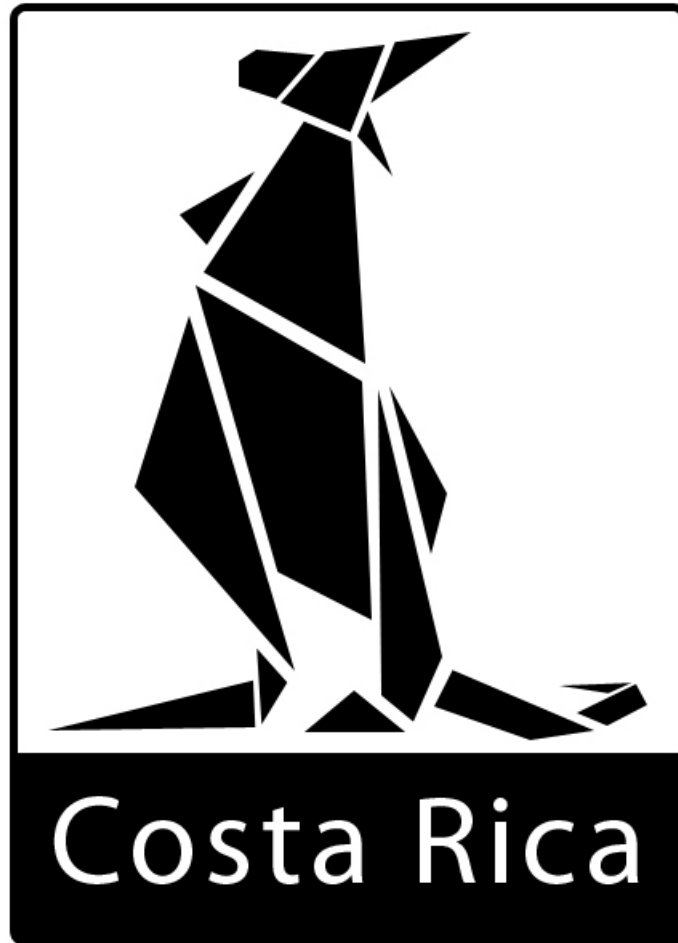


Canguro Matemático Costarricense



Junior Test
Nineth grade

Name of the student: _____

Name of the institution: _____

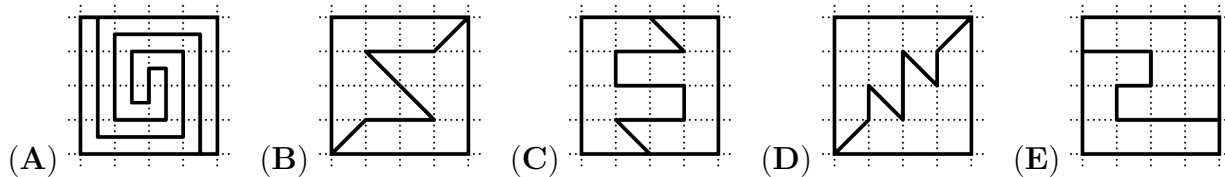
Kangourou Sans Frontières
Costa Rica 2024

3 points

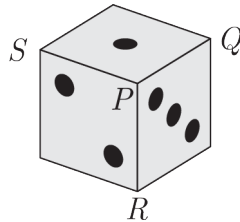
1. What is the value of $\frac{2 \times 0.24}{20 \times 2.4}$?

- (A) 0.01 (B) 0.1 (C) 1 (D) 10 (E) 100

2. Which square is split up into two pieces that do **not** have the same shape?



3. The number of the dots on opposite faces of a die add to 7. The vertex labelled P on the die is formed by the faces which have 1, 2 and 3 dots on them. Its vertex sum is the sum of the number of dots on those faces which meet at a given vertex. The vertex sum of P is $1 + 2 + 3 = 6$.



What is the maximum of the vertex sums of vertices Q , R and S ?

- (A) 7 (B) 9 (C) 10 (D) 11 (E) 15

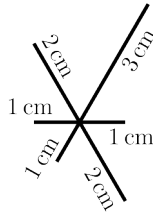
4. A hopping game is played in the following way: Each player hops into the squares, swapping between left foot - both feet - right foot - both feet - left foot - both feet, and so on, as shown.



Maya played the game and hopped into exactly 48 squares starting with her left foot. How many times did her left foot touch the ground?

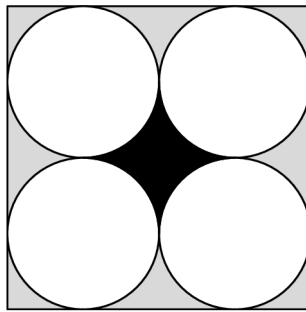
- (A) 12 (B) 24 (C) 36 (D) 40 (E) 48

5. Tim wants to draw the figure shown on a piece of paper, without lifting his pencil off the paper.



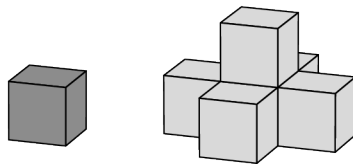
The lengths of the lines are given in the figure. He can choose to start his drawing anywhere. What is the shortest distance he could draw to complete the figure?

- (A) 14 cm (B) 15 cm (C) 16 cm
 (D) 17 cm (E) 18 cm
6. The figure shows a square with four circles of equal area, each touching two sides of the square and two other circles.



What is the ratio between the areas of the black region and the grey region?

- (A) 1 : 4 (B) 1 : 3 (C) 2 : 3 (D) 3 : 4 (E) π : 1
7. John makes a sequence of structures on a table, beginning with one cube. He makes the next structure by adding five cubes which hide the visible faces of the initial cube, as shown.



What is the smallest number of cubes he needs to add to the second structure so that all the visible faces of the second structure are hidden?

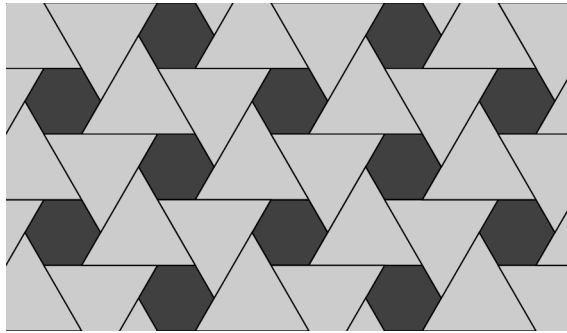
- (A) 8 (B) 9 (C) 10 (D) 13 (E) 19
8. A three-digit palindrome is a number of the form 'aba' where the digits a and b can either be the same or different. What is the sum of the digits of the largest three-digit palindrome that is also a multiple of 6?

- (A) 16 (B) 18 (C) 20 (D) 21 (E) 24

9. Water makes up 80 percent of the mass of fresh mushrooms. However, water makes up only 20 percent of the mass of dried mushrooms. By what percentage does the mass of the mushroom decrease during drying?

- (A) 60 (B) 70 (C) 75 (D) 80 (E) 85

10. Teri the tiler is planning to make a large, square mosaic floor with a repeating pattern, using hexagonal and triangular tiles, arranged as shown in the diagram.

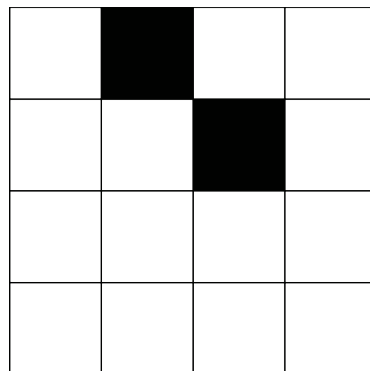


She thinks she will use 3000 hexagonal tiles to make the whole floor. Approximately, how many triangular tiles will she need?

- (A) 1000 (B) 1500 (C) 3000 (D) 6000 (E) 9000

4 points

11. Tarek wants to shade two further squares on the diagram shown so that the resulting pattern has a single axis of symmetry.



In how many different ways can he complete his pattern?

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

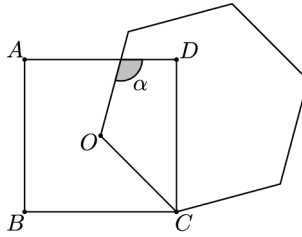
12. Farmer Fi is selling basket with chicken eggs or duck eggs. She has baskets holding 4, 6, 12, 13, 22, and 29 eggs. Her first customer buys all the eggs in one basket. Fi notices that the number of chicken eggs she has left is twice the number of duck eggs. How many eggs did the customer buy?

- (A) 4 (B) 12 (C) 13 (D) 22 (E) 29

13. Alex drives from point A to point B , then immediately returns to A . Bob drives from point B to point A , then immediately returns to B . They travel on the same road, start at the same time and each travels at a constant speed. Alex's speed is three times Bob's speed. They pass each other for the first time 15 minutes after the start. How long after the start will they pass each other for the second time?

- (A) 20 min (B) 25 min (C) 30 min (D) 35 min (E) 45 min

14. Martin draws a square with vertices A, B, C, D and a regular hexagon with side OC , where O is the center of the square.



What is the size of angle α ?

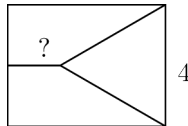
- (A) 105° (B) 110° (C) 115° (D) 120° (E) 125°

15. Ardal encloses a rectangular field with 40 m of fence. The side-lengths of the field are all prime numbers.

What is the maximum possible area of the field?

- (A) 99 m^2 (B) 96 m^2 (C) 91 m^2 (D) 84 m^2 (E) 51 m^2

16. A rectangle is divided into three regions of equal area. One of the regions is an equilateral triangle with side-length 4 cm, the other two are trapezia, as shown in the figure.

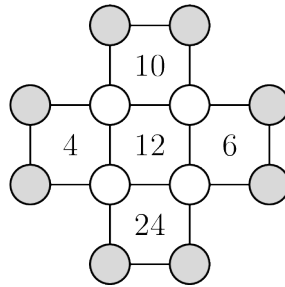


What is the length of the smaller of the parallel sides of the trapezia?

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

5 points

21. A number is written in each of the twelve circles shown.



The number inside each square indicates the product of the numbers at its four vertices. What is the product of the numbers in the eight grey circles?

- (A) 20 (B) 40 (C) 80 (D) 120 (E) 480

22. There are four vases on the table in which a number of sweets have been placed. The number of sweets in the first vase is the number of vases that contain one sweet. The number of sweets in the second vase is equal to the number of vases that contain two sweets. The number of sweets in the third vase is equal to the number of vases that contain three sweets. The number of sweets in the fourth vase is equal to the number of vases that contain zero sweets. How many sweets are in all the vases together?

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

23. Cristina has a set of cards numbered 1 to 12. She places eight of them at the vertices of an octagon so that the sum of every pair of numbers at opposite ends of an edge of the octagon is a multiple of 3.

Which numbers did Cristina not place?

- (A) 1, 5, 9, 12 (B) 3, 5, 7, 9 (C) 1, 2, 11, 12 (D) 5, 6, 7, 8 (E) 3, 6, 9, 12

29. Olya walked in the park. She walked half of the total time at a speed of 2 km/h. She walked half of the total distance at a speed of 3 km/h. She walked the rest of the time at a speed of 4 km/h. For what fraction of the total time did she walk at a speed of 4 km/h?

- (A) $\frac{1}{14}$ (B) $\frac{1}{12}$ (C) $\frac{1}{7}$ (D) $\frac{1}{5}$ (E) $\frac{1}{4}$

30. Ali wants to remove some of the integers from 1 to 25 and then separate the remaining numbers into two groups so that the products of the integers in each group are equal. What is the smallest number of integers Ali could remove?

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

Name: _____

Institution: _____

01. A B C D E

02. A B C D E

03. A B C D E

04. A B C D E

05. A B C D E

06. A B C D E

07. A B C D E

08. A B C D E

09. A B C D E

10. A B C D E

11. A B C D E

12. A B C D E

13. A B C D E

14. A B C D E

15. A B C D E

16. A B C D E

17. A B C D E

18. A B C D E

19. A B C D E

20. A B C D E

21. A B C D E

22. A B C D E

23. A B C D E

24. A B C D E

25. A B C D E

26. A B C D E

27. A B C D E

28. A B C D E

29. A B C D E

30. A B C D E

