

# NTSE

National Talent Search Examination

## MAT + SAT

### [ Stage I ]

Time : 180 Min

Max. Marks : 180

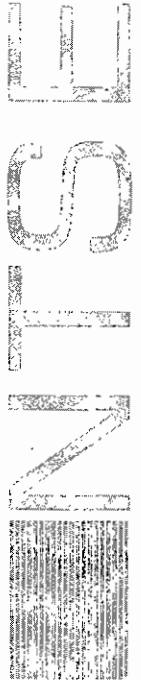
*Read the following instructions carefully.*

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
Wrong way	1	⊗ ⊖ ⊕ ⊙

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



# Paper I : Mental Ability Test

**Directions** (Q.Nos. 1-3) *Read the following information and answer the questions given below.*

Mohit lives 2 km to the North of Aasif, who lives 2 km to the North of Rohan. Aayush lives 2 km to the South of Sumit, who lives 4 km to the East of Aasif.

1. What is the distance between Mohit and Rohan?  
*a.* 4 km                      *b.* 2 km                      *c.* 6 km                      *d.* 3 km
2. What is the distance between Aayush and Rohan?  
*a.* 2 km                      *b.* 8 km                      *c.* 4 km                      *d.* 18 km
3. In which direction Sumit is in respect of Rohan?  
*a.* North-West              *b.* North-East              *c.* South-East              *d.* South-West

**Directions** (Q.Nos. 4-8) *Read the following information carefully and then answer the questions based on that.*

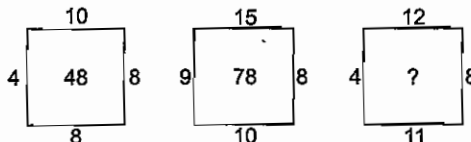
There are five friends named A, B, C, D and E. Everyone like to play game. The name of games are tennis, hockey, football, baseball and cricket. All are standing in a queue and facing North but not necessarily in the same order.

- D doesn't like to play hockey and football but standing in the middle of queue.
  - E likes to play tennis and standing on the right end.
  - B is the neighbour of D and A and like to play football.
  - A likes baseball and standing on the left end of queue.
4. Who likes to play cricket?  
*a.* A                      *b.* B                      *c.* C                      *d.* D
  5. Who is second to the right of B?  
*a.* C                      *b.* A                      *c.* D                      *d.* E
  6. Which game is liked by C?  
*a.* Hockey              *b.* Cricket              *c.* Tennis              *d.* Football
  7. Which pair shows the group who are standing on extreme ends?  
*a.* AB                      *b.* AE                      *c.* CD                      *d.* DA
  8. Who are the neighbour of C?  
*a.* EA                      *b.* BA                      *c.* DE                      *d.* EB

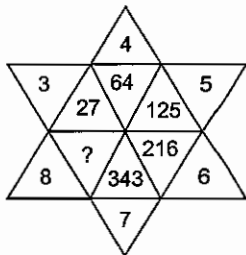
**Directions** (Q. Nos. 9-11) *Arrange the given words in alphabetical order and choose the one that comes first.*

9. *a.* Penalty              *b.* Pedestrian              *c.* People              *d.* Pencil
10. *a.* Demand              *b.* Demon              *c.* Democracy              *d.* Demerit
11. *a.* Scenery              *b.* School              *c.* Scholar              *d.* Scientist

**Directions** (Q. Nos. 12-14) *Insert the missing numerical value in following questions.*

12.   
*a.* 88                      *b.* 100                      *c.* 32                      *d.* 132

13.



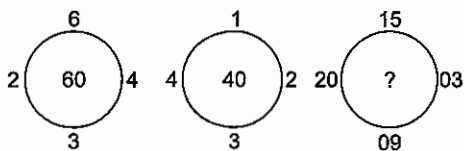
a. 640

b. 512

c. 16

d. 24

14.



a. 235

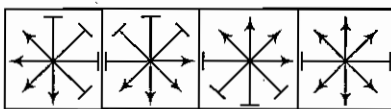
b. 141

c. 144

d. 188

**Directions** (Q. Nos. 15-17) *In the given options, three are similar and one figure is odd. Find the odd one.*

15.



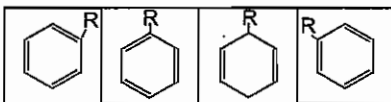
a.

b.

c.

d.

16.



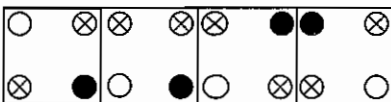
a.

b.

c.

d.

17.



a.

b.

c.

d.

**Directions** (Q. Nos. 18-20) *In each of the questions, complete the given series by choosing correct alternative.*

18.

2, 6, 12, 20, 30, 42, (?), 72

a. 66

b. 56

c. 72

d. 62

19.

62, 64, 61, 65, 60, (?)

a. 66

b. 65

c. 64

d. 67

20.

125, 343, 729, (?)

a. 1331

b. 1000

c. 1728

d. 2744

**Directions** (Q.Nos. 21-23) *Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.*

21.

1. Hansoft

2. Homicide

3. Hitler

4. Handsome

a. (4), (3), (2), (1)

b. (4), (1), (3), (2)

c. (2), (3), (4), (1)

d. (3), (2), (1), (4)

22.

1. Narrow

2. Navigate

3. National

4. Noops

a. (1), (3), (2), (4)

b. (4), (2), (3), (1)

c. (4), (3), (2), (1)

d. (3), (2), (4), (1)

23. 1. Request      2. Recovery      3. Remittance      4. Random  
 a. (1), (3), (2), (4)      b. (2), (3), (4), (1)      c. (4), (2), (3), (1)      d. (4), (1), (2), (3)

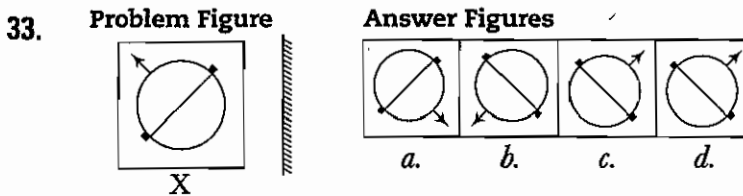
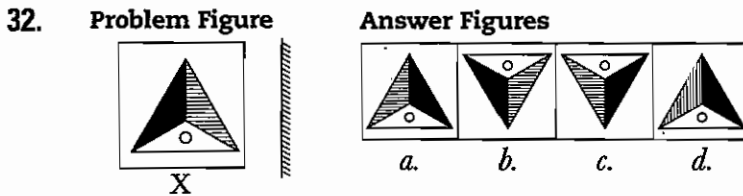
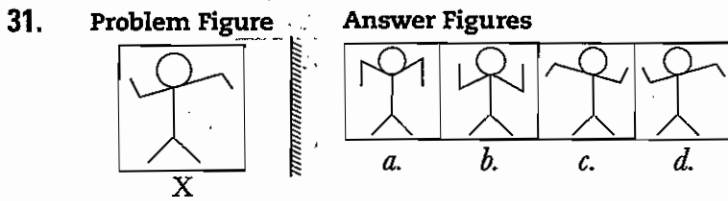
**Directions** (Q. Nos. 24-27) Choose the word from the given alternatives, which bears the same relationship to third word as the first two bear.

24. Japan : Yen :: Pakistan : ?  
 a. Dollar      b. Yen      c. Rupee      d. Pound
25. Mare : Horse :: Loiness : ?  
 a. Jackal      b. Lion      c. Tiger      d. Hunter
26. Book : Author :: Film : ?  
 a. Producer      b. Story writer      c. Director      d. Actor
27. Rose : Flower : Pomegranate : ?  
 a. Fruit      b. Animal      c. Flower      d. Mammal

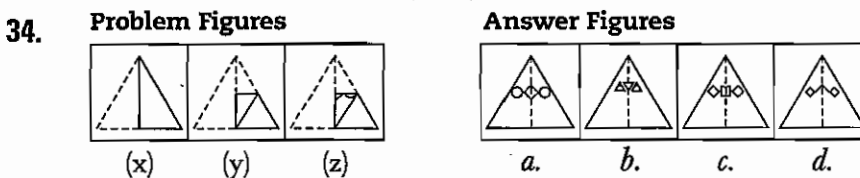
**Directions** (Q. Nos. 28-30) Find out the odd one from given options.

28. a. CX      b. DW      c. IR      d. YM
29. a. Tiger      b. Dog      c. Lion      d. Cow
30. a. Finger      b. Hands      c. Toe      d. Heart

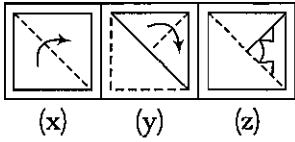
**Directions** (Q. Nos. 31-33) Choose the correct mirror image of the figure (X) from amongst the four alternatives.



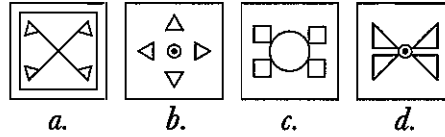
**Directions** (Q. Nos. 34-35) Select the answer from given alternatives, which would most suitable when paper is unfolded.



**35. Problem Figures**

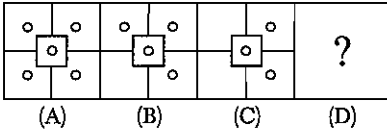


**Answer Figures**

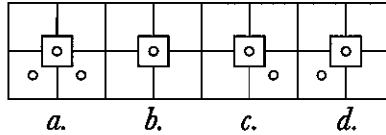


**Directions** (Q. Nos. 36-38) Find the correct answer which completes the series.

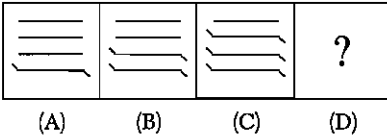
**36. Problem Figures**



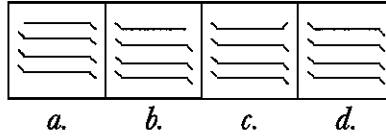
**Answer Figures**



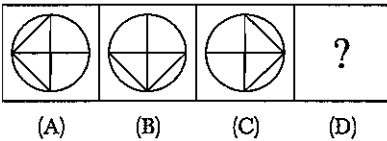
**37. Problem Figures**



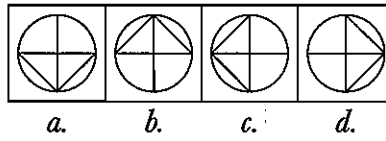
**Answer Figures**



**38. Problem Figures**

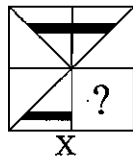


**Answer Figures**

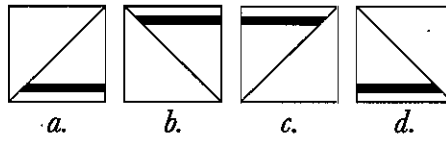


**Directions** (Q. Nos. 39-42) Find out the correct alternative which completes the problem.

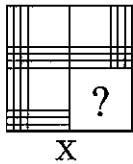
**39. Problem Figure**



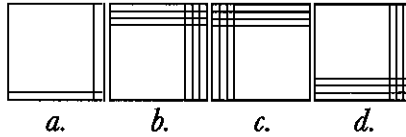
**Answer Figures**



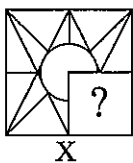
**40. Problem Figure**



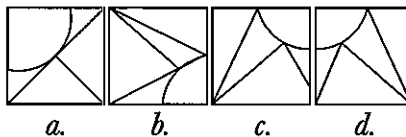
**Answer Figures**



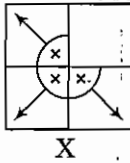
**41. Problem Figure**



**Answer Figures**

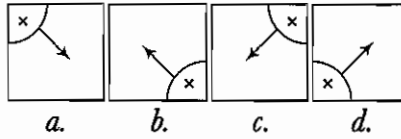


42. Problem Figure



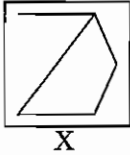
X

Answer Figures



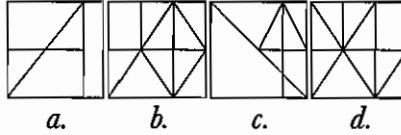
Directions (Q. Nos. 43-45) Trace out the correct alternative in which figure (X) is embedded.

43. Problem Figure

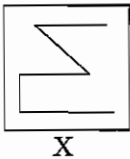


X

Answer Figures

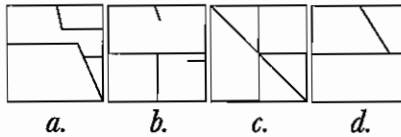


44. Problem Figure

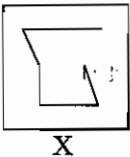


X

Answer Figures

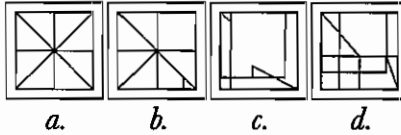


45. Problem Figure



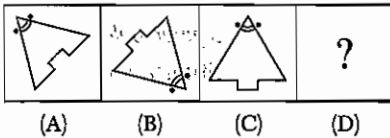
X

Answer Figures

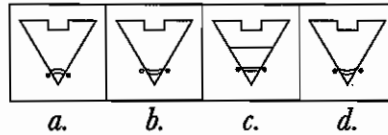


Directions (Q. Nos. 46-49) Find the relationship between C and D as given between A and B in the problem figure.

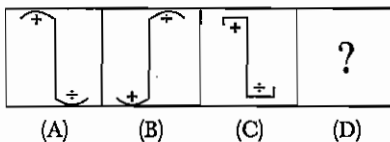
46. Problem Figures



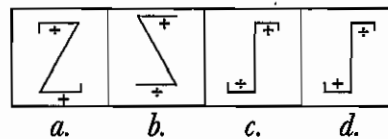
Answer Figures



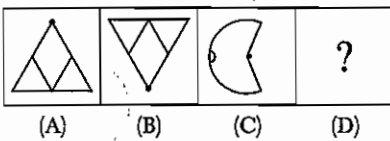
47. Problem Figures



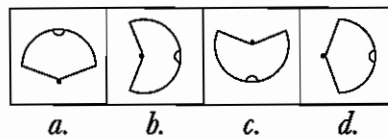
Answer Figures



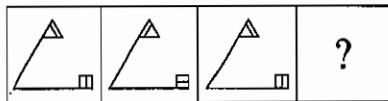
48. Problem Figures



Answer Figures

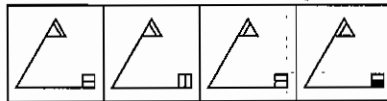


**49. Problem Figures**



(A) (B) (C) (D)

**Answer Figures**

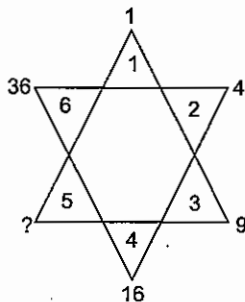


a. b. c. d.

**50.** How many numbers amongst the number 18 to 90 are there which are exactly divisible by 18 but not by 6 and 9?

- a. Eight                      b. Eleven                      c. Forty                      d. None of these

**51.** Find out the missing number in the following figure..



- a. 81                      b. 25                      c. 49                      d. None of these

**52.** Find out how many 2's in the given series?

24 25 26 27 28 29 30 31 21 20 22 23 68 62 62 72 92 82 102

- a. 17                      b. 16                      c. 18                      d. 15

**53.** Deepu is facing West. He moves  $90^\circ$  in anti-clockwise direction and  $135^\circ$  in clockwise direction. In which direction Deepu is facing now?

- a. North-East                      b. South-East                      c. South                      d. North-West

**54.** Pointing to a man in a photograph, a woman said, "He is the only son of my mother-in-law". How woman is related to that man?

- a. Sister                      b. Mother-in-law                      c. Wife                      d. None of these

**Directions (Q. Nos. 55-57)** Read the following information and answer the questions given below.

If A denotes addition, B denotes division, C denotes minus and D denotes multiplication.

**55.**  $54 \text{ C } 10 \text{ D } 16 \text{ B } 4 \text{ A } 8$

- a. 6                      b. 8                      c. 9                      d. 12

**56.**  $80 \text{ B } 20 \text{ D } 8 \text{ A } 8 \text{ C } 30$

- a. 10                      b. 6                      c. 24                      d. 12

**57.**  $30 \text{ C } 16 \text{ A } 2 \text{ D } 32 \text{ B } 8$

- a. 7                      b. 8                      c. 6                      d. 3

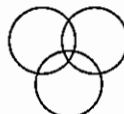
**Directions (Q. Nos. 58-61)** You are to choose from the four Venn-diagrams that best illustrates the relationship among three given classes or groups in the following questions.



a.



b.

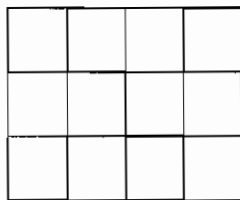


c.

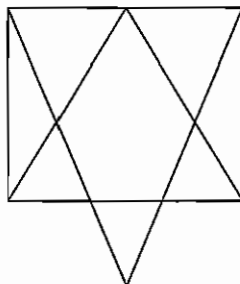


d.

58. Tennis, Cricket, Games
59. Woman, Man, Mother
60. Students, Educated, Teachers
61. Doctor, Teacher, Man
62. Nikhil, Ankur and Neeraj start a business with total capital of ₹ 7200. Nikhil gives ₹ 3600, Ankur gives 50% of remaining sum and remaining sum is given by Neeraj. Find out their gaining ratio?  
*a.* 2:1:1                      *b.* 1:1:2                      *c.* 2:2:1                      *d.* 2:1:2
63. Arun is 15th from the left side and 18th from right side in a row of boy, find out how many boys in that row?  
*a.* 31                              *b.* 34                              *c.* 33                              *d.* 32
64. If  $\frac{11y}{10} - \frac{9y}{10} = 1$ , then find the value of *y*.  
*a.* 18                              *b.* 16                              *c.* 4                                *d.* 5
65. Market price of an article is ₹ 720 and actual price is ₹ 550.80 after given two successive discounts. First is 10%, what is second discount?  
*a.* 16%                          *b.* 20%                          *c.* 15%                          *d.* 18%
66. Vivek is 27th from the either end of the row of men, How many men are there in that row?  
*a.* 54                              *b.* 53                              *c.* 52                              *d.* 55
67. If it was Monday on 27 February, 2012. What will be the day on 1 April of the same year?  
*a.* Friday                        *b.* Saturday                    *c.* Sunday                       *d.* Monday
68. Today is Monday, what will be the day after 308 days?  
*a.* Sunday                       *b.* Monday                      *c.* Tuesday                      *d.* Thursday
69. How many squares are present in the given figure?



- a.* 20                              *b.* 25                              *c.* 24                              *d.* 27
70. How many triangles are in the given figure?



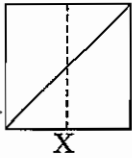
- a.* 10                              *b.* 11                              *c.* 12                              *d.* 13



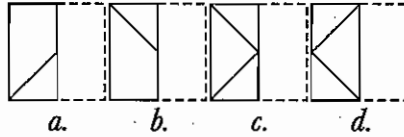
71. Mita is taller than Seema but not as tall as Divya. Seema is taller than Saroj. Divya is not as tall as Reema who among them is the tallest?  
 a. Reema                      b. Saroj                      c. Divya                      d. Mita
72. In a football match Rahul scored more than Mohan but less than Ved. Varun scored less than Ramu but more than Ved. Whose score was the lowest in the match?  
 a. Mohan                      b. Rahul                      c. Ved                      d. Varun

**Directions** (Q. Nos. 73-76) Find the correct answer, when a sheet having a certain design is folded along the dotted line.

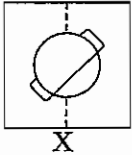
73. **Problem Figure**



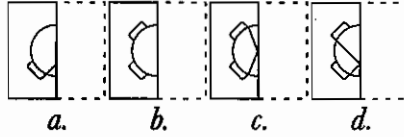
**Answer Figures**



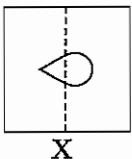
74. **Problem Figure**



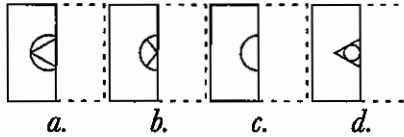
**Answer Figures**



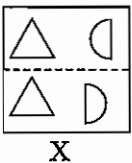
75. **Problem Figure**



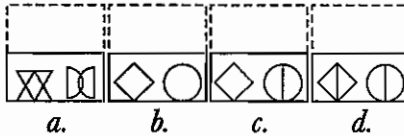
**Answer Figures**



76. **Problem Figure**

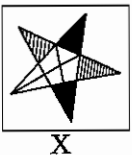


**Answer Figures**

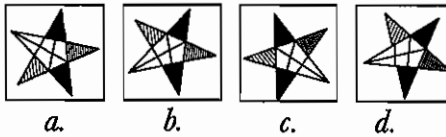


**Directions** (Q. Nos. 77-78) Find out the figure which is exactly similar with the problem figure.

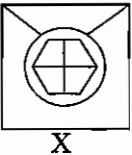
77. **Problem Figure**



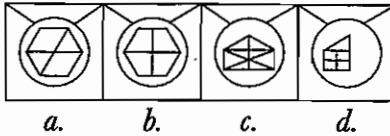
**Answer Figures**



78. **Problem Figure**

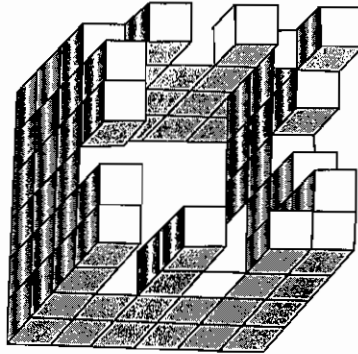


**Answer Figures**





84. Count the number of cubes in the given figure.



a. 68

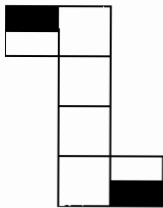
b. 69

c. 70

d. 71

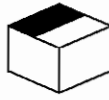
**Directions** (Q. Nos. 85-87) In the figures below marked (X) at left hand side is folded in such a way that it could form the shape of a box. You have to choose one of the choices given as (a), (b) (c) and (d) that is similar as the box formed.

85. Problem Figure

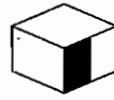


X

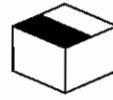
Answer Figures



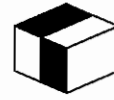
I



II



III



IV

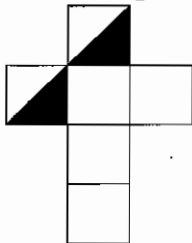
a. I and II

b. II and III

c. II and IV

d. I, II, and III

86. Problem Figure

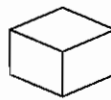


X

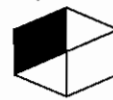
Answer Figures



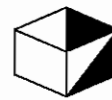
I



II



III



IV

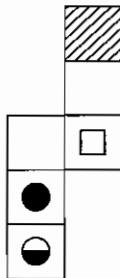
a. I and IV

b. III and IV

c. I and II

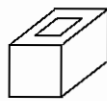
d. I and III

87. Problem Figure

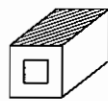


X

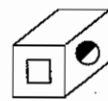
Answer Figures



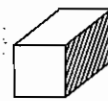
I



II



III



IV

a. I and II

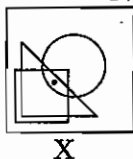
b. II and III

c. I, II and III

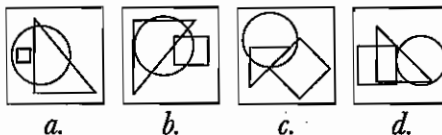
d. I, III and IV

**Directions** (Q. Nos. 88–90) Find the correct alternative in the answer figures, so that the relation between the problem figure(X) and answer figure (a, b, c and d) must be same.

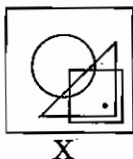
**88. Problem Figure**



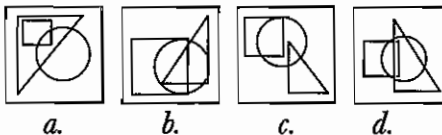
**Answer Figures**



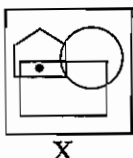
**89. Problem Figure**



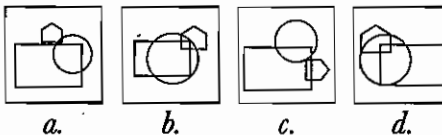
**Answer Figures**



**90. Problem Figure**



**Answer Figures**



## Paper II : Scholastic Aptitude Test

**91.** Match the following

List I	List II
A. $\frac{dv}{dt}$	1. Acceleration
B. $\frac{d v }{dt}$	2. Magnitude of acceleration
C. $\frac{dr}{dt}$	3. Velocity
D. $\left  \frac{dr}{dt} \right $	4. Magnitude of velocity
	5. Rate of change of speed

**Codes**

A B C D

A B C D

A B C D

A B C D

a. 2 3 1 5

b. 1 5 3 4

c. 3 1 3 4

d. 1 2 3 5

**92.** A geostationary satellite has an orbital period of

a. 2 h

b. 6 h

c. 12 h

d. 24 h

**93.** The exact value of 0°C on the kelvin scale is

a. 273 K

b. 273.15 K

c. 275.15 K

d. 270 K

**94.** Which of the following is used in oven?

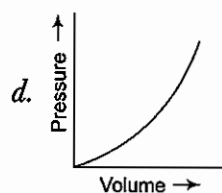
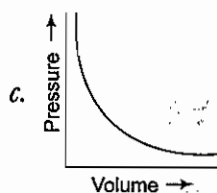
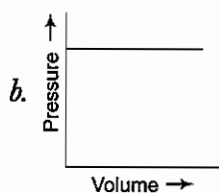
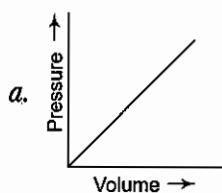
a. X-rays

b. UV-rays

c. Microwaves

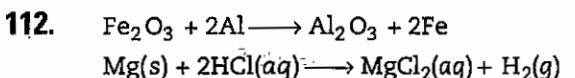
d. Radiowaves

95. Critical angle of light passing from glass to water is minimum for  
*a.* red colour      *b.* green colour      *c.* yellow colour      *d.* violet colour
96. **Assertion (A)**  $V = iR$  is Ohm's law  
**Reason (R)**  $V - i$  graph is always a straight line passing through origin  
*a.* A is true and R is correct explanation for A.      *b.* A is true and R is not correct explanation for A  
*c.* A is false but R is true      *d.* A is true but R is false
97. Unit of magnetic permeability is  
*a.* Ampere/metre      *b.* Ampere/ metre<sup>2</sup>      *c.* Henry      *d.* Henry/metre
98. If a magnet is hanged with its magnetic axis then it stops in  
*a.* magnetic meridian      *b.* geometric meridian      *c.* angle of dip      *d.* None of these
99. Which of the following materials has got the maximum retentivity?  
*a.* Copper      *b.* Zinc      *c.* Soft iron      *d.* Hard iron
100. An object is placed 40 cm from a concave mirror of focal length 20 cm. The image formed is  
*a.* real, inverted and same in size      *b.* real, inverted and smaller in size  
*c.* virtual, erect and larger in size      *d.* virtual, erect and smaller in size
101. The number of lenses in a terrestrial telescope is  
*a.* two      *b.* three      *c.* four      *d.* six
102. Which graph shows the relationship between the pressure and volume of a fixed mass of gas at constant temperature?



103. A transition metal X got its name from a moon of the planet Saturn. It was discovered by William Gregor. It can be extracted from its ore by Kroll process. Can you identify this metal X?  
*a.* Uranium      *b.* Titanium      *c.* Radium      *d.* Francium
104. A gas which is found in ..... helps in protecting us from harmful UV radiations. This gas is  
*a.* ozone in troposphere      *b.* ozone in mesosphere  
*c.* oxygen in troposphere      *d.* ozone in stratosphere
105. Consider the following statements  
 I. Lanthanide series includes metals from atomic number 57 to 71.  
 II. Lanthanum and Lutetium are the first and last metals of lanthanides.  
 Which of the above statement (s) is/are correct?  
*a.* Only I      *b.* Only II      *c.* Both I and II      *d.* Neither I nor II
106. Ammonia on combining with hydrochloric acid, form dense white fumes of  
*a.* ammonium hydrogen carbonate      *b.* ammonium chloride  
*c.* ammonium perchlorate      *d.* None of these
107. Which of the following fact is not true about sodium hydrogen carbonate?  
*a.* It is commonly known as baking soda      *b.* It is used as a raising agent in making cakes  
*c.* Its white crystals are sparingly soluble in water      *d.* It is also used in making 'Borax'

108. A disease, generally caused by the excessive drinking of alcohol over a long period of time is  
*a.* cataract      *b.* cirrhosis      *c.* arthritis      *d.* diabetes
109. Which of the following pair of elements exhibit the property of catenation?  
*a.* Sodium and silicon    *b.* Chlorine and carbon    *c.* Silicon and carbon    *d.* Carbon and sodium
110. The atomic numbers of four elements P, Q, R and S are 6, 8, 10 and 12, respectively. Which of the two elements can react to form ionic compounds?  
*a.* Q and S      *b.* P and S      *c.* R and S      *d.* P and Q
111. An element is soft and can be cut with a knife. It is very reactive and cannot be kept open in the air. It reacts vigorously with water. Can you name this element?  
*a.* S      *b.* P      *c.* Na      *d.* Mg



The above two reactions are the example of

- a.* double displacement reaction      *b.* decomposition reaction  
*c.* displacement reaction      *d.* redox reaction

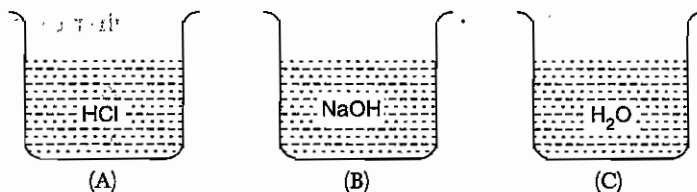
113. Match the following

List I	List II
A. Vermillion	1. $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$
B. Borax	2. NaOH
C. Bleaching powder	3. HgS
D. Caustic soda	4. $\text{Ca}(\text{ClO})_2$

Codes

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

114. Observe the given figures and choose the correct alternative.



- a.* pH of A > pH of B and C      *b.* pH of B > pH of A and C  
*c.* pH of C > pH of A and B      *d.* pH of A, B and C are equal
115. In higher mammals, in the transport of oxygen, haemoglobin plays an important role. The metal associated with haemoglobin is  
*a.* magnesium      *b.* iron      *c.* manganese      *d.* copper

116. Consider the following statements

Which organisms bear the following excretory organs

I. Nephridia      II. Flame cells      III. Kidney

Which of the above statements is/are true?

- a.* Earthworm, flatworm, frog      *b.* Frog, flatworm, earthworm  
*c.* Flatworm, earthworm, frog      *d.* Frog, earthworm, flatworm

117. The microbes living in the gut of termites that helps them to digest cellulose are  
*a.* bacteria                      *b.* bacteriophage                      *c.* fungi                      *d.* protozoan

118. Match the following

List I	List II
A. Phototropism	1. Growth of roots towards soil moisture
B. Hydrotropism	2. Movement of plant in response to light
C. Thigmotropism	3. Movement of plant in response to a chemical stimulus
D. Chemotropism	4. Growth response to touch

Codes

A B C D

A B C D

A B C D

A B C D

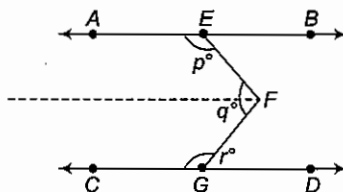
*a.* 2 1 4 3

*b.* 1 4 3 2

*c.* 4 3 2 1

*d.* 3 2 1 4

119. AIDS virus is  
*a.* single strands RNA virus                      *b.* double strands RNA virus  
*c.* single strands DNA virus                      *d.* double strands DNA virus
120. Bull semen is stored for artificial insemination in  
*a.* liquid bromine                      *b.* liquid carbon dioxide                      *c.* liquid oxygen                      *d.* liquid nitrogen
121. *Azolla* is used as a biofertiliser because it  
*a.* multiplies very fast to produce massive biomass  
*b.* has association with nitrogen fixing *Rhizobium*  
*c.* has association with nitrogen fixing cyanobacteria  
*d.* has association with *mycorrhiza*
122. In particular, humans has been injecting enormous quantities of ozone destroying substance into atmosphere, especially a class of chemical known as  
*a.* aerosol spray                      *b.* chloro-fluoro carbons                      *c.* freons                      *d.* radionuclides
123. The lichen forms through the composite combination of two species of the plants  
*a.* fungi and fern                      *b.* algae and bryophyta                      *c.* bacteria and virus                      *d.* fungi and algae
124. What is it called when the concentration inside a cell is higher than the concentration outside the cell?  
*a.* Hypertonic                      *b.* Isotonic                      *c.* Hypotonic                      *d.* Neutral
125. Which of the following is the best indicator of  $\text{SO}_2$  pollution?  
*a.* Bryophyte                      *b.* Pteridophyte                      *c.* Lichen                      *d.* Algae
126. In the given figure,  $AB \parallel CD$ , then which of the following is true?



- a.*  $p + q - r = 180^\circ$                       *b.*  $p + q + r = 180^\circ$                       *c.*  $p - q + r = 180^\circ$                       *d.*  $p + q - 2r = 180^\circ$
127. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was ₹ 1500 after 4 yr of service and ₹ 1800 after 10 yr of service. What was his starting salary?  
*a.* ₹ 1300                      *b.* ₹ 1200                      *c.* ₹ 50                      *d.* ₹ 1100

128. If the roots of  $x^2 - lx + m = 0$  differ by 1, then  
*a.*  $l^2 = 4m - 1$       *b.*  $l^2 = 4m + 2$       *c.*  $l = 4m^2 + 1$       *d.*  $l^2 = 4m + 1$
129. A measuring jar of internal diameter 10 cm is partially filled with water. Four equal spherical balls of diameter 2 cm each are dropped in it and they sink down in the water completely. The change in the level of water in the jar is  
*a.*  $\frac{16}{65}$  cm      *b.*  $\frac{15}{16}$  cm      *c.*  $\frac{16}{75}$  cm      *d.* None of these
130. If  $A$  is the area of a right angled triangle and  $b$  is one of the sides containing the right angle, then what is the length of the altitude on the hypotenuse?  
*a.*  $\frac{2Ab}{\sqrt{b^4 + 4A^2}}$       *b.*  $\frac{2A^2b}{\sqrt{b^4 + 4A^2}}$       *c.*  $\frac{2Ab^2}{\sqrt{b^4 + 4A^2}}$       *d.*  $\frac{2A^2b^2}{\sqrt{b^4 + 4A^2}}$
131. The ratio between the number of sides of two polygons is 2 : 1 and the ratio between their interior angles is 4 : 3. The number of sides of these polygons are, respectively  
*a.* 8, 4      *b.* 10, 5      *c.* 12, 6      *d.* 14, 7
132. With the vertices of a  $\Delta ABC$  as centre three circles are described, each touching the other two circles externally. If the sides of the triangle are 9 cm, 7 cm and 6 cm. Then, the radius of the circles are  
*a.* 4, 5, 2      *b.* 4, 5, 6      *c.* 3, 2, 3      *d.* All equal to 3 cm
133. A student obtains 75%, 80% and 85% marks in three subjects. If the marks of any other subject are added, then their average cannot be less than  
*a.* 60%      *b.* 65%      *c.* 70%      *d.* 80%
134. At what price must Sarita sell a mixture of 80 kg sugar at ₹ 6.75 per kg with 120 kg at ₹ 8 per kg to gain 20%?  
*a.* ₹ 7.50 per kg      *b.* ₹ 8.20 per kg      *c.* ₹ 8.85 per kg      *d.* ₹ 9 per kg
135. The area of a circle inscribed in an equilateral triangle of side 12 cm is  
*a.*  $8\pi$  cm<sup>2</sup>      *b.*  $10\pi$  cm<sup>2</sup>      *c.*  $12\pi$  cm<sup>2</sup>      *d.*  $14\pi$  cm<sup>2</sup>
136. A coin is tossed 5 times. What is the probability of getting number of heads more than the number of tails?  
*a.*  $\frac{1}{3}$       *b.*  $\frac{1}{32}$       *c.*  $\frac{5}{32}$       *d.*  $\frac{1}{2}$
137. If the mid-points of the sides of a triangle are (1, 5), (2, 6) and (3, 2), the coordinates of the centroid of the triangle is  
*a.*  $(2, \frac{13}{3})$       *b.* (3, 6)      *c.* (6.5, 3)      *d.* (3.5, 6)
138. 140 L of a liquid contains 90% of acid and the rest water. How much water must be added to make the water 12.5% of the resulting mixture?  
*a.* 4 L      *b.* 10 L      *c.* 12 L      *d.* 3 L
139. If  $q$  is the mean proportional between  $p$  and  $r$ , then  $\frac{p^2 - q^2 + r^2}{p^{-2} - q^{-2} + r^{-2}}$  is equal to  
*a.*  $p^2q^3$       *b.*  $q^3$       *c.*  $q^4$       *d.*  $p^2r^2q^4$
140. If  $a$  is an integer such that  $a + \frac{1}{a} = \frac{17}{4}$ , then the value of  $(a - \frac{1}{a})$  is  
*a.* 4      *b.*  $\frac{13}{4}$       *c.*  $\frac{17}{4}$       *d.*  $\frac{15}{4}$



141. Consider the following statements  
 I. If  $x$  and  $y$  are composite integers, so also is  $x + y$ .  
 II. If  $x$  and  $y$  are composite integers and  $x > y$ , then  $x - y$  is also a composite integer.  
 III. If  $x$  and  $y$  are composite integers, so also in  $xy$ . Of the above, the correct statement(s) is/are  
 a. All the three      b. I and II      c. Only III      d. None of these
142. If  $\operatorname{cosec} \theta - \sin \theta = a^3$  and  $\sec \theta - \cos \theta = b^3$ , then  $a^2 b^2 (a^2 + b^2)$  is equal to  
 a.  $-1$       b.  $1$       c.  $2$       d.  $-2$
143. If the angle of elevation of a cloud from a point  $h$  m above a lake is  $\beta$  and the angle of depression of its reflection in the lake is  $\alpha$ , then the height of the cloud is  
 a.  $\frac{h \operatorname{cosec} (\alpha - \beta)}{\operatorname{cosec} (\alpha - \beta)}$       b.  $h \operatorname{cosec} (\alpha - \beta) \sin (\alpha - \beta)$   
 c.  $h \sin (\alpha + \beta) \operatorname{cosec} (\alpha - \beta)$       d.  $\frac{h \operatorname{cosec} (\alpha + \beta)}{\sin (\alpha - \beta)}$
144. Two pipes A and B can separately fill a tank in 12 min and 15 min, respectively. Both the pipes are opened together but 4 min after pipe A is turned off. How much time does pipe B will take to fill the tank?  
 a. 11 min      b. 6 min      c. 12 min      d. 8 min
145. The compound interest on ₹ 5000 for 3 yr at 5% for the first year, 10% for the second year and 12% for the third year will be  
 a. ₹ 5580      b. ₹ 5850      c. ₹ 1648      d. ₹ 1468
146. Consider the following statement  
 Which of the above statement(s) is/are true about the development of novel in India?  
 I. The Indian novelists wrote to develop a modern literature of the country that could produce a sense of national belonging and cultural equality  
 II. Translation of novels into different languages helped to spread the popularity of the novel  
 III. Novels helped in establishing a relationship with the past  
 IV. All of the above  
 a. Only I      b. Only II      c. I and II      d. I, II and III
147. The first English weekly magazine that described itself as 'A commercial paper open to all, but influenced by none', published in India was  
 a. National Herald      b. Bengal Gazette      c. Kesari      d. None of these
148. Which of the following is known as the pioneer of modern Hindi literature in India?  
 a. Bharatendu Harishchandra      b. Devaki Nandan Khatri      c. Prem Chand      d. None of these
149. Which of the following Acts put censorship on Indian press in the 19th century?  
 a. Rowlatt Act      b. Vernacular Act      c. Citizens charter      d. None of these
150. The printing press first came to India in the mid-sixteenth century with the  
 a. Chinese travellers      b. Portuguese missionaries  
 c. British merchants      d. French merchants
151. The Fundamental Rights ensure protection of  
 a. citizens against exploitation by traders      b. individuals against arbitrary rule  
 c. country's security      d. dignity of citizens
152. Which of the following presides over the joint sitting of the Parliament?  
 a. Speaker      b. Chairman of Rajya Sabha  
 c. President      d. None of these

153. The salaries of Judges of the Supreme Court are drawn from  
*a.* Home Ministry Grants *b.* Consolidated Fund of India  
*c.* Parliamentary Grants *d.* Provision made by Law Ministry

154. Consider the following statements  
 I. In a federation, the powers of Federal and Provincial Governments are clearly demarcated.  
 II. India is federation as the powers of the Union and State Government are specified in the Constitution and they have exclusive jurisdiction on their respective subjects.  
 III. In India residuary powers are vested in the states.  
 IV. India is no longer a federation because some powers of the states have been devolved on the local government bodies.

Which of the above statement(s) is/are correct?

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

List I	List II
A. Union of India	1. Sarpanch
B. State	2. Mayor
C. Municipal Corporation	3. Governor
D. Panchayat	4. Prime Minister

Codes

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

156. Match the following

List I	List II
A. Moraine	1. Found in deserts
B. Volcano	2. Found in river valleys
C. Ox Bow lakes	3. The sudden movement of the Earth
D. Mushroom rocks	4. The depositional feature of a glacier

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

157. All the weather phenomena like rainfall, fog and hailstorm occur in which of the layer of the atmosphere?

- a.* Stratosphere *b.* Troposphere *c.* Mesosphere *d.* Exosphere

158. The layer which is almost free from clouds and associated weather phenomenon making conditions more ideal for flying aeroplanes?

- a.* Troposphere *b.* Stratosphere *c.* Mesosphere *d.* Exosphere

159. The important factor that influences the distribution of temperature is

- a.* solar energy *b.* heat *c.* pressure *d.* isolation

160. As we go up the layers of the atmosphere, the pressure

- a.* increases *b.* decreases *c.* remains the same *d.* None of these

161. Non-renewable resources will get exhausted after years of use. We have their fixed stock on Earth which cannot be replenished. If we discover new resources that we did not know earlier the new resources in this way add would to the stock. This is an example of

- a.* sustainable development *b.* development  
*c.* ecological balance *d.* None of these

- 162.** The per capita income is calculated in dollars for all countries because  
*a.* to make comparison easier *b.* dollar is widely accepted currency  
*c.* dollar is the currency of maximum countries *d.* None of these
- 163.** In India large population is employed in  
*a.* organised sector *b.* unorganised sector  
*c.* semi-organised sector *d.* None of these
- 164.** The disguised employment is the feature of  
*a.* primary sector *b.* secondary sector *c.* tertiary sector *d.* None of these
- 165.** When money acts as an intermediate in exchange, process known as  
*a.* currency *b.* mode of payment *c.* medium of exchange *d.* None of these
- 166.** The millennium development goals of the United Nations call for reducing the proportion of people living on less than \$1 per day to half the 1990 level by which year?  
*a.* 2020 *b.* 2015 *c.* 2021 *d.* 2050
- 167.** Which of the following schemes assisted poor families at bringing them above poverty line by organising them into self help groups through a mix of bank credit and government subsidy?  
*a.* PMRY *b.* PMGY *c.* SGSY *d.* AAY
- 168.** The best seller Hindi novel 'Chandrakanta' a romance with dazzling elements of fantasy, is written by  
*a.* Bharatendu Harishchandra *b.* Devaki Nandan Khatri  
*c.* Prem Chand *d.* None of these
- 169.** Industrialisation began in England in  
*a.* the first half of the 18th century *b.* the second half of the 18th century  
*c.* the first half of the 19th century *d.* the second half of the 17th century
- 170.** The National Anthem of France the 'Marseillaise' was composed by  
*a.* John Locke *b.* Jean Paul Marat *c.* Roget De Lisle *d.* None of these
- 171.** Who was the first President of the Vietnam Democratic Republic?  
*a.* NGO Dinh Diem *b.* Henry Navarre *c.* Ho Chi Minh *d.* None of these
- 172.** Who was called by the British rulers as 'the Leader of Indian Unrest'?  
*a.* Gopal Krishna Gokhale *b.* Subhash Chandra Bose  
*c.* Bal Gangadhar Tilak *d.* MK Gandhi
- 173.** 'One people, one empire and one leader' is the famous slogan, given by  
*a.* Mazzini *b.* Bismarck *c.* Adolf Hitler *d.* Lenin
- 174.** According to the Indian Constitution, there should be no discrimination in public places on grounds only of  
*a.* religion, race, caste, sex or place of birth  
*b.* religion, race, caste, sex, place of birth or residence  
*c.* religion, race, caste, sex or nationality  
*d.* religion, race, sex, descent or place of birth
- 175.** The basic feature of the government is called 'parliamentary' is as  
*a.* the people elect the government *b.* the Parliament is a sovereign body  
*c.* the executive is accountable to the legislature *d.* All of these

176. 'Judicial review' refers to as
- Parliament's right to ask the judiciary to review judgements
  - judiciary's power to pronounce upon the constitutionality of laws passed by the legislature and orders issued by the executive
  - the President's right to seek the opinion of the Supreme Court on the Constitutionality of a law passed by the Parliament
  - judiciary's right to review judgements passed by lower courts

177. Match the following

List I	List II
A. State Government	1. Residuary powers
B. Central Government	2. Concurrent list
C. State and Central Government	3. Union list
D. Central Government	4. State list

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

178. Consider the following statements

- The uppermost layer over the Earth's surface is called the crust.
- It is the thinnest of all the layers.
- It is about 35 km in the continental masses and only 5 km on the ocean flows.
- The main mineral constituents of the continental mass are silica and magnesium.

Which of the above statement(s) is/are correct?

a. I and IV

b. I, II and III

c. III and IV

d. All of these

179. The forces which act in the interior of the earth are called endogenic forces. Which of the following are examples of endogenic forces?

a. Earthquake

b. Volcano

c. Landslides

d. All of these

180. Consider the following statements

- Focus is the place in the crust, where earthquake occurs.
- It is the origin of the seismic energy.
- The place on the surface above the focus is called the epicentre.
- Greatest damage is caused usually closest to the epicentre.

Which of the above statement(s) is /are correct?

a. I, II and III

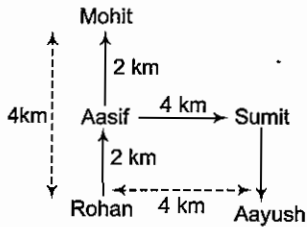
b. III and IV

c. I, III and IV

d. All of these

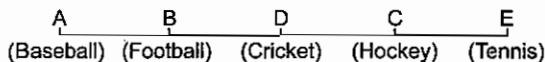
## Paper I : Mental Ability Test

### Solutions (Q. Nos. 1-3)

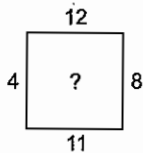


- (a) The distance between Mohit and Rohan is 4 km.
- (c) The distance between Rohan and Aayush is 4 km.
- (b) The direction of Sumit is North-East in respect to Rohan.

### Solutions (Q. Nos. 4-8)

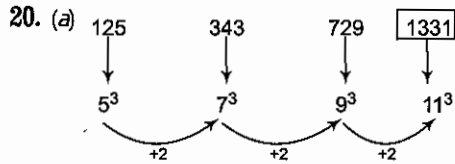
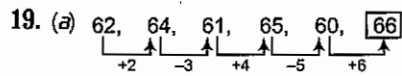
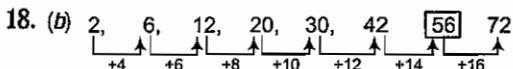


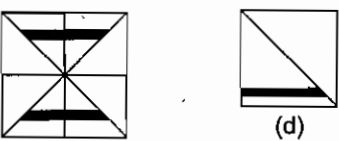
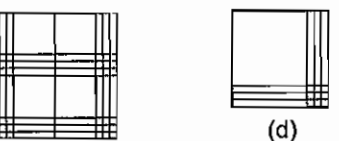
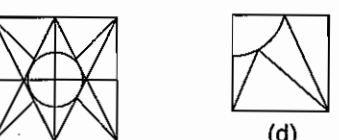
- (d)
- (a)
- (a)
- (b)
- (c)
- (b) On the basis of third letter, **Pedestrian** will come first.
- (a) On the basis of fourth letter, **Demand** will come first.
- (a) On the basis of third letter, **Scenery** will come first.
- (b)

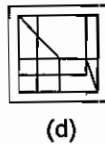
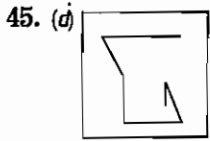
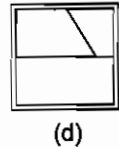
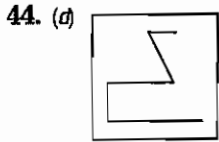
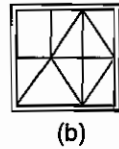
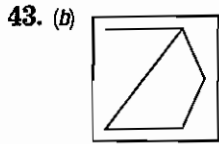
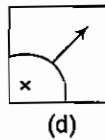
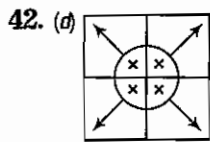


$$? = 12 \times 11 - 4 \times 8 = 132 - 32 = 100$$

- (b)  $? = (8)^3 = 8 \times 8 \times 8 = 512$
- (d)  $? = 4(15 + 20 + 09 + 03) = 188$
- (d) In figure (d) three lines are headed by arrows on the both sides, while other figure has four arrows.
- (c) In figure (c), cyclic ring contains only two small lines.
- (b) In figure (b), along diagonal of square figure are different.



- (b)
- (a)
- (c)
- (c) The currency of 'Japan' is 'yen' and currency of 'Pakistan' is 'rupee'.
- (b) 'Mare' is opposite to 'horse' same as 'loiness' is opposite to 'lion'.
- (b) 'Book' is written by 'author' same as 'Film' is written 'story writer'.
- (a) 'Rose' is a 'flower' same as 'pomegranate is a 'fruit'.
- (d) Except 'YM' all are opposite to each other and their total of letters is equal to 27.
- (d) Except 'cow' all eats meat but cow eats grass.
- (d) Except 'heart' all are external parts of body.
- (c)
- (a)
- (c)
- (a)
- (c)
- (c) In each subsequent step, one inner circle is removed in clockwise direction.
- (d) In each subsequent step, two small lines all added to horizontal line.
- (b) Figure moves in 90° anti-clockwise direction.
- (d)  (d)
- (d)  (d)
- (d)  (d)



46. (a) 47. (d) 48. (b) 49. (c)

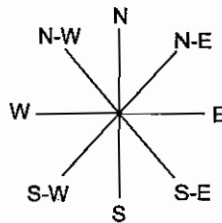
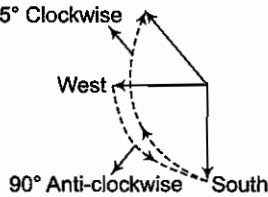
50. (d) Number divisible by 18 are 18, 36, 54, 72 and 90.

$\therefore$  There is no such number because a number which is divisible by 18 is also divisible by 6 and 9.

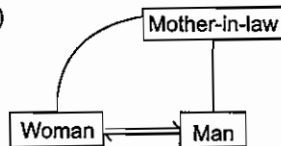
51. (b) All inner numbers square is given outside, so the square of 5 is 25.

52. (a)

53. (d) 135° Clockwise



54. (c)



So, woman is the wife of that man.

55. (a) Given, 54 C 10 D 16 B 4 A 8

$$\Rightarrow 54 - 10 \times 16 \div 4 + 8$$

$$\Rightarrow 54 - 10 \times 4 + 8 \Rightarrow 54 - 40 + 8$$

$$\therefore 54 - 48 = 6$$

56. (a) Given, 80 B 20 D 8 A 8 C 30

$$\Rightarrow 80 + 20 \times 8 + 8 - 30$$

$$\Rightarrow 4 \times 8 + 8 - 30$$

$$\Rightarrow 32 + 8 - 30$$

$$\therefore 40 - 30 = 10$$

57. (c) Given, 30 C 16 A 2 D 32 B 8

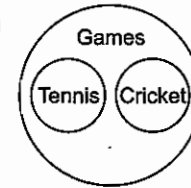
$$\Rightarrow 30 - 16 + 2 \times 32 \div 8$$

$$\Rightarrow 30 - 16 + 2 \times 4$$

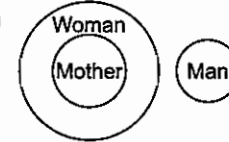
$$\Rightarrow 30 - 16 + 8$$

$$\therefore 30 - 24 = 6$$

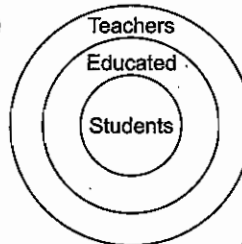
58. (a)



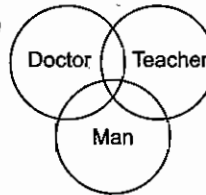
59. (d)



60. (b)



61. (c)



62. (a) Nikhil : Ankur : Neeraj = 7200

$$\Rightarrow 3600 : 3600 \times \frac{50}{100} : 7200 - (3600 + 1800)$$

$$\Rightarrow 3600 : 1800 : 1800$$

$$\therefore 2 : 1 : 1$$

63. (d) When both sides are given.

$$\text{Then, total boys add both sides} - 1 \Rightarrow (15 + 18) - 1$$

$$\therefore = 32$$

Hence, number of boys in that row is 32.

64. (d) Given,  $\frac{11y}{10} - \frac{9y}{10}$

$$\Rightarrow \frac{11y - 9y}{10} = \frac{2y}{10}$$

$$\Rightarrow 2y = 10$$

$$y = 5$$

65. (c) Given, MP = ₹ 720

Actual price = ₹ 550.80

Price after 1st discount = 90% of 720

$$= \frac{90 \times 720}{100} = ₹ 648$$

Now, let the 2nd discount =  $x\%$

Then,  $\Rightarrow x\%$  of 648 = 648 - 550.80

$$\frac{x \times 648}{100} = 97.20$$

$$\therefore x = \frac{97.50 \times 100}{648} = 15\%$$

66. (b) Either sides (ends) means 27th from both sides.

$$\therefore 27 + 27 - 1 \Rightarrow 54 - 1$$

$\Rightarrow$  53 men are there in that row.

67. (c) 2012 is a leap year.

$\therefore$  Number of days February = 2

$\therefore$  Number of days March = 31

$\therefore$  Number of days April = 1

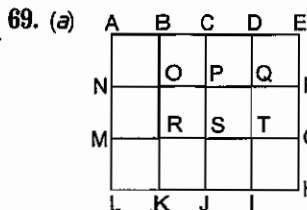
Total number of days is 34.

Number of odd days =  $34/7 = 6$  odd days

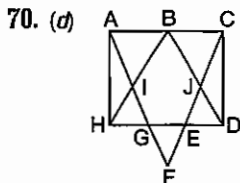
$\therefore$  Monday + 6 = Sunday

68. (b) Number of odd day =  $308/7 = 0$  odd day

So, it will be Monday after 308 days.



Squares are ABON, BCPO, CDQP, DEFQ, NORM, OPSR, PQTS, QFGT, MRKL, RSJK, STIJ, TGHI, ACSM, BDTR, CEGS, NPJL, OQIK, PFHJ, ADIL and BEHK. *i.e.*, 20.



Triangles are AIH, ABI, BCJ, JDE, JCD, EGF, HIG, HAB, AHG, BCD, ECD, ACF and HBD. *i.e.*, 13.

71. (a) Divya > Mita > Seema

Seema > Saroj

Reema > Divya

$\therefore$  Reema > Divya > Mita > Seema > Saroj

So, Reema is the tallest.

72. (a) Ved > Rahul > Mohan

$\Rightarrow$  Ramu > Varun > Ved

$\Rightarrow$  Ramu > Varun > Ved > Rahul > Mohan

So, Mohan score was the lowest in the match.

73. (c)

74. (d)

75. (a)

76. (a)

77. (b)

78. (b)

79. (c) C @ B  $\rightarrow$  C is the sister of B

B % F  $\rightarrow$  B is the son of F

Hence,  $\rightarrow$  C is the daughter of F

F % E  $\rightarrow$  F is the son of E

Hence,  $\rightarrow$  C is the granddaughter of E.

80. (d) Option (d) will mark because no other option shows the relation.

81. (c) There are 3 outer figures (circle, triangle and square), 3 inner figures (circle, triangle and square) and inner figure is shaded.

82. (a) In each column, second arrow rotate  $90^\circ$  anti-clockwise, so answer (a) is correct for third column.

83. (b) As per similar pattern in first and second sequence, option (b) will be correct.

84. (a) In the figure there are 11 columns containing 4 cubes each, 7 columns containing 3 cubes each and 2 columns containing 2 cubes each.

$\therefore$  Total number of cubes

$$= (11 \times 4) + (7 \times 3) + (2 \times 2)$$

$$= 44 + 21 + 4 = 69$$

85. (d) As two-half shaded regions are opposite to each other, so except figure (IV). All figure (boxes) can be formed.

86. (b) Only boxes III and IV can be formed by folding the figure 'X'.

87. (d) Except figure II, all figure can be formed.

88. (b)

89. (a)

90. (c)

## Paper II : Scholastic Aptitude Test

91. (b)
92. (d) A geostationary satellite has an orbital period the same as Earth's rotation period.
93. (b) The exact value is 273.15 K.
94. (c) An oven is a thermally insulated chamber used for heating, baking or drying.
95. (d)  $\therefore$  critical angle  $\alpha = \frac{1}{\text{Refractive index}}$   

$$Q_i \propto \frac{L}{n} \text{ where } n = \frac{\sin \theta}{\sin r}$$
 $\therefore$  refractive index is maximum for violet light and hence the critical angle will be minimum for violet light.
96. (d)  $\frac{V}{i} = \text{constant} = R$  for ohmic circuits in Ohm's law. Further, only for ohmic circuits  $v-i$  graph is a straight line passing through origin.
97. (d) Unit of magnetic permeability is Henry/metre.
98. (a) A freely hanged magnet stays with its magnetic axis parallel to magnetic meridian.
99. (c) Soft iron is more strongly magnetised than steel.
100. (a) Image formed is real, inverted and same in size because object is at the centre of curvature of the mirror.
101. (b) In terrestrial telescope there are 3 lenses, objective eye piece and erecting lens which is placed at  $2f$  from intermediate image.
102. (c) At constant temperature, the pressure of a fixed mass of gas is inversely proportional to its volume. Thus, the pressure of the gas increases and volume decrease or *vice-versa*.
103. (b) **Titanium** Moon of the planet Saturn is titan and Ti extracted from its ore by Kroll's process.
104. (d) Ozone helps in preventing us from harmful UV-radiations. It is present in stratosphere. But due to increasing pollution and global warming, a hole has been created in ozone layer, this is called ozone layer depletion.
105. (c) Lanthanide series is named after its first element lanthanum (57). Lanthanum is the last element of this series.
106. (b) White fumes of ammonium chloride are produced.  

$$\text{NH}_3(g) + \text{HCl}(g) \longrightarrow \text{NH}_4\text{Cl}(s)$$

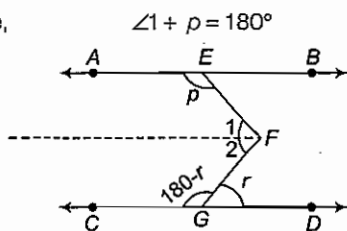
$$\text{NH}_3(aq) + \text{HCl}(aq) \longrightarrow \text{NH}_4\text{Cl}(aq)$$
107. (d) It is not used in making 'Borax'. Sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) is used in its making.
108. (b) Cirrhosis is an abnormal liver condition in which there is irreversible scarring of the liver. The main cause is excessive alcohol intake.
109. (c) Silicon and carbon both possess the property of catenation due to which they can form a large number of compounds.
110. (a) Q and S can react to form ionic compound.  
 Electronic configuration of Q = 2, 6 (it needs two more electrons to attain inert gas configuration).  
 Electronic configuration of S = 2, 8, 2 (it can easily lose two electrons to get inert gas configuration).  
 $\therefore$  Q and S can easily combined to form an ionic compound.
111. (c) Sodium Na is soft metal. It cannot be kept in open air otherwise it starts burning in presence of air. So, it is kept in kerosene. It reacts with water vigorously, it burn violently.
112. (a) Double displacement reactions are those reactions in which more reactive metal displaces the less reactive metal.
113. (d) Vermillion - worn by married Hindu women along the parting of their hair.  
 Borax - as ingredient in enamel glazes.  
 Bleaching powder - as a cleaning agent.  
 Caustic soda - as a chemical base in pulp, paper, textiles soaps etc. making.
114. (b)  $\text{pH}(\text{NaOH}) > \text{pH}(\text{H}_2\text{O}) > \text{pH}(\text{HCl})$   

$$\begin{array}{ccc} \text{B} & \text{C} & \text{A} \\ & \text{more than 7} & \text{less than 7} \\ & \longleftarrow \text{pH 7} \longrightarrow & \end{array}$$
115. (b) Iron is a major component of haemoglobin that carries oxygen to all parts of the body.
116. (a) In earthworm excretion occurs through nephridium, in flatworm excretion occurs through flame cell, in frog excretion occurs through kidney.
117. (d) *Mixotricha paradoxa* is a species of protozoan that lives inside the gut of the termite and helps them to digest cellulose, a major component of the wood they eat.
118. (a) Phototropism is directional growth in which the direction of growth is determined by the direction of the light source. Hydrotropism is when roots of a plant grow only towards the moist soil. Thigmotropism is a movement in which a plant moves or grows in response to touch or contact stimuli. Movement or growth of an organism or part of an organism in response to a chemical stimulus.
119. (a) AIDS virus is single strands RNA virus. In RNA viruses of the retrovirus group (e.g., HIV), single stranded RNA enter the cell and is converted into double stranded DNA with the help of an enzyme carried in the virus (reverse transcriptase)
120. (d) There are two methods of freezing and storing semen: dry ice and liquid nitrogen. Liquid nitrogen is preferred because there is no evidence of fertility deterioration with time.



121. (c) *Azolla* is used as a biofertiliser because it has association with nitrogen fixing cyanobacteria. The presence of the nitrogen-fixing cyanobacterium has led to *Azolla*'s use as a green fertiliser, particularly in rice paddies.
122. (b) Chloro fluoro carbons (CFCs) have been used in refrigeration, air conditioning and as solvents.
123. (d) A lichen is a plant made from the combination of an algae and a fungus. Lichens highly depends on the soil on which they develop. The fungus in their thalus remains either parasitic or saprophytic, depending on the substrate on which the thallus grows. In feeding the fungus may be rather independent from the alga.
124. (c) A hypotonic solution has a lower concentration of solutes than its surroundings, so in an attempt to balance concentrations, water will rush into the cell, causing swelling.
125. (c) Lichen is the best indicator of  $\text{SO}_2$  pollution. Lichen transplants as biological indicators of  $\text{SO}_2$  air pollution in Copenhagen.

126. (a) Here,



$$\angle 2 + 180^\circ - r = 180^\circ$$

$$\text{Adding } \angle 1 + \angle 2 + p + 180^\circ - r = 360^\circ$$

$$p + q - r = 180^\circ \quad (\because \angle 1 + \angle 2 = q)$$

127. (a) Let the starting salary be ₹  $x$  and fixed annual increment be ₹  $y$ .

$$\text{By condition, } x + 4y = 1500 \quad \dots(i)$$

$$\text{and } x + 10y = 1800 \quad \dots(ii)$$

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

$$x = ₹ 1300$$

128. (d) Here, roots are  $\alpha$  and  $\alpha + 1$ .

$$\therefore \alpha + (\alpha + 1) = l \quad (\text{sum of roots})$$

$$\Rightarrow 2\alpha = l - 1$$

$$\therefore \alpha = \frac{l-1}{2}$$

$$\text{Also, } \alpha(\alpha+1) = m \quad \text{or} \quad \alpha^2 + \alpha = m$$

$$\Rightarrow \left(\frac{l-1}{2}\right)^2 + \left(\frac{l-1}{2}\right) = m$$

$$\Rightarrow (l-1)^2 + 2(l-1) = 4m$$

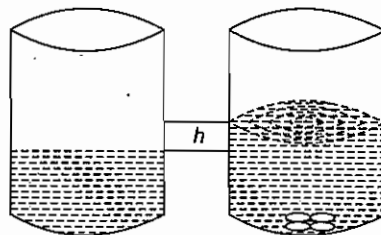
$$\Rightarrow l^2 - 1 = 4m$$

$$\therefore l^2 = 4m + 1$$

129. (c) Radius of balls = 1 cm

$$\text{Volume of each balls} = \frac{4}{3} \times \pi \times 1 \times 1 = \frac{4}{3} \pi \text{ cm}^3$$

$$\therefore \text{Volume of 4 balls} = 4 \times \frac{4}{3} \pi = \frac{16}{3} \pi \text{ cm}^3$$



Volume of water increased = Volume of balls

$$\text{Area of base} \times \text{Height} = \frac{16}{3} \pi$$

$$\pi \times 5 \times 5 \times h = \frac{16}{3} \pi$$

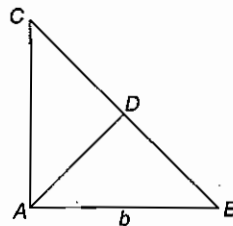
$$h = \frac{16}{3 \times 25}$$

$$= \frac{16}{75} \text{ cm}$$

130. (a) In  $\triangle ABC$ ,

$$A = \frac{1}{2} \times \text{Base} \times \text{Altitude} = \frac{1}{2} b \times AC$$

$$AC = \frac{2A}{b}$$



By Pythagoras theorem,

$$AC^2 + AB^2 = BC^2$$

$$\Rightarrow BC = \sqrt{\frac{4A^2}{b^2} + b^2}$$

$$\text{Again, in } \triangle ABC, A = \frac{1}{2} \times BC \times AD$$

$$\begin{aligned} \Rightarrow AD &= \frac{2A}{\sqrt{\frac{4A^2}{b^2} + b^2}} \\ &= \frac{2Ab}{\sqrt{4A^2 + b^4}} \end{aligned}$$

131. (b) Here, let side be  $2n$  and  $n$ , so equations are

$$\frac{360}{2n} + 4y = 180 \quad \dots(i)$$

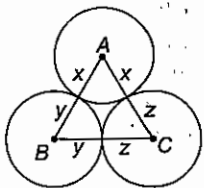
$$\text{and } \frac{360}{n} + 3y = 180 \quad \dots(ii)$$

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

$$n = 5$$

So, number of sides are respectively 10 and 5.

132. (a) Let  $AB = 9$  cm,  $BC = 7$  cm and  $AC = 6$  cm



Let  $x$ ,  $y$  and  $z$  be radii of circles with centre  $A$ ,  $B$  and  $C$ .

$$x + y = 9, y + z = 7 \text{ and } z + x = 6$$

$$\therefore 2(x + y + z) = 22$$

$$\Rightarrow x + y + z = 11$$

$$\therefore z = 11 - 9 = 2 \text{ cm}$$

$$x = 11 - 7 = 4 \text{ cm}$$

$$y = 11 - 6 = 5 \text{ cm}$$

So, radii are 4 cm, 5 cm and 2 cm.

133. (a) Total marks in 3 subjects =  $75 + 80 + 85$

$$= 240 \text{ out of } 300$$

In any other subject the marks are atleast 0.

$$\text{Average of 4 subjects} = \frac{240}{4} = 60\%$$

Hence, average cannot be less than 60%.

134. (d) Total cost of 200 kg of sugar

$$= (80 \times 6.75 + 120 \times 8) = ₹ 1500$$

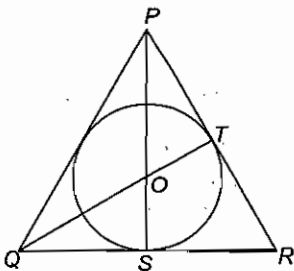
$$\text{Cost price of 1 kg} = \frac{1500}{200} = ₹ 7.50$$

$$\text{Gain required} = 20\%$$

$$\text{Here, selling price of 1 kg} = (120\% \text{ of } 7.50)$$

$$= \left( \frac{120}{100} \times 7.50 \right) = ₹ 9 \text{ per kg}$$

135. (c) Here,  $PQR$  is an equilateral triangle in which a circle has been inscribed. Let  $OS$  be radius of circle



$$\text{Then, } OS = r$$

$$\therefore \angle OQS = 30^\circ$$

$$\therefore \text{In } \triangle OQS, \frac{OQ}{OS} = \text{cosec } 30^\circ$$

$$\frac{OQ}{OS} = 2$$

$$\Rightarrow OQ = 2OS = 2r$$

$$\text{Also, } QS = 6 \text{ cm}$$

$$\Rightarrow r^2 + 6^2 = (2r)^2$$

$$\Rightarrow 3r^2 = 36 \Rightarrow r^2 = 12$$

$$\therefore r = 2\sqrt{3} \text{ cm}$$

$$\therefore \text{Area of circle} = \pi r^2 = \pi (2\sqrt{3})^2 \\ = 12\pi \text{ cm}^2$$

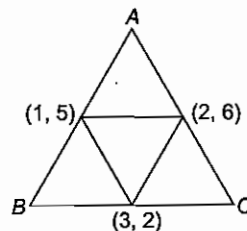
136. (d) In 5 tossed of a coin, number of heads  $>$  of tail  
10 cases, 5 cases, 1 cases

$$= (HHHTT, HHHHT, HHHHH)$$

Thus,  $P$  (heads  $>$  tails)

$$= 10 \times \left(\frac{1}{2}\right)^5 + 5 \times \left(\frac{1}{2}\right)^5 + \left(\frac{1}{2}\right)^5 = \frac{1}{32}(10 + 5 + 1) = \frac{1}{2}$$

137. (a) Coordinate of the centroid is same even when calculated with the mid-point coordinates.



$$\therefore \text{Centroid} = \left( \frac{1+3+2}{3}, \frac{5+6+2}{3} \right) = \left( 2, \frac{13}{3} \right)$$

138. (a) Amount of acid =  $\frac{90}{100} \times 140 = 126$  L

$$\therefore \text{Amount of water} = 140 - 126 = 14 \text{ L}$$

Let  $x$  L of water be added,

$$\text{Then, amount of water} = (14 + x) \text{ L}$$

$$14 + x = \frac{12.5}{100}(140 + x)$$

$$\Rightarrow 1400 + 100x = 1750 + 12.5x$$

$$\Rightarrow 87.5x = 1750 - 1400 = 350$$

$$\therefore x = \frac{350}{87.5} = 4 \text{ L}$$

139. (c) As given,  $q^2 = pr$

$$= \frac{p^2 - q^2 + r^2}{p^2 - q^2 + r^2}$$

$$= \frac{p^2 - q^2 + r^2}{\frac{1}{p^2} - \frac{1}{pr} + \frac{1}{r^2}} = \frac{p^2 - q^2 + r^2}{\frac{r^2 - pr + p^2}{p^2 r^2}}$$

$$= \frac{(p^2 r^2)(p^2 - q^2 + r^2)}{(r^2 - pr + p^2)} = \frac{(p^2 r^2)(p^2 - pr + r^2)}{(r^2 - pr + p^2)}$$

$$= p^2 r^2 = (pr)^2 = (q^2)^2 = q^4$$

140. (d)  $\left(a - \frac{1}{a}\right) = \sqrt{\left(a + \frac{1}{a}\right)^2 - 4}$

$$= \sqrt{\left(\frac{17}{4}\right)^2 - 4}$$

$$= \sqrt{\frac{289 - 64}{16}} = \sqrt{\frac{225}{16}} = \frac{15}{4}$$

$$\left[ \because \left(a + \frac{1}{a}\right) = \frac{17}{4} \right]$$

141. (c) I. If  $x = 15$  and  $y = 14$ , then  $x + y = 15 + 14 = 29$ , which is a prime number. So, if  $x$  and  $y$  are composite, then  $x + y$  is not always composite.
- II. If  $x = 15$  and  $y = 14$ , then  $x - y = 15 - 14 = 1$  which is neither prime nor composite, hence again  $x - y$  is not always composite.
- III. Third condition is satisfied for all measure.  
Hence, it is correct.

142. (b)  $\operatorname{cosec} \theta - \sin \theta = a^3$

$$\Rightarrow \frac{1 - \sin^2 \theta}{\sin \theta} = a^3 \Rightarrow \frac{\cos^2 \theta}{\sin \theta} = a^3$$

$$\Rightarrow \cos^2 \theta = a^3 \sin \theta \quad \dots \dots \dots (i)$$

$$\Rightarrow \sec \theta - \cos \theta = b^3$$

$$\Rightarrow \frac{1 - \cos^2 \theta}{\cos \theta} = b^3$$

$$\Rightarrow \frac{\sin^2 \theta}{\cos \theta} = b^3$$

$$\Rightarrow \sin^2 \theta = b^3 \cos \theta \quad \dots \dots \dots (ii)$$

Put in Eq. (i),  $\cos \theta = \frac{\sin^2 \theta}{b^3}$

$$\frac{\sin^4 \theta}{b^6} = a^3 \sin \theta \Rightarrow \sin^3 \theta = a^3 b^6$$

$$\therefore \sin \theta = ab^2 \quad \dots \dots \dots (iii)$$

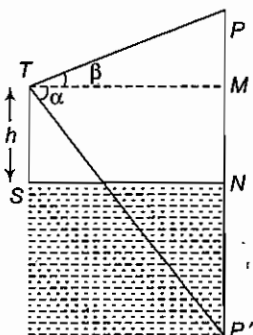
Similarly,  $\cos \theta = a^2 b \quad \dots \dots \dots (iv)$

On squaring and adding Eqs. (iii) and (iv), we have

$$1 = a^2 b^4 + a^4 b^2$$

$$1 = a^2 b^2 (a^2 + b^2)$$

143. (c) Let  $P$  be the cloud and  $P'$  its reflection in the lake  $T$  be the point  $h$  m above the surface of the lake.



$$\therefore ST = h$$

Also,  $NP = NP' = x$  (say)

$$PM = x - h \Rightarrow P'M = x + h$$

In  $\Delta PTM$ ,  $\frac{PM}{TM} = \tan \beta$

$$\therefore x - h = TM \tan \beta \quad \dots \dots \dots (i)$$

In  $\Delta P'TM$ ,  $\frac{P'M}{TM} = \tan \alpha$

$$x + h = TM \tan \alpha \quad \dots \dots \dots (ii)$$

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

$$\frac{x - h}{x + h} = \frac{\tan \beta}{\tan \alpha}$$

Using componendo and dividendo rule,

$$\frac{x}{h} = \frac{\tan \beta + \tan \alpha}{\tan \alpha - \tan \beta}$$

$$= \frac{\sin \beta \cos \alpha + \cos \beta \sin \alpha}{\sin \alpha \cos \beta - \cos \alpha \sin \beta}$$

$$= \frac{\sin(\alpha + \beta)}{\sin(\alpha - \beta)}$$

$$\therefore x = h \sin(\alpha + \beta) \cdot \operatorname{cosec}(\alpha - \beta)$$

144. (b) Part of tank filled by A in a minute =  $\frac{1}{12}$

Part of tank filled by B in a minute =  $\frac{1}{15}$

$$\therefore \text{Total part filled in a minute} = \frac{1}{12} + \frac{1}{15} = \frac{3}{20}$$

$$\therefore \text{Part filled in 4 min} = \frac{4 \times 3}{20} = \frac{3}{5}$$

Now, remaining part =  $1 - \frac{3}{5} = \frac{2}{5}$

$$\therefore \text{Greater part, more time, } \frac{1}{15} : \frac{2}{5} :: 1 : x$$

$$\Rightarrow \frac{x}{15} = \frac{2}{5} \Rightarrow x = 6 \text{ min}$$

145. (a) Sum = ₹ 5000

Time = 3 yr

Rates are  $R_1 = 5\%$ ,  $R_2 = 10\%$

and  $R_3 = 12\%$  for each year.

$$\text{Amount} = 5000 \left(1 + \frac{5}{100}\right) \left(1 + \frac{10}{100}\right) \left(1 + \frac{12}{100}\right)$$

$$= 5000 \times \frac{21}{20} \times \frac{11}{10} \times \frac{28}{25} = ₹ 6468$$

$$\therefore \text{Compounded interest} = (6468 - 5000) = ₹ 1468$$

146. (d)

147. (b) Hicky's Bengal Gazette was an English newspaper published from Kolkata. It was the first major newspaper in India started in 1780.

148. (a) Bharatendu Harishchandra is known as the father of modern Hindi Literature as well as Hindi Theatre. He is considered one of the greatest Hindi writers of modern India.

149. (b) The Vernacular Press Act was passed in 1878 under the Governor generalship and viceroyalty of Lord Lytton, for better control of Indian language newspaper.

150. (b) The printing press in India was brought by Portuguese. The first book was published in 1557 by the Jesuits of Goa.

151. (b) The Fundamental Rights are negative in character. They protect the individual from arbitrary rule by forbidding the government to do certain things.

- 152. (a)** The joint sitting of the Parliament is presided over by the Speaker of the Lok Sabha.
- 153. (b)** All the revenues received by the government by way of taxes are credited into the Consolidated Fund of India and all the expenditure of the government is incurred from this fund and no amount can be withdrawn from the fund without the authorisation of the Parliament.
- 154. (c)** The residuary powers are vested in the centre. The centre is empowered to legislate with respect to any matter not enumerated in any one of the three lists.
- 155. (a)**
- 156. (a)**
- 157. (b)** The troposphere is the lowest portion of Earth's atmosphere and it contains 80% of the atmosphere and 99% of its water vapour and aerosols.
- 158. (b)** The stratosphere is the second major layer of Earth's atmosphere. It absorbs the ultraviolet rays of Sun and free from clouds and associated phenomena and is ideal for flying aeroplanes.
- 159. (d)**
- 160. (b)** The higher we go up in the atmosphere, the lesser air remains. Thus, the atmospheric pressure always decreases with height.
- 161. (a)** Sustainable development refers to a mode of human development in which the use of resources aims to meet human needs while ensuring the sustainability of natural systems and environment. Consequently these needs can be met not only by the present generation but also by generations to come.
- 162. (a)** **163. (b)** **164. (a)** **165. (c)**
- 166. (b)** Millennium development goals consequently international development goals that were officially established following the millennium summit of UNO in 2000. All the 193 UNO member states and 23 INTT organisations have agreed to achieve these goals by 2015.
- 167. (b)**
- 168. (b)** Devaki Nandan Khatri belonged to the first generation of popular novelists in the modern Hindi language. He was the first author of mystery novels in Hindi.
- 169. (b)** **170. (c)**
- 171. (c)** Ho Chi Minh was a Vietnamese communist revolutionary leader who was Prime Minister and President of the democratic Republic of Vietnam.
- 172. (c)** Bal Gangadhar Tilak was the first popular leader of the Indian Independence Movement and was called as 'Father of the Indian Unrest.' By the British He roused the national consciousness for complete independence on the country.
- 173. (c)** **174. (a)**
- 175. (c)** The basic features of the parliamentary form of government is the fusion between legislature and executive and executive is always accountable /answerable to legislature.
- 176. (b)** The power of the Supreme Court/ High Court to declare any law of the legislature or executive action of the government null or void, if it violates the provisions of the Constitution.
- 177. (a)** **178. (b)** **179. (d)** **180. (d)**