

NTSE

National Talent Search Examination

MAT + SAT

[Stage I]

Time : 180 Min

Max. Marks : 180

Read the following instructions carefully.

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

Example

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

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

Paper I : Mental Ability Test

Directions (Q. Nos.1-5) Study the following information carefully and answer the questions given below.

In a certain code 'ca na da' means 'how are you', 'ta na co' we are happy', 'ta po da' 'we and you', so find the question.

1. What is stand for 'happy'?
a. ca b. co c. po d. na
2. What is the code for 'how'?
a. ca b. ta c. po d. co
3. How 'and ' will be code in that language?
a. ca b. co c. po d. ta
4. What is code for 'you are happy'?
a. ta na da b. co ca po c. po ca da d. da na co
5. 'how you happy' will be coded as
a. ca da co b. na da na c. co ca po d. po ca da

Directions (Q. Nos. 6-8) Study the information given below and answer the questions that follow.

'A + B' means A is the father of B.

'A - B' means A is the wife of B.

'A × B' means A is the brother of B.

'A ÷ B' means A is the daughter of B.

6. If $P + R + S + Q$, which of the following is true?
a. P is the daughter of Q b. Q is the aunt of P
c. P is the aunt of Q d. P is the mother of Q
7. If $P - R + Q$, which of the following statements is true?
a. P is the sister of Q b. Q is the daughter of P c. P is the mother of Q d. P is the aunt of Q
8. If $P \times R + Q$, which of the following is true?
a. P is the uncle of Q b. P is the father of Q
c. P is the brother-in-law of Q d. P is the grandfather of Q

Directions (Q. Nos. 9-10) Arrange the given words as they occur in the dictionary.

9. 1. Inward 2. Ion 3. Iodine 4. Invite 5. Iodoform
a. (4), (1), (2), (5), (3) b. (4), (1), (3), (5), (2) c. (1), (3), (2), (4), (5) d. (5), (4), (1), (2), (3)
10. 1. Matter 2. Meal 3. Maze 4. Maximum 5. Mean
a. (2), (3), (5), (4), (1) b. (1), (4), (2), (5), (3) c. (1), (4), (3), (2), (5) d. (4), (1), (3), (2), (5)

Directions (Q. Nos. 11-12) Select the combination of numbers so that letters arranged accordingly will form a meaningful word.

11. H L R A O C S
1 2 3 4 5 6 7
a. 1, 2, 3, 4, 5, 6, 7 b. 7, 6, 5, 1, 4, 2, 3 c. 7, 6, 1, 5, 2, 4, 3 d. 7, 6, 5, 1, 2, 4, 3
12. I K E S R T
1 2 3 4 5 6
a. 6, 4, 5, 1, 2, 3 b. 4, 6, 5, 1, 2, 3 c. 6, 5, 4, 3, 2, 1 d. 1, 2, 3, 4, 5, 6

13. If the positions of the third and tenth letters of the word 'DOCUMENTATION' are interchanged and likewise the positions of the fourth and seventh letters, the second and sixth letters are interchanged, which of the following will be eleventh from the right end?
 a. R b. S c. T d. U

Directions (Q. Nos. 14-15) *Identify the correct related word in the following questions.*

14. Calendar : Dates :: Dictionary : ?
 a. Language b. Sentences c. Words d. Vocabulary
15. Clock : Time :: Thermometer : ?
 a. Temperature b. Speed c. Length d. Humidity

Directions (Q. Nos. 16-20) *Study the following information carefully and answer the questions that follow.*

Four young men Harshit, Ankush, Ankur and Amulya are friendly with girls Pooja, Neha, Sushmita and Nidhi. Pooja and Sushmita are friends. Ankur's girlfriend does not like Pooja and Sushmita. Neha does not care for Ankur. Ankush's girlfriend is friendly with Sushmita. Sushmita does not like Harshit.

16. Who is Harshit's girlfriend?
 a. Neha b. Nidhi c. Pooja d. Sushmita
17. With whom Pooja is friendly?
 a. Harshit b. Amulya c. Ankur d. Ankush
18. Who is Nidhi's boyfriend?
 a. Harshit b. Amulya c. Ankur d. Ankush
19. Who doesn't like Sushmita and Pooja?
 a. Harshit b. Amulya c. Ankur d. Nidhi
20. Who is Sushmita's boyfriend?
 a. Ankush b. Ankur c. Amulya d. Harshit

Directions (Q. Nos. 21-23) *Find the missing number in the following series.*

21. 10, 90, 180, 280, 390, 510, ?
 a. 533 b. 640 c. 630 d. 620
22. 10, 14, 23, 39, 64, ?
 a. 97 b. 98 c. 100 d. 110
23. 6, 12, 24, 48, 96, ?
 a. 120 b. 188 c. 198 d. 192
24. Find out the wrong /incorrect term in the given series.
 18, 72, 144, 576, 1158, 4608
 a. 1158 b. 144 c. 4608 d. 72

Directions (Q. Nos. 25-28) *In the following questions, find out the odd one out.*

25. a. CX b. DW c. EV d. FT
26. a. aA b. bB c. dC d. eE
27. a. 125 b. 729 c. 216 d. 345
28. a. Gold b. Copper c. Silver d. Mercury

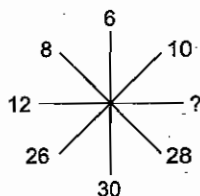
Directions (Q. Nos. 29-33) Study the following information carefully and answer the question given below.

Six flats on a floor in two rows facing North and South are allotted to A, B, C, D, E, and F. B gets a North facing flat and is not next to D. D and F get diagonally opposite flats. C, next to F, gets a South facing flat and E gets a North facing flat.

29. Which of the following combination get South facing flats?
 a. FCA b. BED c. DEF d. ABC
30. Whose flat is between B and D?
 a. F b. E c. A d. C
31. If flats of E and A are interchanged, whose flat will be next to that of F?
 a. C b. A c. B d. D
32. The flats which of the other pairs than DF, is diagonally opposite to each other?
 a. AC b. EC c. BC d. AB
33. Which of the following combination get North facing flats?
 a. CED b. BED c. AED d. BEA

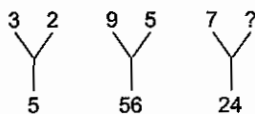
Directions (Q. Nos. 34-35) Find the missing letter or numerical value in following questions given below.

34.



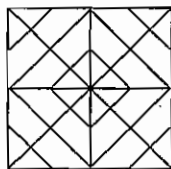
- a. 26 b. 25 c. 24 d. 38

35.



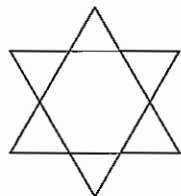
- a. 5 b. 4 c. 3 d. 2

36. In a group of six students, Rahul is heavier than Monu but lighter than Nirmal. Karan is lighter than Monu but he is not as light as Ramu. If Nirmal is lighter than Ayush, then who is the lightest?
 a. Rahul b. Karan c. Monu d. Ramu
37. In a row of 56 students the rank of Deepa is 27th from the left, so what is her position from the right?
 a. 30 b. 31 c. 28 d. 29
38. How many squares are there in the following figure?



- a. 15 b. 14 c. 16 d. 17

39. How many triangle are there in the following figure?



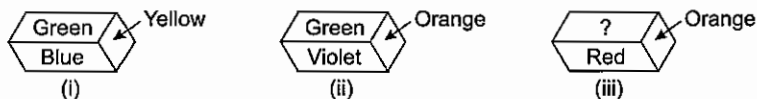
- a. 7 b. 8 c. 9 d. 10
40. From a $10 \times 10 \times 10$ cube, which is formed by combinations of $1 \times 1 \times 1$ cubes, a layer of the smaller cubes is removed, at each corner. What will be the number of $1 \times 1 \times 1$ cubes present in this new cube?

- a. 900 b. 488 c. 512 d. 729

41. Which one of the following figures is correct, if total number of dots on opposite faces of a dice always remains 7?



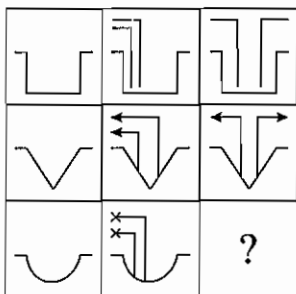
42. The faces of cubical cylinder are painted with 6 colours green, blue, yellow, violet, red and orange. Positions I, II and III are shown below. Find which colour will be on the face left with question mark in position III?



- a. Blue b. Green c. Violet d. Yellow

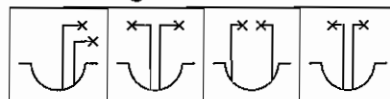
Directions (Q. Nos. 43-45) In the following questions, find out which option that completes the figure matrix.

43. **Problem Figures**



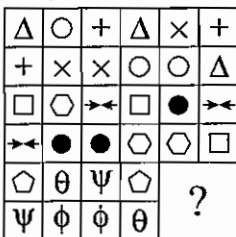
X

Answer Figures



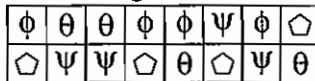
- a. b. c. d.

44. **Problem Figures**



X

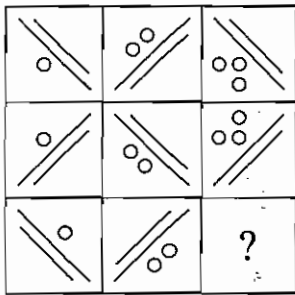
Answer Figures



- a. b. c. d.

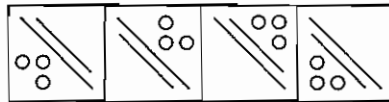
45.

Problem Figures



X

Answer Figures



a.

b.

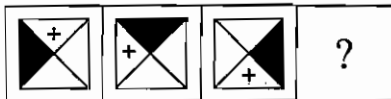
c.

d.

Directions (Q.Nos. 46-50) In the following questions, find out the answer which continue the same series as given in the problem figure.

46.

Problem Figures



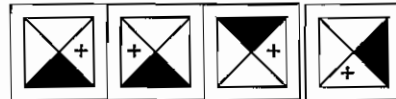
(I)

(II)

(III)

(IV)

Answer Figures



a.

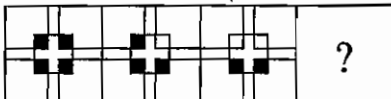
b.

c.

d.

47.

Problem Figures



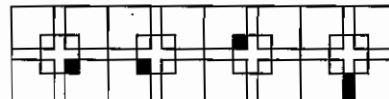
(I)

(II)

(III)

(IV)

Answer Figures



a.

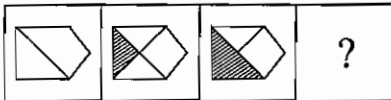
b.

c.

d.

48.

Problem Figures



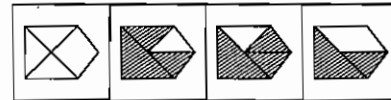
(I)

(II)

(III)

(IV)

Answer Figures



a.

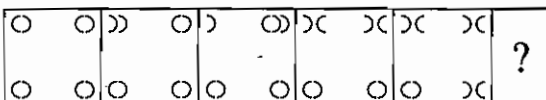
b.

c.

d.

49.

Problem Figures



(I)

(II)

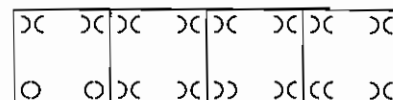
(III)

(IV)

(V)

(VI)

Answer Figures



a.

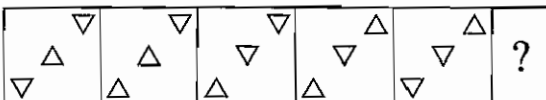
b.

c.

d.

50.

Problem Figures



(I)

(II)

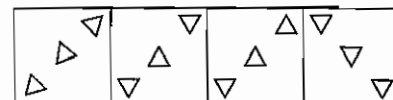
(III)

(IV)

(V)

(VI)

Answer Figures



a.

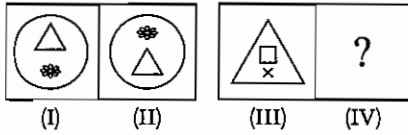
b.

c.

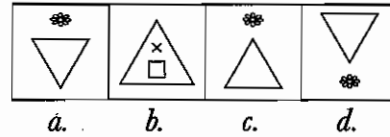
d.

Directions (Q. Nos. 51-53) In the following questions, find out the same relationship between (III) and (IV) as given between (I) and (II).

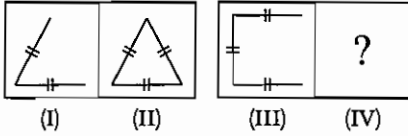
51. Problem Figures



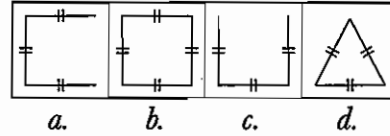
Answer Figures



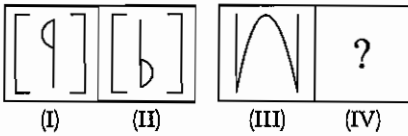
52. Problem Figures



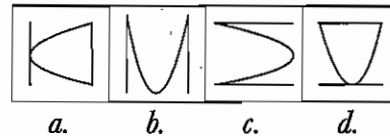
Answer Figures



53. Problem Figures

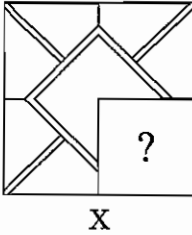


Answer Figures

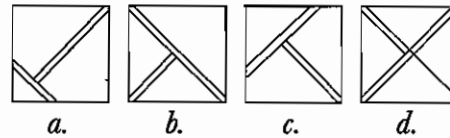


Directions (Q. Nos. 54-56) In the following questions, find out the correct option which completes the problem figure.

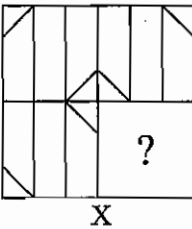
54. Problem Figure



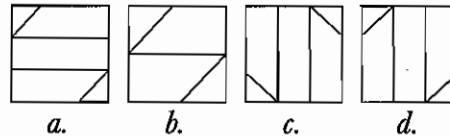
Answer Figures



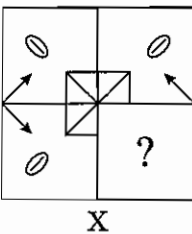
55. Problem Figure



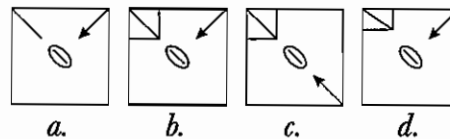
Answer Figures



56. Problem Figures

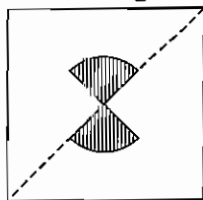


Answer Figures



Directions (Q. Nos. 57-59) In the following questions, find one correct answer figure, the pattern formed when the transpared sheet, having a design folded along the dotted line.

57. Problem Figure



X

Answer Figures



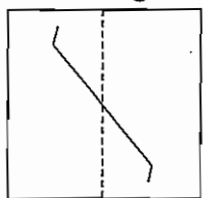
a.

b.

c.

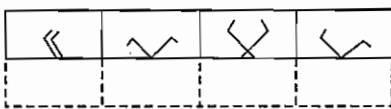
d.

58. Problem Figure



X

Answer Figures



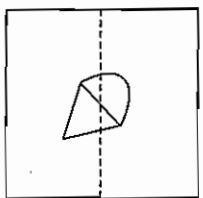
a.

b.

c.

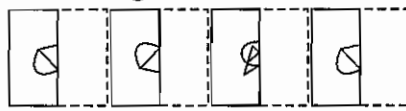
d.

59. Problem Figure



X

Answer Figures



a.

b.

c.

d.

60. A is 3 yr older than B and 3 yr younger to C while B and D are twins. How many years to C than D?

a. 3

b. 2

c. 6

d. 10

61. Two persons X and Y together have total ₹ 100 with them. If X loses half of his money and Y loses 2/3rd of his money, they will have only ₹ 40. How much amount does Y has?

a. ₹ 13

b. ₹ 20

c. ₹ 60

d. ₹ 35

62. Visiting a historical monument, a tourist asked, "How old is this monument?" The guide replied, "The monuments exact age was a square number 2 yr ago and will be a cube number after 2 yr." What is the age of historical monument?

a. 125

b. 124

c. 64

d. 123

Directions (Q. Nos. 63-65) Study the following information carefully and answer the questions given below.

If '+' means '×'; '-' means '÷'; '×' means '+' and '÷' means '-'. So, give the answer of following questions.

63. $10 \times 18 - 9 + 3 \div 1$

a. 15

b. 14

c. 16

d. 13

64. $20 \times 10 - 5 \div 4 + 2$

a. 16

b. 14

c. 15

d. 13

65. $55 \times 10 - 2 + 4 + 3$

a. 47

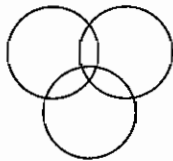
b. 46

c. 48

d. 50

66. Atul is facing South-West. He moves 90° in clockwise direction and 45° in the anti-clockwise direction, which direction Atul is facing now?
 a. West b. South c. North d. East
67. Payal went 20 km South from her house. She turned right and went 15 km, again turned right and cycled 10 km. Now, she turned right and cycled 15 km. What is the actual distance between Payal and her house?
 a. 15 km b. 10 km c. $10\sqrt{10}$ km d. 15 km
68. Akansha wants go to market from her house. If she goes in North from her house she will reach to college and if she goes to West she will reach at dance club and from her house cafe shop is exist in the East. So, where is market exists from her house?
 a. East b. North c. South d. West
69. Prem and Love are brothers. Sonal and Hema are sisters. Son of Prem is the brother of Hema. How is Sonal related to Love?
 a. Niece b. Nephew c. Mother d. Father

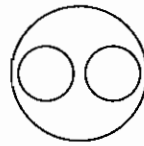
Directions (Q. Nos. 70-74) Each one of the following question contains three items. Using the relationship between these items and match each question with the most suitable diagram.



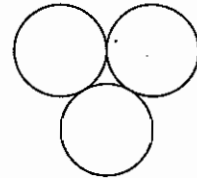
a.



b.



c.

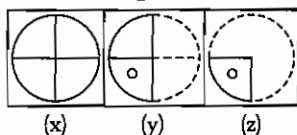


d.

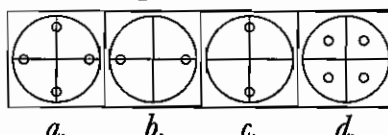
70. Jaipur, Rajasthan, London
71. Solid, Milk, Gas
72. Authors, Teachers, Women
73. Games, Cricket, Tennis
74. Animals, Horse, Cat
75. If 1 January, 2003 is Tuesday, then what was the day on 2 March, 2003?
 a. Friday b. Saturday c. Sunday d. Tuesday
76. If 2nd February of a year is Sunday. Then, what will be day on 28th February?
 a. Wednesday b. Thursday c. Monday d. Friday
77. If 25th December, 2008 is Thursday, what will be the day on 1st January of 2010?
 a. Monday b. Friday c. Saturday d. Sunday
78. Gurpreet was counting down from 32. Gaurav was counting upwards the number starting from 1 and he was calling out only the odd numbers. What common number will they call out at the same time, if they were calling out at the same speed?
 a. 27 b. They will not call out the same number
 c. 28 d. 23
79. How many numbers amongst the numbers 8 to 96 are there which are exactly divisible by 8 but not by 4?
 a. Fifth b. Sixth c. Twelfth d. None of these

Directions (Q. Nos. 80-82) *Select the answer from the alternatives, which would most closely resemble the third figure, when it is unfolded.*

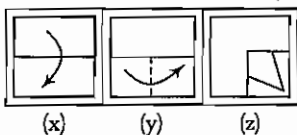
80. Problem Figures



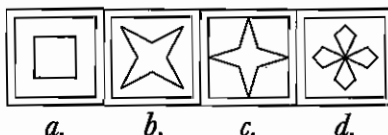
Answer Figures



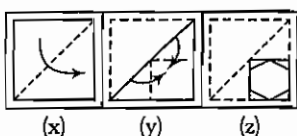
81. Problem Figures



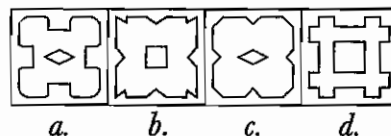
Answer Figures



82. Problem Figures

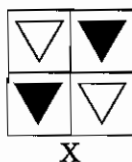


Answer Figures

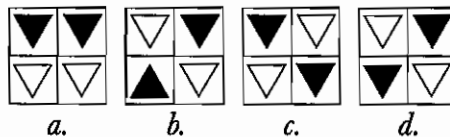


Directions (Q. Nos. 83-84) *Find out the figure which is exactly same with the problem figure.*

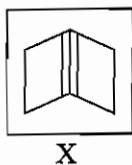
83. Problem Figure



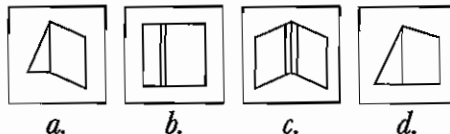
Answer Figures



84. Problem Figure

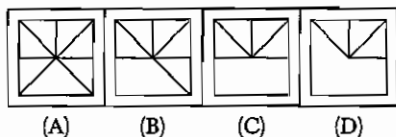


Answer Figures

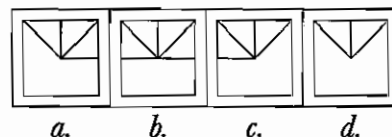


Directions (Q. Nos. 85-87) *Select a figure from amongst the answer figure, which will continue the same series as given in the problem figure.*

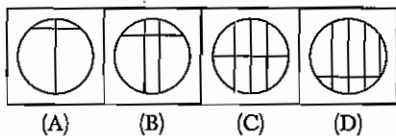
85. Problem Figures



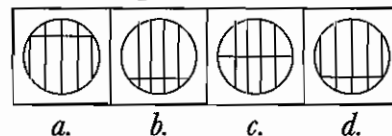
Answer Figures



86. Problem Figures

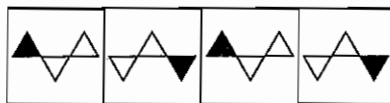


Answer Figures



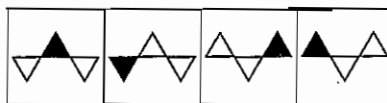
87.

Problem Figures



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

Answer Figures

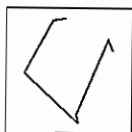


a. b. c. d.

Directions (Q. Nos. 88-90) Find out the answer figure in which problem figure 'X' is embedded.

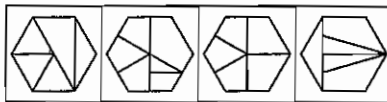
88.

Problem Figure



X

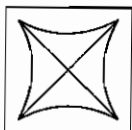
Answer Figures



a. b. c. d.

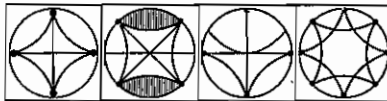
89.

Problem Figure



X

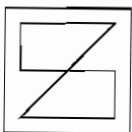
Answer Figures



a. b. c. d.

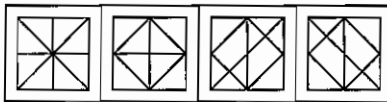
90.

Problem Figure



X

Answer Figures



a. b. c. d.

Paper II : Scholastic Aptitude Test

91.

When a ray of light is going from one medium to another its

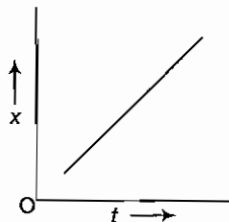
a. wavelength remains same

b. frequency remains same

c. frequency increases

d. wavelength increases

92.

The position-time ($x-t$) graph for motion of a body is given below

Which one among the following is depicted by the above graph?

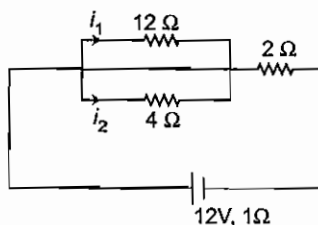
a. Positive acceleration

b. Negative acceleration

c. Zero acceleration

d. None of these

93. According to Newton's law of cooling, the rate of cooling of a body is proportional to the
a. temperature of the body
b. temperature of the surrounding
c. difference of the temperature of the body and its surroundings
d. None of the above
94. The same notes being played on sitar and veena differ in
a. quality
b. pitch
c. both quality and pitch
d. None of these
95. If the top half of a convex lens is covered with black paper,
a. the bottom half of the image will disappear
b. the top half of the image will disappear
c. the magnification will be reduced to half
d. the intensity will be reduced to half
96. If an electric current is passed through a nerve of a man, then man
a. begins to laugh
b. begins to weep
c. is excited
d. becomes insensitive to pain
97. In the circuit diagram shown, find currents i_1 and i_2 .



- a.* $i_1 = 1.5 \text{ A}, i_2 = 0.5 \text{ A}$ *b.* $i_1 = 0.5 \text{ A}, i_2 = 1.5 \text{ A}$ *c.* $i_1 = 1 \text{ A}, i_2 = 3 \text{ A}$ *d.* $i_1 = 3 \text{ A}, i_2 = 1 \text{ A}$
98. The path of a charged particle moving in a magnetic field can be a
a. straight line *b.* circle *c.* helix *d.* All of these
99. The permanent magnet is made from which one of the following substances?
a. Diamagnetic *b.* Paramagnetic *c.* Ferromagnetic *d.* Electromagnetic
100. What is increased in step-down transformer?
a. Voltage *b.* Current *c.* Power *d.* Current density
101. A ray of light is incident on an equilateral glass prism placed on a horizontal table. For minimum deviation which of the following is true?
-
- The diagram shows an equilateral glass prism. An incident ray PQ enters the left face at point Q. The ray refracts towards the normal. It then refracts away from the normal as an emergent ray RS at point R. The angle of incidence at Q is labeled 'Q' and the angle of emergence at R is labeled 'R'. The emergent ray RS is shown as a horizontal line.
- a.* PQ is horizontal
b. QR is horizontal
c. RS is horizontal
d. Either PQ or RS is horizontal
102. Sun is visible a little before the actual sunrise and until a little after the actual sunset. This is due to
a. total internal reflection *b.* reflection
c. refraction *d.* polarisation

103. Elements given below forms a group alike except one. Identify the odd one.
Holmium, Copernicium, Kryptonite, Berkelium
- a. Copernicium b. Kryptonite c. Holmium d. Berkelium
104. In an average adult human body, the amount of NaCl is about
- a. 240 g b. 260 g c. 250 g d. 280 g
105. Dry ice used to preserve food using non-cyclic refrigeration is the solid form of
- a. NO₂ b. CO₂ c. N₂ d. CO

106. Consider the following statements
- I. Positively charged ions are known as cations.
II. Negatively charged ions are known as anions.

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
107. Helium balloons float in air why?
- a. It is heavier than air b. It is lighter than air
c. It has same weight as that of air d. None of these

108. Match the following

List I (Reactants)	List II (Products)
A. BaCl ₂ (aq) + K ₂ SO ₄ (aq) →	1. FeS(s)
B. ZnCO ₃ (s) →	2. Cu + H ₂ O
C. CuO + H ₂ →	3. ZnO(s) + CO ₂ (g)
D. Fe(s) + S(s) $\xrightarrow{\Delta}$	4. BaSO ₄ (s) + 2KCl(aq)

Codes

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

109. Consider the following statements
- I. The only two non-silvery metals are Cu and Au.
II. Hot peppers get their heat from capsaicin.
III. Bee stings are alkaline while wasp stings are acidic.

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

- a. I and III b. Only I c. I and II d. Only III

110. Consider the following statements
- I. It is the cheapest natural element.
II. Its atomic number is 88.
III. Francium and caesium are least electronegative elements.

Which of the above fact (s) regarding francium is/are true?

- a. Only I b. Only III c. I and III d. I and II

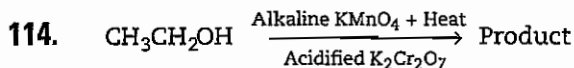
111. The changing of a solid directly into vapour on heating is called
- a. distillation b. crystallisation c. sublimation d. chromatography

112. Consider the following statements
- I. The first artificially synthesised organic molecule was urea.
II. Urea is also known as diaminomethanal.

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

113. The oxide of which of the following elements is used as a coolant?
a. Silicon *b.* Nitrogen *c.* Carbon *d.* Phosphorus



Product = ?

- a.* $\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$ *b.* $\text{CH}_3\text{CHO} + \text{H}_2$ *c.* CH_3COOH *d.* $\text{CH}_4 + \text{HCHO}$
115. Parthenogenesis is development of
a. egg without fertilisation *b.* embryo without fertilisation
c. fruit without hormones *d.* fruit without fertilisation
116. How many times mitosis divisions take place to produce 512 cells from a single parent cell?
a. 256 *b.* 158 *c.* 510 *d.* 9
117. Due to which of the following reasons ploughing is essential before sowing seed?
a. Ventilation *b.* Penetration of plant roots
c. Growth of soil bacteria *d.* All of these
118. Match the branch of biology with field of study.

List I	List I
A. Palynology	1. Silkworms
B. Oncology	2. Pollens
C. Phycology	3. Cancer
D. Sericulture	4. Algae

Codes

- A B C D A B C D A B C D A B C D
a. 4 3 2 1 *b.* 3 2 4 1 *c.* 4 2 3 1 *d.* 2 3 4 1
119. Diabetes is established by
 I. Occurrence of sugar in urine.
 II. Blood sugar level.
 III. Insulin level in blood.
 IV. Blood protein level.
 Which of the above statement(s) is/are correct?
a. I, II and III *b.* I and II *c.* II and IV *d.* I and III
120. From which of the following, the first hormone was artificially produced by culturing bacteria?
a. Insulin *b.* Recon *c.* Genome *d.* None of these
121. Which one of the following organs breaks fast to produce cholesterol?
a. Intestine *b.* Liver *c.* Lungs *d.* Kidneys
122. Consider the following statements
 I. Soil is composed of particles of broken rock.
 II. The best soil for the growth of wheat crop is clayey soil.
 III. Loamy soil is most suitable for pulses.
 Which of the statement(s) given above is/are correct?
a. I and II *b.* I and III *c.* II and III *d.* All of these

123. Mammals have double circulation it means that
- heart chambers receive both oxygenated and deoxygenated blood, which are completely separated from each other
 - the blood circulates with double speed than other vertebrates
 - there are two types of blood vessels associated to every organ
 - the blood vessels are paired

124. At which of the following stages of cell division, the separation of chromatids and their movement to opposite poles occur?
- Prophase
 - Anaphase
 - Metaphase
 - Telophase

125. Surgical removal of both the kidneys would result in death because
- water will accumulate in blood
 - urea will not be excreted
 - immune response will be suppressed
 - glucose will be lost from the body

126. Two parallel lines AB and CD are intersected by a transversal line EF at M and N, respectively. The lines MP and NP are the bisectors of the interior angles BMN and DNM on the same side of the transversal. Then, $\angle MPN$ is equal to
- 90°
 - 45°
 - 135°
 - 60°

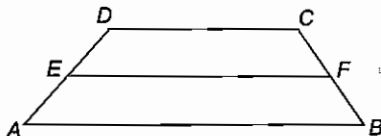
127. Soldiers of a company are made to stand in the rows. If one soldier is extra in a row, there would be 2 rows less. If one soldier is less in a row there would be 3 rows more. Then, the number of soldiers in company is
- 60
 - 50
 - 30
 - 100

128. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then an equation whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is
- $bx^2 + ax + c = 0$
 - $ax^2 - bx + c = 0$
 - $cx^2 + ax + b = 0$
 - $cx^2 + bx + a = 0$

129. The dimensions of a rectangular box are in the ratio of 2 : 3 : 4 and the difference between the cost of covering it with sheet of paper at the rate of ₹ 4 and ₹ 4.50 per m^2 is ₹ 416. Then, length of box is
- 16 m
 - 8 m
 - 26 m
 - 12 m

130. $\triangle ABC$ is a right angled at C and P is the length of the perpendicular from C to AB. If $BC = a$, $AC = b$, and $AB = c$, then
- $\frac{a}{b} = \frac{p}{c}$
 - $pc = ab$
 - $\frac{1}{a} + \frac{1}{b} = \frac{1}{ab}$
 - None of these

131. Let ABCD be a trapezium in which $AB \parallel DC$ and let E be the mid-point of AD. Let F be a point on BC such that $EF \parallel AB$. Then, consider the following statements.



- F is the mid-point of BC
- $EF = \frac{1}{2}(AB + DC)$
- Both (a) and (b)
- None of these

132. S_1 and S_2 are two circles on a plane with radii 4 cm and 2 cm, respectively and the distance between their centres is 3 cm. Which one of the following statements is true?
a. S_2 lies entirely within the circle S_1 *b.* S_1 and S_2 touch each other internally
c. S_1 and S_2 touch each other externally *d.* S_1 and S_2 intersect in two distinct points
133. If the values $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots, \frac{1}{n}$ occur at frequencies 1, 2, 3, 4, 5, 6, ..., n respectively in a frequency distribution, then the mean is
a. 1 *b.* n *c.* $\frac{1}{n}$ *d.* $\frac{2}{n+1}$
134. The difference between a discount of 40% on ₹ 1000 and two successive discounts of 35% and 5% on the same amount is
a. ₹ 15.50 *b.* ₹ 16.50 *c.* ₹ 17.50 *d.* ₹ 18.00
135. Which of the following is rational?
a. Area of a circle with radius $\frac{1}{\pi}$ *b.* Radius of a circle with area $\frac{1}{\pi}$
c. Circumference of a circle with radius $\frac{1}{\pi}$ *d.* Radius of a circle with circumference $\frac{1}{\pi}$
136. From 1 to 100 numbers, 3 numbers are selected at random, what is the probability that the numbers selected will have an odd sum?
a. $\frac{1}{8}$ *b.* $\frac{3}{8}$ *c.* $\frac{1}{2}$ *d.* $\frac{1}{4}$
137. AOBC is a rectangle whose three vertices are vertices A (0, 3), O (0, 0) and B (5, 0). The length of its diagonal is
a. 5 *b.* 3 *c.* $\sqrt{34}$ *d.* 4
138. A man spends 75% of his income. If his income is increased by 20% and he increased his expenditure by 10%. His savings percentage is increased by
a. 25% *b.* 50% *c.* 75% *d.* 10%
139. If a carton containing a dozen mirrors is dropped which of the following cannot be the ratio of the broken mirror to unbroken mirror?
a. 3 : 2 *b.* 1 : 1 *c.* 1 : 2 *d.* 5 : 1
140. If $a + b + c = 0$, then what is the value of $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$?
a. -3 *b.* 0 *c.* 1 *d.* 3
141. A three-digit number has digits h , t and u (from left to right) with $h > u$. If the digits are reversed and the number thus formed is subtracted from the original number, the unit's digit in the resulting number is 4. What are the other two digits of the resulting number from left to right?
a. 5 and 9 *b.* 9 and 5 *c.* 5 and 4 *d.* 4 and 5
142. If $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$, α and β lies between 0 and $\frac{\pi}{4}$, then the value of $\tan 2\alpha$ is
a. $\frac{56}{33}$ *b.* $\frac{56}{23}$ *c.* $\frac{43}{33}$ *d.* $\frac{34}{33}$
143. From a window (h m above from the ground) of a house in a street, the angle of elevation and depression of the top and the foot of another house on the opposite side of the street are θ and ϕ , respectively. Then, the height of the opposite house is
a. $h \tan \theta \cot \phi$ *b.* $h (\tan \theta \cot \phi + 1)$
c. $h (\cot \theta \tan \phi + 1)$ *d.* $h \cot \theta \tan \phi$

144. A certain distance is covered at a certain speed. If half of this distance is covered in triple the time, the ratio of the two speeds is
a. 3 : 1 *b.* 2 : 1 *c.* 6 : 1 *d.* 1 : 1
145. A sum was put at simple interest at a certain rate for 2 yr. Had it been put at 3% higher rate, it would have fetched ₹ 72 more. The sum is
a. ₹ 1200 *b.* ₹ 1600 *c.* ₹ 1900 *d.* ₹ 1400
146. The French revolution envisaging a society based on freedom and equal laws and opportunities for all, were put forward by which of the following philosophers?
a. John Lock *b.* Jean Jacques Rousseau
c. Montesquieu *d.* All of these
147. The earliest figure in the awakening of modern India was
a. Dadabhai Naoroji *b.* Raja Rammohan Roy *c.* Mahatma Gandhi *d.* Swami Vivekananda
148. Henry Vivian Derozio is associated with the
a. Swadeshi Movement *b.* Anti-Partition Movement
c. Young India Movement *d.* Young Bengal Movement
149. The Asiatic society was founded by William Jones in 1783, which aims
a. discovery of the past *b.* promotion of Western culture in Asia
c. the spread of English education *d.* the development of unity of Asian people
150. During whose reign did the Gandharv School of Art developed?
a. Kanishka *b.* Ashoka *c.* Chandragupta *d.* Harsha
151. FA-Hien visited India during the reign of
a. Chandragupta II *b.* Samudragupta *c.* Ramagupta *d.* Kumaragupta
152. The gender divisions usually refers to
a. biological difference between men and women
b. unequal roles assigned by the society to men and women
c. unequal child sex ratio
d. absence of voting rights for women in democracies
153. In India, seats are reserved for women in
a. Lok Sabha *b.* State Legislative Assemblies
c. State Legislative Councils *d.* Panchayati Raj Bodies
154. Consider the following statements on communal politics. Communal politics is based on the belief that
 I. One religion is superior to that of others.
 II. People belonging to different religions can live together happily as equal citizens.
 III. Followers of a particular religion constitute one community.
 IV. State power cannot be used to establish the domination of one religious group over others.
 Which of the above statement(s) is/are correct?
a. I, II and IV *b.* I and III *c.* III and IV *d.* I, II and III

155. Match the following

List I	List II
A. A person who believes in equal rights/opportunities for men and women	1. Secularist
B. A person who believes that religion is the basis of community	2. Castiest
C. Caste is the principal basis of community	3. Communalist
D. One who does not discriminate others on the basis of religious beliefs	4. Feminist

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

156. Match the following

List I	List II
A. Maloca	1. Asom
B. Piranha	2. Sericulture
C. Silk worm	3. Fish
D. Kaziranga	4. Slanting roof

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

157. Which of the following are also known as the 'Granaries of the World' due to the huge surplus of wheat production?

a. Prairies

b. Veld

c. Pampas

d. Down

158. The gold and diamond mining are major occupations of the people of which region?

a. Velds

b. Prairies

c. Down

d. Pampas

159. Match the following

List I	List II
A. River Mississippi drains	1. Diamonds
B. Drakensberg mountains bound the	2. Sheep
C. Merino is a species of	3. Velds
D. Kimberly	4. USA

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

160. Consider the following French Revolution

I. Right to life

II. Freedom of speech

III. Equality before law

IV. Freedom of opinion

Which of the above rights was/were established as natural and inalienable rights?

a. I and IV

b. I, II and IV

c. III and IV

d. All of these

161. At which place in Bengal was the East India Company given permission to trade and build a factory by the Mughals in 1651?

a. Calcutta

b. Casim Bazar

c. Singur

d. Burdwan

162. Which of the following Sikh Guru began to be addressed on the 'Sachcha Badshah'?

a. Guru Gobind Singh

b. Guru Hargovind

c. Guru Tegh Bahadur

d. Guru Arjan Dev

163. Consider the following statements

I. The Champaran Satyagraha marked Gandhiji's, second appearance in Indian politics as a leader of the masses.

II. The Champaran Satyagraha was launched to address the problems faced by indigo plantation workers.

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

164. The Prime Minister holds office theoretically, during the pleasure of the President. He stays in office as long as he enjoys the confidence

- a.* his party *b.* the Lok Sabha
c. majority of the electorate *d.* both the houses of Parliament

165. The judges of the Supreme Court are

- a.* elected by two houses of Parliament
b. appointed by Prime Minister on advice of the Chief Justice of India
c. appointed by President on advice of the Parliament
d. appointed by the President

166. Equality before law implies the following statements

- I. Absence of special privileges.
 II. Subjection of all citizens to the same law.
 III. Trial of cases involving officials and ordinary citizens by the same courts.
 IV. Trial of cases involving officials and ordinary citizens by administrative and ordinary courts respectively.

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

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

167. The Indian Federal system is largely based on the pattern of

- a.* American Federalism *b.* Australian Federalism *c.* Swiss Federalism *d.* Canadian Federalism

168. Which of the following is central to the formation life and death of the Council of Ministers?

- a.* The President *b.* The Prime Minister *c.* The Speaker *d.* Both 'a' and 'b'

169. Match the following

List I	List II
A. Singapore and Mumbai	1. Africa
B. New York and Los Angeles	2. South America
C. Rio De Janerio	3. North America
D. Durban	4. Asia

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

170. Match the following

List I	List II
A. Internet	1. Closely built area of houses
B. Canal route	2. Areas, where people are engaged in manufacturing, trade and services
C. Urban areas	3. Inland waterways
D. Compact settlement	4. A means of communication

Codes

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

171. The river basin drains portions of Brazil, parts of Peru, Bolivia, Ecuador, Columbia and a small part of Venezuela

- a.* Amazon Basin *b.* Maloca Basin *c.* Nile Basin *d.* None of these

172. The headquarters of the International Monetary Fund is situated at

- a.* Berlin *b.* Geneva *c.* Washington DC *d.* Manila

173. The term reactor referred to in waste water treatment is

- a.* vessel *b.* settling tank *c.* clarifies *d.* aeration tank

174. Which one among the following pairs is correctly matched?

a. The second battle of Tarain	Defeat of Jai Chand of Kanauj by Muhammad of Ghor
b. The first battle of Panipat	Defeat of Sikander Lodi by Babur
c. The battle of Chausa	Defeat of Humayun by Sher Shah
d. The battle of Khanwa	Defeat of Rana Pratap by Akbar

175. Which one of the following statements about the teachings of Kabir is not correct?

- He was not against pilgrimage and idol worship
- He believed in universal love
- He emphasised on one God and the spread of devotionalism
- He did not consider it necessary to abandon the normal life of a householder

176. The three tribal principalities mentioned in Ashokan inscriptions of the 3rd century BC and in Kharavela inscription of the first century BC

- Vakatakas, Cholas and Satvahans
- Cholas, Pandyas and Cheras
- Pallavas, Cholas and Pandyas
- Ikshvakus, Vakatakas and Pandyas

177. Consider the following statements

- The Constitution of a country is a set of written rules that are accepted by all people living together in a country.
- The Constitution specifies, how the government will be constituted, have powers to take which decisions.
- The Constitution lays down limits on the powers of the government and tell us what the rights of the citizen are.
- The Constitution is the supreme law that determines the relationship between the people and government.

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

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

178. Match the following

List I	List I
A. General election	1. Voters in a geographical area who elect a representative to legislative body
B. Incumbent	2. Election is held only for one constituency to fill the vacancy caused by death or resignation of a member
C. Bye-election	3. The current holder of a political office
D. Constituency	4. Elections are held regularly after five years

Codes

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

179. The electoral system in India is based on

- Adult Franchise
- Separate Electorate
- Indirect Election System
- Multi-vote System

180. Consider the following statements about fourth Anglo-Mysore War

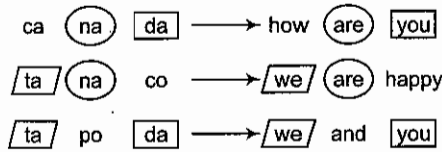
- The Madras council suggested a policy of rigorous and intense attack on Mysore.
- Lord Wellesley tried to revive the triple alliance.
- Tipu sent emissaries to Arabia, Versaille, Mauritius and Kabul enlisting support against the British.
- The war was of a very short duration though decisive.

Which of the above statements is/are correct?

- II, III and IV
- I, III and IV
- II and IV
- I and III

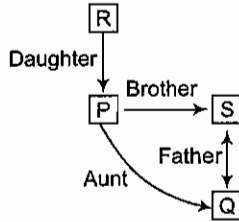
Paper I : Mental Ability Test

Solutions (Q. Nos. 1-5)



- (b) 'happy' means 'co'.
- (a) 'how' means 'ca'.
- (c) 'and' will be code as 'po'.
- (d) 'you are happy' means 'da na co'.
- (a) 'how you happy' means 'ca da co'.
- (c) P is the daughter of R who is the father of S who is the father of Q.

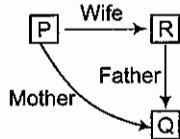
or



∴ Q's father's sister is Q's aunt.

- (c) P is the wife of R who is the father of Q.

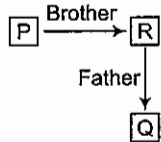
or



∴ Clearly, shows that P is the mother of Q.

- (a) P is the brother of R who is the father of Q.

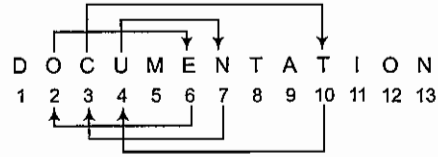
or



∴ P is the uncle of Q because P is Q's father's brother.

- (b) 1. Invite 2. Inward 3. Iodine 4. Iodoform 5. Ion
- (c) 1. Matter 2. Maximum 3. Maze 4. Meal 5. Mean
- (c) 7 6 1 5 2 4 3
S C H O L A R = SCHOLAR
- (b) 4 6 5 1 2 3
S T R I K E = STRIKE

- (c)



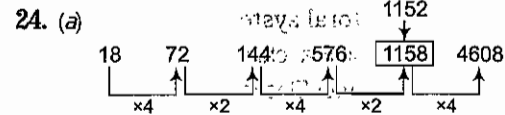
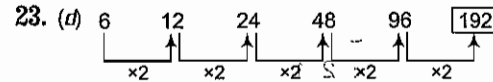
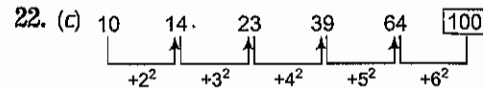
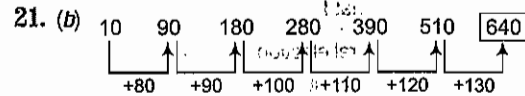
So, 'T' will be 11th from right end.

- (c) Calendar is a list of dates and dictionary is collection of words.
- (a) Clock is used to measure the time and thermometer is used to measure the temperature.

Solutions (Q. Nos. 16-20)

- Pooja and Sushmita are friends and Ankush's girlfriend is friendly with Pooja. This means that Ankush's girlfriend is Shushmita.
- Ankur's girlfriend doesn't like Pooja and Sushmita. So, she is either Neha or Nidhi But Neha does not care for Ankur. So, Ankur's girlfriend is Nidhi.
- Pooja does not like Harshit. So, Harshit's girlfriend is Neha.
- Clearly Amulya's girl friend is Pooja.

- (a)
- (b)
- (c)
- (d)
- (a)



- (d) All except option (d) are opposite letter and there addition is also 27.
- (c) All except option (c) are the same letter in small letters and capital letters.
- (d) All except option (d) are cube roots.
 $5^3 = 125 \Rightarrow 6^3 = 216 \Rightarrow 9^3 = 729$
- (d) All except mercury are solids but mercury is a liquid.

Solutions (Q. Nos. 29-33)

Arrangement of flats

South facing flats ↓

North facing flats ↑

F	C	A
B	E	D

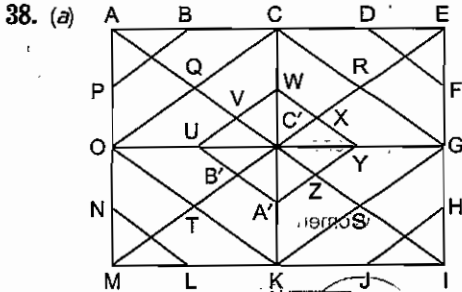
29. (a) The South facing flats are FCA.
 30. (b) E's flat between B and D.
 31. (a) There is no effect on F and C after interchange the position of E and A.
 32. (d) The diagonally opposite pairs are DF and AB.
 33. (b) The North facing flats are BED.
 34. (c) Sum of the numbers on line = 36

$$12 + ? = 36$$

$$? = 36 - 12$$

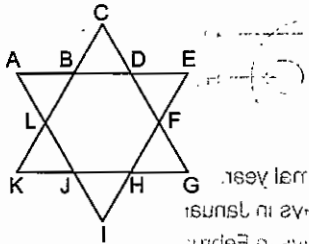
$$? = 24$$

35. (a) $3^2 - 2^2 = 5 \Rightarrow 9^2 - 5^2 = 56 \Rightarrow 7^2 - 5^2 = 24$
 36. (d) Ayush > Nirmal > Rahul > Monu > Karan > Ramu.
 37. (a) Total number of students - Position from the left + 1
 $\Rightarrow 56 - 27 + 1 = 30$



So, squares are ACCQ, GEGC', OC'KM, C'GIK, AEIM, QCRC', C'RGs, C'SKT, C'TOQ, OCGK, UWYA', VWXC', C'XYZ, ZAB'C' and BUVC' i.e., 15.

39. (b)



So, triangles are ABL, BCD, DEF, FGH, HIJ, JKL, AEI and KCG i.e., 8.

40. (c) A $10 \times 10 \times 10$ cube has 10 cubes of $1 \times 1 \times 1$ cubes along its length, breadth and width each. If we remove a layer of $1 \times 1 \times 1$ cubes (the smaller cubes), then the new cube will have following dimensions

$$\text{Length} = 10 - 1 - 1 = 8$$

$$\text{Breadth} = 10 - 1 - 1 = 8$$

$$\text{Width} = 10 - 1 - 1 = 8$$

So, the number of $1 \times 1 \times 1$ cubes in this $8 \times 8 \times 8$ cube
 $= 8 \times 8 \times 8 = 64 \times 8 = 512$

41. (a) Since, the sum of the number of dots on opposite faces of the block is always 7, we cannot get 1 dot adjacent to 6 dots, 2 dots adjacent to 5 dots and 3 dots adjacent to 4 dots. So, the figure (b), (c) and (d) cannot be correct. Hence, (a) is the answer.

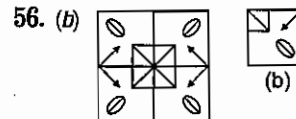
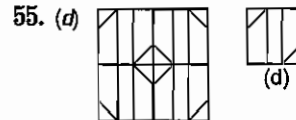
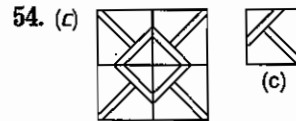
42. (c) By placing the figure I at the position of figure II, we observe that the colour of the cylinder are in order to blue, green, violet and the fourth colour red should come after violet. The orange and yellow colours appear on the sides. Now, by placing figure II in the position of figure III, we get that violet colour should be on the empty space. Hence, (c) this the answer.

43. (b) Figure (b) will satisfy the similar trend is third row.
 44. (c) Sign in square are moving 90° clockwise, option (c) is correct.
 45. (b) In each figure, the circle are towards the longer line. The number of the lines in the first and third figures are identical.

46. (a) '+' moves in anti-clockwise while shaded part in clockwise direction.
 47. (a) In each subsequent step, black shaded square get converted into white.
 48. (c) In figure shaded part increases.

49. (d) In the first step, one are starting from upper left gets inverted and in the second step two arcs get inverted. These two processes are repeated alternately and the process of inversion takes place in clockwise direction.
 50. (c) In the first step, the lower triangle is reversed, in the second step, the middle triangle and in the third step, the upper triangle is reversed. The same procedure is repeated to get the answer.

51. (b) Internal figure/shapes get interchanged.
 52. (b) One arm increases in figure as observed in (a) and (b).
 53. (b) Inner figure moves 180° in clockwise direction.



57. (d) 58. (b) 59. (c)

60. (c) Since, B and D are twins, therefore D is also 3 yr younger to A and A is 3 yr younger to C, C is older than D by $3 + 3$ i.e., 6 yr.

61. (c) Given, $x + y = 100$... (i)

and $\frac{x}{2} + \frac{y}{3} = 40 \Rightarrow 3x + 2y = 240$... (ii)

On multiplying Eq. (i) by 3 and then subtracting Eq. (ii), we get

$$\begin{array}{r} 3x + 3y = 300 \\ 3x + 2y = 240 \\ \hline y = 60 \end{array}$$

62. (d) Take exact age as 66 yr.
 $66 - 2 = 64$, it is 8^2 but not cube of any number.
 Then, take 83, 102 for exact age but these figures do not satisfy the two criteria, Then, take 123 as exact age, it will satisfy the two criteria.

63. (a) Using proper symbol, we get

$$10 + 18 \div 9 \times 3 - 1$$

By using BODMAS,

$$\begin{aligned} 10 + 2 \times 3 - 1 \\ = 16 - 1 = 15 \end{aligned}$$

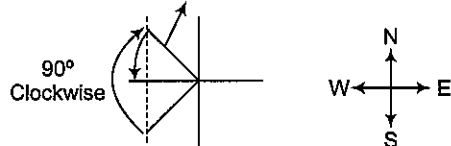
64. (b) Using proper symbol, we get

$$\begin{aligned} 20 + 10 \div 5 - 4 \times 2 \\ \Rightarrow 20 + 2 - 8 \\ \Rightarrow 14 \end{aligned}$$

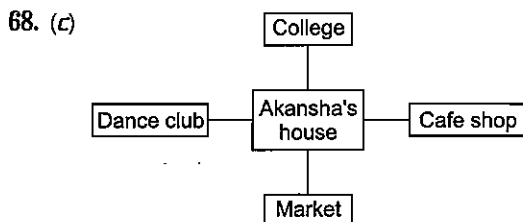
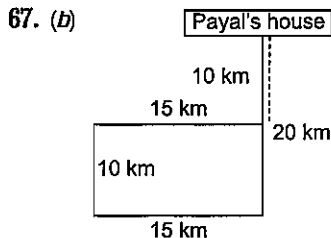
65. (c) Using proper symbol, we get

$$\begin{aligned} 55 + 10 \div 2 - 4 \times 3 \\ \Rightarrow 55 + 5 - 12 \\ \Rightarrow 48 \end{aligned}$$

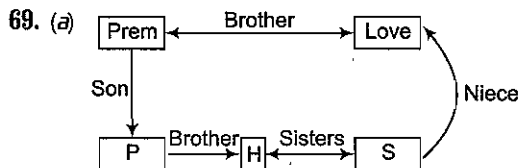
66. (a) 45° Anti-clockwise



So, Atul facing South-West and moves 90° clockwise i.e., North-West from here he moves 45° anti-clockwise i.e., West.

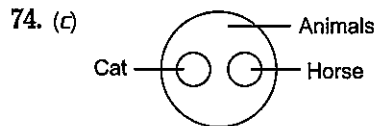
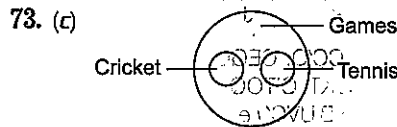
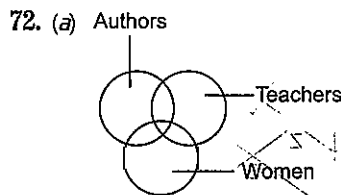
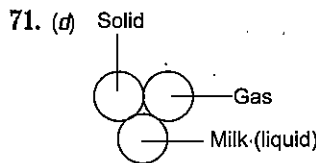
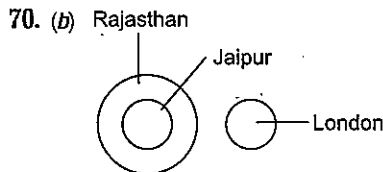


So, except 'South' all sides information we have and only South is the side which have market from Akansha's house.



\therefore Sonal is niece of Love.

Note P's is Prem's son.



75. (b) 2003 is a normal year.
 Number of days in January = 30
 Number of days in February = 28
 Number of days in March = $\frac{02}{60}$

$$\text{Number of odd days in } \frac{60}{7} = 4$$

\therefore Tuesday + 4 = Saturday

76. (d) Number of days in February = $28 - 2 = 26$
 Number of odd days = $\frac{26}{7}$

$$= 5 \text{ odd days}$$

\therefore Sunday + 5 = Friday

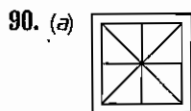
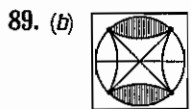
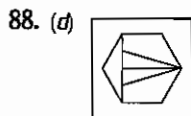
77. (b) Number of odd days in December 2008 = 6
 Number of odd days in 2009 = 1
 Number of odd days in January 2010 = $\frac{1}{8/7} = 1$
 \therefore Thursday + 1 = Friday

78. (b) Gurpreet — 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22
 Gaurav — 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21
 Clearly, both will never call out the same number.

79. (d) 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96
 There is no such number because a number which is divisible by 9 is also divisible by 4.

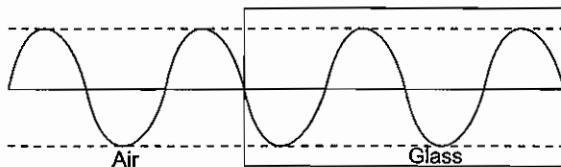
80. (d) 81. (b) 82. (c)
 83. (d) 84. (c) 85. (d)

86. (a) 87. (d)



Paper II : Scholastic Aptitude Test

91. (b) When light passes from one medium to another medium, speed of light changes but frequency of light remains unchanged.



92. (c) According to the graph, equal changes are observed in distance and time. Hence, change in velocity is zero.

93. (c) Newton's law of cooling states that the rate of change of the temperature of an object is proportional to the difference between its own temperature and the ambient temperature (i.e., the temperature of its surroundings).

$$\frac{dT}{dt} \propto (T - T_a) \Rightarrow \frac{dT}{dt} = -k(T - T_a)$$

94. (a) The same note played on sitar and veena differ in their quality i.e., the number of harmonics present, their order and relative intensities.

95. (d) The intensity of light from the object entering the lens decreases due to which intensity of the image formed is decreased.

96. (c) When current is passed through nerve of a man, he is excited because his body is very sensitive to small current.

97. (b) $R = \frac{12 \times 4}{12 + 4} + 2 = \frac{48}{16} + 2 = 5 \Omega$

$$i = \frac{E}{R + r} = \frac{12}{6} = 2 \text{ A}$$

$$i_1 + i_2 = 2 \text{ A}$$

$$\Rightarrow i_2 = 1.5 \text{ A}$$

and $i_1 = 0.5 \text{ A}$

98. (d) The path becomes straight line, circle and helix.

99. (c) If a magnet retains its attracting power for a long time it is called permanent. They are made of ferromagnetic substances.

100. (b) In step down transformer,

$$V_p > V_s$$

But $\frac{V_p}{V_s} = \frac{i_s}{i_p}$

$$\therefore i_s > i_p$$

101. (b) In minimum deviation position refracted ray inside an isosceles prism is parallel to the base of the prism.

102. (c) Sun is visible a little before the actual sunrise and until a little after the actual sunset because of refraction.

103. (b) **Kryptonite** Rest of the three are elements (metals) while it is an ore of krypton.

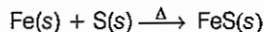
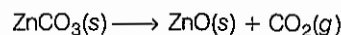
104. (c) 250 g of common salt is present in an average adult human body.

105. (b) Dry ice is the solid form of carbon dioxide (CO_2) gas. It is used as cooling agent.

106. (c) Positively charged ions are called cations while negatively charged ions are called anions.

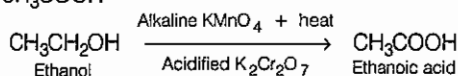
107. (b) Helium balloons float in air because helium is lighter than air. Helium is less dense than air.

108. (a) $\text{BaCl}_2(aq) + \text{K}_2\text{SO}_4(aq) \longrightarrow \text{BaSO}_4(s) + 2\text{KCl}(aq)$

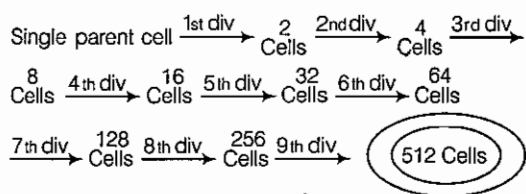


109. (c) I and II, Bee stings are acidic while wasp stings are alkaline.

110. (b) Fr is the most expensive element and its atomic number is 87.
111. (c) Sublimation, it is used in purification of camphor, naphthalene etc.
112. (c) Urea is an organic molecule that is also known as diaminomethanal or carbamide. It was the first organic molecule to be artificially synthesised.
113. (c) Solid carbon dioxide is used as a refrigerant (coolant).
114. (c) CH_3COOH



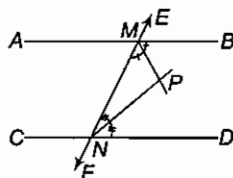
115. (a) Parthenogenesis is a form of reproduction in which an unfertilised egg develops into a new individual, occurring commonly among insects and certain other arthropods.
116. (d) Mitosis is a process of nuclear division in eukaryotic cells that occurs when a parent cell divides to produce two identical daughter cells.



117. (d) The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds. The remains of previous crops, both crop and weed seeds, allowing them to break down.
118. (d) Palynology is the study of plant pollen and spores.
Oncology is the study of cancer.
Phycology is the study of algae.
Sericulture or silk farming is the rearing of silkworms for the production of raw silk.
119. (b) Sugar in the urine is associated with high blood sugar and diabetes.
120. (a) Human insulin derived from bacteria is the first clinically proven product of recombinant DNA technology.
121. (b) Cholesterol is a precursor to bile acids and steroid hormones. The main organ that synthesizes cholesterol is liver. It is not an essential nutrient and can be made in the body from simple compounds via acetyl co. A.
122. (d) Soil is composed of particles of broken rock (parent materials) which have been altered by physical, chemical and biological processes. Clayey soil is best for the wheat crop. Loamy soil is best for pulses.
123. (a) Mammals have double circulation which means that during one circulation blood passes twice through the heart.
124. (b) Anaphase begins when the duplicated centromeres of each pair of sister chromatids separate and the now

daughter chromosomes begin moving toward opposite poles of the cell due to the action of the spindle.

125. (b) Surgical removal of both the kidneys would result in death because urea will not be excreted. The kidneys remove urea and other toxic wastes from the blood, forming a dilute solution called urine in the process.
126. (a) As, $\angle BMN + \angle DNM = 180^\circ$



$$\begin{aligned} \angle PMN + \angle PNM &= 90^\circ \\ \angle MPN &= 180^\circ - (\angle PMN + \angle PNM) \\ \angle MPN &= 180^\circ - 90^\circ = 90^\circ \end{aligned}$$

127. (a) Let the number of soldiers be x and number of rows be y .
 \therefore Number of soldier in each row = $\frac{x}{y}$

Case I When number of soldiers each row = $\frac{x}{y} + 1$, then number of rows = $y - 2$

$$\therefore \left(\frac{x}{y} + 1\right)(y - 2) = x$$

Case II When number of soldiers in each row = $\frac{x}{y} - 1$

Number of row = $y + 3$

$$\therefore \left(\frac{x}{y} - 1\right)(y + 3) = x$$

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

$$\begin{aligned} \left(\frac{x}{y} + 1\right)(y - 2) &= \left(\frac{x}{y} - 1\right)(y + 3) \\ \Rightarrow 2y + 1 &= \frac{5x}{y} \Rightarrow \frac{x}{y} = \frac{2y + 1}{5} \end{aligned}$$

Also from Eq. (i),

$$\left(\frac{x}{y} + 1\right)(y - 2) = x \Rightarrow 2 \frac{x}{y} = y - 2$$

From Eq. (iii),

$$2 \left(\frac{2y + 1}{5}\right) = y - 2 \Rightarrow 4y + 2 = 5y - 10$$

$$\Rightarrow y = 12$$

Put $y = 12$ in Eq. (ii), we get $x = 5 \times 12$

\therefore Number of soldiers = $5 \times 12 = 60$

128. (d) Here, $\alpha + \beta = -b/c$ and $\alpha\beta = c/a$

Now, roots of required equation are $\frac{1}{\alpha}, \frac{1}{\beta}$

$$S = \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{-b/a}{c/a} = \frac{-b}{c}$$

$$P = \frac{1}{\alpha} \cdot \frac{1}{\beta} = \frac{1}{c/a} = \frac{a}{c}$$

∴ Quadratic equation is

$$x^2 - \left(\frac{-b}{c}\right)x + \frac{a}{c} = 0$$

$$cx^2 + bx + a = 0$$

129. (b) Let the dimensions be $2x$, $3x$ m and $4x$ m.

Total surface area of the box
 $= 2(2x \times 3x + 3x \times 4x + 4x \times 2x) = 52x^2 \text{ m}^2$

Cost of covering with sheet of paper at the rate of ₹ 4 per $\text{m}^2 = 52x^2 \times 4 = ₹ 208x^2$

Cost of covering with sheet of paper at the rate of ₹ 4.50 per $\text{m}^2 = 52x^2 \times 4.50$
 $= ₹ 234x^2$

Difference between rates $= 234x^2 - 208x^2 = ₹ 26x^2$

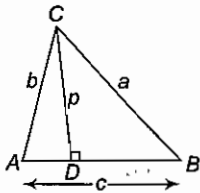
⇒ $26x^2 = 416$ (given)

⇒ $x^2 = 16$

⇒ $x = 4$

∴ length $= 2 \times x = 2 \times 4 = 8$ cm

130. (b) ∴ C is the base and p is the altitude of $\triangle ABC$.



Here, area of $\triangle ABC = \frac{1}{2}pc$... (i)

Again, area of $\triangle ABC = \frac{1}{2}ab$... (ii)

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

$\frac{1}{2}pc = \frac{1}{2}ab$

⇒ $pc = ab$

131. (c) Join BD , cutting EF at M .

So, M is mid point of BD .

Since E is mid-point of AD and $EM \parallel AB$.

∴ $EM = \frac{1}{2}AB$

Similarly, F is mid-point of BC in $\triangle BCD$.

∴ $FM = \frac{1}{2}DC$

∴ $EF = EM + MF = \frac{1}{2}(AB + DC)$

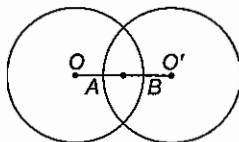
132. (d) $OB = 4$ cm

$O'A = 2$ cm

$OO' = 3$ cm

As, $OO' \neq OB + O'A$

So, circle does not touch each other externally.



Also, $OO' \neq OB - O'A$

So, circle does not touch internally, hence they cut each other at two distinct points.

133. (d) Here, $\Sigma f_i = (1 + 2 + 3 + \dots + n) = \frac{n(n+1)}{2}$

$\Sigma f_i \times x_i = \left(1 \times 1 + 2 \times \frac{1}{2} + 3 \times \frac{1}{3} + \dots + n \times \frac{1}{n}\right)$

$= (1 + 1 + 1 + \dots n \text{ times}) = n$

Mean $= \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{n}{\frac{1}{2}n(n+1)} = \frac{2}{n+1}$

134. (c) Case I Discount = 40%

⇒ Selling price = 60% of 1000 = $\frac{60}{100} \times 1000 = ₹ 600$

Case II Two successive discounts are of 35% and 5%.

⇒ Selling price = 65% of (95% of 100)

$= \frac{65}{100} \times \frac{95}{100} \times 1000 = ₹ 617.50$

∴ Difference = $(617.50 - 600) = ₹ 17.50$

135. (c) Taking option one by one

(a) Area of circle with radius $\frac{1}{\pi} = \pi \times \frac{1}{\pi^2} = \frac{1}{\pi}$

which is irrational.

(b) Radius of circle $= \sqrt{\frac{\text{Area}}{\pi}} = \sqrt{\frac{1}{\pi}} = \sqrt{\frac{1}{\pi^2}} = \frac{1}{\pi}$

which is irrational.

(c) Circumference of circle with radius $\frac{1}{\pi} = 2\pi \cdot \frac{1}{\pi} = 2$

which is rational.

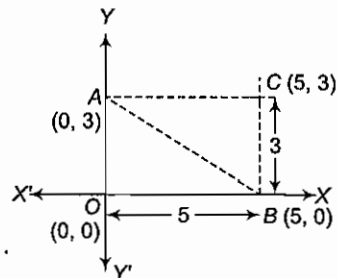
136. (c) $P(\text{even}) = P(\text{odd}) = \frac{50}{100} = \frac{1}{2}$

Sum of three numbers will be odd when all three are odd or 2 even and one odd.

Thus, $P(OOO) + P(EEO) + P(EOE) + P(OEE)$

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

137. (c) We know that the adjacent of rectangle having angle 90° .



By Pythagoras theorem.

In $\triangle OAB$, $(AB)^2 = (OB)^2 + (OA)^2 = (5)^2 + (3)^2$
 $= 25 + 9 = 34$

∴ $AB = \sqrt{34}$

which is the required length of diagonal of rectangle.

138. (b) Let his income be ₹ 100.

Then, his expenditure = ₹ 75
and savings = ₹ 25

$$\text{New income} = (100 + 20) = ₹ 120$$

$$\text{New expenditure} = (75 + 10\% \text{ of } 75) = ₹ 82.50$$

$$\text{New saving} = (120 - 82.5) = ₹ 37.50$$

$$\therefore \text{Percentage increase saving} = \frac{12.5}{25} \times 100 = 50\%$$

139. (a) For a perfect division into whole numbers, the sum of the terms of the ratio must divide 12.

As, $3 + 2 = 5$ does not 12

So, $3 : 2$ cannot be the ratio of the broken mirrors to unbroken mirrors.

140. (d) Given, $a + b + c = 0$

$$\Rightarrow a^3 + b^3 + c^3 = 3abc$$

$$\Rightarrow \frac{a^3}{abc} + \frac{b^3}{abc} + \frac{c^3}{abc} = 3$$

$$\Rightarrow \frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab} = 3$$

141. (a) \therefore Original number = $h \times 100 + t \times 10 + u$

Number obtained by reversing digits

$$= u \times 100 + t \times 10 + h$$

$$\therefore \text{Required number} = (h \times 100 + t \times 10 + u)$$

$$- (u \times 100 + t \times 10 + h)$$

$$= 99(h - u)$$

But the unit's place digit in above number is 4, therefore $(h - u)$ should be 6, then number is 594. Whose digits are 5, 9 and 4, respectively.

142. (a) $\sin(\alpha + \beta) = \sqrt{1 - \cos^2(\alpha + \beta)}$
 $= \sqrt{1 - \frac{16}{25}} = \sqrt{\frac{9}{25}} = \frac{3}{5}$

$$\cos(\alpha - \beta) = \sqrt{1 - \sin^2(\alpha - \beta)}$$

$$= \sqrt{1 - \frac{25}{169}} = \sqrt{\frac{144}{169}} = \frac{12}{13}$$

$$\therefore \tan(\alpha + \beta) = \frac{\sin(\alpha + \beta)}{\cos(\alpha + \beta)}$$

$$= \left(\frac{3}{5} \times \frac{5}{4}\right) = \frac{3}{4}$$

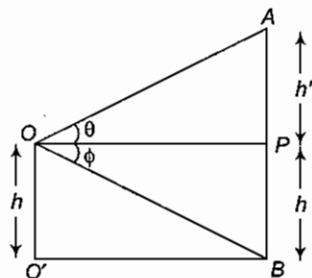
$$\tan(\alpha - \beta) = \frac{\sin(\alpha - \beta)}{\cos(\alpha - \beta)}$$

$$= \frac{5}{13} \times \frac{13}{12} = \frac{5}{12}$$

$$\therefore \tan(2\alpha) = \frac{\tan(\alpha + \beta) + \tan(\alpha - \beta)}{1 - \tan(\alpha + \beta) \cdot \tan(\alpha - \beta)}$$

$$= \frac{\frac{3}{4} + \frac{5}{12}}{1 - \frac{3}{4} \times \frac{5}{12}} = \frac{56}{33}$$

143. (b) Let O be the window and AB be the house on the opposite side of the street.



Then, OP is the width of the street.

Let $AP = h'$, $BP = OO' = h$

$$\text{In right angled } \triangle AOP, \frac{h'}{OP} = \tan \theta$$

$$\text{and in right angled } \triangle BOP, \frac{h}{OP} = \tan \phi$$

$$\therefore \frac{h'}{h} = \frac{\tan \theta}{\tan \phi}$$

$$\Rightarrow h' = h \tan \theta \cot \phi$$

\therefore Height of the house

$$AB = AP + PB$$

$$= h \tan \theta \cot \phi + h$$

$$= h(\tan \theta \cot \phi + 1)$$

144. (c) Let a km be covered in b h.

Then, speed of object in first case = $\frac{a}{b}$ km/h

As, half of this distance is covered in triple the time.

Then, speed of object in second case

$$= \frac{a/2}{3b} = \left(\frac{a}{6b}\right) \text{ km/h}$$

$$\therefore \text{Ratio of speed} = \frac{a}{b} : \frac{a}{6b} = \frac{1}{1} : \frac{1}{6} = 6 : 1$$

145. (a) Let the sum be ₹ x and the original rate $r\%$. Then,

$$\text{Simple interest} = \frac{x \times r \times 2}{100}$$

Now, rate is increased by 3%.

$$\therefore \text{New rate} = (r + 3)$$

$$\therefore \text{Simple interest} = \frac{x \times (r + 3) \times 2}{100}$$

$$\therefore \frac{x \times (r + 3) \times 2}{100} - \frac{x \times r \times 2}{100} = 72$$

$$\Rightarrow \frac{(xr + 3x)2}{100} - \frac{2xr}{100} = 72$$

$$\Rightarrow \frac{2xr + 6x - 2xr}{100} = 72$$

$$\Rightarrow 6x = 72 \times 100$$

$$\therefore x = \frac{72 \times 100}{6}$$

$$\Rightarrow ₹ 1200$$

146. (d) The writings of John Lock/ Rousseau and Voltaire/ and Montesquie influenced the French Revolution. They propounding the ideas of natural liberty/perfect government of Republic.
147. (b) Raja Rammohan Roy has come to called the 'maker of modern India'. He put an end to Sati Pratha and advocated the study of English, Science, Western Medicine and Technology.
148. (d) Young Bengal Movement was started by HV Derozio. The movement was a group of radical Bengali free thinkers inspired and excited by the free thought and revolt against the existing social and religious structure of Hindu society.
149. (a) Asiatic society of Bengal, Scholarly Society founded by William Jones, a British lawyer and orientalist, to encourage oriental studies.
150. (b) During the reign of Ashoka of the Maurya Dynasty in the 3rd Century BC Gandhara Art, a predominantly Buddhist style of Art flourished.
151. (a) Fa-Hien a renowned Chinese traveler and pilgrim, visited India during the reign of Chandragupta II.
152. (b) Gender division refers to the roles and responsibilities of men and women that are created in our families, societies and our cultures.
153. (d) By amendment to the Article, 243(D) 50% of seats in panchayats reserved for women across the country.
154. (b) Communalism refers to loyalty to a sociopolitical grouping based on religious or ethnic affiliation.
155. (a)
156. (a)
157. (a) The prairies are also known as the 'Granaries of the World' due to the huge surplus of wheat production. Dairy farming is another major industry.
158. (a) The velds is the temperate grass land of South Africa. The major occupation of the people's of this region is gold and diamond mining.
159. (a)
160. (d) After the French Revolution, Republic was established and Right to life/ Freedom-of speech/ Equality before law / Freedom of opinion are declared as 'natural and inalienable rights' of the people.
161. (b) Casim Bazar, a census town in Murshidabad, was established by East India Company in 1651.
162. (b)
163. (b) Gandhi's first great experiment in Satyagraha came in 1917, in Champaran, a district in Bihar. The peasantry on the indigo plantations in the district was excessively oppressed by European planters.
164. (b) The Prime Minister stays in office as long as he has the majority in the Lok Sabha.
165. (d) The judges of the Supreme Court as well as of the High Courts are appointed by the President.
166. (a) Equality before law, also known as legal equality is the principle under which all people are subject the same laws of justice. All are equal before the law of the land.
167. (d) The federalism in India is largely based on federalism of Canada. In Indian federalism, centre was made more powerful in comparison to states.
168. (b) The formation of Council of Minister's starts with the appointment of Prime Minister. He is the central to the formation, life and death of CoM.
169. (a) 170. (d)
171. (a) Amazon Basin is part of South America drained by Amazon river and its tributaries that drains an area of about 6915000 km.
172. (c) IMF is an organisation of 188 countries, working to Foster Global Monetary cooperation, secure financial stability facilitate intt. trade, promote high employment and sustainable economic growth and reduce poverty around the world. It has its headquarters at Washington DC.
173. (d) 174. (c)
175. (a) Kabir influenced the idea of bhakti through his preaching. He was totally against the idea's of idol worship and pilgrimage.
176. (b) The Ashokan inscription is in Brahmi and is dated around 232 BC and Hathigumpā inscription, from Udaigiri was inscribed by Kharavela mentioned the Cholas, Pandayas and Cheras, the three tribal principalities of that age.
177. (d) A Constitution is a set of established principles or established precedents according to which a state or other organisations is governed.
178. (b)
179. (a) Adult Franchise or Universal Adult Franchise or Universal Suffrage consists of extension of the right to vote to all adult citizens of the country.
180. (a) The fourth Anglo Mysore war (1798-1799) fought between the kingdom of Mysore and British East India company saw the defeat of the Tipu Sultan and further reductions in Mysorean territory.