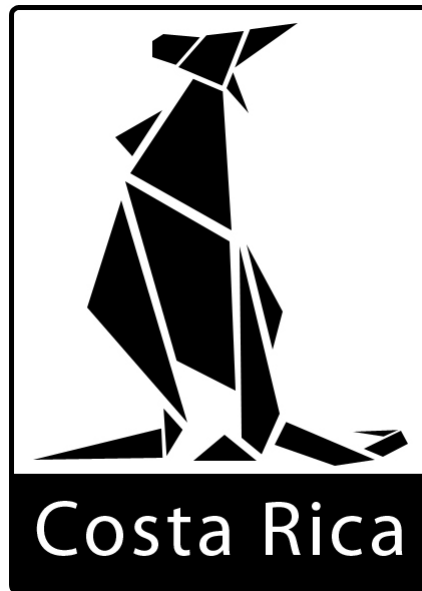# Canguro Matemático Costarricense


Junior Test
Nineth grade

Name of the student:_____

Name of the institution:_____

Kangourou Sans Frontières
Costa Rica 2025

3 puntos

1. Isabelle rotates the hexagonal sheet of paper, as shown. Each rotation turns the hexagon through the same angle in the same direction. The figure shows the result of one rotation.

start   result of
one rotation

Which of these numbers of rotations would leave the sheet looking the same as it did at the start?

(**A**) 7 (**B**) 8 (**C**) 9 (**D**) 10 (**E**) 12

2. Five circles, each with an area of 8 cm^2, overlap to form the figure shown. The area of each section where two circles overlap is 1 cm^2.

What is the total area covered by the figure?

(**A**) 32 cm^2 (**B**) 36 cm^2 (**C**) 38 cm^2 (**D**) 39 cm^2 (**E**) 42 cm^2

3. The real combination for the bicycle lock shown in the picture is 0000. However, when someone looks at it from the side, they see 8888. When Paul looks at the combination of his friend's lock from the side, he sees 2815.

What is the real combination of his friend's lock?

(**A**) 4037 (**B**) 4693 (**C**) 0639 (**D**) 0693 (**E**) 9603

4. Matias the mouse wants to get to a piece of cheese. He can only move horizontally or vertically between any two cells in the directions shown by the arrows.
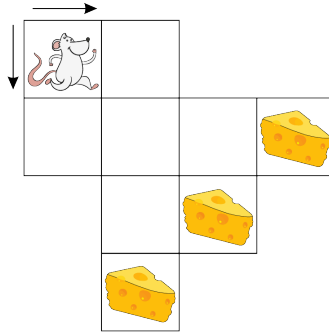
How many different routes can Matias take to reach a piece of cheese?

(**A**) 3   (**B**) 5   (**C**) 8   (**D**) 10   (**E**) 11

5. There are five hurdles in a 60 m hurdles race. The first hurdle is after 12 m. The gap between any two consecutive hurdles is 8 m. How far is the last hurdle from the finish?

(**A**) 16 m   (**B**) 14 m   (**C**) 12 m   (**D**) 10 m   (**E**) 8 m

6. Edgar wants to write a number in each circle in the diagram. He wants each number to be equal to the sum of the numbers in the two adjacent circles. He has already written two numbers, as shown.
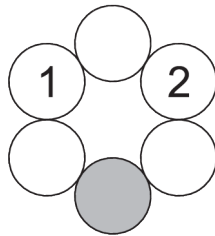
What number should he write in the grey circle?

(**A**) 2   (**B**) −1   (**C**) −2   (**D**) −3   (**E**) −5

7. Julia wants to fill each $\square$ with a different prime number less than 20 so that the value of A is an integer.

$$A = \frac{\square + \square + \square + \square + \square + \square + \square}{\square}$$

What is the maximum value of A?

(**A**) 20   (**B**) 14   (**C**) 10   (**D**) 8   (**E**) 6

8. Morten wants to fill in the cells on the diagram shown so that each cell contains either a cross or a circle. He also wants to ensure there is no line of four consecutive identical symbols in any column, row or diagonal.
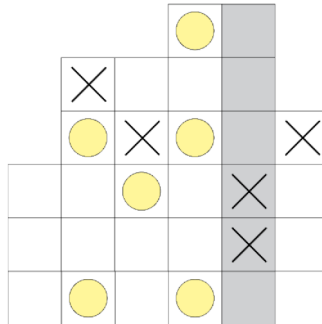
When has completed the diagram, what will the column coloured grey contain?

(**A**) 3 circles and 3 crosses   (**B**) 2 circles and 4 crosses

(**C**) 4 circles and 2 crosses   (**D**) 5 circles and a cross

(**E**) a circle and 5 crosses

9. Sonia has two bowls of numbered balls.

- Bowl X contains seven balls numbered 1, 2, 6, 7, 10, 11 and 12.

- Bowl Y contains five balls numbered 3, 4, 5, 8, and 9.

Which ball should Sonia transfer from Bowl X to Bowl Y to increase the average number on the balls in each bowl?

(**A**) 6   (**B**) 7   (**C**) 10   (**D**) 11   (**E**) 12

10. The leaflet shown includes transparent windows, allowing what is below to be clearly seen when the flaps are folded over.

		4	9	2		
		3	5	7		
		8	1	6		

When both flaps are folded over, what is the sum of the numbers that can be seen through the windows?

(**A**) 7   (**B**) 9   (**C**) 12   (**D**) 14   (**E**) 15

4 puntos

11. In the six-digit integer $PAPAYA$, different letters stand for different digits and the same letter always represents the same digit. Also $Y = P + P = A + A + A$.
What is the value of $P \times A \times P \times A \times Y \times A$?

(**A**) 432   (**B**) 342   (**C**) 324   (**D**) 243   (**E**) 234

12. During two sessions of football training, Paul shoots a total of 17 times at a target. He hits with 60% of the shots he shoots in the first session. He hits with 75% of the shots he shoots in the second session.
How many times did he hit the target in the second session?

(**A**) 6   (**B**) 7   (**C**) 8   (**D**) 9   (**E**) 10

13. Santiago always leaves for school at 8:00 a.m. His school is 1 km away. When he walks, his speed is 4 km/h. When he cycles, his speed is 15 km/h. He is 5 minutes early when he walks. How many minutes early is he when he cycles?
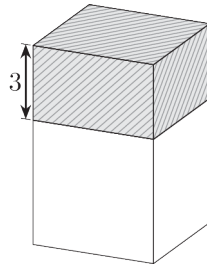
(**A**) 12   (**B**) 13   (**C**) 14   (**D**) 15   (**E**) 16

14. Ria draws four squares side by side, as shown.
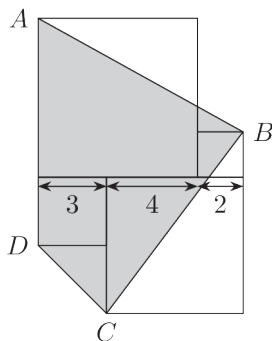
What is the area of the shaded quadrilateral?

(**A**) 54   (**B**) 60   (**C**) 66   (**D**) 72   (**E**) 80

15. When the height of a cuboid is reduced by 3 cm, its surface area is reduced by 60 cm^2. The resulting shape is a cube.


What is the volume of the original cuboid, in cm^3?

(**A**) 75   (**B**) 125   (**C**) 150   (**D**) 200   (**E**) 225

16. Lisa has four wooden digits. She can use them to form the number 2025.

How many different numbers greater than 2025 can she form with these digits?

(**A**) 3   (**B**) 6   (**C**) 8   (**D**) 9   (**E**) 11

17. Alex folds a square in half along a diagonal to make a triangle. Then he folds the paper again so that one of the short edges of this triangle lies on top of the long edge of this triangle, making the smaller triangle AXC, as shown.
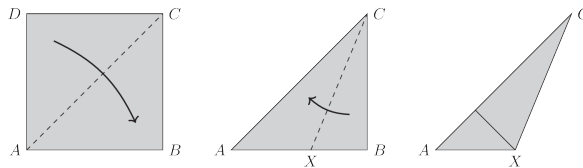

What is the size of angle AXC?

(**A**) 108°   (**B**) 112.5°   (**C**) 120°   (**D**) 145°   (**E**) 157.5°

18. The 4-digit number 80□□ is missing its last two digits. The number is divisible by 8 and 9. What is the product of these two missing digits?

(**A**) 6   (**B**) 16   (**C**) 20   (**D**) 24   (**E**) 48

19. Luka has some dogs, some rabbits and some cats. Eight of his pets are not dogs. Five of his pets are not rabbits. Seven of his pets are not cats.
How many pets does Luka have?

(**A**) 10   (**B**) 11   (**C**) 15   (**D**) 16   (**E**) 20

20. A circle with center O and radius 10 cm is given. A square $OPQR$ is drawn inside the circle, where Q is a point on the circle.
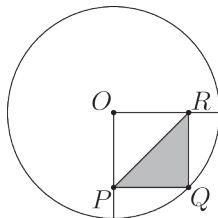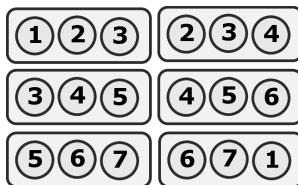

What is the area of the shaded triangle PQR?

(**A**) 12.5 cm^2 (**B**) 25 cm^2 (**C**) 50 cm^2 (**D**) 75 cm^2 (**E**) 100 cm^2

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5 puntos

21. An athlete has a collection of two gold and five silver medals. They are numbered from 1 to 7, in some order. The picture shows black and white photos of the medals. It is known that in each photo, exactly one of the medals is gold.

What is the sum of the numbers on the two gold medals?

(**A**) 7   (**B**) 8   (**C**) 9   (**D**) 10   (**E**) 11

22. Anna looks at a photo on her smartphone. The format is 16 : 9 and fills the whole display. When she turns the smartphone, the picture gets smaller.
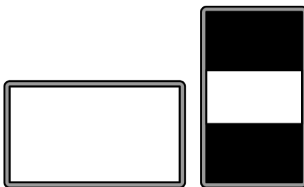
What fraction of the display area is taken up by the smaller picture?

(**A**) $\dfrac{3}{4}$ (**B**) $\dfrac{9}{16}$ (**C**) $\dfrac{27}{64}$ (**D**) $\dfrac{32}{81}$ (**E**) $\dfrac{81}{256}$

23. Kate and Tom are celebrating their birthday today. Tom notices that $\frac{1}{19}$ of Kate's age is equal to $\frac{1}{17}$ of his age. The sum of their ages is greater than 40 and less than 100. How old is Kate?

(**A**) 19   (**B**) 34   (**C**) 38   (**D**) 57   (**E**) 76

24. Sara has a bag of 18 balls, numbered from 1 to 18. What is the smallest number of balls Sara should remove in order to guarantee that she has removed at least three balls with prime numbers on them?

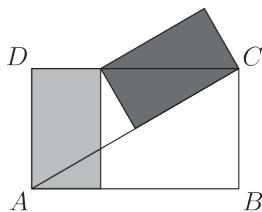(**A**) 11   (**B**) 12   (**C**) 13   (**D**) 14   (**E**) 15

25. David wants to place the numbers 1 to 8 in the eight cells of the diagram, with one number in each cell. He wants the cells that contain two consecutive numbers not to share a side or a vertex.
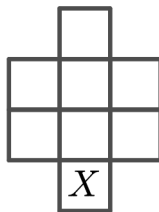
Which numbers can David put in cell marked X?

(**A**) 1 or 8   (**B**) 2 or 7   (**C**) 3 or 6   (**D**) 4 or 5   (**E**) 7 or 8
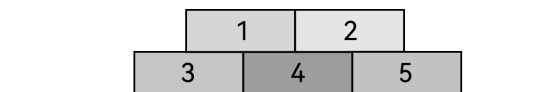
26. The two shaded rectangles are congruent. Both shaded rectangles have area 4.

What is the area of the large rectangle?

(**A**) 10   (**B**) $8\sqrt{3}$ (**C**) 8   (**D**) 12   (**E**) $4\sqrt{3}$

27. Five bricks are placed on the ground, as shown. Peter can only remove a brick if there are no bricks on top of it. He selects one of the available bricks at random and removes it, until all the bricks are removed.

What is the probability that the brick numbered 4 is the third brick to be removed?

(**A**) $\frac{1}{3}$ (**B**) $\frac{1}{4}$ (**C**) $\frac{1}{5}$ (**D**) $\frac{1}{6}$ (**E**) $\frac{1}{8}$

28. The square $ABCD$ contains two rectangles. One is grey and the other striped, with dimensions as shown in the diagram (not to scale). The area of the overlapping part of the two rectangles is 18 cm².
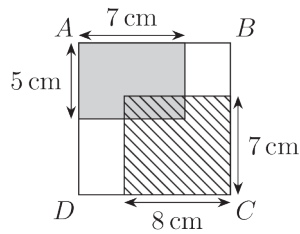
What is the perimeter of $ABCD$?

(**A**) 28 cm   (**B**) 34 cm   (**C**) 36 cm   (**D**) 38 cm   (**E**) 40 cm

29. Daniel numbers certain squares on a sheet of grid paper. Each square has a side-length of 0.5 cm. He starts with one square and then numbers the squares $2, 3, 4, 5, \ldots$ in a counter-clockwise direction, as shown. He stops when he has numbered 2025 squares, and looks at the shape made up of all the numbered squares.
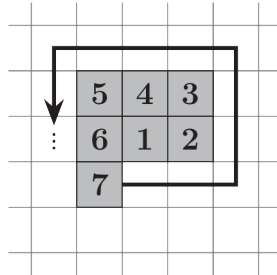
What is the perimeter of this shape?

(**A**) 25 cm   (**B**) 45 cm   (**C**) 80 cm   (**D**) 90 cm   (**E**) 180 cm

30. $\overline{ABCDEF}$ is a six-digit integer made up of the digits 1, 2, 3, 4, 5, and 6, with no repeated digits. Its first two digits $\overline{AB}$ is multiple of 2, its first three digits $\overline{ABC}$ is multiple of 3, its first four digits $\overline{ABCD}$ is multiple of 4, its first five digits $\overline{ABCDE}$ is multiple of 5, and the full integer $\overline{ABCDEF}$ is a multiple of 6. What is the sixth digit, F?

(**A**) 2   (**B**) 4   (**C**) 6
(**D**) both 2 and 4 are possible   (**E**) both 4 and 6 are possible

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

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