs

Therefore Required percentage = 300/600 × 100% = 50%

Q100. Answer: (d) 0.08

Shortcut Trick

Since $\sec^2\theta - \tan^2\theta = 1$, it follows that $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$.

Therefore, $(\sec\theta - \tan\theta)$ is the reciprocal of $(\sec\theta + \tan\theta)$.

Value = 1 ÷ 12.5 = 10 ÷ 125 = 2 ÷ 25 = 0.08.

Therefore The correct answer is 0.08.

Alternate Method

Given: $\sec\theta + \tan\theta = 12.5$

Formula Used: $a^2 - b^2 = (a + b)(a - b)$

=> We know that $\sec^2\theta - \tan^2\theta = 1$

=> $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

=> 12.5 × (sec θ − tan θ) = 1

=> sec θ − tan θ = 1 ÷ 12.5

=> sec θ − tan θ = 10 ÷ 125

=> sec θ − tan θ = 0.08

Therefore The correct answer is 0.08.

Additional Information

Trigonometric Identities

Standard identities: $\sin^2 \theta + \cos^2 \theta = 1$, $1 + \tan^2 \theta = \sec^2 \theta$, and $1 + \cot^2 \theta = \text{cosec}^2 \theta$.

Reciprocal Relationships

If sec θ + tan θ = x, then sec θ − tan θ = 1/x. Similarly, if cosec θ + cot θ = y, then cosec θ − cot θ = 1/y.

Finding sec θ and tan θ Individual Values

By adding the two equations (x and 1/x), we get 2 sec θ = x + 1/x. By subtracting, we get 2 tan θ = x − 1/x.

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