RRC Group D Previous Year Paper 38 (Held On: 10 Oct 2018 Shift 2)

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

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CBT

Q1. Which state cricket team has won the 2018 Vijay Hazare trophy?

(a) Mumbai
(b) Rajasthan
(c) Odisha
(d) Karnataka

Q2. Pavani is walking towards south direction. She then turns left and walks for another 5 km and then turns left again and continue walking. In which direction she is walking now?

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

Q3. The work done across two points having a potential difference of 10 V is 30 J. Then the electric charge flowing between the two points is:

(a) 3 Ampere
(b) 3 Joule
(c) 3 Coulomb
(d) 3 Ohm

Q4. What is the missing term in the series?

YB25, WD23, ____, SH19

(a) UG21
(b) UF21
(c) uF20
(d) UG20

Q5. David Grossman won the ‘Man Booker International Prize 2017’for his novel _____.

(a) Decoding the Decade
(b) The President’s Lady
(c) A Horse Walks Into a Bar
(d) Courage & Commitment : An Autobiography

Q6. Solve the following equation and find the value of x:

((x - 5))/3 - ((x - 2))/4 = 7/2

(a) 52
(b) 42
(c) 60
(d) 56

Q7. A tank has two inlets which can fill it in 4 hours and 6 hours, respectively, an outlet can empty the full tank in 8 hours. Both inlet taps are opened for an hour and closed. Then the three pipes are opened together. The remaining part of the tank fills in:

(a) 51/3 hours
(b) 2 hours
(c) 31/4 hours
(d) 3 hours

Q8. A 15 m tall house on the bank of a river is facing a chimney directly opposite to it on the other bank. The angle of depression from the roof of the house to the base of the base of the chimney is 30 degree and the angle of elevation from the base of the house to the top of the chimney is 60 degree. Find the approximate width of the river and the height of the chimney.

(a) 24 m and 47 m
(b) 20 m and 25 m
(c) 25 m and 41 m
(d) 26 m and 45 m

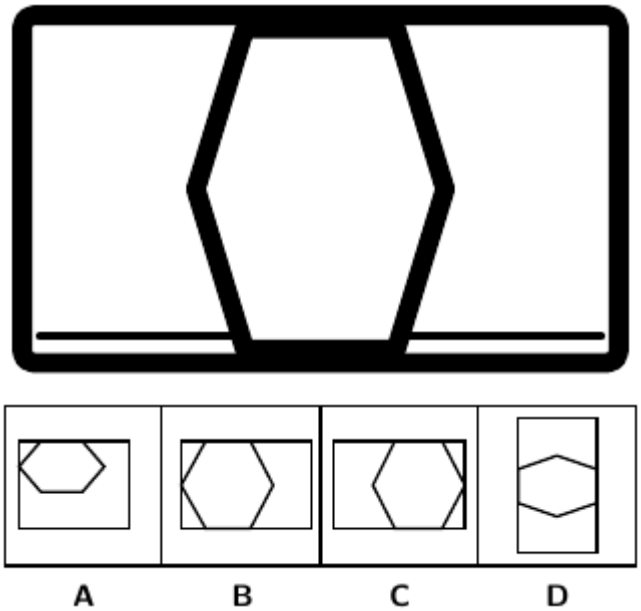
Q9. Which of the following states is the largest producer of saffron?

(a) Arunachal Pradesh
(b) Jammu and Kashmir
(c) Himachal Pradesh
(d) Uttarakhand

Q10. Who has been appointed as the first brand ambassador of Sikkim?

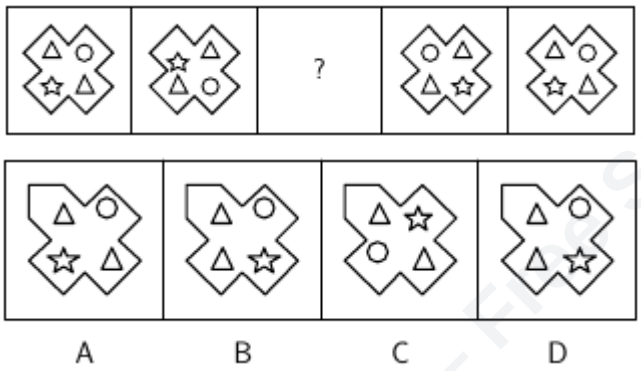
(a) Shah Rukh Khan
(b) John Abraham
(c) Amitabh Bachchan
(d) AR Rahman

Q11. Which of the options bears the closest resemblance to the following figure?



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

Q12.



Which of the below figure will fit in the blank in the above sequence?

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

Q13. Two friends Seema and Rekha went to shopping with equal amount of money. Seema bought a shoe for Rs. 95 and Rekha spent Rs. 350 on dress. If Rekha had 4/7 of what Seema had left. How much money did Seema have left after shopping?

(a) Rs. 595
(b) Rs. 690
(c) Rs. 535
(d) Rs. 495

Q14. The southernmost of the three mountain belts in the north of India are the Outer Himalayas, also called as the _____.

(a) Kangchenjunga
(b) The Great Himalayas
(c) Kailash range
(d) Shiwalik Range

Q15. As of 2018, Jai Ram Thakur is the incumbent chief minster of which state in India?

(a) Uttar Pradesh
(b) Andhra Pradesh
(c) Arunachal Pradesh
(d) Himachal Pradesh

Q16. Simplify the given equation

22 - (1/4){- 5 - (- 48) ÷ (- 16)} = ?

(a) 22
(b) 20
(c) 24
(d) 21

Q17. Whom has The Central Government appointed as the Special Public Prosecutor for cases related to the 2G scam?

(a) Tushar Mehta
(b) Tapesh Mehta
(c) Tapan Mehta
(d) Tarun Mehta

Q18. Consider the following statement and decide which of the conclusion logically follows from the statements.

Statements:

If you're a good computer programmer, then we definitely have a job for you.

Conclusions:

1. Good computer programmers are never jobless.
2. We are in need of a good computer programmer.

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

Q19. In the following question, correct the equation by interchanging the two signs.

5 + 6 ÷ 3 - 2 x 5 = 13

(a) • and ÷
(b) ÷ and -
(c) • and x
(d) ÷ and x

Q20. _____ is an English naturalist, geologist and biologist best known for his contributions to the science of evolution.

(a) RH Whittaker
(b) Charles Robert Darwin
(c) Linnaeus
(d) Mendeleev

Q21. The Symbol of the constant of gravitation is _____.

(a) G
(b) g
(c) CG
(d) Cg

Q22. A semicircle is inscribed inside a rectangle in such a way, so that the diameter of the semicircle coincides with the length of the rectangle. If the area of the semicircle is 50 π, then what is the area of the rectangle?

(a) 200
(b) 175
(c) 150
(d) 125

Q23. Who is the founder of a microenterprise, named after her, and Ekta Sakhi Producer Company?

(a) Arundhati Bhattacharya
(b) Sharmila Jain
(c) Kamal kumbhar
(d) Sulajja Firodia Motwani

Q24. Which one of the following is NOT true of WBCs?

(a) Size – 18-25 µm
(b) They act as “soldiers” and eat up the germs
(c) Nucleus - Nucleated
(d) Shape – Irregular shape

Q25. 15 persons have taken a job of digging a pond in 20 days. 5 persons have left after 10 days. Again after 5 days 5 more have left. How many days would be required to complete the job?

(a) 55
(b) 25
(c) 35
(d) 45

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Q26. Anikitha sold her text book for a loss of 15%. If she would have sold the textbook for an increased price of Rs. 150, there would have been gain of 10%. What was the cost price of the text book? (Used)

(a) Rs. 500
(b) Rs. 900
(c) Rs. 400
(d) Rs. 600

Q27. In Buddhism the rules of conduct that are in keeping with the _____ are known as Panchasheel.

(a) eight-fold path
(b) five-fold path
(c) four-fold path
(d) six-fold path

Q28. Choose the person who not belong to the group

(a) Kapil Dev
(b) Ravi Shastri
(c) Sachin Tendulkar
(d) Pullela Gopichand

Q29. Which of the following represents Alkenes?

(a) —C = C—
(b) —C—C—
(c) H—O—H
(d) O=C=O

Q30. Read the given statement (s) and conclusions carefully and select and which of the conclusions logically follow(s) from the statement(s).

A tenant said to his neighbour, “Now-a-days, even in highrise bulidings, there are lot of mosquitoes. It is hindering my night’s sleep.”

Conclusions:

I. The tenant is agitated due to mosquito nuisance.

II. Generally, there are no mosquitoes in highrise buildings.

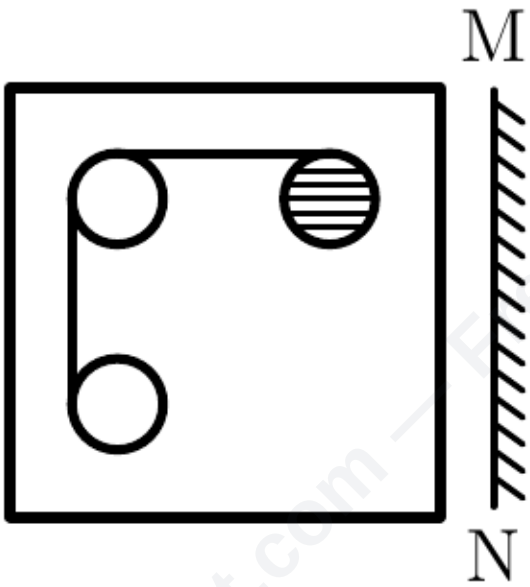
(a) Only conclusion II follows
(b) No conclusion follows
(c) Only conclusion I follows
(d) Both the conclusions follow

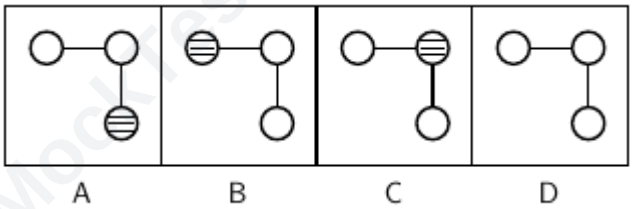
Q31. Which of the following scientists suggested that the symbols of elements be made from one or two letters of the name the element?

(a) Berzelius
(b) Democritus
(c) Proust
(d) Lavoisier

Q32. Choose the mirror image for the following figure.

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

Q33. What is the full form of RNA?

(a) Ribo nucleic acid
(b) Ribo nuclear acid
(c) Retinal nucleic acid
(d) Robert nuclear acid

Q34. Read the given statement and conclusions carefully and select which of the conclusions logically follows(s) from the statement.

Statement: It is good to exercise early morning.

Conclusions:

I. Early morning exercise has some benefits.

II. It is wise to choose free time available for workouts.

(a) Only conclusion II follows
(b) Neither I nor II follows
(c) Both I and II follow
(d) Only conclusion I follows

Q35. In Newlands law of Octaves, _____, Which resembles cobalt and nickel in properties, has been placed far away form these elements.

(a) Mn
(b) Al
(c) Fe
(d) Mg

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Q36. What comes next in the given series:

17C, 21F, 25I, 29L,?

(a) 30K
(b) 35T
(c) 40U
(d) 33O

Q37. Which of the two conclusions can be concluded on the basis of given statements?

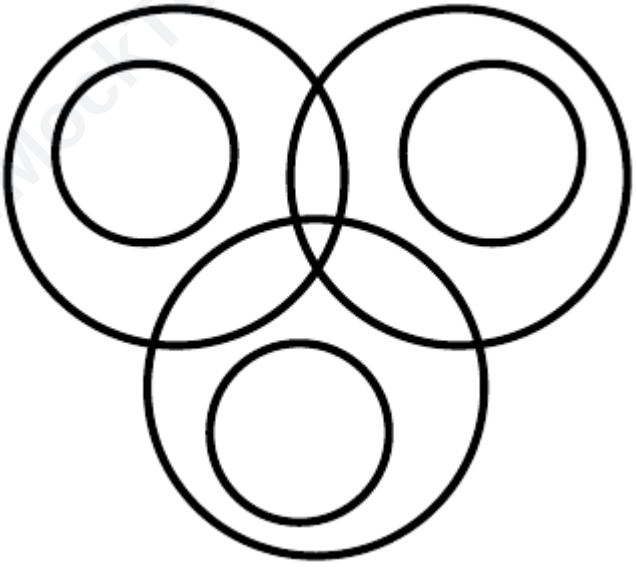
Statement: All the slates are suns. Some stars are suns.

Conclusion:

1. All the slates are stars.
2. Some stars are slates.

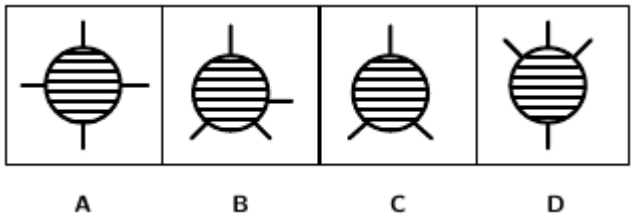
(a) Either (1) or (2) follows
(b) Only (1) follows
(c) Only (2) follows
(d) Neither (1) nor (2) follows

Q38. Find the number of circles in the figure.



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

Q39. Find the odd one out.



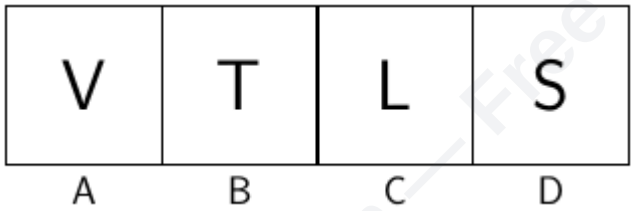
(a) D
(b) C
(c) B
(d) A

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Q40. Two numbers are 30% and 60% respectively more than a third number. The two numbers are in the ratio of:

(a) 13 : 16
(b) 22 : 23
(c) 14 : 13
(d) 16 : 13

Q41. Find the odd one out of the given figures.



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

Q42. Four numbers when arranged in ascending order are w, x, y and z. The average of the smallest three numbers is 22, whereas the average of the largest three numbers is 28. What is the range of the data?

(a) 16
(b) 17
(c) 18
(d) 19

Q43. Which of the given terms does NOT belong to the group?

A) Bike
B) Car
C) Bus
D) Carriage

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

Q44. If (3x + 9) is greater than or equal to (5x + 7), then find the maximum possible value of x:

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

Q45. Gaurav said to Neeraj, “That boy playing cricket is the elder of the two brothers of the daughter of my father”. How is the boy playing cricket related to Gaurav?

(a) Son
(b) Cousin
(c) Brother
(d) Brother-in-law

Q46. Which of the following is NOT based on the heating effect of current?

(a) Electric heater
(b) Electric bulb (with filament)
(c) Electric iron
(d) Microwave

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Q47. Corrosion causes damage, especially that of:

(a) Ag
(b) Fe
(c) Al
(d) Cu

Q48. Taimur gained 37.5% on the resale of a used stereo. If he purchased the item for Rs. 3,880, how much did sell it for?

(a) Rs. 5,355
(b) Rs. 5,345
(c) Rs. 5,335
(d) Rs. 5,325

Q49. Hydrogenation of vegetable oil is an example for _____.

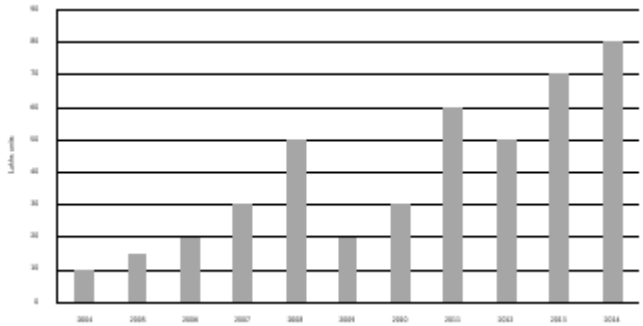
(a) Displacement reaction
(b) Addition reaction
(c) Combination reaction
(d) Substitution reaction

Q50. Simplify:

30.9 + 3.09 + 0.309 + 0.039 + 309 = ?

(a) 534.388
(b) 340.138
(c) 343.338
(d) 243.338

Q51. The following bar graph shows information on the sales of the personal computer by the company 'XYZ' for the last 10 years.



How many units (lakhs) of personal computers were sold by the company XYZ in 2009?

(a) 15
(b) 20
(c) 10
(d) 30

Q52. In which year was Gandhi-Irwin Pact signed?

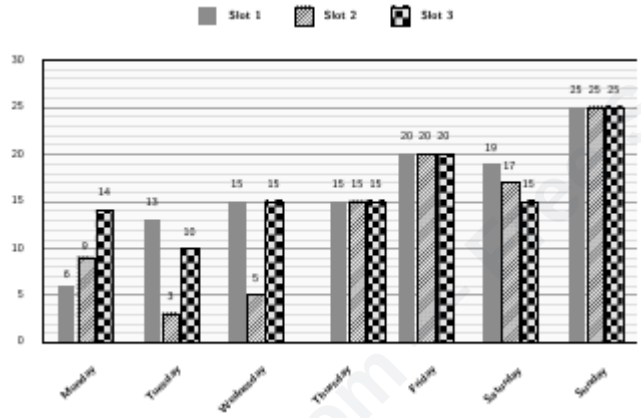
(a) 1925
(b) 1940
(c) 1920
(d) 1931

Q53. The body of _____ is made of two layers of cells.

(a) Platyhelminthes
(b) Annelida
(c) Coelenterata
(d) Nematoda

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Q54. A private gym can accommodate 25 persons in a time slot. It has three different time slots for its users and the following is the chart showing average visitors over a week. Which is the day when they cannot accommodate more members?



(a) Friday
(b) Saturday
(c) Sunday
(d) Thursday

Q55. Solve the following:

((0.54 × 0.540 - 0.460 × 0.460))/((1 - 0.920)) = ?

(a) 2
(b) 0.1
(c) 0.01
(d) 1

Q56. Baht is the currency of _____?

(a) Togo
(b) Thailand
(c) Tajikistan
(d) Tanzania

Q57. Kiran needs to travel 300 km in 5 hours. She travels for some time @ 75 km/hr and the rest of the time @ 55 km/hr. How long did Kiran travel at the higher speed?

(a) 1 hour 10 mins
(b) 1 hour 35 mins
(c) 1 hour 15 mins
(d) 1 hour 25 mins

Q58. Oxides of non-metals are usually _____.

(a) Acidic
(b) Neutral
(c) Less reactive
(d) Basic

Q59. A train travels the distance between two stations X km apart at speed of 60 km per hour for the onward journey and 90 km per hour on the return journey. What is the average speed of the train?

(a) 77 km/hr
(b) 76 km/hr
(c) 75 km/hr
(d) 72 km/hr

Q60. The relative atomic masses of all elements have been found with respect to an atom of _____.

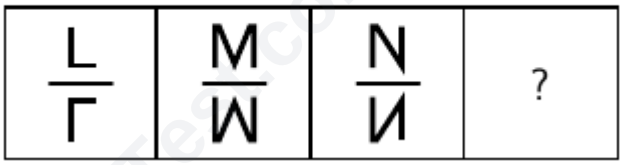
(a) N-14
(b) O-16
(c) C-12
(d) C-16

Q61. Sound propagates maximum in _____.

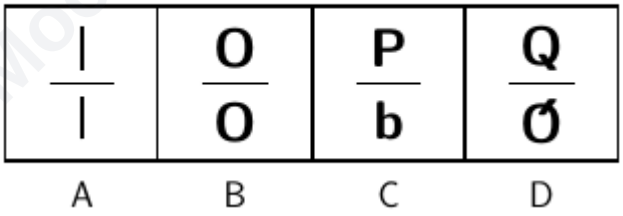
(a) Gas
(b) Vacuum
(c) Solid
(d) Liquid

Q62. Find the next figure for the given series:

Problem figures:

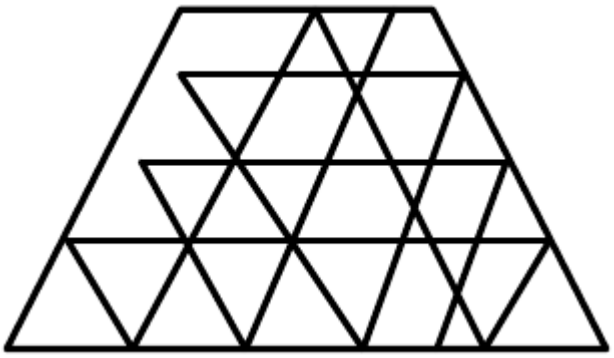


Answer figures:



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

Q63. What is the minimum number of lines required to create the following figure?



(a) 12
(b) 17
(c) 15
(d) 10

Q64. If the dimensions of a square are increased by 10%, the area of the square increases by:

(a) 10%
(b) 21%
(c) 20%

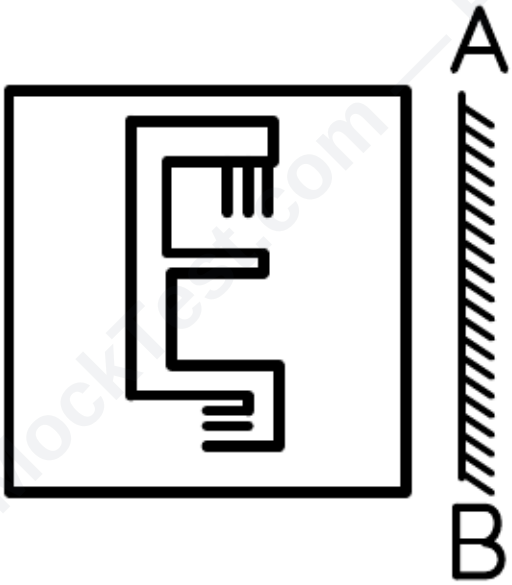
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(d) 40%

Q65. Maharashtra Chief Minister Devendra Fadnavis has been selected for the 'SIES-Sri Chandrasekarendra Saraswati National Eminence Award' for:

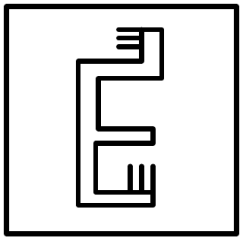
(a) Social Thinking
(b) International category
(c) Science and Technology
(d) Public Leadership

Q66.

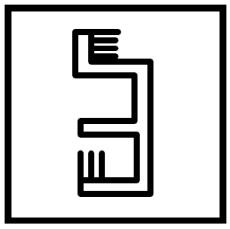


The mirror image of the above figure with respect to the line AB is:

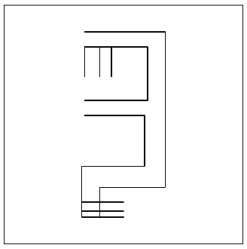
(a)



(b)

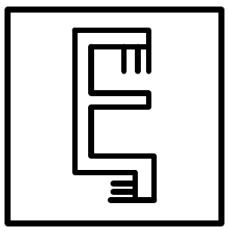


(c)



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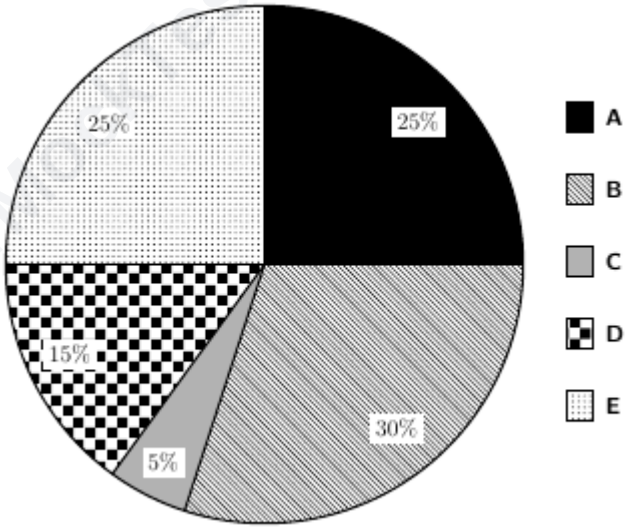
(d)



Q67. How much is the amount given by Walmart for acquiring Flipkart?

(a) $ 15 trillion
(b) $ 16 billions
(c) $ 3 trillion
(d) $ 2 billions

Q68. The following pie diagram shows information about tyres manufacturing data from various companies in India during 2017. If the total tyres produced in India during 2017 was 1,80,000 units, how many units of tyres were produced by company 'B'?



(a) 25,000
(b) 54,000
(c) 15,000
(d) 45,000

Q69. Which state is the second largest crude oil producer in India?

(a) Uttar Pradesh
(b) Maharashtra
(c) Goa
(d) Rajasthan

Q70. What is the name of the compound CH3 – CH3?

(a) Butane
(b) Ethane
(c) Methane
(d) Propane

Q71. The pH of the solution is given. Which of the solutions has the highest concentration of hydrogen ions?

(a) 10.1
(b) 4.7
(c) 2.4

(d) 8.0

Q72. What is any external push or pull applied on a body called?

(a) Inertia
(b) Force
(c) Pressure
(d) friction

Q73. What is the mass of an object whose weight on the earth is 196 N (g = 9.8 ms^(-2))?

(a) 19.6 kg
(b) 1.96 kg
(c) 20 kg
(d) 2 kg

Q74. _____ base gives less OH – ion when dissolved in water.

(a) NH4OH
(b) Ba(OH)2
(c) NaOH
(d) Ca(OH)2

Q75. At what rate of simple interest per annum will a sum triple itself in 8 years?

(a) 12.5%
(b) 33.3%
(c) 10%
(d) 25%

Q76. Find the value of $\sqrt{(20^2 - 16^2)}$

(a) 12
(b) 18
(c) 16
(d) 14

Q77. An object of mass 11 kg is moving with a uniform velocity fo 5 ms^(-1). What is the kinetic energy possessed by the object?

(a) 17.5 J
(b) 137.5 J
(c) 137.5 ms
(d) 180.5 J

Q78. Find the next number in the series.

14, 19, 29, 44, 64, ?

(a) 90
(b) 92
(c) 87
(d) 89

Q79. A sound source sends waves of 600 Hz. It produces a wavelength of 3 m. The velocity of the sound wave in question is

(a) 1800 ms^(-1)
(b) 1800 ms^2
(c) 1800 ms^1
(d) 1800 ms + 1

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Q80. The difference between the selling prices of an article at profits 5% and 10% is Rs. 30. What will be the cost price of the article?

(a) Rs. 600
(b) Rs. 1200
(c) Rs. 500
(d) Rs. 900

Q81. 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:

Karan is versatile writer. His comedy and fiction novels are very popular among youngsters.

Assumptions:

I. Karan is capable of adapting to different writing skills.

II. All writers are versatile.

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

Q82. The Right to Education Act (RTE) was enacted in which year in India?

(a) 2000
(b) 2015
(c) 2012
(d) 2009

Q83. Refrigerator: Cool, match the correct pairs given below:

(a) Listen : Radio
(b) Sit : Chair
(c) Watch : Television
(d) Phone : Talk

Q84. Who is the current Chief Minister of Arunachal Pradesh?

(a) Pema Khandu
(b) Jarbom Gamlin
(c) Nabam Tuki
(d) Kalikho pul

Q85. Find the next letter in the series:

H, L, P, T, X, ?

(a) M
(b) K
(c) B
(d) D

Q86. 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: Life skills should be taught right from primary education.

Assumptions:

I. Student should learn life skills at an early stage as it prepares them for a better future.

II. Students are taking up paid courses to learn life skills for their jobs.

(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

Q87. Sarthak can fill a sandpit with sand in 36 days while Vivan takes 90 days to fill it. Ali can take the entire sand of a filled sand-pit out in 60 days. If all three starts working when the pit is empty, in how many days will the sandpit be full again?

(a) 45
(b) 54
(c) 48
(d) 50

Q88. A man walks 10 m towards east and then 28 m towards north. How far is he from his starting point?

(a) 2√221 m
(b) √221 m
(c) 4√221
(d) √38 m

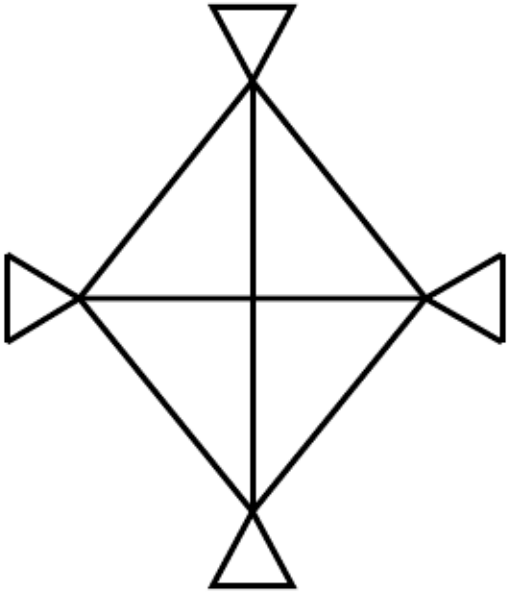
Q89. Ankit went to his relative's house to meet, the only sister of the wife of his father. Whom did he meet?

(a) Sister
(b) Cousin
(c) Paternal aunt
(d) Maternal aunt

Q90. Which team won the 2017 season of the Indian Premier Linguae?

(a) Kolkata Knight Riders
(b) Sunrisers Hyderabad
(c) Mumbai Indians
(d) Royal Challengers Bangalore

Q91. Count the number of triangles in the figure.



(a) 11
(b) 13
(c) 10
(d) 12

Q92. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statements:

I. Some napkins are papers.

II. Some napkins are cloth.

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Conclusions:

1. Some cloth are napkins
2. Some papers are cloth

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

Q93. Which of the following is used by plants during photosynthesis?

(a) Solar energy
(b) Heat energy
(c) Kinetic energy
(d) Chemical energy

Q94. A Padma Bhushan in the field of Art-Music for the year 2017 was awarded to whom?

(a) SP Balasubramanyam
(b) Bala Murali Krishna
(c) Bappi Lahiri
(d) Pandit Vishwa Mohan Bhatt

Q95. Suhrit has 683/4 m of cloth. After cutting out as many pieces possible of length 31/2 m from it, how many metre of cloth will still be left in the original piece?

(a) 21/8m
(b) 21/4m
(c) 17/8m
(d) 2 1/2 m

Q96. Solve:

16 ÷ 2 × 2 ÷ 2 × 2 + 2 = ?

(a) 6
(b) 10
(c) 18
(d) 3

Q97. Which of the following vulgar fractions, when written as a decimal, will not terminate?

(a) 80/150
(b) 81/150
(c) 15/48
(d) 21/600

Q98. Choose the pair which is related in the same way as the words in the first pair from the given choices.

LUNG : MAN ? GILL : _____

A. FISH
B. COW
C. PEACOCK
D. BIRD

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

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Q99. If the perimeter of a rhombus is 56 cm and the length of one of its diagonals is 26 cm, then find the length of the other diagonal of the rhombus.

(a) 6√7 cm
(b) 6√5 cm
(c) 6√3 cm
(d) 6√2 cm

Q100. Who created history by becoming the first Indian woman to scale Mount Everest for the fourth time?

(a) Bachendri Pal
(b) Anshu Jamsenpa
(c) Premlata Agrawal
(d) Arunima Sinha

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Mumbai

• Mumbai team was the winner of Vijay Hazare trophy 2018-19.
• It was the 3^(rd) title of the Mumbai team, in which the Mumbai team beat the Delhi team.
• Vijay Hazare Trophy is also known as Ranji one day trophy which was started in 2002-03 as a limited over cricket domestic cricket competition, in which the state team is involving from the Ranji trophy plates.
• The name of this trophy is after the name of the famous International Indian cricketer Vijay Hazare.
• In 2019, Karnataka won the Vijay Hazare trophy by defeating Tamil Nadu.

Q2. Answer: (d) North

According to given conditions,
Pavani is facing north direction now.
Hence, ‘north’ is the correct answer.

Q3. Answer: (c) 3 Coulomb

The correct answer is 3 Coulomb.
• Work is done when a force is applied on a body and makes a body move i.e. when the body displaces from its position by the act of force.
• For example- Pushing a car horizontally from a rest, Walking upstairs, Shooting a Bullet, etc. Its S.I. Unit is Joule (J).
• Potential Difference is the amount of work done by the positive test charge from one point to another point.
• For example- the movement of free electrons in a metallic conductor. Its S.I. Unit is Volt (V).
• Electric charge is the physical property of matter that causes it to experience a force when placed in an electromagnetic field.
• They are of two types: positive and negative. Its S.I. unit is Coulomb (C).

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Concept

Work done= Potential Difference × Charge.

Calculation:

• Work- 30 J,

• Potential difference- 10 V

• Charge- ?

By Formula,

• Work = potential difference × charge

• Charge = work / potential difference

• Charge = 30 J / 10 V

• Charge = 3 Coulomb.

Q4. Answer: (b) UF21

The pattern followed is,

Hence, UF21 is the correct answer.

Q5. Answer: (c) A Horse Walks Into a Bar

The correct answer is A Horse Walks Into a Bar.

• A Horse Walks Into a Bar is a book written by David Grossman, won the Man Booker prize in 2017.

• David Grossman has become the first Israeli author to win the Man Booker prize.

• This book shines a spotlight on the effects of grief, without any hint of sentimentality.

• This is not just a book about Israel, it's about people and societies horribly functioning.

Additional Information

Books	Authors
Decoding the Decade	Manish Tewari
The President's Lady	Irving Stone
Courage & Commitment : An Autobiography	Margaret Alva

Important Points

• PH Newby was the first winner of the Booker prize in 1969 with "something to answer for ".

• From 1969 to 2001 this prize called a Booker prize.

• From 2002, the Man group sponsored this prize known as Man Booker prize.

• Yann Martel the first winner of the Man Booker prize with "Life of Pie" in 2002.

• Indian winner of Man Booker prize is Arundhati Roy for "The God of Small Things" in 1997, Salman Rushdie for " Midnight's Children" in 1981, Sir V.S.Naipaul for "In a Free State" in 1971.

Q6. Answer: (d) 56

Shortcut Trick

Multiply the entire equation by the LCM of denominators 3 and 4, which is 12, to eliminate fractions.

=> 4 × (x − 5) − 3 × (x − 2) = 12 × (7 ÷ 2)

=> 4x − 20 − 3x + 6 = 42

=> x − 14 = 42

=> x = 56

Therefore The correct answer is 56.

Alternate Method

Given:

(x − 5) ÷ 3 − (x − 2) ÷ 4 = 7 ÷ 2

Method: Fractions subtraction and Linear Equation simplification.

=> [4(x − 5) − 3(x − 2)] ÷ 12 = 7 ÷ 2

=> (4x − 20 − 3x + 6) ÷ 12 = 7 ÷ 2

=> (x − 14) ÷ 12 = 3.5

=> x − 14 = 3.5 × 12

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=> x − 14 = 42

=> x = 42 + 14

=> x = 56

Therefore The correct answer is 56.

Additional Information

Linear Equation in One Variable

A linear equation is an algebraic equation in which each term has an exponent of one and the graphing of the equation results in a straight line. The general form is ax + b = 0.

Least Common Multiple (LCM)

When solving equations involving fractions, multiplying every term by the LCM of the denominators is an efficient way to clear fractions instantly.

Sign Convention in Brackets

When a negative sign is outside a bracket, the signs of all terms inside the bracket change when expanded: − (a − b) = −a + b.

Q7. Answer: (b) 2 hours

Shortcut Trick

Let Total Capacity of the tank be LCM(4, 6, 8) = 24 units.

Efficiency of Inlet A = 6, Inlet B = 4, and Outlet C = −3.

Work done by A and B in 1 hour = 6 + 4 = 10 units.

Remaining work = 24 − 10 = 14 units.

Combined efficiency of all three pipes = 6 + 4 − 3 = 7 units/hr.

Time taken for remaining part = 14 ÷ 7 = 2 hours.

Therefore The correct answer is 2 hr.

Alternate Method

Given: Inlet 1 = 4 hr, Inlet 2 = 6 hr, Outlet = 8 hr.

Formula Used: Work = Time × Efficiency.

Person	Days	Total Work	Efficiency
Inlet 1 (A)	4	24	6
Inlet 2 (B)	6	4	
Outlet (C)	8	−3	

=> Total capacity of tank = 24 units

=> Work done by A and B in 1st hour = (6 + 4) × 1 = 10 units

=> Remaining tank to be filled = 24 − 10 = 14 units

=> Combined efficiency of (A + B + C) = 6 + 4 − 3 = 7 units/hr

=> Time to fill remaining part = Remaining Capacity ÷ Combined Efficiency

=> Time = 14 ÷ 7 = 2 hours

Therefore The correct answer is 2 hr.

Additional Information

Inlet and Outlet Pipes

Inlet pipes add water (positive work) while outlet pipes remove water (negative work). Net work is the algebraic sum of their efficiencies.

Pipes and Cisterns Logic

If an inlet fills a tank in x hours and an outlet empties it in y hours (y > x), the net part filled in 1 hour is (1/x − 1/y).

Q8. Answer: (d) 26 m and 45 m

Shortcut Trick

In Δ formed by angle of depression 30°, Width = Height × cot 30°.

Width of river = 15 × √3 ≈ 15 × 1.732 = 25.98 m ≈ 26 m.

In Δ formed by angle of elevation 60°, Height of chimney = Width × tan 60°.

Height = 25.98 × √3 = 25.98 × 1.732 ≈ 45 m.

Therefore The correct answer is 26 m and 45 m.

Alternate Method

Given: Height of house (AB) = 15 m, Angle of depression (θ1) = 30°, Angle of elevation (θ2) = 60°.

Formula Used: tan θ = Perpendicular / Base

=> In ΔABC (where BC is river width), tan 30° = AB / BC

=> 1 / √3 = 15 / BC

=> BC = 15√3 = 15 × 1.732 = 25.98 m ≈ 26 m

=> Let Height of Chimney be CD. In ΔBCD, tan 60° = CD / BC

=> √3 = CD / (15√3)

=> CD = 15√3 × √3 = 15 × 3 = 45 m

Therefore The correct answer is 26 m and 45 m.

Additional Information

Angle of Elevation and Depression

The angle of elevation is the angle between the horizontal line and the line of sight when looking up, while the angle of depression is looking down. Both are numerically equal when measured between parallel horizontal lines.

Trigonometric Ratios for Heights

Standard values used: tan 30° = 1/√3, tan 45° = 1, and tan 60° = √3. These are essential for solving distance and height problems.

Q9. Answer: (b) Jammu and Kashmir

The Correct Answer is Jammu and Kashmir.

Key Points

• The Saffron in Jammu and Kashmir is mainly cultivated and harvested in the Karewa highlands in Kashmir Himalayas.

• Iran is the largest producer of saffron in the world and India is very near to it.

• Kashmir saffron is a very precious and costly product recently it has been given the Geographical Indication (GI) tag by the Geographical Indications Registry.

Additional Information

State	Largest producer of
Himachal Pradesh	the wild Marigold essential oil in India which is used in perfume, flavoring, and condiment industries
Arunachal Pradesh	Kiwis in India and the second-largest producer of large cardamom
Uttarakhand	Magnesite mineral in India after Tamil Nadu

Q10. Answer: (d) AR Rahman

The correct answer is AR Rahman.

• AR Rahaman is the brand ambassador of Sikkim.

Key Points

• Sikkim is a state in northeast India. It is the second smallest among the Indian states.

• Gangtok is the capital and largest city of Sikkim.

• The world's third-highest mountain, Kanchenjunga, is regarded as the guardian deity of Sikkim.

• Prem Singh Tamang, better known as P. S. Golay, is an Indian politician and the current Chief Minister of Sikkim.(Sept 2020)

Additional Information

• Shah Rukh Khan is the brand ambassador of West Bengal.

• West Bengal is situated in eastern India between the Himalayas and the Bay of Bengal.

• Kolkata is the capital of West Bengal.

• Smt. Mamata Banerjee is the current Chief Minister of the state.

• John Abraham is the brand ambassador of Arunachal Pradesh.

• Arunachal Pradesh is a state in North East India.

• Itanagar is the capital of Arunachal Pradesh.

• Pema Khandu is the Current Chief Minister of the state.

• Amitabh Bacchan is the brand ambassador of Gujarat.

• Gujarat is a state on the western coast of India.

• Gandhinagar is the capital of Gujarat.

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• Bhupendra Patel was elected the new Chief Minister of Gujarat.

Q11. Answer: (a) D

In the question figure, a hexagon is placed exactly in the middle of the rectangle.

Only option D's hexagon is placed exactly in the middle of the rectangle.

Hence, 'option 1' is the correct answer.

Q12. Answer: (d) C

The figure that will fit in the blank to complete the series is shown below:

The figure is moving in clockwise direction inside the figure.

Hence, 'option 4' is the correct answer.

Q13. Answer: (a) Rs. 595

Shortcut Trick

Difference in expenditure = 350 − 95 = Rs. 255

Since their initial amounts were equal, the difference in their remaining amounts must also be Rs. 255.

Ratio of Rekha's left money to Seema's left money = 4 : 7

Difference in ratio parts = 7 − 4 = 3 units

3 units = Rs. 255 => 1 unit = Rs. 85

Seema's money left (7 units) = 7 × 85 = Rs. 595

Therefore The correct answer is Rs. 595.

Alternate Method

Given:

Initial money with Seema and Rekha = x

Seema's spending = Rs. 95 | Rekha's spending = Rs. 350

Money left with Seema = x − 95

Money left with Rekha = x − 350

According to the question:

=> (x − 350) = 4/7 × (x − 95)

=> 7 × (x − 350) = 4 × (x − 95)

=> 7x − 2450 = 4x − 380

=> 7x − 4x = 2450 − 380

=> 3x = 2070

=> x = 690

Money left with Seema = 690 − 95 = 595

Therefore The correct answer is Rs. 595.

Additional Information

Ratio and Difference Property

If two quantities change by different amounts from an equal base, the difference in their final values is exactly equal to the difference in the amounts spent or added.

Fraction to Ratio Conversion

A statement like 'A is 4/7 of B' can be directly written as the ratio A : B = 4 : 7, where B represents the denominator total.

Unitary Method in Ratios

Value of 1 unit = (Actual Difference) ÷ (Difference in ratio parts). This value can then be multiplied by any ratio part to find the absolute value.

Q14. Answer: (d) Shiwalik Range

The correct answer is the Shiwalik Range.

Key Points

• A Mountain is any natural elevation of the earth's surface. the mountains may have a small summit and a broad base.

• The mountains are considerably higher than the surrounding area. some mountains are even higher than the clouds.

• In the Mountains, the climate becomes colder as we go on high altitude.

• Mountains are of three types: 1. Fold mountains 2. Block mountains 3. Volcanic mountains.

• Mountains arranged in a line are known as Range.

Important Points

• The Himalayan mountains are young fold mountains with Rugged relief and high conical peaks.

• Himalaya means "the adobe of snow", in the north they are capped with lofty snow.

• The Himalayas divided into three parallel ranges: 1. The great Himalayas or Himadri - Northernmost range 2. Middle Himalayas or Himanchal - South of Himadri 3. The Shiwaliks - Southernmost range.

• The Shiwalik is the sub-Himalayan range of the northern Indian Sub-continent. It extends from West to North westwards for more than 1,600Km (1,000 miles) from Teesta river in Sikkim state, northeastern India through Nepal, across northwestern India, and into Northern Pakistan.

• Kailash range forms the part of Trans-Himalayan and It is one of the highest and most rugged parts of the Himalayas, located in the southwestern part of the Tibet Autonomous Region, southwestern China. It is known as GANG-TISE to the Tibetans and is the highest peak in the range, with 6,714 meters.

• Kangchenjunga also called Kanchenjunga, the World's Third highest mountain with an elevation of 8,586 meters. It is situated in the eastern Himalayas on the border between Sikkim state, north eastern India, and eastern Nepal. The Mountain is the part of the great Himalayan range.

Q15. Answer: (d) Himachal Pradesh

The correct answer is Himachal Pradesh.

• Jai Ram Thakur is an Indian politician and the current Chief Minister of Himachal Pradesh.

• He defeated Prem Kumar Dhumal in the assembly elections 2017.

• He was the Minister of Rural Development and Panchayati Raj.

Important Points

STATE	CAPITAL	CM
Uttar Pradesh	Lucknow	Yogi Adityanath
Andhra Pradesh (Known as the rice-bowl of India)	Amaravati	Y.S Jaganmohan Reddy
Arunachal Pradesh (Known as the Orchid State of India)	Itanagar	Pema Khandu
Himachal Pradesh	Simla	Jai Ram Thakur

Q16. Answer: (c) 24

CALCULATION:

Considering the given equation,

22 - (1/4){- 5 - (- 48) ÷ (- 16)} = ?

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

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction'

should be calculated.

Now,

22 - (1/4){- 5 - (- 48) ÷ (- 16)}

=> 22 - (1/4){- 5 - 3}

=> 22 - ((- 8)/4)

=> 22 + 2 = 24

Therefore Required value is 24

Q17. Answer: (a) Tushar Mehta

The correct answer is Tushar Mehta.

• The 2G spectrum scandal involved officials in the government of India illegally undercharging mobile telephony companies for frequency allocation license, which they would use to create a 2G subscription for cell phones.

• The issuing of the 2G licenses occurred in 2008, but the scam came to public notice when the Indian Income Tax Department investigated political lobbyist Niira Radia and the Supreme Court of India took Subramaniam Swamy's complaints on record.

Key Points

• Tushar Mehta is a senior counsel in India and is currently serving as the Solicitor General of India.

• Mehta began his career as an advocate in 1987 and was designated as a senior advocate in 2007 by Gujarat High Court.

• He was appointed as the advocate general in 2008.

• The Centre has appointed Additional Solicitor General Tushar Mehta the special public prosecutor in the 2G spectrum scam.

Q18. Answer: (b) Only conclusion 2 follows

The use of the word 'definitely' indicates the employer's need for a good computer programmer.

Therefore, conclusion 2 follows.

The author of the statement certainly needs a good computer programmer.

But we cannot conclude that this is the case in general for any employer.

Nor do we know if there are as many jobs as the number of good computer programmer.

Therefore, conclusion 1 does not follow.

Hence, only conclusion 2 follows.

Q19. Answer: (c) • and x

Interchanging the symbols and using BODMAS rule,

Option 1 → + and ÷

Given equation: 5 + 6 ÷ 3 - 2 x 5 = 13

After changing sign

5 ÷ 6 + 3 - 2 x 5

0.83 + 3 – 2 × 5

0.83 + 3 – 10

3.83 – 10 ≠ 13

Option 2 → ÷ and –

Given equation: 5 + 6 ÷ 3 - 2 x 5 = 13

After changing sign

5 + 6 - 3 ÷ 2 x 5

5 + 6 – 1.5 × 5

5 + 6 – 7.5

11 – 7.5 ≠ 13

Option 3 → + and x

Given equation: 5 + 6 ÷ 3 - 2 x 5 = 13

After changing sign

5 x 6 ÷ 3 - 2 + 5

5 x 2 – 2 + 5

10 – 2 + 5

15 – 2 = 13

13 = 13

Option 4 → ÷ and x

Given equation: 5 + 6 ÷ 3 - 2 x 5 = 13

After changing sign

5 + 6 x 3 - 2 ÷ 5

5 + 6 x 3 – 0.4

5 + 18 – 0.4

23 – 0.4 ≠ 13

Hence, option 3 is the correct answer.

Q20. Answer: (b) Charles Robert Darwin

The correct answer is Charles Robert Darwin.

• Charles Robert Darwin was a British naturalist and biologist known for his theory of evolution and his understanding of the process of natural selection.

• In 1859, he published his landmark book, On the Origin of Species. Darwin's theory of evolution and the process of natural

selection later became known simply as “Darwinism.”

Important Points

• R.H Whittakar was an American plant ecologist.

• He was the first to propose the five kingdoms taxonomic classification of the world's biota.

• The five kingdoms are Kingdom Monera, Kingdom Protista, Kingdom Fungi, Kingdom Plantae, and Kingdom Animalia.

• He also proposed the Whittaker Biome Classification, which categorized biome-types upon two abiotic factors: temperature and precipitation.

• Carl Linnaeus was a Swedish botanist, zoologist, and physician who formalized binomial nomenclature, the modern system of naming organisms.

• He is known as the "father of modern taxonomy".

• He was the first to frame principles for defining natural genera and species of organisms and to create a uniform system for naming them, known as binomial nomenclature.

• Mendeleyev was a Russian chemist and inventor.

• He is best remembered for formulating the Periodic Law and creating a farsighted version of the periodic table of elements.

• Mendeleev devised the periodic classification of the chemical elements, in which the elements were arranged in order of increasing atomic weight.

Q21. Answer: (a) G

The correct answer is G.

• According to Newton's Law of Universal Gravitation, The gravitational constant is the proportionality constant which is denoted by G.

• The value of G is 6.673×10-11 N m² kg^(-2).

Important Points

• Newton's law of universal gravitation: The attractive force between two objects (F) is equal to G times the product of their masses (m1, m2) divided by the square of the distance between them (r).

F = G(m1m2/r²)

Key Points

• The acceleration of objects due to the gravity on Earth is around 9.8 ms^(-2), which is denoted by g.

• To leave Earth’s gravitational pull behind, an object must travel 7 miles/second.

• At the center of the Earth, every object is weightless.

Q22. Answer: (a) 200

Shortcut Trick

Area of Semicircle = 50 π => (1/2) × π × r² = 50 π => r² = 100 => r = 10.

In an inscribed semicircle where the diameter is the length (L), the breadth (B) equals the radius (r).

Area of Rectangle = L × B = (2r) × r = 2r².

Area of Rectangle = 2 × 100 = 200.

Therefore The correct answer is 200.

Alternate Method

Given: Area of semicircle = 50 π. The diameter coincides with the length of the rectangle.

Formula Used: Area of Semicircle = (1/2) × πr²; Area of Rectangle = Length × Breadth.

Calculations:

=> Area of Semicircle = (1/2) πr² = 50 π

=> r² = 50 × 2 = 100

=> r = 10

=> For a semicircle inscribed in a rectangle with its diameter as the length:

=> Length (L) = Diameter = 2r = 2 × 10 = 20

=> Breadth (B) = Radius = r = 10 (since the semicircle touches the opposite side)

=> Area of Rectangle = L × B = 20 × 10

=> Area of Rectangle = 200

Therefore The correct answer is 200.

Additional Information

Properties of Inscribed Semicircle

When a semicircle is inscribed in a rectangle with its diameter on the length, the aspect ratio of the rectangle is always 2:1.

Circle Mensuration

Area of Full Circle = πr^2; Perimeter of Semicircle = $\pi r + 2r$.

Area Comparison

The ratio of the area of the semicircle to the area of the circumscribing rectangle is $\pi : 4 \approx 0.785$.

Q23. Answer: (c) Kamal kumbhar

The correct answer is Kamal kumbhar

• Kamal Kumbhar is an Indian social entrepreneur from Osmanabad, Maharashtra.

• She is the founder of Kamal Poultry and Ekta Sakhi Producer Company.

• She started Kamal Poultry and Ekta Sakhi Producer Company with a capital of only "2000" and encouraged around 3,000 women in the drought-prone region of Osmanabad to successfully run poultry farms and to be financially independent.

• Kamal Kumbhar was awarded the CII Foundation Woman Exemplar Award in 2017 by the President of India for her extraordinary contribution to the field of micro-enterprise.

Additional Information

• CII foundation women exemplar award is a part of the CII Foundation Woman Exemplar Program (WEP) which was launched in 2005 by the CII Foundation (CIIF).

• The CII Woman Exemplar Award is given to the exemplary women change-makers from grassroots, who overcame grave personal challenges to create transformative work impacting communities and providing new paradigms for social development.

• The Award promotes women's empowerment at the community level by discovering and recognizing those who have contributed significantly in the fields of Education & Literacy, Health, and Micro-Enterprise.

• It carries a cash reward of Rs 3,00,000.

• Ms. Bhimavva Chalwadi of Goa, Ms. Vanlalruati of Mizoram, and Ms. Nilima Tigga of Jharkhand have conferred with the awards for education, health, and micro-enterprise respectively at the CII Annual Session 2019 held in New Delhi.

Q24. Answer: (a) Size – 18-25 µm

The correct answer is Size - 18-25 µm.

Key Points

Cells are the basic, fundamental, structural, and functional unit of life responsible for all life's processes, hence they are called Building blocks of life.

On the basis of the count, cells are of three types:- 1. RBCs 2. WBCs 3. Platelets.

• RBCs are called red blood cells and help in oxygen transport from the lungs to all body organs and tissues.

• WBCs are called white blood cells and help to fight infection and eat up all germs.

• Platelets help in blood clotting.

RBCs	WBCs	Platelets
Life span is 120 days	The life span is 13 to 20 days	Life span is 3 to 7 days
Produced in bone marrow	Produced in the lymph node, spleen, etc.	Produced in bone marrow
Due to the presence of hemoglobin, Red in color	Due to the absence of hemoglobin, colorless.	Platelets are yellow in color.
Low count of RBCs signifies anemia Number increases at high altitudes	Low count of WBCs signifies leukopenia A high count results in infection in the body	A low count of Platelets signifies unusual bleeding A high count can cause blood clots to develop spontaneously.

Important Points

• WBCs are also called leukocytes or white corpuscles.

• The life span of WBCs is 13 to 20 days.

• Total WBCs count ranges from 4,500 to 10,000.

• WBCs are a cellular component of the blood that lacks hemoglobin, has a nucleus, is capable of mobility, and producing antibodies.

• They act as a " Soldier or Guard " of our body.

• The size of WBCs is 12 to 17 µm in diameter and about three times of RBCs.

• WBCs do not have any fixed shape, they may be circular, rhomboid or any other shape.

Q25. Answer: (c) 35

Shortcut Trick

Total Work = 15 × 20 = 300 units.

Work done in first 10 days = 15 × 10 = 150 units.

Work done in next 5 days = 10 × 5 = 50 units.

Remaining work = 300 − (150 + 50) = 100 units.

Remaining persons = 10 − 5 = 5. Days needed = 100 ÷ 5 = 20 days.

Total Days = 10 + 5 + 20 = 35 days.

Therefore The correct answer is 35 days.

Alternate Method

Given: Initial 15 persons can finish the job in 20 days.

Formula Used: Total Work = Number of Persons × Number of Days

=> Total Work = 15 × 20 = 300 units

=> Work (Phase 1) = 15 × 10 = 150 units

=> Work (Phase 2) = (15 − 5) × 5 = 10 × 5 = 50 units

=> Total Work done so far = 150 + 50 = 200 units

=> Remaining Work = 300 − 200 = 100 units

=> Remaining Persons = 10 − 5 = 5 persons

=> Time for remaining work = 100 ÷ 5 = 20 days

=> Total duration = 10 + 5 + 20 = 35 days

Therefore The correct answer is 35 days.

Additional Information

Work-Person Equation

Total work is proportional to the product of efficiency, number of persons, and time (M1D1H1/W1 = M2D2H2/W2).

Variable Manpower

When manpower changes periodically, the sum of work done in each interval equals the total work required.

Inverse Proportion

For a constant piece of work, the number of persons is inversely proportional to the number of days taken.

Q26. Answer: (d) Rs. 600

Shortcut Trick

Total percentage gap = 15% (loss) + 10% (gain) = 25%

According to the question, this 25% gap = Rs. 150

Value of 1% = 150 ÷ 25 = 6

Cost Price (100%) = 6 × 100 = 600

Therefore The correct answer is Rs. 600.

Alternate Method

Given:

Initial loss = 15%

Expected gain = 10%

Increase in Selling Price = Rs. 150

Formula Used:

Selling Price (SP) = Cost Price (CP) × (100 ± Profit or Loss%) ÷ 100

=> Let the Cost Price (CP) of the textbook be Rs. x.

=> Initial Selling Price (SP1) = x − 15% of x = 0.85x

=> New Selling Price (SP2) = x + 10% of x = 1.10x

=> Difference = SP2 − SP1 = 150

=> 1.10x − 0.85x = 150

=> 0.25x = 150

=> x = 150 ÷ 0.25

=> x = 600

Therefore The correct answer is Rs. 600.

Additional Information

Relationship between CP and SP

Profit is earned when SP > CP, and Loss occurs when CP > SP. CP is the base for percentage calculation.

Net Percentage Gap

When switching from a loss of L% to a profit of P%, the total change in percentage is (L + P)% of the Cost Price.

Marked Price and Discount

Selling Price is also calculated as Marked Price (MP) − Discount. Discount is always calculated on MP.

Q27. Answer: (a) eight-fold path

The correct answer is the eight-fold path

• The Panchshila of Buddha is comprised of the basic teachings of conduct which are the eight-fold path.

• The Panchshila or Five Precepts and refrain from them are Violence, stealing, sexual misconduct, lying, or gossip, taking intoxicating substances like drugs or alcohol.

Buddhism	
Founder	Siddhartha Gautam
Born in	Circa 563 BCE
Birth Place	Lumbini, Nepal
Bodhi (enlightenment)	Under a pipal tree at Bodhgaya, Bihar.
First sermon	Sarnath (Dharma-Chakra-Pravartana)
Died in	Kushinagar (Mahaparinibban)
Four noble truths	Dukkha Samudya Nirodha Atthanga Magga (Eight-Fold Path).
Eight-Fold Paths	Right view Right intention Right speech Right action Right livelihood Right mindfulness Right effort Right concentration

Q28. Answer: (d) Pullela Gopichand

The logic is:

1) Kapil Dev – is a cricketer by profession.

2) Ravi Shastri – is a cricketer by profession.

3) Sachin Tendulkar – is a cricketer by profession.

4) Pullela Gopichand - is a badminton player by profession.

Hence, ‘Pullela Gopichand’ is the odd one out.

Q29. Answer: (a) —C = C—

The correct answer is —C=C—.

Important Points

• In organic chemistry, Hydrocarbons are classified into three:- 1. Alkanes 2. Alkenes 3. Alkynes.

• Hydrocarbons are the derivates of the carbon and hydrogen compounds.

• Alkanes are represented by Single Bond between two carbons and having the chemical formula C_nH_(2n+2,)the first member of the alkane group - Methane (CH_(4)), Symbolic representation of alkanes is —C—C—.

• Methane is colorless, odorless, flammable gas. it is used primarily as fuel to make heat and light. it is used in the manufacturing of organic chemicals.

• Alkenes are represented by Double Bond between two carbons and having chemical formula C_nH_(2n,)the first member of the alkene group - Ethene (C2H4), Symbolic Representation of alkenes is —C=C—.

• Ethene is used in the production of ethylene glycol (1,2-ethanediol) an automotive anti-freezing agent, used in the production of polymers such as polythene, polyvinyl chloride, polystyrene.

• Alkynes are represented by a Triple Bond between two carbons and having chemical formula C_nH_(2n-2,)the first member of the alkyne group - Ethyne (C2H_(2)), symbolic representation of alkynes is —C=C—.

• Ethyne is also called Acetylene which is used in portable lighting, welding, and cutting, production of Chemicals.

• Water is represented by Two hydrogens attached to one oxygen by a single bond and having chemical formula H2O, also called as Dihydrogen Oxide, the symbolic representation of water is H —O—H.

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• Carbon dioxide is represented by Two oxygens attached to one carbon by a Double bond and having the chemical formula CO_(2,)the symbolic representation of carbon dioxide is O=C=O.

Q30. Answer: (d) Both the conclusions follow

I. The tenant is agitated due to mosquito nuisance. → True (As, “It is hindering my night’s sleep” implies that the tenant is agitated due to mosquito nuisance.)

II. Generally, there are no mosquitoes in highrise buildings. → True (As, “Now-a-days, even in highrise bulidings, there are lot of mosquitoes” the word ‘even’ here clarifies that generally there are no mosquito in buildings.)

Hence, both the conclusions follow.

Q31. Answer: (a) Berzelius

The correct answer is Berzelius.

• He was the scientist who suggested that the symbols should be made of one or more letters.

• He discovers the chemical elements cerium and selenium and technic of isolate silicon and thorium.

Important Points

Democritus	**• He was a greek philosopher, introduced the idea of the atom as the basic building block matter. - He theorized that all material bodies are made up of indivisibly small “atoms.”**
Proust	• He was a french writer who wrote the longest novel in the world: " À la recherche du temps perdu", which has 1,267,069 words in it.
Lavoisier	• Known as the father of modern chemistry. - Discovers The oxygen theory of combustion.

Q32. Answer: (d) B

The correct mirror image for the question figure is shown below:

Hence, ‘option 4’ is the correct answer.

Q33. Answer: (a) Ribo nucleic acid

The correct answer is Ribonucleic acid.

• It is a polymer of nucleotides that is made up of a ribose sugar, a phosphate, and bases such as adenine (A), guanine (G), cytosine (C), and uracil (U).

• It has various biological roles in coding, decoding, regulation, and expression of genes.

• RNA is a nucleic acid messenger between DNA and ribosomes.

• Thymine (T) in DNA is replaced by uracil (U) in RNA.

Important Points

• There are three main types of RNA – rRNA (ribosomal), tRNA (transfer), mRNA (messenger).

• mRNA: It transcribes the genetic code from DNA into a form that can be read and used to make proteins.

mRNA carries genetic information from the nucleus to the cytoplasm of a cell.

• rRNA: It directs the translation of mRNA into proteins.

• tRNA: It brings or transfers amino acids to the ribosome that correspond to each three-nucleotide codon of rRNA. The amino acids then can be joined together and processed to make polypeptides and proteins.

Q34. Answer: (d) Only conclusion I follows

Note: The official question of Group D has a discrepancy. Therefore, we have rephrased the first conclusion.

• Early morning exercise has some benefits. → Follows (The word "good" used in the question statement implies that it is beneficial to exercise in the morning in "some" sense. Thus, conclusion I follows.)

• It is wise to choose free time available for workouts. → Does not follow. (The availability of time is not discussed anywhere in the statement. Thus, conclusion II does not follow.)

Hence, only conclusion I follows.

Q35. Answer: (c) Fe

The correct answer is Fe.

• This is one of the limitations of Newlands' Law of Octaves.

• To fit elements into his table, Newlands adjusted two elements in the same slot, but also put some unlike elements under the same note.

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• For example, cobalt and nickel were in the same slot and these were placed in the same column as fluorine, chlorine, and bromine which have very different properties than these elements.

• Iron, which resembles cobalt and nickel in properties, had been placed far away from these elements.

Important Points

• Other limitation of Newlands' Octaves law:

• The Law of Octaves was applicable only up to calcium, as after calcium every eighth element did not possess properties similar to that of the first.

• Newly discovered elements' properties did not fit into the Law of Octaves. Newlands assumed that only 56 elements existed in nature and no new elements will be discovered in the future.

Key Points

ELEMENT	GROUP	ATOMIC NUMBER
Mn	7	25
Al	13	13
Fe	8	26
Mg	2	12

Q36. Answer: (d) 33O

The logic is:

Hence, '33O' is the correct answer.

Q37. Answer: (d) Neither (1) nor (2) follows

The least possible venn diagram is:

1. All the slates are stars. → False (As, All the slates are suns. Some stars are suns. → So, All the slates are stars is possible, but it is not definite)

2. Some stars are slates. → False (As, As, All the slates are suns. Some stars are suns. → So, Some stars are slates is possible, but it is not definite)

Hence, neither (1) nor (2) follows.

Q38. Answer: (b) 6

The number of circles in the figure is shown below:

Hence, '6' is the correct answer.

Q39. Answer: (b) C

In each option except image C, there are four lines outside the circle, while in image C there is only three lines.

Hence, 'option 2' is the odd one out.

Q40. Answer: (a) 13 : 16

The solution is in Hindi. Read it online.

Q41. Answer: (a) D

The logic is:

V = 22

T = 20

L = 12

S = 19

The place value of V, T and L are even numbers, while the place value of S is an odd number.

Hence, 'option 1' is the odd one out.

Q42. Answer: (c) 18

Shortcut Trick

For a set of n numbers where the average of the first (n−1) and last (n−1) numbers are given, the range is calculated as:

Range = (Average of largest group − Average of smallest group) × Number of elements in group

Range = (28 − 22) × 3

Range = 6 × 3 = 18

Therefore The correct answer is 18.

Alternate Method

Given:

Four numbers in ascending order: w < x < y < z

Average of smallest three (w, x, y) = 22

Average of largest three (x, y, z) = 28

Formula Used:

Sum of observations = Average × Number of observations

Range = Maximum value − Minimum value

Calculations:

=> Sum of smallest three numbers (w + x + y) = 3 × 22 = 66 ... (i)

=> Sum of largest three numbers (x + y + z) = 3 × 28 = 84 ... (ii)

=> Subtracting equation (i) from equation (ii):

=> (x + y + z) − (w + x + y) = 84 − 66

=> z − w = 18

The range of the data (z − w) is 18.

Therefore The correct answer is 18.

Additional Information

Range of Data

The range is the simplest measure of variability, calculated as the difference between the maximum and minimum values: Range = X_(max) − X_(min).

Properties of Averages

If the average of n observations is A, then the total sum is A × n. When comparing overlapping groups, the difference in sums equals the difference between the non-overlapping elements.

Ascending Order

Arranging data in ascending order ensures that the first element is the minimum and the last element is the maximum, making the range calculation straightforward.

Q43. Answer: (d) D

All options except ‘carriage’ are vehicles that run on road, while ‘carriage’ runs on railway track.

Hence, ‘carriage’ is the odd one out.

Q44. Answer: (b) 1

Shortcut Trick

Subtract 3x and 7 from both sides to group like terms: 9 − 7 ≥ 5x − 3x.

This simplifies to 2 ≥ 2x.

Divide both sides by 2 to isolate the variable: 1 ≥ x.

The condition x ≤ 1 implies that the maximum possible value for x is 1.

Therefore The correct answer is 1.

Alternate Method

Given:

3x + 9 ≥ 5x + 7

Method Used:

Solving Linear Inequalities by isolating the variable x.

Calculations:

=> 3x + 9 ≥ 5x + 7

=> 9 − 7 ≥ 5x − 3x

=> 2 ≥ 2x

=> 2/2 ≥ x

=> 1 ≥ x

=> x ≤ 1

Since x can take any value less than or equal to 1, the largest value it can attain is 1.

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Therefore The correct answer is 1.

Additional Information

Properties of Inequalities

When adding or subtracting the same number on both sides, the inequality sign remains unchanged.

Multiplication by Negative Numbers

If you multiply or divide both sides of an inequality by a negative number, the direction of the inequality sign must be reversed.

Maximum and Minimum Values

For an expression $x \leq k$, the maximum value is k. For $x \geq k$, the minimum value is k.

Q45. Answer: (c) Brother

The family tree diagram is shown below:

Hence, the boy plying cricket is brother of Gaurav.

Q46. Answer: (d) Microwave

The correct answer is the Microwave.

Key Points

• A microwave oven uses microwaves to heat food.

• In the case of microwave ovens, the commonly used radio wave frequency is roughly 2,500 megahertz (2.5 gigahertz).

• Radio waves in this frequency range absorbed by water, fats, and sugars. When they are absorbed they are converted directly into atomic motion or vibration.

• Therefore heavy motion or vibration is converted into heat.

Important Points

• Microwaves are not absorbed by most plastics, glass, or ceramics.

• The frequency of the Microwave equals the resonance frequency of water. Therefore foods could be heated up by the oscillation of water molecules.

Additional Information

• An Electric heater, Electric blub (with filament), Electric iron is the electrical device that converts an electric current into heat.

• They working on the principle of the Joule heating effect.

• An electric current passing through a resistor will convert that electrical energy into heat energy.

Q47. Answer: (b) Fe

The correct answer is Fe.

• Rusting is an oxidation reaction. When acidic substances (including water) come in contact with metals, such as iron and/or steel, it forms rust.

• Rust is the result of corroding steel after the iron (Fe) particles have been exposed to oxygen and moisture (e.g., humidity, vapor, immersion).

• When steel is exposed to water, the iron particles are lost to the water's acidic electrolytes. The iron particles then become oxidized, which results in the formation of Fe^+^+.

• Two electrons are released and flow through the steel to another area of the steel known as the cathodic area.

• Balanced equation: $4Fe + 3O_2 + 6H_2O \rightarrow 4Fe(OH)_3$

• Corrosion prevention processes include the use of paint or metallic coatings are the following:

• Hot-dip galvanizing.

• Zinc thermal spraying.

• Aluminum thermal spraying.

Q48. Answer: (c) Rs. 5,335

Shortcut Trick

Convert Profit% to a fraction: 37.5% = 3/8.

Ratio of Cost Price (CP) to Selling Price (SP) = 8 : (8 + 3) = 8 : 11.

Given 8 units = Rs. 3,880 => 1 unit = 3,880 ÷ 8 = Rs. 485.

SP = 11 units = 11 × 485 = Rs. 5,335.

Therefore The correct answer is Rs. 5,335.

Alternate Method

Given: CP = Rs. 3,880, Profit% = 37.5%

Formulas: SP = CP × (100 + Profit%) ÷ 100

=> Selling Price = 3,880 × (100 + 37.5) ÷ 100

=> Selling Price = 3,880 × 137.5 ÷ 100

=> Selling Price = 3,880 × 1.375

=> Selling Price = Rs. 5,335.

Therefore The correct answer is Rs. 5,335.

Additional Information

Percentage to Fraction Conversion

Common fractions like 12.5% = 1/8, 25% = 1/4, and 37.5% = 3/8 help in solving Profit and Loss problems quickly using the ratio method.

Profit and Loss Relation

When there is a profit, SP is always greater than CP (SP = CP + Profit). When there is a loss, CP is greater than SP (SP = CP − Loss).

Q49. Answer: (b) Addition reaction

The correct answer is Addition reaction.

• Hydrogenation is a process that uses hydrogen gas to change a liquid vegetable oil into a hard spread/margarine.

• This process stabilizes the oil and prevents spoilage from oxidation.

• Nickel is the preferred catalyst for the hydrogenation of fats and oils to speed up the reaction.

• The hydrogenation process increases the melting point of the fat, which changes liquid oil into solid shortening.

Important Points

Displacement reaction	**• A chemical reaction in which a more reactive element displaces a less reactive element from its compound. - Both metals and non-metals take part in displacement reactions. - Example: CuO + Ca → Cu + CaO**
Combination reaction	• Known as a synthesis reaction. - A reaction in which two reactants combine to form one product. - When a metal undergoes a combination reaction with oxygen, a metal oxide is formed. - Rust is the product of a combination reaction of iron and oxygen. - Example: 2Na + Cl2 → 2NaCl
Substitution reaction	• Known as a single displacement reaction. - One functional group in a chemical compound is replaced by another functional group. - Types: nucleophilic and electrophilic. - CH3Cl reacted with a hydroxyl ion (OH^-) that will produce CH3OH and chlorine. This substitution reaction replaces the chlorine atom on the original molecule with the hydroxy ion.

Mistake Points

• In addition reaction, hydrogen is added in the presence of any catalyst to make a hydrocarbon saturated

• In a combination reaction two elements combine together to form a single compound.

• so the hydrogenation is an addition reaction. It is done by using the pd as catalyst

Q50. Answer: (c) 343.338

CONCEPT:

Add the digits before and after decimal separately, then add the two.

SOLUTION:

Considering the given statement

30.9 + 3.09 + 0.309 + 0.039 + 309 = ?

Before decimal = 30 + 3 + 0 + 0 + 309 = 342

After decimal = 0.9 + 0.09 + 0.309 + 0.039 = 1.338

Add the two = 342 + 1.338 = 343.338

Therefore Value of given statement is 343.338

Q51. Answer: (b) 20

CONCEPT:

Here we need to look at the graph and find the value in y-axis corresponding to the year asked represented on the x-axis.

SOLUTION:

From the given bar graph we can say that,

Year on x-axis corresponds with value 20 on y-axis.

Therefore No. of units sold in 2009 is 20 lakhs.

Q52. Answer: (d) 1931

The correct answer is 1931.

• The Gandhi-Irwin Pact was signed on 5th March 1931 by Mahatma Gandhi and Viceroy Lord Irwin.

• In this pact, Gandhi agreed to end the civil disobedience movement in India against British rule and to join the second Round Table Conference.

Additional Information

• The Poona Pact was signed on 24 September 1932 at Yerwada Central Jail in Poona, India.

• It refers to an agreement between B. R. Ambedkar and Mahatma Gandhi.

• It was signed by B.R Ambedkar for the depressed classes and Madan Mohan Malviya for the upper Caste Hindus resulting in the end of the fast that Gandhi was undertaking in jail as wrath against the MacDonald communal award.

Q53. Answer: (c) Coelenterata

The correct answer is Coelenterata.

• The body wall consisting of two layers of cells, an outer epithelium (ectoderm) and an inner gastrodermis (entoderm).

• In between the two layers, there is a gelatinous non-cellular layer called mesoglea is present.

• Coelenterata or Phylum Cnidaria belongs to the Animalia kingdom.

• Examples: Hydra, Obelia, Physalia physalis, Tubularia.

• Classification of Coelenterates: Hydrozoa, Scyphozoa, Cubozoa, Anthozoa.

Important Points

• Platyhelminthes are triploblastic, bilaterally symmetrical, dorsoventrally flattened, acoelomate flatworms.

• Their organ construction without a definite anus, circulatory, skeletal or respiratory system.

• They have a Protonephridial excretory system and mesenchyme filling the space between the various organ of the body.

• Annelids (ringed worms or segmented worms) are a large phylum belonging to the kingdom Animalia.

• Annelida split into three major groups: Polychaeta, Oligochaeta (earthworms), and Hirudinea (leeches).

• They respire through their body surface.

• Nephridia are the excretory organs.

• They move with the help of Setae.

• Nematoda is also known as “roundworms” belongs to the phylum.

• Nematodes present in the soil feed on the bacteria, fungi, and other nematodes.

• Nematoda plays an important role in nutrient recycling.

Q54. Answer: (c) Sunday

CONCEPT:

Here we need to look for the day that has reached the limit i.e. 25 members.

SOLUTION:

From the given bar graph we can say that,

Maximum limit of members that can be accommodated is 25.

On x-axis the day Sunday has the bar raised till 25 corresponding to y-axis.

Therefore On Sunday more members cannot be accommodated.

Q55. Answer: (d) 1

CONCEPT:

Use the concept of BODMAS, so first multiply then subtract and lastly divide.

SOLUTION:

Considering the given statement

((0.54 × 0.540 - 0.460 × 0.460))/((1 - 0.920)) = ?

=> ((0.2916 - 0.2116))/0.08

=> 0.08/0.08 = 1

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Alternate method:

Considering the given statement

((0.54 × 0.540 - 0.460 × 0.460))/((1 - 0.920)) = ?

=> $(0.54^2 - 0.46^2)/0.08$

=> ((0.54 + 0.46) × (0.54 - 0.46))/0.08

=> (1 × 0.08)/0.08 = 1

Q56. Answer: (b) Thailand

The correct answer is Thailand.

• Baht (B) is the official currency of Thailand.

• Thailand is a Southeast Asian country.

• Capital: Bangkok

• King: Maha Vajiralongkorn

• Thailand is called the country of white elephants.

Important Points

COUNTRY	CURRENCY	CAPITAL
Togo	CFA franc	Lome
Tajikistan	Tajikistani somoni	Dushanbe
Tanzania	Tanzanian Shilling	Dodoma

Q57. Answer: (c) 1 hour 15 mins

Shortcut Trick

Average speed of the whole journey = 300 ÷ 5 = 60 km/hr.

Using Alligation on speeds: (Higher speed 75) − (Average 60) = 15; (Average 60) − (Lower speed 55) = 5.

Ratio of Time (Higher : Lower) = 5 : 15 = 1 : 3.

Total time ratio parts = 1 + 3 = 4 units → 5 hours.

Time at higher speed = (1 ÷ 4) × 5 = 1.25 hours = 1 hr 15 min.

Therefore The correct answer is 1 hr 15 min.

Alternate Method

Given: Total Distance = 300 km, Total Time = 5 hours, Speed1 = 75 km/hr, Speed2 = 55 km/hr.

Formula Used: Distance = Speed × Time

=> Let time spent at 75 km/hr be T hours.

=> Then time spent at 55 km/hr is (5 − T) hours.

=> 75 × T + 55 × (5 − T) = 300

=> 75T + 275 − 55T = 300

=> 20T = 25

=> T = 25 ÷ 20 = 1.25 hours

=> 1 hour + (0.25 × 60) minutes = 1 hr 15 min.

Therefore The correct answer is 1 hr 15 min.

Additional Information

Average Speed

Defined as Total Distance divided by Total Time taken for the entire journey.

Alligation Rule for Speed

When alligation is applied to speeds, the resulting ratio is always the ratio of the time taken at those respective speeds.

Unit Conversion

To convert hours to minutes, multiply by 60. Example: 0.25 hr = 0.25 × 60 = 15 minutes.

Q58. Answer: (a) Acidic

• The Oxides of non-metals are usually acidic in nature.

• Non-metal react with oxygen in the presence of air and produce non-metal oxides.

• Non-metal oxides are usually gases at room temperature.

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• Non-metal oxides are easily dissolved in the water and form an acidic solution.

Q59. Answer: (d) 72 km/hr

Shortcut Trick

When the distance for two journeys is equal (X km onward and X km return), use the harmonic mean formula.

Average Speed = (2 × a × b) ÷ (a + b)

Average Speed = (2 × 60 × 90) ÷ (60 + 90) = 10800 ÷ 150 = 72 km/hr.

Therefore The correct answer is 72 km/hr.

Alternate Method

Given: Onward speed = 60 km/hr, Return speed = 90 km/hr, Distance = X km.

Formula Used: Average Speed = Total Distance ÷ Total Time

=> Time taken for onward journey (t1) = X ÷ 60

=> Time taken for return journey (t2) = X ÷ 90

=> Total Distance = X + X = 2X

=> Total Time = (X ÷ 60) + (X ÷ 90) = (3X + 2X) ÷ 180 = 5X ÷ 180 = X ÷ 36

=> Average Speed = 2X ÷ (X ÷ 36) = 2X × (36 ÷ X) = 72 km/hr.

Therefore The correct answer is 72 km/hr.

Additional Information

Average Speed for Different Distances

If distances are different, use the basic formula: Total Distance (d1 + d2 + ...) ÷ Total Time (t1 + t2 + ...).

Three Equal Distances

If a train covers three equal distances at speeds u, v, and w, the Average Speed = (3uvw) ÷ (uv + vw + wu).

Relative Speed

In the same direction, relative speed is (u − v). In opposite directions, it is (u + v).

Q60. Answer: (c) C-12

The correct answer is C-12.

• The International Union of Chemists selected the most stable carbon isotope (C-12) or ^{12}C as the standard for comparison of the atomic masses of various elements.

• The mass of C-12 is taken as a 12 atomic mass unit (standard).

• A Carbon-12 contains six protons, six neutrons, and six electrons.

Additional Information

• The amount of carbon-14 found in fossils allows paleontologists to determine their age.

• A carbon-14 contains six protons, eight neutrons, and six electrons.

• C-16 is a new Isotope of Carbon.

• Oxygen-16 (^(16)O) is a stable isotope of oxygen contains 8 neutrons and 8 protons.

• Oxygen is composed of three stable isotopes, ^(16)O, ^(17)O, and ^(18)O.

• N-14 is a stable isotope of nitrogen, contain 7 protons and 7 neutrons.

Q61. Answer: (c) Solid

The correct answer is Solid.

• Sound propagates maximum in a solid because the particles in a solid are closer and tight to each other so the transfer of sound wave moves faster than other media (gas, vacuum, liquid).

• This closeness of particles due to density means that they can collide very quickly.

• The speed of sound in solid is 6000 ms-1 while the speed of sound in steel is equal to 5100 ms^(-1).

• The sound travels 35 times faster in diamonds than in the air.

Important Points

• The speed of sound in a vacuum is zero because there are no particles present in the vacuum. So, there is no propagation of sound waves.

• In a space, Sound cannot travel.

• The density of a liquid is greater than the density of a gas, therefore, the distance between molecules in a liquid is more than in solids but are less than in gases. So the speed of sound in liquids is between the speed of sound in solids and gases.

• The speed of sound in water is more than that of the air.

• The speed of sound in water is 1480 ms^(-1).

• The speed of sound: Solid > Liquid > Gas.

Key Points

Material	Speed of sound (m/s)
Beryllium	12890
Copper	6420
Aluminum	6420
Steel	5940
Water	1496
Air	331

Q62. Answer: (a) B

The logic is:

L + 1 = M; M + 1 = N; N + 1 = O

So, answer figure 'B' will be the next figure for the given series.

Hence, 'option 1' is the correct answer.

Q63. Answer: (c) 15

The minimum number of lines required to create the following figure is shown below:

Hence, '15' is the correct answer.

Q64. Answer: (b) 21%

Shortcut Trick

Net percentage change in area = x + y + (x × y) / 100

Since it is a square, both dimensions (length and breadth) increase by 10%.

Change = 10 + 10 + (10 × 10) / 100

Change = 20 + 1 = 21%

Therefore The correct answer is 21%.

Alternate Method

Given: Increase in side = 10%

Formula Used: Area of Square = Side²

=> Let original side be 10 units.

=> Original Area = 10 × 10 = 100 sq. units.

=> New side = 10 + 10% of 10 = 11 units.

=> New Area = 11 × 11 = 121 sq. units.

=> Percentage Increase = (121 − 100) / 100 × 100 = 21%.

Therefore The correct answer is 21%.

Additional Information

Successive Percentage Formula

For two successive changes a% and b%, the net change is (a + b + ab/100)%.

Square Perimeter Change

If the side of a square increases by x%, the perimeter also increases by exactly x%.

Volume Change for Cube

If the side of a cube increases by 10%, the volume increases by $(1.1)^3 - 1 = 33.1\%$.

Q65. Answer: (d) Public Leadership

The correct answer is Public Leadership.

• Maharashtra CM Devendra Fadnavis has been selected for the SIES-Sri Chandrasekarendra Saraswati National Eminence Award in the category of Public Leadership.

• Hari Katha exponent Kamala Murthy has been selected for Social Thinkers, Philosophers, and Pravachana Karthas category.

• John Marr has been felicitated for his work in the International category.

• The ISRO chairman A S Kiran Kumar has been presented the award for Science & Technology category.

Additional Information

• The SIES-Sri Chandrasekarendra Saraswati National Eminence Award is given in memory of the late Seer of Kanchi Sri Chandrasekarendra Saraswati who passed away at the age of 100 in 1994.

• The awards were instituted by the South Indian Education Society (SIES)

• It carries a cash prize of Rs 2.5 lakh, a citation, a shawl, and an ornamental lamp.

2017 SIES Awards	
Social Thinking	Pujya Swami Omkarananda
International category	Dr. David Dean Shulman
Science and Technology	Prof. Baldev Raj
Public Leadership	Shri. Pranab Mukherjee
Community Leadership	General Vishwanath Sharma

Q66. Answer: (c) [figure]

The mirror image of the given figure with respect to the line AB is shown below:

Hence, ‘option 3’ is the correct answer.

Q67. Answer: (b) $ 16 billions

The correct answer is $ 16 billion.

• US retail giant Walmart Inc will pick up a 77% stake in India’s largest online retailer Flipkart for $16 billion in 2018.

Key Points

• Walmart Inc:

• Owner: Walton family

CEO: Doug McMillon

Founder: Sam Walton

• Flipkart :

• CEO: Kalyan Krishnamurthy

• Founders: Sachin Bansal, Binny Bansal

• HQ: Bangalore, Karnataka, India.

Q68. Answer: (b) 54,000

From the given pie chart we can say that

Total number of tyres produced by all the companies during the year = 180000

Percentage of tyres produced by company B = 30%

Therefore Number of tyres produced by company B in 2017 = 0.3 × 180000 = 54000

Q69. Answer: (d) Rajasthan

The correct answer is Rajasthan.

• Rajasthan has become the second-largest crude oil producer in the country after the offshore field Bombay High.

• The state was producing nearly 90 lakh tonnes of oil annually, which is 24 per cent of the total domestic crude oil production.

Q70. Answer: (b) Ethane

The correct answer is Ethane.

• Ethane (C2H6) is a simple hydrocarbon seen to be chains of carbon atoms where the spare valencies were occupied by hydrogen atoms.

• At standard temperature and pressure, ethane is a colorless, odorless gas.

• Ethane is mainly used to produce ethylene, which is used by the petrochemical industry.

• The common name of ethane is bimethyl.

Additional Information

• Butane (C4H10) is considered a hydrocarbon. At standard temperature and pressure, butane is a highly flammable, colorless, easily liquefied gas that quickly vaporizes.

• It is used as a fuel, an aerosol propellant, in cigarette lighters, and to make other chemicals.

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• Methane (CH4) is gas at room temperature with a single carbon atom with four arms of hydrogen atoms.
• Methane is one of the Greenhouse gases absorb energy reflected by Earth's surface, stopping it from escaping into space.
• Alessandro Volta discovers Methane.
• Methane is used as a fuel for ovens, homes, water heaters, kilns, automobiles, turbines, and other things.
• Activated carbon is used to store methane.
• Propane (C3H8) is a three-carbon alkane, is an odorless gas, for this reason, odorant has been added to detect leaks.
• The complete combustion of propane produces clean water vapor and carbon dioxide.

Q71. Answer: (c) 2.4

• The pH level is a measure of the number of Hydrogen ions in a solution.
• The lower the solution or compound on the pH scale, the higher will be the concentration of hydrogen ions.
• Therefore the solution having a pH of 2.4 will have the highest concentration of hydrogen ions.
• The pH scale ranges from 0 to 14.
• A pH value of 7 is considered neutral, example - water and pH value > 7 is Basic > pH value < 7 is Acidic

Q72. Answer: (b) Force

The correct answer is Force.
• For the first time, Newton's law enabled accurate predictions of motion to be made.
• Force is defined as a push or pulls exerted on one object by another.
• Force measured in Newtons (denoted N, where 1 N is the force required to give a 1 kg mass an acceleration of 1 m/s^2).
Important Points
• Newton's 2nd law states that the rate of change of a body's momentum-the product of its mass and velocity-is proportional to the force applied, and takes place in the direction of the applied force.
Key Points

Inertia	**• Newton's first law of motion, which is sometimes called the law of inertia, explains that an object at rest stays at rest, and an object in motion remains in motion with the same velocity unless acted upon by an external force. - For instance, if the front wheel of a bicycle being ridden at speed hits a large rock, the bike is acted upon by an external force, causing it to stop. Unfortunately for the cyclist, he or she will not have been acted upon by the same force and will continue in motion—over the handlebars.**
Pressure	• A continual force per unit area pushing against an object. - The pressure of gases is caused by the movement of their molecules. - Pascal's law means that pressure exerted on a piston at one end of a fluid-filled cylinder produces an equal increase in pressure on another piston at the other end of the cylinder. - A pascal is the measurement unit for pressure: 1 Pa is defined as 1 N (newton) per square meter.
friction	• A force that resists or stops the movement of objects that are in contact with one another. - Since the force of friction is opposite to the direction of travel, this acceleration causes the object to slow and eventually stop. - For example, when a ball is rolled across the floor, why does it eventually stop? In fact, as the ball rolls, it experiences an outside force: friction, which causes it to decelerate.

Q73. Answer: (c) 20 kg

The correct answer is 20 kg.
• Given, Weight (w) = 196 N, g = 9.8 ms^(-2)
So, mass (m) = (w / g) = 20 kg.
Important Points
• Mass is a measure of the amount of matter in an object.
• Mass is always constant.
• Weight is the force of gravity on an object.

• Weight depends on the gravitational force of attraction.

• Weight (w) = Mass (m) * Gravitational acceleration (g)

• The weight of a body is greater in the pole of the earth than in the equator, because of acceleration of gravity at the poles is 980.665 cm/sec² while at the equator it is 3.39 cm/sec² less due to the centrifugal force.

Q74. Answer: (a) NH4OH

The correct answer is NH4OH.

• A base that can dissolve in water is also called an alkali.

• A base is dissolved in water and make a conjugate acid and conjugate base, both are ion.

• The conjugate base is stronger than the conjugate acid.

Key Points

• Ba(OH)2 (Barium hydroxide, strong base) is soluble in water and gives an alkaline solution.

• Ba(OH)2 → Ba^(2+) + 2 OH^−

• NaOH is also a strong base, fully soluble in water, and gives sodium ions (Na^+) and hydroxyl ions (OH^-).

• NaOH + H2O = Na^+ + OH^-

• Ca(OH)2 (Calcium hydroxide or slaked lime) is slightly soluble in water and forming a basic solution called lime water.

• Ca(OH)2 → Ca^(2+) + 2 OH^-

Q75. Answer: (d) 25%

Shortcut Trick

For a sum to triple itself (n = 3) in 8 years, the interest earned must be 200% of the principal.

Rate (R) = [(n − 1) × 100] ÷ Time

Rate (R) = [(3 − 1) × 100] ÷ 8

Rate (R) = 200 ÷ 8 = 25%

Therefore The correct answer is 25%.

Alternate Method

Given:

Let the Principal (P) = Rs. 100

The sum triples itself, so Amount (A) = Rs. 300

Time (T) = 8 years

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Amount (A) = P + SI

Calculations:

=> SI = A − P

=> SI = 300 − 100 = Rs. 200

=> 200 = (100 × R × 8) ÷ 100

=> 200 = 8 × R

=> R = 200 ÷ 8

=> R = 25%

Therefore The correct answer is 25%.

Additional Information

Sum Doubling Property

To double a sum (n=2) in T years, the rate R = 100 ÷ T. Conversely, time T = 100 ÷ R.

Simple Interest vs Compound Interest

In SI, the Principal remains constant throughout the period, whereas in CI, interest is added to the principal at the end of each period.

Rule of 72 (Approximation for CI)

For Compound Interest, the time to double a sum is approximately 72 ÷ Rate.

Q76. Answer: (a) 12

Shortcut Trick

Recognize the values as part of a Pythagorean Triplet (a, b, c) where $a^2 + b^2 = c^2$.

The standard triplet (3, 4, 5) scaled by 4 gives (12, 16, 20).

Since 20 is the hypotenuse and 16 is one side, the remaining side is 12.

Therefore The correct answer is 12.

Alternate Method

Given: $\sqrt{(20^2 - 16^2)}$

Formula Used: Difference of squares identity: $a^2 - b^2 = (a - b)(a + b)$

$\Rightarrow \sqrt{((20 - 16) \times (20 + 16))}$

$\Rightarrow \sqrt{(4 \times 36)}$

$\Rightarrow \sqrt{144}$

$\Rightarrow 12$

Therefore The correct answer is 12.

Additional Information

Difference of Squares

The expression $a^2 - b^2$ can always be factored into $(a + b)(a - b)$, which simplifies mental square root calculations.

Pythagorean Triplets

Common triplets used in exams include (3, 4, 5), (5, 12, 13), (8, 15, 17), and (7, 24, 25). Multiples of these (like 12, 16, 20) also satisfy the Pythagoras theorem.

Perfect Squares

A perfect square is an integer that is the square of an integer. For example, 144 is a perfect square because $12 \times 12 = 144$.

Q77. Answer: (b) 137.5 J

The correct answer is 137.5 J.

• Given, mass (m) = 11 kg, velocity (v) = 5 ms^(-1).

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

So, the kinetic energy of the object is $1/2*11*5^2 = 137.5$ J.

Key Points

• It is the energy of object mass in motion.

• When an objects' mass doubles, its kinetic energy also doubles.

• When an objects' speed doubles, its kinetic energy quadruples.

• When a pendulum goes uphill (top point), it loses kinetic energy.

Q78. Answer: (d) 89

The logic is:

Hence, ‘89’ is the correct answer.

Q79. Answer: (a) 1800 ms^(-1)

The correct answer is 1800 ms^(-1).

• Given, frequency (f) = 600 Hz, wavelength (λ) = 3 m

The velocity of a sound wave is given by $v = f\lambda$

so, velocity (v) = 600×3 = 1800 ms^(-1)

Important Points

• Sound waves create from vibrations, which move through mediums such as air, water, or any solid before reaching our ears.

• Sound waves can't travel through a vacuum.

• The speed of sound is around 767 miles/hour.

• When sound waves traveling through water, the speed around four times faster than when it travels through the air.

• Sound waves in air or fluid are longitudinal waves.

• Particles of the medium through which the sound is transported vibrate parallel to the direction that the sound wave moves.

Q80. Answer: (a) Rs. 600

Shortcut Trick

Difference in Profit percentages = 10% − 5% = 5%.

According to the question, this 5% difference is equivalent to Rs. 30.

Since Cost Price (CP) is always 100%.

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5% of CP = 30 => 1% of CP = 30 ÷ 5 = 6.

100% of CP = 6 × 100 = 600.

Therefore The correct answer is Rs. 600.

Alternate Method

Given: Difference between Selling Prices (SP) = Rs. 30, Profit1 = 5%, Profit2 = 10%.

Formulas: SP = CP × (100 + Profit%) ÷ 100 | Difference = SP2 − SP1.

Let the Cost Price be x.

=> SP1 = x × 105 ÷ 100 = 1.05x

=> SP2 = x × 110 ÷ 100 = 1.10x

=> Difference = SP2 − SP1 = 1.10x − 1.05x = 0.05x

=> 0.05x = 30

=> x = 30 ÷ 0.05 = 3000 ÷ 5 = 600.

Therefore The correct answer is Rs. 600.

Additional Information

Profit and Loss Basics

Profit occurs when Selling Price (SP) is greater than Cost Price (CP). Profit = SP − CP.

Percentage Difference

When two selling prices are based on the same CP, the difference in SP is equal to the difference in profit/loss percentages multiplied by the CP.

Q81. Answer: (a) Only assumption I is implicit

(Implicit - suggested though not directly expressed)

I. Karan is capable of adapting to different writing skills. → True (As, Karan is versatile writer. His comedy and fiction novels are very popular among youngsters, which implies he is capable of adapting to different writing skills.)

II. All writers are versatile. → False (As, the statement gives information related to Karan only and not all writers.)

Hence, only assumption I is implicit.

Q82. Answer: (d) 2009

The correct answer is 2009.

• The Right of Children to Free and Compulsory Education Act commonly known as The Right to Education Act (RTE) was passed by the Parliament in August 2009.

Important Points

• The Act came into force in 2010 resulting in India becoming one among 135 countries where education is a fundamental right of every child.

• It enforces Education as a Fundamental Right under Article 21-A and aims to provide free and compulsory education to all children aged 6 to 14 years in such a manner as the state may determine.

• The above provision was added by the 86th constitutional amendment act of 2002 which aims to 'Education for All'.

Q83. Answer: (d) Phone : Talk

The logic is:

Refrigerator: Cool → Refrigerator is an appliance which is used for artificial cooling. (Device – Use)

Similarly,

1) Listen : Radio → Radio is a device which is used for transmission of voice related services. (Use - Device)

2) Sit : Chair → Chair is a furniture used for the general purpose of sitting. (Use - Device)

3) Watch : Television → Television is a device used to display virtual images with sound. (Use - Device)

4) Phone : Talk → Phone is a device which is used for talking. (Device – Use)

Note: The relation in all the above given pairs is similar to that of ‘Refrigerator: Cool’, but the order in which they are written is different. Only ‘Phone : Talk’ follows the same order as followed by the given pair in the question.

Hence, ‘Phone : Talk’ is the correct answer.

Q84. Answer: (a) Pema Khandu

The correct answer is Pema Khandu.

• Pema Khandu is the 9^(th) Chief Minister of Arunachal Pradesh, since July 2016.

• He is currently the youngest CM in India.

Key Points

• Governor of Arunachal Pradesh: B. D. Mishra.

Jarbom Gamlin	Former (7^(th)) Chief Minister of Arunachal Pradesh.
Nabam Tuki	Former (8^(th)) Chief Minister of Arunachal Pradesh.
Kalikho Pul	Former Chief Minister of Arunachal Pradesh.

Q85. Answer: (c) B

The logic is:

H + 4 = L,

L + 4 = P,

P + 4 = T,

T + 4 = X,

X + 4 = B

Hence, 'B' is the correct answer.

Q86. Answer: (d) Only assumption I is implicit

(Implicit - suggested though not directly expressed)

I. Student should learn life skills at an early stage as it prepares them for a better future. → True (As, Life skills should be taught right from primary education suggests to learn life skills at an early stage as it prepares them for a better future).

II. Students are taking up paid courses to learn life skills for their jobs. → False (As, it is not mentioned about paid courses in the given statement).

Hence, only assumption I is implicit.

Q87. Answer: (a) 45

Shortcut Trick

Total Work (LCM of 36, 90, 60) = 180 units.

Efficiency of Sarthak = 180 ÷ 36 = 5 units/day.

Efficiency of Vivan = 180 ÷ 90 = 2 units/day.

Efficiency of Ali (Outlet) = −(180 ÷ 60) = −3 units/day.

Combined Efficiency = 5 + 2 − 3 = 4 units/day.

Time taken = 180 ÷ 4 = 45 days.

Therefore The correct answer is 45 days.

Alternate Method

Given:

Time taken by Sarthak (Positive work) = 36 days

Time taken by Vivan (Positive work) = 90 days

Time taken by Ali (Negative work/Emptying) = 60 days

Person	Days	Total Work	Efficiency
Sarthak	36	180	5
Vivan	90	2	
Ali	60	−3	

Formula Used:

Total Efficiency = Efficiency_(Sarthak) + Efficiency_(Vivan) − Efficiency_(Ali)

Time = Total Work ÷ Total Efficiency

Calculations:

=> Total Work = LCM(36, 90, 60) = 180 units

=> Net efficiency of all three = 5 + 2 − 3

=> Net efficiency = 4 units/day

=> Time required to fill the pit = 180 ÷ 4

=> Time = 45 days

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Therefore The correct answer is 45 days.

Additional Information

Pipes and Cisterns Logic

Filling a sandpit is analogous to inlet pipes, while removing sand is analogous to an outlet pipe. Work done by an outlet pipe is always taken as negative.

LCM Method for Time and Work

To find Total Work, calculate the Least Common Multiple of individual time periods. Efficiency is then calculated as Total Work ÷ Individual Time.

Net Work Done

If A and B are filling and C is emptying, 1/Total Time = 1/A + 1/B − 1/C.

Q88. Answer: (a) 2√221 m

GIVEN:

Distance walked towards east = 10 m

Distance walked towards north = 28 m

CONCEPT:

Use Pythagoras theorem to calculate the distance between starting and end points.

FORMULAE USED:

Hypotenuse² = Perpendicular²+ Base²

SOLUTION:

Distance = √(10² + 28²) = √(100 + 784) = √884 = 2√221 m

Therefore Man is 2√21 m away from his starting point.

Q89. Answer: (d) Maternal aunt

The family tree diagram is shown below:

Hence, he met his ‘maternal aunt’.

Q90. Answer: (c) Mumbai Indians

The correct answer is Mumbai Indians.

• Venue: Rajiv Gandhi International Stadium, Uppal, Hyderabad.

• Player Of The Series: Ben Stokes.

• He is the current vice-captain of the England cricket team.

• The final match was between the Mumbai Indians and the Rising Pune Supergiant.

• Player of the match: Krunal Pandya (Mumbai Indians).

Key Points

• Captain of Mumbai Indians in 2017 IPL: Rohit Sharma.

• IPL 2017, known as IPL 10 and sponsored by Vivo.

Q91. Answer: (d) 12

Total number of triangles:

Hence, ‘12’ is the correct answer.

Q92. Answer: (b) Conclusion 1 alone follows

The least possible venn diagram is:

1. Some cloth are napkins → True (As, Some napkins are cloth, so some cloth are napkins)

2. Some papers are cloth → False (As, Some napkins are papers and Some napkins are cloth → So, it is not definite that Some papers are cloth)

Hence, conclusion 1 alone follows.

Q93. Answer: (a) Solar energy

The correct answer is Solar energy.

Key Points

• The process by which plants and algae transfer the Sun’s light energy (Solar energy) into chemical energy like glucose, allowing it to be passed along the food chain. The process absorbs carbon dioxide and releases oxygen.

• Plants obtain their nutrients and water from the soil, and sunlight provides solar energy for photosynthesis.

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• The proportion of carbon in their chemical makeup can rise on a particularly sunny day because more photosynthesis occurs.

Additional Information

• The fungus receives sugar from the plant—made by photosynthesis in the leaves and transported to the roots via the plant's sap.

• Organisms producing their food are chemotrophs in places where there is no sunlight.

• In the deep ocean, organisms get their energy from chemicals released by hydrothermal vents.

• Bacteria can do photosynthesis.

Q94. Answer: (d) Pandit Vishwa Mohan Bhatt

The correct answer is Pandit Vishwa Mohan Bhatt.

Key Points

• He belongs from Jaipur and is a Hindustani classical music instrumentalist who plays the Mohan Veena (slide guitar).

• SP Balasubrahmanyam is an Indian musician, playback singer, music director, actor, dubbing artist, and film producer who worked predominantly in Telugu, Tamil, Kannada, Hindi, and Malayalam.

• Balamurali Krishna, the last of the great Carnatic musicians who preserved the grand Andhra tradition of vocalism.

• Bappi Lahiri was born in Calcutta, he is a classical musician.

Important Points

Awardee	Field of Prominence
Vishwa Mohan Bhatt	Art - Music
Devi Prasad Dwivedi	Literature & Education
Tehemton Udwadia	Medicine
Ratna Sundar Maharaj	Others-Spiritualism
Cho Ramaswamy	Literature & Education –Journalism

Q95. Answer: (b) 21/4m

GIVEN:

Total length of the cloth = 683/4 m

Length of 1 piece of cloth = 31/2 m

CONCEPT:

Here after dividing the total length of the cloth with length of one piece, the remainder is left length of cloth.

FORMULAE USED:

Number of pieces that can be cut = Total length of the cloth/ Length of 1 piece of cloth

SOLUTION:

Number of pieces that can be cut = (275/4) ÷ (7/2) = (275/4) × (2/7) = 19.643

Remaining cloth = (19.643 – 19) × (7/2) = 2.25 m = 21/4 m

Therefore Remaining cloth = 21/4 m

Q96. Answer: (c) 18

CONCEPT:

Use the BODMAS rule to solve, first divide then multiply and lastly add.

SOLUTION:

Considering the given equation,

16 ÷ 2 × 2 ÷ 2 × 2 + 2 = ?

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

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction'

should be calculated.

Now,

16 ÷ 2 × 2 ÷ 2 × 2 + 2 = ?

=> (16/2) × (2/2) × 2 + 2

=> 8 × 1 × 2 + 2

=> 16 + 2 = 18

Therefore Required value = 18

Q97. Answer: (a) 80/150

CONCEPT:

Here just divide the numerator by the denominator. If you end up with a remainder of 0, then you have a terminating decimal.

SOLUTION:

1) 80/150 = 0.5333

2) 81/150 = 0.54

3) 15/48 = 0.3125

4) 21/600 = 0.035

Therefore 80/150 will not terminate.

Q98. Answer: (b) A

The relation is:

LUNG : MAN → The human respiratory system is a series of organs responsible for taking in oxygen and expelling carbon dioxide. The primary organs of the respiratory system are the lungs, which carry out this exchange of gases as we breathe.

Similarly,

GILL : _____ → Fish gills are organs that allow fish to breathe underwater. Most fish exchange gases like oxygen and carbon dioxide using gills that are protected under gill covers on both sides of the pharynx (throat). Gills are tissues that are like short threads, protein structures called filaments.

Hence, 'fish' is the correct answer.

Q99. Answer: (c) 6√3 cm

Shortcut Trick

Side (a) of rhombus = Perimeter ÷ 4 = 56 ÷ 4 = 14 cm.

Using the rhombus property: $d1^2 + d2^2 = 4a^2$

$26^2 + d2^2 = 4 \times 14^2$ => $676 + d2^2 = 4 \times 196 = 784$

$d2^2 = 784 - 676 = 108$ => $d2 = \sqrt{108} = 6\sqrt{3}$ cm.

Therefore The correct answer is $6\sqrt{3}$ cm.

Alternate Method

Given: Perimeter = 56 cm, Diagonal 1 (d1) = 26 cm.

Formula: Side of rhombus (a) = $\sqrt{[(d1/2)^2 + (d2/2)^2]}$

=> Side (a) = 56 ÷ 4 = 14 cm.

=> In a rhombus, diagonals bisect each other at 90°.

=> Let half of d2 be x. Then, $13^2 + x^2 = 14^2$

=> $169 + x^2 = 196$

=> $x^2 = 196 - 169 = 27$

=> $x = \sqrt{27} = 3\sqrt{3}$ cm.

=> Length of other diagonal (d2) = $2 \times x = 2 \times 3\sqrt{3} = 6\sqrt{3}$ cm.

Therefore The correct answer is $6\sqrt{3}$ cm.

Additional Information

Area of Rhombus

The area is calculated using the diagonals: Area = (1/2) × d1 × d2.

Diagonal Properties

Diagonals of a rhombus are perpendicular bisectors of each other and bisect the internal angles.

Side and Diagonal Relation

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

Q100. Answer: (b) Anshu Jamsenpa

The correct answer is Anshu Jamsenpa.

• Anshu Jamsenpa scripted history as the first Indian woman to scale Mount Everest for the fourth time.

• She is from Arunachal Pradesh.

• On May 21, 2017, she made the fastest double ascent of Mount Everest and became the first woman to reach the highest point on Earth twice in five days.

• Anshu was the brand Ambassador of the clean Indian Campaign in the year 2012-2013.

• She was nominated as the brand ambassador of the North East Tourism.

Important Points

• Bachendri Pal is an Indian mountaineer. She is the first Indian woman to reach the summit of Mount Everest in 1984.

• She was awarded by Padma Bhushan, Padma Shri.

• "EVEREST MY JOURNEY TO THE TOP" book written by Bachendri Pal.

• Premlata Agarwal is an Indian mountaineer. She is the first Indian woman to have climbed the Seven Summits or the seven highest peaks of the world.

• She was conferred with the Padma Shri in the year 2013.

• She is the winner of the Tenzing Norgay National Adventure Award.

• "Kar Vijay Har Shikhar" written by Premlata Agarwal.

• Arunima Sinha is the world's first female amputee to scale Mount Everest, Mount Kilimanjaro (Tanzania), Mount Elbrus (Russia), Mount Kosciusko (Australia), Mount Aconcagua (South America), Mount Denali (North America) and Mount Vinson

• She was trained by Bachendri Pal.

• She was awarded Padma Shri.

• Arunima Sinha was honored Amazing Indian Award from Vice President of India Shri M. Hamid Ansari on 6th February 2014.

• "Born Again on the Mountain: How I Lost Everything and Found It Back" book is written by Arunima Sinha.

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