# Mathematica Centrum

Together, let's shape the mathematicians of the future

NEWTON PREPARATORY TEST 2024

1. $(\sqrt{9})^2 + (\sqrt{4})^2 = ?$

   A) 97   B) 13   C) 85   D) 12   E) 36

2. The value of (-3 + 9) x (-9 + 3) is equal to

   A) 16   B) 0   C) -12   D) -36   E) 36

3. The number of divisors of 10 is equal to

   A) 6   B) 2   C) 4   D) 3   E) 5

4. If 1/4 of N is equal to (1/3 - 1/4) x 2/3, what is the value of N?

   A) 2/9   B) 1/16   C) 1/21   D) -3/18   E) 1/18

5. A grasshopper hops along the number line. It jumps from the number 1/3 and lands on number X, the point from which it rebounds to the number 7/9. What is the value of number X if it lies 9/10 of the distance between 1/3 and 7/9?
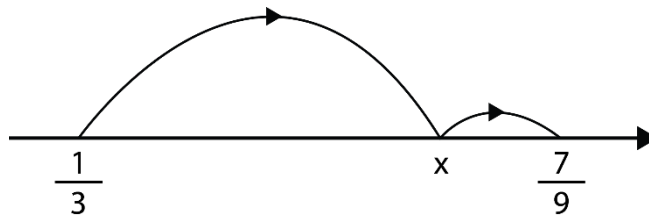
   A) 31/45   B) 2/3   C) 11/15   D) 2/5   E) 16/45

6. The number of cube numbers smaller than 200 is equal to

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

7. Which of the answers below is closest in value to a speed of 100 km/h?

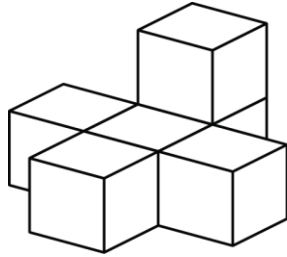   A) 28 m/s   B) 27 m/s   C) 29 m/s   D) 26 m/s   E) 30 m/s

8. What is the value of (10%)² of 200?

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

9. The average value of an angle in a hexagon is

    A) 100º   B) 105º   C) 110º   D) 115º   E) 120º

10. Six blocks were glued together as shown in the diagram. How many faces of these blocks are covered with glue?

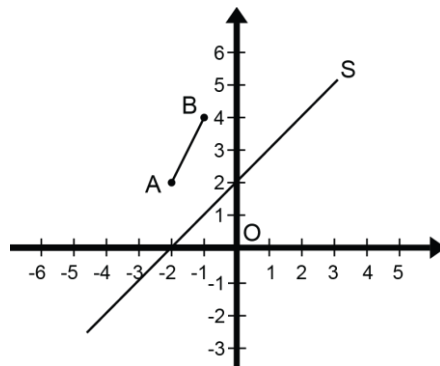   A) 6   B) 14   C) 8   D) 10   E) 12

11. The value of n in the equation $10^4 \times 10^2 \times n = 8 \times 100^3$ is

    A) 10   B) 7   C) 8   D) 6   E) 5

12. Which of the suggested numbers has the most prime factors?

    A) 15   B) 30   C) 60   D) 45   E) 26

13. What are the coordinates of the image of point A of line segment AB if it is first reflected in the axis of symmetry S, and then is moved (translation) by a value of t (5, 5)?
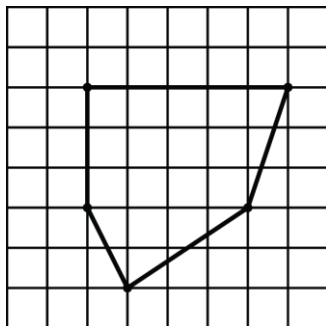

    A) A'(5, 5)   B) A'(5, 4)   C) A'(4, 4)   D) A'(5, 6)   E) A'(4, 5)

14. The GCD and LCM of 12 and 16 are respectively
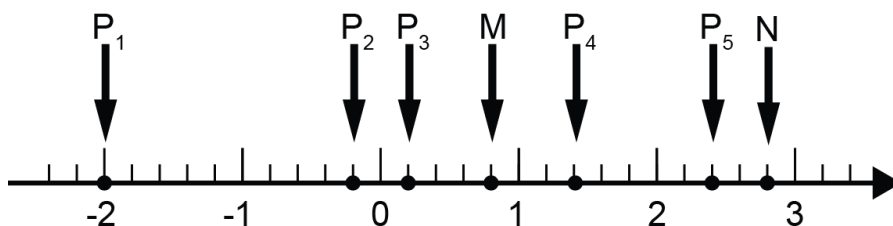
    A) 6 and 36   B) 4 and 96   C) 4 and 36   D) 4 and 48   E) 48 and 8

15. Each vertex of the pentagon below coincides with the vertex of a small square. What is the area of the pentagon if the area of each small square of the grid is 9 cm²?

A) 157.5 cm²   B) 158 cm²   C) 158.5 cm²   D) 159 cm²   E) 160 cm²

16. What point on the number line is 3 times farther from N than from M?

A) P_1 B) P_5 C) P_2 D) P_3 E) P_4

17. The area of a triangle is twice that of a square. We double the side of the square and double the height of the triangle. Which of the following represents the ratio of the area of the new square compared to the area of the new triangle?

A) 1   B) 1.1   C) 0.9   D) 1.5   E) 2

18. Which answer corresponds to (20%)%?

A) 0.004   B) 1/25   C) 0.002   D) 2/5   E) 3/50

19. If x = 2, what is the value of $1 + 2x + x^2 - 2x^3$?

A) 7   B) -7   C) -8   D) -6   E) 25

20. Look carefully at the diagram below which represents the first 4 steps (step 0, step 1, step 2, and step 3) in the transformation of a triangle. In step 0, the transformation has not yet begun and the the triangle is intact. In step 1, 1 triangle is removed. In Step 2, three more triangles are removed. How many triangles will be removed in Step 11 of the transformation (Sierpinski fractal)?


| 0 | 1 | 2 | 3 |
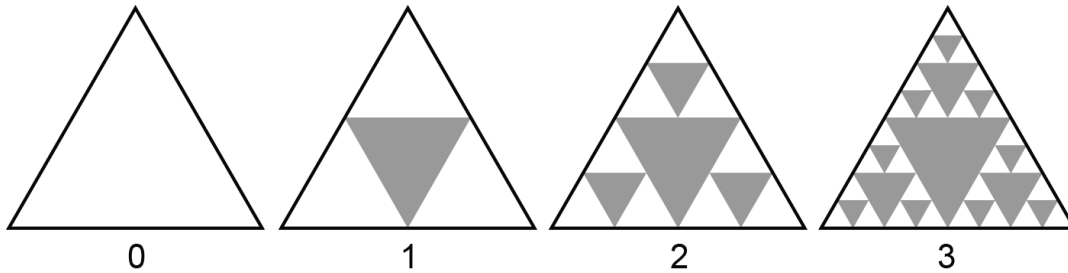
A) 3^9 B) 3^{10} C) 3^{11} D) 3^8 E) 3^7

21. The measures of the 3 angles of a triangle are in the ratio 2: 3: 4. What is the value of the largest angle?

A) 85^0 B) 90^0 C) 75^0 D) 65^0 E) 80^0

22. Andrea is going to conduct a 3-part experiment. Firstly, she will randomly pick a ball in a box containing 3 red balls and 4 blue balls. Then, she will spin only once the arrow of the spinner with numbers and finally, she will spin only once the arrow of the spinner with the letters. What is the probability that she will get a red ball, the number 3, and the letter E?
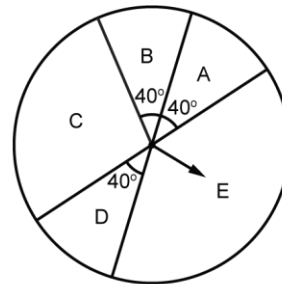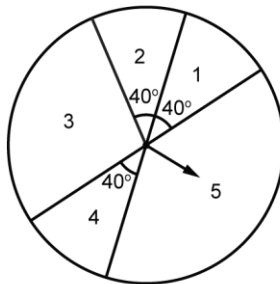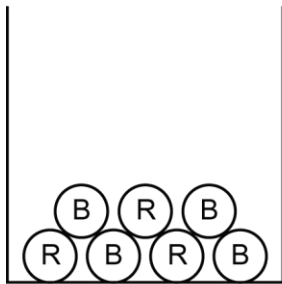

A) 1/5   B) 1/9   C) 6/124   D) 5/108   E) 5/81

23. 10! - 9! = ?

A) 10!   B) 9 x 9!   C) 9 x 10!   D) 11 x 9!   E) 9!

24. The circumference of a circle is m cm. The area of the same circle is m cm². What is the length of the diameter of the circle?

A) 3 cm   B) 5 cm   C) 5.5 cm   D) 2 cm   E) 4 cm

25. The 4 vertices of square ABCD are on the sides of an isosceles triangle as shown in the diagram below. The base and height of the triangle are respectively 8 cm and 12 cm. What is the perimeter of the square?
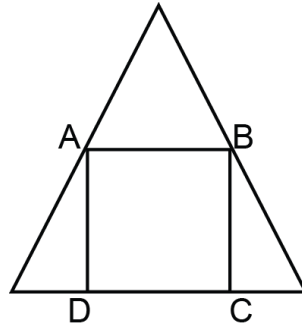
A) 18.5 cm   B) 20 cm   C) 19.4 cm   D) 19.2 cm   E) 19.3 cm

26. Four regular hexagons are placed together as shown in the diagram below. Each hexagon has sides 10 cm long. Points A, B, C, and D are the centres of the hexagons and figure ABCD is a rhombus. Line segment AE is the apothem of hexagon A and measures 8.65 cm. What is the area of rhombus ABCD?
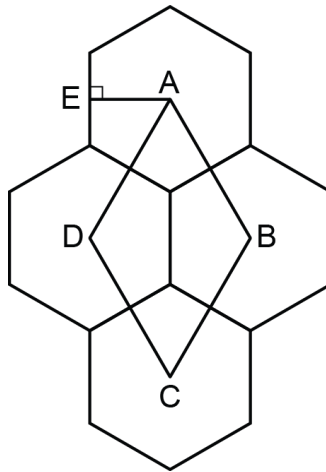
A) 248.5 cm²   B) 259.5 cm²   C) 260.5 cm²   D) 261 cm²   E) 245.8 cm²