

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. Separate sheet has been provided for rough work in this test booklet.
6. If you want to change your answer, erase the earlier filled circle completely and then darken the circle of your choice.
7. Now, turn to the next page and start answering the questions.



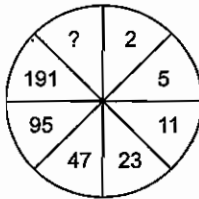
Paper I : Mental Ability Test

Directions (Q. Nos. 1-4) In each of the following questions, there is same relationship between the two terms of the left of '::' and the same relationship holds between the two terms to its right. Also, in each question, one term to the right of '::' is missing. This term is given as one of the alternatives, from the given alternatives below each question. Find out this term from the given alternatives.

1. LHPQ : MGQP :: SRTP : ?
 a. TQUQ b. STQP c. TQUO d. QTUO
2. SLPH : HPLS :: NBAD : ?
 a. ADBN b. DABN c. BADN d. ADNB
3. CSAT : DTBU :: RACE : ?
 a. Tbfd b. SDBF c. SCFD d. SBDF
4. NMLO : OOOs :: LSPH : ?
 a. MUSL b. NULS c. NUSL d. MUSM

Directions (Q. Nos. 5-6) Find the missing character in the following questions.

5.



- a. 325 b. 383 c. 275 d. 393

6.

2	6	8
2	2	2
2	3	4
2	4	?

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

Direction (Q. No. 7) Find the related number.

7. 360 180 60 15 : 600 300 100 25 :: 480 240 80 20 : ?
 a. 1200 600 200 50 b. 1000 500 300 50
 c. 600 200 100 20 d. 300 150 75 30

Directions (Q. Nos. 8-9) In the following questions, find the number which holds the same relationship with the third number as their between the first two numbers.

8. 7 : 64 :: 10 : ?
 a. 81 b. 121 c. 49 d. 169
9. 16 : 2 : 8 :: ? : ? : 64
 a. 225, 5 b. 156, 6 c. 321, 7 d. 256, 4

Directions (Q. Nos. 10-12) In each of the following questions, four numbers are given, out of these three are alike in a certain way but the one is different. Choose the one which is different from the rest three.

10. a. 21 b. 39 c. 51 d. 83
11. a. 372164 b. 376821 c. 318951 d. 319446
12. a. 11 b. 13 c. 15 d. 17

Directions (Q. Nos. 13-15) In each of the following questions, one term in the number series is wrong. Find out the wrong term.

13. 2, 5, 11, 23, 45, 95
a. 23 b. 95 c. 45 d. 11
14. 60, 55, 45, 35, 10
a. 55 b. 60 c. 35 d. 10
15. 4, 5, 7, 10, 14, 20, 25
a. 10 b. 20 c. 14 d. 25

16. In a March past, seven persons are standing in a row. Q is standing left to R but right to P. O is standing right to N and left to P. Similarly, S is standing right to R and left to T. Find out who is standing in the middle?

- a. P b. Q c. R d. D
17. If Anita is taller than Surjit but shorter than Kusum and Surjit is just as tall as Kalpana but taller than Vanita, then Kalpana is
a. just as tall as Anita b. taller than Kusum
c. shorter than Anita d. shorter than Surjit

18. Alok walked 30 m towards East and took a right turn and walked 40 m. He again took a right turn and walked 50 m towards. Which direction is he from his starting point?

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

19. Which one of the following diagrams correctly represents the relationship among the classes tennis fans, cricket players, students?



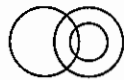
a.



b.



c.



d.

20. In a queue of children, Kashish is fifth from the left and Mona is sixth from the right. When they interchange their places between them, Kashish becomes thirteenth from the left. What will be Mona's position from the right?

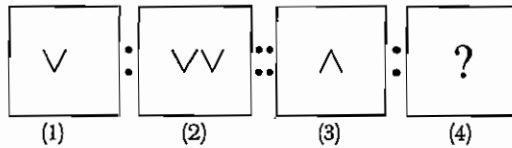
- a. 4th b. 8th c. 14th d. 15th

21. The priest told the devotee, "The temple bell rings at regular intervals of 45 min. The last bell was rung 5 min ago. The next bell is due to ring at 7 : 45 am." At what time did the priest give this information to the devotee?

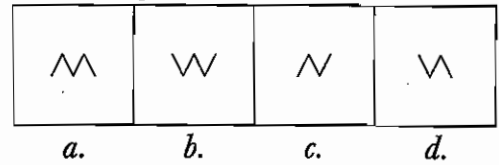
- a. 7 : 40 am b. 7 : 05 am c. 7 : 00 am d. 6 : 55 am

Directions (Q. Nos. 22-23) Each of the following questions consists of two sets of figures. (1), (2), (3) and (4) constitute the problem set while figures (a), (b), (c) and (d) constitute the answer set. There is a definite relationship between figures (1) and (2). Establish a similar relationship between figures (3) and (4) by choosing a suitable figure from the answer set.

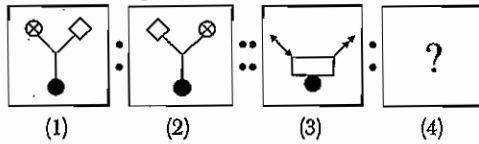
22. Problem Figures



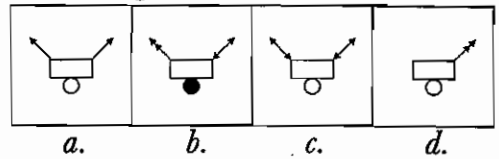
Answer Figures



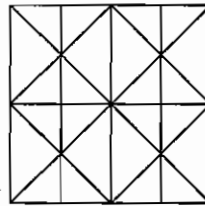
23. Problem Figures



Answer Figures



24. What is the number of straight lines in the following figure?



a. 11

b. 14

c. 16

d. 17

Directions (Q. Nos. 25-29) A cube of 4 cm has been painted on its surfaces in such a way that two opposite surfaces have been painted blue and two adjacent surfaces have been painted red. Two remaining surfaces have been left unpainted. Now, the cube is cut into smaller cubes of side 1 cm each.

25. How many cubes will have none of the sides painted?

a. 18

b. 16

c. 22

d. 8

26. How many cubes will have atleast red colour on its surfaces?

a. 20

b. 22

c. 28

d. 32

27. How many cubes will have atleast blue colour on its surfaces?

a. 20

b. 8

c. 24

d. 32

28. How many cubes will have only two surfaces painted with red and blue colours, respectively?

a. 8

b. 12

c. 24

d. 30

29. How many cubes will have three surfaces coloured?

a. 3

b. 4

c. 2

d. 16

30. If the seventh day of a month is three days earlier than Friday, what day will be on the nineteenth day of the month?

a. Sunday

b. Monday

c. Wednesday

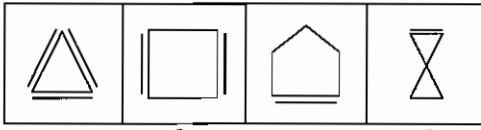
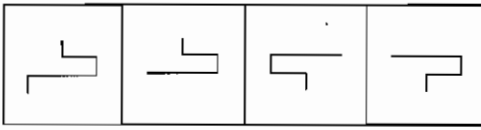
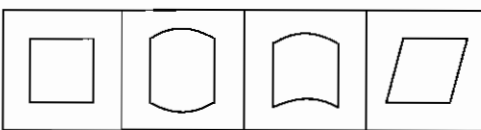
d. Friday

Directions (Q. Nos. 31-32) On the basis of the informations given below, answer the questions.

Eight friends A, B, C, D, E, F, G and H are sitting in a circle facing the centre. B is sitting between G and D. H is third to the left of B and second to the right of A. C is sitting between A and G. B and E are not opposite to each other.

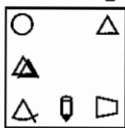
31. Who is third to the left of D?
a. A b. E c. F d. None of these
32. Which of the following statements is not true?
a. C is third to the right of D b. A is sitting between C and F
c. D and A are sitting opposite to each other d. E is sitting between F and D
33. How many even numbers are there in the following series of numbers, each of which is preceded by an odd number but not followed by an even number?
5, 3, 4, 8, 9, 7, 1, 6, 5, 3, 2, 9, 8, 7, 3, 5
a. One b. Two c. Three d. Four
34. How many such 5's are there in the following number sequence, each of which is preceded by 3 or 4 but not followed by 8 or 9?
3, 5, 9, 5, 4, 5, 5, 3, 5, 8, 4, 5, 6, 7, 3, 5, 7, 5, 5, 4, 5, 2, 3, 5, 1, 0
a. One b. Two c. Three d. More than three
35. In a certain code language 'TEACHER' is written as 'VGCEJGT'. How will 'DULLARD' be written in that code?
a. FWNNTCF b. FWNCSF c. FWNNTBE d. FWNNTCF

Directions (Q. Nos. 36-38) Find the odd figure from given figures.

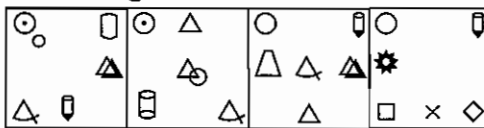
36. 
a. b. c. d.
37. 
a. b. c. d.
38. 
a. b. c. d.

Directions (Q. Nos. 39-41) In each of the following questions, select the alternative in which the specified components of the problem figure are found?

39. **Problem Figure** :



Answer Figures



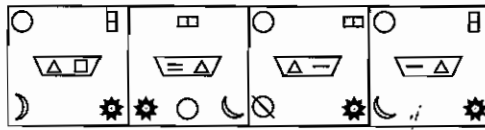
a. b. c. d.

40.

Problem Figure

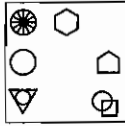


Answer Figures

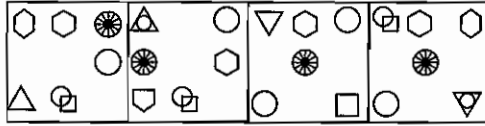


41.

Problem Figure

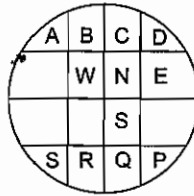


Answer Figures



Directions (Q. Nos. 42-43) These questions are based on the information given below.

A position of four policemen A, B, C and D in a circular park which is divided into 16 plots is shown. P, Q, R and S are the offenders whom they have to catch for given moves. The figure shows their positions.



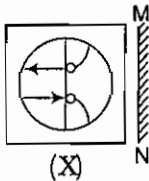
Note that the by lanes are North-South and East-West.

42. If A, B, C and D were to move clockwise four plots and P, Q, R and S were to move anti-clockwise six plots, then who two would be the North-South?
- a. P, C b. R, D c. P, A d. Q, B
43. Who two are positioned North-West and South-East?
- a. Q, C b. P, A c. B, R d. S, D

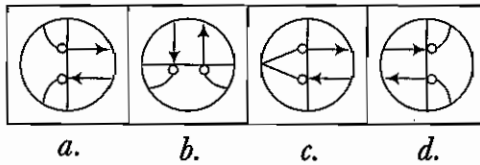
Directions (Q. Nos. 44-46) In each of the following questions, choose the correct mirror image of the figure (X) from amongst the four alternatives a, b, c and d given along with it.

44.

Problem Figure

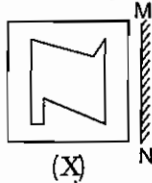


Answer Figures

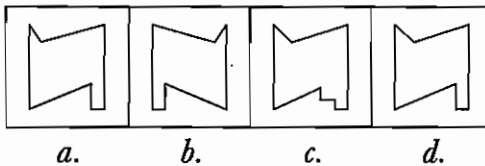


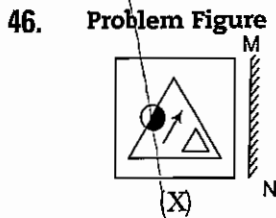
45.

Problem Figure

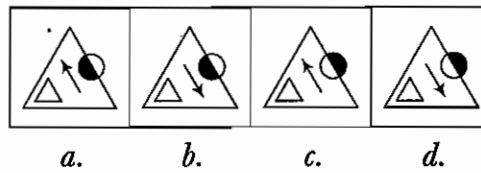


Answer Figures





Answer Figures



Directions (Q. Nos. 47-49) In each of the following questions, various term of a letter series are given with one term missing as shown by (?). Choose the missing term out of the given alternatives.

47. b, e, d, f, ?, h, j, ?, l

a. i, m

b. m, i

c. i, n

d. j, m

48. AZ, CX, FU, ?

a. IR

b. IV

c. JQ

d. KP

49. AZ, GT, MN, ?, YB

a. KF

b. RX

c. SH

d. TS

50. Raman is facing North-West. He turns 90° in the clockwise direction, then 180° in the anti-clockwise direction and then another 90° in the same direction. Which direction is he facing now?

a. South

b. South-West

c. West

d. South-East

51. Pointing to a woman, a man said, "The sister of her mother's husband is my aunt." How is he related to that woman?

a. Nephew

b. Father

c. Uncle

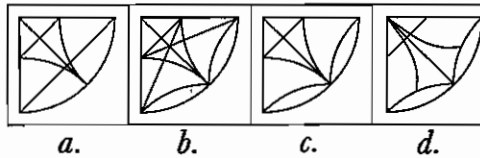
d. Brother

Directions (Q. Nos. 52-54) In each of the following questions, select a figure from amongst the four alternatives, which, when placed in the blank space, would complete the pattern.

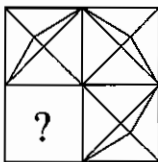
52. **Problem Figure**



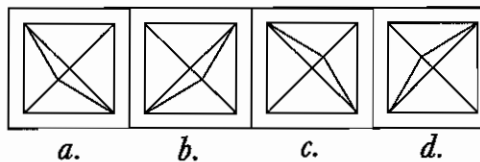
Answer Figures



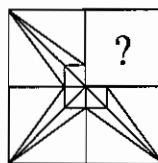
53. **Problem Figure**



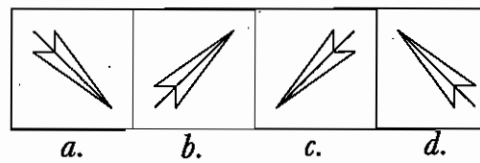
Answer Figures



54. **Problem Figure**

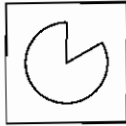


Answer Figures

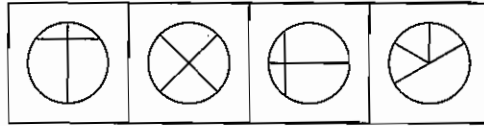


Directions (Q. Nos. 55-57) In the following questions, choose the alternative figure the problem figure is embedded.

55. Problem Figure

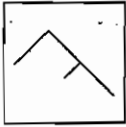


Answer Figures

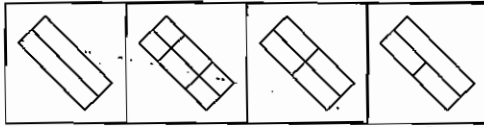


a. b. c. d.

56. Problem Figure

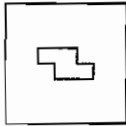


Answer Figures

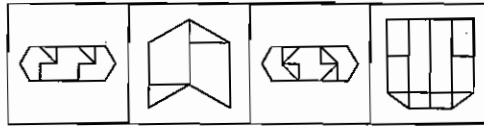


a. b. c. d.

57. Problem Figure



Answer Figures



a. b. c. d.

58. Two positions of a block are shown below. When 2 is at the bottom, which number will come at the top?



(i)



(ii)

a. 1

b. 4

c. 6

d. Cannot be determined

59. Two positions of a block are shown below.



(i)



(ii)

When six is at the bottom, what number come at the top?

a. 1

b. 2

c. 4

d. 5

60. Which alphabet will come on the opposite surface of which alphabet F appears?



(i)



(ii)



(iii)

a. B

b. A

c. C

d. E

61. Which figure will best suit the relationship in the given class?
Engineer, Human beings and Rats



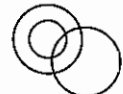
a.



b.

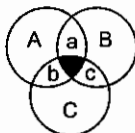


c.



d.

62. In the figure, A-represents students studying Chemistry, B-students studying Physics and C-students studying Mathematics.



What does the shaded portion represent?

- a. Students who study Chemistry and Physics
 b. Students who study Physics and Mathematics
 c. Students who study Chemistry and Mathematics
 d. Students who study Chemistry, Physics and Mathematics
63. How many 1's are there in the following sequence which are immediately preceded by 9 but not immediately following by 7?
 7, 1, 9, 1, 1, 7, 1, 8, 9, 1, 7, 1, 2, 1, 3, 1, 4, 5, 7, 1, 3, 9, 1, 7
- a. One b. Two c. Three d. Four

Directions (Q. Nos. 64-67) Study the following questions carefully and answer the questions given below.

Of the five students, A, B, C, D and E two are good in studies, one is average and two are poor. Four of them play volleyball and of these two play tennis also. One student plays four games, another plays cricket only and the rest play two games each. The one who plays four games is poor in studies while the other who plays tennis and volleyball is average in studies. A is good in studies and plays football and volleyball, while E who plays only one game, is poor in studies. C plays hockey and volleyball and B plays two games only.

64. Which game does D not play?
 a. Cricket b. Football c. Hockey d. Tennis
65. What games does B play?
 a. Cricket, Tennis b. Cricket, Volleyball c. Volleyball, Tennis d. Hockey, Tennis
66. Besides A, who is good in studies?
 a. B b. C c. D d. E
67. Which game does E plays?
 a. Cricket b. Hockey c. Tennis d. Volleyball

Directions (Q. Nos. 68-70) In each question below is given a statement followed by two conclusions numbered I and II. You have to assume everything in the statement to be true, then consider the two conclusions together and decide which of them logically follows beyond a reasonable doubt from the information given in the statement.

Give answer

- a. if only Conclusion I follows
 b. if only Conclusion II follows
 c. if either Conclusion I or II follows
 d. if neither Conclusion I nor II follows
68. **Statement** The old order changed yielding place to new.
Conclusions
 I. Change is the law of nature.
 II. Discard old ideas because they are old.

69. **Statement** Domestic demand has been increasing faster than the production of indigenous crude oil.

Conclusions

- I. Crude oil must be imported.
- II. Domestic demand should be reduced.

70. **Statement** The Government run company had asked its employees to declare their income and assets but it has been strongly resisted by employees union and no employee is going to declare his income.

Conclusions

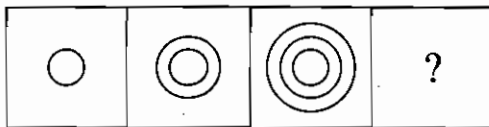
- I. The employees of this company do not seem to have any additional undisclosed income besides their salary.
- II. The employees union wants all senior officers to declare their income first.

Directions (Q. Nos. 71-75) Study the following information carefully and answer the questions given below it. Digits in the numbers are to be coded as follows.

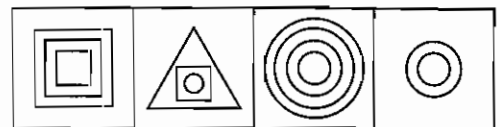
Digit	3	9	5	8	1	7	0	4	6	2
Code	M	O	Q	K	T	S	P	L	R	N

71. What will be the code for 1692746?
 a. RONLSRK b. ROTPMLR c. TRONSLR d. TRNOSLR
72. KTMRNS is the code for which of the following numbers?
 a. 813627 b. 836127 c. 836539 d. 813527
73. What will be the code for 3256789?
 a. MNPRSKO b. MNQRSKO c. LNQRSKT d. MSPRSKO
74. What will be the code for 8765403?
 a. KSRNLPM b. LSRQPLO c. KSRLLP T d. KSRQLPM
75. KQTNSMNL is the code for which of the following numbers?
 a. 85127324 b. 85217324 c. 81527324 d. 85127234
76. Find the next figure in the following figure series.

Problem Figures



Answer Figures



Directions (Q. Nos. 77-80) In each question below are given two statements followed by two conclusions numbered I and II. You have to take the given two statements to be true even, if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

Give answer

- a. if only Conclusion I follows
- b. if only Conclusion II follows
- c. if either Conclusion I or II follows
- d. if neither Conclusion I nor II follows

77. **Statements** All bags are cakes.
All lamps are cakes.

Conclusions

I. Some lamps are bags.

II. No lamp is bag.

78. **Statements** Some doctors are fools.
Some fools are rich.

Conclusions

I. Some doctors are rich.

II. Some rich are doctors.

79. **Statements** Some desks are caps.
No cap is red.

Conclusions

I. Some caps are desks.

II. No desk is red.

80. **Statements** All water is divine.
All temples are divine.

Conclusions

I. All water is temple.

II. All temples are water.

81. Present ages of Anupum and Raju are in the ratio of 5 : 4, respectively. After Three years, the ratio of their ages will become 11 : 9, respectively. What is Raju's present age in?

a. 24

b. 27

c. 40

d. 32

Directions (Q. Nos. 82-83) *In a certain code language,*

- (i) 'pit dar na' means 'you are good'.
- (ii) 'dar tok pa' means 'good and bad'.
- (iii) 'tim na tok' means 'they are bad'.

82. In that language, which word stands for 'they'?

a. na

b. tok

c. tim

d. pit

83. In that language, which word stands for 'good'?

a. pit

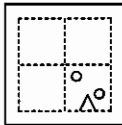
b. dar

c. tok

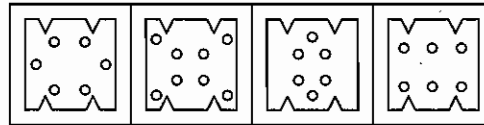
d. Cannot be determined

84. A piece of paper is folded and punched as shown below.

Problem Figure



Answer Figures



a.

b.

c.

d.

From the given responses, indicate how it will appear when it is unfolded?

85. If 3rd December, 1990 is Sunday. What day is 3rd January, 1991?

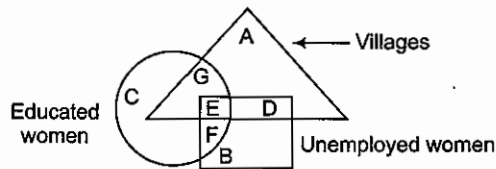
a. Tuesday

b. Wednesday

c. Thursday

d. Friday

Directions (Q. Nos. 86-89) Study the diagram given below to answer these questions.



86. Educated employed women in villages are represented by
 a. D b. E c. F d. G
87. What does letter D represent?
 a. Uneducated women in villages b. Uneducated employed women in villages
 c. Uneducated unemployed women d. Educated employed women
88. Educated unemployed women in villages are represented by
 a. A b. B c. D d. E
89. Educated unemployed women are represented by
 a. B and C b. D and E c. E and F d. G and E

Direction (Q. No. 90) In each of following questions, a word is represented by only one of numbers are as given in any one of the alternatives. The sets of numbers given in the alternatives are represented by two classes of alphabets as in the two given matrices. The columns and rows of Matrix I are numbered from 0 to 4 and these of Matrix II from 5 to 9. A letter from these matrices can be represented first by its row and then the column number e.g., in the Matrix I, A can be represented as 13, 23 etc., and in the Matrix II, O can be represented as 57, 78 etc.

Matrix I

	0	1	2	3	4
0	D	K	A	E	C
1	C	D	K	A	E
2	K	C	E	A	D
3	K	C	D	E	A
4	E	D	A	K	C

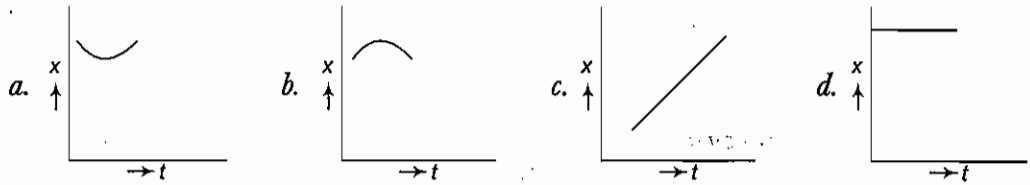
Matrix II

	5	6	7	8	9
5	P	L	O	T	N
6	T	P	N	L	O
7	P	N	T	O	L
8	O	N	T	P	L
9	L	O	P	N	T

90. LATE
 a. 79, 14, 65, 22 b. 79, 42, 65, 22
 c. 79, 42, 75, 22 d. 79, 42, 65, 00

Paper II : Scholastic Aptitude Test

91. Position-time graph for motion with zero acceleration is



92. Consider the following statements

The escape velocity depends on

1. Mass of the planet
2. Mass of the particles escaping
3. Temperature of the planet
4. Radius of the planet

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

- a. I and II b. II and IV c. I and IV d. I, III and IV

93. A gas thermometer is more sensitive than a liquid thermometer because gases

- a. expand more than liquids
- b. do not change their state easily
- c. are much lighter
- d. are easy to obtain

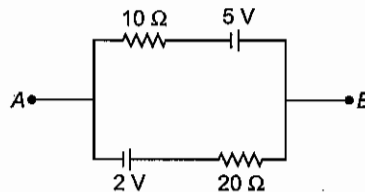
94. Doppler effect is depend on

- a. velocity of source
- b. velocity of listener
- c. distance between source and listener
- d. All of these

95. When the magnet is brought near the iron needle, it act as

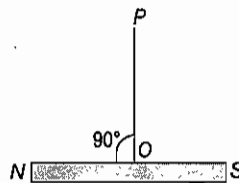
- a. non-magnetic material
- b. bar-magnetic
- c. temporary magnet
- d. None of these

96. Find the current in the given circuit.



- a. 0.3 A b. 0.4 A c. 0.1 A d. 0.2 A fig

97. The magnetic field at P due to the magnet NS is

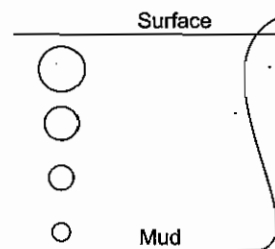


- a. along OP b. along PO c. parallel to NS d. parallel to SN

98. Magnetic lines of force due to a bar magnet do not intersect because

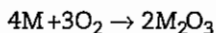
- a. a point always has a single net magnetic field
- b. the lines have similar charges and so repel each other
- c. the lines always diverge from a single point
- d. None of the above

99. The area enclosed by a hysteresis loop is a measure of
a. retentivity *b.* susceptibility *c.* permeability *d.* energy loss per cycle
100. A concave mirror of focal length f (in air) is immersed in water ($\mu = \frac{4}{3}$). The focal length of the mirror in water will be
a. f *b.* $\frac{4}{3}f$ *c.* $\frac{3}{4}f$ *d.* $\frac{7}{3}f$
101. If the tube length of astronomical telescope is 105 cm and magnifying power is 20 for normal setting, find the focal length of the objective.
a. 100 cm *b.* 10 cm *c.* 20 cm *d.* 25 cm
102. Bubbles of gas, escaping from the mud at the bottom of a deep lake, rise to the surface. As the bubbles rise, the bubble get larger. Why is this?



- a.* Atmospheric pressure on the bubbles decreases
b. Atmospheric pressure on the bubbles increases
c. Water pressure on the bubbles decreases
d. Water pressure on the bubbles increases
103. Arrange the following elements in increasing order of their ionization energies
 Nb, Sr, Y, Cd, Rb
a. Rb < Sr < Y < Nb < Cd *b.* Cd < Nb < Y < Sr < Rb
c. Sr < Y < Nb < Rb < Cd *d.* Cd < Rb < Nb < Y < Sr
104. Ankit while heating solid lead nitrate taken in a test-tube, observed
a. yellow residue of PbO *b.* brown residue of NO
c. green residue of NO₂ *d.* white residue to PbO₂
105. Which of the following statements about the modern periodic table is true?
a. It has 18 horizontal rows called periods *b.* It has 7 vertical columns called periods
c. It has 18 vertical columns called groups *d.* It has 7 horizontal rows called groups
106. When ethanol is heated with conc. H₂SO₄ at a temperature of 170°C, it gets converted into ethene acid. In this reaction conc. H₂SO₄ plays a role of
a. catalyst *b.* oxidising agent
c. reducing agent *d.* dehydrating agent
107. Which of the following is an exothermic reaction?
a. Conversion of limestone into quicklime
b. Electrolysis of water
c. Photosynthesis
d. Respiration

108. When a metal 'M' reacts with oxygen, following reaction takes place.



This equation represents

- a.* combination and reduction reaction both *b.* decomposition and oxidation reaction both
c. displacement and oxidation reaction both *d.* combination and oxidation reaction both

109. Consider the following statements

- I. Sulphur is used in making electrodes of dry cells.
II. Carbon is used in the vulcanisation of rubber.

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

110. 10 mL of dilute acetic acid was added to 10 mL of water and this mixture was shaken for a minute. It was observed that

- a.* the acid formed a separate layer at the bottom *b.* a clear solution was formed
c. the turbidity appeared in the test tube *d.* water formed a separate layer at the bottom

111. Consider the following statements

- I. On moving from left to right in a period atomic radii increases.
II. On moving from left to right in a period atomic radii decreases.

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

- a.* Only II *b.* Only I *c.* Both I and II *d.* Neither I nor II

112. Which of the following pairs includes isomeric compounds?

- a.* Alcohols and aldehydes *b.* Alcohols and ketones
c. Aldehydes and carboxylic acids *d.* Ketons and aldehydes

113. Which of the following forms of coal has the lowest percentage of carbon?

- a.* Peat *b.* Lignite *c.* Bituminous *d.* Anthracite

114. In order to displace Ag from AgNO₃ solution, which is the most appropriate metal to be used?

- a.* Magnesium *b.* Zinc *c.* Gold *d.* Copper

115. Cellulose is a strong substance found in all plant cells. Which part of a plant cell contains cellulose?

- a.* The cell membrane *b.* The cell wall *c.* The chloroplasts *d.* The vacuoles

116. When a marine fish is placed in fresh water, it dies because

- a.* entry of water *b.* exit of water and shrinks
c. deficiency of salts *d.* deficiency of nutrients

117. A certain patient is suspected to be suffering from Acquired Immuno deficiency Syndrome. Which diagnostic technique will you recommend for its detection?

- a.* WIDAL *b.* ELISA *c.* MRI *d.* Ultra Sound

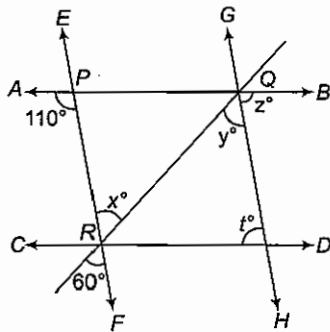
118. Consider the following statements about organic farming.

- I. Utilises genetically modified crops like Bt cotton.
II. Uses only naturally produced inputs like compost.
III. Does not use pesticides and urea.
IV. Produces vegetables rich in vitamins and minerals.

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

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

119. Certain bacteria living in the soil poor in oxygen convert nitrates into nitrites and then to free nitrogen and such bacteria are termed as
 a. nitrogen fixing bacteria
 b. denitrifying bacteria
 c. ammonifying bacteria
 d. saprophytic bacteria
120. The life supporting gases such as O_2 , CO_2 and N_2 are primarily concentrated in
 a. troposphere
 b. exosphere
 c. homosphere
 d. stratosphere
121. Two microbes found to be very useful in genetic engineering are
 a. *Diplococcus* species and a *Pseudomonas* species
 b. *Vibrio cholerae* and a tailed bacteriophage
 c. *Escherichia coli* and *Agrobacterium tumefaciens*
 d. *Crown gall bacterium* and *Vibrio cholerae*
122. Which group is responsible for formation and flavour of yoghurt?
 a. *Bacillus megatherms* and *Xanthomonas* species
 b. *Bacillus subtilis* and *E. coli*
 c. *Rhizobium meliloti* and *Azotobacter*
 d. *Lactobacillus casei* and *Streptococcus thermophilus*
123. Red dye used for dying silk is obtained from the petals
 a. *Carthamus tinctorius*
 b. *Tagetes erecta*
 c. *Zinnia elegans*
 d. *Colchicum autumnale*
124. Wood is a common name of
 a. phloem
 b. secondary xylem
 c. cambium
 d. vascular bundles
125. Yeast is used in the production of
 a. and beer
 b. cheese and butter
 c. citric acid and lactic acid
 d. lipase and pectinase
126. In the given figure $AB \parallel CD$ and $EF \parallel GH$. The values of x , y , z and t are, respectively

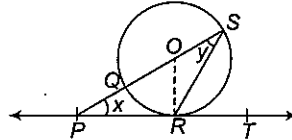


- a. 60, 75, 75, 60
 b. 50, 75, 75, 65
 c. 60, 70, 60, 70
 d. 60, 60, 70, 70
127. A and B each have a certain number of mangoes. A says to B, "If you give 30 of your mangoes, I will have twice as many as left with you." B replies "If you give me 10, I will have thrice as many as left with you". How many mangoes did A has?
 a. 41
 b. 62
 c. 34
 d. 32

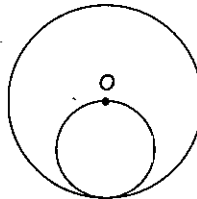
128. If α and β are the roots of the equation $x^2 - (1 + a^2)x + \frac{1}{2}(1 + a^2 + a^4) = 0$, then $\alpha^2 + \beta^2$ is equal to
 a. $a^4 + a^2$ b. a^2 c. $(a^2 + a^4)^2$ d. None of these
129. A vessel is in the form of an inverted cone. Its height is 8 cm and radius of its top which is open is 5 cm. It is filled with water upto the rim. When lead shots each of which is a sphere of radius 0.5 cm, are dropped into the vessel, one-fourth of water flows out. The number of lead shots dropped into the vessel.
 a. 50 b. 75 c. 85 d. 100
130. ABC is triangle with $\angle A = 90^\circ$. From A, a perpendicular AD is drawn on BC. Which one of the following is correct?
 a. $\triangle ABC \sim \triangle DAC$ b. $\triangle DAC \sim \triangle DBA$
 c. $\triangle ABC \sim \triangle DBA \sim \triangle DAC$ d. $\triangle ABC \sim \triangle DAB$

Where \sim stands for the notation of similarity.

131. The ratio of an interior angle to the exterior angle of a regular polygon is 5 : 1. The number of sides of polygon is
 a. 10 b. 11 c. 12 d. 14
132. In the given figure PT touches the circle with centre O at R. Diameter SQ when produced meet PT at P. If $\angle SPR = x$ and $\angle QSR = y$, then $x + 2y$ is equal to



- a. 180° b. 90° c. 135° d. None of these
133. The geometric mean of two numbers is 8 and their harmonic mean is 6.4. The numbers are
 a. 2, 8 b. 4, 16 c. 4, 8 d. 2, 16
134. A merchant advertises 10% off on the items bought from his store. The total discount got by a customer who bought a suitcase worth ₹ 560, a bag worth ₹ 90 and a towel worth ₹ 45 is
 a. ₹ 69.50 b. ₹ 70 c. ₹ 71.50 d. ₹ 72
135. In the adjoining figure, a smaller circle touches a larger circle internally and passes through the centre O of the latter. If the area of the smaller circle is 200 cm^2 . The area of the larger circle in cm^2 is



- a. 200 cm^2 b. 400 cm^2 c. 600 cm^2 d. 800 cm^2
136. An unbiased dice is rolled twice, what is the probability of not getting a 2 in any one of the two rolls?
 a. $1/3$ b. $5/12$
 c. $25/36$ d. $35/36$

- 137.** For what value of k , the vertices $(2, 1)$, $(3, 3)$ and $(5, k)$ form an equilateral triangle?
a. 4 *b.* 2 *c.* $3/4$ *d.* No such value exist
- 138.** An employee is required to contribute 10% of his pay to general provident fund. If he gets ₹ 13500 as net pay in a month, then what is the monthly general provident fund contribution (assuming no other deductions)?
a. ₹ 1215 *b.* ₹ 1350 *c.* ₹ 1500 *d.* ₹ 1650
- 139.** Pressure varies inversely as volume varies and temperature varies directly as volume varies. At a time volume = 50 m^3 , temperature = 25 K and pressure = 1 atm. If volume is increased to 200 m^3 , then the temperature will be
a. 100 K *b.* 20 K *c.* 400 K *d.* 80 K
- 140.** If $x + y + z = 0$, then what is the value of $\frac{xyz}{(x+y)(y+z)(z+x)}$ where, $(x \neq -y, y \neq -z, z \neq -x)$?
a. -1 *b.* 1 *c.* $xy + yz + zx$ *d.* None of these
- 141.** For a positive integer n , define $d(n)$ = the number of positive divisors of n . What is the value of $d(d(d(12)))$?
a. 1 *b.* 2 *c.* 4 *d.* None of these
- 142.** If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$, then $\cos \theta_1 + \cos \theta_2 + \cos \theta_3$ is equal to
a. 0 *b.* 1 *c.* 2 *d.* 3
- 143.** An aeroplane flying at a height of 300 m above the ground phase vertically above another plane at an instant when the angle of elevation of the two planes from the same point on the ground are 60° and 45° , respectively. The height of the lower plane from the ground (in m) is
a. $100\sqrt{3}$ *b.* 50 *c.* $\frac{100}{\sqrt{3}}$ *d.* 150
- 144.** Ravi and Sneha working separately can finish a job in 8 and 12 h, respectively. If they work for an hour alternatively. Ravi beginning at 9 : 00 am. When will the job be finished?
a. 7 : 30 pm *b.* 7 : 00 pm *c.* 6 : 30 pm *d.* 6 : 00 pm
- 145.** The difference between simple and compound interest for 2 yr at 5% per annum is ₹ 25. The sum is
a. ₹ 10100 *b.* ₹ 2500 *c.* ₹ 10000 *d.* 12000
- 146.** Consider the following statement
I. The power was transferred from the East India Company to the British Crown in order to ensure a more responsible management of Indian affairs.
II. The Governor-General of India was given the title of Viceroy.
III. The British decided to respect the customary religious and social practices of the people of India.
IV. All the ruling chiefs of the country were assured that their territory would never be annexed in future.
Which of the following is/are feature of the revolt of 1857?
a. I, II and III *b.* III and IV *c.* I, III and IV *d.* All of these
- 147.** The Governor-General at the time when the 1857 revolt broke out was
a. Dalhousie *b.* Canning *c.* Curzon *d.* Lawrence

157. Which of the following regions is known as 'Orchards of the World' for their fruit cultivation?
a. Mediterranean *b.* Tropical grasslands
c. Tundra *d.* Temperate grasslands
158. Settlements are places, where people build their homes. The natural conditions for the selection of an ideal settlement are
 I. Favourable climate II. Availability of water
 III. Suitable land IV. Fertile soil
 Which of the above statement(s) is/are correct?
a. III and IV *b.* I, II and III *c.* I and IV *d.* All of these
159. Investment made in the form of education, training and medical care on people is known as
a. fixed capital *b.* human capital *c.* working capital *d.* None of these
160. The sample surveys for estimating poverty-line in India is conducted by which of the following organisations?
a. Central Statistical Organisation (CSO) *b.* National Sample Survey Organisation (NSSO)
c. Planning Commission *d.* National Development Council
161. Availability of food means
a. food production within the country
b. imports of food
c. previous years stock stored in government granaries
d. All of the above
162. Human development report published by United Nations Development Programme compares the development of countries on the basis of
a. education level of the people *b.* health status of the people
c. per capita income of the people *d.* All of these
163. The total number of High Courts in India at present is
a. 15 *b.* 16 *c.* 18 *d.* 21
164. Consider the following statements
 I. The James Mill was a severe critic of the Orientalists.
 II. The 1854 despatch on education was in favour of English being introduced as a medium of higher education in India.
 III. Mahatma Gandhi thought that promotion of literacy was the most important aim of education.
 IV. Rabindranath Tagore felt that children ought to be subjected to strict discipline.
 Which of the above statement(s) is/are correct?
a. I, II and III *b.* I and III *c.* II and III *d.* All of these
165. Who of the following was the chief exponent of combining elements of modern Western civilisation with the best within Indian tradition?
a. Mahatma Gandhi *b.* William Jones *c.* Rabindranath Tagore *d.* None of these
166. Consider the following statements
 I. Mahatma Gandhi argues that colonial education created a sense of inferiority in the minds of Indians.
 II. Mahatma Gandhi strongly felt that Indian languages ought to be the medium of teaching.
 III. He focused on reading and writing rather than oral knowledge.
 IV. Education would develop individual's mind and their capacity to understand.
 Which of the above statement(s) is/are true about Mahatma Gandhi's view on Education?
a. I, II and III *b.* II, III and IV *c.* I and IV *d.* All of these

- 167.** What does the Equality before Law used in Article 14 mean?
- That all individuals are equal
 - That all laws are the same for everybody
 - That all individuals are equally subjected to the ordinary law of the land
 - That everybody is to be treated equally by law in equal circumstances
- 168.** Choose the appropriate answer in case of Speaker's vote in Lok Sabha?
- When there is an equality of votes on a particular matter
 - During consideration of a bill relating to amendment of the Constitution
 - On the request of the leader of the majority party in Lok Sabha
 - Has no right to vote in any circumstances
- 169.** Who decides about the number of judges in a Supreme Court?
- The Parliament
 - Council of Ministers
 - The President
 - Chief Justice of India

170. Consider the following statement(s)

- I. USA II. Switzerland III. Australia IV. Spain

Which of the above states is/are examples of coming together federalism in which independent states came together on their own to form bigger unit?

- I, II and III
- I and IV
- I, III and IV
- All of these

171. Match the following

List I	List II
A. Rosewood	1. Temperate deciduous forests
B. Hardwood	2. Temperate evergreen forests
C. Eucalyptus	3. Tropical deciduous forests
D. Oak	4. Tropical evergreen forests

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 |

172. Rosewood, Ebony, Mahogany are common vegetation of which of the following types of forests?

- Evergreen forest
- Deciduous forest
- Temperate evergreen forest
- Temperate deciduous forest

173. Which of the following forests is found in higher latitudes and are also called as 'Taiga'?

- Coniferous forests
- Evergreen rain forest
- Temperate deciduous forests
- None of these

174. Match the following

List I	List II
A. East Africa	1. Llanos
B. Brazil	2. Campos
C. Venezuela	3. Savanna

Codes

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

- 175.** The total value of goods and services produced in one year within the territory of a country is known as
a. Gross Domestic Product (GDP) *b.* Net National Product (NNP)
c. Industrial Production *d.* None of these
- 176.** The international organisation like World Bank uses a uniform standard for describing poverty line, is the minimum availability of the equivalent of per person per day.
a. \$ 10 *b.* \$ 1 *c.* \$ 100 *d.* \$ 50
- 177.** A process through which individuals or groups are excluded from facilities, benefits and opportunities that others enjoys, is known as
a. vulnerability *b.* social exclusion *c.* social discrimination *d.* None of these
- 178.** Match the following

List I	List II
A. MNREGA	1. Self employment opportunities for educated youth
B. SGSY	2. Food grains at subsidised rates
C. PMRY	3. 100 days assured employment every year
D. AAY	4. Assisted poor families through self-help groups

Codes

A B C D

a. 3 4 1 2

A B C D

b. 4 3 1 2

A B C D

c. 1 2 3 4

A B C D

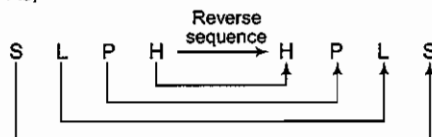
d. 2 1 3 4

- 179.** The stock of food grains procured by the government is known as
a. buffer stock *b.* consumption stock *c.* national stock *d.* None of these
- 180.** The headquarters of the International Atomic Energy Agency is situated at
a. Austria *b.* Rome *c.* Geneva *d.* None of these

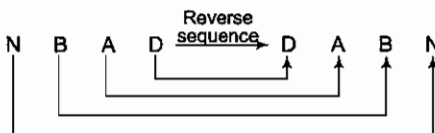
Paper I : Mental Ability Test

1. (c) As, $L \xrightarrow{+1} M$ Similarly, $S \xrightarrow{+1} T$
 $H \xrightarrow{-1} G$ $R \xrightarrow{-1} Q$
 $P \xrightarrow{+1} Q$ $T \xrightarrow{+1} U$
 $Q \xrightarrow{-1} P$ $P \xrightarrow{-1} O$
 $\therefore ? = TQUO$

2. (b) As,



Similarly,



$\therefore ? = DABN$

3. (d) As, $C \xrightarrow{+1} D$ Similarly, $R \xrightarrow{+1} S$
 $S \xrightarrow{+1} T$ $A \xrightarrow{+1} B$
 $A \xrightarrow{+1} B$ $C \xrightarrow{+1} D$
 $T \xrightarrow{+1} U$ $E \xrightarrow{+1} F$
 $\therefore ? = SBDF$

4. (a) As, $N \xrightarrow{+1} O$ Similarly, $L \xrightarrow{+1} M$
 $M \xrightarrow{+2} O$ $S \xrightarrow{+2} U$
 $L \xrightarrow{+3} O$ $P \xrightarrow{+3} S$
 $O \xrightarrow{+4} S$ $H \xrightarrow{+4} L$
 $\therefore ? = MUSL$

5. (b) Starting clockwise direction from number 2.

$$2 \times 2 + 1 = 5; 5 \times 2 + 1 = 11;$$

$$11 \times 2 + 1 = 23;$$

$$23 \times 2 + 1 = 47; 47 \times 2 + 1 = 95;$$

$$95 \times 2 + 1 = 191; 191 \times 2 + 1 = 383$$

$\therefore ? = 383$

6. (c) As, $2 \times 2 = 4 + 2 = 2$ (in first column)
 and $6 \times 2 = 12 + 3 = 4$ (in second column)
 Similarly, $8 \times 2 = 16 + 4 = 4$ (in third column)
 $\therefore ? = 4$

7. (a) As, $360 \div 2 = 180; 180 \div 3 = 60;$
 $60 \div 4 = 15$

and $600 \div 2 = 300; 300 \div 3 = 100; 100 \div 4 = 25$

Similarly, $480 \div 2 = 240$

$$240 \div 3 = 80$$

$$80 \div 4 = 20$$

and $1200 \div 2 = 600; 600 \div 3 = 200;$

$$200 \div 4 = 50$$

$\therefore ? = 1200, 600, 200, 50$

8. (b) As, 7 and $(7 + 1)^2 = 64$

Similarly, 10 and $(10 + 1)^2 = 121$

$\therefore ? = 121$

9. (d) The relationship is $n^4 : n : n^3$

$$\therefore 4^4 : 4 : 4^3 = 256 : 4 : 64$$

$$\therefore ? = 256, 4$$

10. (d) Number 83 is a prime number whereas 21, 39 and 51 are composite numbers.

11. (a) Sum of all digits is 27 for options (b), (c) and (d) but for option (a), it is 23.

12. (c) Among all the given numbers, only 15 is not a prime number. Rest numbers 11, 13 and 17 are prime numbers.

13. (c)
 $2 \xrightarrow{+3} 5 \xrightarrow{+6} 11 \xrightarrow{+12} 23 \xrightarrow{+24} 45 \xrightarrow{+48} 95$

Hence, 47 will come in place of 45.

14. (c)
 $60 \xrightarrow{-5} 55 \xrightarrow{-10} 45 \xrightarrow{-15} 35 \xrightarrow{-20} 10$

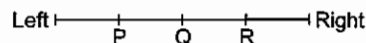
Hence, 30 will come in place of 35.

15. (b)
 $4 \xrightarrow{+1} 5 \xrightarrow{+2} 7 \xrightarrow{+3} 10 \xrightarrow{+4} 14 \xrightarrow{+5} 20 \xrightarrow{+6} 25$

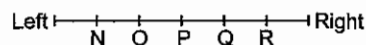
Hence, 19 will come in place of 20.

16. (b) At first, we arrange the given informations.

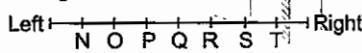
(i) Q is to the left of R but right of P.



(ii) O is right to N and left to P.



(iii) S is right to R and left to T.



Hence, Q is in the middle.

17. (c) At first, we arrange the given informations in the descending order.

(i) Anita is taller than Surjit but shorter than Kusum.

$$\text{Kusum} > \text{Anita} > \text{Surjit} \quad \dots(i)$$

(ii) Surjit is just as tall as Kalpana but taller than Vanita.

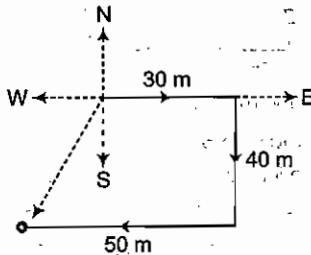
$$\text{Surjit} = \text{Kalpana} > \text{Vanita} \quad \dots(ii)$$

From Eqs. (i) and (ii), the order will be

$$\text{Kusum} > \text{Anita} > \text{Surjit} = \text{Kalpana} > \text{Vanita}$$

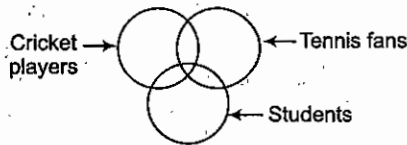
Hence, Kalpana is shorter than Anita.

18. (c) Alok walked 30 m towards East. He took a right turn and walked 40 m. He took a right turn and walked 50 m.



Hence, Alok is South-West from his starting point.

19. (a) Some students can be tennis fans or cricket players. Even some tennis fans can be cricket players.



20. (c) Kashish and Mona are on a line. Kashish is 5th from the left and Mona is 6th from the right. An arrow shows Kashish moving 8 places right.

Since, Kashish moved 8 places towards right in the same way. Mona will also move 8 places towards left and she will become 14th from right.

21. (b) The bell was rung 5 min ago, it rings at regular intervals of 45 min. Hence, after 40 min it will ring again. In question, it has been said that the bell will ring at 7:45 am. Hence, the priest gave information at 7:05 am.

22. (a) In the first pair, the first figure is doubled to make the second figure.

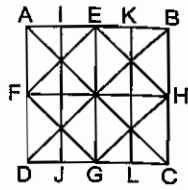
In the same way, in the second pair, the first figure will be doubled.

23. (b) In the first pair, the first figure gets laterally inverted and the shaded circle becomes unshaded.

In the same way, in the second figure, the first figure will get laterally inverted and the shaded circle will become unshaded.

24. (b) The figure has been labelled as shown in the right figure.

It is clear from the figure that the straight lines in the figure are as follows



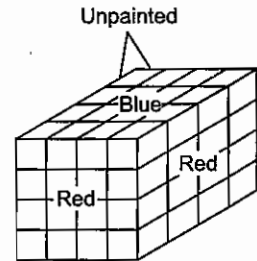
(i) Straight lines from the outer square : AB, BC, CD, AD — 4.

(ii) Straight lines in the diagonals : AC, BD — 2.

(iii) Other straight lines inside the square : EG, FH, EF, FG, GH, EH, IJ, KL — 8.

Therefore, total number of straight lines is 14.

25. (a) Number of smaller cubes which are unpainted = 8 cubes from inside + 10 cubes from two adjacent unpainted surfaces = 18 cubes



26. (c) Twenty eight cubes from two adjacent surfaces painted red will have atleast red colour on their surfaces.

27. (d) Thirty two cubes from two opposite surfaces painted blue have atleast one surface painted blue.

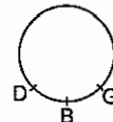
28. (b) Twelve cubes present on the four edges common to blue and red surfaces will have two surfaces painted, one with red colour and the other with blue colour.

29. (c) Only two cubes from the two corners will have three surfaces painted.

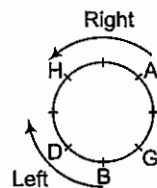
30. (a) 7th day is three days earlier than Friday i.e., Tuesday. Hence, 5th day of the month will be Sunday. Rest Sundays of the month will be 12th, 19th, 26th. Hence, 19th of month will be Sunday.

Solutions (Q. Nos. 31-32) At first we arrange the given informations.

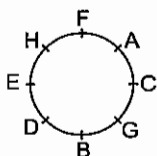
(i) B is sitting between G and D.



(ii) H is third to the left of B and second to the right of A.



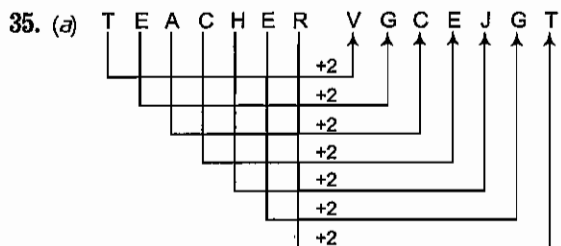
(iii) C is between A and G. B and E are not sitting opposite to each other.



31. (c) F is third to the left of D.
 32. (d) E is sitting between H and D, not between F and D.
 33. (c) There are three such even numbers 6, 2, 8 each of which is preceded by an odd number and not followed by an even number.

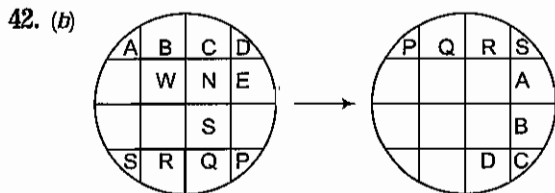
5 3 4 8 9 7 1 6 5 3 2 9 8 7 3 5

34. (d) There are five such 5's.
 3 5 9 5 4 5 5 3 5 8 4 5 6 7 3 5 7 5 5 4 5 2 3 5 1 0



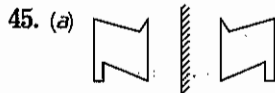
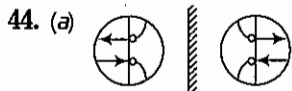
Similarly, DULLARD = FWNNCTF

36. (d) All others are geometrical structures and have some straight lines but option (d) is not geometrical structure.
 37. (a) In all others, there is only one vertical line at the apical and of horizontal line, whereas in option (a), there are two such lines.
 38. (b) In all others, vertically opposite sides are parallel to each other but in option (b), they are not parallel.
 39. (c) In answer figure (c), the specified components of the problem figure are found.
 40. (d) In answer figure (d), the specified components of the problem figure are found.
 41. (b) In answer figure (b), the specified components of the problem figure are found.

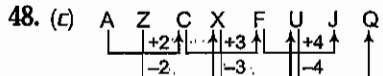


Hence, R and D would be the North-South.

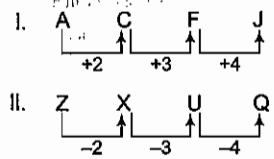
43. (b) From the initial positions A is positioned North-West and P is positioned South-East.



47. (a) bed f ? h j ? l
 bed / f i j h / j m l

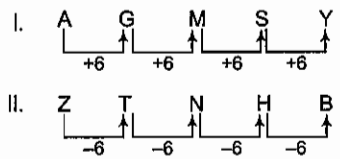


The series can be written in two parts.

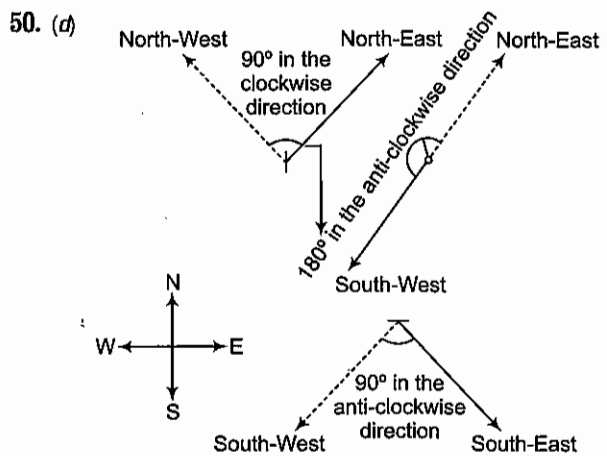


∴ JQ are the missing letters.

49. (c) AZ GT MN ? YB
 The series can be written in two parts.



Hence, (SH) will be the missing letters.



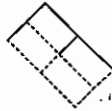
Hence, Raman is finally facing South-East direction.

51. (d) The sister of her mother's husband is my aunt.
 (i) Her (woman in photograph) mother's husband = Her father
 (ii) Sister of her father = Her aunt
 That means the woman in photograph is sister of that man or that man is brother of that woman because that woman's aunt is also that man's aunt.

52. (c) Answer figure (c) will complete the problem figure.
53. (a) Answer figure (a) will complete the problem figure.
54. (b) Answer figure (b) will complete the problem figure.
55. (d) On close observation, we find that the problem figure is embedded in figure (d) as shown.



56. (c) On close observation, we find that the problem figure is embedded in figure (c) as shown below.



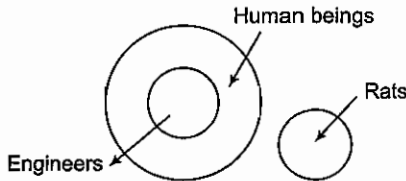
57. (c) On close observation, we find that the problem figure is embedded in figure (c) as shown.



58. (c) When 3 is on right hand side face, then 4 on the front face, 6 on the top face, 5 on the rear face and 2 on the bottom face. Hence, it is clear that when 2 is at the bottom, 6 is at the top.
59. (d) From figures (i) and (ii), we conclude that the numbers 1, 2, 3 and 4 appear adjacent to 6. Thus, the number 5 will appear opposite to 6. Therefore, when 6 is at the bottom, 5 will be at the top.

60. (c) From the figures (i) and (ii), it is clear that letters A, B, E and D are on the adjacent surfaces of the letter C. Hence, letter F will be at the opposite to letter C.

61. (b)



62. (d) Shaded portion represent students who study Chemistry, Physics and Mathematics.

63. (a) 7 1 | 9 1 1 | 7 1 8 9 1 7 1 2 1 3 1 4 5 7 1 3 9 1 7

Solutions (Q.Nos. 64-67)

A is good in studies and plays-Football and Volleyball.
 B is average in studies and plays-Tennis and Volleyball.
 C is good in studies and plays-Hockey and Volleyball.
 D is poor in studies and plays-Four games (Tennis Volleyball, Hockey and Football).
 E is poor in studies and plays-only one game (Cricket).

64. (a) D does not play the game cricket.
65. (c) B play two games volleyball and tennis.
66. (b) Good in studies other than A-C.
67. (a) E plays only one game cricket.
68. (a) Clearly, I directly follows the given statement. Also, it is mentioned that old ideas are replaced by new ones, as thinking changes with the progressing time. So, II does not follow.

69. (c) The statement mentions that demand for oil is increasing faster than the production. So, either the demand must be reduced or oil must be imported to cope with the increasing demand. Thus, either I or II follows.
70. (d) Nothing about the details of the employees' income or the cause of their refusal to declare their income and assets, can be deduced from the given statement. So, neither I nor II follows.

71. (c) 1 6 9 2 7 4 6
 ↓ ↓ ↓ ↓ ↓ ↓ ↓
 T R O N S L R

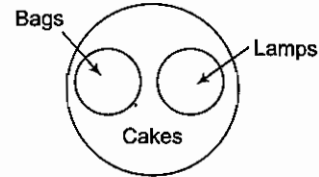
72. (a) K T M R N S
 ↓ ↓ ↓ ↓ ↓ ↓ ↓
 8 1 3 6 2 7

73. (b) 3 2 5 6 7 8 9
 ↓ ↓ ↓ ↓ ↓ ↓ ↓
 M N Q R S K O

74. (d) 8 7 6 5 4 0 3
 ↓ ↓ ↓ ↓ ↓ ↓ ↓
 K S R Q L P M

75. (a) K Q T N S M N L
 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
 8 5 1 2 7 3 2 4

76. (c) In each problem figures, one circle is increasing.
77. (c) According to the statements, Venn-diagram is

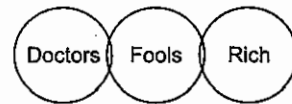


Conclusions

- I. ✓ / ✗ II. ✓ / ✗

Hence, either Conclusion I or II follows.

78. (d) According to the statements, Venn-diagram is

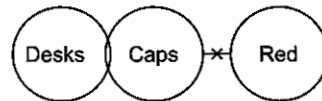


Conclusions

- I. ✗ II. ✗

Hence, neither Conclusion I nor II follows.

79. (a) According to the statements, Venn-diagram is

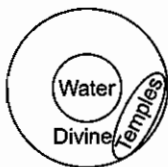


Conclusions

I. ✓ II. ✗

Hence, only conclusion I follows.

80. (d) According to the statements, venn diagram is



Conclusions

I. ✗ II. ✗

Hence, neither conclusion I nor II follows.

81. (a) Let the present ages of Anupam and Raju be $5x$ and $4x$ yr, respectively.

Now, age of Anupam 3 yr hence = $(5x + 3)$ yr and age of

Raju 3 yr, hence = $(4x + 3)$ yr

According to the question, •

$$\frac{5x + 3}{4x + 3} = \frac{11}{9}$$

$$\Rightarrow 45x + 27 = 44x + 33$$

$$\Rightarrow x = 6 \text{ yr}$$

$$\therefore \text{Present age of Raju} = 4 \times 6 = 24 \text{ yr}$$

82. (c) From Statements (I) and (III), $na \rightarrow are$
From Statements (II) and (III), $tok \rightarrow bad$
 \therefore $tim \rightarrow they$

83. (b) From Statements (I) and (II), we get
 \therefore $dar \rightarrow good$

84. (b) Answer figure (b) is appear when paper is folded and punched as shown below.

85. (b) In December 1990, 3rd, 10th, 17th, 24th and 31st December are Sundays.

Hence, 1st January is Monday *i.e.*, 3rd January 1991 will be Wednesday.

86. (d) The required region is the one, which is common to the triangle and the circle but lies outside the square *i.e.*, G.

87. (b) D lies inside the triangle and the square but outside the circle. So, D represents such a situation.

88. (d) The letter is E.

89. (c) The required region is the one, which is common to the circle and square *i.e.*, E and F.

90. (b) $L \rightarrow 56, 68, 79, 89, 95$ $A \rightarrow 02, 13, 23, 34, 42$

$$T \rightarrow 58, 65, 77, 87, 99$$

$$E \rightarrow 03, 14, 22, 33, 40$$

$$\therefore \text{LATE} \rightarrow 79, 42, 65, 22$$

Paper II : Scholastic Aptitude Test

91. (d) Position-time graph with zero acceleration is constant.

92. (c) Escape velocity does not depend on mass of particle and temperature of planet.

93. (a) A gas thermometer is more sensitive than a liquid thermometer because gas expansion factor is greater than that of liquid.

94. (c) It depends on three factors : velocity of source, velocity of observer and velocity of the medium.

95. (c) Incident beam is a sound wave beam generated by a transducer that strikes on interface.

96. (c) $R = R_1 + R_2 = 10 + 20 = 30 \Omega$

$$E = E_1 - E_2 = 5 - 2 = 3 \text{ V}$$

From Ohm's law,

$$E = iR$$

$$\Rightarrow i = \frac{E}{R} = \frac{3}{30} = \frac{1}{10} = 0.1 \text{ A}$$

97. (c) The magnetic field at P is parallel to NS.

98. (a) Magnetic lines of force due to a bar magnet do not intersect because if they intersect, then they are two directions of magnetic field intensity which is impossible.

99. (d) The energy lost as heat, which is known as the hysteresis loss, in reversing the magnetisation of the material is proportional to the area of the hysteresis loop.

100. (a) On immersing a mirror in water, focal length of the mirror remains unchanged.

101. (a) $f_o + f_e = 105 \text{ cm}$ and $\frac{f_o}{f_e} = 20$

$$\Rightarrow f_o = 20 f_e$$

$$\Rightarrow 21 f_e = 105 \Rightarrow f_e = 5, f_o = 100 \text{ cm}$$

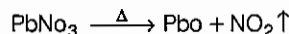
102. (c) As the bubble rises, the pressure of the trapped air in the bubble decreases due to decreasing vertical liquid depth.

103. (a) On going from left to right in a period nuclear charge increases. Hence, ionization energy increases.

Correct order of ionization potential is

$$Rb < Sr < Y < Nb < Cd$$

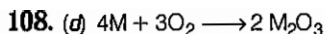
104. (a) When solid lead nitrate heated, a brown coloured gas (NO_2) evolves and a solid yellow coloured residue (Pb) is obtained.



105. (c) Modern Periodic table has 18 vertical columns called groups and 7 horizontal rows called periods.

106. (d) When ethanol is heated with conc. H_2SO_4 at a temperature of 170° , it gets converted in to ethene. In this reaction, conc. H_2SO_4 plays a role of dehydrating agent.

107. (d) In the process of respiration heat producer, thus it is a exothermic reaction.



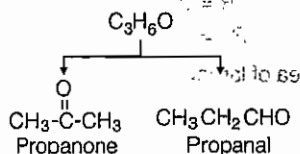
This is a combination and oxidation reaction both.

109. (d) Carbon is used in making electrodes of dry cells. Sulphur is used in vulcanisation of rubber.

110. (a) Acetic acid is not completely soluble in water. It contains a hydrophilic gp. - COOH and a hydrophobic gp. - CH₃. It forms a separate layer at the bottom.

111. (a) On moving from left to right in a period, due to increase in nuclear charge, atomic radii decreases.

112. (d) Ketones and aldehydes includes isomeric compounds. e.g.,



113. (a)

114. (a)

115. (b) The living part of a plant is made of interconnected cells each surrounded by a cell wall whose main constituent is cellulose.

116. (d) When Marine fish goes into fresh water, the water goes into their body because of osmosis. Due to which there will be high concentration of solvent in Marine fish body which leads to death.

117. (b) HIV ELISA Western blot is a set of blood tests used to diagnose chronic infection with Human Immunodeficiency Virus (HIV).

118. (a) Organic farming is a system, which avoids or largely excludes the use of synthetic inputs (such as fertilisers, pesticides, hormones, feed additives etc.). Organic farming is a form of agriculture that relies on green manure, compost and biological pest control.

119. (b) Denitrifying bacteria form a necessary part of the process known as denitrification as part of the nitrogen cycle. During denitrification nitrates are reduced to nitrites and then to nitrogen gas and ammonia.

120. (a) The atmosphere consists of 78% nitrogen, 21% oxygen, 0.93% argon, 0.03% carbon dioxide and 0.04% of other gases. The troposphere contains over 75% of all the atmosphere's gases.

121. (c) The wider use of *Agrobacterium tumefaciens* and *E.coli* as a tool for genetic engineering.

122. (d) Yoghurt is defined as a product resulting from milk by fermentation with a mixed starter culture consisting of *Streptococcus thermophilus* and *Lactobacillus casei*.

123. (a) Red dye extracted from the orange flowers of the thistle like *Carthamus tinctorius*.

124. (b) Wood, also known as secondary xylem, is a composite of tissues found in trees.

125. (a) Many types of yeasts are used for making many foods. Baker's yeast in bread production, brewer's yeast in beer fermentation.

126. (d) $x^\circ = 60^\circ$ (vertically opposite)

$$x = y \quad (\text{acute angles})$$

$$\Rightarrow y = 60^\circ$$

$$\angle PRS = 110^\circ$$

$$\angle QRS + x^\circ = 110^\circ$$

$$\angle QRS = 110^\circ - 60^\circ$$

$$= 50^\circ$$

$$\therefore t = 180^\circ - (y + \angle QRS) = 180^\circ - (60^\circ + 50^\circ)$$

$$t = 70^\circ$$

Also, $t = z$ (acute angles)

$$\therefore z = 70^\circ$$

127. (c) Let A has x mangoes and B has y mangoes.

Case I $x + 30 = 2(y - 30)$

$$\Rightarrow x + 30 = 2y - 60$$

$$x - 2y = -90 \quad \dots(i)$$

Case II $(y + 10) = 3(x - 10)$

$$y = 3x - 30 - 10$$

$$3x - y = 40 \quad \dots(ii)$$

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

$$x = 34, y = 62$$

\therefore A has 34 mangoes.

128. (b) Here, $\alpha + \beta = (1 + a^2)$ and $\alpha\beta = \frac{1}{2}(a^4 + a^2 + 1)$

$$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta \quad (\text{by formula})$$

$$= (1 + a^2)^2 - (a^4 + a^2 + 1)$$

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

$$\alpha^2 + \beta^2 = a^2$$

129. (d) Volume of the cone

$$= \frac{1}{3} \pi r^2 h = \frac{1}{3} \times \pi \times 5^2 \times 8 = \frac{200}{3} \pi \text{ cm}^3$$

$\frac{1}{4}$ th volume of the cone

$$= \frac{1}{4} \times \frac{200}{3} \pi = \frac{50}{3} \pi \text{ cm}^3$$

Volume of one lead shot

$$= \frac{4}{3} \pi r^3 = \frac{4}{3} \pi \left(\frac{1}{2}\right)^3 = \frac{\pi}{6} \text{ cm}^3$$

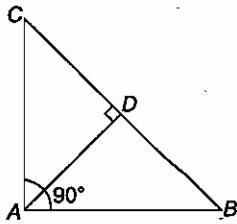
Let n leads be dropped.

\therefore Volume of n leads shots = $\frac{1}{4}$ th volume of the cone

$$\therefore n \times \frac{\pi}{6} = \frac{50}{3} \pi$$

$$\Rightarrow n = \frac{50 \times 6}{3} = 100$$

130. (c) Let $\angle C = \theta$, then $\angle B = 90^\circ - \theta$



In $\triangle ADC$, $\angle D = 90^\circ$, $\angle C = \theta$
 and $\angle CAD = 90^\circ - \theta$
 In $\triangle ADB$, $\angle D = 90^\circ$, $\angle B = 90^\circ - \theta$, $\angle DAB = \theta$
 and in $\triangle ABC$,
 $\angle C = \theta$, $\angle B = 90^\circ - \theta$, $\angle A = 90^\circ$
 $\therefore \triangle ABC \sim \triangle DBA \sim \triangle DAC$

131. (c) By condition,

$$\frac{\text{Interior angle of regular polygon}}{\text{Exterior angle of a regular polygon}} = \frac{5}{1}$$

$$\Rightarrow \frac{\frac{(n-2) \times 180^\circ}{n}}{\frac{360^\circ}{n}} = \frac{5}{1}$$

$$\Rightarrow \frac{(n-2)}{2} = \frac{5}{1}$$

$$\Rightarrow n-2 = 10$$

$$\therefore n = 12$$

132. (b) $\angle SRQ = 90^\circ$ (angle in semi-circle)
 $\angle QRP = \angle QSR = y^\circ$ (angle in alternate segments)
 Also, $\angle PRS = 90 + y^\circ$
 In $\triangle PRS$,
 $\angle SRP + \angle RPS + \angle PSR = 180^\circ$
 $(90 + y^\circ) + x^\circ + y^\circ = 180^\circ$
 $x + 2y^\circ = 90^\circ$

133. (b) Let the number be a and b .
 Here, $\sqrt{ab} = 8$ (given)
 Harmonic mean of a and $b = \frac{2}{\frac{1}{a} + \frac{1}{b}} = 6.4$ (given)

$$\frac{2ab}{a+b} = 6.4$$

$$ab = 64$$

 and
$$\frac{2ab}{a+b} = 6.4$$

$$a+b = \frac{2 \times 64}{6.4} = 20$$

$$\Rightarrow a-b = \sqrt{(a+b)^2 - 4ab}$$

$$= \sqrt{(20)^2 - 4(64)}$$

$$= \sqrt{400 - 256}$$

$$= \sqrt{144} = 12$$

$$a+b=20 \text{ and } a-b=12$$

 On solving above equations, we get
 $a = 16$ and $b = 4$

134. (a) Total discount amount = 10% of total cost of items

$$\text{Total cost} = \frac{10}{100} \times (560 + 90 + 45)$$

$$= \frac{10}{100} \times 695 = ₹ 69.50$$

 135. (d) Let r be the radius of smaller circle.

$$\therefore \pi r^2 = 200$$

$$\therefore r^2 = \frac{200}{\pi}$$

 Let radius of bigger circle = R

$$\Rightarrow R = 2r$$

$$\Rightarrow R^2 = 4r^2$$

 \therefore Area of larger circle

$$= \pi R^2 = \pi \cdot 4 \cdot \frac{200}{\pi} = 800 \text{ cm}^2$$

136. (c) P (getting a 2) = $\frac{1}{6}$
 So, P (not getting a 2) = $1 - \frac{1}{6} = \frac{5}{6}$
 Thus, P (not getting a 2 in 2 rolls of an unbiased dice)

$$= \frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$$

137. (d) Let the points be $A(2, 1)$, $B(3, 3)$ and $C(5, k)$.

$$AB = \sqrt{1^2 + 2^2} = \sqrt{5}$$

$$BC = \sqrt{2^2 + (k-3)^2} = \sqrt{k^2 - 6k + 13}$$

$$CA = \sqrt{3^2 + (k-1)^2} = \sqrt{10 + k^2 - 2k}$$

We should have $AB = BC = CA$ for triangle to be equilateral.
 Taking $AB = BC$, we get $k^2 - 6k + 13 = 5$

$$\Rightarrow k^2 - 6k + 8 = 0$$

$$\Rightarrow k = 4, 2$$

 Taking $BC = CA$

$$\Rightarrow k^2 - 2k + 10 = k^2 - 6k + 13$$

$$\Rightarrow 4k = 3 \Rightarrow k = \frac{3}{4}$$

Since, there is no common value of k possible, the triangle cannot be equilateral.

138. (c) Let net pay of an employee be ₹ 100.
 After contributing 10%, then pay = ₹ 90
 When ₹ 90 is net pay, then basic pay = ₹ 100
 \therefore ₹ 13500 is net pay, then basic pay

$$= \frac{100 \times 13500}{90} = ₹ 15000$$

 \therefore General provident fund = 10% \times basic pay

$$= \frac{15000 \times 10}{100} = ₹ 1500$$

139. (a) As pressure (P) varies inversely as volume (V).
 $\therefore P \propto \frac{1}{V}$ and $T \propto V \Rightarrow P = \frac{K_1}{V}$ and $T = K_2 V$
 But $V = 50$, $T = 25$ and $P = 1$

$$\Rightarrow K_1 = 50 \text{ and } K_2 = \frac{1}{2}$$

$$\therefore p = \frac{50}{V} \text{ and } T = \frac{1}{2}V$$

where $V = 200$, then $T = \frac{1}{2} \times 200 = 100$

140. (a) Given $x + y + z = 0$

$$\therefore \frac{xyz}{(x+y)(y+z)(z+x)} = \frac{xyz}{(-z)(-x)(-y)}$$

$$= \frac{xyz}{-xyz} = -1$$

141. (d) $d(d(d(12))) = d(d(6))$

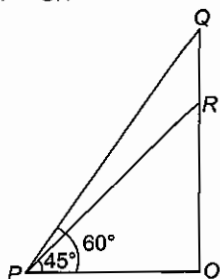
(\therefore positive integer divisor of 12 = 1, 2, 3, 4, 6, 12)
 $= d(4)$
 (\therefore positive integer divisor of 4 = 1, 2, 4)
 $= 3$

142. (a) $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$

But $-1 \leq \sin \theta \leq 1$
 $\Rightarrow \sin \theta_1 = \sin \theta_2 = \sin \theta_3 = 1$
 $\Rightarrow \theta_1 = \theta_2 = \theta_3 = \frac{\pi}{2}$
 $\Rightarrow \cos \theta_1 + \cos \theta_2 + \cos \theta_3$
 $= \cos \frac{\pi}{2} + \cos \frac{\pi}{2} + \cos \frac{\pi}{2}$
 $= 0 + 0 + 0 = 0$

143. (a) Let Q and R be the position of two planes.

Here, $OQ = 300$ m
 In ΔPOR ,
 We have, $OP = OR$



Now, in ΔPOQ ,

$$\tan 60^\circ = \frac{OQ}{OP} = \frac{300}{OR} \quad (\because OP = OR)$$

$$\sqrt{3} = \frac{300}{OR}$$

$$\Rightarrow OR = \frac{300}{\sqrt{3}} = 100\sqrt{3} \text{ m}$$

144. (c) Capacity of Ravi and Sneha per hour = $\frac{1}{8}$ and $\frac{1}{12}$, respectively.

Total work done by them in

$$1 \text{ h} = \frac{1}{8} + \frac{1}{12} = \frac{5}{24} \text{ per h}$$

$$\therefore \text{Full work} = 1 \times \frac{48}{5} = 9 \text{ h, then } \frac{1}{6} \text{ th of work will left and}$$

now turn is of Sneha. Sneha will do the remaining work in 30 min.

Total time taken = 8 h and 30 min

Time = 9 + 9 h and 30 min = 18 : 30 h = 6 : 30 pm

145. (c) Let the principal be ₹ x.

Rate = 5% per annum

Time = 2 yr

By condition,

$$\therefore \left[x \left(1 + \frac{5}{100} \right)^2 - x \right] - \frac{x \times 2 \times 5}{100} = 25$$

$$x \left(\frac{21}{20} \right)^2 - x - \frac{x}{10} = 25$$

$$\frac{441x}{400} - \frac{11x}{10} = 25$$

$$\frac{441x - 440x}{400} = 25$$

$$x = 25 \times 400$$

$$= ₹ 10000$$

146. (d) The rebellion of 1857 saw the end of the East India Company's rule in India. In August, by the Government of India Act, 1858, the company was dissolved and its powers over India were transferred to British Crown.

147. (b) Lord Canning was the Governor-General of India from 1856-1862 and the first Viceroy in India from November 1st, 1858.

148. (a) The doctrine of Subsidiary Alliance was introduced by Wellesly. Under the Alliance, Indian Ruler had to accept British forces within their territory and to pay for their maintenance and to accept the British resident in his state and the ruler will not employ any European other than the British. Hyderabad, Mysore, Tanjore, Awadh, Peshwa, Scindia and Gaekwad entered into such alliance.

149. (d) Chintz fabric is a Glazed Woven Textile bearing bold printed or floral patterns. 'Bandanna' refers to any brightly coloured and printed scarf for the neck or head.

150. (a)

151. (d) The Fundamental Rights can be altered only by the constitutional amendment done by the Parliament.

152. (c) The Council of States or Rajya Sabha can't be dissolved, it is a permanent house, one-third of its members retire after every 2 yrs.

153. (a) The Parliament cannot alter any privileges and rights to the judge's disadvantage after his appointment. Only at the time of financial emergency (Article 360) President can reduce the salaries of the judges.

154. (d) In federalism, the power is divided between the centre and state and this calls for a written Constitution and an independent court to resolve the disputes between the centre and the states.

- 155. (b)**
- 156. (a)** Tundra is the simplest biome in terms of species composition and food chain.
- 157. (a)** The mediterranean regions are known as orchard of the world because of their fruit cultivation. Citrus fruits are mainly cultivated here i.e., oranges, figs, olives etc.
- 158. (d)**
- 159. (b)** Expenditure on education, training and medical care is known as human capital because people cannot be separated from their knowledge, skills, health or values in the way they can be separated from their financial and physical assets.
- 160. (b)** The National Sample Survey Organisation (NSSO), now known as National Sample Survey Office, is an organisation under the ministry of statistic of the Government of India. It is the largest organisation in India conducting regular socio-economic surveys.
- 161. (d)**
- 162. (d)** Human development report measures the development by combining indicators of life expectancy, educational attainment and income into a composite Human Development Index (HDI).
- 163. (d)**
- 164. (a)** Education is backbone of the society and is largely responsible for its upliftment. According to Gandhi education means an all round drawing of the best in child and man in body, mind and spirit.
- 165. (c)** Rabindranath Tagore founded an experimental residential school at Shantiniketan as an alternative to the British education system, in which he tried to combine the best of both Eastern and Western culture and values. Here he tried his Upanishads ideals of education.
- 166. (d)**
- 167. (d)** Equality before Law is the principle under which all the people are subject the same kind of justice in equal circumstances.
- 168. (a)** The speaker does not vote in the House except on those rare occasion when there is a tie at the end of a decision.
- 169. (a)** The judges of the Supreme Court are appointed by the President. The Parliament of India increased the number of judges from original eight in 1950 to eleven, twenty-six in 1986 and thirty-one in 2008.
- 170. (a)**
- 171. (a)**
- 172. (a)** These forests are dense and multi-layered. They harbour many types of plants and animals. Tropical evergreen forests are usually found in areas receiving more than 200 cm of rainfall.
- 173. (a)** Taiga is a belt of coniferous forest found in the Northern hemi-sphere, close to arctic tundra. Coniferous trees are needle-leaved trees that are usually evergreen and shallow rooted and usually bear cones.
- 174. (a)**
- 175. (a)** GDP is the market value of all officially recognised goods and services produced within a country in a given period of time.
- 176. (b)**
- 177. (b)** Social exclusion is a concept to characterise contemporary forms of social disadvantage and relegation to the fringe of society.
- 178. (a)**
- 179. (a)** A buffer stock scheme is an attempt to use commodity storage for the purposes of stabilising prices in an entire economy or more commonly, an individual commodity.
- 180. (a)** The IAEA is an International Organisation that seeks to promote the peaceful use of nuclear energy and to inhibit its use for any military purpose including nuclear weapons. Its headquarters is situated at Vienna, Austria.