MOTION®

ASSOCIATION OF MATHEMATICS TEACHRS OF INDIA

Screening Test – Kaprekar Contest

(NMTC-- SUB-JUNIOR LEVEL—VII and VIII Grades)

Saturday, the 15th October 2022

Note:

1. **Fill in the Response Sheet with your Name, Class and the Institution through which you appear, in the specified places.**
2. **Diagrams given are only Visual aids; they are not drawn to scale.**
3. **You may use separate sheets to do rough work.**
4. **Use of Electronic gadgets such as Calculator, Mobile Phone or Computer is not permitted.**
5. **Duration of the Test: 2 pm to 4 pm (2 hours).**

01. The value of $\sqrt{46.47.48.49+1}$ when simplified is

a) 2245 **b**) 2255 **c**) 2345 **d**) 2195

02. Two regular polygons of same number of sides have side lengths 8 *cm* and 15 *cm.* The length of the side of another regular polygon of same number of sides whose area is equal to the sum of the areas of the given polygons is (in *cm.*)

a) 17 **b**) 23 **c**) 38 **d**) 120

03. When $a = 2022$, $b = 2023$, the numerical value of

$$\left(\frac{a}{1+\frac{a}{b}} - \frac{b}{1-\frac{b}{a}} - \frac{2}{\frac{1}{a}-\frac{a}{b^2}} \right)$$ is

a) 1 **b**) 2022×2023 **c**) $(2023)^2$ **d**) 0

04. Two sides of a triangle are of lengths 5 *cm* and 10 *cm*. The length of the altitude to the third side is equal to the average of the other two altitudes. The length of the third side (in *cm*) is

a) 12 **b**) 8 **c**) $\frac{20}{3}$ **d**) 9

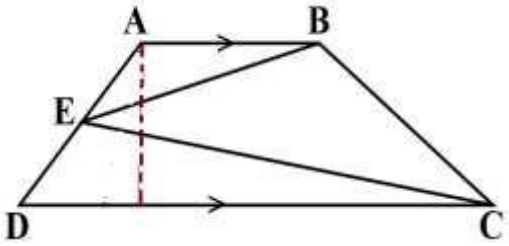
05. a,b,c,d,e,f are natural numbers in some order among 4, 5, 6, 12, 20, 24. The maximum value of $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}$ is

a) 1 **b**) 5 **c**) 10 **d**) 12

06. Two consecutive natural numbers exist such that the square of their sum exceeds the sum of their squares by 112; then the difference of their squares is ...

a) 10 **b**) 12 **c**) 13 **d**) 15

07. ABCD is a trapezoid with $AB \parallel CD$. Given $AB = 11\ cm$ and $DC = 21\ cm$. and the height of the trapezoid is $4\ cm$. If E is the midpoint of AD, the area of triangle BEC (in cm^2) is ...



a) 32 **b**) 34 **c**) 28 **d**) 40

08. One-sixth of one-fourth of three-fourths of a number is 15, the number is

a) 1020 **b**) 320 **c**) 520 **d**) 480

09. Two places A and B are connected by a straight road. Samrud and Saket start by motorbikes respectively from A and B at the same time; after meeting each other, they complete their journey in 90 minutes and 40 minutes respectively. If the speed of Samrud's bike is 16 km/hr., then the speed of Saket's bike (in km/hr.) is ...

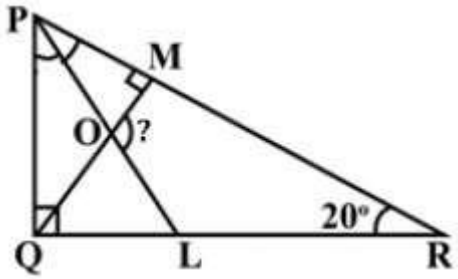
a) 20 **b**) 18 **c**) 24 **d**) 22

10. The length of a rectangle is increased by 60%. By what percent should the breadth be decreased to have the same area?

a) 35.5 **b**) 37.5 **c**) 38.25 **d**) 36.5

11. In the adjoining figure, *PL* is the bisector of ∠QPR.

The measure of the angle *MOL* is ...



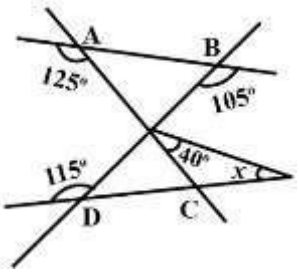
a) 115° **b**) 120°

c) 125° **d**) 135°

12. A four centimetre cube is painted blue on all its faces. It is then cut into Identical one centimetre cubes. Among them, the number of cubes with only one face painted is ...

a) 12 **b**) 16 **c**) 18 **d**) 24

13. In the adjoining figure, the value of *x* (in degrees) is



a) 20° **b**) 25°

c) 30° **d**) 35°

14. Given here is a magic square.

The numerical value of

$a^2 + b^2 + c^2 + d^2 + e^2$ is ...

a	14	**b**	0
c	5	6	11
4	***d***	10	7
15	2	***e***	12

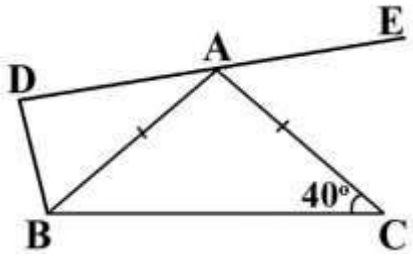
a) 324 **b**) 144 **c**) 274 **d**) 316

15. *x* % of 400 added to *y* % of 200 gives 100. If *y* % of 800 is 80, what percent of *x* is *y* ?

a) 60 **b**) 40 **c**) 50 **d**) 20

FILL IN THE BLANKS:

16. In the adjoining figure, $AB = AC$ and $\hat{C} = 40^\circ$.



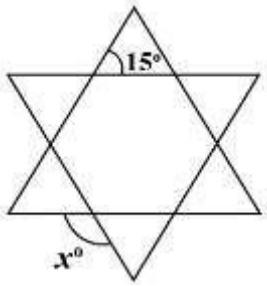
If $\angle ABD = (3x - 3)^\circ$, $\angle BDA = (2x + 8)^\circ$ and $\angle CAE = (x - 11)^\circ$ then $x =$ _____

17. If $a = 2022$, $b = -2$, $c = 4044$ then the numerical value of

$$\frac{a(b^2 - c^2)}{bc} + \frac{2b(c^2 - a^2)}{ca} - \frac{c(2b^2 - a^2)}{ab}$$ is_____.

18. If $a = \sqrt[3]{2} - \frac{1}{\sqrt[3]{2}}$, then the numerical value of $2a^3 + 6a$ is_____.

19. In the adjoining figure, two equilateral triangles cut each other.

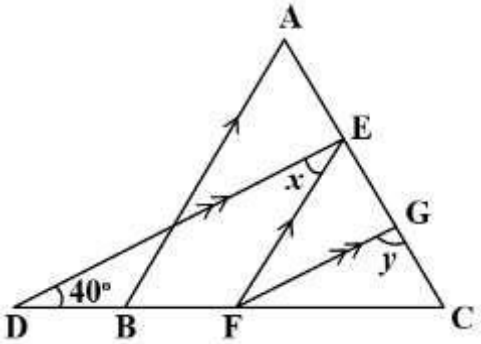


The measure of the angle x° is_____ degrees.

20. A vendor has four regular customers. He sells to the first customer half his stock of cakes and half a cake. He sells to the second customer half of the remaining stock and half a cake. He repeats this procedure for the third and the fourth customer also. Now, finally he is left with 15 cakes. The number of cakes he had in the beginning is_____.

21. In the sequence 1, 1, 1, 2, 1, 3, 1, 4, 1, 5, ..., the 2022nd term is_____.

22. In the adjoining figure, ABC is an equilateral triangle.



AB and EF are parallel.

DE and FG are parallel.

$\angle BDE = 40^\circ$.

Then $x + y$ (in degrees) is _____

23. A gardener has to plant a number of rose plants in straight rows. First he tried 5 in each row; then he successively tried 6, 8, 9 and 12 in each row but always had 1 plant left Then he tried 13 in a row and to his pleasant surprise, no plant was left out. The smallest number of plants he could have had is_____.

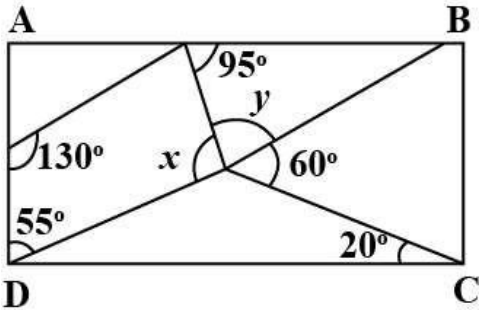
24. *A*, *B* run a race 1 *km* long straight path. If *A* gives B 40 *m* start then , *A* wins by 19 seconds. If *A* gives *B* 30 seconds start, then *B* wins by 40 *m.* If *B* normally would take t_1 seconds to run the total 1 km length and *A* normally would take t_2 seconds to run the total 1 km length, then $t_1 - t_2$ ((in seconds) is_____.

25. David computed the value of 3^{19} as 11*a* 2261467. He found all the digits correctly except '*a*'. The value of '*a*' is_____.

26. The sum of eight consecutive natural numbers is 124. The sum of the next 5 natural numbers will be_____.

27. In the adjoining figure, *ABCD* is a rectangle.

The value of $x + y$ (in degrees) is_____.



28. If $A = (625)^{-3/4}$ and $B = (78125)^{3/7}$, then the value of $A \times B$ is_____.

29. A room is 5 *m* 44*cm* long and 3 *m* 74*cm* broad. The side of the largest square-slabs which can be paved of this room (in *cm.*) is_____.

30. A company sells umbrellas in two different sizes, large and small. This year it sold 200 umbrellas, of which one-fourth were large. The sale of large umbrellas produced one-third of the company's income. If $a : b$ is the ratio of the price of a larger umbrella to the price of a smaller umbrella, then ab^2 is_____.

Answer Key

SUB-JUNIOR LEVEL SOLUTIONS-KAPREKAR CONTEST

Qn.	1	2	3	4	5	6	7	8	9	10
Ans.	b	a	d	c	d	d	a	d	c	b
Qn.	11	12	13	14	15	16	17	18	19	20
Ans.	c	d	b	a	c	21	1	3	165	255
Qn.	21	22	23	24	25	26	27	28	29	30
Ans.	1011	120	3601	25	6	110	175	1	34	12