

Canguro Matemático Costarricense



Junior Test
Nineth grade

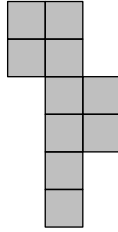
Name: _____

Institution: _____

Kangourou Sans Frontières
Costa Rica 2020

3 points

1. The diagram shows a shape made from ten squares of side length 1 cm joined edge to edge.



What is the length of its perimeter?

- (A) 14 cm (B) 18 cm (C) 30 cm (D) 32 cm (E) 40 cm

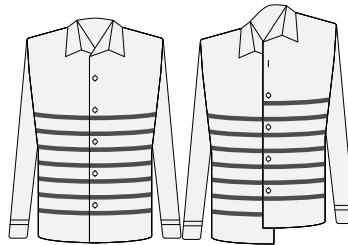
2. When the answers to the following calculations are put in order from smallest to largest, which will be in the middle?

- (A) $1 + 2345$ (B) $12 + 345$ (C) $123 + 45$ (D) $1234 + 5$ (E) 12345

3. Who is the mother of the daughter of Anne's mother's mother?

- (A) Anne's sister (B) Anne's niece (C) Anne's mother
 (D) Anne's aunt (E) Anne's grandmother

4. When Cosmo wears his new shirt properly as shown on the left, the horizontal stripes form seven closed rings around his waist. This morning he buttoned his shirt wrongly, as shown on the right.



How many closed rings were there around Cosmo's waist this morning?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

5. The sum of four consecutive integers is 2. What is the smallest of these integers?

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

6. The years 2020 and 1717 both consist of a two-digit number repeated twice. How many years after 2020 will it be until the next year which has this property?

- (A) 20 (B) 101 (C) 120 (D) 121 (E) 202

7. In the calculations shown each letter stands for a digit. They are used to make some two-digit numbers. The two numbers on the left have a total of 79.

		A D
		+ C D
A B		+ A B
+ C D		+ C B
<hr/> 7 9		<hr/> ?

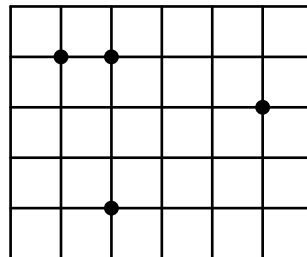
What is the total of the four numbers on the right?

- (A) 79 (B) 158 (C) 869 (D) 1418 (E) 7979

8. Mary has ten pieces of paper. Some of these are squares and the rest are triangles. She cuts three squares diagonally from corner to corner. She counts the total number of vertices of the 13 pieces of paper she now has and gets the answer 42. How many triangles did she have before making the cuts?

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

9. Four points are marked on a grid of squares of side-length 1. Forming a triangle using three of these points.



What is the smallest area that can be obtained?

- (A) $\frac{1}{2}$ (B) 1 (C) $\frac{3}{2}$ (D) 2 (E) $\frac{5}{2}$

10. Every pupil in a class either swims or dances or both. Three fifths of the class swim and three fifths dance. Five pupils both swim and dance. How many pupils are in the class?

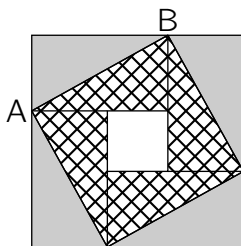
- (A) 15 (B) 20 (C) 25 (D) 30 (E) 35

4 points

11. Helen wants to spend 18 consecutive days visiting her Grandma. Her Grandma reads her story books on story days Tuesday, Saturday and Sunday. Helen wants to spend as many story days with her Grandma as possible. On which day of the week should she start her visit?

- (A) Monday (B) Tuesday (C) Friday (D) Saturday (E) Sunday

12. A large square consists of four identical rectangles and a small square. The area of the large square is 49 cm^2 and the length of the diagonal AB of one of the rectangles is 5 cm.



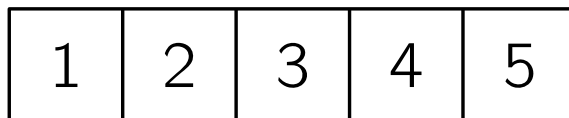
What is the area of the small square?

- (A) 1 cm^2 (B) 4 cm^2 (C) 9 cm^2 (D) 16 cm^2 (E) 25 cm^2

13. Werner's salary is 20% of his boss's salary. By what percentage should Werner's salary increase to become equal to his boss's salary?

- (A) 80% (B) 120% (C) 180% (D) 400% (E) 520%

14. Aisha has a strip of paper with the numbers 1, 2, 3, 4 and 5 written in five cells as shown. She folds the strip so that the cells overlap, forming 5 layers.



Which of the following configurations, from top layer to bottom layer, is it not possible to obtain?

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

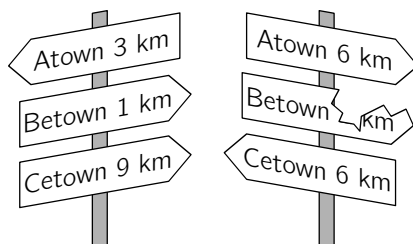
15. Twelve coloured cubes are arranged in a row. There are 3 blue cubes, 2 yellow cubes, 3 red cubes and 4 green cubes but not in that order. There is a yellow cube at one end and a red cube at the other end. The red cubes are all touching. The green cubes are also all touching. The tenth cube from the left is blue. What colour is the cube sixth from the left?

- (A) green (B) yellow (C) blue (D) red (E) red or blue

16. The integers a , b , c and d satisfy $ab = 2cd$. Which of the following numbers could not be the value of the product $abcd$?

- (A) 50 (B) 100 (C) 200 (D) 450 (E) 800

17. The shortest path from Atown to Cetown runs through Betown. Walking on this path from Atown to Cetown, we would first find the signpost shown on the left. Later we would find the signpost shown on the right.



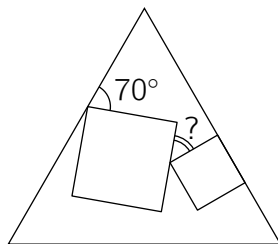
What distance was written on the broken sign?

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

18. Masha put a multiplication sign between the 2nd and 3rd digits of the number 2020 and noted that the resulting product $20 \cdot 20$ is a square number. How many numbers between 2010 and 2099 (including 2020) have the same property?

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

19. Two squares of different size are drawn inside an equilateral triangle. One side of one of these squares lies on one of the sides of the triangle, as shown.



What is the size of the angle marked by the question mark?

- (A) 25° (B) 30° (C) 35° (D) 45° (E) 50°

20. Luca began a 520 km trip by car with 14 litres of fuel in the car tank. His car consumes 1 litre of fuel per 10 km. After driving 55 km, he reads a road sign showing the distances from that point to five petrol stations ahead on the road. These distances are 35 km, 45 km, 55 km, 75 km and 95 km. The capacity of the car's fuel tank is 40 litres and Luca wants to stop just once to fill the tank. How far is the petrol station that he should stop at?

- (A) 35 km (B) 45 km (C) 55 km (D) 75 km (E) 95 km

5 points

21. In the final of the dancing competition, each of the three members of the jury gives the five competitors 0 points, 1 point, 2 points, 3 points or 4 points. No two competitors get the same mark from any individual judge. Adam knows all the sums of the marks and a few single marks, as shown.

	Adam	Berta	Clara	David	Emil
I	2	0			
II		2	0		
III					
Sum	7	5	3	4	11

How many points did Adam get from judge III?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

22. Saniya writes a positive integer on each edge of a square. She also writes at each vertex the product of the numbers on the two edges that meet at that vertex. The sum of the numbers at the vertices is 15. What is the sum of the numbers on the edges of the square?

- (A) 6 (B) 7 (C) 8 (D) 10 (E) 15

23. Sophia has 52 identical isosceles right-angled triangles. She wants to make a square using some of them. How many different sized squares can she make?

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

24. Four children are in the four corners of a $10\text{ m} \times 25\text{ m}$ pool. Their trainer is standing somewhere on one side of the pool. When he calls them, three children get out and walk as short a distance as possible round the pool to meet him. They walk 50 m in total. What is the shortest distance the trainer needs to walk to get to the fourth child?

- (A) 10 m (B) 12 m (C) 15 m (D) 20 m (E) 25 m

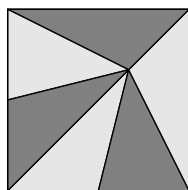
25. Let $17x + 51y = 102$. What is the value of $9x + 27y$?

- (A) 54 (B) 36 (C) 34 (D) 18
(E) The value is undetermined.

26. The digits from 1 to 9 are randomly arranged to make a 9-digit number. What is the probability that the resulting number is divisible by 18?

- (A) $\frac{1}{2}$ (B) $\frac{4}{9}$ (C) $\frac{5}{9}$ (D) $\frac{1}{3}$ (E) $\frac{3}{4}$

27. A square shaped stained glass window of 81 dm^2 is made out of six triangles of equal area (see figure). A fly is sitting exactly on the spot where the six triangles meet.



How far from the bottom of the window is the fly sitting?

- (A) 3 dm (B) 5 dm (C) 5.5 dm (D) 6 dm (E) 7.5 dm

28. A hare and a tortoise competed in a 5 km race along a straight line. The hare is five times faster than the tortoise. The hare mistakenly started perpendicular to the route. After a while he realized his mistake, then turned and ran straight to the finish point. He arrived at the same time as the tortoise. What is the distance between the hare's turning point and the finish point?

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

29. A large cube is built using 64 smaller identical cubes. Three of the faces of the large cube are painted. What is the maximum possible number of small cubes that have exactly one face painted?

- (A) 27 (B) 28 (C) 32 (D) 34 (E) 40

30. Anna wants to write a number in each of the squares of the grid so that the sum of the four numbers in each row and the sum of the four numbers in each column are the same. She has already written some numbers, as shown.

1		6	3
	2	2	8
	7		4
		7	

What number does she write in the shaded square?

- (A) 5 (B) 6 (C) 7 (D) 8 (E) 9

Name: _____

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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

