



Math Olympiad Online

MOTS 2022

Math Olympiad Talent Search

6-7

INSTRUCTIONS TO BE FOLLOWED

- Do not open booklet until instructed to do so
- 20 Questions in total
- 30 mins to complete
- Each question carries one mark
- No negative marking
- Answers are to be shaded in OMR sheet
- Only OMR sheet to be returned

Math Olympiad Talent Search 2022

1. How many of the following statements are true ?

A prime multiplied by a prime is always a prime.

A square multiplied by a square is always a square.

An odd number multiplied by an odd number is always an odd number.

An even number multiplied by an even number is always an even number.

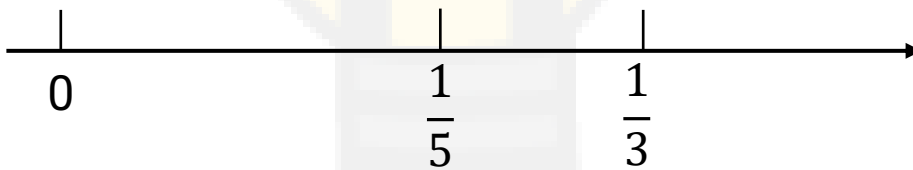
A. 0 B. 1 C. 2 D. 3 E. 4

2. B is a digit in the product shown. What is the value of B ?

$$\begin{array}{r} B2 \\ \times 7B \\ \hline 6396 \end{array}$$

A. 3 B. 5 C. 6 D. 7 E. 8

3. The fraction halfway between $\frac{1}{5}$ and $\frac{1}{3}$ on the number line is



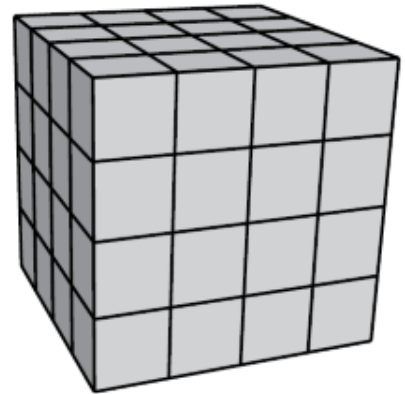
A. $\frac{1}{4}$ B. $\frac{2}{15}$ C. $\frac{4}{15}$ D. $\frac{8}{15}$ E. $\frac{7}{15}$

4. What is the value of $2 - (-2 - 2) - (-2 - (-2 - 2))$?

A. 0 B. 2 C. 4 D. 6 E. 8

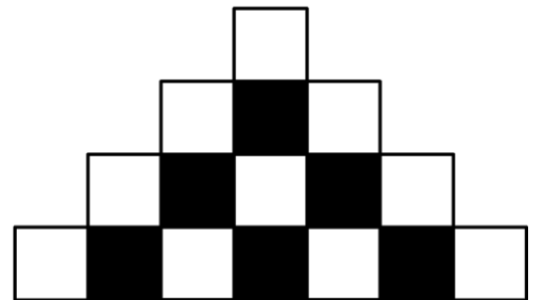
5. Abinеш's birthday cake is in the form of a $4 \times 4 \times 4$ inch cube. The cake has icing on the top and the four side faces, and no icing on the bottom. Suppose the cake is cut into 64 smaller cubes, each measuring $1 \times 1 \times 1$ inch, as shown below. How many of the small pieces will have icing on exactly two sides?

- A. 12 B. 16 C. 18
D. 20 E. 24



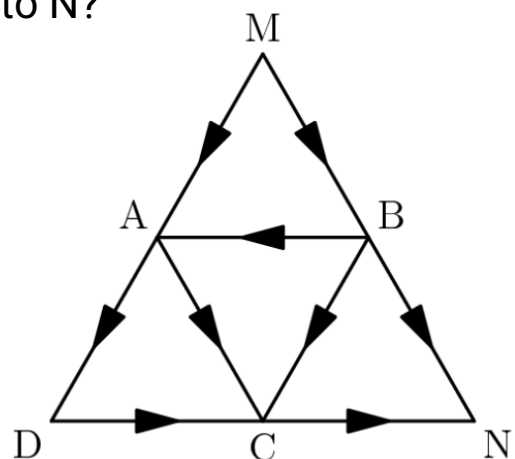
6. A pyramid figure is made of alternating black and white squares in each row. Rows 1 to 4 are shown. All rows begin and end with a white square. The number of black squares in the 37th row is:

- A. 34 B. 35 C. 36
D. 37 E. 38



7. Using only the paths and directions shown, how many different routes are there from M to N?

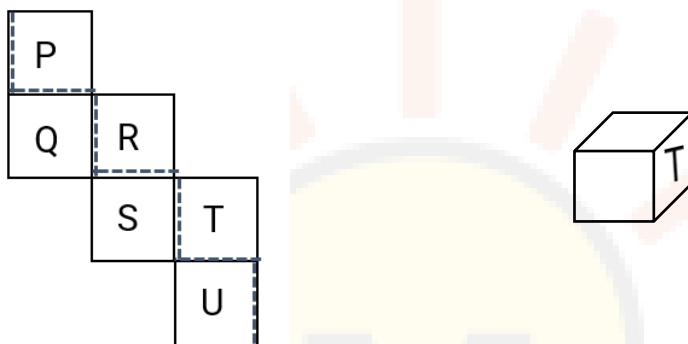
- A. 2 B. 3 C. 4
D. 5 E. 6



8. When Shruthi divides her favourite number by 7, she gets a remainder of 5. What will the remainder be if she multiplies her favourite number by 5 and then divides by 7 ?

- A. 0 B. 5 C. 6 D. 2 E. 4

9. There are six squares on which the letters P, Q, R, S, T, U are written as shown. It is folded along dotted lines to form a cube as shown. Which letter will show up on the square opposite to the square having T on it ?



- A. P B. Q C. R D. S E. U

10. In a parking lot, there are 60 cars, all of which are black or blue and all of which are either Maruti or Toyota make. There are 25 black Maruti cars. There are 18 blue cars. There are 25 Toyota cars. How many blue Toyotas are there in that parking lot ?

- A. 8 B. 7 C. 10 D. 2 E. 6

11. 100 flowers were kept in 4 vases. After some time, 4, 5, 3 and 8 flowers were taken out from first, second, third and fourth vase respectively. Now all the four vases have the same number of flowers. The number of flowers in the fourth vase at the beginning was

- A. 24 B. 25 C. 23 D. 28 E. 27

12. If $p + p = n$, and $p + n = q$, and $d = q + n$

What is the value of $\frac{d}{p}$?

- A. $\frac{1}{5}$ B. 5 C. $\frac{4}{5}$ D. 6 E. $\frac{6}{5}$

13. A number x has a property such that both $\frac{x}{2}$ and $2x$ are four-digit whole numbers. How many such numbers exist ?

- A. 1499 B. 1500 C. 2499
D. 2500 E. None of the above

14. There are three prime numbers p, q and r whose sum $(p + q + r) = 22$. Find the largest possible value for $p * q * r$

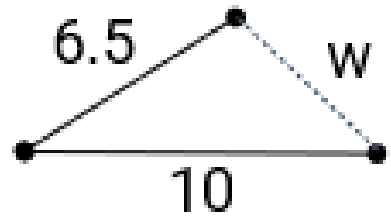
- A. 57 B. 182 C. 102
D. 85 E. infinitely large

15. Let O be an odd whole number and let n be any whole number. Which of the following statements about the whole number $(O^2 + n * O)$ is always true

- A. It is always odd B. It is always even
C. It is even only if n is even D. It is odd only if n is odd
E. It is odd only if n is even

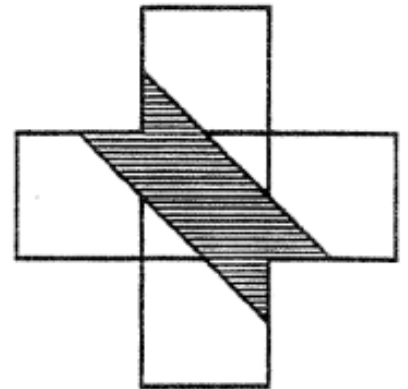
16. The sides of a triangle have lengths 6.5, 10 and w , where w is a whole number. What is the smallest possible value of w ?

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



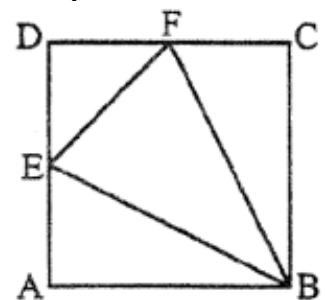
17. The shaded region in the Figure below is formed by drawing two parallel line segments which connect the midpoints of congruent squares. Each square has side length 1 cm. What is the area of the shaded region in sq cm.

- A. $\frac{3}{2}$ B. $\frac{5}{4}$ C. $\frac{4}{5}$
 D. 1 E. $\frac{7}{4}$



18. In the square ABCD, E and F are midpoints of sides AD and DC respectively. AB = 2 cm. What is the number of square centimeters in the area of $\triangle BEF$

- A. 2 B. $2\sqrt{3}$ C. $\sqrt{3}$
 D. $\frac{3}{2}$ E. $\frac{3}{\sqrt{2}}$

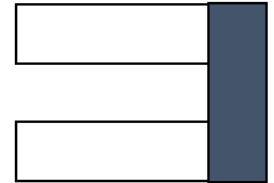


19. A square is divided into three congruent (identical) rectangles as shown. The middle one is removed and placed touching the others vertically as shown. If the perimeter of the square is s and the perimeter of the new figure is n , what is the value of

$$\frac{s}{n} ?$$



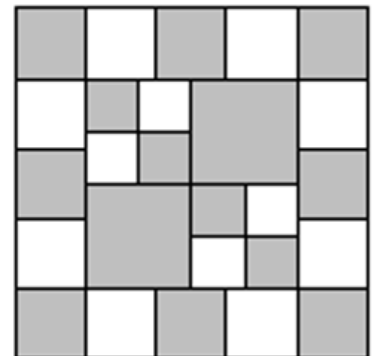
Perimeter= s



Perimeter= n

- A. $\frac{3}{5}$ B. $\frac{2}{3}$ C. $\frac{5}{8}$ D. $\frac{1}{2}$ E. $\frac{4}{7}$
20. The diagram shows a large square divided into squares of three different sizes. What fraction of the large square is shaded?

- A. $\frac{61}{100}$ B. $\frac{59}{100}$ C. $\frac{57}{100}$
- D. $\frac{11}{20}$ E. $\frac{53}{100}$





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