

Mathematica Centrum

Together, let's shape the mathematicians of the future

LAGRANGE PREPARATORY TEST 2018

1. How many of the following: 1, 3, 15, 7, and 48 yield a perfect square when you add 1 to them?

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

2. The largest possible sum, less than 10, of two consecutive prime numbers is

- A) 3 B) 5 C) 7 D) 8 E) 9

3. If $\frac{3}{4}$ of a number is equal to 8, then $\frac{9}{4}$ of the same number is equal to

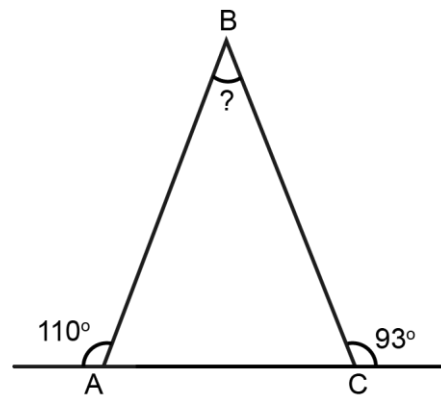
- A) 20 B) 21 C) 22
D) 23 E) 24

4. If $n \div \frac{1}{6} = 18$, then $n \times 2 = ?$

- A) 10 B) 6 C) 12
D) 8 E) 108

5. What is the value of angle B?

- A) 19° B) 20° C) 21°
D) 22° E) 23°



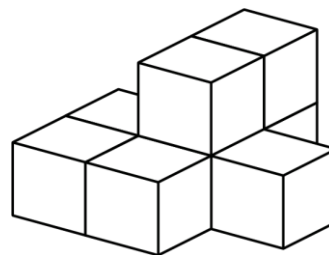
6. Which fraction is equal to (50% of 50%)%?

- A) $\frac{1}{400}$ B) $\frac{1}{10}$ C) $\frac{1}{200}$ D) $\frac{1}{100}$ E) $\frac{1}{20}$

7. Starting with -9, all integers are written in increasing order: -9, -8, -7, -6, -5, -4, -3, -2, The 20th digit that will be written is a

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

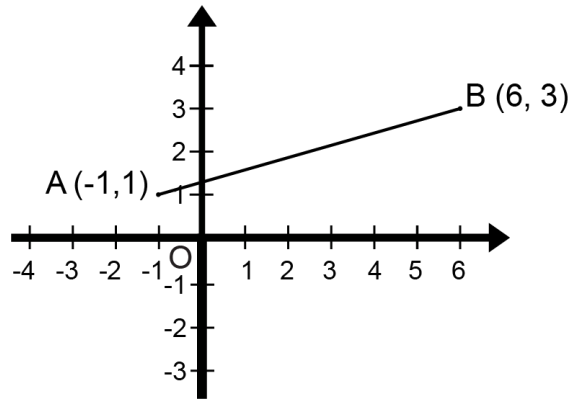
8. Eight blocks have been glued together, as shown in the diagram. How many faces of these blocks have glue on them?



- A) 18 B) 20 C) 24 D) 26 E) 28

9. The price of a 100\$ dress increases by 40%. The price of a 150\$ shirt decreases by 30%. When bought together, the price of the two items

- A) increases by 10%
- B) decreases by 10%
- C) increases by 2%
- D) decreases by 2%
- E) stays the same

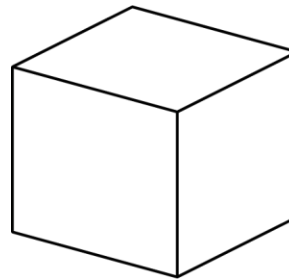


10. In the equation $P + Q = 12$, P and Q are natural numbers. What is the greatest possible value of the expression $P \times Q$?

- A) 27
- B) 32
- C) 36
- D) 35
- E) 39

11. Line segment AB is reflected in the y-axis. The coordinates of the images of points A and B, after the reflection, are respectively,

- A) (-1, 1) and (6, 3)
- B) (1, -1) and (6, 3)
- C) (-1, -1) and (6, 3)
- D) (-1, -1) and (3, 6)
- E) (1, 1) and (-6, 3)



12. The result of the number of faces of a cube plus the number of edges of a cube plus the number of vertices of a cube minus the number of angles of a cube is equal to

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

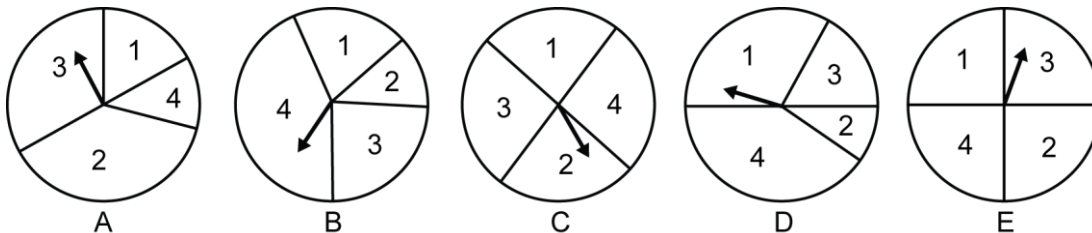
13. The LCM (3, 4, 5) = ?

- A) 12
- B) 120
- C) 30
- D) 60
- E) 30

14. $20 \text{ cm}^2 = ? \text{ mm}^2$

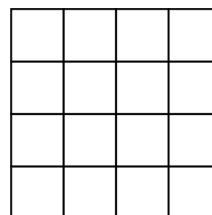
- A) 2 000
- B) 1 000
- C) 4 000
- D) 20
- E) 200

15. Which spinner should you choose to increase your chances of getting a 2 or a 4?



16. How many squares can you count in the diagram shown on the right?

- A) 28
- B) 29
- C) 30
- D) 31
- E) 32



17. The base and height of a triangle are twice as long as the base and height of another triangle. The area of the small triangle is what fraction of the area of the large triangle?

- A) $3/4$ B) $1/2$ C) $1/3$ D) $1/4$ E) $1/16$

18. A, B, and C are the 3 angles of a triangle. A is 10° more than B and B is 10° more than C. The sum of angle B + angle C is equal to

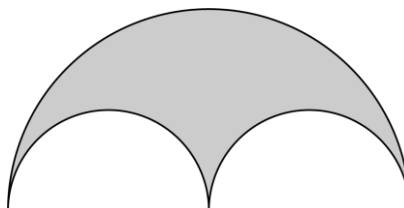
- A) 130° B) 110° C) 120° D) 100° E) 105°

19. The sum of 3 prime numbers is 19. One of these prime numbers must be

- A) 13 B) 17 C) 2 D) 11 E) 7

20. Which of the following answers represents the area of the shaded surface, if the diameter of the large circle is 4?

- A) π B) $\pi/2$
 C) $3\pi/2$ D) 2π
 E) $5\pi/2$

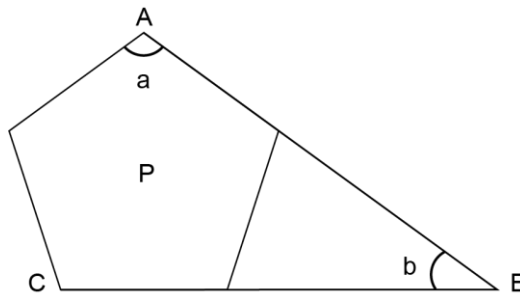


21. How many 3-digit natural numbers can be formed using the digits 1, 2, and 3, if each digit can appear more than once in the same number?

- A) 24 B) 26 C) 27
 D) 30 E) 21

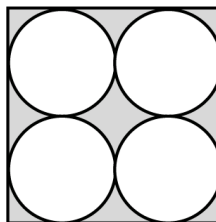
22. AB and CB are two line segments. Polygon P is a regular pentagon. What is the value of $2a + b$?

- A) 278° B) 290°
 C) 280° D) 360°
 E) 252°



23. What is the area of the shaded surface, if the side of the square shown in the diagram is 4?

- A) $16 - 4\pi$ B) $4 - \pi$
 C) $16 - 2\pi$ D) $16 - \pi$
 E) $4 + \pi$



4