

NTSE STAGE – I (DELHI STATE)
05 – A (2019 – 20)
(For Class – X)
MENTAL ABILITY TEST (MAT)
QUESTION PAPER

1. What is sum of all positive factors of 256.
1. 526
2. 511
3. 625
4. 562
2. Value of $\frac{X}{X+1} + \frac{X+1}{X} - \frac{1}{X(X+1)}$ will be?
1. X^2
2. 1
3. X
4. 2
3. Sum of sequence $5+6+7+8+\dots+19$ will be?
1. 180
2. 175
3. 185
4. 190
4. If three Numbers are in Ratio $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, Difference between largest and smallest is 27 then numbers are
1. 54, 72, 81
2. 24, 45, 51
3. 64, 72, 91
4. 54, 65, 81
5. Which of the following number will completely divide the value of $(3^{25} + 3^{26} + 3^{27} + 3^{28})$?
1. 35
2. 40
3. 50
4. 45
6. Rohan's score on the mid term exam was 75, and his score on the final exam was 90. If the weight of the final exam is twice that of mid term, what is Rohan's final score in the course?
1. 82.5
2. 80
3. 85.5
4. 85
7. A grandmother, mother and daughter wish to arrange themselves in a row in order to be photographed. How many different ways can they arrange themselves?
1. 6
2. 3
3. 18
4. 9
8. At the time of marriage a man was 6 year older than his wife, but 12 year after the marriage his age was $\frac{6}{5}$ times the age of his wife. Their ages (in years) at the time of the marriage were?
1. 26, 20
2. 24, 18
3. 27, 21
4. 30, 24
9. If we throw a dice, what is the probability of obtaining a result that is less than 4. If we know that the result obtained was an even number?
1. $\frac{1}{2}$
2. $\frac{2}{3}$

3. $\frac{1}{3}$

4. $\frac{4}{5}$

10. There are 10 balls in a box, 5 white and 5 black. Two balls are removed randomly from the box, one after another. The first ball that is removed is black and it is not returned to the box. What is the probability that the second ball that is removed is also black?
1. $\frac{5}{9}$ 2. $\frac{4}{9}$
3. $\frac{3}{9}$ 4. $\frac{1}{2}$
11. Some equations are based on the basis of a certain system. Using the same pattern solve the unsolved equation. If $10 - 3 = 12, 12 - 4 = 13, 14 - 5 = 14$ what is $16 - 6 = ?$
1. 10 2. 15
3. 16 4. 18
12. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?
1. 9 2. 10
3. 12 4. 20
13. If $40\% \text{ of } 1620 + 30\% \text{ of } 960 = ?\% \text{ of } 5200$
1. 12 2. 24
3. 5 4. 18
14. In a row, 25 trees are planted at equal distance from each other. The distance between 1st and 25th tree is 30m. What is the distance between 3rd and 15th tree?
1. 8m 2. 15m
3. 16m 4. 18m
15. In a school, the bell is rung once after each half an hour. The school starts at 8:00 AM and close at 1:30PM. The bell is rung 3 times continuously, at the time beginning, at the time of lunch break at 10:00 and 10:30 AM and at the end. How many times is the bell rung every day?
1. 21 2. 22
3. 19 4. 20
16. If $80\% \text{ of } A = 50\% \text{ of } B$ and $B = x\% \text{ of } A$ then value of x will be?
1. 145 2. 170
3. 150 4. 160
17. The mean of five consecutive number is 7. Which is the highest number?
1. 10 2. 7
3. 9 4. 8
18. Find the value of $x^3 + y^3 + z^3 - 3xyz$. If $x + y + z = 15$ and $x^2 + y^2 + z^2 = 51$
1. 540 2. -540
3. -225 4. 765
19. If area of any triangle is 384 cm^2 and its sides are in Ratio 3:4:5 then perimeter of triangle will be?
1. 60cm 2. 48cm
3. 64cm 4. 96cm

20. $\frac{13}{48}$ is equal to

1. $\frac{1}{3 + \frac{1}{1 + \frac{1}{16}}}$

2. $\frac{1}{3 + \frac{1}{1 + \frac{1}{1 + \frac{1}{8}}}}$

3. $\frac{1}{3 + \frac{1}{1 + \frac{1}{2 + \frac{1}{4}}}}$

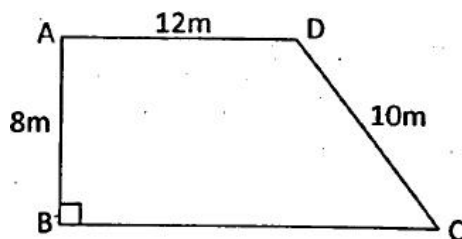
4. $\frac{1}{3 + \frac{1}{1 + \frac{1}{8}}}$

21. If for any two numbers a and b, the operation \$ is defined as follow:
 $a\$b = a \times (a + b)$ then $(2\$0)\1 ?

1. 12
3. 20

2. 10
4. 4

22. The accompanying figure shows a right + trapezoid ($AD \parallel BC$) Based on this information and the information in the figure, the area of the trapezoid (in m^2) is



1. 150
3. 108

2. 120
4. 96

Directions (23 to 25) find the missing numbers in the number series.

23. 4, 8, 28, ?, 244

1. 69
3. 80

2. 75
4. 90

24. 4, 7, 12, 19, 28, 39, ?

1. 48
3. 55

2. 52
4. 58

25. 10080, 1680, ?, 84, 28, 14

1. 840
3. 108

2. 168
4. 336

26. The compound interest on Rs. 30, 000 at 7% per annum is Rs. 4, 347. The period (in year) is

1. 1
3. 3

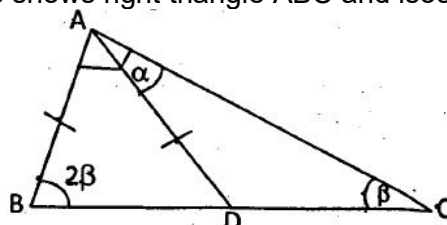
2. 2
4. 3.5

27. Among the numbers $\sqrt{2}, \sqrt[3]{9}, \sqrt[4]{16}, \sqrt[5]{32}$ the greatest one is:

1. $\sqrt{2}$
3. $\sqrt[4]{16}$

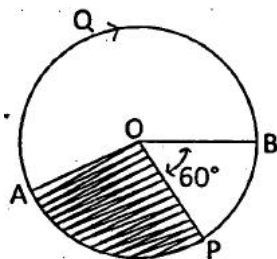
2. $\sqrt[3]{9}$
4. $\sqrt[5]{32}$

28. If $x + \frac{1}{x} = 2$ and x is real, then the value of $x^{17} + \frac{1}{x^{19}}$ is
1. 1
 2. 0
 3. 2
 4. -2
29. To win a 20 over match, the run rate is required 7.2. If in the end of 15th over, the run rate is 6. Then to win the match the required run rate is?
1. 1.2
 2. 13.2
 3. 10.8
 4. 12
30. If P and Q are HCF and LCF of two Algebraic expression respectively and $P + Q = x + y$ then what will be value of $P^3 + Q^3$?
1. $x^3 + y^3$
 2. $x^3 - y^3$
 3. $x + y$
 4. $x - y$
31. Pipe A and B can fill a tank in 12 minutes and 16 minutes respectively. Both pipe are kept open for x minutes and then B is closed and A fills the rest of tank in 5 minutes. The value of x will be
1. 4 minutes
 2. 6 minutes
 3. 5 minutes
 4. 7 minutes
32. The accompanying figure shows right triangle ABC and isosceles triangle ABD ($AB = AD$)



- Based on this information and the information in the figure, the value of angle α is
1. 60°
 2. 45°
 3. 30°
 4. 25°

33.



The accompanying figure shows a circle whose centre is O and radius is 10cm. The shaded sector equal $\frac{1}{6}$ of the area of the circle. Based on this information and the information in figure the length (in cm) of the arc AQB is

1. 30π
 2. $\frac{40}{3}\pi$
 3. $\frac{20}{3}\pi$
 4. 20π
34. If length of a Rectangle is increased by 25% and its width decreased by 20% then of the following which change in the Area of Rectangle occur.
1. 10% increase
 2. 16% increase
 3. 5% decrease
 4. No change

35. An official meeting is attended by 130 department employees of them 66 drink tea, 56 drink coffee and 63 drink juice, 27 can drink either tea or coffee, 25 can drink coffee or juice and 23 can drink juice and tea. 5 employees can drink any of the three. How many drink only tea.
 1. 21
 2. 22
 3. 18
 4. 20
36. Of the three number, the sum of first two is 55, third is 65, and sum of third with thrice of the first is 110. The third number is?
 1. 25
 2. 30
 3. 35
 4. 28

Directions : (37 to 40) Study the following table and answer questions given below:

EMPLOYEES SOURCE OF INCOME (Rs)					
	K	L	M	N	O
Salary	12000	6000	21000	9000	12000
Bonus	2400	1200	4500	2400	3000
Overtime	5400	2100	6000	5100	6000
Arrears	6000	5400	12000	4200	7500
Miscellaneous	1200	300	1500	300	1500
Total	27000	15000	45000	21000	30000

37. The employee who has minimum ratio of income from arrears to income from salary is
 1. K
 2. L
 3. M
 4. N
38. The employee who earns maximum bonus in comparison to his total income?
 1. M
 2. N
 3. L
 4. K
39. The employee who has maximum percentage of his salary out of the income?
 1. K
 2. L
 3. M
 4. O
40. The income from overtime is what percentage of the income from the arrears in case of employee in category O?
 1. 80
 2. 75
 3. 25
 4. 20
41. The ratio of the present ages of Mohan and Suresh is 4:5. Five year ago, the ratio of their ages was 7:9. Their present ages (in year) are:
 1. 40, 50
 2. 18, 25
 3. 40, 60
 4. 20, 25
42. For a business lunch in a certain restaurant, you may choose one of 3 different first courses and one of 4 different main course. In addition to first course and the main courses, you have a choice of a soup or dessert. How many different combinations of three course business lunch does this restaurant offer?
 1. 12
 2. 14
 3. 18
 4. 24
43. If the length of a rectangular plot of land is increased by $12\frac{1}{2}\%$ and the breadth is decreased by 10%, its area is --
 1. Decreased by 1.25%
 2. Decreased by 2.5%
 3. Increased by 2.5%
 4. Increased by 1.25%

44. K is an even number and P is an odd number. Which of the following statement is not correct?
1. $P - K - 1$ is an odd number
 2. $P + K + 1$ is an even number
 3. $P \times K + P$ is an odd number
 4. $P^2 + K^2 + 1$ is an even number

45. All of the liquid filling a cuboidal container that measures 2cm x 10cm x 20cm is poured into a cylindrical container with a base radius of 5cm. What height (in cm) will the surface of the liquid reach in the cylindrical container?
1. $\frac{16}{\pi}$
 2. $\frac{40}{\pi}$
 3. 8π
 4. 8

46. ($0 < \theta < 90$)
 If $\tan \theta + \cot \theta = 2$ then what will be value of $\tan^{100} \theta + \cot^{100} \theta$?
1. 2
 2. $2\sqrt{3}$
 3. 1
 4. $\frac{1}{\sqrt{3}}$

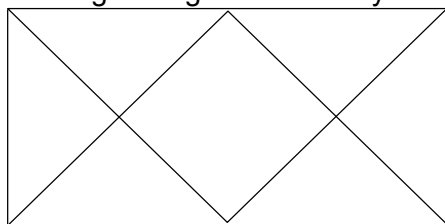
47. What is the coefficient of a^2b^2 in the expansion of $(a + b)^4$?
1. 1
 2. 6
 3. 2
 4. 3

48. In a class composed of x girls, y boys. What part of the class is composed of girls?
1. $y(x + y)$
 2. $\frac{x}{xy}$
 3. $\frac{x}{(x + y)}$
 4. $\frac{y}{xy}$

49. The expression $2^{6n} - 4^{2n}$, where n is a natural number is always divisible by --
1. 15
 2. 18
 3. 36
 4. 48

50. If $x = 2 - 2^{1/3} + 2^{2/3}$ then the value of $x^3 - 6x^2 + 18x + 18$ is --
1. 22
 2. 33
 3. 40
 4. 45

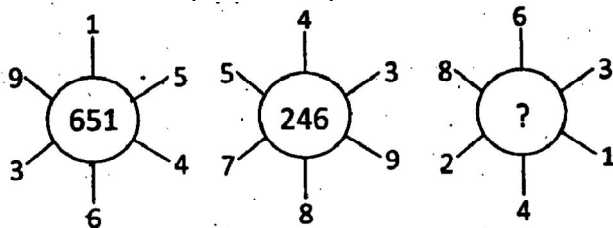
51. In this given figure how many triangle are there?



1. 12
 2. 10
 3. 14
 4. 8
52. If Amit's father is Ketan's father's only son and Ketan has neither a brother nor a daughter. What is the relation between Ketan and Amit?
1. Uncle-Nephew
 2. Father-Daughter
 3. Father-Son
 4. Cousin

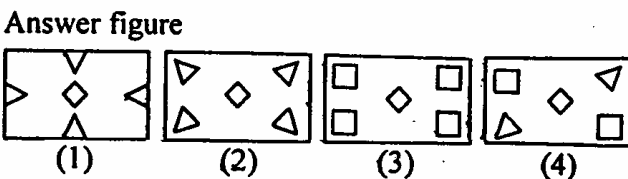
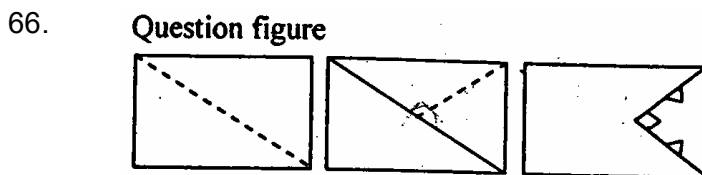
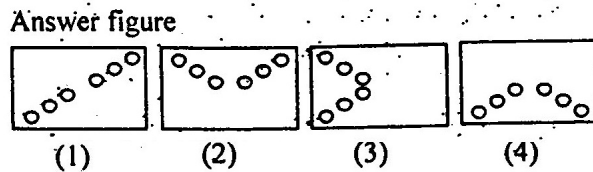
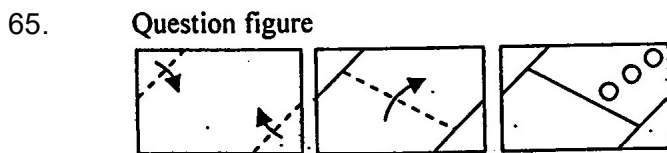
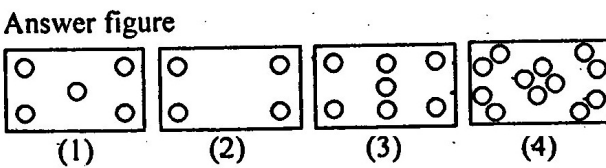
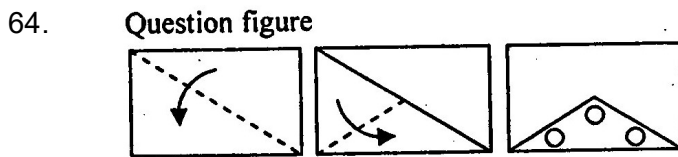
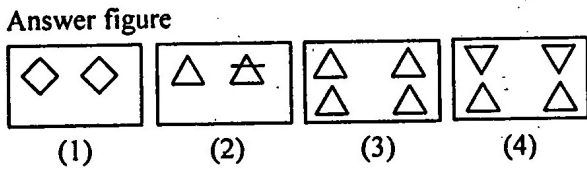
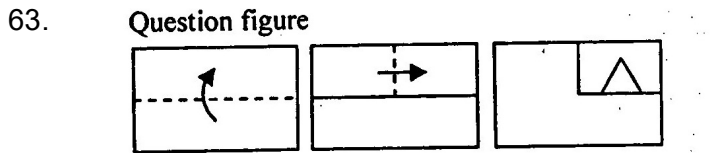
53. In a certain code language 'si po re' means 'book is thick', 'ti na re' means 'bag is heavy', 'ka si' means 'interesting book' and 'de ti' means 'that bag' what should stand for 'that bag is interesting' in that code language?
1. ka re na ti
 2. de si re ka
 3. ti po ka na
 4. de ti re ka
54. In a certain language 'PRINCIPAL' is written as 'MBOQSOMVW' and 'TEACHER' is written as 'FDVSZDB'. Then how is 'CAPITAL' written in that code?
1. SVMOFVW
 2. SVMODVW
 3. BVMODVM
 4. SVMIDVW
55. In a certain language ROPE is written as %57\$, DOUBT is written as 35#8* and LIVE is written as @24\$. How is TROUBLE is written in that code?
1. *%5#8@\$
 2. *%#58@\$
 3. *%5#8@4
 4. *%58\$@
56. If \$ means 'Plus(+)', # means 'minus(-)', @ means multiplied (\times), and * means 'divided (\div)' then what is the value of $16\$4@5\#72*8$
1. 29
 2. 25
 3. 27
 4. 36
57. In the number '5321648' how many digit will be as far away from the beginning of the number if digit arranged in ascending order as they are in the number?
1. None
 2. One
 3. Two
 4. Three
58. In a class of 35 students Kunal is placed seventh from the bottom. Where as Sonali is placed ninth from top. Pulkit is placed exactly in between the two. What is Kunal's position from Pulkit?
1. 9th
 2. 10th
 3. 11th
 4. 12th
59. In a row of girls facing north, Reena is 10th to the left of Pallavi. Who is 21st from the right end. If malini, who is 17th from the left end is fourth to the right of Reena, how many girls are there in a row?
1. 37
 2. 43
 3. 44
 4. Data Inadequate
60. Anupriya was born on 29th Nov, 1970, which was Sunday. When her next birthday will fall on Sunday?
1. 1975
 2. 1976
 3. 1981
 4. 1982

61. Which one will replace the question mark?



1. 262
 2. 622
 3. 631
 4. 824
62. If + means \div , - means \times , \times means + and \div means - then, $4 + 6 \times 9 \div 6 - 2 \times 5$
1. $\frac{4}{6}$
 2. $\frac{8}{3}$
 3. 2
 4. $\frac{9}{2}$

Direction (63 to 66): In the question given below piece of paper folded and cut as shown below in question paper, from the given answer figure.

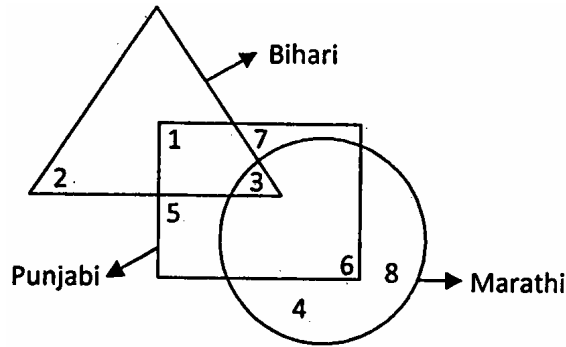


67. In the matrix below, the numbers in the cells follow some rules. Identify the number which when substituted for? Maintaining the same rule?

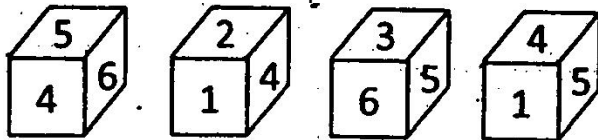
4	1	2
13	11	6
153	120	?

- 1. 32
- 2. 45
- 3. 16
- 4. 48

Direction (68 – 72). The venn diagram given below is about a small circle is Marathi and triangle is Bihari square is Pubjabi.



68. What is the total number of Biharis?
 1. 5
 2. 6
 3. 7
 4. 8
69. What is the total number of Punjabis?
 1. 22
 2. 28
 3. 29
 4. 35
70. What is the total number of Marathis?
 1. 20
 2. 15
 3. 22
 4. 21
71. How many Bihari which are not Pubjabi?
 1. 1
 2. 2
 3. 3
 4. 4
72. How many Punjabi which are not Marathi.
 1. 10
 2. 11
 3. 12
 4. 13
73. India became a republic on 26th January, 1950. Which day of the week was it?
 1. Monday
 2. Tuesday
 3. Thursday
 4. Saturday
74. At what angle (larger) are two hands of a clock inclined at 48 minute past 12?
 1. 264°
 2. 263°
 3. 265°
 4. 266°
75. A clock is set right at 4 am. The clock loses 20 minutes in 24 hours. What will be the time, when the clock indicate 3 am on 4th day?
 1. 5 am
 2. 4 am
 3. 3 am
 4. 4 pm
76. A dice has four different positions. Find the number on the face opposite to 3.
 1. 1
 2. 2
 3. 4
 4. 6



Direction (77 to 79) are based on given information: A solid cube is painted red on all faces. The side of the cube is 8 cm. It is cut into smaller cubes of side 2 cm. Answer the following question.

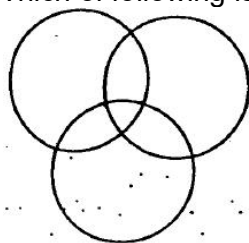
77. How many cubes have three faces coloured?
 1. 4
 2. 6
 3. 8
 4. 12
78. How many cubes have two faces coloured?
 1. 8
 2. 16
 3. 36
 4. 24
79. How many cubes have only one face coloured?
 1. 16
 2. 24
 3. 32
 4. 36

80. Choose the correct option to complete the matrix?

4C	2B	3A
28A	10C	45B
7C	?	15B

1. 15A
 2. 12B
 3. 5A
 4. 8C

81. Which of following is the best represented in diagram?



1. Chair, Table, Furniture
 2. Doctor, Social Person, Honest Person
 3. Family, Parents, Children
 4. Gold Jewellery, Silver Jewellery, Ornaments

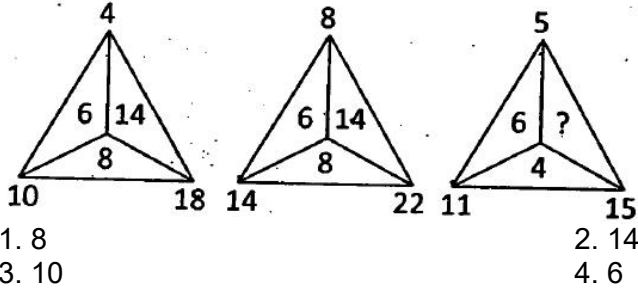
Direction: (82 to 84): Study the letter series given below and answer the questions that follows.
 H D Y S M W N B Q P O C R T B L Z V E G U F

82. Which two neighbours in the given arrangement are farthest in the alphabetical order?
 1. B and Q
 2. D and Y
 3. U and F
 4. V and E
83. Which letter has the same neighbours as in the alphabetical order through they have change places?
 1. M
 2. N
 3. O
 4. F
84. Which three letters have the same distance as they have in the alphabetical order through they have changed places?
 1. HMP
 2. NQZ
 3. QOE
 4. YLF
85. A and B are sisters. R and S are brothers. Daughter of A is she sister of R. Then which relation between B and S.
 1. Aunt
 2. Grand Mother
 3. Sister
 4. Mother
86. Abhay is the husband of Neena and Sunita is the mother of Abhay. Sohan is the uncle of Neeraj. Who is the relation between Sohan and Neena?

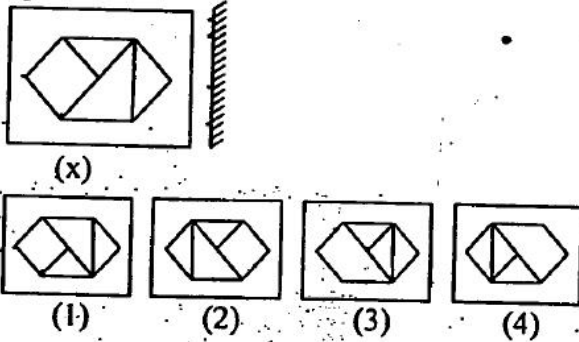
1. Jeth
3. Bhatija

2. Devar
4. Jeth/Devar

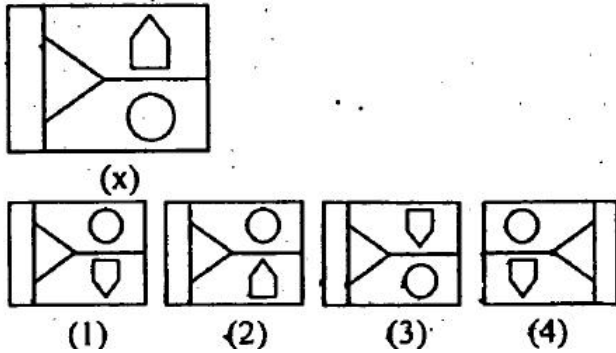
87. Which one will replace the question mark?



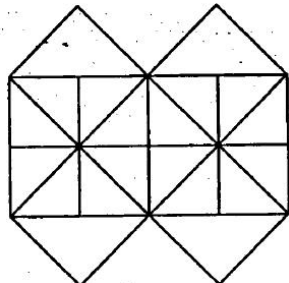
88. Choose the correct mirror image of figure (X) from given alternatives:



89. Choose the correct water image of figure (x) from given alternatives:



90. Which is the minimum number of straight lines needed to construct the following figure?



1. 13
2. 15
3. 16
4. 17

Direction (91 to 95): A cube is coloured red on all of its faces. It is then cut into 64 smaller cube of equal size. The smaller cube so obtained are now separated.

91. How many smaller cubes have no surface coloured?

1. 24
2. 16
3. 8
4. 10

92. How many smaller cubes will have atleast two surfaces painted with red coloured?
 1. 4
 2. 18
 3. 32
 4. 24
93. How many smaller cubes have two surfaces painted with red coloured?
 1. 24
 2. 8
 3. 12
 4. 20
94. How many smaller cubes have only three surfaces painted with red coloured?
 1. 0
 2. 12
 3. 24
 4. 6
95. A 6 cm cube is cut into 2 cm smaller cube. How many smaller cubes can be obtained from their:
 1. 108
 2. 156
 3. 27
 4. 64

Direction (96 to 100): Read the following informations and answer the questions which follows:

1. 'A × B' means 'A' is father of 'B'
 2. 'A + B' means 'A' is daughter of 'B'
 3. 'A ÷ B' means 'A' is mother of 'B'
 4. 'A – B' means 'A' is brother of 'B'
96. If $P + Q - R \div T$, How is T related to P?
 1. Aunt
 2. Brother
 3. Father
 4. Cousin
97. Which of the following means that R is the wife of P?
 1. $P \times R - Q - T$
 2. $P \div T + R - Q$
 3. $P \div R - Q + T$
 4. $P \times T - Q + R$
98. If ' $P \times T \div Q + R$ ', how is R related to P?
 1. Daughter
 2. Husband
 3. Son in law
 4. Daughter in law
99. If $P \div R - Q \times T$. How is P related to T?
 1. Grandmother
 2. Mother in law
 3. Sister
 4. Grandfather
100. If $P \div Q + R \times T$, How Q is related to T?
 1. Aunt
 2. Sister
 3. Brother
 4. None of these