

## SAMPLE QUESTIONS - MATHEMATICS, CATEGORY 2

1. Find the value of  $2020 \div (2 + 0 + 2 + 0) - 2 \times 0 \times 2 \times 0$

- A) 4      B) 55      C) 101      D) 505      E) 2020

2. Find the value of the expression

$$100 - 98 + 96 - 94 + 92 - 90 + \dots + 8 - 6 + 4 - 2$$

- A) 20      B) 40      C) 50      D) 80      E) 100

3. Alex wants to paint the slogan COPERNICUS OLYMPIAD on a wall. He wants different letters to be colored differently, and same letters to be colored identically. How many colors will he need?

- A) 9      B) 10      C) 12      D) 14      E) 16

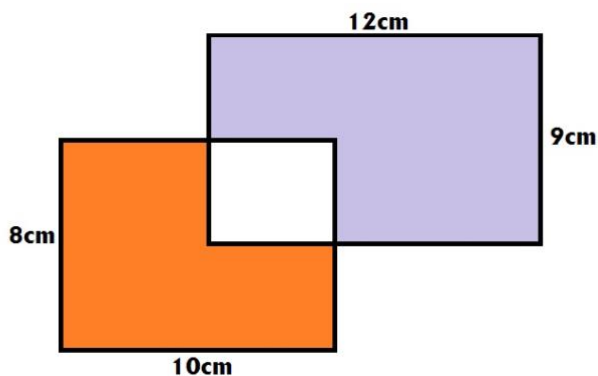
4. Find the remainder when  $(2004 \cdot 10875) + 4640985 - 285$  is divided by 4

- A) -1      B) 0      C) 1      D) 2      E) 3

5. Solve  $7^7 + 7^7 + 7^7 + 7^7 + 7^7 + 7^7 + 7^7 =$

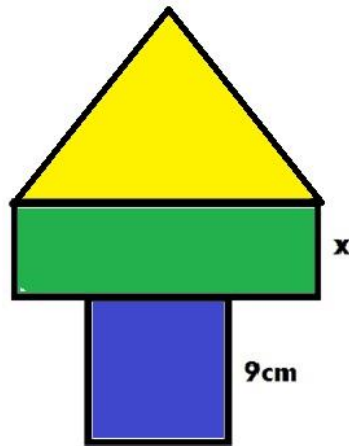
- A)  $7^7$       B)  $7^8$       C)  $49^7$       D)  $7^{49}$       E)  $49^{49}$

6. Two rectangles of  $8 \times 10$  and  $9 \times 12$  partly cover each other. The orange area is 37. What is the purple area?



- A) 60      B) 62      C) 64      D) 65      E) 70

7. "Tower" at the picture is formed of three structures – square, rectangle and equilateral triangle. Perimeter of all three structures is the same. Side of the square is 9 cm long. Find the length of  $x$ .



- A) 4 cm      B) 5 cm      C) 6 cm      D) 7cm E) 8 cm

8. There are 4 statements about the positive integer  $A$ :

$A$  is divisible by 5

$A$  is divisible by 11

$A$  is divisible by 55

$A$  is divisible by 10

It is known that two of these statements are true, and the other two are false. Then  $A$  is equal to:

- A) 0      B) 5      C) 10      D) 11      E) 55

9. The sum of each row and column is given. What is the value of  $\blacklozenge + \bullet - \blacktriangle$  ?

$\blacklozenge$	$\bullet$	$\blacklozenge$	<b>11</b>
$\bullet$	$\blacklozenge$	$\blacktriangle$	<b>8</b>
$\bullet$	$\blacktriangle$	$\blacklozenge$	<b>8</b>
<b>10</b>	<b>8</b>	<b>9</b>	

A) 4      B) 5      C) 6      D) 7      E) 0

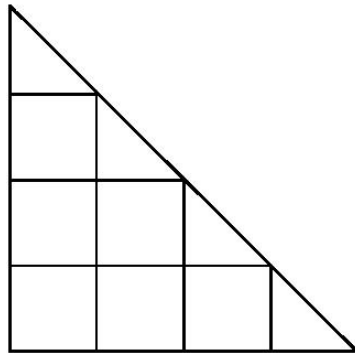
10. Alex chose a whole number and multiplied it by 3. Which of the following numbers could not be his answer?

A) 103      B) 105      C) 204      D) 444      E) 2022

11. If the sum of five consecutive positive integers is 2020, then the largest of these numbers is

A) 402      B) 404      C) 406      D) 1010      E) 2020

12. If you count the number of all possible triangles and the number of all possible squares in the picture how many more triangles than square do you find?

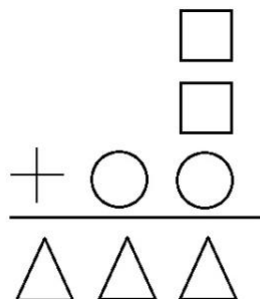


- A) The same quantity      B) 1      C) 2      D) 3      E) 4

13. Which of the following equalities represents  $m$  as 30% of  $k$ ?

- A)  $10m - 3k = 0$       B)  $3m - 10k = 0$       C)  $7m - 10k = 0$   
 D)  $7m - 3k = 0$       E)  $10m + 3k = 0$

14. Different figures represent different digits. Find the digit corresponding to the square of square.



- A) 1      B) 6      C) 9      D) 36      E) 81

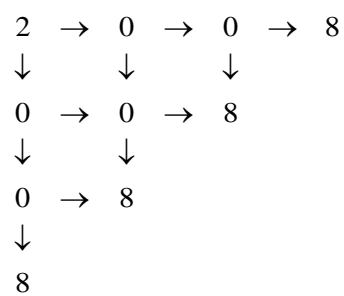
15. If  $x + y = -2$  and  $a - b = -1$  then, find  $bx + by - ax - ay = ?$

- A) 1      B) 2      C) 3      D) -2      E) -3

16. Solve  $2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - \dots}}}} = ?$

- A) **1**      B)  $\frac{3}{2}$       C)  $\frac{1}{2}$       D)  $\frac{5}{3}$       E) 0

17. With how many ways Alex can get a number 2008 while following the arrows on the figure.



- A) 6      B) 7      C) 8      D) 9      E) 10

18. This is a small piece of the multiplication table

x	4	3
5	20	15
7	28	21

And this is another one, in which, unfortunately, one number is missing.

x		
	35	63
	30	?

Find the missing number.

- A) 36      B) 48      C) 54      D) 56      E) 63

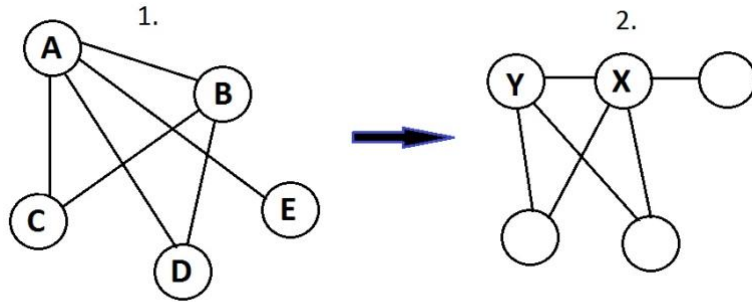
19. Find 
$$\frac{\left[ (4)^{-2} : \left( \frac{1}{3} \right)^2 \right]^{\frac{1}{2}}}{\left( -\frac{1}{6} \right)^2} = ?$$

- A) -36      B) -27      C) 27      D) 36      E) 48

20. If  $a = 3 + \sqrt{3}$  and  $b = \frac{\sqrt{3}a^4\sqrt{a^2}}{\sqrt{3} + \sqrt[3]{27}}$  then, find b=?

- A)  $3\sqrt{a}$     B)  $a\sqrt{3}$     C)  $3\sqrt{3}$     D)  $2\sqrt{3}$     E)  $\sqrt{3}$

21. Find the letters that correspond to  $x$  and  $y$  in figure 2.  $(x, y) = ?$



- A)  $(E, C)$     B)  $(B, A)$     C)  $(C, E)$     D)  $(A, B)$     E)  $(D, C)$

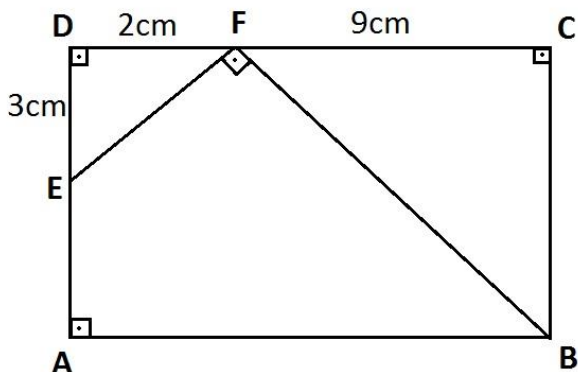
22. In equation  $I$ , the operation  $\Delta$  is established. According to this operation, which of the following does the question mark stand for in equation  $II$ ?

$I. \quad \frac{a+b}{2} \Delta (2a-b) = a^b$

$II. \quad 2 \Delta 5 = ?$

- A) 3    B) 4    C) 5    D) 6    E) 7

23. ABCD is a rectangle  $|DF| = 2$ ,  $|FC| = 9$ ,  $|DE| = 3$ , Find  $|AE| = ?$

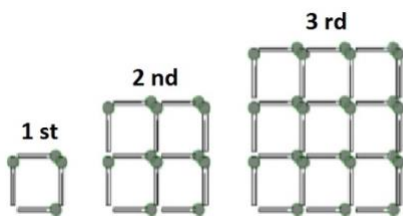


- A) 1    B) 2    C) 3    D) 4    E) 5

24. How many digits can be at most erased from the 1000-digit number 20082008 . . . 2008, such that the sum of the remaining digits is 2008?

- A) 260      B) 476      C) 510      D) 746      E) 1020

25. Alex is building squares with matches adding small squares that he has already built according to the schema of the figure. How many matches does he have to add to the 5<sup>th</sup> square to build the 6<sup>th</sup> square?



- A) 12      B) 18      C) 20      D) 24      E) 32