

# NTSE

National Talent Search Examination

## MAT + SAT

### [ Stage I ]

Time : 180 Min

Max. Marks : 180

*Read the following instructions carefully.*

1. Answers are to be given on a separate answer sheet. Use only HB Pencil.
2. Write your Roll No. very clearly (only one digit in one block) on this booklet and on the answer sheet.
3. This test consists of 180 questions of one mark each. All the questions are compulsory.
4. Answer to each question by filling the correct alternative among the four choices on the answer sheet.

Example

	Q. No.	Alternatives			
Correct way	1	①	②	●	④
	Q. No.	Alternatives			
Wrong way	1	⊗	②	③	④

5. Now, turn to the next page and start answering the questions.



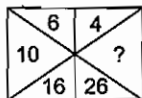
# Paper I : Mental Ability Test

**Directions** (Q. Nos. 1-4) In the following questions, there is a relationship between the numbers/letters/figures on the left of the sign (:), the same relationship exists to the right of the sign (:), of which one is missing. Find the missing term from the alternatives.

- ate : tea :: top : ?  
 a. pot                                      b. opt                                      c. top                                      d. pto
- Match : Win :: Examination : ?  
 a. Write                                      b. Appear                                      c. Success                                      d. Attempt
- KLQM : CFMK :: NRPT : ?  
 a. FLLR                                      b. GLLP                                      c. FLMR                                      d. RLNT
- LJPN : KMOQ :: ? : XVTZ  
 a. YSVV                                      b. SUWT                                      c. GTXY                                      d. YSUW
- Look at the following figure. Find the pattern for writing a number in the small triangles and find the missing number.



- 13
  - 14
  - 20
  - 21
- Find out the correct alternative from the alternatives a, b, c and d which will replace the question mark.



- 20
- 42
- 36
- 52

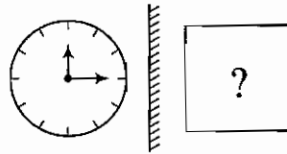
**Directions** (Q. Nos. 7-9) In the following question. Find out the alternatives, which bears the some relationship to third word as the first two bears.

- Select the correct alternative to replace the question mark (?).  
 3, 1, 2, 2 : 9, 1, 4, 4, :: 0, 2, 3, 3, ?  
 a. 1, 4, 6, 6                                      b. 1, 4, 9, 9                                      c. 0, 4, 6, 6                                      d. 0, 4, 9, 9
- Select the correct alternative to replace the question mark (?).  
 40 : 21 :: 100 : ?  
 a. 99                                      b. 89                                      c. 31                                      d. 51
- Select the correct alternative to replace the question mark (?).  
 L/S : 12/19 :: I/T : ?  
 a. 12/20                                      b. 20/9                                      c. 9/20                                      d. 19/20



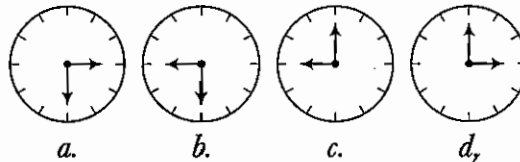
19. Observe the figure given below.

**Problem Figure**



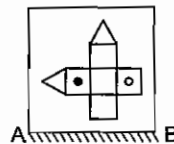
If the mirror image of the figure is rotated through  $90^\circ$  in the clockwise direction, it will look like

**Answer Figures**



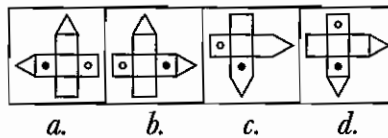
20. Observe the figure given below.

**Problem Figure**



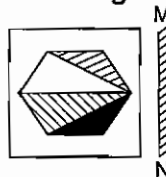
If the mirror image of the figure is rotated to  $90^\circ$  in anti-clockwise direction, it will look like.

**Answer Figures**



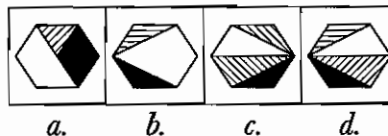
21. Observe the figure given below.

**Problem Figure**



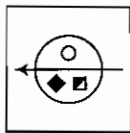
Which of the answer figure is the mirror image of the given figure when mirror is hold at MN?

**Answer Figures**



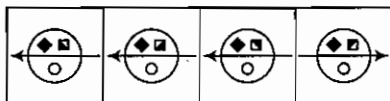
22. Observe the figure given below.

**Problem Figure**



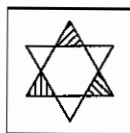
Which of the answer figure is exactly the water image of the given figure when water is below the item?

**Answer Figures**



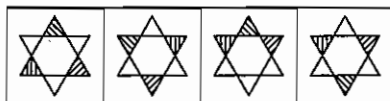
23. Observe the figure given below.

**Problem Figure**



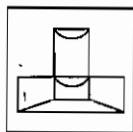
If the water image of the figure is rotated to  $180^\circ$  in clockwise direction, it will look like as?

**Answer Figures**

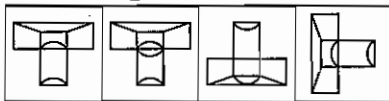


24. Observe the figure given below and find out the water reflection of the figure.

**Problem Figure**



**Answer Figures**



25. Standing on a platform, Amit told Sunita that Aligarh was more than 10 km but less than 15 km from there. Sunita knew that it was more than 12 km but less than 14 km from there. If both of them were correct, which of the following could be the distance of Aligarh from the platform?

a. 11 km                      b. 12 km                      c. 13 km                      d. 14 km

26. Students line up in a queue, in which Ashish stands fifteenth from the left end Sachin is seventh from the right. If they interchange their places, Sachin would be fifteenth from the right. How many students are there in the queue?

a. 21                              b. 22                              c. 29                              d. None of these

27. Looking at a portrait of man, Harsh said, 'His mother is the wife of my father's son. Brothers and sisters I have none'. At whose portrait was Harsh looking?

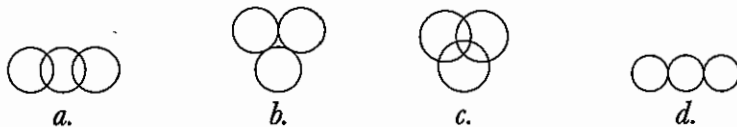
a. His son                      b. His cousin                      c. His uncle                      d. His nephew

28. If X is the brother of the son of Y's son, how is X related to Y?  
*a.* Son                      *b.* Brother                      *c.* Cousin                      *d.* Grandson
29. Reena is twice as old as Sunita. 3 yr ago, she was three times as old as Sunita. How old is Reena now?  
*a.* 6 yr                      *b.* 7 yr                      *c.* 8 yr                      *d.* 12 yr
30. A child is looking for his father. He went 90 m in the East before turning to his right he went 20 m before turning to his right again to look for his father at his uncle's place 30 m from this point. His father was not there. From here he went 100 m to the North before meeting his father in a street. How far child the son meet his father from the starting point?  
*a.* 80 m                      *b.* 100 m                      *c.* 140 m                      *d.* 260 m
31. P, Q, R, S, T, U, V and W are sitting around a round table in the same order, for group discussion at equal distances. Their positions are clockwise. If V sits in the North, then what will be the position of S?  
*a.* East                      *b.* South-East                      *c.* South                      *d.* South-West

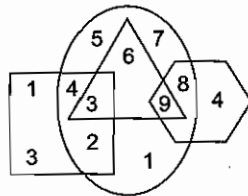
**Directions** (Q. Nos.32-34) *Read the following information given below to answer these questions.*

- (i) Aarti is older than Sanya.  
 (ii) Muskan is elder than Aarti but younger than Kashish.  
 (iii) Kashish is elder than Sanya.  
 (iv) Sanya is younger than Muskan.  
 (v) Gargi is the eldest.

32. Who is the youngest?  
*a.* Kashish                      *b.* Aarti                      *c.* Muskan                      *d.* Sanya
33. Agewise, who is in the middle?  
*a.* Kashish                      *b.* Aarti                      *c.* Muskan                      *d.* Sanya
34. Which of the given statements is/ are superfluous and can be dispensed with while answering the above questions?  
*a.* Either (i) or (iii)                      *b.* Only (iv)                      *c.* Either (i) or (iv)                      *d.* Both (iii) and (iv)
35. In an accounts department of a company, there are some who are only chartered accountants and some who are only cost accountants. A few hold both the chartered and cost accountancy qualifications. Some of this management accountants have also done either chartered or cost accountancy or both. Which of the following figure represents these facts?



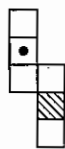
**Directions** (Q. Nos. 36-40) *Study the figure given below carefully and answer the questions that follow.*



36. Which number belongs to all figures?  
*a.* 3                      *b.* 4                      *c.* 6                      *d.* None of these

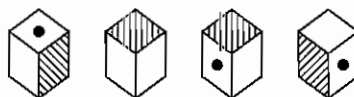
37. What is the sum of the numbers which belong to two figures only?  
*a.* 6                      *b.* 15                      *c.* 20                      *d.* None of these
38. What is the product of the number which belong to three figures only?  
*a.* 27                      *b.* 162                      *c.* 648                      *d.* None fo these
39. What is the sum of the numbers which belong to one figure only?  
*a.* 5                      *b.* 16                      *c.* 21                      *d.* None of these
40. What is the product of the numbers which belong to two figures only?  
*a.* 64                      *b.* 192                      *c.* 384                      *d.* None of these
41. Select from the alternatives, the box that can be formed by folding the sheet shown in figure (X).

**Problem Figure**



X

**Answer Figures**



A

B

C

D

- a.* A, B and D                      *b.* A, B and C                      *c.* Only B                      *d.* B and D
42. In a certain code language, 'col tip mat' means 'singing is appreciable', 'mat baj min' means 'dancing is good' and 'tip hop baj' means 'singing and dancing', which of the following means 'good' in that language?  
*a.* hot                      *b.* min                      *c.* baj                      *d.* Cannot be determind
43. In a certain code, RAIL is written as KCTN and SPEAK is written as CGRUM. How will AVOID be written in that code ?  
*a.* FKQXC                      *b.* KQXCF                      *c.* KRXCF                      *d.* KQVCB
44. If 'blue' means 'green', 'green' means 'white', 'white' means 'yellow', 'yellow' means 'black', 'black' means 'red' and 'red' means 'brown', then what is the colour of milk?  
*a.* Black                      *b.* Brown                      *c.* Blue                      *d.* Yellow

**Directions** (Q. Nos. 45-50) According to a code language, words in capital letters in Column I are written in small letters in Column II. The letters in Column II are jumbled up. Decode the language and choose the correct code for the word given in each question.

Column I	Column II
1. CURSE	a. opkif
2. INCUR	b. fbpcoc
3. TALLY	c. ughvg
4. CADET	d. rkufh
5. DRIP	e. rotc
6. TOIL	f. jugc
7. VARY	g. vwoh

45. DAIRY  
*a.* rhcov                      *b.* gkvbf                      *c.* rctvo                      *d.* whtou
46. TODAY  
*a.* rjuyh                      *b.* kjuvh                      *c.* ujrthv                      *d.* rjuvk
47. PIECE  
*a.* fvuyr                      *b.* tkfck                      *c.* fbocv                      *d.* frgkp

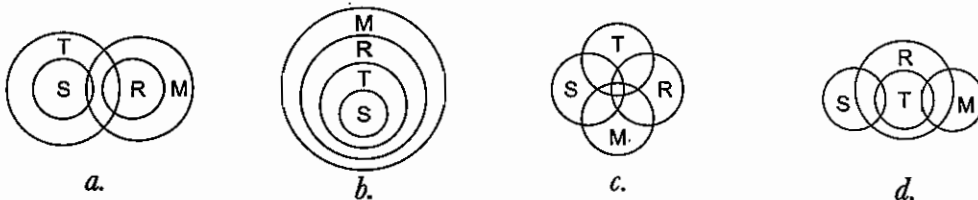
48. CIVIL  
 a. gfwcc                      b. ghwcc                      c. ggwfc                      d. gwffc
49. SUSTAIN  
 a. hibucpi                      b. hkcrjph                      c. hwojfvw                      d. hgpkkgc
50. TRIED  
 a. ukfhr                      b. ubovc                      c. ukhbp                      d. ukorc

**Directions** (Q. Nos. 51-53) *In a certain code 'les koo de' means 'rains and showers', 'hoo Jo' means 'heavy wall' and 'Jo koo pee' means 'walls and roads'.*

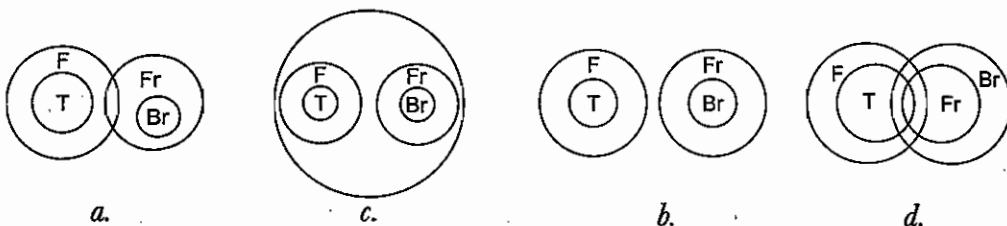
51. How is 'heavy' written in that code?  
 a. Jo                      b. hoo                      c. koo                      d. Cannot be determined
52. How is 'rains' written in that code?  
 a. le                      b. de                      c. koo                      d. Cannot be determined
53. How is 'roads and heavy wall' written in this code?  
 a. Jo hoo koo pee                      b. Jo hoo le de                      c. le, koo, hoo, pee                      d. Cannot be determined

**Directions** (Q. Nos. 54-57) *Read the statements given below. Find out the diagram (s) from the given alternatives representing the statement correctly.*

54. If all snakes are trees. Some trees are roads. All roads are mountains.



55. If all trees are flowers. No flower is fruit. All branches are fruits.

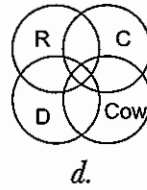
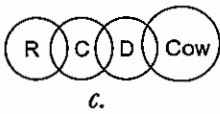
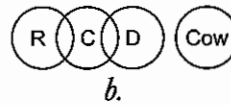
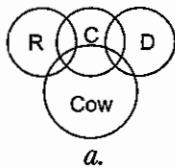


56. If some hills are rivers. Some rivers are deserts. All deserts are roads.





57. If some rats are cats. Some cats are dogs. No dog is cow.



58. Rita told Mani, "The girl I met yesterday at the beach was the youngest daughter of the brother-in-law of my friend's mother". How is the girl related to Rita's friend?  
*a.* Cousin                      *b.* Daughter                      *c.* Niece                      *d.* Friend
59. A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is A related to D?  
*a.* Grandmother                      *b.* Grandfather                      *c.* Daughter                      *d.* Granddaughter
60. I am standing at the centre of a circular field. I go down South to the edge of the field and then turning left I walk along the boundary of the field equal to three eighths of its length. Then, I turn West and go right across to the opposite point on the boundary. In which direction am from the starting point?  
*a.* North-West                      *b.* North                      *c.* South-West                      *d.* West
61. A man is facing towards West and turns through  $45^\circ$  clockwise, again  $180^\circ$  clockwise and then turns through  $270^\circ$  anti-clockwise. In which direction is he facing now?  
*a.* West                      *b.* North-West                      *c.* South                      *d.* South-West
62. The position of how many letters in the word BRAKES remains unchanged when they are arranged in alphabetical order?  
*a.* One                      *b.* Two                      *c.* Three                      *d.* More than three
63. If the words in the sentence, 'She showed several sample snaps' are rearranged in alphabetical order, which will be the middle word?  
*a.* Snaps                      *b.* Several                      *c.* Showed                      *d.* She
64. In a class of 60, where girls are twice that of boys Kamal ranked seventeenth from the top. If there are 9 girls ahead of Kamal, how many boys are after him in rank?  
*a.* 3                      *b.* 7                      *c.* 12                      *d.* 23
65. In a row of boys, if A who is tenth from the left and B who is ninth from the right interchange their post, then A becomes fifteenth from the left. How many boys are there in the row?  
*a.* 23                      *b.* 27                      *c.* 28                      *d.* 31
66. Ajay left home for the bus stop 15 min earlier than usual. It takes 10 min to reach the stop. He reached the stop at 8 : 40 am. What time does he usually leave home for the bus stop?  
*a.* 8 : 30 am                      *b.* 8 : 45 am                      *c.* 8 : 55 am                      *d.* Data inadequate
67. Saturday was a holiday for Republic Day, 14th of the next month is again a holiday for Shivratri. What day was it on the 14th?  
*a.* Monday                      *b.* Thursday                      *c.* Friday                      *d.* Saturday
68. How many such digits are there in the number 831729564, each of which is as far away from the beginning of the number as when the digits are arranged in descending order?  
*a.* None                      *b.* One                      *c.* Two                      *d.* Three

69. Which is the third number to the left of the number which is exactly in the middle of the following sequence of the numbers?

1 2 3 4 5 6 7 8 9 2 4 6 8 9 7 5 3 1 9 8 7 6 5 4 3 2 1

- a. 3                      b. 4                      c. 5                      d. 6

70. Arrange the given words in a meaningful sequence and choose the appropriate alternatives provided below each questions.

1. District    2. Village    3. State    4. Town    5. City

- a. 2, 4, 1, 5, 3              b. 2, 1, 4, 5, 3              c. 5, 3, 2, 1, 4              d. 2, 5, 3, 4, 1

**Directions** (Q. Nos. 71-74) Given below are two matrices containing two classes of letters. The rows and columns of Matrix I are numbered from 0 to 4 and that of Matrix II from 5 to 9. A letter from these matrices can be represented by its row number and next by its column number.

Matrix I					
	0	1	2	3	4
0	A	E	S	T	H
1	T	H	A	E	S
2	E	S	T	H	A
3	H	A	E	S	T
4	S	T	H	A	E

Matrix II					
	5	6	7	8	9
5	P	O	R	K	L
6	K	L	P	O	R
7	O	R	K	L	P
8	L	P	O	R	K
9	R	K	L	P	O

71. EAST  
a. 44, 32, 21, 03              b. 32, 31, 02, 04              c. 20, 43, 33, 11              d. 13, 12, 14, 10
72. ROSE  
a. 95, 75, 02, 32              b. 88, 76, 31, 32              c. 86, 67, 33, 44              d. 57, 87, 32, 33
73. SOLE  
a. 41, 57, 87, 31              b. 33, 99, 66, 44              c. 21, 75, 44, 62              d. 02, 78, 87, 13
74. LAKE  
a. 97, 00, 77, 12              b. 66, 12, 58, 40              c. 85, 31, 77, 44              d. 77, 43, 76, 31

**Directions** (Q. Nos. 75-77) Take the given statements as true and decide which of the conclusions logically follows from the statement.

75. **Statement** Vegetable prices are scaling in the market.

**Conclusions**

- I. Vegetables are becoming a rare commodity.    II. People cannot eat vegetables.  
a. If only Conclusion I follows                      b. If only Conclusion II follows  
c. If neither I nor II follows                      d. If both I and II follow

76. **Statements** No box is toy. All toys are blocks.

**Conclusions**

- I. Some blocks are toys.    II. Some blocks are boxes.    III. No block is box.  
a. Only I follows                      b. Either II or III follows  
c. Either II or III and I follow                      d. None follows

77. **Statements** Some houses are offices. Some offices are schools.

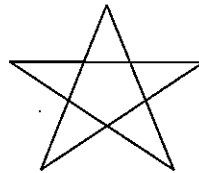
**Conclusions**

- I. Some schools are houses.    II. Some offices are houses.  
III. No house is school.    IV. Schools are offices.  
a. II and III follow                      b. I and IV follow  
c. Either III or IV and I follow                      d. II and IV and either I or III follow

78. Consider the given statement to be true.  
**Statement** Every library has books.  
 Which of the following inferences is correct?  
 a. Books are only in library  
 b. Libraries are meant for books only  
 c. No library is without books  
 d. Some libraries do not have readers
79. Find out the missing term in the series.  
 3, 7, 15, ?, 63, 127  
 a. 30  
 b. 31  
 c. 47  
 d. 52
80. Find the wrong term in the sequence 2, 5, 10, 17, 26, 37, 50, 64  
 a. 17  
 b. 26  
 c. 37  
 d. 64

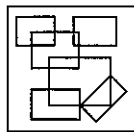
**Directions** (Q. Nos. 81-84) A cube of side 10 cm is coloured red with a 2 cm wide green strip along all the sides on all the faces. The cube is cut in 125 smaller cubes of equal size. Answer the following questions based on this statement.

81. How many cubes have three green faces each?  
 a. 0  
 b. 4  
 c. 8  
 d. 16
82. How many cubes have one face red and an adjacent face green?  
 a. 0  
 b. 6  
 c. 8  
 d. 16
83. How many cubes have atleast one face coloured?  
 a. 76  
 b. 89  
 c. 98  
 d. 102
84. How many cubes are without any colour?  
 a. 64  
 b. 27  
 c. 12  
 d. 0
85. Find the number of triangles in the given figure.



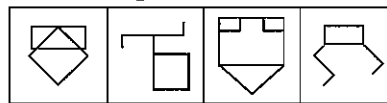
- a. 5  
 b. 6  
 c. 8  
 d. 10
86. Which figure is embedded in the pattern given in figure (X)?

**Problem Figure**



X

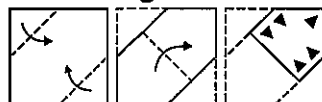
**Answer Figures**



a. b. c. d.

87. A square paper is folded in a particular manner and acts are made. When unfolded the paper appears as which of the following alternatives?

**Problem Figure**

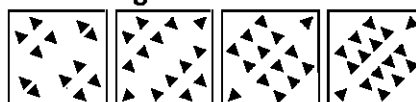


(X)

(Y)

(Z)

**Answer Figures**



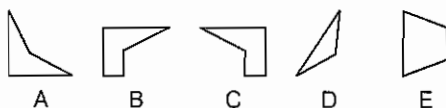
a.

b.

c.

d.

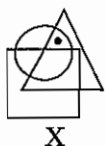
88. Select the answer that depicts three of the alternative figures which when fitted together will form a complete square?



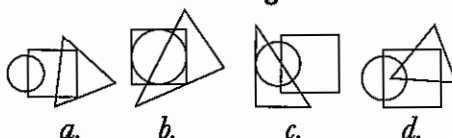
- a. ABC                      b. BCD                      c. CDE                      d. BCE

89. From amongst the figure marked (a), (b), (c) and (d), select the figure which satisfies the same conditions of placement of the dot as in figure (X).

**Problem Figure**

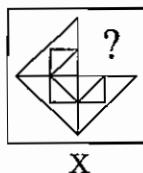


**Answer Figures**

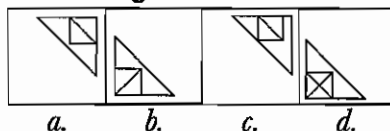


90. Complete the pattern in figure (X) by selecting one of the figures from four alternatives.

**Problem Figure**



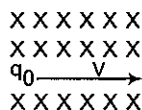
**Answer Figure**



## Paper II : Scholastic Aptitude Test

91. A helicopter, moving vertically upwards, releases a packet when it is at a certain height above the ground. The packet initially moves upwards for a time  $t_1$  and then falls downwards for a time  $t_2$  until it reaches the ground. Then
- a.  $t_1 < t_2$                       b.  $t_1 = t_2$                       c.  $t_1 > t_2$                       d. Data insufficient
92. By mistake a voltmeter is connected in series and an ammeter is connected in parallel with a resistance in an electrical circuit. What will happen to the instruments?
- a. Voltmeter is damaged                      b. Ammeter is damaged  
c. Both are damaged                      d. None are damaged
93. Which of the following is the example of ideal black body?
- a. Kajal                      b. Blackboard                      c. A pin hole box                      d. None of these
94. Consider the following statements
- Assertion (A)** The velocity of sound in air increases due to the presence of moisture in it.  
**Reason (R)** The presence of moisture in air lowers the density of air.
- a. Both A and R are true and R is the correct explanation of A.  
b. Both A and R are true but R is not the correct explanation of A.  
c. A is true, but R is false.  
d. A is false, but R is true.

95. When seen in green light, the saffron and green portions of our national flag will appear as  
*a.* black *b.* black and green respectively  
*c.* green *d.* green and yellow respectively
96. If a 0.1% length is increased due to stretching, then the percentage increase in its resistance will be  
*a.* 0.2% *b.* 2% *c.* 1% *d.* 0.1%
97. There are two electric bulbs of 40 W and 100 W. Which one will be brighter when first connected in series and then in parallel?  
*a.* 40 W in series and 100 W in parallel *b.* 100 W in series and 40 W in parallel  
*c.* 40 W both in series and parallel will be uniform *d.* 100 W both in series and parallel will be uniform
98. A positive charge enters a uniform magnetic field as shown. What is the direction of the magnetic force?



- a.* Out of the page *b.* Into the page *c.* Downwards *d.* Upward
99. A permanent magnet  
*a.* attracts all substances  
*b.* attracts only magnetic substances  
*c.* attracts magnetic substances and repels all non-magnetic substances  
*d.* attracts non-magnetic substances and repels magnetic substances
100. A magnetic wire of dipole moment  $4\pi \text{ Am}^2$  is bent in the form of semi-circle. The new magnetic moment is  
*a.*  $4\pi \text{ Am}^2$  *b.*  $8\pi \text{ Am}^2$  *c.*  $4 \text{ Am}^2$  *d.* None of these
101. A point object is placed at a distance of 30 cm from a convex mirror of focal length of 30 cm. The image will form at  
*a.* infinity *b.* pole *c.* focus *d.* 15 cm behind the mirror
102. An astronaut in a spaceship see the outer space as  
*a.* white *b.* black *c.* blue *d.* red
103. Which of the following is an example of a chemical change?  
*a.* Dissolution of salt in water *b.* Evaporation of water  
*c.* Rusting of iron *d.* Sublimation
104. Consider the following facts regarding electrons and identify the incorrect statements.  
*a.* Mass of an electron is  $9.11 \times 10^{-27} \text{ g}$  *b.* Charge of an electron is  $-1.6 \times 10^{-19} \text{ C}$   
*c.* Relative charge of an electron is  $-1$  *d.* Electron was named by stoney
105. Match the following

List I (Element)	List II (Discoverer)
A. Nitrogen	1. Carl Wihhelm Scheele
B. Barium	2. Daniel Rutherford
C. Titanium	3. Marie Curie, Pierre Curie
D. Polonium	4. William Gregor

Codes

- a.* A B C D *b.* A B C D *c.* A B C D *d.* A B C D  
*a.* 1 2 3 4 *b.* 3 2 1 4 *c.* 2 1 4 3 *d.* 4 3 2 1

106.  $^{35}_{17}\text{Cl}$  and  $^{37}_{17}\text{Cl}$  differ from each other in respect of number of  
*a.* protons                      *b.* electrons                      *c.* neutrons                      *d.* None of these

107. Which of the following is the correct electronic configuration of Neon?  
*a.* 2, 8                      *b.* 2, 8, 2                      *c.* 2, 7                      *d.* 2, 8, 1

108.  $2\text{KClO}_3 \longrightarrow 2\text{KCl} + 3\text{O}_2$   
 The above reaction is an example of a  
*a.* combination reaction                      *b.* decomposition reaction  
*c.* displacement reaction                      *d.* double displacement reaction

109. Tendency of an atom in a molecule to attract the shared pair of electron towards itself is known as  
*a.* electron-affinity (EA)                      *b.* electronegativity (EN)  
*c.* ionisation energy (IE)                      *d.* valency

110. Match the following

List I (Example of Reaction)	List II (Type of Reaction)
A. $\text{Fe (s)} + \text{CuSO}_4(\text{aq}) \longrightarrow \text{FeSO}_4(\text{aq}) + \text{Cu (s)}$	1. Decomposition reaction
B. $\text{AgNO}_3 + \text{HCl} \longrightarrow \text{AgCl} \downarrow + \text{HNO}_3$	2. Precipitation reaction
C. $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$	3. Combination reaction
D. $2\text{AgCl}(\text{s}) \longrightarrow 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$	4. Displacement reaction

Codes

A B C D                      A B C D                      A B C D                      A B C D  
*a.* 1 2 3 4                      *b.* 4 2 3 1                      *c.* 4 3 2 1                      *d.* 1 3 2 4

111. Which of the following elements are more reactive than hydrogen?  
 Hg, K, Ni, Co, Cu, Pt  
*a.* Hg, Co, Cu                      *b.* K, Ni, Co                      *c.* Cu, Pt, Ni                      *d.* Hg, K, Pt

112. A compound 'X' is an alkane. It is the main constituent of natural gas and abundantly found in marshy areas. In presence of sunlight, it reacts with chlorine and forms chloroform, but in absence of sunlight, it does not reacts with chlorine. Identify 'X'.  
*a.* Ethane                      *b.* Methane                      *c.* Butane                      *d.* Propane

113. Match the following

Alloy	Use
A. Stainless steel	1. Utensils, pipes, nut
B. Duralumin	2. Coins
C. Bronze	3. Knives of blades
D. Brass	4. Rockets

Codes

A B C D                      A B C D                      A B C D                      A B C D  
*a.* 1 2 3 4                      *b.* 4 3 2 1                      *c.* 1 3 2 4                      *d.* 3 4 2 1

- 114.** Which metal is the best conductor of electricity?  
*a.* Silver                      *b.* Gold                      *c.* Sodium                      *d.* Aluminium
- 115.** Consider the following statements  
I. Carbon dioxide is one of the greenhouse gases.  
II. An increase in the carbon dioxide content in the atmosphere would cause more heat to be retained by the atmosphere and lead to global warming.  
Which of the statements given above is/are correct?  
*a.* Only I                      *b.* Only II                      *c.* Both I and II                      *d.* None of these
- 116.** Pine, fir, spruce, cedar, larch and cypress are the famous timber yielding plants of which several also occur widely in the hilly regions of India. All these belong to  
*a.* angiosperms                      *b.* gymnosperms  
*c.* monocotyledons                      *d.* dicotyledons
- 117.** Movement of cell against concentration gradient is called  
*a.* osmosis                      *b.* active transport  
*c.* diffusion                      *d.* passive transport
- 118.** Most fish do not sink in water because of the presence of  
I. Swim bladder                      II. Air sacs                      III. Air in spongy bones  
Which of the statements given above is/are correct?  
*a.* I and II                      *b.* II and III                      *c.* III and IV                      *d.* Only I
- 119.** Other than spreading malaria, anopheles mosquitoes are also vectors of  
*a.* dengue fever                      *b.* filariasis                      *c.* encephalitis                      *d.* yellow fever
- 120.** Our skin, when exposed to excess sunlight, become dark. This is because our skin pigments called  
*a.* flavoxanthin                      *b.* melanin                      *c.* carotene                      *d.* xanthophyll
- 121.** One day you wake with a sore throat and runny nose. Your doctor takes a swab from your throat, send it to a lab and telephones you the next day to say that antibiotic will not help you get better. Which of the following is the most likely reason for the doctor's statement?  
*a.* Having waited a day, it is too late to take an antibiotic  
*b.* You need an antiseptic, not an antibiotic  
*c.* You need to be vaccinated instead of taking an antibiotic  
*d.* You are infected by a virus
- 122.** Nitrogen is fixed in ecosystems in ways stated below. Which one of the statements below is false?  
*a.* By cyanobacteria  
*b.* By electrical discharges in the atmosphere  
*c.* By industrially synthesised fertiliser  
*d.* By denitrification
- 123.** *Mycobacterium* causes leprosy, *Corynebacterium diphtheria* causes diphtheria and vibrio comma causes  
*a.* tetanus                      *b.* influenza                      *c.* cholera                      *d.* typhoid
- 124.** The first transgenic plants expressing engineered foreign genes were tobacco plants produced by the use of  
*a.* *Agrobacterium tumefaciens*                      *b.* *Bacillus thuringiensis*  
*c.* *Arabidopsis thaliana*                      *d.* *Streptomyces hygroscopicus*

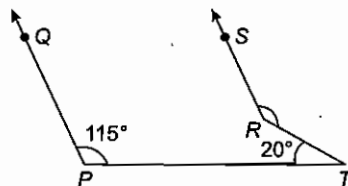
125. Match the following

List I	List II
A. A home for living organism	1. Large particle
B. Upper layer of soil	2. All kind of soil
C. Sandy soil	3. Dark in colour
D. Middle layer of the soil	4. Small particles and packed tight
E. Clayey soil	5. Lesser amount of humus

Codes

A B C D E	A B C D E	A B C D E	A B C D E
a. 2 3 1 5 4	b. 3 1 5 4 2	c. 1 5 4 3 2	d. 5 4 2 3 1

126. In the given figure, if  $PQ \parallel RS$ ,  $\angle QPT = 115^\circ$  and  $\angle PTR = 20^\circ$ , then  $\angle SRT$  is equal to



- a.  $155^\circ$       b.  $150^\circ$       c.  $135^\circ$       d.  $95^\circ$

127. Two planes start from a city and fly in opposite directions, one averaging a speed of 40 km/h greater than the others. If they are 3400 km apart after 5 h, the average speeds, respectively are

- a. 330, 370 km/h      b. 320, 360 km/h      c. 250, 290 km/h      d. 300, 340 km/h

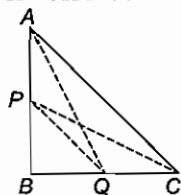
128. Sum of the roots of the equation  $x^2 + 5x + 6 = 0$  is

- a. 5      b. 4      c. -4      d. -5

129. A hollow sphere of internal and external diameters 4 cm and 8 cm, respectively is melted into a cone of base diameter 8 cm. The height of the cone is

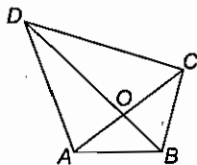
- a. 11 cm      b. 12 cm      c. 14 cm      d. 16 cm

130. In a right angled  $\triangle ABC$ , right angled at B, if P and Q are points on the sides AB and AC respectively, then which of the given option is correct ?



- a.  $AQ^2 + CP^2 = 2(AC^2 + PQ^2)$       b.  $2(AQ^2 + CP^2) = AC^2 + PQ^2$   
 c.  $AQ^2 + PC^2 = AC^2 + PQ^2$       d.  $AQ + CP = \frac{1}{2}(AC + PQ)$

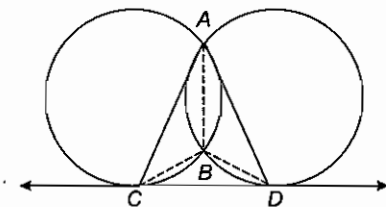
131. If ABCD is a quadrilateral whose diagonals AC and BD intersect at O, then which of the given option is correct ?



- a.  $(AB + BC + CD + DA) < (AC + BD)$       b.  $(AB + BC + CD + DA) < 2(AC + BD)$   
 c.  $(AB + BC + CD + DA) > (AC + BD)$       d.  $(AB + BC + CD + DA) = 2(AC + BD)$



132. CD is a direct common tangent to two circles intersecting each other at A and B. Then,  $\angle CAD + \angle CBD$  is equal to



- a.  $180^\circ$                       b.  $90^\circ$                       c.  $360^\circ$                       d.  $120^\circ$
133. The mid value of a class interval is 42. If the class size is 10, then the upper and lower limits of the class are  
 a. 37.5 and 47.5              b. 47 and 37                      c. 37 and 47                      d. 47.5 and 37.5
134. A man buys 4 tables and 5 chairs for ₹ 1000. If he sells the tables at 10% profit and chairs 20% profit, he earns a profit of ₹ 120. What is the cost of one table?  
 a. ₹ 200                          b. ₹ 220                          c. ₹ 240                          d. ₹ 260
135. The ratio of the area of a square to that of the square drawn on its diagonal is  
 a. 1 : 1                          b. 1 : 2                          c. 2 : 3                          d. 1 : 3
136. What is the probability of getting atleast one head when two coins are tossed simultaneously?  
 a.  $\frac{1}{4}$                               b.  $\frac{1}{2}$                               c.  $\frac{3}{4}$                               d.  $\frac{2}{3}$
137. If the distance of the points  $(2, -3)$  and  $(-8, -11)$  are equal from the point  $(k, -7)$ , what is the value of  $k$ ?  
 a. 7                                  b. -7                                  c. -3                                  d. 3
138. If the length of a rectangle is increased by 10% and the area is unchanged, then by how much per cent does the breadth decrease?  
 a. 100/11%                      b. 100/9%                      c. 9%                                  d. 10%
139. If  $x + 5 : 3x + 4$  is the duplicate ratio of 5 : 8, then the value of  $x$  is  
 a. 16                                  b. 18                                  c. 20                                  d. 22
140. If  $\left(x - \frac{1}{x}\right) = \frac{1}{2}$ , then the value of  $\left(6x^2 + \frac{6}{x^2}\right)$  is  
 a.  $\frac{25}{4}$                               b.  $\frac{9}{2}$                               c.  $\frac{9}{4}$                               d.  $\frac{27}{2}$
141. What can be said about the expansion of  $2^{12n} - 6^{4n}$ , where  $n$  is a positive integer?  
 a. Last digit is 4              b. Last digit is 8                      c. Last digit is 2                      d. Last two digits are zero
142. The value of  $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}}$  is  
 a.  $2 \cos^2 \theta$                       b.  $2 \cos 2\theta$                       c.  $2 \cos \theta$                       d.  $2 \cos \frac{\theta}{2}$
143. From the top of a pillar of height 20 m the angles of elevation and depression of the top and bottom of another pillar are  $30^\circ$  and  $45^\circ$ , respectively. The height of the second pillar (in m) is  
 a.  $\frac{20}{\sqrt{3}}(\sqrt{3} - 1)$               b.  $\frac{20}{\sqrt{3}}(\sqrt{3} + 1)$               c.  $20\sqrt{3}$                       d.  $\frac{20}{\sqrt{3}}$
144. A man runs upstream 13 km and downstream 28 km taking 5 h time for each side. Then, the velocity of the current is  
 a. 1.5 km/h                      b. 2.5 km/h                      c. 2 km/h                      d. None of these

145. A sum of ₹ 1550 was lent partly at 5% and partly at 8% simple interest. The total interest received after 3 yr was ₹ 300. The ratio of money lent at 5% to 8% is  
*a.* 11 : 12                      *b.* 16 : 15                      *c.* 12 : 21                      *d.* 11 : 13

146. Consider the following statements about Raja Ravi Verma.  
 I. He belonged to the family of the Maharajas of Travancore in Kerala.  
 II. He tried to create a style that was both modern and national.  
 III. He mastered the Western Art of oil painting and realistic life study. Painted themes from Indian Mythology.  
 IV. He set-up a picture production team and printing press on the outskirts of Mumbai.

Which of the above statements is/are correct?

- a.* I and III                      *b.* II and IV                      *c.* I, III and IV                      *d.* All of these
147. Match the following

List I	List II
A. Hinterland	1. Collected the revenues.
B. Garrison Town	2. Slaves purchased for military services
C. Bandagan	3. A fortified settlement with soldiers
D. Muqtis	4. The lands adjacent to a city or port that supply it with goods and services

Codes

- A B C D                      A B C D                      A B C D                      A B C D  
*a.* 4 3 2 1                      *b.* 3 4 2 1                      *c.* 1 2 3 4                      *d.* 2 1 3 4

148. The capital of Tipu Sultan was  
*a.* Dwarsmudra                      *b.* Belur                      *c.* Srirangam                      *d.* Seringapatnam
149. The President of India is not a Member of either House of Parliament or of a house of a legislature of any state. Which of the following functions is/are as an integral part of the Parliament?  
 I. He accords assent to bills passed by Parliament.  
 II. He orders elections to the Parliament when its term is over.  
 III. He can summon both the Houses of the Parliament.  
 IV. He can dissolve the Lok Sabha.  
*a.* I, II and III                      *b.* II, III and IV                      *c.* I, II and IV                      *d.* I, III and IV
150. Majority of the Members of Rajya Sabha are  
*a.* indirectly elected by the State Legislatures  
*b.* indirectly elected by the local bodies and State Legislatures  
*c.* elected by the people  
*d.* nominated by the President
151. The Constitution of India vests the executive authority of the union in the  
*a.* President                      *b.* Council of Ministers  
*c.* President- in- Parliament                      *d.* Prime Minister
152. Which of the following legislative functions are performed by the Council of Ministers?  
*a.* It nominates certain members to the Rajya Sabha as well as to the Lok Sabha  
*b.* It introduces most of the important bills in the Parliament  
*c.* It appoints the speaker of Lok Sabha and Chairman of the Rajya Sabha  
*d.* All of the above
153. Who among the following served as Vice-President before becoming the President of India?  
*a.* Dr S Radhakrishnan                      *b.* Dr Zakir Hussain  
*c.* V V Giri                      *d.* All of these

154. Match the following

List I	List II
A. Core	1. Made of silicon and alumina
B. Rocks	2. Has definite chemical composition
C. Minerals	3. Used for roads and buildings
D. Sial	4. Innermost layer of Earth

Codes

A B C D

a. 4 3 2 1

A B C D

b. 3 4 2 1

A B C D

c. 1 2 3 4

A B C D

d. 2 1 3 4

155. The natural mass of mineral matter that makes up the Earth crust is known as  
a. core                      b. mantle                      c. fossils                      d. rock
156. Consider the following statements  
I. Igneous rocks are made up of molten lava that comes on the Earth surface.  
II. They have very fine grained structure.  
III. Basalt is an example of igneous rocks.  
IV. Deccan plateau is made up of basalt rocks.  
Which of the above statements is/are correct?  
a. I and IV                      b. II and III                      c. Only I                      d. All of these
157. Which of the following rocks can be changed into metamorphic rocks under great heat and pressure?  
a. Igneous                      b. Sedimentary                      c. Both 'a' and 'b'                      d. None of these
158. The remains of the dead plants and animals trapped in the layers of rocks are known as  
a. Igneous                      b. sediments                      c. fossils                      d. None of these
159. Currency is accepted as a medium of exchange because  
a. the currency is authorised by the government of the country  
b. it has the backing of the people  
c. it is easy to handle  
d. None of the above
160. The main source of the banks are  
a. interest paid by them on deposits  
b. interest earned by them on loans extended to people  
c. interest received by them from the government  
d. None of the above
161. Intermediate goods are not considered in the gross domestic product because  
a. they don't have any economic value  
b. these are not considered as economic activities  
c. Their value is implicitly included in the prices of final goods  
d. None of the above
162. Infant mortality rate indicates the number of children that DIE as a proportion of 1000 live children born in that particular year in which of the following age groups.  
a. 1 year-5 years                      b. 1 year-3 years                      c. 0-1 year                      d. None of these
163. The main criterion used by the World Bank in classifying different countries as developed and under-developed is  
a. their income                      b. their literacy level                      c. their health status                      d. None of these

164. Which of the following artists broke away from the convention of oil painting and the realistic style and turned for inspiration to medieval Indian traditions of miniature painting and the ancient art of Mural Painting in the Ajanta Caves.
- a. Raja Ravi Verma      b. Amrita Shergil      c. Rabindranath Tagore      d. None of these

165. Consider the following statements

- I. The term Kathak is derived from Katha, a word used in Sanskrit and other languages for story.  
 II. The legends of Radha-Krishna were the main theme of the Kathak.  
 III. It developed in two traditions or Gharanas. One in the court of Rajasthan (Jaipur) and other in Lucknow.  
 IV. Under the Patronage of Wajid Ali Shah it grew into a major art form.

Which of the above statements is/are true about Kathak?

- a. I and II      b. III and IV      c. I, II and III      d. All of these
166. Match the following

List I	List II
A. Bharatanatyam	1. Andhra Pradesh
B. Kathakali	2. Odisha
C. Odissi	3. Kerala
D. Kuchipudi	4. Tamil Nadu

Codes

- A B C D      A B C D      A B C D      A B C D  
 a. 3 4 2 1      b. 4 3 2 1      c. 1 2 3 4      d. 2 1 3 4

167. On what basis the representation has been accorded to the states in Rajya Sabha?
- a. Party of all the states      b. on the basis of population  
 c. on the basis of the stage of development of a state      d. on the basis of population cum- development
168. Under the Indian Constitution, the Council of Ministers is collectively responsible to
- a. The Lok Sabha and Rajya Sabha      b. Lok Sabha only  
 c. Rajya Sabha only      d. None of these
169. The President is indirectly elected through an electoral college consisting of
- a. elected members of all the State Legislatures  
 b. the elected members of both the Houses of Parliament  
 c. the elected members of the Parliament and elected members of the State Legislative Assemblies  
 d. all the members of the Parliament and the state Legislative Assemblies
170. If the President chooses to resign before the expiry of his normal term, he has to address his resignation to the
- a. Chief Justice of India      b. The Vice President  
 c. Speaker of the Lok Sabha      d. Election Commissioner
171. Generally the members of the Council of Ministers are members of either House of the Parliament and non-members can be appointed as ministers for a maximum period of
- a. three months      b. six months      c. one year      d. five years
172. Consider the following statements.
- I. Lithosphere is the solid crust or the hard top layer of the Earth, made up of rocks and minerals.  
 II. Hydrosphere comprises various sources of water and different types of water bodies.  
 III. The atmosphere is the thin layer of air that surrounds the Earth.  
 IV. Plants and animal kingdom together make Biosphere or the living world.

Which of the above statements is/are correct?

- a.* I and IV                      *b.* II and III                      *c.* II, III and IV                      *d.* All of these

**173.** The relation between the living organisms, as well as the relation between the organisms and their surroundings is known as

- a.* Biosphere                      *b.* Lithosphere                      *c.* Ecosystem                      *d.* None of these

**174.** Match the following

List I	List II
A. Biosphere	1. Threat to environment
B. Industries	2. Human environment
C. Community	3. Human made environment
D. Growing population	4. Natural environment

Codes

- A B C D                      A B C D                      A B C D                      A B C D  
*a.* 4 3 2 1                      *b.* 3 4 2 1                      *c.* 1 2 3 4                      *d.* 2 1 3 4

**175.** Every Year World Environment Day is celebrated on

- a.* 5th June                      *b.* 15th June                      *c.* 5th January                      *d.* 4th April

**176.** Match the following

List I	List II
A. Food and Agriculture Organisation	1. Berne, Switzerland
B. Institute Civil Aviation Organisation	2. London, UK
C. International Maritime Organisation	3. Montreal, Canada
D. Universal Postal Union	4. Rome, Italy

Codes

- A B C D                      A B C D                      A B C D                      A B C D  
*a.* 2 1 3 4                      *b.* 1 2 3 4                      *c.* 3 4 2 1                      *d.* 4 3 2 1

**177.** The sigmoid colon is part of

- a.* Ileum                      *b.* Small Intestine                      *c.* Anal canal                      *d.* Large Intestine

**178.** Which of the following artists was influenced by the art of Japanese artists to develop an Asian Art Movement?

- a.* Raja Ravi Verma                      *b.* Rabindranath Tagore                      *c.* Nandalal Bose                      *d.* Amrita Shergil

**179.** Consider the following statements.

- I. French society in the 18th century was divided into three estates and only the members of the third estate paid taxes.
- II. The members of the first two estates, that is, the clergy and the nobility, enjoyed certain privileges by birth.
- III. The nobles, enjoyed feudal privileges, which included feudal dues, which they extracted from the peasants.
- IV. The church too extracted its share of taxes called tithes from the peasants.

Which of the above statements is/are true about 18th century society of France?

- a.* I and IV                      *b.* II and III                      *c.* I, II and III                      *d.* All of these

**180.** Darul-Uloom Deoband is associated with

- a.* Parsi Socio-cultural reforms                      *b.* Muslim reform movement  
*c.* Satyagraha movement                      *d.* Terrorist activities

## Paper I : Mental Ability Test

1. (b) As, ate  $\rightarrow$  tea  
123  $\rightarrow$  231  
Similarly, top  $\rightarrow$  opt  
123  $\rightarrow$  231

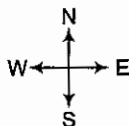
2. (c) As, we win the match similarly we get 'success' in the examination.

3. (a) As,
- |    |    |    |    |               |    |   |    |    |
|----|----|----|----|---------------|----|---|----|----|
| 11 | 12 | 17 | 13 |               | 3  | 6 | 13 | 11 |
| K  | L  | Q  | M  | $\rightarrow$ | C  | F | M  | K  |
|    |    |    |    |               | -8 |   |    |    |
|    |    |    |    |               | -6 |   |    |    |
|    |    |    |    |               | -4 |   |    |    |
|    |    |    |    |               | -2 |   |    |    |
- Similarly, NRPT  $\rightarrow$  FLLR

4. (d) As,
- |    |    |    |    |               |    |    |    |    |
|----|----|----|----|---------------|----|----|----|----|
| 12 | 10 | 16 | 14 |               | 11 | 13 | 15 | 17 |
| L  | J  | P  | N  | $\rightarrow$ | K  | M  | O  | Q  |
|    |    |    |    |               | -1 |    |    |    |
|    |    |    |    |               | +3 |    |    |    |
|    |    |    |    |               | -1 |    |    |    |
|    |    |    |    |               | +3 |    |    |    |

Similarly, YSUW  $\rightarrow$  XVTZ

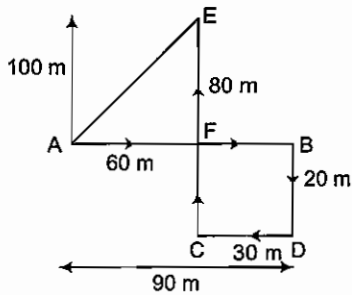
5. (b) In this we have two series of numbers.  
1, 2, 3, 4, 5, 6 and 14, 15, 16, 17, 18, 19  
So, missing number is = 14.
6. (b)  $4 + 6 = 10$                        $6 + 10 = 16$   
 $16 + 10 = 26$                        $16 + 26 = 42$   
 $\therefore ? = 42$
7. (d) By doing the square of each number we get the required number.
8. (d)  $40 + 2 = 20$ ,       $20 + 1 = 21$   
Similarly,  $100 + 2 = 50$ ,       $50 + 1 = 51$
9. (c)  $L/S = 12/9$ , This is according to the position of letter in the English alphabet similarly  $I/T = 9/20$
10. (a) The bottom design reaches the top and gets inverted and the similar circle adjacent to it also gets inverted the arrow goes below and gets inverted and the second design from the top reaches to third place and gets inverted.
11. (d) This cities are located in the following manner



Bhopri  $\leftarrow$  Karan  $\leftarrow$  Akrama  $\leftarrow$  Thakada  $\leftarrow$  Pranda  
Hence, city Bhopri is located at the extreme left West.

12. (c) Except (c), the second and third number are exactly divisible by the first number.
13. (c) Except (c), when small design is kept at the empty space of big design it gets completed.
14. (b)  $4/12/95$  to  $1/1/96 = 28$  days  
 $1/1/96$  to  $29/1/96 = 28$  days  
 $29/1/96$  to  $26/2/96 = 28$  days  
 $26/2/96 + 28$  days =  $25/3/96$   
Here, February has 29 days.  
 $\therefore ? = 25/3/96$
15. (b) 1 9 2 6 5 9 3 8 3 9 3 2 5 9 2 9 3 4 8 2 6 9 8
16. (a) 2 9 7 3 173 7 7 1 3 3 173 8 5 7 1 3 7 7 173 9 0 6
17. (b) 6 412 2 8 7 4 2 153 8 6 2 1 7 1 4 1 1 3 2 8 6
18. (c) 4 2 1 2 1 4 2 1 1 2 4 4 4 1 2 2 1 2 1 4 4 2 1 4 2 1 2 1 2  
4 1 4 2 1 2 4 1 4 6
19. (d) Clearly, when clock is rotated through  $90^\circ$  in clockwise direction, it will look like figure (d).
20. (d) The mirror image will look like as figure (d).
21. (d) The mirror image will look like as figure (d).
22. (a) The water image will look like as figure (a).
23. (a) The water image will look like as figure (a).
24. (a) The water image will look like as figure (a).
25. (c) Clearly, according to Sunita, the distance was more than 12 km but less than 14 km which is 13 km.
26. (c) Sachin's new position is 15th from the right as well as the left end of the row.  
 $\therefore$  Number of students in the queue =  $(14 + 1 + 14) = 29$
27. (a) Since, Harsh has no brother or sister, so he is his father's only son. So, wife of Harsh's father's son-Harsh's wife. Thus, Harsh's wife is the man's mother or the man is Harsh's son.
28. (d) Son of Y's son-grandson, brother of Y's grandson Y's grandson. So, X is Y's grandson.
29. (d) Let Sunita's present age be x yr.  
Then, Reena's present age =  $2x$  yr  
3 yr ago, Sunita's age =  $(x - 3)$  yr and  
Reena's age =  $(2x - 3)$  yr  
So,  $(2x - 3) = 3(x - 3)$   
 $\Rightarrow 2x - 3 = 3x - 9$   
 $\Rightarrow x = 6$   
 $\therefore$  Reena's present age =  $2x = 12$  yr

30. (b) The movements of the child from A to E are as shown in figure



Clearly, the child meets his father at E.

Now,  $AF = (AB - FB)$   
 $= (AB - DC) = (90 - 30) = 60 \text{ m}$   
 $EF = (DE - DF) = (DE - BC)$   
 $= (100 - 20) = 80 \text{ m}$

$\therefore$  Required distance

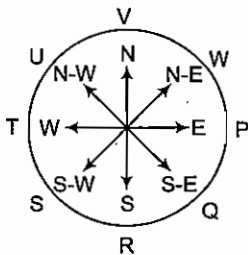
$$= AE = \sqrt{AF^2 + EF^2}$$

$$= \sqrt{(60)^2 + (80)^2}$$

$$= \sqrt{3600 + 6400}$$

$$= \sqrt{10000} = 100 \text{ m}$$

31. (d) Clearly, the seating arrangement is as shown in the adjoining figure.



So, S is at the South-West position.

**Solutions (Q. Nos. 32-34)** Let the first letter of the name of each girl denote her age.

From (i), we have :  $A > S$

From (ii), we have :  $K > M > A$

From (iii) we have :  $K > S$

From (iv), we have :  $S < M$

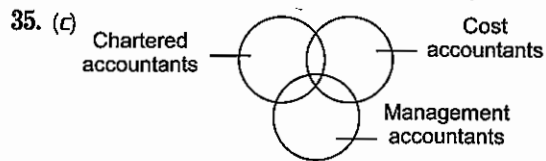
Combining these, we get :  $K > N > A > S$

Since, Gargi is the eldest so we have :  $G > K > M > A > S$

32. (d) Sanya is the youngest.

33. (c) Agewise, Muskan is in the middle.

34. (d) From (i) and (ii) we have :  $K > M > A > S$ . This indicates both  $K > S$  and  $S < M$  which are given in (iii) and (iv). Thus, both (iii) and (iv) are superfluous.



36. (d) Clearly, there is no such number in the diagram.

37. (c) We first find the numbers which belong to two figures only as follows.

Number common to square and oval : 2, 4

Number common to triangle and oval : 6

Number common to hexagon and oval : 8

The number common to square and triangle *i.e.*, 3 or triangle and hexagon *i.e.*, 9 lie inside the oval also and hence none of them should be considered here.

$\therefore$  Required sums =  $(2 + 4 + 6 + 8) = 20$

38. (a) We find the numbers which belong to three figures only as follows.

Number common to square, triangle and oval : 3

Number common to triangle, hexagon and oval : 9

$\therefore$  Required product =  $3 \times 9 = 27$

39. (c) We first find the numbers which belong to one figure only, as follows

Number inside the square only : 1, 3

Number inside the oval only : 1, 5, 7

Number inside the hexagon only : 4

$\therefore$  Required sum =  $(1 + 3 + 1 + 5 + 7 + 4) = 21$

40. (c) We first find the numbers which belong to two figures only.

Clearly, such numbers are 2, 4, 6, 8.

$\therefore$  Required product =  $(2 \times 4 \times 6 \times 8) = 384$

41. (c) The fig. (X) is similar to form V. Therefore, when the sheet in fig. (X) is folded to form the cube, then the dot and shading must lie opposite to each other. Hence, the figure (A), (C) and (D) which bear the dot and the shading on adjacent faces cannot possibly be formed by folding the sheet in figure (X). Therefore, only cube (B) can be formed.

42. (b) In the first and second statements, the common code word is 'mat' and common word is 'is'. So, 'mat' means 'is'. In the second and third statements, the common word is 'bai' and common word is 'dancing'. So, 'bai' means dancing.

Thus, in the second statement, 'min' means 'good'.

43. (b) All the letters of the word, except the last letter are written in the reverse order and in the group of letters so obtained, each letter is moved two steps forward to get that code. Thus, we have

AVOID  $\rightarrow$  IOVAD  $\rightarrow$  KQXCF

44. (d) The colour of milk is 'white'. But as given, 'white' means 'Yellow'. So, the colour of the milk is 'Yellow'.

## Solutions (Q. Nos. 45-50)

- In *CURSE* and *VARY*, the common code letter is O and the common letter is R. So, O stands for R.
- In *CADET* and *VARY*, the common code letter is h and the common letter is A. So, h stands for A.
- In *TALLY* and *VARY*, the common code letter h means A. The other common letter is V and other common letter is Y so V stand for Y.

Thus, in *VARY*, the remaining code letter W stands for V.

In *CADET* and *TOIL*, the common code letter is C and common letter is I. So, C stands for I.

In *TALLY* and *TOIL*, the common letter u stands for T. The other common code word is g and the other common letter is L. So, g stands for L.

Thus, in *TOIL*, the remaining code letter j stands for O. In *CADET* and *DRIP*, the common code letter is r and the common letter is D. So, r stands for D.

- In *DRIP*, o stands for R, c stands for I. So, the remaining code letter t stands for P.
- In *INCUR*, *CURSE* and *CADET*, the common code letter is f and common letter is C, so f stands for C.
- In *INCUR* and *CURSE*, the common code letter f and o means C and R, respectively. So, the remaining code letter p stand for U.

Thus in *INCUR*, the remaining code letter b stands for N.

In *CURSE* and *CADET*, the common code letter f means C. and the other common code letter k means E.

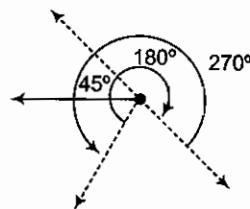
Thus in *CURSE*, the remaining code letter i means S.

The information can be summarised as below

Code	o	h	v	w	u	c	g	j	r	t	f	p	b	k	i
Letter	R	A	Y	V	T	I	L	O	D	P	C	U	N	E	S

45. (a) The code for DAIRY is rhcvo.
46. (c) The code for TODAY is ujrhv.
47. (b) The code for PIECE is tckfk.
48. (a) The code for CIVIL is fcwgc or gfwcc.
49. (a) The code for SUSTAIN is ipihucb or hibucpi.
50. (d) The code for TRIED is uockr or ukorc.
51. (b) In the second and third statements, the common code word is 'Jo' and common word is 'wall', so 'Jo stands for 'wall'.  
Thus, in the second statement, 'hoo' stands for 'heavy.'
52. (d) Since, from the given information, we can only find the code for 'and' in the first statement, it cannot be determined which of the remaining two codes stands for rains.
53. (a) Clearly, the required code will consist of the same codes as in the third statement with the code for 'heavy' added to it.
54. (a) Clearly, the figure (a) represents the given statements correctly.

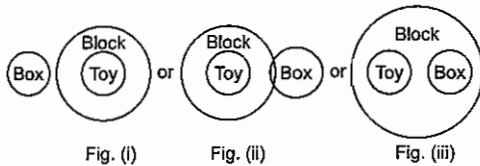
55. (b) Clearly, the figure (b) represents the given statements correctly.
56. (a) Clearly, the figure (a) represents the given statements correctly.
57. (b) Clearly, the figure (b) represents the given statements correctly..
58. (a) The relations may be analysed as follows. Daughter of brother-in-law niece; Mother's niece-cousin. So, the girl is the cousin of Rita's friend.
59. (d) A is the sister of B and B is the son/daughter of C. So, A is the daughter of C. Also, D is the father of C. Thus, A is the granddaughter of D.
60. (c) The movement are as indicated in figure (O to A, A to B and B to C). Clearly, C lies to the South-West of O.
61. (d) The man initially faces in the direction OA. On moving  $45^\circ$  clockwise, the man faces in the direction OB. On further moving  $180^\circ$  clockwise, he faces in the direction OC. Finally, on moving  $270^\circ$  anti-clockwise, he faces in the direction OD, which is South-West.



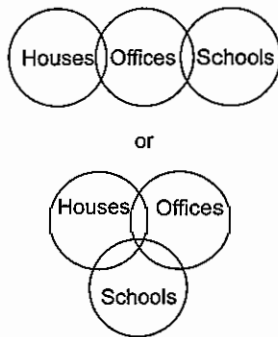
62. (b) Letters in word BRAKES  
Letters in alphabetical ABEKRS order.  
The positions of K and S remain unchanged.
63. (d) The correct alphabetical order is sample, several, she, showed snaps.
64. (c) Let the number of boys be x.  
Then, number of girls = 2x  
 $\therefore x + 2x = 60$   
or  $3x = 60$   
or  $x = 20$   
So, number of boys = 20 and number of girls = 40  
Number of students behind Kamal in rank  
 $= (60 - 17) = 43$   
Number of girls ahead of Kamal in rank = 9  
Number of girls behind Kamal in rank  $= (40 - 9) = 31$   
So, number of boys behind Kamal in rank  
 $= (43 - 31) = 12$
65. (a) Clearly, A's new position is 15 from the left. But this is the same as B's earlier position which is 9th from the right.  
 $\therefore (15 + 9) - 1 = 23$
66. (b) Clearly, Ajay left home 10 min before 8:40 am, i.e., at 8.30 am. But it was 15 min earlier than usual, so he usually left for the bus stop at 8:45 am.



67. (b) As given, Saturday falls on 26th January and we have to find the day on 14th February.  
Clearly, 2nd, 9th and 16th February each is a Saturday.  
Thus, 14th February was a Thursday.
68. (a) Original number 8 3 1 7 2 9 5 6 4  
Number formed by 9 8 7 6 5 4 3 2 1  
arranging digits in descending order  
Clearly, there is no such digits.
69. (b) There are 27 numbers in the given sequence.  
So, middle number = 14th number = 9  
Clearly, the third number to the left of this 9 is 4.
70. (a) Clearly, the correct sequence is 2, 4, 1, 5, 3.
71. (d) EAST is coded as 13, 12, 14, 10.
72. (a) ROSE is coded as 95, 75, 02, 32.
73. (b) SOLE is coded as 33, 99, 66, 44.
74. (c) LAKE is coded as 85, 31, 77, 44.
75. (c) The availability of vegetables is not mentioned in the given statement. So, I does not follow. Also, II is not directly related to the statement and so it also does not follow.
76. (c) From the above figures, only either II or III and I follow.

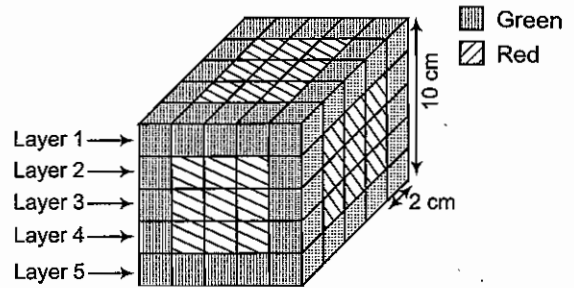


77. (d) From the above figures, only II and IV and either I and III follow.

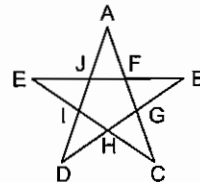


78. (c) Clearly, no library is without books' is the correct inference.
79. (b) Each number in the series is one more than twice the preceding number.  
So, missing term =  $(15 \times 2) + 1 = 31$
80. (d) The terms of the series are  $(1^2 + 1)$ ,  $(2^2 + 1)$ ,  $(3^2 + 1)$ ,  $(4^2 + 1)$ ,  $(5^2 + 1)$ ,  $(6^2 + 1)$ ,  $(7^2 + 1)$ .  
So, 64 is wrong and must be replaced by  $(8^2 + 1)$  i.e., 65.

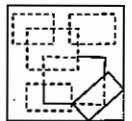
**Solutions (Q. Nos. 81-84)** Clearly, upon colouring the cube as stated and then cutting it into 125 smaller cubes of equal size we get the stock of cubes as shown in the given figure.



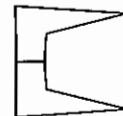
81. (c) There are 4 corner cubes in layer 1 and 4 corner cubes in layer 5 having three green faces each. Thus, there are 8 such cubes.
82. (a) There is no cube having one face red and adjacent face green.
83. (c) There are nine central cubes in each of the layers, 2, 3 and 4 having none of their faces coloured i.e., there are  $(9 \times 3) = 27$  cubes  
Therefore, there are  $125 - 27 = 98$  cubes having atleast one face coloured.
84. (b) There are 9 central cubes in each of the layers 2, 3 and 4 which are without any colour. Thus, there are  $(9 \times 3) = 27$  such cubes.
85. (d) The figure may be labelled as shown the simplest triangles are AJF, FBG, GCH, HDI and IEJ i.e., 5 in number. The triangles compared of three component each EBH, AIC, EFC, ADG and BJD i.e., 5 in number.  
Thus, there are  $5 + 5 = 10$  triangles in the figures



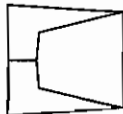
86. (d) On close observation, we find that fig. (X) contains fig. (d) rotated through an angle of  $135^\circ$  as shown in the figure.



87. (b) Clearly, the figure (b) will appear when the paper is unfolded.
88. (d) No combination can be formed using fig. (A), so as to get a square. We start with fig. (B). The figures (B) and (C) can be combined as shown below.



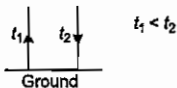
The fig. (E) can now be easily fitted into this combination to form a square as shown.



Clearly, figures B, C and E when fitted together will form a complete square

## Paper II : Scholastic Aptitude Test

91. (a)



92. (d) Due to high resistance of voltmeter connected in series, the effective resistance of the circuit will increase and the current in the circuit decreases. For this the ammeter and voltmeter will not be damaged.

93. (c) An ideal black board absorbs all incident electromagnetic radiations.

94. (a) Both the statements are correct.

95. (b) Saffron and green appear as black and green when seen in green light.

96. (b)  $R = \rho \frac{l}{A}$  For given wire, volume  $V = Al \Rightarrow A = V/l$

$$\Rightarrow \therefore R = \rho \frac{l^2}{V}$$

$\therefore$  % increase in  $R$  is 2%.

97. (a) As  $\frac{P_1}{P_2} = \frac{P_2}{P_1} = \frac{100}{40} = \frac{5}{2}$

Resistance of 40 W bulb is  $\frac{5}{2}$  times than 100 W.

$$\text{In series, } P = i^2 R \text{ and in parallel, } P = \frac{V^2}{R}$$

Thus, 40 W is in series and 100 W in parallel will glow brighter.

98. (d) Using the right-hand rule, we can see that the magnetic force is directed upwards.

99. (b) A permanent magnet has large retentivity and coercivity, so it attracts only magnetic substances.

100. (d) The magnetic moment will be zero because it becomes an open circuit.

$$101. (d) \frac{1}{V} + \frac{1}{-30} = \frac{1}{30} \Rightarrow V = +15 \text{ cm}$$

102. (b) In space, there is no scattering of light. So space appears black.

103. (c) Rusting of iron is an example of a chemical change because it is an irreversible process.

89. (c) In Fig. (X), the dot is placed in the region common to the circle and the triangle. Amongst the four alternatives, only figure (c) shows the region common to the circle and triangle only.

90. (a) Clearly, figure (a) completes the given pattern.



104. (a) Mass of an electron is  $9.11 \times 10^{-28} \text{ g}$

$$\left[ \therefore \frac{1}{1840} m = 9.11 \times 10^{-28} \text{ gm} \right]$$

105. (a) A B C D

1 2 3 4

N, Ba, Ti and Po have atomic numbers 7, 56, 22, 84, respectively.

106. (c) Neutrons,  $^{35}_{17}\text{Cl}$  atomic number = 17;

Mass number = 35

$\therefore$  Number of neutrons =  $35 - 17 = 18$

$^{37}_{17}\text{Cl}$  atomic number = 17

Mass number = 37

$\therefore$  Number of neutrons =  $37 - 17 = 20$

107. (a) 2, 8

Atomic number of Ne = 10

Electronic configuration of Ne = K L  
2, 8

108. (b) It is an example of a decomposition reaction because on heating potassium chlorate ( $\text{KClO}_3$ ) decomposes into its constituents potassium chloride (KCl) and  $\text{O}_2$ .

109. (b) **Electronegativity** is affected by both its atomic number as well as the distance of valence electrons from the nucleus.

110. (b) A B C D

4 2 3 1

Reactants combine to give products in a combination reaction.

Precipitate formation occurs in a precipitation reaction. A reactant decomposes into its constituents in a decomposition reaction. A more reactive metal displaces the less reactive one in a displacement reaction.

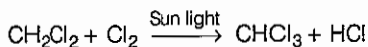
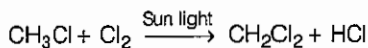
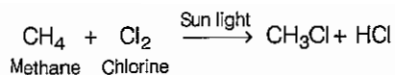
111. (b) K, Ni, Co These three metals are more reactive than hydrogen, because they can easily displace hydrogen gas from a solution while others cannot displace  $\text{H}_2$ .

112. (b) Methane

General formula of alkane =  $\text{C}_n \text{H}_{2n+2}$

Chemical formula of methane =  $\text{CH}_4$ .

It is found in marshy areas.



A B C D  
3 4 2 1

113. (d) Stainless steel is also used in cookwares, cutlery.  
Duralumin is also used in wire, rod making.  
Bronze is also used in wire, statues making.  
Brass is also used in scraps making.
114. (a) Silver is the best conductor of electricity because it contains maximum number of free electron and its electrical resistance is very low too.
115. (c) Global warming is caused by the emission of greenhouse gases. 72% of the total emitted greenhouse gases are carbon dioxide (CO<sub>2</sub>), 18% Methane and 9% Nitrous oxide (NO<sub>x</sub>). Carbon dioxide emissions, therefore are the most important cause of global warming.
116. (b) The gymnospermic softwoods are commercially more important, since they have some fine properties which make them highly useful.
117. (b) Active transport, this is the only transport method that can move species against their concentration gradient (from low to high concentration).
118. (d) Fish also have a swim bladder for swimming at different depths. The swim bladder is like a tiny balloon inside the fish. Fish use their swim bladders to keep themselves a float.
119. (b) Other diseases transmitted by Anopheles mosquitoes: Apart from malaria, anopheles mosquitoes are also known to transmit *Wuchereria bancrofti* (filarial worm). These worms occupy the lymphatic system, including the lymph nodes.
120. (b) Melanin is a substance that gives the skin and hair its natural colour. It also gives colour to the iris of the eye, feathers and scales. In humans, those with darker skin have higher amounts of melanin. By contrast, those with less pigment have lighter or more fair skin colouring.
121. (d) The doctor's decision for not taking anti biotics because it is helpful in killing bacteria not viruses. So, a viral infection cannot be cured by anti biotics. The virus has no cell wall, therefore antibiotics can not help you.
122. (d) Denitrification is a process in which nitrates or nitrites are reduced back to nitrogen gas, with the help of nitrous reductase enzymes. This process takes place in complete absence of oxygen.  
Denitrification generally proceeds through some combination of the following intermediate forms  

$$\text{NO}_3^- \longrightarrow \text{NO}_2^- \longrightarrow \text{NO} + \text{N}_2\text{O} \longrightarrow (\text{g})$$
 The complete denitrification process can be expressed as a redox reaction  

$$2\text{NO}_3^- + 10\text{e}^- + 12\text{H}^+ \longrightarrow \text{N}_2 + 6\text{H}_2\text{O}$$

123. (c) *Vibrio cholerae* is a gram negative comma shaped bacterium with a polar flagellum that causes cholera in humans.

*V. Cholera* was first isolated as the cause of cholera by Italian anatomist Filippo Pacini in 1854.

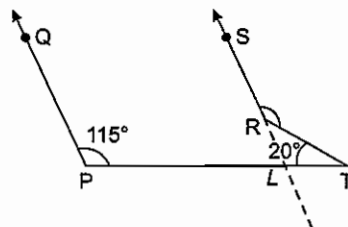
124. (a) The first plant transformed by *Agrobacterium tumefaciens* was tobacco (Herrera-Estrella, 1983).

125. (a) Soil organisms are creatures that spend all or part of their lives in the soil. Humus is the biochemical substance that makes the upper layers of the soil become dark. Sandy soils have large particles and large pores. However, large pores do not have a great ability to hold water. Middle layer of soil has lesser amount of humus or organic matter. Soil composed of extremely small particles, with a large capacity for holding water and dissolved plant nutrients.

126. (c) Here,  $\angle QPL + \angle PLR = 180^\circ$

$$\angle PLR = 180^\circ - \angle QPL = 180^\circ - 115^\circ = 65^\circ$$

$$\angle RLP = \angle RLT + \angle RTL$$



$$\Rightarrow \angle LRT = \angle RLP - \angle RTL = 65^\circ - 20^\circ = 45^\circ$$

$$\Rightarrow \angle SRT + \angle LRT = 180^\circ$$

$$\Rightarrow \angle SRT = 180^\circ - \angle LRT$$

$$\Rightarrow \angle SRT = 180^\circ - 45^\circ = 135^\circ$$

$$\therefore \angle SRT = 135^\circ$$

127. (b) Let average speed of one plane be  $x$  km/h.

Then, average speed of other plane be  $(x + 40)$  km/h.

Distance travelled by first plane in 5 h =  $5x$  km

Distance travelled by second plane in 5 h  
=  $5(x + 40)$  km

$$\Rightarrow 5x + 5(x + 40) = 3400$$

$$\Rightarrow 10x + 200 = 3400 \Rightarrow 10x = 3200$$

$$\therefore x = \frac{3200}{10} = 320 \text{ km/h}$$

So, average speed of second plane

$$= 320 + 40 = 360 \text{ km/h}$$

128. (d) **Alternate Method** Let the roots of given equation are  $\alpha$  and  $\beta$

$$\therefore \text{Sum of the roots} = -\frac{\alpha}{\beta} = \frac{-5}{1} = -5$$

$$x^2 + 5x + 6 = 0$$

$$\Rightarrow x^2 + 3x + 2x + 6 = 0$$

$$\Rightarrow x(x + 3) + 2(x + 3) = 0$$

$$\Rightarrow (x + 3)(x + 2) = 0$$

$$\Rightarrow x = -3, -2$$

$$\therefore \text{Sum of the roots} = -3 - 2 = -5$$

129. (c) Inner radius ( $r$ ) =  $\frac{4}{2} = 2$  cm

Outer radius ( $R$ ) =  $\frac{8}{2} = 4$  cm

Volume of metal of the sphere =  $\frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3$   
 $\frac{4}{3}\pi(4^3 - 2^3) = \frac{4}{3}\pi \times 56 \text{ cm}^3$

Radius of base of cone ( $x$ ) =  $\frac{8}{2} = 4$  cm

$\therefore \frac{1}{3}\pi x^2 h = \frac{4}{3}\pi 56$  (by condition)

$\Rightarrow h = \frac{\frac{4}{3} \times 56 \times 3}{16} = 14$  cm

130. (c) In  $\triangle ABC$  by Pythagoras theorem,  
 $AC^2 = AB^2 + BC^2$  ... (i)

and in  $\triangle PBQ$   $PQ^2 = PB^2 + BQ^2$  ... (ii)

On adding Eqs. (i) and (ii), we get  
 $AC^2 + PQ^2 = (AB^2 + BC^2) + PB^2 + BQ^2$   
 $= (AB^2 + BQ^2) + (PB^2 + BC^2)$

$AC^2 + PQ^2 = AQ^2 + PC^2$

As,  $\triangle ABQ$  and  $\triangle PBC$  are right triangles.

131. (c) In  $\triangle ABC$ ,  $\triangle ACD$ ,  $\triangle BCD$  and  $\triangle ABD$ .

$AB + BC > AC$

$CD + DA > AC$

$BC + CD > BD$

$DA + AB > BD$

adding above inequalities, we get

$2(AB + BC + CD + DA) > 2(AC + BD)$

$(AB + BC + CD + DA) > (AC + BD)$

132. (a) Here,  $\angle CAB = \angle BCD$  (angles in alternate segments)

and  $\angle DAB = \angle CDB$  (angles in alternate segments)

$\Rightarrow \angle CAD = \angle CAB + \angle DAB = \angle BCD + \angle CDB$

$\Rightarrow \angle CAD + \angle CBD = \angle BCD + \angle CDB + \angle CBD$   
 $= 180^\circ$  (sum of angles of a triangle)

133. (c) Let the lower limit be  $x$ .

Then, the upper limit of class interval =  $x + 10$

$\therefore \frac{x + (x + 10)}{2} = 42$

$2x + 10 = 84$

$2x = 74 \Rightarrow x = 37$

$\therefore$  Lower limit = 37

and upper limit =  $37 + 10 = 47$

134. (a) Let cost of 1 table be ₹  $x$  and cost of 1 chair be ₹  $y$ .

$4x + 5y = 1000$

	Table	Chair
CP	$4x$	$5y$
SP	$4x\left(1 + \frac{1}{10}\right) = \frac{44x}{10}$	$5y\left(1 + \frac{1}{5}\right) = 6y$

$\therefore$  SP - CP = Profit

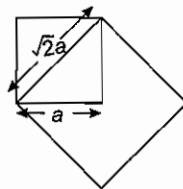
$\therefore \left(\frac{44x}{10} - 4x\right) + 6y - (4x + 5y) = 120$

$\Rightarrow \frac{4x}{10} + y = 120$  ... (ii)

From Eqs. (i) and (ii), we get

$x = ₹ 200$

135. (b) Let the side of the square be 'a'.



$\therefore$  Its diagonal =  $\sqrt{2}a$

Its area =  $a^2$

Area of square on the diagonal =  $(\sqrt{2}a)^2 = 2a^2$

Required ratio =  $\frac{a^2}{2a^2} = 1:2$

136. (c)  $P$  (Atleast one head) =  $1 - P$  (no head)

$= 1 - \left(1/2 \times \frac{1}{2}\right) = 1 - \frac{1}{4} = \frac{3}{4}$

137. (c) We know,

$A(2, -3), B(-8, -11)$  and  $C(k, -7)$   $AC = BC$

i.e.,  $\sqrt{(k-2)^2 + (-7+3)^2}$   
 $= \sqrt{(k+8)^2 + (-7+11)^2}$

i.e.,  $k^2 - 4k + 4 + 16 = k^2 + 16k + 64 + 16$

$\Rightarrow 20k = -60$

$\therefore k = -3$

138. (a) Let the length of the rectangle =  $l$

and breadth of the rectangle =  $b$

$\therefore$  Area of rectangle =  $lb$

New length of the rectangle =  $\frac{l \times 110}{100} = \frac{11l}{10}$

and let new breadth of the rectangle =  $B$

$\therefore$  Area of new rectangle =  $\frac{11l}{10}B$

By given condition,  $lb = \frac{11l}{10}B$

$\Rightarrow B = \frac{10}{11}b$

Hence, decrease in breadth of the rectangle

$= b - \frac{10}{11}b = \frac{b}{11}$

Percentage decrease =  $\frac{b/11}{b} \times 100\% = \frac{100}{11}\%$

139. (c) Duplicate ratio of  $5:8 = \frac{5^2}{8^2}$

$\Rightarrow \frac{5^2}{8^2} = \frac{x+5}{3x+4} \Rightarrow \frac{25}{64} = \frac{x+5}{3x+4}$

$\Rightarrow 25(3x+4) = 64(x+5)$

$$\begin{aligned} \Rightarrow 75x + 100 &= 64x + 320 \\ \Rightarrow 75x - 64x &= 320 - 100 \\ \Rightarrow 11x &= 220 \\ \therefore x &= \frac{220}{11} = 20 \end{aligned}$$

140. (d)  $\therefore x - \frac{1}{x} = \frac{1}{2}$

On squaring both side, we get

$$\begin{aligned} x^2 + \frac{1}{x^2} - 2 \cdot \frac{1}{x} &= \frac{1}{4} \\ \Rightarrow x^2 + \frac{1}{x^2} &= \frac{1}{4} + 2 = \frac{9}{4} \\ \therefore 6 \left( x^2 + \frac{1}{x^2} \right) &= 6 \times \frac{9}{4} = \frac{27}{2} \end{aligned}$$

141. (d)  $2^{12n} - 6^{4n} = (2^{12})^n - (6^4)^n$   
 $= (4096)^n - (1296)^n$   
 $= (4096 - 1296) [(4096)^{n-1} + (4096)^{n-2}(1296) + \dots + (1296)^{n-1}]$   
 $= 2800 (k)$

Hence, last two digits are always be zero.

142. (c)  $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = \sqrt{2 + \sqrt{2(1 + \cos 4\theta)}}$   
 $= \sqrt{2 + \sqrt{2(2 \cos^2 2\theta)}} = \sqrt{2 + \sqrt{4 \cos^2 2\theta}}$   
 $= \sqrt{2 + 2 \cos 2\theta} = \sqrt{2(1 + \cos 2\theta)}$   
 $= \sqrt{2(2 \cos^2 \theta)} = \sqrt{4 \cos^2 \theta} = 2 \cos \theta$

143. (b) Let SP and RQ be two pillars in which SP = 20 m

Here, let ST ⊥ RQ

Then, ∠RST = 30°

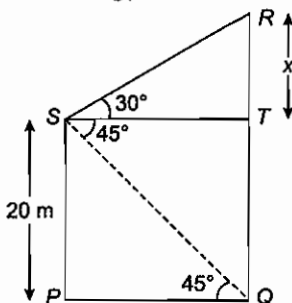
and let RT = x, SP = TQ = 20 m

Also, SP = PQ

As, θ = 45°

⇒ PQ = ST = 20 m

In ΔSRT,  $\tan 30^\circ = \frac{x}{ST}$



$$\frac{x}{20} = \frac{1}{\sqrt{3}} \Rightarrow x = \frac{20}{\sqrt{3}}$$

So, height of pillar RQ = RT + TQ

$$= 20 + \frac{20}{\sqrt{3}} = \frac{20(\sqrt{3} + 1)}{\sqrt{3}}$$

144. (a) Let speed of boat = x km/h  
 and speed of current = y km/h  
 Speed in upstream = x - y  
 Speed in downstream = x + y

So,  $5(x - y) = 13$  ... (i)

$5(x + y) = 28$  ... (ii)

On solving Eqs. (i) and (ii), we get

$$10y = 15$$

$$y = 1.5 \text{ km/h}$$

145. (b) Let sum lent at rate 5% = ₹ x.

Then, sum lent at rate 8% = ₹ (1550 - x)

So, simple interest in first case =  $\frac{x \times 5 \times 3}{100}$

Simple interest in second case

$$= \frac{(1550 - x) \times 8 \times 3}{100}$$

But  $\frac{x \times 15}{100} + \frac{(1550 - x) \times 24}{100} = 300$

$$\Rightarrow \frac{15x}{100} + \frac{37200}{100} - \frac{24x}{100} = 300$$

$$\Rightarrow \frac{-9x}{100} = 300 - 372$$

$$\Rightarrow \frac{-9x}{100} = -72 \Rightarrow x = \frac{72 \times 100}{9}$$

$$\therefore x = ₹ 800$$

Amount lent at rate 8% = (1550 - 800) = ₹ 750

$$\therefore \text{Required ratio} = \frac{800}{750} = \frac{16}{15} = 16 : 15$$

146. (d) Raja Ravi Verma was an Indian artist from the princely state of Travancore who achieved recognition for his dedication of scenes from the epics of the Mahabharata and the Ramayana.

147. (a)

148. (d) Seringapatnam was the capital city of Tipu Sultan and his father Haider Ali and the crucial focus for the campaigns of Mysore Wars.

149. (d) The election commission is the apex body that conducts the elections in India. Both the general election and the assembly elections in India are held in accordance with the clear rules laid down by the Election Commission of India.

150. (a) The Members of the Rajya Sabha indirectly elected by the members of the state assemblies except the 12 members who are nominated by the President.

151. (a) The Constitution of India vests the executive authority of the union in the President. Although, the real power is exercised by the Council of Ministers in the name of the President.

152. (b) The functions of the Council of Ministers cover an extensive range of activities. Their main function is to help the President in the exercise of his powers and in practice. The Council of Ministers administers the affairs of the Union Government.

