

NTSE STAGE – I
02 – A/2017 – 18 (For Class – X)
MENTAL ABILITY TEST (MAT)

1. The value of $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}}$ is

1. 4	2. 2
3. 0	4. 1

2. If $5 \tan \theta = 3$ then $\frac{5 \tan \theta - 3 \cos \theta}{5 \sin \theta + 3 \cos \theta} = \underline{\hspace{2cm}}$

1. 0	2. $\frac{5}{3}$
3. $\frac{3}{5}$	4. $\frac{4}{5}$

3. A regular polygon is drawn with 35 diagonals. Its interior angle will be

1. 154°	2. 164°
3. 144°	4. None of these

4. If \times means $-$, $+$ means \div , $-$ means \times and \div means $+$ then $15 - 2 \div 900 + 90 \times 100 = ?$

1. 190	2. 180
3. 90	4. -60

5. If one root of quadratic equation $(K+1)x^2 - 5x + 2k = 0$ is reciprocal of other then value of K is

1. 2	2. 0
3. -1	4. 1

6. What will be the ratio of volume of cube is to volume of sphere inscribed in the cube

1. $3 : \pi$	2. $6 : \pi$
3. $6 : 5$	4. $2 : \pi$

7. If α, β are the roots of the equation $2x^2 - 5x + 16 = 0$, then value of $\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$ is

1. $\frac{1}{4}$	2. $\frac{5}{4}$
3. $\frac{1}{3}$	4. $\frac{5}{12}$

8. Divisor is 10 times of quotient and 10 times of remainder. If quotient is 10 then what is divided

1. 1010	2. 1100
3. 1001	4. 101

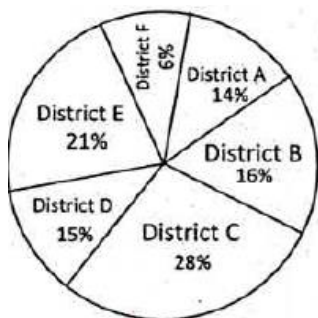
9. Value of $\left[(0.111)^3 + (0.222)^3 - (0.333)^3 + (0.333)^2 (0.222) \right]^2$ will be

1. 222	2. 0
3. 333	4. 2

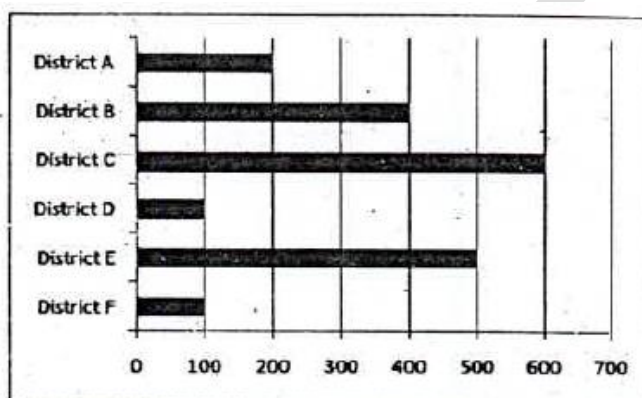
10. If n is a natural number the $9^{2n} - 4^{2n}$ is always divisible by
1. 13
2. both 5 and 13
3. 5
4. none of the above
11. If sum of LCM and HCF of two number is 50 and their LCM is 20 more than their HCF, then the product of two numbers will be
1. 525
2. 425
3. 625
4. 325
12. A 320 m long train moving at an average speed of 120 km/h crosses a platform in 24 seconds. A man crossed the same platform in 4 minutes. The speed of the man in m/sec is
1. 2.0
2. 2.4
3. 1.6
4. 1.5
13. If $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the AM (arithmetic mean) between a and b , then find the value of n
1. 1
2. 3
3. 2
4. 0
14. In a certain office, $\frac{1}{3}$ of the workers are women, $\frac{1}{2}$ of the same are married and $\frac{1}{3}$ of the married women have children. If $\frac{3}{4}$ of the men married and $\frac{2}{3}$ of the married men have children, then what part of worker are without children?
1. $\frac{5}{18}$
2. $\frac{4}{9}$
3. $\frac{11}{18}$
4. $\frac{17}{36}$
15. If in a business, Alok gain 75% more profit than Akash, then by what percentage profit of Akash is less than the profit of Alok
1. 25%
2. 12.63%
3. 30.8%
4. 42.85%
16. The height of three towers are in the ratio of 5:6:7. If a spider takes 15 minutes to climb the smallest tower, how much time it will take to climb the highest one
1. 15 minutes
2. 18 minutes
3. 21 minutes
4. 54 minutes
17. The two vertices of a Triangle are (4, -2) and (2, -6). If centerod of a triangle is (0, 1) then third vertex of triangle will be
1. (-6, 11)
2. (11, -6)
3. (6, -11)
4. (6, 11)
18. If $\sin\alpha, \cos\alpha, \tan\alpha$ are in GP, GP means $\cos^2\alpha = \sin\alpha \cdot \tan\alpha$ $\cot^6\alpha - \cot^2\alpha =$
1. 1
2. 0
3. 4
4. 2
19. Eight members of a group shake hand with one another once. How many hand shakes were done altogether
1. 64
2. 16
3. 28
4. 18
20. Three of the six vertices of a regular hexagon are chosen at random. The probability that triangle formed by these vertices is equilateral is
1. $\frac{1}{20}$
2. $\frac{1}{10}$
3. $\frac{1}{5}$
4. $\frac{1}{2}$

Directions: Question 21 – 25

Study the following pie- chart and bar graph and answer the following questions percentage distribution of teachers in six different districts. Total numbers of teacher = 4500.



Number of male out of 4500



21. What is the total number of male teachers in District F, Female teachers in District C and Female teachers in District B together?
 1. 1180
 2. 1080
 3. 1020
 4. 1120

22. The numbers of female teachers in District D is approximately what percent of the total number of teachers (both male and female) in District A
 1. 70
 2. 80
 3. 75
 4. 90

23. In which district is the number of male teachers more than the number of female teachers?
 1. B only
 2. D only
 3. Both B and E
 4. Both E and F

24. What is the difference between the number of female teachers in district F and total number of teachers (both male and female) in district E?
 1. 625
 2. 775
 3. 675
 4. 725

25. What is the ratio of the number of male teachers in district C to number of female teachers in district B?
 1. 11:15
 2. 15:11
 3. 15:8
 4. 8:15

26. Complete the given series:
25, 255, 2545, 25455, ...
 1. 254545
 2. 25555
 3. 254555
 4. 255454

27. Find the missing letter:

3	L	4
1	Q	17
5	?	4

1. V
3. Q
2. P
4. T

28. In the given arrangement of numbers after removing all even numbers which is the middle most number?

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

29. A clock is set right at 5 am. The clock loses 16 minutes in 24 hours. What will be the right time when the clock indicates 10 pm on the 4th day?

1. 8 pm
3. 10 pm
2. 9 pm
4. 11 pm

Directions (Q. No 30 – 31):

Answer the questions based on the following information. Numbers are written on the Chess Board as given below.

	a	b	c	d	e	f	g	h
1	1	2	3	4	5	6	7	8
2	9	10	11	12	13	14	15	16
3	17	18	19	20	21	22	23	24
4	25	26	27	28	29	30	31	32
5	33	34	35	36	37	38	39	40
6	41	42	43	44	45	46	47	48
7	49	50	51	52	53	54	55	56
8	57	58	59	60	61	62	63	64

30. If $a_8 = a_1 + a_2 + a_3 + \dots + a_7$
 $b_8 = b_1 + b_2 + b_3 + \dots + b_7$
 \vdots
 \vdots
 \vdots
 $h_8 = h_1 + h_2 + h_3 + \dots + h_7$
 What is $a_8 + b_8 + \dots + h_8 = \underline{\quad}$

1. 2080
3. 399
2. 1596
4. 741

31. The total number of odd numbers on the white box are

1. 8
3. 24
2. 16
4. 32

Directions: Read the information given below carefully and answer the question.

$x + y$ means x is the sister of y .

$x - y$ means x is the son of y .

$x \times y$ means x is the mother of y

$x \neq y$ means x is the father of y

$x \div y$ means x is brother of y

$x = y$ means x is daughter of y

32. Which of the following alternative means 'F is father of J'?

1. $F \div G \neq H \times I - J$

2. $J = I + H \neq G \div F$

3. $F + G - H \times I - J$

4. $J + I - H \times G - F$

33. Five persons are standing in a line facing North. One of the two persons standing at the extreme ends is a teacher and the other is a businessman. A doctor is standing to the right of a student. A clerk is to left of the businessman. The student is standing between the teacher and the doctor. Counting from the left the doctor is at which place?

1. I

2. III

3. II

4. IV

Directions (Q. 34 – 36):

Read the information given below.

Ten friends A, B, C, D, E, F, G, H, I, J are sitting on the opposite sides of a rectangular table, five on each side of a pair of opposite sides of the table. J and F are sitting next to each other. B is sitting at middle position on one of the sides and C is sitting as far from B as B is sitting from A. A, B and C are sitting on the same side of the table. G and I are sitting opposite to each other, D is on one of the ends. E has an equal number of persons sitting on his either side. I is sitting to the immediate right of D.

34. Who is sitting opposite to G?

1. H

2. I

3. J

4. A

35. In between in which two persons I is sitting?

1. D – E

2. J – E

3. B – C

4. D – B

36. In which of the following pairs, given persons cannot be sitting opposite to each other?

1. D – C

2. F – C

3. E – B

4. G – H

37. A fruit seller does not use currency. Instead of he uses the following exchange rates

10 strawberries = 2 Apples

1 Apple = 2 Bananas

4 Bananas = 1 Mango

On the basis of the above exchange rates, how many strawberries are equal to one mango?

1. 4

2. 8

3. 10

4. 12

38. If $>$ stands for +

$<$ stands for –

\wedge stands for \times

\vee stands for \div

Then what is the value of $52 < 4 \wedge 5 > 8 \vee 2$

1. 38

2. 36

3. 124

4. 312

39. The time shown by the reflection of a clock in a mirror is 4 hours 35 minutes. What is the actual time in that clock?
1. 7 hrs 25 min
 2. 8 hrs 20 min
 3. 7 hrs 35 min
 4. 8 hrs 25 min

Directions (Q. No 40 – 41):

Read the information carefully and answer the question given below:

A cube is cut into two equal parts along a plane parallel to one of its faces. One piece is coloured orange on the two largest faces and yellow on the remaining. The other piece is coloured yellow on two small adjacent faces and orange on the remaining. Each is then cut into 32 cubes of the same size. These 64 cubes are mixed up. Then:

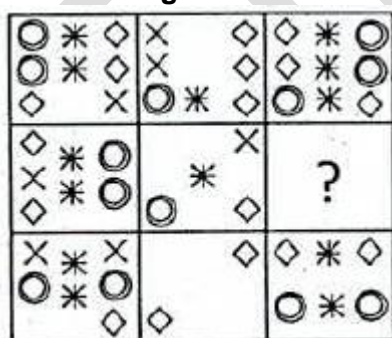
40. How many cubes have no coloured face at all?
1. 0
 2. 4
 3. 8
 4. 16
41. How many cubes have only one coloured face?
1. 8
 2. 16
 3. 20
 4. 24
42. Choose the correct alternative that represents the relationship among illiterates, poor people and unemployed.



Directions (Q. 43 – 44):

In each of the following questions find out which of the answer figures complete the figure .

43. **Question Figure**

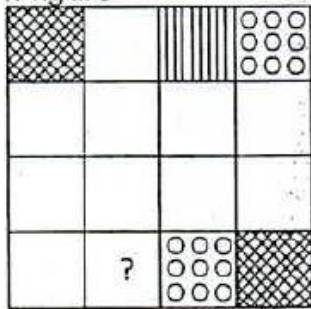


Answer Figure



44

Question Figure



Answer Figure



1.



2.



3.

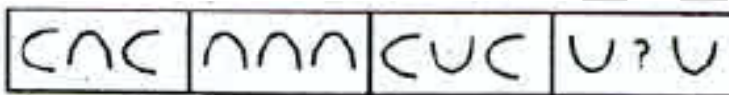


4.

Directions (Q. 45 – 46):

Select the correct alternatives which will fit in the place of the sign of interrogation for a correct pattern.

45.



1.	2.	3.	4.

46.



1.	2.	3.	4.

47.

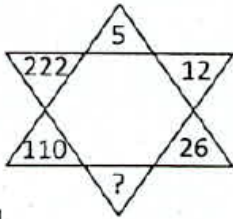
If 'SKY WAS BLUE' is 123
 'SEA IS BLUE' is 245
 'PEOPLE SWIMMING IN SEA' is 4678
 'PEOPLE LIKE SKY' is 801 and
 'BIRDS IN SKY' is 169. Then 'PEOPLE LIKE BIRDS' will have the number.

- | | |
|--------|--------|
| 1. 809 | 2. 104 |
| 3. 036 | 4. 806 |

Directions (Q 48 – 50):

Find the missing character in each of the following questions.

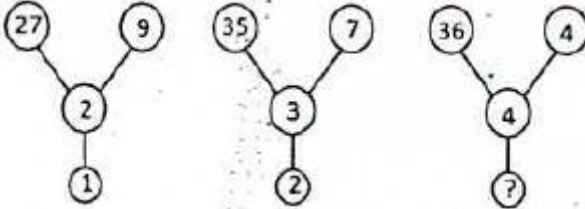
48.



- 1. 54
- 3. 48

- 2. 51
- 4. 44

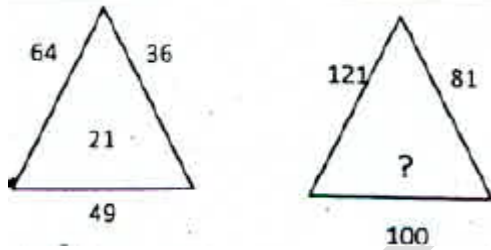
49.



- 1. 54
- 3. 5

- 2. 51
- 4. 6

50.



- 1. 40
- 3. 20

- 2. 30
- 4. 10