RRC Group D Previous Year Paper 32 (Held On: 1 Oct 2018 Shift 3)

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

Take this paper as a timed mock test

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

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CBT

Q1. Read the statements and identify the logically correct conclusion from the given information.

Statement:

"The pedestrian crossing is few feet away. It is safe to use it, "says a mother to her child.

Conclusions:

I. Pedestrian should use pedestrian crossing for safety.

II. All the children know what is pedestrian crossing.

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

Q2. What is the third proportional to 9 and 12?

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

Q3. Which of the statements is sufficient to answer the question?

Question:

Find the total number of students in a class if the class has some boys and some girls.

Statements:

I. The number of boys in a class is 10.

II. The number of girls in a class is 2 more than the number of boys.

(a) Only statement II is sufficient
(b) Either statement I or II is sufficient
(c) Both statements I and II are sufficient
(d) Only statement I is sufficient

Q4. In a code language, TURN is written as STQM. What is the code for LIMP?

(a) KHLP
(b) KHNQ
(c) KHLO
(d) JHLO

Q5. Select the option that is related to the third word on the same basis as the second word is related to the first word.

Magnetic field : Oersted ? Power : ?

(a) Litre
(b) Volt

(c) Watt
(d) Metre

Q6. Kalyan is twice as old as his sister and five times younger than his father. After two years their combined age will be 58. How old is Kalyan's sister now?
(a) 5
(b) 4
(c) 6
(d) 3

Q7. If east becomes north-east, what will be north become?
(a) North-west
(b) North-east
(c) West
(d) East

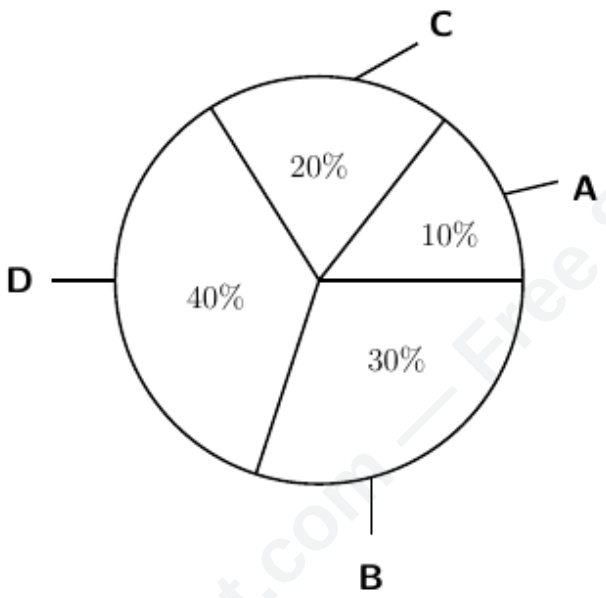
Q8. In 2017, The Government of India announced which of the following schemes to help replace incandescent bulbs with LED bulbs?
(a) Deen Dayal Upadhayaya Gram Jyoti Yojana (DDUGJY)
(b) Vidyut Shakti Sanrakshan Yojana (vssy)
(c) Integrated Power Development Scheme (IPDS)
(d) Unnat Jyoti by Affordabled LEDs for All (UJALA)

Q9. 3 R # 2 A $ K 5 % T 7 & N Y + X B / L Q @ 1
If the second half of the above series is reversed then using the new series find the missing term
+%2 : /$3 ? @y$: _____
(a) 7XR
(b) TB#
(c) BT#
(d) %#K

Q10. Diksha obtained 58% marks in an exam where the maximum marks was 450. She obtained___ marks.
(a) 290
(b) 276
(c) 261
(d) 275.5

Q11. The data shows the information on the number of children vaccinated in the year 2016 in different cities.

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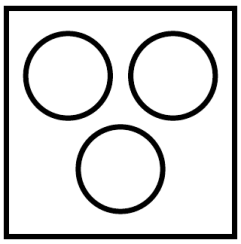
If the total number of children vaccinated in the year 2016 is 1,20,000, then how many kids from city 'B' were vaccinated?

(a) 24,000
(b) 48,000
(c) 12,000
(d) 36,000

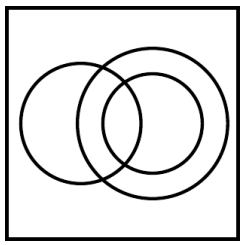
Q12. Choose the correct Venn Diagram which represents the given words:

"Utensils, Furniture, Clothes"

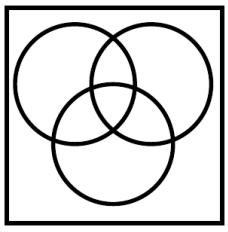
(a)



(b)

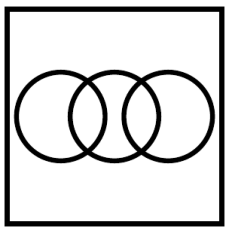


(c)



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(d)



Q13. Sindhu can cover a distance of 202/3 km in 73/4 hours on foot. How many km per hour does she walk?

(a) 4 km
(b) 2/3km
(c) 22/3km
(d) 32/3km

Q14. A statement is followed by two arguments. Decide which of the arguments is/are strong with respect to the statement.

Statement:

Too much of pain killer affects the liver.

Arguments:

I. Yes, for all small aches we should avoid taking pain killers.

II. No, when we have the comfort of gulping a tablet; why to beat the pain?

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

Q15. If the simple interest on a certain sum for 1.5 years at 8% p.a. is Rs. 360. Find the compound interest on the same sum for the same rate of interest but double the time?

(a) Rs. 778
(b) Rs. 778.13
(c) Rs. 779
(d) Rs. 779.13

Q16. The capital of Jharkhand is _____

(a) Hattia
(b) Patna
(c) Ranchi
(d) Jamshedpur

Q17. Rathin & Bratin together can complete a piece of work in 12 days. They start the work together but Rathin had to leave 5 days before the work got over. As a result it took a total of 15 days to complete the work. How many days would it have taken Bratin to complete the work by himself?

(a) 20
(b) 24
(c) 30
(d) 28

Q18. The substances whose odor changes in acidic or basic medium are called _____.

(a) Natural indicators
(b) Synthetic indicatiors
(c) Acid-base indicators
(d) Olfactory indicators

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Q19. Which of the following statements is/are true/ false about the speed of sound in the different medium at 25° C?

A. In oxygen gas, speed of sound is 316 m/s

B. In water (distilled), the speed of sound is 1498 m/s

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

Q20. Find the square root of the perfect square made by multiplying 4050 with a least positive integer.

(a) 80
(b) 90
(c) 85
(d) 95

Q21. Transpiration takes place through the _____.

(a) vascular bundles
(b) cortex
(c) stomata
(d) epidermis

Q22. If L stands for +, M stand for -, N stands for ×, P stands for ÷ then what is the value of 7N12L48P4M6?

(a) 98
(b) 90
(c) 94
(d) 92

Q23. The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 172.5 V?

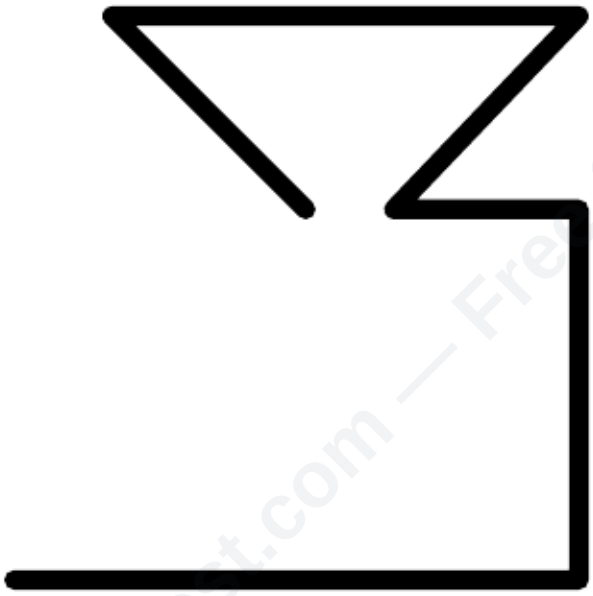
(a) 10 A
(b) 24 A
(c) 8.5 A
(d) 11.5 A

Q24. Name the shuttler who represents the Olympic committee in the Badminton world Federation?

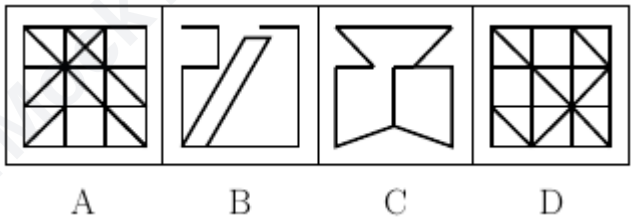
(a) Saina Nehwal
(b) K Srikanth
(c) P Gopichand
(d) B Sai Praneeth

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Q25.



The above figure is embedded in any of these four figures. The correct pictures containing the above picture is:

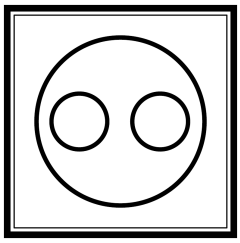


(a) C
(b) D
(c) B
(d) A

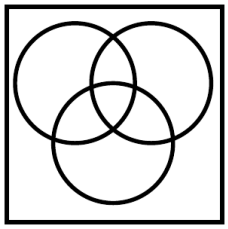
Q26. Choose the best suitable Venn diagram for the following words

"Metal, Gold, Platinum"

(a)

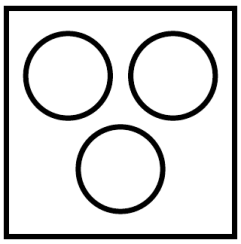


(b)

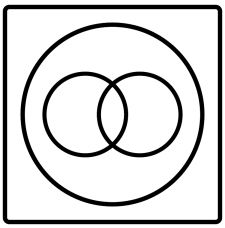


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(c)



(d)



Q27. A Person borrowed Rs. 32,000 at a yearly 9% simple interest and deposited the same amount in a bank at a yearly compound interest of 10%. What is the gain in rupees at the end of 3 years?

(a) Rs. 926
(b) Rs. 1,940
(c) Rs. 2,904
(d) Rs. 1,952

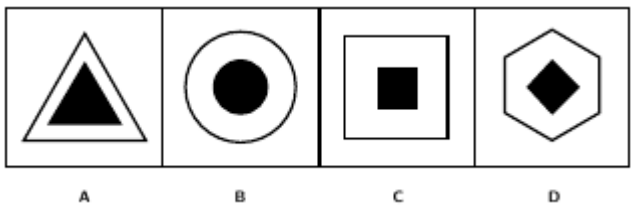
Q28. Which of the following states that "Properties of elements are a periodic function of their atomic number"?

(a) Dobereiner's triads
(b) Modern periodic law
(c) Newlands's law of octaves
(d) Mendeleev's periodic law

Q29. The relation between potential difference (V) and current (I) was discovered by:

(a) Pascal
(b) Tesla
(c) Newton
(d) Ohm

Q30. Out of the four option figures, three are similar in a certain manner. However, one figure is NOT like the other three. Select the figure which is different from the rest.



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

Q31. A car, while moving, is facing a wind from the opposite direction. The work done by the wind on the car will be _____.

(a) Infinity
(b) Positive
(c) Zero

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(d) Negative

Q32. The SI unit of power is_____.

(a) Erg
(b) Kilowatt
(c) Joule
(d) Watt

Q33. Person A, B and C can complete a task together in 81 days. A and B can completed the same task together in 97.2 days. B and C can complete the same task together in 162 days. In how many days can B alone complete the task?

(a) 243
(b) 225
(c) 261
(d) 234

Q34. There are 10 protons and 17 neutrons in the nucleus of an element. What is its mass number?

(a) 27
(b) 7
(c) 17
(d) 10

Q35. Select the option that is related to the third word on the same basis as the second word is related to the first word.
Sound : Ear ? Scent :

(a) Feel
(b) Think
(c) Smell
(d) Nose

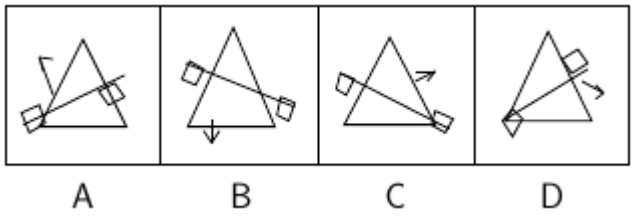
Q36. If the vulgar fraction of 0.4141... is given by 41/(999 … … 9(n times)) then find the value of n?

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

Q37. Bratin is now 18 years old, whereas his cousin is 7 years old. After how many years will Bertin's age be 1.5 times that of his cousin?

(a) 15
(b) 16
(c) 13
(d) 14

Q38. Choose the odd one from among the given figures



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

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Q39. The British made English the medium of instruction in India in ____

(a) 1835
(b) 1857
(c) 1855
(d) 1833

Q40. How is Srilekha's brother's only sister's father's sister related to her?

(a) Paternal Aunt
(b) Sister
(c) Mother
(d) Grandmother

Q41. A fraction when added to 17/3 gives 4. What is the said fraction?

(a) -1/1
(b) -12/3
(c) 9/2
(d) 2/3

Q42. Which of the following statements is/are true/false?

A. An acid which is completely ionized into ions and produces a large number of H+ ions. For example HCl, H2 SO4, HNO3

B. An acid which is partially ionized in water and produces less number of H+ ions. For example CH3COOH, H2CO3, H2SO2

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

Q43. Who received the prestigious Florence Nightingale Award from the former President Pranab Mukherjee in 2017?

(a) Krishna Kumari
(b) Jaya Lakshmi
(c) Devi Kumari
(d) Kavitha

Q44. The SI unit of pressure is _____.

(a) Newton
(b) Ohm
(c) Pascal
(d) Dyne

Q45. Let α, β be the roots of $ax^2 + bx + c = 0$; γ, δ be the roots of $px^2 + qx + r = 0$;& D1, D2 the respective discriminants of these equations. If α, β, γ, δ are in A.P. Then find the value of D1: D2

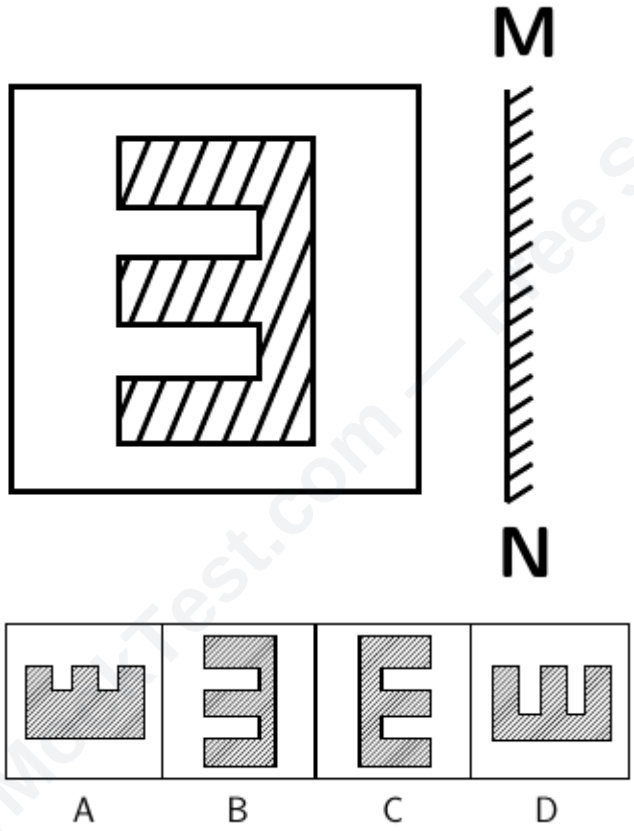
(a) $(a^2)/(p^2)$
(b) $(a^2)/(b^2)$
(c) $(b^2)/(q^2)$
(d) $(c^2)/(r^2)$

Q46. In triangle ABC, AD perpendicular to BC and AO is the bisector of angle BAC. If angle ABC = 65° and angle ACB = 23(1°)/2, then angle DAO is ____ (in degrees)

(a) 20(1°)/4
(b) 20(1°)/5
(c) 20(1°)/2
(d) 20(3°)/4

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Q47. Find the mirror image of the given figure if the mirror is placed at line MN.



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

Q48. _____ was the founder of the Lodi Dynasty.

(a) Sultan Ibrahim
(b) Ala-ud-din Lodi
(c) Ibranhim Lodi
(d) Bahlul Lodi

Q49. The Indian Women's hockey team won the Asia Cup 2017 by defeating which coutry?

(a) Germany
(b) South Korea
(c) China
(d) Japan

Q50. In a class there were 18 boys and some girls. In a test the mean score obtained by the boys was 12 while that obtained by the girls was 14. If the overall average was 13.1, what was the total number of students in the class?

(a) 38
(b) 44
(c) 42
(d) 40

Q51. Aanya and Manya are standing facing each other. Anya is facing North-West. Which direction in Manya facing with respect to Anya?

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

Q52. A person walks 2/5 ^(th) of the total distance and covers one-third of the remaining distance by bus. What is the fraction of the remaining distance to be covered?

(a) 3/5
(b) 2/5
(c) 7/15
(d) 1/5

Q53. Who won the Best Actress Award at the 64th National Film Awards in 2017?

(a) Sonam Kapoor
(b) Taapsee Pannu
(c) Anushka Sharma
(d) Surabhi Lakshmi

Q54. India's first World Heritage City Status was accorded to which of the following city by UNESCO?

(a) Hyderabad
(b) Hampi
(c) Jaipur
(d) Ahmedabad

Q55. Which of the following pairs do not have the same SI unit?

(a) Displacement and distance
(b) Force and pressure
(c) work and energy
(d) Speed and velocity

Q56. Read the following statement and the arguments that follow. Decide which of the arguments is strong.

Statement:

Young entrepreneurs should be encouraged.

Arguments:

I. Yes. It helps in the industrial development of the country and reduces burden on the employment market.

II. No, they are not experienced and may make losses.

(a) Only argument I is strong
(b) Either argument I or II is strong
(c) Neither argument I nor II is strong
(d) Only argument II is strong

Q57. The atomic mass of aluminum is 27. The number of moles present in 81 grams of aluminum is _____.

(a) 4
(b) 5
(c) 2
(d) 3

Q58. What is the SI unit of speed?

(a) m/s
(b) km/h
(c) m/minute
(d) km/s

Q59. You are given question and two statement. Identify which of the statement is/are necessary to answer the question.

How is Rajesh related to Vijay?

Statement:

I. Rajesh is the only son of Vijay’s mother-in-law.

II. Verma is Rajesh’s only sister.

(a) Data in I alone is sufficient

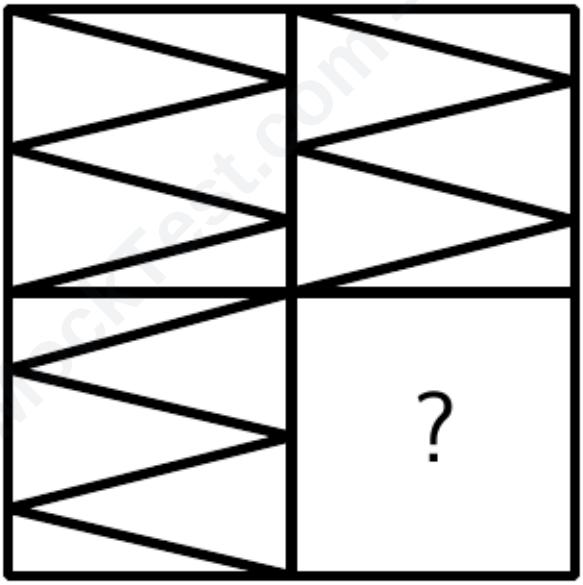
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(b) Data in both I and II together are not sufficient
(c) Data either in I alone or II alone are sufficient
(d) Data in II alone is sufficient

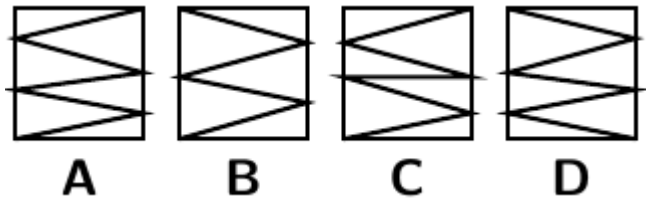
Q60. A girl saw a clock when it was 3 am. The clock losses 16 minutes per day. What will be the actual time when she sees the clock on the 4^(th) day at 8 pm?

(a) 9 : 15 pm
(b) 9 : 00 pm
(c) 8 : 30 pm
(d) 9 : 30 pm

Q61.



Choose the correct picture that replaces the (?) symbol above with the below given options:



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

Q62. An object moving with a uniform velocity of 4ms^(-1) possesses kinetic energy of 120 J. Find the mass of the object.

(a) 15 N
(b) 15 W
(c) 15 Kg
(d) 15 Pa

Q63. Which of the following is not a noble gas?

(a) oganesson
(b) Argon
(c) Xenon
(d) Chlorine

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Q64. Who was conferred with the Best Director Award in the 64^(th) National Film Awards?

(a) Rajesh Mapuskar
(b) Srijit Mukherji
(c) Anurag Basu
(d) Nitesh Tiwari

Q65. Pointing to a man, Pankaj(boy) said, “He is the brother of my uncle’s daughter”. How is this man related to Pankaj?

(a) Nephew
(b) Cousin
(c) Uncle
(d) Son

Q66. If $10 \sec^2 x - 9 \tan^2 x = 13$ and $0° \leq x\ 90°$, then x = _____.

(a) 30°
(b) 45°
(c) 60°
(d) 90°

Q67. Which of the fractions given below is not equal to 5/9 ?

(a) 105/198
(b) 80/144
(c) 40/72
(d) 25/45

Q68. 20 men can finish a certain work in 10 days, where as it takes 12 women to finish it in 10 days. If 15 men and 6 women undertake to complete the work, how many days will they take to complete it?

(a) 8 days
(b) 10 days
(c) 6 days
(d) 4 days

Q69. When light travels form a denser medium to a rare medium, what is the effect on its speed?

(a) Increases
(b) No change
(c) Decreases
(d) Decreases and the increases

Q70. _____ is the state flower of Jharkhand.

(a) Lotus
(b) Rohira
(c) Orchid
(d) Palash

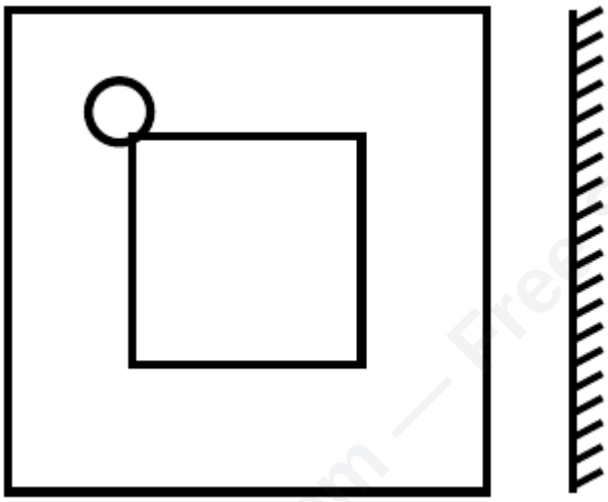
Q71. Find the missing letter in the series:

Y, W, U, S ?, O

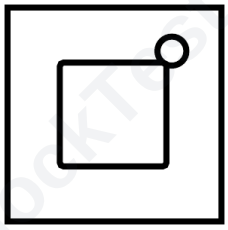
(a) N
(b) T
(c) R
(d) Q

Q72. Choose the correct mirror image for the following figure.

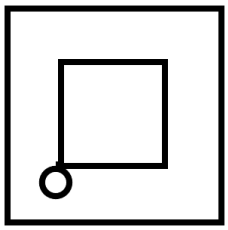
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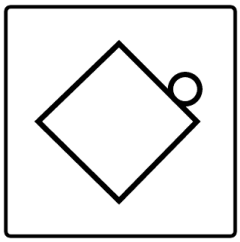
(a)



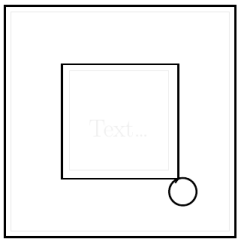
(b)



(c)



(d)



Q73. In which of the following phenomena can many plants be grown from one parent in disease-free conditions?

(a) Sexual reproduction
(b) Tissue culture
(c) Spore formation
(d) Regeneration

Q74. Read the following statements and the conclusions that follow. Decide which of the two conclusions follow from the given statements.

Statements:

1. All the cots are hotels.
2. All hotels are sheets.

Conclusions:

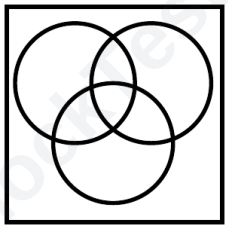
1. Some cots are not sheets.
2. Some sheets are cots.

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

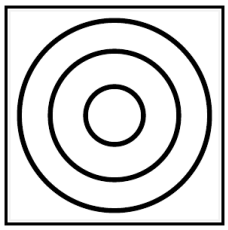
Q75. Choose the best suitable Venn diagram for the following words:

Amphibians, Tortoise, Crocodile

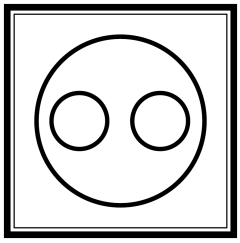
(a)



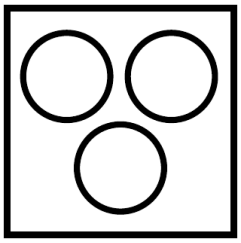
(b)



(c)



(d)



Q76. Which mobile application has N. Chandrababu Naidu, the Andhra Pradesh chief Minister, launched at the Collectors conference in Vijayawada?

(a) 'People First' mobile application
(b) 'People Safe' mobile application
(c) 'People Friend' mobile application

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(d) 'People Help' mobile application

Q77. The _____ System transports fluids from one place to another.

(a) respiratiory
(b) vascular
(c) nervous
(d) excretory

Q78. Which of the following tissues is composed of mainly dead cells?

(a) Parenchyma
(b) Collenchyma
(c) Aerenchyma
(d) Xylem

Q79. Fill the missing number for the series form the given options:

8, 11, 16, 23, 32, ?

(a) 40
(b) 43
(c) 46
(d) 42

Q80. Who is the Chief Minister of Uttarakhand who was elected in 2017?

(a) Satpal Maharaj
(b) Harak Sigh Rawat
(c) Trivendra Singh Rawat
(d) Prakash Pant

Q81. Aluminium metal is extracted only by:

(a) Electrolysis
(b) Calcination
(c) Reduction
(d) Oxidation

Q82. Halogens contains_____.

(a) 2 gases, two liquids and 1 solid
(b) 2 gases and 3 solids
(c) 2 gases, one liquid and 2 solids
(d) 3 gases and 3 solids

Q83. A statement is followed by two arguments. Decide which of the argument is/are strong with respect to the statement.

Statement:

Should income tax be abolished in developed countries?

Arguments:

1. Yes, it will motivate to earn more.

2. No, people must learn to share their wealth for the betterment of other people.

(a) Either argument 1 or 2 is strong
(b) Only argument 1 is strong
(c) Neither 1 nor 2 is strong
(d) Only argument 2 is strong

Q84. A solution contains 32 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

(a) 9.09%
(b) 13.05%
(c) 9.09 g

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(d) 8.84%

Q85. In diamond, each carbon atom is bonded to:

(a) two other carbon atoms
(b) three other carbon atoms
(c) four other carbon atoms
(d) five other carbon atoms

Q86. India's first bullet train is proposed to run between ____.

(a) Surat and Mumbai
(b) Ahmedabad and Mumbai
(c) Vadodara and Mumbai
(d) Vapi and Mumbai

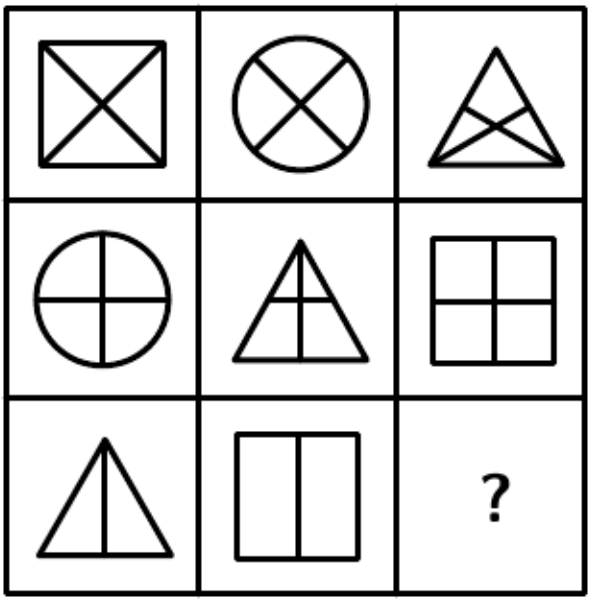
Q87. Amoeba, Paramecium and Bacteria undergo:

(a) Sexual reproduction
(b) budding
(c) binary fission
(d) multiple fission

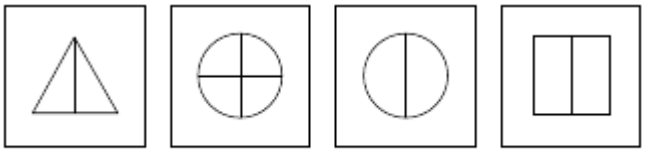
Q88. If $x = a(\sin\theta + \cos\theta)$ and $y = b(\sin\theta - \cos\theta)$ then $(x^2/a^2) + (y^2/b^2) = ?$

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

Q89.



Choose the correct pictures that fit the blank place



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

Q90. The Asia-Africa-Europe (AAE-1) submarine cable system, the world's longest 100-Gbps submarine cable system was launched by ____.

(a) Bharti Airtel
(b) Reliance Jio
(c) Idea Cellular
(d) Vodafone

Q91. Which one the following is the equation for Position - Time relation?

(a) $s = ut + 1/2\ at^2$
(b) $V = u + at$
(c) $U = v + at$
(d) $2as = v^2 - u^2$

Q92. In January 2018, who was appointed as the official brand ambassador of Sikkim?

(a) A. R. Rahman
(b) Sania Mirza
(c) Bhaichung Bhutia
(d) Mary Kom

Q93. €1156 was divided between two people in the ratio 13 : 21. The one who got the larger share received €_____.

(a) 782
(b) 714
(c) 680
(d) 748

Q94. Which country had hosted the FIFA under 17 world cup in the year 2017?

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

Q95. Divide 1,380 among A, B and C, so that A gets 5 times of C and 3 times of B.

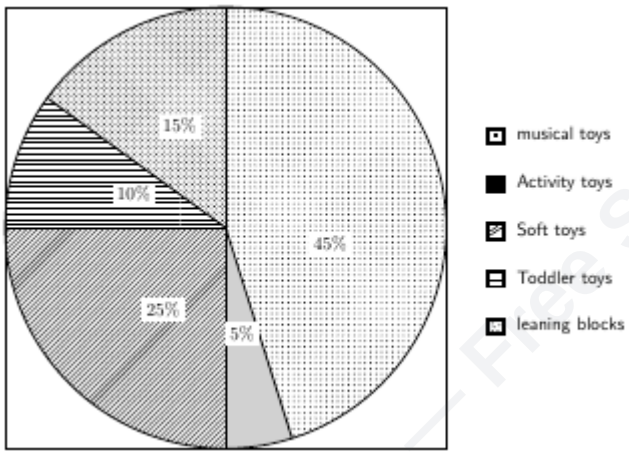
(a) A = 980 ; B = 300; C = 100
(b) A = 880 ; B = 200 ; C = 300
(c) A = 900 ; B = 300 ; C = 180
(d) A = 800 ; B = 300 ; C = 280

Q96. Which Indian city was included in the UNESCO Creative Cities Network in 2017 for its rich musical tradition?

(a) Begaluru
(b) Chennai
(c) New Delhi
(d) Lucknow

Q97. The following pie chart shows the information on sales of a toy-making company "XYZ" for 2017-18 financial year

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The total revenue made by sales of the toys is Rs. 38,72,00/- which type of toys made the least revenue for the company?

(a) Musical toys
(b) Activity toys
(c) Learning blocks
(d) Soft toys

Q98. Which of the following has the highest value?

(a) 10 power 11
(b) 12 power 9
(c) 5 power 5
(d) 11 power 10

Q99. 5% population of a town died of some epidemic and 8% of the remaining population left in panic. If the population of the town now is 88,274, find the population of the town at the beginning.

(a) 99, 800
(b) 1,21,600
(c) 1,01,000
(d) 84, 500

Q100. Who won the 2017 Discovery Education 3M Young Scientist Challenge for inventing a quick, low-cost test to detect lead-contaminated water?

(a) Loushik Chakraborty
(b) Divya Sharma
(c) Gitanjali Rao
(d) Shiv Prakash Singh

ANSWER KEY

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

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SOLUTIONS

Q1. Answer: (a) Only conclusion I follows

According to the given information,

Conclusion 1: This follows, because pedestrian crossing is safe.

Conclusion 2: This does not follow, because it is not mentioned that children know what is pedestrian crossing.

Hence, “only conclusion 1” follows.

Q2. Answer: (b) 16

Shortcut Trick

For two numbers a and b, the third proportional is given by $b^2 \div a$.

Here, a = 9 and b = 12.

Third Proportional = $(12 \times 12) \div 9 = 144 \div 9 = 16$.

Therefore The correct answer is 16.

Alternate Method

Given: First number (a) = 9, Second number (b) = 12.

Formula Used: If x is the third proportional to a and b, then a : b :: b : x.

=> 9 / 12 = 12 / x

=> $9 \times x = 12 \times 12$

=> $9x = 144$

=> $x = 144 \div 9$

=> $x = 16$

Therefore The correct answer is 16.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is calculated as $\sqrt{(a \times b)}$.

Fourth Proportional

If four quantities a, b, c, d are in proportion (a:b = c:d), then d is the fourth proportional, calculated as $(b \times c) \div a$.

Continued Proportion

Three numbers a, b, c are in continued proportion if $a/b = b/c$, which implies $b^2 = ac$.

Q3. Answer: (c) Both statements I and II are sufficient

Shortcut Trick

To find the total number of students, we need both the number of boys and girls.

Statement I gives only the number of boys (10).

Statement II gives the girls relative to boys (Boys + 2).

Neither statement alone provides both values, but combining them gives Boys = 10 and Girls = 12.

Therefore The correct answer is Both statements I and II are sufficient.

Alternate Method

Given:

Statement I: Number of boys (B) = 10

Statement II: Number of girls (G) = B + 2

Formula Used:

Total Students (T) = Boys (B) + Girls (G)

Calculations:

=> From Statement I: B = 10

=> From Statement II: G = B + 2

=> Substitute B from I into II: G = 10 + 2 = 12

=> Total Students = 10 + 12 = 22

=> Since we used information from both statements to find the unique total, both are necessary.

Therefore The correct answer is Both statements I and II are sufficient.

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Additional Information

Data Sufficiency Rules

In Data Sufficiency, a question is solvable if the given statements provide a unique value. You do not need to calculate the actual answer, only determine if it can be calculated.

Independent vs. Dependent Statements

If one statement depends on a variable defined in another (like Girls depending on Boys), both statements must be analyzed together to find the solution.

Variable Elimination

For n unknown variables, you generally require n independent equations or pieces of information to find a specific solution.

Q4. Answer: (c) KHLO

The pattern followed is,

Similarly,

Hence, “KHLO” is the correct answer.

Q5. Answer: (c) Watt

Oersted is the intensity of a magnetic field in vacuum.

Similarly,

Watt is the unit of power.

‘Watt’ is related to the third words on the same basis as the second word is related to the first word.

Hence, “watt” is the correct answer.

Q6. Answer: (b) 4

Let kalyan’s age be 2x, kalyan’s sister age be x.

Kalyan’s father’ s age is 10x

After two years their combined age will be 58

X + 2 + 2x + 2 + 10x + 2 = 58

13x + 6 = 58

13x = 52

x= 4

x is Kalyan’s sister’s age, which is 4.

Hence, “4” is the correct answer.

Q7. Answer: (a) North-west

Drawing diagram according to the given information,

There is a moment of 45^0 anti clock – wist.

If east becomes, north – east, the north becomes ‘north – west’.

Hence, “north – west” is the correct answer.

Q8. Answer: (d) Unnat Jyoti by Affordabled LEDs for All (UJALA)

The correct answer is option 4 i.e Unnat Jyoti by Affordable LEDs for All (UJALA).

• The Government of India announced Unnat Jyoti by Affordable LEDs for All (UJALA) scheme to help replace incandescent bulbs with LED bulbs and promote lightening, enhance awareness on using efficient equipment with less electricity bill and help preserve the environment.

• The scheme was launched by Prime Minister of India Narendra Modi on 1 May 2015.

• The scheme comes under the Ministry of Power.

• In May 2017, the Government of India expanded the LED distribution project to the United Kingdom.

Deen Dayal Upadhayaya Gram Jyoti Yojana (DDUGJY)	**• Scheme aimed to provide a continuous power supply to rural India. - Launch year: 2015.**
Integrated Power Development Scheme (IPDS)	• The scheme aimed at Strengthening sub-transmission and distribution networks in the urban areas. - Launched by the Modi Government.

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Q9. Answer: (b) TB#

Reversing the second half of the series,

3 R # 2 A $ K 5 % T 7 1 @ Q L / B X + Y N &

The pattern followed is,

For +%2 : /$3,

There is a gap of 9 between '+' and '%' and there a gap of 4 between '%' and '2'

And,

There is a gap of 9 between '/' and '$' and there a gap of 4 between '$' and '3'

Similarly,

For @y$: _

There is a gap of 6 between '@' and 'y' and there a gap of 13 between 'y' and '$'

And,

Similarly,

There is a gap of 6 between 'T' and 'B' and there a gap of 13 between 'B' and '#'

Hence, "TB#" is the correct answer.

Q10. Answer: (c) 261

Shortcut Trick

Marks = 58% of 450

Calculate 50% + 8% of 450

50% of 450 = 225

8% of 450 = 36

Total = 225 + 36 = 261

Therefore The correct answer is 261 marks.

Alternate Method

Given:

Maximum Marks = 450

Percentage Obtained = 58%

Formula Used:

Marks Obtained = (Percentage ÷ 100) × Total Marks

=> Marks = (58 ÷ 100) × 450

=> Marks = 0.58 × 450

=> Marks = 58 × 4.5

=> Marks = 261

Therefore The correct answer is 261 marks.

Additional Information

Percentage Change

Percentage change = (Difference ÷ Original Value) × 100. It measures how much a value has increased or decreased relative to its base.

Fraction to Percentage Conversion

To convert a fraction to a percentage, multiply the fraction by 100. For example, 3/5 = (3/5) × 100 = 60%.

Base Change Property

x% of y is always equal to y% of x. This is useful for easier mental calculations (e.g., 16% of 50 = 50% of 16 = 8).

Q11. Answer: (d) 36,000

Given:

Number of children vaccinated = 120000

Calculation:

Percentage of kids from city B who were vaccinated = 30%

Therefore Number of kids from city B who were vaccinated = 1,20,000 × 30/100 = 36,000

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Q12. Answer: (a) [figure]

Utensils, furniture and clothes are represented separately.

The correct Venn diagram is,

Hence, option 1 is the correct answer.

Q13. Answer: (c) 22/3km

Shortcut Trick

Convert mixed fractions to improper fractions: Distance = 62/3 km and Time = 31/4 hours.

Speed = Distance ÷ Time => (62/3) ÷ (31/4).

Speed = (62/3) × (4/31) = 2 × (4/3) = 8/3 kmph.

8/3 kmph = 2(2/3) kmph.

Therefore The correct answer is 2(2)/(3)km.

Alternate Method

Given:

Distance covered by Sindhu = 20(2/3) km

Time taken = 7(3/4) hours

Formula Used:

Speed = Distance ÷ Time

Calculations:

=> Distance = 20(2/3) = (20×3 + 2)/3 = 62/3 km

=> Time = 7(3/4) = (7×4 + 3)/4 = 31/4 hours

=> Speed = (62/3) / (31/4)

=> Speed = (62/3) × (4/31)

=> Speed = (2 × 4) / 3

=> Speed = 8/3 = 2(2/3) kmph

Therefore The correct answer is 2(2)/(3)km.

Additional Information

Unit Conversion

To convert km/hr to m/s, multiply the value by 5/18. To convert m/s to km/hr, multiply by 18/5.

Average Speed

Average Speed = Total Distance ÷ Total Time. If distances are equal, Average Speed = 2xy/(x+y).

Q14. Answer: (a) Only argument I is strong.

According to the given information,

Conclusion 1: This is strong, because pain killers should be avoided for small aches.

Conclusion 2: This is not strong, because taking too many pain killers will affect the liver.

Hence, “only argument 1” is strong.

Q15. Answer: (d) Rs. 779.13

Shortcut Trick

Effective Simple Interest rate = 1.5 × 8% = 12%

If 12% → Rs. 360, then 100% (Principal) = (360 ÷ 12) × 100 = Rs. 3000

For Compound Interest, Time = 1.5 × 2 = 3 years

Effective CI rate for 3 years at 8% = 25.9712%

CI = 3000 × 25.9712% = Rs. 779.136

Therefore The correct answer is Rs. 779.13.

Alternate Method

Given: Simple Interest (SI) = Rs. 360, Rate (R) = 8% p.a., Time (T1) = 1.5 years

Formula Used: SI = (P × R × T) ÷ 100 | CI = $P[(1 + R/100)^n - 1]$

=> SI = (P × 8 × 1.5) ÷ 100

=> 360 = (P × 12) ÷ 100

=> Principal (P) = (360 × 100) ÷ 12 = Rs. 3000

=> New Time (n) = 1.5 × 2 = 3 years

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=> Compound Interest (CI) = 3000 × [(1 + 8/100)³ − 1]

=> CI = 3000 × [(1.08)³ − 1]

=> CI = 3000 × [1.259712 − 1]

=> CI = 3000 × 0.259712 = Rs. 779.136

Therefore The correct answer is Rs. 779.13.

Additional Information

Effective Rate of Compound Interest

For 3 years at rate R%, effective CI rate = $3R.3R^2R^3$ (using decimal positions for calculations).

Difference between CI and SI

Difference for 2 years = $P(R/100)^2$. Difference for 3 years = $P(R/100)^2 \times (3 + R/100)$.

Compound Interest Formula

Amount (A) = $P(1 + R/100)^n$, where P is Principal, R is Rate, and n is Time in years.

Q16. Answer: (c) Ranchi

The correct answer is option 3 i.e Ranchi.

• Ranchi is the capital of Indian state Jharkhand.

• The Jharkhand state was formed on 15 November 2000.

• The current chief minister of Jharkhand is Hemant Soren.

• The current Governor of jharkhand is Ramesh Bais.

Hattia	**• Small town and railway station located in Ranchi district, Jharkhand. - National Institute of Foundry and Forge Technology, is situated in Hattia.**
Patna	• Capital of Bihar. - the ancient name of Patna was Patliputra. - Founded in 490 BCE by the king of Magadha.
Jamshedpur	• Famous City located in Jharkhand. - Founded by Jamsetji Tata and was also named after him. - Jamshedpur ranked as the 15th cleanest city in India by Swachh Survekshan 2019.

Q17. Answer: (c) 30

Shortcut Trick

Total time taken = 15 days. Rathin left 5 days before, so Bratin worked alone for the last 5 days.

Rathin & Bratin together worked for 15 − 5 = 10 days.

Work left by both in 2 days (12 − 10) = Work done by Bratin in 5 days.

Efficiency Ratio (R+B) : B = 5 : 2 → Efficiency of B = 2 units, Total Work = 5 × 12 = 60 units.

Time for Bratin = 60 ÷ 2 = 30 days.

Therefore The correct answer is 30 days.

Alternate Method

Given: (Rathin + Bratin) can do work in 12 days. Total time taken = 15 days. Rathin left 5 days before completion.

Person	Days	Total Work	Efficiency
Rathin + Bratin	12	W	W/12
Bratin	x	W/x	

Let efficiency of Rathin be R and Bratin be B.

=> Total Work = 12 × (R + B)

=> According to question: 10 × (R + B) + 5 × B = 12 × (R + B)

=> 5B = 2 × (R + B)

=> 5B = 2R + 2B

=> 3B = 2R → R/B = 3/2

=> Let B = 2 and R = 3. Total Work = 12 × (3 + 2) = 60 units.

=> Time for Bratin = 60 ÷ 2 = 30 days.

Therefore The correct answer is 30 days.

Additional Information

Work Left Before Completion

If a person leaves 'n' days before completion, add their 'n' days of work to the total work and divide by combined efficiency.

Efficiency and Time

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

Man-Days Formula

M1D1H1/W1 = M2D2H2/W2, used for comparing work done by different groups.

Q18. Answer: (d) Olfactory indicators

The correct answer is Olfactory indicators.

• The substances whose odour changes in an acidic or basic medium are called olfactory indicators.

• In an olfactory indicator, smell varies depending on whether it is mixed with an acidic or basic solution.

• These are mainly used in laboratories to check whether a given solution is a basic or an acidic solution by a process called olfactory titration.

• Examples: Onion, clove oil, and vanilla extract.

Synthetic indicators	**• An indicator prepared from artificial substances(Man-made). - Example: Methyl orange, phenolphthalein.**
Natural indicators	• Indicators obtained from natural sources. - Examples: Turmeric, litmus (obtained from lichen).
Acid-base indicators	• Chemicals used to determine whether an aqueous solution is acidic, neutral, or alkaline. - Examples: litmus paper, phenolphthalein, and red cabbage juice.

Q19. Answer: (c) Both A and B are true

The correct answer is option 3 i.e Both A and B are true.

• Both statements are true.

• The speed of sound in oxygen gas at 25°C is 316 m/s.

• The speed of sound in water (distilled) at 25°C is 1498 m/s.

• The speed of sound decreases when it passes from solid to gaseous state of a given medium.

• Sound travels fastest through solids.

• The speed of sound depends on the medium through which it is travelling and the temperature and pressure of that medium.

Additional Information

Speed of sound in different media at 25 ºC		
State	Medium	Speed of sound (m/s)
Solid	Solids Aluminium	6420
Nickel	6040	
Steel	5960	
Iron	5950	
Brass	4700	
Glass (Flint)	3980	
liquid	Liquids Water (Sea)	1531
Water (distilled)	1498	
Ethanol 1207	1207	
Methanol	1103	
gas	Gases Hydrogen	1284
Helium	965	
Air	346	

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Oxygen	316	
Sulfur dioxide	213	

https://ncert.nic.in/ncerts/l/iesc112.pdf

Q20. Answer: (b) 90

Shortcut Trick

Prime factorize 4050: 4050 = 81 × 50 = 81 × 25 × 2.

4050 = $9^2 \times 5^2 \times 2^1$.

To make it a perfect square, multiply by the missing factor 2.

New number = 4050 × 2 = 8100.

Square root = √8100 = 90.

Therefore The correct answer is 90.

Alternate Method

Given: Number = 4050.

Step 1: Find the prime factors of 4050.

=> 4050 = 2 × 2025

=> 4050 = 2 × 3 × 675

=> 4050 = 2 × 3 × 3 × 225

=> 4050 = 2 × 3 × 3 × 3 × 75

=> 4050 = 2 × 3 × 3 × 3 × 3 × 25

=> 4050 = $2^1 \times 3\text{^}4 \times 5^2$

Step 2: Identify the factor with an odd exponent.

=> The factor 2 has an exponent of 1.

=> To make it a perfect square, we multiply by 2.

Step 3: Calculate the square root of the resulting number.

=> Square root = $\sqrt{(2^2 \times 3\text{^}4 \times 5^2)}$

=> Square root = $2 \times 3^2 \times 5$

=> Square root = 2 × 9 × 5 = 90

Therefore The correct answer is 90.

Additional Information

Perfect Square Condition

A number is a perfect square if all the exponents in its prime factorization are even numbers.

Square Root of a Product

The property √(a × b) = √a × √b is used to simplify the calculation of roots after factorization.

Least Positive Integer

To find the least multiplier for a perfect square, multiply the number by the product of all prime factors that have odd powers.

Q21. Answer: (c) stomata

The correct answer is option 3 i.e Stomata.

• Transpiration takes place through the stomata.

• Stomata is a tiny opening or pore, found in the epidermis of leaves, stems, and other organs, that facilitates gas exchange.

• Stomata are typically found in plant leaves but can also be found in some stems.

• The pore is surrounded by a pair of specialized parenchyma called guard cells that are responsible for regulating the size of the stomatal opening.

Vascular bundles	**• Part of the transport system in vascular plants. - Exists in two forms: xylem and phloem. - Xylem: Transporting water from roots to stems and leaves. - Phloem: Transporting food produced from photosynthesis from leaves to roots and stems.**
Cortex	• The outer layer of a stem or root in a plant. - Lying below the epidermis but outside the vascular bundles.

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Epidermis	• Single-layer of cells that cover the leaves, flowers, roots, and stems of plants. - It protects against water loss, regulates gas exchange, absorbs water and mineral nutrients.

Q22. Answer: (b) 90

By decoding given information,

L	M	N	P
Means			
•	•	×	÷

7N12L48P4M6

7 × 12 + 48 ÷ 4 – 6

Using BODMAS rule,

7 × 12 + 12 – 6

84 + 12 – 6

96 – 6

90

Hence, “90” is the correct answer.

Q23. Answer: (d) 11.5 A

The correct answer is option 4 i.e 11.5 A.

Given,

Potential difference(V)= 60 V.

Current (I)= 4 A.

Using ohm's law:

V= I × R

Resistance (R)= V over I

Therefore R= 60/4 = 15 Ω

If the potential difference is increased to 172.5 V

V= 172.5 V

R= 15 Ω

Current (I)= V/R= 172.5/15= 11.5 A.

Therefore The heater will draw 11.5 A current if the potential difference is increased to 172.5 V.

Q24. Answer: (a) Saina Nehwal

The correct answer is option 1 i.e Saina Nehwal

• Saina Nehwal was the shuttler who represented the Olympic committee in the Badminton World Federation.

• Saina is the only female player from India and overall the second Indian player who attains the world no. 1 ranking after Prakash Padukone.

• She has represented India three times in the Olympics.

• Autobiography: Playing to Win: My Life On and Off Court.

• Saina joined the Bharatiya Janata Party on 29 January 2020.

K Srikanth	**• Indian badminton player. - He became the best men's singles badminton player in the world in April 2018. - Awards: Padma Shri (2018), Arjuna award (2015).**
P Gopichand	• Former Indian badminton player. - Presently, Chief National Coach for the Indian Badminton team. - 1st Indian to be honoured with Lifetime award by the Olympics Committee.
B Sai Praneeth	• Indian badminton player. - First Indian male shuttler in 36 years to win a bronze medal in the BWF World Championships after Prakash Padukone. - Honoured with the Arjun Award in 2019.

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Q25. Answer: (d) A

The given figure is embedded in,

Hence, option 4 is the correct answer.

Q26. Answer: (a) [figure]

Gold and platinum are metals.

The correct Venn diagram is,

Hence, option 1 is the correct answer.

Q27. Answer: (d) Rs. 1,952

Shortcut Trick

Net Simple Interest rate for 3 years = 9% × 3 = 27%.

Net Compound Interest rate for 3 years at 10% = 33.1%.

Difference in interest percentage = 33.1% − 27% = 6.1%.

Total gain = 6.1% of Rs. 32,000 = 0.061 × 32,000 = Rs. 1,952.

Therefore The correct answer is Rs. 1,952.

Alternate Method

Given: Principal (P) = Rs. 32,000, SI rate (R1) = 9%, CI rate (R2) = 10%, Time (T) = 3 years.

Formula Used: SI = (P × R × T) / 100 | CI = P × [(1 + R/100)^T − 1]

Calculations:

=> Simple Interest (SI) = (32,000 × 9 × 3) / 100

=> SI = 320 × 27 = Rs. 8,640

=> Compound Interest (CI) = 32,000 × [(1 + 10/100)^3 − 1]

=> CI = 32,000 × [(1.1)^3 − 1] = 32,000 × [1.331 − 1]

=> CI = 32,000 × 0.331 = Rs. 10,592

=> Total Gain = CI − SI = 10,592 − 8,640

=> Gain = Rs. 1,952

Therefore The correct answer is Rs. 1,952.

Additional Information

Effective Rate for 10% Compound Interest

For 2 years, effective CI rate = 10 + 10 + (10 × 10)/100 = 21%. For 3 years, it is 21 + 10 + (21 × 10)/100 = 33.1%.

Difference between CI and SI

When rates are equal (R), the difference for 2 years is P(R/100)^2 and for 3 years is P(R/100)^2 × (3 + R/100).

Simple Interest Nature

Simple Interest remains constant every year because it is always calculated on the original Principal amount.

Q28. Answer: (b) Modern periodic law

The correct answer is option 2 i.e Modern periodic law.

• Modern periodic law states that "Properties of elements are a periodic function of their atomic number".

• Modern periodic law was proposed by Henry Moseley in 1913.

• Mendeleev's periodic law is slightly different from Moseley's, it states that "Properties of the elements are periodic functions of their atomic mass".

• Mendeleev's periodic law was proposed by Dmitri Ivanovich Mendeleev.

Dobereiner's triads	**• States that the atomic mass of the middle element of a triad is the arithmetic mean of the atomic masses of the other two elements. - Example: Triad of lithium, sodium, and potassium.**
Newlands's law of octaves	• States that when the elements are arranged in the increasing order of their atomic masses every eighth element has similar properties. - Proposed by John Newlands.

Q29. Answer: (d) Ohm

The correct answer is option 4 i.e Ohm.

• The relation between the potential difference (V) and current (I) was discovered by Georg Ohm.

• The law was named after the scientist who discovered it and hence it is known as ohm's law.

• Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points.

• V= I × R

Pascal	**• The pascal (Pa) is the SI derived unit of pressure. - The unit, named after Blaise Pascal.**
Newton	• Newton is the SI unit of force. - The unit Named after Isaac Newton.
Tesla	• Tesla is the unit of magnetic induction. - Named in honour of Nikola Tesla.

Q30. Answer: (c) D

The pattern followed is,

In figure A, there is a triangle inside a triangle, in figure B there is a circle inside a circle and in figure

C there is a square inside a square.

But,

In figure D, there is a rhombus inside a hexagon, both the figures are not same.

Hence, figure D is different from the rest.

Q31. Answer: (d) Negative

The correct answer is option 4 i.e Negative.

• The work done by the wind on the car while it is blowing, from the opposite direction of the car will be negative.

• Work is the product of force and displacement.

• The SI unit of work is the joule (J).

• The work done by a force can be either positive or negative or zero.

Positive Work	**• Work done is Positive, If applied force displaces the object in the same direction of the force.**
Negative Work	• Work done is Negative, If applied force displaces the object in the opposite direction of the force.
Zero Work	• If the directions of force and the displacement are perpendicular to each other, the work done by the force on the object is zero.

Q32. Answer: (d) Watt

The correct answer is option 4 i.e Watt.

Key Points

• The SI unit of power is Watt.

• The Watt is named after James Watt.

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

• 1 watt (W) = 1.00 joules per second (J/sec).

• Power is a scalar quantity.

Additional Information

Erg	**• Unit of energy(not an SI unit). - Equal to 10^(−7) joules (100 nJ). - Its name is derived from ergon, a Greek word meaning work or task.**
Kilowatt	• Unit of electric power. - One kilowatt (kW) is equal to 1000 watts (W).
Joule	• SI-derived unit of energy. - Named after the English physicist James Prescott Joule.

Q33. Answer: (a) 243

Shortcut Trick

Total Work = LCM(81, 97.2, 162) = 486 units.

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Efficiency of (A+B+C) = 486 ÷ 81 = 6 units/day.

Efficiency of (A+B) = 486 ÷ 97.2 = 5 units/day.

Efficiency of (B+C) = 486 ÷ 162 = 3 units/day.

Efficiency of B = (A+B) + (B+C) − (A+B+C) = 5 + 3 − 6 = 2 units/day.

Time taken by B = 486 ÷ 2 = 243 days.

Therefore The correct answer is 243 days.

Alternate Method

Given: (A+B+C) = 81 days, (A+B) = 97.2 days, (B+C) = 162 days.

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

Person	Days	Total Work	Efficiency
A + B + C	81	486	6
A + B	97.2	5	
B + C	162	3	

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

=> Efficiency of C = 6 − 5 = 1 unit/day.

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

=> Efficiency of B = 3 − 1 = 2 units/day.

=> Time taken by B = 486 ÷ 2 = 243 days.

Therefore The correct answer is 243 days.

Additional Information

Total Work Assumption

Total work is always assumed to be the Least Common Multiple (LCM) of the number of days taken by the individuals to simplify efficiency calculations.

Inverse Relation of Time and Efficiency

Efficiency is inversely proportional to the time taken to complete a work. If time increases, efficiency decreases and vice versa.

Additive Nature of Efficiency

When people work together, their individual efficiencies are added to get the combined rate of work per day.

Q34. Answer: (a) 27

The correct answer is option 1 i.e 27

• Mass number is 27.

• The mass number is the total number of protons and neutrons in an atomic nucleus.

• The number of protons = 10.

• Number of neutrons = 17.

• Mass number = Number of protons + Number of neutrons = 10 + 17 = 27.

Q35. Answer: (d) Nose

Sound is heard with the help of ears.

Similarly,

Scent is smelled with the help of nose.

'Nose' is related to the third word on the same basis as the second word is related to the first word.

Hence, "nose" is the correct answer.

Q36. Answer: (c) 2

Calculation:

Let n = 0.41

n = 0.41 ---- (i)

n = 0.4141

Two digits are repeated after the decimal point,

So we multiply both sides by 100.

100n = 41.41 ---- (ii)

From (ii) - (i)

=> 100n - n = 41.41 - 0.41

=> 99n = 41

=> n = 41/99

Therefore The value of n {999……9(ntimes)} is 2.

Q37. Answer: (a) 15

According to the given information,

Bratin' s age is 18 years

His cousin' s age is 7 years

Verifying the given options,

Option 1→ 15 years

Bratin' s age after 15 years is 33

His cousin's age after 15 years is 22

22 × 1.5 = 33

Option 2 → 16 years

Bratin' s age after 16 years is 34

His cousin's age after 16 years is 23

23 × 1.5 is not equal to 34

Option 3 → 13 years

Bratin' s age after 13 years is 31

His cousin's age after 13 years is 20

20 × 1.5 is not equal to 31

Option 4 → 14 years

Bratin' s age after 14 years is 32

His cousin's age after 14 years is 21

21 × 1.5 is not equal to 32

Hence, "15 years" is the correct answer.

Q38. Answer: (d) B

The pattern followed is,

In figures A, C and D the arrow mark is present on the sides of the triangle.

Whereas,

In figure B, the arrow is at the base of the triangle.

Hence, figure B is the odd one.

Q39. Answer: (a) 1835

The correct answer is option 1 i.e 1835.

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

• Macaulay's minute of 1835 leads to the inclusion of the English language as the medium of instruction in government schools and colleges in India.

• Lord William Bentinck was the governor-general of India during Macaulay's minute of 1835.

• Macaulay has a major role in the introduction of Western concepts to education in India.

• The famous Infiltration theory was introduced by Macaulay.

• As a part of developments in the education sector, the Elphinstone College (Bombay) and the Calcutta Medical College were established. in 1835.

Q40. Answer: (a) Paternal Aunt

Drawing the family tree,

Srilekha's brother's only sister's father's sister is the paternal aunt to her.

Hence, "paternal aunt" is the correct answer.

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Q41. Answer: (b) -12/3

Given:

A fraction when added to 17/3 gives 4.

Concept:

Whenever there is a need of taking a fraction, take it as ‘x/1’ as this will reduce calculation.

Example: Find the fraction which is equal to the reciprocal of 2.

Suppose, fraction = x/1

x/1 = ½ => x = ½ or Fraction = ½

Calculation:

Let the fraction be x

According to the question

x + 17/3 = 4

=> x = 4 - 17/3

=> x = (12 - 17)/3

=> x = -5/3

=> x -12/3

Therefore The fraction -12/3

Q42. Answer: (a) Both A and B are true

The correct answer is option 1 i.e Both A and B are true.

• Both statements are true.

• An acid or base's strength refers to its degree of ionization.

• Strong acids completely dissociate into their ions in water.

• The strong acids are hydrochloric acid (HCl), sulfuric acid(H2SO4, hydrobromic acid, and nitric acid(HNO3).

• Weak acids only partially dissociate into their ions in water.

• Most organic acids are weak acids.

• The examples of these acids are Acetic acid(CH3COOH), Carbonic acid (H2CO_(3)), Sulfoxylic acid (H2SO2).

Q43. Answer: (a) Krishna Kumari

The correct answer is option 1 i.e Krishna Kumari.

• Krishna Kumari, Odisha nurse has bagged the prestigious Florence Nightingale award 2017.

• She received the award from former President Pranab Mukherjee at a function at the Rashtrapati Bhawan in New Delhi on the occasion of International Nurses Day.

• Florence Nightingale was an English reformer and the founder of modern nursing.

• The Florence Nightingale Awards are given for nursing professionals, as a mark of recognition for the meritorious services of nurses.

• Award was instituted by the Health ministry in 1973.

• The National Florence Nightingale Award 2019 was presented by President Ram Nath Kovind to Lini Puthussery, the nurse from Kerala who died due to the Nipah virus.

Q44. Answer: (c) Pascal

The correct answer is option 3 i.e Pascal.

• Pascal (Pa) is the SI unit of pressure.

• The unit of pressure is named after scientist Blaise Pascal.

• The pressure is the force applied perpendicular to the surface of an object per unit area over which that force is distributed.

• The Barometer is a scientific instrument that is used to measure air pressure.

Ohm	**• Ohm is the SI derived unit of electrical resistance. - The unit Ohm is named after Georg Simon Ohm. - Symbol: Ω.**
Newton	• Newton is the SI unit of force. - The symbol of the newton is 'N'. - Newton is also used as the unit of weight. - Named after Isaac Newton, who developed the laws of motion.
Dyne	• Dyne is the unit of force in the centimetre-gram-second (CGS) system of physical units. - One dyne = 10^(−5) N.

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Q45. Answer: (a) $(a^2)/(p^2)$

Shortcut Trick

The difference of roots for any quadratic equation $Ax^2 + Bx + C = 0$ is given by $\sqrt{D}/|A|$.

Since α, β, γ, δ are in Arithmetic Progression (A.P.), the difference between consecutive roots is the same.

=> $|\beta - \alpha| = |\delta - \gamma| = d$ (common difference).

=> $\sqrt{D1}/|a| = \sqrt{D2}/|p|$

=> $D1/a^2 = D2/p^2$ => $D1 : D2 = a^2 : p^2$.

Therefore The correct answer is a^2/p^2.

Alternate Method

Given: $ax^2 + bx + c = 0$ has roots α, β and $px^2 + qx + r = 0$ has roots γ, δ.

Formula Used: $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta = D/a^2$.

=> For $ax^2 + bx + c = 0$, sum $(\alpha + \beta) = -b/a$ and product $\alpha\beta = c/a$.

=> $(\alpha - \beta)^2 = (-b/a)^2 - 4(c/a) = (b^2 - 4ac)/a^2 = D1/a^2$.

=> Similarly for $px^2 + qx + r = 0$, $(\gamma - \delta)^2 = (q^2 - 4pr)/p^2 = D2/p^2$.

=> Since α, β, γ, δ form an Arithmetic Progression, let the common difference be d.

=> $\beta - \alpha = d$ and $\delta - \gamma = d$.

=> $d^2 = D1/a^2$ and $d^2 = D2/p^2$.

=> Equating both: $D1/a^2 = D2/p^2$.

=> $D1/D2 = a^2/p^2$.

Therefore The correct answer is a^2/p^2.

Additional Information

Discriminant and Nature of Roots

The discriminant ($D = b^2 - 4ac$) defines the roots: If $D > 0$, roots are real and unequal; if $D = 0$, roots are real and equal; if $D < 0$, roots are complex conjugates.

Difference of Roots

The absolute difference between roots is $|\alpha - \beta| = \sqrt{D} / |a|$, which is useful when roots are related by a constant gap.

Arithmetic Progression (A.P.) Properties

In an A.P., any four terms x1, x2, x3, x4 satisfy the condition that x2 − x1 = x4 − x3 = d, where d is the common difference.

Q46. Answer: (d) 20(3°)/4

Shortcut Trick

The angle between the altitude and the angle bisector of the vertical angle is half the positive difference of the base angles.

angle DAO = 1/2 × |angle ABC − angle ACB|

angle DAO = 1/2 × (65° − 23.5°) = 1/2 × 41.5° = 20.75°

20.75° = 20° + 3/4° = 20^(3°)/4

Therefore The correct answer is 20^(3°)/4.

Alternate Method

Given: angle B = 65°, angle C = 23.5°, AD perpendicular to BC, AO is bisector of angle A.

Formula Used: Angle sum property of triangle = 180°.

=> In ΔABC, angle BAC = 180° − (65° + 23.5°) = 180° − 88.5° = 91.5°

=> Since AO is the angle bisector, angle BAO = 91.5° ÷ 2 = 45.75°

=> In right-angled ΔABD, angle BAD = 90° − angle B = 90° − 65° = 25°

=> angle DAO = angle BAO − angle BAD = 45.75° − 25° = 20.75°

=> 20.75° = 20 + 75/100 = 20 + 3/4 = 20^(3°)/4

Therefore The correct answer is 20^(3°)/4.

Additional Information

Internal Angle Bisector Theorem

In a triangle, the internal bisector of an angle divides the opposite side in the ratio of the sides containing the angle: AB/AC = BD/CD.

Altitude of a Triangle

The altitude is a line segment through a vertex and perpendicular to the opposite side. The three altitudes intersect at the orthocenter.

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Angle Sum Property

The sum of the interior angles of any triangle is always 180°. For a right-angled triangle, the sum of the two acute angles is 90°.

Q47. Answer: (d) C

The mirror image of the given figure if the mirror is placed at line MN is,

Hence, option 4 is the correct answer.

Q48. Answer: (d) Bahlul Lodi

The correct answer is Bahlul Lodi.

Key Points

• The Lodi dynasty was founded by Bahlul Khan Lodi.
• The Lodi dynasty was an Afghan dynasty.
• The Lodi dynasty was the last dynasty in Delhi Sultanate, ruled from 1451 to 1526.
• Sikandar Lodi was the son of Bahlul founded Agra in 1504.
• Ibrahim Lodi was the son of Sikandar Lodi and he was the last Lodi Sultan of Delhi.
• The Mughal emperor Babur defeated and killed Ibrahim Lodi in the Battle of Panipat, in 1526.
• The death of Ibrahim Lodi ended the 320 years long Delhi Sultanate, and the Mughal Empire replaced it.

Q49. Answer: (c) China

The correct answer is option 3 i.e China.

• Indian Women's hockey team won the Asia Cup 2017 by defeating China.
• Host country: Japan.
• This is India's second title.
• The tournament organized by the Asian Hockey Federation.
• Headquarters of the Asian Hockey Federation: Kuala Lumpur, Malaysia.
• President of the Asian Hockey Federation: Al-Sultan Abdullah Sultan Ahmad Shah.
• South Korea has won the most titles(3).
• 2017 Men's Hockey Asia Cup: India won the third title after defeating Malaysia.

Q50. Answer: (d) 40

Shortcut Trick

Ratio of Boys to Girls using the Alligation method:

(Girls Mean − Total Mean) : (Total Mean − Boys Mean)

=> (14 − 13.1) : (13.1 − 12) = 0.9 : 1.1 = 9 : 11

Given: 9 units = 18 boys => 1 unit = 2

Total students = (9 + 11) units = 20 units × 2 = 40 students

Therefore The correct answer is 40 students.

Alternate Method

Given:

Number of Boys (n_b) = 18

Mean score of Boys (x_b) = 12

Mean score of Girls (x_g) = 14

Overall Average (x_(total)) = 13.1

Formula Used:

Overall Average = [(n_b × x_b) + (n_g × x_g)] ÷ (n_b + n_g)

Let the number of Girls be G.

=> 13.1 = [(18 × 12) + (G × 14)] ÷ (18 + G)

=> 13.1 × (18 + G) = 216 + 14G

=> 235.8 + 13.1G = 216 + 14G

=> 14G − 13.1G = 235.8 − 216

=> 0.9G = 19.8

=> G = 19.8 ÷ 0.9 = 22

=> Total Students = 18 + 22 = 40

Therefore The correct answer is 40 students.

Additional Information

Weighted Average

It calculates the average of a combined set where each group has a different number of observations: Avg = (n1A1 + n2A2) ÷ (n1 + n2).

Alligation Rule

The ratio of the quantities is inversely proportional to the differences of their individual averages from the target mean: n1/n2 = (A2 − A_m) / (A_m − A1).

Mean Properties

The sum of deviations of all observations from the mean is always zero. The overall mean always lies between the lowest and highest group means.

Q51. Answer: (c) South- East

Drawing diagram according to the given information,

Manya is south – east with respect to Anya.

Hence, “south – east" is the correct answer.

Q52. Answer: (b) 2/5

Formula:

Distance remaining to be covered = Total distance - Distance covered

Calculation:

Let total distance be x km.

Distance covered by the person by walking = x × 2/5 = 2x/5

=> Remaining distance = x - 2x/5 = 3x/5

1/3^(rd) part of remaining distance covered by bus then

Distance covered by the bus = 3x/5 × 1/3 = x/5

Now final remaining distance

=> Remaining distance = x - 2x/5 - x/5 = 2x/5

Therefore Required fraction = 2x/5 × 1/x = 2/5

Q53. Answer: (d) Surabhi Lakshmi

The correct answer is option 4 i.e Surabhi Lakshmi.

• Surabhi Lakshmi won the Best Actress Award at the 64th National Film Awards in 2017.

• Surabhi won this award for her role in the Malayalam film Minnaminungu.

• Award was presented by former Indian President Pranab Mukherjee.

• Best Feature Film: Kaasav (Marathi).

• Best Actor: Akshay Kumar (Hindi film Rustom).

Category	Winner
Best Feature Film	Hellaro(Gujarati)
Best Actor	Ayushman Khurrana and Vicky Kaushal
Best Actress	Keerthy Suresh
Best Film on Other Social Issues	Pad man

Q54. Answer: (d) Ahmedabad

The correct answer is option 4 i.e Ahmedabad.

• Ahmedabad is India's first World Heritage City recognised by UNESCO.

• As per the official records, Ahmedabad is the first Indian city honoured with World Heritage City Status by UNESCO (Third city in Asia, after Bhaktapur(Nepal) and Galle(Srilanka)).

• UNESCO stands for United Nations Educational Scientific and Cultural Organization.

• Headquarters of UNESCO: Paris, France.

• Director-General of UNESCO: Audrey Azoulay.

• Ahmedabad city was founded by Sultan Ahmed Shah.

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• Recently, the Jaipur was declared as India's second city in UNESCO World Heritage Site on July 6, 2019.

Hyderabad	**• Capital of Telangana - The Charminar constructed in 1591 is located in Hyderabad. - Hyderabad was founded by the Qutb Shahi sultans of Golconda. - Recently the Telangana government declared 2020 as the Artificial Intelligence year.**
Hampi	• UNESCO World Heritage Site located in Karnataka, - Hampi was the capital of the Vijayanagara Empire in the 14th century. - Situated on the banks of the Tungabhadra River. - Hampi-Vijayanagara was the world's second-largest medieval-era city after Beijing
Jaipur	• Capital of Rajasthan. - Also known as the Pink City. - Founded in 1727 by the Rajput ruler Jai Singh II. - On 6 July 2019, UNESCO World Heritage Committee inscribed Jaipur the 'Pink City of India' among its World Heritage Sites.

Q55. Answer: (b) Force and pressure

The correct answer is option 2 i.e Force and Pressure.

Key Points

• Force and pressure do not have the same SI unit.

• SI unit of force is the newton(N).

• SI unit of pressure is the pascal(Pa).

• The SI unit of distance and displacement is the meter (m).

• The SI unit of energy and work is the joule (J).

• The SI unit of speed and velocity is meter per second (m/s).

Q56. Answer: (a) Only argument I is strong

According to the given information,

Argument 1: This is strong, because young entrepreneurs help in the development of the country.

Argument 2: This is not strong, because nothing is mentioned about losses in the statement and young entrepreneurs reduces burden on the employment market.

Hence, "only argument 1" is strong.

Q57. Answer: (d) 3

The correct answer is option 4 i.e. 3.

The number of moles present in 81 grams of aluminium is 3 moles.

Number of moles=(Mass of substance)/(Mass of one mole)

Mass of substance= 81 grams

Mass of one mole(molar mass) aluminum= 27.

The number of moles= 81/27= 3 moles.

Q58. Answer: (a) m/s

The correct answer is option 1 i.e m/s.

• The SI unit of speed is meter per second(m/s).

• The speed of an object is the magnitude of the change of its position.

• Speed is a scalar quantity.

• The most common unit of speed in everyday usage is kilometre per hour (km/h).

• For air and marine travel the knot is commonly used as the unit of speed.

Q59. Answer: (a) Data in I alone is sufficient

According to the given statements,

Statement 1: Rajesh is the only son of Vijay's mother-in-law.

Rajesh is the brother – in – law of Vijay.

Statement 2: Verma is Rajesh's only sister.

From, statement 1, we can say that Rajesh is the brother – in – law of Vijay.

Hence, "data in 1 alone" is sufficient.

Q60. Answer: (b) 9 : 00 pm

Total hours when clock on the 4th day at 8 pm = 24 + 24 + 24 + 17 = 89 hours

Clock losses in 24 hours = 16 minutes

Clock losses in 1 hour = (; 16)/24 minutes

In 89 hours clock losses = (; 16)/24 × 89 = (; 2)/3 × 89 = (; 178)/3 = 59. 33 minutes ≈ 1 hr

So Actual time when girl sees the clock on the 4th day at 8 pm = 8 + 1 = 9 pm

Hence, "9.00 pm" is the correct answer.

Q61. Answer: (c) C

The picture that replaces the (?) symbol is,

Hence, option 3 is the correct answer.

Q62. Answer: (c) 15 Kg

The correct answer is option 3 i.e 15 Kg.

Given,

Velocity (v) = 4ms^(-1).

Kinetic energy = 120 J.

Using the equation of kinetic energy,

Kinetic energy= $1/2mv^2$

Therefore Mass(m) = 2 × Kinetic Energy over v^2 = (2 × 120)/16 = 15 Kg.

Hence the mass of the object is 15 Kg.

Q63. Answer: (d) Chlorine

The correct answer is option 4 i.e Chlorine.

Key Points

• Among the options, all except Chlorine, are noble gasses

• Chlorine belongs to the halogen family.

• The naturally occurring noble gases are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), and, radon (Rn).

• Noble gases belong to group 18 in the periodic table.

• Oganesson is a synthetic chemical element with the symbol Og and atomic number 118.

Argon	**• Atomic number: 18. - Third-most abundant gas in the Earth's atmosphere. - Argon is produced industrially by the fractional distillation of liquid air. - Argon is commonly used to fill incandescent light bulbs.**
Xenon	• Atomic number: 54. - Xenon was discovered by the William Ramsay and Morris Travers

Q64. Answer: (a) Rajesh Mapuskar

The correct answer is option 1 i.e Rajesh Mapuskar.

• The Famous Indian director Rajesh Mapuskar was conferred with the Best Director Award in the 64th National Film Awards.

• Rajesh Mapuskar was awarded for directing a Marathi film named Ventilator.

• Best Film Friendly State (2017): Uttar Pradesh.

• Best Film Friendly State (2019): Uttarakhand.

• The Best Director in 66th National Film Awards (2019): Aditya Dhar.

• Aditya Dhar was awarded for directing a Hindi film named Uri: The Surgical Strike.

Q65. Answer: (b) Cousin

Drawing the diagram,

The man is the cousin to Pankaj.

Hence, “cousin” is the correct answer

Q66. Answer: (c) 60°

Shortcut Trick

Use the identity $\sec^2 x = 1 + \tan^2 x$.

10(1 + tan²x) − 9 tan²x = 13
10 + 10 tan²x − 9 tan²x = 13
tan²x = 3 => tan x = √3
Therefore The correct answer is 60°.
Alternate Method
Given: 10 sec²x − 9 tan²x = 13
Formula Used: sec²x − tan²x = 1
=> 10 sec²x − 9 tan²x = 13
=> (9 sec²x − 9 tan²x) + sec²x = 13
=> 9(sec²x − tan²x) + sec²x = 13
=> 9(1) + sec²x = 13
=> sec²x = 13 − 9
=> sec²x = 4
=> sec x = 2
=> x = cos^(−1)(1/2) = 60°
Therefore The correct answer is 60°.
Additional Information
Trigonometric Identities
Fundamental Pythagorean identities include sin²x + cos²x = 1, 1 + tan²x = sec²x, and 1 + cot²x = cosec²x.
Specific Angles
Common values for tan x: tan 30° = 1/√3, tan 45° = 1, tan 60° = √3.
Reciprocal Relations
sec x = 1/cos x, cosec x = 1/sin x, and cot x = 1/tan x.

Q67. Answer: (a) 105/198

Concept:
Deduce each fraction into its simplest form and then check for its value.
Example: a/b
If ‘a’ is divided by ‘c’ and it gives 5 as quotient then ‘b’ on division by ‘c’ should give 9 as quotient to make a/b = 5/9.
Calculation:
Option 1: 105/198
Write the fraction in the simplest form so, divide the numerator and denominator of the fraction by 3.
=> 35/66
Option 2: 80/144
Write the fraction in the simplest form so, divide the numerator and denominator of the fraction by 16.
=> 5/9
Option 3: 40/72
Write the fraction in the simplest form so, divide the numerator and denominator of the fraction by 8.
=> 5/9
Option 4: 25/45
Write the fraction in the simplest form so, divide the numerator and denominator of the fraction by 5.
=> 5/9
Therefore 105/198 cannot ne written in the form of 5/9.

Q68. Answer: (a) 8 days

Shortcut Trick
Efficiency ratio of Men to Women: 20M × 10 = 12W × 10 => 5M = 3W => M/W = 3/5.
Total Work = 20 × 3 × 10 = 600 units.
Efficiency of (15M + 6W) = (15 × 3) + (6 × 5) = 45 + 30 = 75 units/day.
Time taken = 600 ÷ 75 = 8 days.
Therefore The correct answer is 8 days.
Alternate Method

Given: 20 men can do work in 10 days; 12 women can do work in 10 days.

Formula Used: Total Work = Number of persons × Efficiency × Days

Person	Days	Total Work	Efficiency
20 Men	10	120	12
12 Women	10	12	

=> Efficiency of 20 men = 120 ÷ 10 = 12 units/day

=> Efficiency of 1 man = 12 ÷ 20 = 0.6 units/day

=> Efficiency of 12 women = 120 ÷ 10 = 12 units/day

=> Efficiency of 1 woman = 12 ÷ 12 = 1 unit/day

=> Total Efficiency of (15 men + 6 women) = (15 × 0.6) + (6 × 1)

=> Total Efficiency = 9 + 6 = 15 units/day

=> Days required = Total Work ÷ Total Efficiency = 120 ÷ 15

=> Days required = 8 days

Therefore The correct answer is 8 days.

Additional Information

Work Equivalence Formula

M1D1H1/W1 = M2D2H2/W2 where M is number of workers, D is days, H is hours and W is work done.

Efficiency and Time

Efficiency is inversely proportional to the time taken to complete a task when the work remains constant.

Pipes & Cisterns

Similar to time and work, the rate of filling a tank is its efficiency, and total capacity is the total work.

Q69. Answer: (a) Increases

The correct answer is option 1 i.e Increases.

• When light travels from a denser medium to a rare medium speed of light will increase.

• The refraction of light is the phenomenon of bend or change the direction of light rays when it passes from one medium to another.

• When light travels from denser to rarer medium, it bends away from the normal.

• According to Snell's Law: (sin θ2)/(sin θ1)= ν2/ν1=n1/n2

• Denser medium has a greater refractive index(n1) when compared to an optically rarer medium (n2).

• According to Snell's law, speed will Increase while travelling from a denser medium to rarer, i.e.(v1>v2).

Q70. Answer: (d) Palash

The correct answer is option 4 i.e Palash.

• Palash is the state flower of Jharkhand and Uttar Pradesh.

• State animal of Jharkhand: Indian elephant.

• State bird of Jharkhand: Asian Koel.

• Jharkhand state was formed on 15 November 2000.

• Chief Minister of Jharkhand: Hemant Soren.

• Rohira is the state flower of Rajasthan.

• Orchid is the state flower of Arunachal Pradesh.

• Lotus is the National Flower of India and the state flower of Karnataka.

Q71. Answer: (d) Q

The pattern followed is,

Hence, “Q” is the correct answer.

Q72. Answer: (a) [figure]

The mirror image of the given image is,

Hence, option 1 is the correct answer.

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Q73. Answer: (b) Tissue culture

The correct answer is Tissue culture.

Key Points

• Tissue culture is the phenomenon that many plants are grown from one parent in disease-free conditions.

• The production of plants by the method of tissue culture is also known as micropropagation

• This technique is being used increasingly for the production of ornamental plants like orchids, dahlia, carnation, chrysanthemum, etc.

• The new plants produced by tissue culture are disease-free is an advantage of this technique.

Sexual reproduction	**• Reproduction involves two parents and produces offspring that are genetically unique. - In human reproduction, each cell contains 46 chromosomes in 23 pairs. - Plant reproduction can be accomplished by sexual or asexual reproduction.**
Spore formation	• This occurs when a plant produces tiny spores and propagates through them. - Fungi like Rhizopus, Mucor, etc., are examples of spore formation.
Regeneration	• Regeneration is the ability of an organism to regrow its lost parts. - When a lizard loses its tail and then grows it back, this is an example of regeneration.

Q74. Answer: (b) Only conclusion 2 follows

Drawing the Venn diagram,

Conclusion 1: Some cots are not sheets → False (This is definitely false)

Conclusion 2:Some sheets are cots → True (This is definitely true)

Hence, “only conclusion 2” follows.

Q75. Answer: (d) [figure]

Tortoise and Crocodile are generally classified into reptiles but they don't have any relation with Amphibians.

The correct Venn diagram is,

Hence, "Option 4" is the correct answer.

Important Points

1. Crocodile can live both on land as well as water but it is not an amphibian. Crocodiles are very similar to amphibians but they are not termed under amphibians. In fact, they are a part of the reptile family.

2. Tortoises are exclusively land animals. Most other turtles live in the water much of the time, but not tortoises.

3. Reptiles are born with lungs, typically lay their eggs on dry land, and have scaly skin. Most amphibians are born with gills but later develop lungs, typically lay their eggs in water, and have thin, moist skin (without scales).

Crocodiles lay their eggs on the land unlike the amphibians.

Q76. Answer: (a) 'People First' mobile application

The correct answer is option 1 i.e People First' mobile application.

• N. Chandrababu Naidu, the Andhra Pradesh former Chief Minister, has launched ‘People First’ mobile application at the Collectors’ conference in Vijayawada.

• As the name mentions(People First' mobile application), the application will "empower citizens with real-time governance".

• Andhra Pradesh has the second-longest coastline after Gujarat (Longest in south India).

• Andhra Pradesh is the first state formed on linguistic basis in India.

• Governor of Andhra Pradesh: Biswabhusan Harichandan.

• Chief Minister of Andhra Pradesh: Y. S. Jaganmohan Reddy.

Q77. Answer: (b) vascular

The correct answer is option 2 i.e Vascular

• The vascular system transports fluids from one place to another.

• The plant vascular system helps to deliver various resources to the different plant organs and provides mechanical support.

• Xylem tissue helps for the transportation of water and minerals to the leaves.

• Phloem tissue helps for the transportation of food from the leaves to different parts of the plant.

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Respiratory system	**• The important system in the plant/human body, the place where gas exchange happens. - The respiratory system consists of the lungs, pharynx, larynx, trachea, and bronchi.**
Nervous system	• The nervous system is responsible for the control of the body. - The nervous system consists of the brain, spinal cord, sensory organs, and all of the nerves that connect these organs with the rest of the body.
Excretory system	• The system that performs the function of excretion, the bodily process of discharging wastes. - Organs involving in excretion are kidneys, large intestine, liver, skin, and lungs.

Q78. Answer: (d) Xylem

The correct answer is option 4 i.e Xylem.

• Xylem tissues are composed of mainly dead cells.

• Xylem is one of the transport tissues in vascular plants.

• Transportation of water from roots to stems and leaves is the major function of xylem.

• The term xylem was first used by Carl Nägeli in 1858.

• Xylem vessels are a long straight chain made of long-dead cells known as vessel elements.

Parenchyma	**• Composed of living cells - Parenchyma tissue converts sugar into insoluble starch and stores it for future use.**
Collenchyma	• Simple permanent tissue found in plants. - Present in the mesophyll of leaves that contain chloroplast. - Almost completely absent in monocots.
Aerenchyma	• Present in leaves, stems, and roots of the plants - Aerenchyma is richly found in Hydrophytes. - Helps for the transportation of oxygen and reduce cellular oxygen demand in plants

Q79. Answer: (b) 43

The pattern followed is,

Hence, “43” is the correct answer.

Q80. Answer: (c) Trivendra Singh Rawat

The correct answer is option 3 i.e Trivendra Singh Rawat.

• Trivendra Singh Rawat is the Chief Minister of Uttarakhand who was elected in 2017.

• He was elected from the assembly constituency of Doiwala, In 2017

• Governor of Uttarakhand: Baby Rani Maurya.

• Statehood of Uttarakhand: 9 November 2000.

• Uttarakhand is often referred to as the "Devabhumi" (Land of the Gods).

• On June 8, 2020, Uttarakhand declared Gairsain as the new summer capital (Winter capital: Dehradun).

Q81. Answer: (a) Electrolysis

The correct answer is option 1 i.e Electrolysis.

• Aluminium metal can be extracted only by Electrolysis.

• Aluminium is more reactive than carbon so it must be extracted from its compounds using electrolysis

• The atomic number of aluminium is 13.

• Third most abundant element and also the most abundant metal on earth crust.

• Bauxite is the ore of aluminium.

Calcination	**• Calcination is a process in which the carbonate ores are converted into oxides in order to obtain the metal. - This process takes place in the absence or limited amount of oxygen.**
Reduction	• The chemical reaction that involves the gaining of electrons.
Oxidation	• This occurs when a reactant loses electrons during the reaction.

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Q82. Answer: (c) 2 gases, one liquid and 2 solids

The correct answer is option 3 i.e 2 gases, one liquid, and 2 solids.

• Halogens contain 2 gases, one liquid, and 2 solids.

• Halogens are elements of group 17 in the periodic table consisting of five elements: fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At).

• Fluorine and chlorine are gases.

• Bromine is liquid.

• Iodine and astatine are solids.

• Because of their great reactivity, the free halogen elements are not found in nature.

Q83. Answer: (d) Only argument 2 is strong

According to the given information,

Argument 1: This is not strong, because nothing about earnings is given in the statement.

Argument 2: This is strong, because people must learn to share their wealth for the betterment of other people.

Hence, “only argument 2” is strong.

Q84. Answer: (a) 9.09%

The correct answer is option 1 i.e 9.09%.

Mass of common salt (solute)=32 g

Mass of water =320 g.

Mass of solution= Mass of common salt (solute) + Mass of water = 32+320 = 352.

Using the equation:

Concentration of solution= (Mass of common salt (solute))/(mass of solution)× 100

Concentration of solution= 32/352 × 100= 9.09 %

The concentration of the solution is 9.09%.

Q85. Answer: (c) four other carbon atoms

The correct answer is option 3 i.e Four other carbon atoms.

• In a diamond, each carbon atom is bonded to four other carbon atoms.

• Carbon in diamond is covalently bonded due to its non-metallic character.

• Diamond is the solid form of carbon.

• Diamond is the hardest naturally occurring substance found on Earth

• Diamond and graphite are the most common allotropes of pure carbon.

• India has only one active diamond mine which is located at Panna, in Madhya Pradesh.

Q86. Answer: (b) Ahmedabad and Mumbai

The correct answer is Ahmedabad and Mumbai.

• India's first bullet train is proposed to run between Ahmedabad and Mumbai.

• The train will cover the distance of over 508 km from Sabarmati (Gujarat) to Bandra (Mumbai, Maharashtra)

• Indian Prime Minister Narendra Modi and Japanese Prime Minister Shinzo Abe laid the foundation stone for the project in Ahmedabad, Gujarat on 14 September 2017.

• The Proposed date for the first run is on 15 August 2022 on the occasion of India's 75th Independence day (Recently advanced by year from the earlier deadline).

• This project is a joint venture between Indian Railways and Japan’s Shinkansen Technology.

• India’s second bullet train proposed from Delhi to Amritsar.

Q87. Answer: (c) binary fission

The correct answer is option 3 i.e binary fission.

• Amoeba, Paramecium, and Bacteria use binary fission as a means of propagation.

• Binary fission is an asexual mode of reproduction.

• In binary fission, The parent organism divide to form 2 new organism.

• Bacteria is the most common example for the binary fission.

• The simultaneous occurring of DNA replication and segregation is an important feature if binary fission.

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Multiple fission	**• Process of asexual reproduction. - Many daughter cells are produced from the parent cell. - sporozoans and algae are examples of multiple fission.**
Sexual reproduction	• Production of a new organism from two parents using their sex cells or gametes. - Sexual reproduction is the most common mode of reproduction in eukaryotes, such as animals, fungi, and plants.
Budding	• Budding is the formation of a bud from an organism and the bud is capable of developing into a new individual. - Hydra and yeast are examples of budding.

Q88. Answer: (d) 2

Shortcut Trick

Put θ = 90° in the given equations.

$x = a(\sin 90° + \cos 90°) = a(1 + 0) = a \Rightarrow x/a = 1$

$y = b(\sin 90° - \cos 90°) = b(1 - 0) = b \Rightarrow y/b = 1$

$(x^2/a^2) + (y^2/b^2) = 1^2 + 1^2 = 2$

Therefore The correct answer is 2.

Alternate Method

Given: $x = a(\sin\theta + \cos\theta)$ and $y = b(\sin\theta - \cos\theta)$

Formula Used: $(m + n)^2 + (m - n)^2 = 2(m^2 + n^2)$ and $\sin^2\theta + \cos^2\theta = 1$

$\Rightarrow x/a = \sin\theta + \cos\theta$

$\Rightarrow x^2/a^2 = (\sin\theta + \cos\theta)^2 = \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta$

$\Rightarrow y/b = \sin\theta - \cos\theta$

$\Rightarrow y^2/b^2 = (\sin\theta - \cos\theta)^2 = \sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta$

$\Rightarrow (x^2/a^2) + (y^2/b^2) = (\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta) + (\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta)$

$\Rightarrow (x^2/a^2) + (y^2/b^2) = 2(\sin^2\theta + \cos^2\theta) = 2(1) = 2$

Therefore The correct answer is 2.

Additional Information

Trigonometric Identities

The three fundamental identities are $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \operatorname{cosec}^2\theta$.

Algebraic Expansion

The square of a binomial sum and difference is $(a \pm b)^2 = a^2 + b^2 \pm 2ab$.

Q89. Answer: (b) C

The pattern followed is,

There are three figures in each row circle, triangle and square.

In the first row, the inside symbol is a multiplication symbol.

In the second row, it is a Addition symbol and in the third row it is a line.

The picture that correctly fits is,

Hence, option 2 is the correct answer.

Q90. Answer: (b) Reliance Jio

The correct answer is option 2 i.e Reliance Jio

• Reliance Jio launches the Asia-Africa-Europe (AAE-1) submarine cable system.

• This is World's Longest 100Gbps Submarine Cable System Measuring 25,000 Kms.

• A submarine cable system is a cable system that consists of telecom and internet cables, which are laid on the seabed between land-based stations.

• The cable system will be laid from Marseille, France to Hong Kong.

• This project was initiated by China Unicom in 2011.

Q91. Answer: (a) $s = ut + 1/2\ at^2$

The correct answer is option 1 i.e $s=ut+1/2at^2$

$s=ut+1/2at^2$ is the equation for Position - Time relation.

This is the second equation of motion.

Equation is used to calculate the distance travelled by a body in time (t), with initial velocity (u) and acceleration (a).

s → position

u → initial velocity

t → time

a → acceleration

V = u + at	**Equation for Velocity - Time relation**
$V^2 = u^2 + 2as$	Equation for Velocity-Position relation

Q92. Answer: (a) A. R. Rahman

The correct answer is option 1 i.e A. R. Rahman.

• A. R. Rahman was appointed as the official brand ambassador of Sikkim in January 2018.

• A. R. Rahman is an Indian composer, singer, and music producer.

• Sikkim is the least populous and second smallest among the Indian states.

• Governor of Sikkim: Ganga Prasad.

• Chief Minister of Sikkim: Prem Singh Tamang.

Sania Mirza	**• Indian professional tennis player. - She has won six Grand Slam titles in her career. - Brand ambassador of Telangana.**
Bhaichung Bhutia	• Former Indian professional footballer. - He is often nicknamed the Sikkimese Sniper. - He unsuccessfully contested the 2014 Lok Sabha elections from the Darjeeling constituency.
Mary Kom	• Indian Olympic boxer and incumbent Member of Parliament, Rajya Sabha. - Ranked as No. 1 AIBA World Women's Ranking Light Flyweight category. - First Indian woman boxer to win gold at the 2018 Commonwealth Games.

Q93. Answer: (b) 714

Shortcut Trick

Total ratio units = 13 + 21 = 34 units.

Value of 34 units = €1156.

Value of 1 unit = 1156 ÷ 34 = €34.

Larger share (21 units) = 21 × 34 = €714.

Therefore The correct answer is €714.

Alternate Method

Given: Total amount = €1156, Ratio = 13 : 21.

Formula: Share of larger portion = (Larger Ratio ÷ Sum of Ratios) × Total Amount

=> Sum of ratio parts = 13 + 21 = 34

=> Larger share = (21 ÷ 34) × 1156

=> Larger share = 21 × (1156 ÷ 34)

=> Larger share = 21 × 34

=> Larger share = €714

Therefore The correct answer is €714.

Additional Information

Ratio and Proportion

A ratio indicates how many times one number contains another. If a quantity Q is divided in ratio a : b, the shares are [a/(a+b)]×Q and [b/(a+b)]×Q.

Unitary Method in Ratios

Find the value of one unit by dividing the total value by the sum of ratio parts, then multiply by the specific part required.

Difference between Shares

The difference between shares can be found directly by (b − a)/(a + b) × Total Amount.

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Q94. Answer: (a) India

The correct answer is option 1 i.e India.

• India hosted the FIFA under 17 world cup in the year 2017.

• This is the first time India has hosted a FIFA tournament.

• The mascot was "Kheleo".

• England won the U-17 World Cup for the first time and Spain became the runner-up.

• FIFA was founded in 1904.

• President of FIFA: Gianni Infantino.

• FIFA Founded at Paris, France.

Q95. Answer: (c) A = 900 ; B = 300 ; C = 180

Shortcut Trick

Ratio of A : B : C is derived by making A common: A is 3 × 5 = 15 units.

Then B = 15 ÷ 3 = 5 units and C = 15 ÷ 5 = 3 units.

Total units = 15 + 5 + 3 = 23 units → 1,380.

1 unit = 1,380 ÷ 23 = 60.

A = 15 × 60 = 900; B = 5 × 60 = 300; C = 3 × 60 = 180.

Therefore The correct answer is A = 900 ; B = 300 ; C = 180.

Alternate Method

Given: Total sum = 1,380. A = 5C and A = 3B.

Formula: Ratio = A : B : C

=> A : B = 3 : 1 and A : C = 5 : 1

=> To equalize A, multiply (A : B) by 5 and (A : C) by 3.

=> A : B : C = 15 : 5 : 3

=> Sum of ratios = 15 + 5 + 3 = 23

=> Share of A = (15 ÷ 23) × 1,380 = 15 × 60 = 900

=> Share of B = (5 ÷ 23) × 1,380 = 5 × 60 = 300

=> Share of C = (3 ÷ 23) × 1,380 = 3 × 60 = 180

Therefore The correct answer is A = 900 ; B = 300 ; C = 180.

Additional Information

Ratio Balancing

When one variable is related to two others, find the LCM of its coefficients to normalize the entire ratio chain.

Division of Proportions

Individual Share = (Individual Ratio ÷ Sum of all Ratios) × Total Value.

Inverse Ratio

If mA = nB = pC, then the ratio A : B : C is (1/m) : (1/n) : (1/p).

Q96. Answer: (b) Chennai

The correct answer is option 2 i.e Chennai.

• Chennai was included in the UNESCO Creative Cities Network in 2017 for its rich musical tradition.

• After Jaipur and Varanasi, Chennai became the third Indian city on the UNESCO Creative Cities list.

• UNESCO Creative Cities Network List highlights its members' creativity within seven fields: Crafts and Folk Art, Design, Film, Gastronomy, Literature, Media Arts, and Music.

• Right now the list includes a total of 180 cities in 72 countries.

Bengaluru	**• The city is known as the silicon valley of India. - India's first helicopter-taxi service launched in Bengaluru.**
New Delhi	• Capital of India. - The city was designed by British architects Sir Edwin Lutyens and Sir Herbert Baker.
Lucknow	• Capital of the state of Uttar Pradesh. - Historically, Lucknow was the capital of the Awadh region, controlled by the Delhi Sultanate.

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Q97. Answer: (b) Activity toys

Given:

Total revenue made by sale of toys = Rs.3, 87,200

Activity percentage = 5%

Calculation:

Activity toys is least among all other toys.

Revenue generated by activities toys = 5% of 387200

=> (5/100) × 387200

=> Rs.19360

Q98. Answer: (a) 10 power 11

Concept:

Try to make base as close possible then compare their values

Calculation:

10^{11} and 11^(10)

Divide by 10^(10)

=> 10 and (1.1)^(10), clearly, 10 > (1.1)^(10)

=> 10^{11} > 11^(10)

Now, 10^{11} and 12^9

Divide by 10^9

=> 100 and (1.2)^9, clearly, 100 > (1.2)^9

=> 10^{11} > 12^9

Now, 10^{11} and 5^5

Clearly, 10^{11} > 5^5

Therefore 10^{11} has the highest value.

Alternate Method Concept used:-

=> log a^x = xlog a

Calculation:-

Taking log for all numbers-

=> 10^{11} = 11log10 = 11 × 1 = 11 Because log10 = 1

=> 12^9 = 9log12 = 9 × 1.07 = 9.63 Because log12 = 1.07

=> 5^5 = 5log5 = 5 × 0.69 = 3.45 Because log5 = 0.69

=> 11^(10) = 10log11 = 10 × 1.04 = 10.4 Because log11 = 1.04

Therefore 10^{11} has the highest value.

Q99. Answer: (c) 1,01,000

Shortcut Trick

Let the initial population be P.

Remaining after 5% death = 95/100 of P

Remaining after 8% left = 92/100 of (95/100 of P)

P × 0.95 × 0.92 = 88,274

P = 88,274 ÷ (0.95 × 0.92) = 1,01,000

Therefore The correct answer is 1,01,000.

Alternate Method

Given:

=> Final population = 88,274

=> Death rate = 5%

=> Leaving rate = 8%

Calculations:

=> Let Initial Population = x

=> Population after 5% died = x − (5% of x) = 0.95x

=> Population after 8% of remaining left = 0.95x − (8% of 0.95x)

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=> Final Population = 0.95x × (1 − 0.08) = 0.95x × 0.92

=> 0.874x = 88,274

=> x = 88,274 ÷ 0.874

=> x = 1,01,000

Therefore The correct answer is 1,01,000.

Additional Information

Successive Percentage Change

When a value is changed by a% and then by b%, the effective change is [a + b + (a × b)/100]%.

Population Depreciation Formula

Final Population = Initial Population × (1 − R1/100) × (1 − R2/100), where R_n are the reduction rates.

Multiplier Method

A 5% decrease corresponds to a multiplier of 0.95, and an 8% decrease corresponds to a multiplier of 0.92.

Q100. Answer: (c) Gitanjali Rao

The correct answer is option 3 i.e Gitanjali Rao.

• Gitanjali Rao won the 2017 Discovery Education 3M Young Scientist Challenge for inventing a quick, low-cost test to detect lead-contaminated water.

• Gitanjali Rao is an American inventor.

• In 2018 she was awarded the United States Environmental Protection Agency President's Environmental Youth Award.

• In 2019 she was awarded the Top Health Pillar Prize for the TCS Ignite Innovation Student Challenge.

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