RRC Group D Previous Year Paper 17 (Held On: 27 Nov 2018 Shift 2)

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

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CBT

Q1. The square root for $73^2 - 55^2$ is:

(a) 42
(b) 48
(c) 18
(d) 52

Q2. In the Constitution of India, the residuary powers are entrusted with the _____.

(a) Centre
(b) Village panchayat
(c) State
(d) both, state and centre

Q3. _____ break the fat globules into smaller globules.

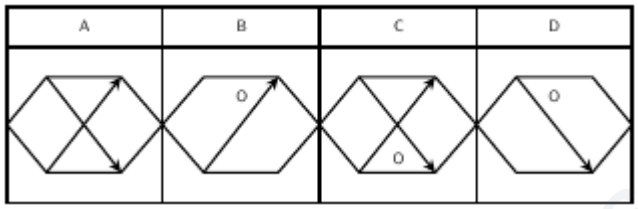
(a) Bile salts
(b) Pepsin
(c) Trypsin
(d) Amylase

Q4. If W > X, X > Y and Y > Z, then which of the following conclusions is definitely wrong?

(a) X > Z
(b) W > Z
(c) Z > W
(d) W > Y

Q5. Which pattern most closely resembles the following pattern?





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

Q6. Ramesh raises an object of 12 kg through a height of 2.0 m. The work done by him is _____. (take g = 10 m/s²)
(a) 24 J
(b) 240 J
(c) 12 J
(d) 60 J

Q7. What happens when we switch on a light bulb?
(a) The filament or wire inside it burns with a yellow flame
(b) The filament gets active and glows.
(c) The filament or wire inside it gets heated and glows
(d) The wire inside it burns

Q8. If ‘plant’ is called -green’, ‘green’ is called flower’, ‘flower’ is called ‘blue’, ‘blue’ is called ‘white’ and ‘white’ is called ‘black’, then what is the colour of the clear sky?
(a) Flower
(b) Black
(c) White
(d) Blue

Q9. A and B together can complete a piece of work in 12 days: B and C together can complete it in 15 days. If A is twice as good a workman as C, in how many days will A alone complete the same work?
(a) 45
(b) 60
(c) 75
(d) 30

Q10. Which one of these is an example of displacement reaction?
(a) Fe(s) + CuSO4(aq) = FeSO4(aq) + Cu(s)
(b) 2FeSO4(s) = Fe2O3(s) + SO2(g) + SO3(g)
(c) CaO(s) + H2O (1) = Ca(OH)2 (aq)
(d) C(s) + O2(g) = CO2 (g)

Q11. The value of 20 ÷ [{2 × (3 – 7)} – 15 + 25] is:
(a) -2
(b) 7.5
(c) 10
(d) -1.54

Q12. Road Transport and Highways Minister Nitin Gadkari has launched a new Mobile App for users who frequently use highways. Name this app that empowers frequent highway users with information.
(a) Yaad Radkho
(b) Safe Raasta
(c) Suraksha
(d) Sukhad Yatra

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Q13. Raju introduced a girl in a party as the daughter-in-law of his mother's only son. How is Raju related to the girl?

(a) Father
(b) Husband
(c) Father-in-law
(d) Grand father

Q14. The gravitational potential difference between the surface of a planet and a point 20 m above it is 16 J/kg. How much work is done in moving a 2 kg mass by 8 m on a slope 60° from the horizontal?

(a) 11.1 J
(b) 55.5 J
(c) 16 J
(d) 27.1 J

Q15. Nathan's monthly income is Rs. 50,000. Every year, he pays a total EMI amount of Rs. 30,000. What percentage of his 3 yearly salary goes towards the EMI?

(a) 8
(b) 2
(c) 5
(d) 4

Q16. According to the US Chamber of Commerce, India ranked _____ out of 50 countries in the Intellectual Property Index.

(a) 45^(th)
(b) 15^(th)
(c) 12^(th)
(d) 44^(th)

Q17. Mrinal and Yukta together can paint half of a wall in 6 days. Working separately, Mrinal would need thrice as much time as Yukta would to paint half of the wall. In how many days can Yukta alone paint the whole wall?

(a) 12
(b) 20
(c) 9
(d) 16

Q18. Reshmi and Swathi were playing chess sitting in a standard chess seating arrangement. If Reshmi was facing east direction then her opponent Swathi was facing towards which direction?

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

Q19. N + 1 value of the 6p orbital is:

(a) 5
(b) 8
(c) 7
(d) 3

Q20. Find the next term in this series

45, 54, 64, 75, _____.

(a) 87
(b) 89
(c) 91
(d) 90

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Q21. The SI unit of work is _____.

(a) Joule
(b) Newton
(c) Pascal
(d) Watt

Q22. A vertical pole, 30 m long, casts a shadow 20 m long on the ground. At the same time, a vertical building casts a shadow 60 m long on the ground. What is the height of the building?

(a) 60 m
(b) 120 m
(c) 150 m
(d) 90 m

Q23. The area under a velocity-time graph gives _____.

(a) Displacement
(b) Change in Velocity
(c) Acceleration
(d) Speed

Q24. Two inlet pipes A and B can fill an empty cistern in 35 hours and 52.5 hours respectively while Pipe C is an outlet pipe that can drain the filled cistern in 17.5 hours. When the cistern is full Pipe C is left open for an hour, then closed and Pipe A is opened for an hour, closed and Pipe B is opened for an hour. The process continues till the cistern is empty. How many hours will it take for the filled cistern to be emptied?

(a) 301
(b) 313
(c) 298
(d) 315

Q25. The technique that used to show doctors the images of a patient's organs such as the liver, gall bladder, uterus etc. is:

(a) Ultrasonography
(b) Ranging
(c) Echocardiography
(d) Sonar

Q26. How many perfect squares having digit 6 in the unit's place are there between 1 and 600?

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

Q27. A tap can fill a tank in 10 hours and another tap can empty the tank in 15 hours. If both the taps are opened together how much time will be taken to fill 2/3 of the tank.

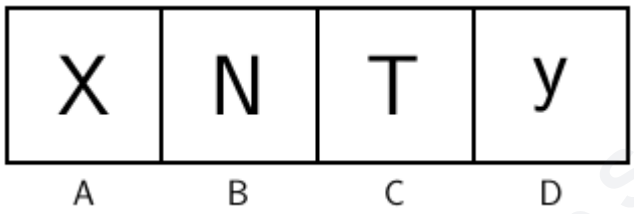
(a) 15 hours
(b) 10 hours
(c) 20 hours
(d) 5 hours

Q28. Which of the following tissues contains striped, short and branched cells joined together by intercalated discs?

(a) Striated Muscle Tissue
(b) Unstriated Muscle Tissue
(c) Cardiac Muscle Tissue
(d) Cuboidal Epithelium Tissue

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Q29. Find the odd figure out from among the given figures.



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

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

Statement:

Ram is the eldest of Shyam and Krishna. Krishna is younger to Shyam.

Conclusions:

I. Krishna is the youngest.

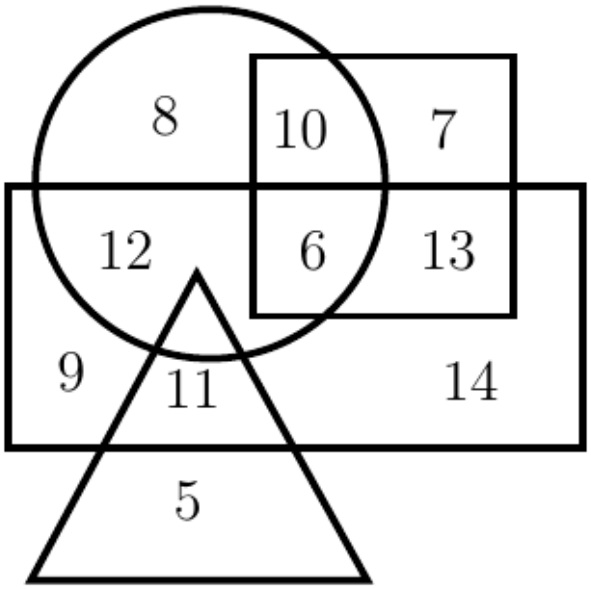
II. Krishna is younger to Shyam by 2 years.

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

Q31. A sum of Rs. 1000 is invested at a rate of 30% per annum at compound interest but compounded in every four months, will give an amount of Rs. _____ in one year.

(a) 1331
(b) 1300
(c) 1327
(d) 1330

Q32. In NGO Colony, the people are classified into four different groups as given in the following figure: the rectangle represents men, the triangle represents educated, the circle represents urban and the square represents government employees.



Which one of the following represents the educated men who are NOT urban?

(a) 9

(b) 4
(c) 11
(d) 5

Q33. How many factors of number 4000 are perfect squares?

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

Q34. Introducing Nag, Haritha said, “His brother’s father is the only child of my grandfather”. How is Haritha related to Nag?

(a) Daughter
(b) Niece
(c) Mother
(d) Sister or brother

Q35. The Portuguese conquered Goa in 1510 CE with _____ as their Viceroy.

(a) De’Costa
(b) Albuquerque
(c) De’Mello
(d) Braganza

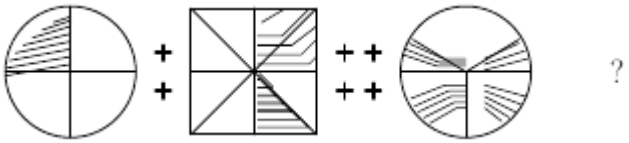
Q36. Suresh alone takes 20 days to do a piece of work. Rajesh alone takes 30 days to do the same piece of work. The total wages for the entire work is Rs. 10,000. How much should Suresh be paid if they work together for the entire duration of the work?

(a) Rs. 4000
(b) Rs. 3000
(c) Rs. 6000
(d) Rs. 7000

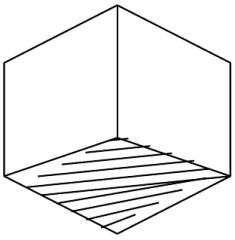
Q37. Candolim beach is located in _____.

(a) Lakshadweep
(b) Goa
(c) Diu
(d) Daman

Q38. Select the missing figure that will complete the following analogy.

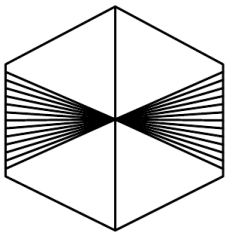


(a)

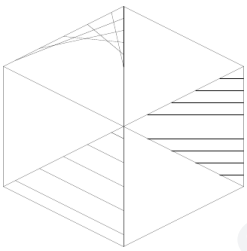


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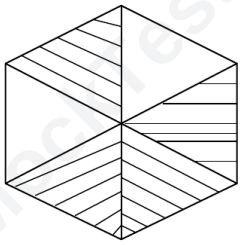
(b)



(c)



(d)



Q39. If the following data is plotted in a pie chart, find the measure of the central angle for the sector that denotes the third week. Choose the closest option.

Week	Number of shirts sold
1	800
2	900
3	1200
4	940
5	1460

(a) 72°
(b) 81.5°
(c) 61.2°
(d) 63.8°

Q40. Which of the statements is sufficient to answer the question?

Question:

Find the value of n.

Statements:

1) A = [*20c n 1; 0 -1]

2) B = [*20c 1 -1; 0 1]

3) A + B = O, where O is a null matrix of 2 × 2

(a) All statements 1, 2 and 3 are sufficient
(b) Only statement 2 is sufficient
(c) Only statement 1 is sufficient
(d) Only statement 3 is sufficient

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Q41. Read the following information carefully and answer the question given below:

'M @ N' means 'M is the daughter of N':

'M $ N' means 'M is the husband of N':

'M #N" means 'M is the brother of N';

If R @ S $ T, then which of the following is true?

(a) T is the sister of R
(b) T is the mother-in-law of R
(c) T is the sister-in-law of R
(d) T is the mother of R

Q42. Consider the statements and the following assumptions and decide which of the assumptions is 'are implicit in the statement

Statement:

While playing a card game, a man exclaims to his friend, 'What are my chances of winning at least one game against you today?"

Assumptions:

I. The friend is an expert player

II. He hasn't won a game against his friend today

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

Q43. Find the next letter in the series:

LR, OQ, SO, _____ ?

(a) LO
(b) XL
(c) XM
(d) XN

Q44. Located in the Sahyadri hills near _____, Ellora is the most important second-wave site of ancient rock-cut architecture in India.

(a) Aurangabad
(b) Ahmedabad
(c) Pune
(d) Mumbai

Q45. Choose INCORRECT one for Aldehydes.

(a) C3H7COH → butanal → butyraldehyde
(b) CH3COH → ethanal → acetaldehyde
(c) C2H5COH → propanal → propionaldehyde
(d) CH2COH → methanol → formaldehyde

Q46. Name the NBA Basketball star who won an Oscar award for an animation film. The six-minute-long film is titled ~Dear Basketball'.

(a) Magic Johnson
(b) Michael Jordan
(c) LeBron James
(d) Kobe Bryant

Q47. Which of the following country has Football as its national game?

(a) England
(b) India
(c) Australia

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(d) Germany

Q48. BTU is the measurement of _____.

(a) Temperature
(b) Area
(c) Volume
(d) Heat content

Q49. Which of the following is an example of Newland's Octaves?

(a) Boron and Sodium
(b) Lithium and Sodium
(c) Calcium and Nitrogen
(d) Carbon and Potassium

Q50. An elevator descends into a mine shaft at the rate of 7.5 m/minute. If the descend starts from 35 m above the mine, how long will it take to reach the mine that is 430 m below ground?

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

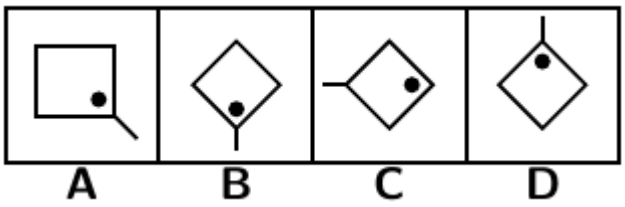
Q51. A solid cylinder whose radius of the base is 12 cm and the height is 8 cm is melted and made a solid sphere. The radius of the sphere is _____ cm.

(a) 6cbrt4
(b) 6
(c) 6cbrt3
(d) 12cbrt3

Q52. 'A' and 'B' are brothers. 'B' is married to 'Z'. 'A' is the _____ of 'Z'.

(a) uncle
(b) cousin
(c) brother-in-law
(d) brother

Q53. Choose the figure that is different from the other figures.



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

Q54. The mean of four numbers is 37. The mean of the smallest three of them is 34. If the range of the data is 15, what is the mean of the largest three?

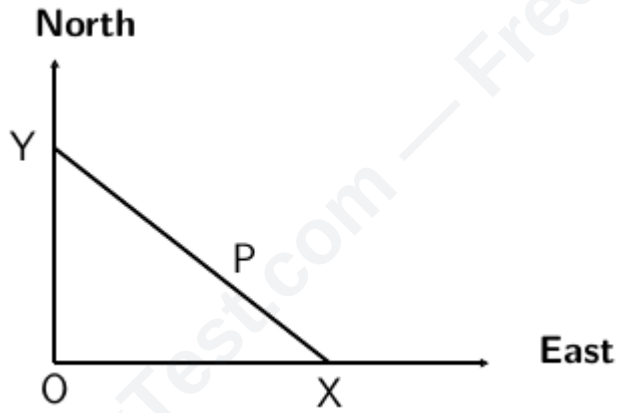
(a) 41
(b) 38
(c) 40
(d) 39

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Q55. What is the SI unit of force?

(a) m/s^2
(b) Watt
(c) Newton
(d) Joule

Q56. In the given figure, X is 150 km eastward of O and Y is 200 km north of O. P is exactly in the middle of Y and X. The distance between Y and P is.



(a) 350 km
(b) 300 km
(c) 125 km
(d) 200 km

Q57. How many types of elements make up the Xylem tissue?

(a) Two types
(b) Three types
(c) One type
(d) Four types

Q58. What would be the next two numbers in the following series?

2, 3, 5, 9, 8, 27, 11, 81, ?, ?

(a) 14,729
(b) 15,81
(c) 90,14
(d) 14,243

Q59. A statement is followed by two assumptions. Decide which of the assumptions is/are implicit in the statement.

Statement:

The waiter asks a group of people if they wish to go by a la carte or buffet.

Assumptions:

I. Usually in restaurants they serve by both methods, a la carte and buffet.

II. Generally customers choose the way they want to have food, either fixed or a la carte

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

Q60. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statement:

1. Some sticks are needles.

2. Some bats are sticks.

Conclusions:

1. Some sticks are boxes.

2. Bat is a needle.

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

Q61. Complete the series by choosing the correct term from the options given below

CAT, CAT2, CA2T2, ____ C2A2T3

(a) C2A2T2
(b) C2A3T
(c) C3AT3
(d) CAT3

Q62. Who is the Founder and CEO of Red Dot Foundation (Safecity)?

(a) ElsaMarie D'Silva
(b) Vandita Morarka
(c) Avantika Wankhede
(d) Anita Verma

Q63. Radhika Mohan Bhagawati is a famous person known for his contributions towards which of the following?

(a) Science
(b) Journalism
(c) Music
(d) Pollitics

Q64. Rs. 775, invested for 8 years gives an interest of Rs. 434. The rate of simple interest per annum is:

(a) 8%
(b) 7.5%
(c) 7%
(d) 9%

Q65. Neha bought an old refrigerator for Rs. 4800 and spent 20% on its repairs. By how much should the cost price be increased to get a profit of Rs 1440?

(a) 30%
(b) 25%
(c) 45%
(d) 35%

Q66. The Rock garden is a sculpture garden located in _____, India.

(a) Srinagar
(b) Mysore
(c) Chandigarh
(d) Bangalore

Q67. To which of the following sport the term 'Banana kick' is related?

(a) Kick boxing
(b) Hockey
(c) Rugby
(d) Football

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Q68. The National Disaster Management Authority (NDMA) is located in which city?

(a) Jaipur
(b) Bengaluru
(c) New Delhi
(d) Chennai

Q69. Complete the following numerical series.

20, 32, 46, 64, 84, 108, _____?

(a) 134
(b) 113
(c) 136
(d) 128

Q70. In vitro fertilisation is a technique that involves transfer of which one of the following into the fallopian tube?

(a) Only embryo up to 32 cell stage
(b) Only zygote
(c) Either zygote or early embryo up to 8-cell stage
(d) Only embryo up to 8-cell stage

Q71. Joe can complete ¼ of a task in 10 days while jack complete the whole work in 45/2 days. How long will Joe and Jack take to complete the task working together?

(a) 93/8 days
(b) 61/10 days
(c) 142/5 days
(d) 17 days

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

Statement:

Mayank's paintings are really profound in conveying the theme.

Conclusions:

I. Mayank is an artist

II. He has profound knowledge in his field

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

Q73. Which country is the largest trading partner of India according to the 2017 data?

(a) Russia
(b) England
(c) China
(d) USA

Q74. Which of the following countries is not a neighbour of India?

(a) China
(b) Indonesia
(c) Bhutan
(d) Nepal

Q75. Two inlet pipes A & B can fill an empty cistern in 12 hours & 36 hours respectively while Pipe C is an outlet pipe that can drain the filled cistern in 6 hours. When the cistern is full Pipe C is left open for an hour, then closed & Pipe A is opened for an hour, closed and Pipe B is opened for an hour. The process continues till the cistern is empty. How many hours will it take for the filled cistern to be emptied?

(a) 54

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(b) 46
(c) 18
(d) 52

Q76. Which of the following numbers greater than 10000 and also nearest to 10000 is exactly divisible by 21, 25 and 30?
(a) 10910
(b) 10800
(c) 10500
(d) 10710

Q77. Which Bollywood actress became the first woman ambassador to be a part of the 'Friend of Australia' (FOA) advocacy panel?
(a) Priyanka chopra
(b) Aishwarya Rai
(c) Dimple Kapadia
(d) Parineeti Chopra

Q78. Which of the following does NOT react with acids?
(a) Cu
(b) Au
(c) Ni
(d) Cr

Q79. The sun and the stars glow because of the presence of _____ in them.
(a) helium
(b) dust particles
(c) hydrogen
(d) plasma

Q80. An object in motion possesses _____ energy.
(a) Potential
(b) Kinetic
(c) Chemical
(d) Gravitational

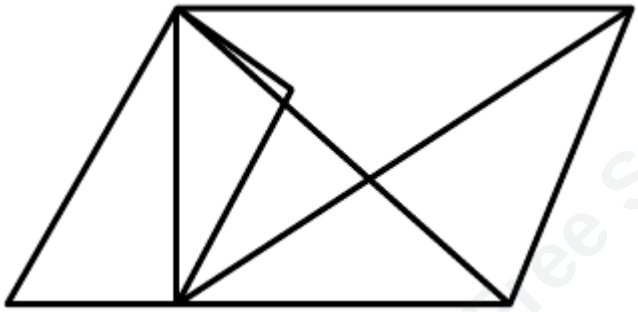
Q81. Which set of elements is listed in an order of their increasing ionisation energy?
(a) Sb < As < Cl < S < P
(b) As < Cl < P < S < Sb
(c) Sb < As < S < P < Cl
(d) Cl < Sb < P < As < S

Q82. Which of the following are twin prime numbers?
(a) 41 and 43
(b) 21 and 23
(c) 19 and 31
(d) 0 and 11

Q83. When an alkali is added to an acid, water and salt are formed. This process is called _____.
(a) neutralisation
(b) formation of hydroxonium ions
(c) reversible reactions
(d) polymerisation

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Q84. How many triangles are there in this figure:



(a) 9
(b) 10
(c) 8
(d) 14

Q85. A body of mass 5 kg has momentum of 10 kg m/s. When a force of 0.1 N is applied on it for 10 seconds, the change in its kinetic energy is:

(a) 1.1 J
(b) 4.4 J
(c) 2.1 J
(d) 1.4 J

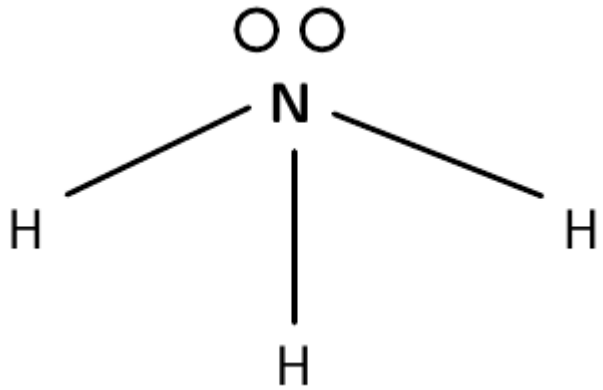
Q86. A, B and C are waiting for three different-route buses. Who leaves second?

Statements:

1. A's bus Departs first.
2. B is the last one to leave.

(a) Statement 1 and 2 together are insufficient.
(b) Statement 1 and 2 together are sufficient.
(c) Statement 2 alone is sufficient.
(d) Statement 1 alone is sufficient.

Q87. The structure of ammonia is given below. What are the two dots denote?



(a) Transferred electrons
(b) Shared electrons
(c) Additional pair of electrons
(d) Lone pair of electrons

Q88. How many solar cities have been planned to be developed under 'Development of Solar Cities' scheme by the Ministry of New and Renewable Energy?

(a) 70
(b) 30
(c) 60

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(d) 50

Q89. The total sales of a small home based business earned a profit of 30,000 in the previous quarter and the current quarter the profit increased by 15% over the previous quarter. What is the actual profit in the current quarter?

(a) 34,000
(b) 34,500
(c) 33,000
(d) 30,000

Q90. Who is the founder of company Sun Pharmaceutical Industries?

(a) Pallonji Mistry
(b) Dilip Shanghvi
(c) Shiv Nadar
(d) The Hinduja brothers

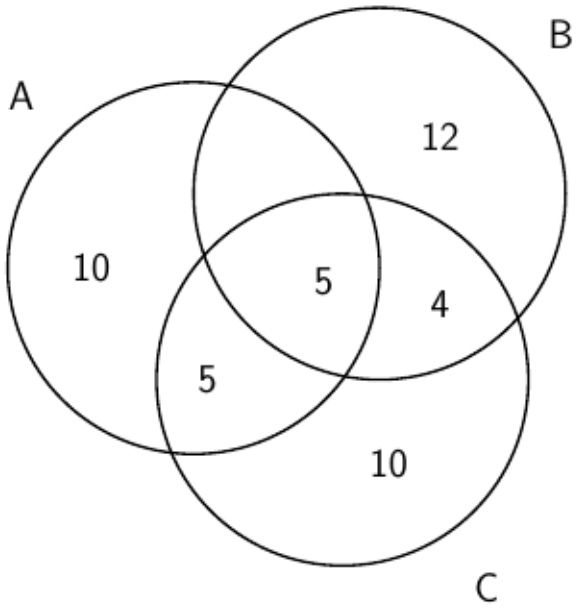
Q91. A shopkeeper sold a pair of trousers at a loss of 13.5% If he paid Rs. 400 for the pair, how much did he sell them for?

(a) Rs. 337
(b) Rs. 346
(c) Rs. 329
(d) Rs. 338

Q92. Who was declared the winner in the 'illustrator category' in the Big Little Book Award 2017?

(a) Nabaneeta Dev sen
(b) Proiti Roy
(c) Amarendra Chakravorty
(d) Karitik Ghosh

Q93. The given Venn diagram shows a total of 50 students who appeared for three different examinations: A, B and C. All have appeared for at least one examination. How many appeared for examinations A and B but not C?

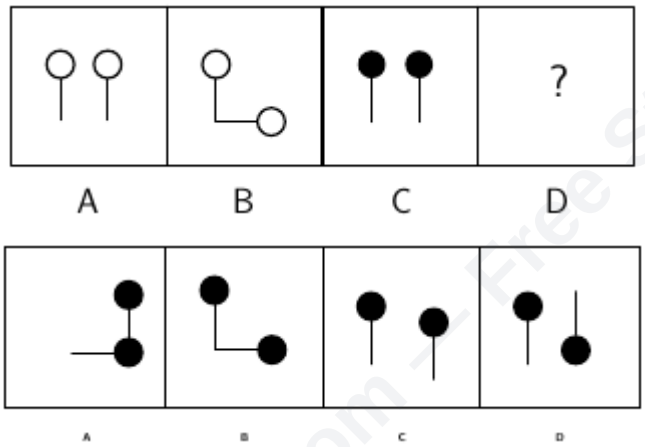


(a) 5
(b) 10
(c) 4
(d) 6

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Q94. Find the next figure for the given series:

Problem Figures:



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

Q95. The India wrestler to bag a medal at the 2016 Olympics is:

(a) Sakshi Malik
(b) Babita Kumari
(c) Geeta Phogat
(d) Sushil Kumar

Q96. Which of the following statements is/are correct?

Statements:

(1) Convex mirrors are used as rearview mirrors in cars, motorcycles, scooters etc.

(2) Concave mirrors are used by doctors to focus light inside the ear or mouth for medical examination.

(3) Convex mirrors are used by dentists to see enlarged images of patients' teeth.

(4) Concave mirrors are used for shaving purpose

(a) Statements (1), (3), (4)
(b) Statements (2), (3), (4)
(c) Statements (1), (2). (4)
(d) Statements (1), (2), (3)

Q97. $Cot^2A - cos^2A$ is equal to:

(a) $cos^2A - tan^2A$
(b) cot^2A
(c) $cos^2A\ cot^2A$
(d) $cos^2A\ sec^2\ A$

Q98. If a sum of Rs. 2,465.82 is spent on the purchase of 132 metres of ribbon, what would be the cost of 1 metre of the same ribbon (rounded off to two decimal places)?

(a) Rs. 17.97
(b) Rs. 19.02
(c) Rs. 18.68
(d) Rs. 18.23

Q99. Find out the angle (smaller between the two) between the hour hand and minute hand at 11:00 AM.

(a) 20°
(b) 30°
(c) 25°

(d) 50°

Q100. To an astronaut in space, the sky appears to be _____.

(a) yellow
(b) red
(c) blue
(d) black

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) 48

Shortcut Trick

To find the square root of the difference of two squares, apply the identity $a^2 - b^2 = (a + b)(a - b)$.

$\sqrt{(73^2 - 55^2)} = \sqrt{((73 + 55) \times (73 - 55))}$

$\Rightarrow \sqrt{(128 \times 18)} = \sqrt{(2304)}$

Since $40^2 = 1600$ and $50^2 = 2500$, and the number ends in 4, the answer must be 48.

Therefore The correct answer is 48.

Alternate Method

Given: Expression = $\sqrt{(73^2 - 55^2)}$

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

$\Rightarrow$ Expression = $\sqrt{((73 + 55) \times (73 - 55))}$

$\Rightarrow$ Expression = $\sqrt{(128 \times 18)}$

$\Rightarrow$ Expression = $\sqrt{(64 \times 2 \times 2 \times 9)}$

$\Rightarrow$ Expression = $\sqrt{(64 \times 4 \times 9)}$

$\Rightarrow$ Expression = $8 \times 2 \times 3$

$\Rightarrow$ Expression = 48

Therefore The correct answer is 48.

Additional Information

Algebraic Identities

The formula $a^2 - b^2 = (a - b)(a + b)$ is one of the most common algebraic identities used to simplify products and square roots of differences.

Square root of a product

The property $\sqrt{(x \times y)} = \sqrt{x} \times \sqrt{y}$ allows breaking down large products into smaller perfect squares for easier calculation.

Units Digit Rule

A perfect square ending in 4 must have a square root ending in either 2 or 8 (since $2^2=4$ and $8^2=64$).

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Q2. Answer: (a) Centre

The correct answer is Centre

Key Points:

• In the Constitution of India, the Residuary powers are entrusted to the centre.

• A residuary power is one that a governing body retains after delegating those rights to other authorities.

• Residuary Powers are special powers granted to the Union Government by the Constitution.

• The idea of residuary powers is taken from the Canadian Constitution.

• The Parliament has the authority to enact legislation on any subject not covered by the Concurrent or State Lists.

• The three lists of residuary control are the union list, state list, and concurrent list. These powers do not fall under the statutory authority of either the state or the federal government.

• Parliament has exclusive authority to enact legislation on any subject not covered by the Concurrent or State Lists.

• Such authority includes the ability to enact any legislation imposing a tax not included on either of those lists.

Q3. Answer: (a) Bile salts

• Bile salts break the fat globules into smaller globules.

• This process of breaking down of fat globules in the duodenum into smaller globules is called emulsification.

• Emulsification: It provides a larger surface area on which the enzyme pancreatic lipase can act to digest the fats into fatty acids and glycerol.

Q4. Answer: (c) Z > W

Given: W > X, X > Y and Y > Z

On combining: W > X > Y > Z

I) X > Z → True

II) W > Z → True

III) Z > W → False (as W > Z)

IV) W > Y → True

Hence, Z > W is definitely wrong.

Q5. Answer: (b) C

The logic followed here is:

The given figure:

The figure given in question has two lines with arrows and a circle in the centre of the figure.

Figure A: Circle in the centre of the figure is missing. → Does not resemble the question figure.

Figure B: One of the lines with arrow is missing → Does not resemble the question figure.

Figure C Follows the same pattern. → Resemble the question figure.

Figure D: One of the lines with arrow is missing → Does not resemble the question figure.

Hence, Figure C is the correct answer.

Q6. Answer: (b) 240 J

It is given that,

=> Mass, M = 12 kg

=> Heighty, h = 2 m

=> g = 10 m/s2

Work done against gravitational force is positive in nature giving :

=> W = mgh = 12 x 10 x 2

=> W = 240 J

Q7. Answer: (c) The filament or wire inside it gets heated and glows

• When a light bulb is connected to a source of electricity, the current flows from one metal to the other.

• As the current travels through the wires and the filament, the filament heats up to the point where it begins to emit photons, which are small packets of visible light.

• The Light bulb was invented by Thomas Edison.

Q8. Answer: (c) White

The logic followed here is:

The codes are as follows:

Plant → Green

Green → Flower

Flower → Blue

Blue → White

White → Black

Colour of Sky is Blue but in the given codes Blue is called White.

Hence, Colour of Sky will be White.

Q9. Answer: (d) 30

Shortcut Trick

Ratio of efficiency of A : C = 2 : 1.

Total work (LCM of 12 and 15) = 60 units.

Efficiency of (A + B) = 60 ÷ 12 = 5; Efficiency of (B + C) = 60 ÷ 15 = 4.

Difference (A − C) = 5 − 4 = 1 unit. Since A = 2C, then 2C − C = 1 => C = 1 and A = 2.

Time taken by A = 60 ÷ 2 = 30 days.

Therefore The correct answer is 30 days.

Alternate Method

Given: Time for (A + B) = 12 days, Time for (B + C) = 15 days, Efficiency ratio A = 2C.

Formula: Efficiency = Total Work ÷ Time Taken

Person	Days	Total Work	Efficiency
A + B	12	60	5
B + C	15	4	

=> Efficiency of (A + B) − Efficiency of (B + C) = 5 − 4

=> A + B − B − C = 1 => A − C = 1

=> Given A = 2C, so 2C − C = 1 => C = 1 unit/day

=> Efficiency of A = 2 × 1 = 2 units/day

=> Time taken by A alone = Total Work ÷ Efficiency of A

=> Time = 60 ÷ 2 = 30 days.

Therefore The correct answer is 30 days.

Additional Information

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken to complete the work (E prop. to 1/T).

Work and Wages

Wages are generally distributed in the ratio of the work done or in the ratio of the efficiencies of the workers.

Combined Efficiency Rule

If person X completes work in 'x' days and Y in 'y' days, together they take (x × y) ÷ (x + y) days.

Q10. Answer: (a) Fe(s) + CuSO4(aq) = FeSO4(aq) + Cu(s)

• A displacement reaction is a type of reaction in which part of one reactant is replaced by another reactant.

• There are two types of displacement reactions.

• Single displacement reactions: These are those reactions in which one reactant replaces part of the other.

• Eg: Fe + CuSO4→ FeSO4 + Cu

• Double displacement reactions: These are those reactions in which the cations and anions in the reactants switch partners to form products.

• Eg: AgNO3+ NaCl → AgCl + NaNO3

• A displacement reaction is also known as a replacement reaction or a metathesis reaction.

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Q11. Answer: (c) 10

Given:

20 ÷ [{2 × (3 – 7)} – 15 + 25]

Concept used:

Calculation:

=> 20 ÷ [{2 × (-4)} -15 + 25]

=> 20 ÷ [{-8} +10}

=> 20 ÷ 2

=> 10

Therefore The value of 20 ÷ [{2 × (-4)} -15 + 25] is 10.

Q12. Answer: (d) Sukhad Yatra

• Sukhad Yatra App was launched by the Ministry of Road Transport & Highways.

• The mobile application has been prepared by the National Highways Authority of India (NHAI).

• The key feature of the app includes:

• Provision for the user to enter road quality-related information

• Report any accident or pothole on the highway

• Provides users with real-time data related to waiting time expected at Plazas

• Users can purchase the FASTag

Q13. Answer: (c) Father-in-law

Preparing the family tree using the following symbols:

• Raju's mother's only son = Raju

• Daughter-in-law of Raju's mother's only son = Daughter-in-law of Raju.

• Therefore, Raju is the father-in-law of the girl.

Hence, Raju is Father-in-Law of the girl.

Q14. Answer: (a) 11.1 J

Concept:

• Two drops of different mass have different gravitational potential energy.

GPE = mgh

where m is mass, g is the gravitational acceleration and h is the height above the zero level.

• We can define a quantity called gravitational potential which is independent of mass by dividing the gravitational potential energy by m, i.e.,

Gravitational potential = GPE/m = mgh/m = gh.

Note: The gravitational potential is independent of mass.

Calculation:

• Let the gravity on the planet be "g"

• Gravitational Potential Difference = g × h, where h is the height.

=> 16 = g × 20

=> g = 16/20 = 4/5 m/sec²

=> Height, h = 8 × Sin 60°

=> Work done = mgh = 2 × (4/5) × 8 × Sin 60° = 11.1 J

=> where m = mass, g = gravity and h = height

Q15. Answer: (c) 5

Shortcut Trick

Monthly Income = Rs. 50,000

Yearly Income = 50,000 × 12 = Rs. 6,00,000

Yearly EMI = Rs. 30,000

Since the ratio of EMI to Salary remains constant every year, we calculate for 1 year:

Required % = (30,000 ÷ 6,00,000) × 100 = 5%

Therefore The correct answer is 5%.

Alternate Method

Given:

Monthly Income = Rs. 50,000

Total EMI per year = Rs. 30,000

Calculations:

=> Total Salary for 3 years = 50,000 × 12 × 3 = Rs. 18,00,000

=> Total EMI for 3 years = 30,000 × 3 = Rs. 90,000

=> Percentage = (90,000 ÷ 18,00,000) × 100

=> Percentage = 90,000 ÷ 18,000 = 5%

Therefore The correct answer is 5%.

Additional Information

Percentage Change

Percentage change is calculated as (Change ÷ Original Value) × 100.

Monthly to Yearly Conversion

To convert monthly data to yearly, always multiply by 12. For n years, multiply by 12 × n.

Constant Ratio Property

If both the numerator (EMI) and denominator (Salary) are multiplied by the same constant (3 years), the percentage value remains unchanged.

Q16. Answer: (d) 44^(th)

• According to the US Chamber of Commerce, India ranked 44th of 50 countries in the Intellectual Property Index 2018.

• The US tops the list, followed by the United Kingdom and Sweden.

• India ranked 36th of 50 countries in the Intellectual Property Index 2019.

• The Index was topped by the United States, followed by the United Kingdom at 2nd, Sweden at 3rd and Germany at 4th in 2019.

Q17. Answer: (d) 16

Shortcut Trick

Ratio of Time taken by Mrinal and Yukta = 3 : 1

Ratio of Efficiency (inverse of time) = 1 : 3

Combined efficiency = 1 + 3 = 4 units/day

Total work to paint half wall = 6 days × 4 units/day = 24 units

Days for Yukta to paint half wall = 24 ÷ 3 = 8 days

Days for Yukta to paint whole wall = 8 × 2 = 16 days

Therefore The correct answer is 16 days.

Alternate Method

Given: Time taken by (Mrinal + Yukta) for 1/2 wall = 6 days.

Formula Used: Total Work = Efficiency × Time; Efficiency prop. to 1/Time

Person	Efficiency (Ratio)	Total Work (1/2 Wall)	Days (1/2 Wall)
Mrinal	1	24 units	24
Yukta	3	8	

=> Let Yukta's efficiency be 3x and Mrinal's efficiency be x.

=> Combined efficiency = 3x + x = 4x

=> Total work (half wall) = 4x × 6 = 24x

=> Time for Yukta for 1/2 wall = 24x ÷ 3x = 8 days

=> Time for Yukta for 1 full wall = 8 × 2 = 16 days

Therefore The correct answer is 16 days.

Additional Information

Efficiency and Time Relation

Efficiency is inversely proportional to the time taken. If A is 'n' times as fast as B, the ratio of time taken by A and B is 1 : n.

Work and Wages

Wages are distributed in the ratio of work done or the ratio of efficiencies when all persons work for the same duration.

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Fractional Work

If 1/n part of work is done in 't' days, then the whole work is completed in 'n × t' days.

Q18. Answer: (c) West

In a standard chess or any board game setting two opponents sit opposite to each other.

So, if Reshmi is facing East direction then her opponent Swathi will be facing West direction.

Hence, West is the correct answer.

Q19. Answer: (a) 5

The total number of Quantum numbers for 6p orbital is given by:

=> N = n – l – 1, where N is the total number of Quantum numbers, n is the principal quantum number and l is the orbital quantum number.

=> n (principal quantum number) = 6, because the orbital is 6p. Eg, If orbital was "2s", then n = 2.

=> l (orbital quantum number) = 1, for "P" shell, where S shell = 0, D shell = 2.

=> N = 6 – 1 – 1 = 4

=> N + 1 = 5 (total number of quantum numbers)

Q20. Answer: (a) 87

The logic followed here is :

45 + 9 = 54

54 + 10 = 64

64 + 11 =75

75 + 12 = 87

Hence, 87 is the next term in the given series.

Q21. Answer: (a) Joule

Quantity	SI unit
Force, Weight	Newton (N)
Electrical conductance	Siemens (S)
Magnetic flux	Weber (Wb)
Energy, Work, Heat	Joule (J)
Capacitance	Farad (F)

Q22. Answer: (d) 90 m

Shortcut Trick

Since the time is same, the ratio of height to shadow remains constant for both objects.

Height : Shadow of pole = 30 : 20 = 3 : 2

Building shadow = 60 m => 2 units = 60 m => 1 unit = 30 m

Building height = 3 units × 30 m = 90 m

Therefore The correct answer is 90 m.

Alternate Method

Given:

Height of pole (H1) = 30 m

Shadow of pole (S1) = 20 m

Shadow of building (S2) = 60 m

Formula Used:

By properties of Similar Triangles (or tan θ): Height1 / Shadow1 = Height2 / Shadow2

Calculations:

=> 30 / 20 = H2 / 60

=> 3 / 2 = H2 / 60

=> H2 = (3 × 60) / 2

=> H2 = 180 / 2

=> H2 = 90 m

Therefore The correct answer is 90 m.

Additional Information

Similarity of Triangles

When two triangles are similar (AA criterion here due to vertical objects and same sun angle), the ratio of their corresponding sides is proportional.

Trigonometric Relation

The angle of elevation of the sun (θ) is the same for both objects, thus tan θ = Height / Shadow is constant.

Q23. Answer: (a) Displacement

Concept:

Displacement (X): The change in the position of an object is called displacement.

• Displacement is a one-dimensional quantity representing the smallest separation between two defined points.

• The standard unit of displacement in the International System of Units (SI) is the meter (m).

Velocity (V): The rate of change of displacement is called velocity. It is a vector quantity.

• The SI unit of velocity is called m/s and the CGS unit is cm/s.

• The slope of the displacement-time graph gives the velocity.

Instantaneous velocity (V) = dx/dt

V = dx/dt

Hence dx = V dt

Displacement (X) = ∫ _(x1)^(x2) dx = ∫ _(t1)^(t2) V dt

Thus the area under the velocity-time graph gives the displacement. Similarly, the area under-speed time graph gives the total distance travelled.

Explanation:

• The area under a velocity-time graph is a representation of the displacement. So option 1 is correct.

• The rate of change in distance is called speed.

• The rate of change in velocity is called acceleration

Mistake Points Likewise, acceleration is the first derivative of velocity. So it is not the area that gives acceleration.

Q24. Answer: (c) 298

Shortcut Trick

Total Capacity (LCM of 35, 52.5, 17.5) = 105 units.

Efficiencies: A = +3, B = +2, C = −6.

Cycle (3 hours): 1st hr (C) −6, 2nd hr (A) +3, 3rd hr (B) +2. Net work = −1 unit.

Target: Reach the point where Pipe C can finish the emptying (105 − 6 = 99 units).

99 cycles of 3 hours = 297 hours. Remaining units = 105 − 99 = 6 units.

Next hour (298th), Pipe C opens and drains exactly 6 units. Total time = 298 hours.

Therefore The correct answer is 298 hours.

Alternate Method

Pipe	Time (hrs)	Total Work (units)	Efficiency
Pipe A (Inlet)	35	105	+3
Pipe B (Inlet)	52.5	+2	
Pipe C (Outlet)	17.5	−6	

Given: Initial state is full cistern (105 units). Cycle order: C → A → B.

=> Work in Hour 1 (Pipe C) = −6 units

=> Work in Hour 2 (Pipe A) = +3 units

=> Work in Hour 3 (Pipe B) = +2 units

=> Total work in 1 cycle (3 hours) = (−6 + 3 + 2) = −1 unit (Emptying)

=> We need to empty 105 units. Since the last step must be C emptying, we check for (105 − 6) = 99 units.

=> Time to empty 99 units = 99 cycles × 3 hours/cycle = 297 hours.

=> Units remaining after 297 hours = 105 − 99 = 6 units.

=> In the 298th hour, Pipe C opens. It drains 6 units per hour.

=> Time taken by C to drain remaining 6 units = 6 ÷ 6 = 1 hour.

=> Total time = 297 + 1 = 298 hours.

Therefore The correct answer is 298 hours.

Additional Information

Alternate Work Principle

In problems where one pipe fills and another empties, always subtract the maximum emptying efficiency from the total work to find the point where the last stroke completes the task.

Efficiency and Time Relation

Efficiency is inversely proportional to the time taken to complete the work. Total Work = Efficiency × Time.

Negative Work

Outlet pipes are considered to do negative work (−) while inlet pipes do positive work (+).

Q25. Answer: (a) Ultrasonography

• Ultrasonography is a diagnostic imaging technique works on the principle of ultrasound.

• It is used to create an image of internal body organs such as tendons, muscles, joints and blood vessels.

• In this technique, high-frequency sound waves passed into tissue using a probe.

• Sound waves bounce off structures in the body and are reflected back to the transducer (A device which converts the waves into electrical signals into Sound waves and Vice versa).

• The pattern of electrical signals turns into an image, which is displayed on a monitor and recorded as a digital computer image.

Q26. Answer: (d) 5

Shortcut Trick

For a perfect square to have 6 in its unit's place, the base number must end in either 4 or 6.

The upper limit is 600, and $\sqrt{600} \approx 24.49$.

Possible base numbers (n) ≤ 24 ending in 4 or 6 are: 4, 6, 14, 16, 24.

Total count = 5.

Therefore The correct answer is 5.

Alternate Method

Given: Range 1 to 600; Unit's digit of square = 6.

Property Used: $(....4)^2$ ends in 6 and $(....6)^2$ ends in 6.

=> Identify the maximum number whose square is near 600:

=> $24^2 = 576$ and $25^2 = 625$.

=> Thus, the base number n must be between 1 and 24.

=> List numbers ending in 4: 4, 14, 24.

=> List numbers ending in 6: 6, 16.

=> Check squares: $4^2 = 16$, $6^2 = 36$, $14^2 = 196$, $16^2 = 256$, $24^2 = 576$.

=> All 5 squares are within the range 1 to 600.

Therefore The correct answer is 5.

Additional Information

Unit Digits of Perfect Squares

A perfect square can only end in digits 0, 1, 4, 5, 6, or 9. It can never end in 2, 3, 7, or 8.

Squares ending in 6

For any number n, n^2 ends in 6 if and only if the unit digit of n is 4 or 6. Also, the tens digit of such a square is always odd.

Square Root Estimation

To find the number of squares below X, calculate $\sqrt{X}$. The integer part of $\sqrt{X}$ gives the total number of perfect squares from 1 to X.

Q27. Answer: (c) 20 hours

Shortcut Trick

Net efficiency = 1/10 − 1/15 = 1/30

Time to fill full tank = 30 hours

Time to fill 2/3 of the tank = 30 × (2/3) = 20 hours

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Therefore The correct answer is 20 hr.

Alternate Method

Tap	Time (hr)	Total Work (LCM)	Efficiency
Filling Tap (A)	10	30	+3
Emptying Tap (B)	15	−2	

Given: Filling time = 10 hr, Emptying time = 15 hr.

Formula: Total Work = LCM of individual times; Efficiency = Total Work ÷ Time.

=> Let Total Capacity of tank = LCM(10, 15) = 30 units.

=> Efficiency of filling tap (A) = 30 ÷ 10 = +3 units/hr.

=> Efficiency of emptying tap (B) = 30 ÷ 15 = −2 units/hr.

=> Combined Efficiency (A + B) = 3 − 2 = 1 unit/hr.

=> 2/3 of Total Capacity = 30 × (2/3) = 20 units.

=> Time taken = Work ÷ Efficiency = 20 ÷ 1 = 20 hr.

Therefore The correct answer is 20 hr.

Additional Information

Pipes and Cisterns Efficiency

Filling pipes have positive efficiency (+) while emptying pipes (leakage) have negative efficiency (−).

Net Work Formula

If two pipes fill and empty in x and y hours respectively, the net work done in one hour is (1/x − 1/y).

Alternate Day/Tap Operation

When pipes are opened in alternate hours, calculate the work done in a 2-hour cycle before finding the total time.

Q28. Answer: (c) Cardiac Muscle Tissue

• Cardiac Muscle Tissues are shorter and striped. They usually contain only one nucleus, which is located in the central region of the cell.

• Cardiac Muscle Tissues also possess many mitochondria and myoglobin.

• Cardiac Muscle Tissue cells also are extensively branched and are connected at their ends by intercalated discs.

• An intercalated disc allows the cardiac muscle cells to contract in a wave-like pattern so that the heart can work as a pump.

Q29. Answer: (d) B

LOGIC: All the alphabets are made up of two lines except N which is made of three lines.

Figure A:

X has two lines.

Figure B:

N has three lines.

Figure C:

T has 2 lines.

Figure D:

Y has two lines.

N is the odd figure among the given figures.

Hence, option (4) is the correct answer.

Q30. Answer: (b) Only conclusion I follows

Ram is the eldest of Shyam and Krishna implies that Ram is elder than Shyam and Krishna.

Ram > Shyam, Krishna

Krishna is younger to Shyam implies that Shyam is elder than Krishna.

Shyam > Krishna

Both the statements combined together implies that Ram is eldest followed by Shyam and Krishna (youngest).

Ram > Shyam > Krishna

There is no information about the ages of these three people. So, Conclusion II does not follows and only statement I follows.

Hence, “Only conclusion I follows” is the correct answer.

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Q31. Answer: (a) 1331

Shortcut Trick

Rate is 30% per annum, so for every four months, the rate is 30% ÷ 3 = 10%.

In one year, there are 12 ÷ 4 = 3 compounding periods.

Using the successive percentage method for 10% over 3 periods: 10% + 10% + 10% → 33.1%.

Amount = Principal + (33.1% of Principal) = 1000 + 331 = Rs. 1331.

Therefore The correct answer is Rs. 1331.

Alternate Method

Given: Principal (P) = Rs. 1000, Rate (R) = 30% p.a., Time = 1 year.

Since interest is compounded every four months, it is compounded 3 times in a year.

Formula Used: Amount (A) = $P \times (1 + r/100)^n$

=> Periodical rate (r) = 30% ÷ 3 = 10%

=> Number of periods (n) = 3

=> $A = 1000 \times (1 + 10/100)^3$

=> $A = 1000 \times (11/10) \times (11/10) \times (11/10)$

=> $A = 1000 \times (1331 / 1000)$

=> A = Rs. 1331

Therefore The correct answer is Rs. 1331.

Additional Information

Effective Annual Rate (EAR)

The actual interest rate earned over a year when compounding occurs multiple times. Formula: $EAR = (1 + r/n)^n - 1$, where r is the nominal rate and n is the frequency.

Compounding Frequency Effect

As the frequency of compounding increases (from annually to semi-annually, quarterly, or monthly), the Amount and Effective Rate also increase.

Difference between SI and CI

For the first period, SI and CI are equal. For two periods, the difference is $P(r/100)^2$. For three periods, it is $P(r/100)^2 \times (3 + r/100)$.

Q32. Answer: (c) 11

The logic followed here is:

Educated →Triangle

Men → Rectangle

Circle → Urban

So, the educated men who are not urban will be represented by the area of intersection of triangle and rectangle but excluding area of circle.

Such area is represented by number 11. Hence, 11 is the correct answer.

Q33. Answer: (d) 6

Shortcut Trick

Prime factorization of 4000 = $2^5 \times 5^3$.

For a factor to be a perfect square, the exponents of its prime factors must be even.

Possible exponents for base 2: {0, 2, 4} (Total 3 choices).

Possible exponents for base 5: {0, 2} (Total 2 choices).

Total perfect square factors = 3 × 2 = 6.

Therefore The correct answer is 6.

Alternate Method

Given: Number = 4000.

Formula Used: If $N = a^p \times b^q \times c^r...$, the number of perfect square factors is found by taking exponents of prime factors in the form 2k and calculating (floor(p/2)+1) × (floor(q/2)+1) × ...

=> Step 1: Prime factorize 4000.

=> $4000 = 4 \times 1000 = 2^2 \times (10^3) = 2^2 \times (2 \times 5)^3 = 2^2 \times 2^3 \times 5^3 = 2^5 \times 5^3$.

=> Step 2: Identify even exponents for each prime base.

=> For 2^5, even exponents are 0, 2, 4 (3 values).

=> For 5^3, even exponents are 0, 2 (2 values).

=> Step 3: Multiply the count of choices.

=> Total perfect square factors = 3 × 2 = 6.

=> The factors are: 2^0×5^0=1, 2^2×5^0=4, 2^4×5^0=16, 2^0×5^2=25, 2^2×5^2=100, 2^4×5^2=400.

Therefore The correct answer is 6.

Additional Information

Total Number of Factors

If N = a^p × b^q, then total factors = (p+1)(q+1). For 4000, total factors = (5+1)(3+1) = 24.

Perfect Cube Factors

A factor is a perfect cube if prime exponents are multiples of 3 (0, 3, 6...). For 4000, exponents of 2 can be {0, 3} and 5 can be {0, 3}. Total = 2 × 2 = 4.

Sum of Factors

Sum = [(a^(p+1)−1)/(a−1)] × [(b^(q+1)−1)/(b−1)].

Q34. Answer: (d) Sister or brother

Preparing the family tree using the following symbols:

Hence, Haritha is either sister or brother of Nag.

Q35. Answer: (b) Albuquerque

• Afonso de Albuquerque succeeded Dom Francisco de Almeida as Governor of the Portuguese State of India in 1509.

• Afonso de Albuquerque conquered Goa in 1510 CE.

• He conquered Goa by defeating Bijapur Sultanate Adil Shah.

• He removed Bluewater policy in India.

Q36. Answer: (c) Rs. 6000

Shortcut Trick

Wages are distributed in the ratio of efficiency when time worked is the same.

Ratio of Days (Suresh : Rajesh) = 20 : 30 = 2 : 3

Ratio of Efficiency (Suresh : Rajesh) = 3 : 2

Suresh's share = [3 ÷ (3 + 2)] × 10,000 = 3/5 × 10,000 = Rs. 6,000

Therefore The correct answer is Rs. 6000.

Alternate Method

Given: Suresh takes 20 days, Rajesh takes 30 days. Total wages = Rs. 10,000.

Formula Used: Efficiency = Total Work ÷ Time; Wages prop. to Efficiency

Person	Days	Total Work	Efficiency
Suresh	20	60	3
Rajesh	30	2	

=> Ratio of efficiencies = 3 : 2

=> Total efficiency parts = 3 + 2 = 5 units

=> 5 units = Rs. 10,000

=> 1 unit = Rs. 2,000

=> Suresh's share (3 units) = 3 × 2000 = Rs. 6,000

Therefore The correct answer is Rs. 6000.

Additional Information

Work and Wages Rule

Wages are always distributed in proportion to the actual work done. If everyone works for the same number of days, the ratio of wages is the same as the ratio of efficiency.

Inverse Relation

For the same amount of work, Efficiency is inversely proportional to the Time taken (Efficiency = 1 ÷ Time).

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Q37. Answer: (b) Goa

List of the important beach and their location

Name of the beach	Location
Baga, Colva, Palolem, Candolim, Agonda, Calangute, Cavelossim Beach, Sinquerim, Vagator, Majorda, Varca.	Goa
Radhanagar beach, Kala Pathar Beach, Elephanta Beach	Havelock Island, Andaman
Auroville Beach, Serenity Beach, Paradise Beach	Pondicherry
Marina beach	Chennai

Q38. Answer: (d) [figure]

In the given analogy the ratio of shaded to unshaded area is same.

Ratio for Circle → shaded area : unshaded area = 1 : 3

Ratio for Square → shaded area : unshaded area = 2 : 6 = 1 : 3

Similarly in the second part of analogy

Ratio for Circle → shaded area : unshaded area = 2: 1

Ratio for Hexagon → shaded area : unshaded area = 4: 2 = 2 : 1

Hence, above figure will complete the analogy.

Q39. Answer: (b) 81.5°

Total number of shirts sold = 800 + 900 + 1200 + 940 + 1460 = 5300

Total number of shirts sold in 3^(rd) week = 1200

The measure of the central angle that denotes the third week = (1200 / 5300) × 360°

=> 81.5°

Q40. Answer: (a) All statements 1, 2 and 3 are sufficient

Concept:

Let A and B be any two matrices of same order m × n, then their sum A + B = [a_(ij) + b_(ij)]_(m × n) where A = [a_(ij)]_(m × n) and B = [b_(ij)]_(m × n)

Calculation:

From statement 1:

A = [*20c n 1; 0 -1]

We can not find anything with this statement.

From statement 2:

B = [*20c 1 -1; 0 1]

We cannot find anything with this statement.

From statement 3:

A + B = O, where O is a null matrix of 2 × 2.

We cannot find anything with this statement.

Combining all these statements:

Because O is a null matrix.

Therefore O = [*20c 0 0; 0 0]

A + B = O

[*20c n 1; 0 -1] + [*20c 1 -1; 0 1]= [*20c 0 0; 0 0]

=> [*20c n+1 1-1; 0+0 -1+1] = [*20c 0 0; 0 0]

=> [*20c n+1 0; 0 0] = [*20c 0 0; 0 0]

=> n + 1 = 0

Therefore n = -1

Q41. Answer: (d) T is the mother of R

By decoding given information,

M is			

Symbol	@	$	#
Meaning	Daughter	Husband	Brother
Of N			

R @ S $ T is decoded as R is the daughter of S, S is the husband of T.

Preparing the family tree using the following symbols:

1) T is the sister of R → False (T is the mother of R)

2) T is the mother-in-law of R → False (T is the mother of R)

3) T is the sister-in-law of R → False (T is the mother of R)

4) Tis the mother of R → True

Hence, “T is the mother of R”is true.

Q42. Answer: (d) Both I and II are implicit

While playing a card game, a man exclaims to his friend, ‘What are my chances of winning at least one game against you today?” implies that until now the man has not won any game day and his friend is better than him or in other words his friend is an expert player.

Hence, both the assumptions are implicit.

Q43. Answer: (b) XL

The logic followed here is:

Hence, the next letter in the series will be XL.

Q44. Answer: (a) Aurangabad

• Located in the Sahyadri hills near the Aurangabad district of Maharashtra.

• Ellora is considered the most important second-wave site of ancient rock-cut architecture in India with a series of 34 rock-cut temples.

• The Ellora Caves are listed by UNESCO as a World Heritage Site in the year 1983.

Q45. Answer: (d) CH2COH → methanol → formaldehyde

The correct answer is option 4 i.e CH2COH → methanol → formaldehyde

Name of the compound	Also known as	Chemical Formula
Butyraldehyde	butanal	C3H7COH
Acetaldehyde	ethanal	CH3COH
Propionaldehyde	propanal	C2H5COH
Formaldehyde	methanal	CH2O

Q46. Answer: (d) Kobe Bryant

The correct answer is option 4 i.e Kobe Bryant

Kobe Bean Bryant:

• He is an American former professional basketball player.

• "Dear Basketball" won an Oscar for Best Animated Short Film at Academy Awards in 2018.

• The six-minute film is based on a poem Bryant wrote that was published in The Players Tribune in 2015.

Q47. Answer: (d) Germany

Country	National game
England, Australia	Cricket
France, Germany, Italy and Israel	Football
China	Table Tennis

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Q48. Answer: (d) Heat content

• British thermal unit (BTU) is a measure of the Heat content of fuels or energy sources.

• It is defined as the amount of heat required to raise the temperature of one pound of water by 1° F.

• One BTU equals 1,055 joules or 252 gm. calories.

Q49. Answer: (b) Lithium and Sodium

The correct answer is Lithium and Sodium,

Key Points

• Newland's octave rule states that every eighth element has similar properties when the elements are arranged in the increasing order of their atomic masses.

• He compared the similarity between the elements to the octaves of music, where every eighth note is comparable to the first.

• For Example Lithium and Sodium, Sodium and Potassium, Fluorine and Chlorine.

Element	Atomic Number
Boron	5
Sodium	11
Lithium	3
Calcium	20
Carbon	6
Potassium	19

Q50. Answer: (c) 62 Minutes

Given that

=> Velocity = V = 7.5 m/ min

=> The total displacement is D = 430 + 35 (since it is above surface) = 465 m.

=> Velocity : V = D / t where t is time.

=> Time = D / V => 465 / 7.5

=> Time = 62 minutes.

Q51. Answer: (a) 6cbrt4

Shortcut Trick

Equate Volume: $\pi r^2 h = (4/3)\pi R^3$

$R^3 = (3/4) \times r^2 \times h$ => $R^3 = (3/4) \times 12 \times 12 \times 8$

$R^3 = 3 \times 144 \times 2 = 864$

R = √[3]{864} = √[3]{216 × 4} = 6√[3]{4}

Therefore The correct answer is 6√[3]{4} cm.

Alternate Method

Given:

Base radius of Cylinder (r) = 12 cm

Height of Cylinder (h) = 8 cm

Formula Used:

Volume of Cylinder = $\pi r^2 h$

Volume of Sphere = $(4/3)\pi R^3$

Calculations:

When a solid is melted to form another, their Volumes remain equal.

=> Volume of Sphere = Volume of Cylinder

=> $(4/3) \times \pi \times R^3 = \pi \times (12)^2 \times 8$

=> $(4/3) \times R^3 = 144 \times 8$

=> $R^3 = (144 \times 8 \times 3) \div 4$

=> $R^3 = 144 \times 2 \times 3$

=> $R^3 = 864$

=> R = √[3]{216 × 4}

=> R = 6√[3]{4}

Therefore The correct answer is 6√[3]{4} cm.

Additional Information

Volume Invariance

When a 3D object is reshaped or melted, the Total Volume remains constant provided there is no wastage during the process.

Cylinder Properties

Total Surface Area = 2πr(h + r) and Curved Surface Area = 2πrh.

Sphere Properties

Surface Area of a sphere = 4πR². It is the only shape where the curved surface area equals the total surface area.

Q52. Answer: (c) brother-in-law

Preparing the family tree using the following symbols:

Hence, A is the brother – in – law of Z.

Q53. Answer: (b) C

In the given figures dot is on the same side of quadrilateral as the line. Whereas in the figure C both line and dot are on opposite ends.

Hence, figure C is different from the other figures.

Q54. Answer: (d) 39

Calculation:

Let the numbers be x_(1,)x2, x3, x4.

The mean of four numbers x_(1,)x2, x3, x4 = 37

The sum of four numbers x_(1,)x2, x3, x4= 37 × 4 = 148.

The mean of the smallest three numbers x_(1,)x2, x3 = 34

The sum of the smallest three numbers x_(1,)x2, x3 = 34 × 3 = 102.

Therefore The value of the largest number x4= 148 – 102 = 46.

The Range (Difference between largest and smallest value) x4 – x1 = 15.

Therefore Smallest number x1 = 46 – 15 = 31.

Now,

The sum of x2, x3= Total sum – (sum of smallest and largest number).

=> 148 – (46 + 31)

=> 148 – 77

=> 71

Now,

The mean of the Largest three numbers x2, x3, x4= (71 + 46)/3 = 117/3 = 39

Q55. Answer: (c) Newton

Force: It is defined as the push/pull on an object that has the mass and due to this push/pull it changes its position.

Quantity	SI unit
Force, Weight	Newton (N)
Electrical conductance	Siemens (S)
Magnetic flux	Weber (Wb)
Energy, Work, Heat	Joule (J)
Capacitance	Farad (F)
Electric potential (Voltage)	Volt (V)
Radioactivity	Becquerel (Bq)

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Q56. Answer: (c) 125 km

The logic followed here is:

Here, P is in the middle of YX. Therefore, the distance between Y and P is YP = YX ÷ 2.

Now, by Pythagoras theorem,

$YX^2 = YO^2 + XO^2$

Therefore, YX2 = 2002 + 1502 = 40000 + 22500 = 62500.

=> YX = 250.

=> YP = 125 km.

Hence, the distance between Y and P is 125 km.

Q57. Answer: (d) Four types

- Xylem: It is a type of tissue in vascular plants that transports water and nutrients from the roots to the leaves.
- Xylem tissue is made up of four types of elements.
- They are tracheids, vessels, Xylem parenchyma and fibres.
- There is another transport tissue which is known as Phloem.
- It transports sucrose and other nutrients throughout the plant.

Q58. Answer: (d) 14,243

The logic followed here is:

There are two series

Series 1.

2 + 3 = 5

5 + 3 = 8

8 + 3 = 11

11 + 3 = 14

Series 2.

3 × 3 = 9

9 × 3 = 27

27 × 3 = 81

81 × 3 = 243

Hence, (14, 243) will be the next two numbers in the given series.

Note: For this question, a discrepancy is found in question/answer. So, we have changed the answer.

Q59. Answer: (c) Both I and II are implicit.

The waiter asks a group of people if they wish to go by a la carte or buffet. In the given statement it is assumed that there are two types of methods in which restaurants serve food viz. la carte and buffet. Also, as the waiter is asking customers for the option it can also be assumed that they allow customers to choose the way they want to have their food.

Hence, both the statements are implicit.

Q60. Answer: (b) Neither (1) nor (2) follows

The least possible Venn diagram is as follows:

Conclusions:

1. Some sticks are boxes → False (as there is no information about boxes)

2. Bat is a needle → False (it is possible but not definite)

Hence, neither conclusion I nor conclusion II follows.

Q61. Answer: (a) C2A2T2

The logic followed here is:

Number 2 is added between two alphabets starting from right end. When 2 is placed between all the pair of alphabets, each 2 is replaced by 3 starting from right end.

CAT → CAT2 → CA2T2 → C2A2T2 → C2A2T3

Hence, C2A2T2 will complete the series.

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Q62. Answer: (a) ElsaMarie D'Silva

• ElsaMarie D'Silva is the Founder and CEO of Red Dot Foundation (Safecity).

• Safecity is a platform that crowdsources personal stories of sexual harassment and abuse in public spaces.

• The collected data useful for individuals, local communities and local administration to identify factors that lead to violence and work on strategies for solutions.

• It was launched in the year 2012.

Name	Known for
ElsaMarie D'Silva	Founder and CEO of Red Dot Foundation
Vandita Morarka	Founder & CEO, One Future Collective

Q63. Answer: (b) Journalism

• Radhika Mohan Bhagawati is a renowned journalist.

• He was the recipient of the Sahitya Akademi Award in 1991 for Assamese translation of 'The Story of Our Newspapers'.

• He served as the editor for several Assamese newspapers such as 'Ajir Dainik Batori', 'Batori', 'Ajir Asom', 'Sentinel (Hindi)' and 'Dainik Asam'.

• He was also awarded the Harendra Nath Barua Award for his journalistic work in 1990, 'Shiva Prashad Baruah' national award in 2009, 'Birendra Kumar Bhattacharya' award in 2009 and 'Shashiprabha Barbarua Sahitya Award' in 2015. He also received the 'Sadi Journalist Award.

Q64. Answer: (c) 7%

Shortcut Trick

Total Interest for 8 years = Rs. 434

Rate % = (Interest ÷ (Principal × Time)) × 100

Rate % = (434 ÷ (775 × 8)) × 100

Rate % = (434 ÷ 6200) × 100 = 7%

Therefore The correct answer is 7%.

Alternate Method

Given:

Principal (P) = Rs. 775

Time (T) = 8 years

Interest (SI) = Rs. 434

Formula Used:

Rate of Interest (R) = (Simple Interest × 100) ÷ (Principal × Time)

Calculations:

=> R = (434 × 100) ÷ (775 × 8)

=> R = 43400 ÷ 6200

=> R = 434 ÷ 62

=> R = 7

Therefore The correct answer is 7%.

Additional Information

Total Amount (A)

The sum of Principal and Simple Interest: A = P + SI. In this case, A = 775 + 434 = Rs. 1209.

Simple Interest Characteristics

Simple interest is calculated only on the original principal amount. It remains constant for every year if the rate and principal do not change.

Rate and Time Relationship

If the Principal is constant, the Simple Interest is directly proportional to both Rate and Time (SI prop. to R and SI prop. to T).

Q65. Answer: (b) 25%

Shortcut Trick

Total Effective Cost Price (CP) = 4800 + 20% of 4800 = 4800 × 1.2 = 5760.

Required Profit = 1440.

Profit% = (Profit ÷ CP) × 100.
Profit% = (1440 ÷ 5760) × 100 = 1/4 × 100 = 25%.
Therefore The correct answer is 25%.
Alternate Method
Given → Initial Price = 4800, Overhead Expenses = 20%, Target Profit = 1440.
Formulas: Total CP = Initial Price + Overhead | Profit% = (Profit ÷ Total CP) × 100.
Initial: 4800
Total CP: 5760
Profit
+20% Repair
1440
=> Repairing Cost = 20/100 × 4800 = 960.
=> Total Cost Price = 4800 + 960 = 5760.
=> To get a profit of 1440, Increase % = (1440 ÷ 5760) × 100.
=> Increase % = 144000 ÷ 5760 = 25%.
Therefore The correct answer is 25%.
Additional Information
Total Cost Price
When an item is repaired or transported, the extra expenses (overheads) are always added to the original purchase price to calculate the Effective Cost Price.
Profit Percentage
Profit % is always calculated on the total cost price unless stated otherwise. Formula: P% = (P ÷ Total CP) × 100.

Q66. Answer: (c) Chandigarh

- The Rock garden is a sculpture garden located in Chandigarh.
- It was made by Nek Chand and it was inaugurated in 1976.
- It is spread over with an area of 40 acres.
- The garden is completely built of industrial and home waste and discarded items.

Q67. Answer: (d) Football

Name of the sport	Terminology related to sports
Football	Banana Kick, Head, Penalty kick, Dribble, Offside, Hattrick, Foul, Left out, Goal, Right out, Stopper, Defender, Move, Pass, Comer bick, Baseline, Rebound.
Baseball	Pitcher, Diamond, Pinching, Bunting Home run, Base runner, Throw, Perfect game, Strike, Put out.
Boxing	Knock out, Jab, Round, Hook, Punch, Uppercut, Kidney punch, Timing, Footwork.
Tennis	Service, Grandslam, Deuce, Advantage, Game Point, Breakpoint, Smash, Shot, Break, Grass Court, Drop shot, Netplay, Baseline, etc.

Q68. Answer: (c) New Delhi

NDMA (National Disaster Management Authority):

- It is a Government body to lay down policies for disaster management.
- The National Disaster Management Authority is located in New Delhi.
- It was formed in the year 2005 under the Ministry of Home Affairs.
- NDMA is headed by Prime Minister.

Q69. Answer: (a) 134

The logic followed here is:
20 + 12 = 32
32 + 14(12 + 2) = 46

46 + 18(14 + 4) = 64

64 + 20(18 + 2) = 84

84 + 24(20 + 4) = 108

108 + 26 (24 + 2) = 134

Or. diagrametically we can represent the series as follows:

Hence, 134 will complete the series.

Q70. Answer: (c) Either zygote or early embryo up to 8-cell stage

- In vitro fertilization (IVF) technique involves fertilizing of eggs outside the body.
- Fertilized eggs known as pre-embryos are transferred back into the uterus.
- In this, the zygote or early embryos up to 8-cell stage are transferred into the Fallopian tube.
- If the embryo has more than 8 blastomeres (8-cell stage) then it is transferred into uterus called IUT(Intra Uterine Transfer).
- Zygote Intra Fallopian Transfer (ZIFT) is an example of IVF.

Q71. Answer: (c) 142/5 days

Shortcut Trick

Joe total days → 10 × 4 = 40 days.

Jack total days → 45/2 = 22.5 days.

Combined time = (A × B) ÷ (A + B) = (40 × 22.5) ÷ (40 + 22.5) = 900 ÷ 62.5.

900 ÷ 62.5 = 14.4 days = 14(2/5) days.

Therefore The correct answer is 14(2/5) days.

Alternate Method

Given:

Time taken by Joe to complete 1/4 work = 10 days.

Time taken by Jack to complete whole work = 45/2 days.

Formula Used:

Total Work = LCM of individual days; Efficiency = Total Work ÷ Days.

Person	Days	Total Work	Efficiency
Joe	40	360	9
Jack	22.5	16	

=> Joe total days = 10 ÷ (1/4) = 40 days.

=> Total Efficiency = 9 + 16 = 25 units/day.

=> Time required = Total Work ÷ Total Efficiency = 360 ÷ 25.

=> Time required = 72/5 = 14(2/5) days.

Therefore The correct answer is 14(2/5) days.

Additional Information

Work done by Part

If 1/n part of work is done in 't' days, the Total Work is completed in (n × t) days.

Combined Efficiency

When individuals work together, their efficiencies are added to calculate the total work rate.

Pipes & Cisterns

This concept is identical to work-time, where filling pipes have positive efficiency and leakage has negative efficiency.

Q72. Answer: (a) Both the conclusions follow

Mayank's paintings are really profound in conveying the theme.

Since, the speaker is so amazed at the paintings it can be concluded that Mayank is a painter or an artist. Also, according to speaker paintings are really profound in conveying the theme. So, this implies that Mayank has profound knowledge in his field.

Hence, both the conclusions follow.

Q73. Answer: (c) China

- According to the 2017-18 Commerce ministry data, China is the largest trading partner of India.
- China tops with the total trade worth the US $84.4 billion in which the US $16.34 billion is through exports and rests the US

$68.08 billion.

• In the year 2018-19, the US tops in the largest trading partner of India.

• The other top ten trading partners in FY 2018-19 are UAE, Saudi Arabia, Hong Kong, Singapore, Germany, Republic of Korea and Indonesia.

Country	Capital	Currency
Russia	Moscow	Russian Ruble
England	London	Pound Sterling
China	Beijing	Renminbi
USA	Washington, D.C.	Dollar

Q74. Answer: (b) Indonesia

The correct answer is Indonesia.

Key Points

• Indonesia is not a neighbour of India (including the Andaman Nicobar Islands)

• India is a vast country. Lying entirely in the Northern hemisphere the mainland extends between latitudes 8°4'N and 37°6'N and longitudes 68°7'E and 97°25'E.

• The landmass of India has an area of 3.28 million square km.

• India's total area accounts for about 2.4 percent of the total geographical area of the world.

• India shares its land boundaries with Pakistan and Afghanistan in the northwest, China (Tibet), Nepal and Bhutan in the north and Myanmar and Bangladesh in the east.

• Our southern neighbors across the sea consist of the two island countries, namely Sri Lanka and the Maldives.

-

Q75. Answer: (b) 46

Shortcut Trick

Let Total Capacity of cistern = 36 units (LCM of 12, 36, 6).

Efficiency: A = +3, B = +1, C = −6.

Cycle: Hour 1 (C) = −6, Hour 2 (A) = +3, Hour 3 (B) = +1. Net drainage in 3 hours = 6 − 3 − 1 = 2 units.

To reach 36 units: After 15 cycles (45 hours), drainage = 15 × 2 = 30 units.

Hour 46: Pipe C opens and drains 6 units. Total drained = 30 + 6 = 36 units.

Therefore The correct answer is 46 hours.

Alternate Method

Given: Pipe A = 12 hrs (Inlet), Pipe B = 36 hrs (Inlet), Pipe C = 6 hrs (Outlet).

Formula Used: Total Work = Time × Efficiency.

Pipe	Time (hrs)	Total Capacity	Efficiency
A (Inlet)	12	36 units	+3
B (Inlet)	36	+1	
C (Outlet)	6	−6	

=> Sequence of operation: Hour 1: C, Hour 2: A, Hour 3: B.

=> Work done in 1st hour (C) = −6 units.

=> Work done in 2nd hour (A) = +3 units.

=> Work done in 3rd hour (B) = +1 units.

=> Total work done in 1 cycle (3 hours) = −6 + 3 + 1 = −2 units (2 units emptied).

=> Capacity to be emptied = 36 units.

=> Before the last drainage by C, we need to reach: 36 − 6 = 30 units.

=> Number of cycles to empty 30 units = 30 ÷ 2 = 15 cycles.

=> Time taken for 15 cycles = 15 × 3 = 45 hours.

=> After 45 hours, the cistern has 6 units left to be emptied. In the 46th hour, Pipe C opens.

=> Drainage in 46th hour = 6 units. Total emptied = 30 + 6 = 36 units.

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Therefore The correct answer is 46 hours.

Additional Information

Pipes and Cisterns Efficiency

Inlet pipes have positive efficiency (+) as they add water, while outlet pipes have negative efficiency (−) as they remove water.

Alternate Work Concept

In alternate work problems involving emptying, always subtract the maximum emptying capacity from the total to find the point where the cycle might end prematurely.

LCM Method

Total capacity is assumed as the LCM of individual times to simplify calculations into whole numbers.

Q76. Answer: (c) 10500

Shortcut Trick

Find the LCM of 21, 25, and 30.

LCM(21, 25, 30) → 21 = 3 × 7, 25 = 52, 30 = 2 × 3 × 5.

LCM = 2 × 3 × 52 × 7 = 1050.

The required number must be a multiple of 1050 and greater than 10000.

1050 × 10 = 10500, which is the nearest value to 10000.

Therefore The correct answer is 10500.

Alternate Method

Given: Numbers are 21, 25, and 30. Target is a number > 10000 nearest to it.

Formula: Required Number = Multiple of LCM(21, 25, 30).

=> Prime factorization of 21 = 3 × 7

=> Prime factorization of 25 = 5 × 5

=> Prime factorization of 30 = 2 × 3 × 5

=> LCM = 21 × 31 × 52 × 71 = 1050

=> Divide 10000 by 1050: 10000 ÷ 1050 ≈ 9.52

=> Smallest multiple greater than 10000 = 1050 × 10 = 10500

Therefore The correct answer is 10500.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is divisible by each of the given numbers. It is calculated by taking the highest power of all prime factors involved.

Divisibility Rule of 25

A number is divisible by 25 if its last two digits are 00, 25, 50, or 75.

Finding Multiples near a Value

To find a multiple of L near N, divide N by L to find the quotient q. The nearest multiples are L × q and L × (q+1).

Q77. Answer: (d) Parineeti Chopra

• Bollywood actress Parineeti Chopra has been appointed by Tourism Australia as the ambassador for the ‘Friend of Australia’ advocacy panel. Chopra becomes the first Indian women ambassador for the advocacy panel.

• The "Friends of Australia" programme has been devised as a way of fostering mutually beneficial, long-term friendship with those that Tourism Australia regards as unique storytellers.

• The Capital of Australia - Canberra

• The currency of Australia - Australian Dollar

Q78. Answer: (b) Au

Option 2 is correct:

• Gold (Au) is one of the least reactive elements on the Periodic Table.

• As it is placed at lowest in the reactivity series. So, because of this reason, gold does not react with acid.

• It doesn’t react with oxygen, so it never rusts or corrodes.

• Gold is unaffected by air, water, alkalis and all acids except aqua regia (a mixture of hydrochloric acid and nitric acid) which can dissolve gold.

• Gold does react with halogens. For example, It will react very slowly with chlorine gas at room temperature to form gold chloride, AuCl3.

Q79. Answer: (d) plasma

• Plasma is a mixture of free electrons and ions. Plasma occurs naturally in the stars (including the sun).

• Inside the stars, the temperature is so high that the atoms break up. Some of the electrons break away from the atoms converting the rest of atoms into electrically charged particles called ions.

• This mixture of free electrons and ions in a star is called plasma.

• The sun and other stars glow because of the presence of plasma in them.

• Plasma can also be made on the earth by passing electricity through gases at very low pressure.

• The fluorescent tubes and neon sign bulbs form plasma when they are switched on.

Q80. Answer: (b) Kinetic

The correct answer is Kinetic.

• Kinetic energy: The kinetic energy of an object is the energy that it possesses due to its motion.

• The formula of kinetic energy KE = 1/2 mv^2

• Kinetic energy is an example of the scalar quantity which means that the quantity has only magnitude and no direction.

• The unit of the kinetic energy is Joule. (J = kg m^2/s^2)

• An object of mass "m" places at a height "h" possess potential energy which is equal to "mgh", where g = 10 m/s^2which is the acceleration due to gravity.

Q81. Answer: (c) Sb < As < S < P < Cl

• Sb < As < S < P < Cl is the correct order of their increasing ionisation energy.

• Ionization energy: It is defined as the energy required to remove an electron from a gaseous atom or ion.

• Units: kilojoules per mole (kJ/M) or electron volts (eV).

• I.E increases while moving from left to right across an element period because moving left to right across a period, the atomic radius decreases, so electrons are more attracted to the nucleus.

• I.E decreases while moving from top to bottom of the periodic table group because while moving down a group, a valence shell is added. The outermost electrons are further from the positive-charged nucleus, so they are easier to remove.

Element	Symbol	Atomic Number	Ionization Energy (eV)
Antimony	Sb	51	8.6084
Arsenic	As	33	9.7886
Sulphur	S	16	10.36001
Phosphorous	P	15	10.48669
Chlorine	Cl	17	12.96764

Q82. Answer: (a) 41 and 43

Shortcut Trick

Twin Primes are pairs of prime numbers that have a difference of exactly 2.

Check pairs: (41, 43) → Both are prime and 43 − 41 = 2.

Check pairs: (21, 23) → 21 is not prime (3 × 7 = 21).

Check pairs: (19, 31) → Difference is 12, not 2.

Therefore The correct answer is 41 and 43.

Alternate Method

Definition: Two prime numbers are called twin primes if there is only one composite number between them, or their difference is 2.

Given: Numerical pairs for identification.

=> Case 1: (41, 43). 41 is prime. 43 is prime. Difference = 43 − 41 = 2. (Valid)

=> Case 2: (21, 23). 21 is divisible by 3 and 7, so it is composite. (Invalid)

=> Case 3: (19, 31). Both are prime, but 31 − 19 = 12. (Invalid)

=> Case 4: (0, 11). 0 is neither prime nor composite. (Invalid)

Therefore The correct answer is 41 and 43.

Additional Information

Prime Numbers

Numbers greater than 1 that have only two factors: 1 and the number itself. Example: 2, 3, 5, 7, 11, ...

Co-prime Numbers

Two numbers are co-prime if their Highest Common Factor (HCF) is 1. They do not need to be prime themselves.

Common Twin Primes

Examples include (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), and (41, 43).

Q83. Answer: (a) neutralisation

Option 1 is correct:

• The alkali metals are six chemical elements in Group 1, the leftmost column in the periodic table.

• They are lithium (Li), sodium (Na), potassium (K), rubidium (Rb), caesium (Cs), and francium (Fr).

• The reaction between an acid and a base to give a salt and water is known as a neutralization reaction.

• In general, a neutralization reaction can be written as-

• Base + Acid → Salt + Water

• NaOH + HCl → NaCl + H2O

Q84. Answer: (a) 9

The number of triangles in the given figure is as follows:

Hence, there are nine triangles in the given figure.

Q85. Answer: (c) 2.1 J

Option 3 is correct:

According to Newton's second law, F = change in momentum/time period

=> Momentum P = mv, 10 = 5 × v, v = 2 m/s

=> Initial kinetic energy K1 = 1/2mv²

=> K1 = 1/2 × 5 × 4 = 10 J

=> Let final momentum be P,

F = (P-10) /10 (Given, F = 0.1N)

0.1 = (P-10) /10

=>P = 11 kg m/s, P = mv, 11 = 5 × v, v = 11/5

=> Final Kinetic energy K2 = 1/2 mv²

=> K2 = 1/2 (mv)v = 1/2 pv

=> K2 = 1/2 × 11 × 11/5 = 12.1 J

Changing in kinetic energy K = 12.1 - 10 = 2.1J

Q86. Answer: (b) Statement 1 and 2 together are sufficient.

The logic followed here is :

Statement 1: A’s bus Departs first.

No information is given about B or C. So, statement 1 is not sufficient.

Statement 2: B is the last one to leave.

No information is given about A or C. So, statement 2 is not sufficient.

Combining both the statements:

As A is first and B is last, C will be second.

Hence, Statement 1 and Statement 2 together are sufficient.

Q87. Answer: (d) Lone pair of electrons

Option 4 is correct.

• The atomic number of nitrogen is 7.

• Electronic configuration of Nitrogen is $1s^2,2s^2,2p^3$.

• The ammonia (NH3) molecule is trigonal pyramidal with the nitrogen atom at the apex.

• It has three bond pairs and one lone pair of electrons as shown in the structure.

• Ammonia is a colourless gas with a pungent odour.

• It's freezing and boiling points are 198.4 K and 239.7 K respectively.

Q88. Answer: (c) 60

Option 3 is correct:

• The Ministry of New and Renewable Energy under its scheme “Development of Solar Cities” has approved/sanctioned 60 Cities including 13 Pilot and 5 Model Cities up to 12th Five-year Plan period.

• Minister of State (Independent charge) for Power & New and Renewable Energy is Shri Raj Kumar Singh.

• The Scheme aims at reducing a minimum 10% in projected demand of conventional energy at the end of five years, through a combination of enhancing supply from renewable energy sources in city and energy efficiency measures.

• Under it, local Governments are motivated to adopting renewable energy technologies and energy efficiency measures.

Q89. Answer: (b) 34,500

Shortcut Trick

Previous Quarter Profit = 30,000.

Current Quarter Profit = 115% of Previous Profit.

Current Quarter Profit = 30,000 × 1.15 = 34,500.

Therefore The correct answer is 34,500.

Alternate Method

Given → Previous Quarter Profit = 30,000 | Percentage Increase = 15%.

Formulas: Increase Amount = (Previous Profit × Increase%) ÷ 100 | New Profit = Previous Profit + Increase Amount.

30,000

Previous Profit

+15% Increase

34,500

Current Profit

=> Increase in Profit = (15 ÷ 100) × 30,000

=> Increase in Profit = 15 × 300 = 4,500.

=> Current Quarter Profit = 30,000 + 4,500.

=> Current Quarter Profit = 34,500.

Therefore The correct answer is 34,500.

Additional Information

Percentage Increase

To calculate the final value after an x% increase, multiply the original value by (100 + x) ÷ 100.

Quarterly Growth

Growth rate reflects the change in profit over a specific period, usually expressed as a percentage of the base period value.

Q90. Answer: (b) Dilip Shanghvi

Option 2 is correct:

• Sun Pharmaceutical Industries was founded by Dilip Shanghvi in 1983.

• It is India's largest and world's 5th largest generic pharmaceutical company.

• The government of India awarded him the civilian honour of the Padma Shri in 2016.

Q91. Answer: (b) Rs. 346

Shortcut Trick

Loss Percentage = 13.5%

Selling Price (SP) = Cost Price (CP) × (100 − Loss%) ÷ 100

SP = 400 × (100 − 13.5) ÷ 100

SP = 400 × 86.5 ÷ 100 = 4 × 86.5

SP = Rs. 346

Therefore The correct answer is Rs. 346.

Alternate Method

Given → Cost Price (CP) = Rs. 400, Loss Percentage = 13.5%

Formulas: Loss = (Loss% ÷ 100) × CP | SP = CP − Loss

=> Loss Amount = (13.5 ÷ 100) × 400

=> Loss Amount = 13.5 × 4 = Rs. 54

=> Selling Price (SP) = 400 − 54

=> SP = Rs. 346

Therefore The correct answer is Rs. 346.

Additional Information

Loss and Selling Price Relationship

When an article is sold at a loss, the Selling Price is always less than the Cost Price. Formula: Loss = CP − SP.

Loss Percentage Calculation

The loss percentage is always calculated on the Cost Price (CP) unless stated otherwise. Formula: Loss% = (Loss ÷ CP) × 100.

Q92. Answer: (b) Proiti Roy

- The Big Little Book Award 2017 in the 'illustrator category' went to Proiti Roy.
- She is known for her works in various children's books across languages and received the award in the illustrator category.
- The 'Big Little Book Award' has been instituted by the Parag initiative of Tata Trusts and 'Literature Live'.
- It recognizes authors and illustrators who have written and illustrated stories that connect with children, make them laugh, encourage them to think, introduce them to new ideas and cultures, are inclusive and balance the traditional with the contemporary.

Q93. Answer: (c) 4

In the given figure students who appeared for examination A and B but not C is represented by the area of intersection of A and B which does not have any number.

The number will be calculated as follows:

Total number of students : 50

Number of students who appeared for examination A and B but not C = 50 – (10 + 5 + 10 + 4 + 12 + 5) = 50 – 46 = 4

Hence, 4 is the correct answer.

Q94. Answer: (a) B

The logic followed here is:

→

In figure A there are two parallel lines and two circles. In figure B the lines join at right angle with two circles at the open ends of the two lines.

Similarly,

→

In figure C again there are two parallel lines and two dots. In figure D the lines will join at right angle with two dots at the open ends of the two lines.

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

Q95. Answer: (a) Sakshi Malik

- Sakshi Malik is an Indian freestyle wrestler. She won the Bronze medal at the summer Olympic 2016 in the 58 kg category.
- She became the first Indian female wrestler who won a medal in the Olympic games.
- Also, P.V. Sindhu won the silver medal in Badminton at Summer Olympics 2016.
- The Olympic games 2016 were held in Rio de Janeiro in Brazil.
- Next Olympic games are going to be held in Tokyo in 2020.
- Only two medals (one bronze and one silver medal) won by India in the Summer Olympics 2016.

Q96. Answer: (c) Statements (1), (2). (4)

- A concave mirror is used in Headlights, Shaving mirrors and in Torches
- A convex mirror is used as rearview mirrors.

Concave Mirror	Explanation
As a Shaving mirror	Concave mirrors at less distance produced magnified, upright images, therefore, are used as a shaving mirror
In Headlights	In case of headlights and searchlights, the light should not scatter and instead should be a parallel beam so that it can cover a longer distance. For this purpose, concave mirrors are used because a parallel beam of light is produced when the light source is placed at the focus of a concave mirror.

In Torches	Concave mirrors reflect the light inward to one focal point and they are used to focus light.

Q97. Answer: (c) $\cos^2 A \cot^2 A$

Shortcut Trick

Use Value Substitution: Let A = 45°.

Expression = $\cot^2 45° - \cos^2 45° = 1^2 - (1/\sqrt{2})^2 = 1 - 0.5 = 0.5$.

Option (3) = $\cos^2 45° \times \cot^2 45° = (1/\sqrt{2})^2 \times 1^2 = 0.5 \times 1 = 0.5$.

Since the values match, Option (3) is correct.

Therefore The correct answer is $\cos^2 A \cot^2 A$.

Alternate Method

Given: $\cot^2 A - \cos^2 A$

Formula Used: cot A = cos A ÷ sin A; $\sin^2 A + \cos^2 A = 1$

=> $\cot^2 A - \cos^2 A = (\cos^2 A \div \sin^2 A) - \cos^2 A$

=> Take $\cos^2 A$ common: $\cos^2 A \times (1 \div \sin^2 A - 1)$

=> $\cos^2 A \times [(1 - \sin^2 A) \div \sin^2 A]$

=> Since $1 - \sin^2 A = \cos^2 A$

=> $\cos^2 A \times [\cos^2 A \div \sin^2 A]$

=> $\cos^2 A \times \cot^2 A$

Therefore The correct answer is $\cos^2 A \cot^2 A$.

Additional Information

Trigonometric Identities

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

Product to Difference Rule

For tan and cot: $\tan^2 A - \sin^2 A = \tan^2 A \times \sin^2 A$ and $\cot^2 A - \cos^2 A = \cot^2 A \times \cos^2 A$.

Q98. Answer: (c) Rs. 18.68

Shortcut Trick

Cost of 1 metre = Total Cost ÷ Total Quantity.

Cost = 2465.82 ÷ 132.

By division: 2465.82 ÷ 132 = 18.68045...

Rounding to two decimal places, we get Rs. 18.68.

Therefore The correct answer is Rs. 18.68.

Alternate Method

Given: Total expenditure = Rs. 2,465.82 | Total length of ribbon = 132 metres.

Formulas: Unitary Method Cost = Total Price ÷ Number of units.

=> Price of 132 metres = 2,465.82

=> Price of 1 metre = 2,465.82 ÷ 132

=> Step 1: 2465.82 ÷ 12 = 205.485

=> Step 2: 205.485 ÷ 11 = 18.6804545...

=> Rounding off to two decimal places = 18.68

Therefore The correct answer is Rs. 18.68.

Additional Information

Unitary Method

Finding the value of a single unit by dividing the total value by the total number of units.

Rounding Rules

If the third decimal digit is less than 5, leave the second digit unchanged. If 5 or more, round up.

Q99. Answer: (b) 30°

The logic followed here is:

Numbers in a clock → 12

(Minor)Angle between two consecutive numbers → 360° ÷ 12 = 30°

(Major)Angle between two consecutive numbers → 360° - 30° = 330°

At 11:00 AM the hour hand will be at 11 and minute hand will be at 12. AS discussed above the minor angle between two consecutive numbers is 30°. Hence, the angle between the hour hand and minute hand at 11:00 AM is 30°.

Alternate Method Formula used:

If minutes are more than 00

Angle between hour hand and minute hand = | * 11/2 * × minutes - 30 × hours |

if the minutes are 00

Angle between hour hand and minute hand = 30 × hours

Calculation:

Angle between hour hand and minute hand = | 11/2 × 00 - 30 ×11 |

= |- 30 ×11|

= |- 330|

= | -330°|

= 330° but this is the obtuse angle.

= The acute angle will be 360° - 330° = 30°

Hence, the angle between the hour hand and minute hand at 11:00 AM is 30°.

Q100. Answer: (d) black

Option 4 is correct i.e black,

• The sky appears black to an astronaut because there is no atmosphere in outer space that can scatter the sunlight.

• As sunlight does not scatter in space, no scatter light reaches the eyes of the astronauts and the sky appears black to them.

• Light can travel through space because it is an EM(electromagnetic) wave, but the scattering will not take place because of the lack of atmosphere.

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