Canguro Matemático Costarricense

Cadet Test
Seventh grade

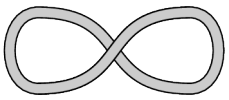
Name of the student:_____

Name of the institution:_____

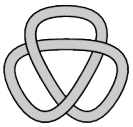
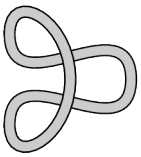
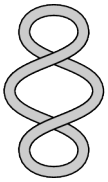
Kangourou Sans Frontières
Costa Rica 2024

3 points

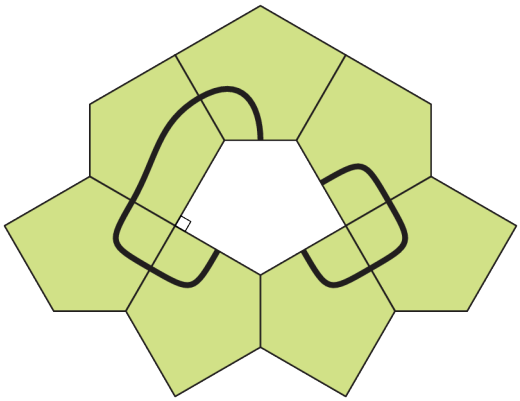
1.



Which of the following strings cannot be transformed into the string on the right without cutting?

(**A**)  (**B**)  (**C**)  (**D**)  (**E**) 

2. A shape is made of equal-sized pentagonal tiles.



Which of the following tiles can be placed in the space in the shape to produce two closed curves?

(**A**) 

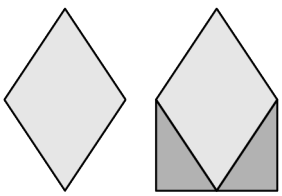
(**B**) 

(**C**) 

(**D**) 

(**E**) 

3. The first diagram shows a rhombus. The area of the first diagram is increased by adding two right-angled triangles, as shown.



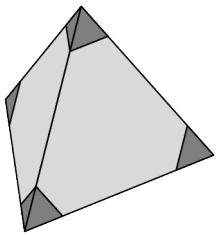
By what percentage has the area increased?

(**A**) 20% (**B**) 25% (**C**) 30% (**D**) 40% (**E**) 50%

4. What is the value of $\dfrac{20 \times 24}{2 \times 0 + 2 \times 4}$?

(**A**) 12 (**B**) 30 (**C**) 48 (**D**) 60 (**E**) 120

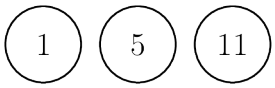
5. Julio cuts off the four corners of a regular tetrahedron, as shown.



How many corners does the shape that remains have?

(**A**) 8 (**B**) 9 (**C**) 11 (**D**) 12 (**E**) 15

6. Ria has three counters marked 1, 5 and 11, as shown.



She wants to place them side by side to make a four-digit number. How many different four-digit numbers can she make?

(**A**) 3 (**B**) 4 (**C**) 6 (**D**) 8 (**E**) 9

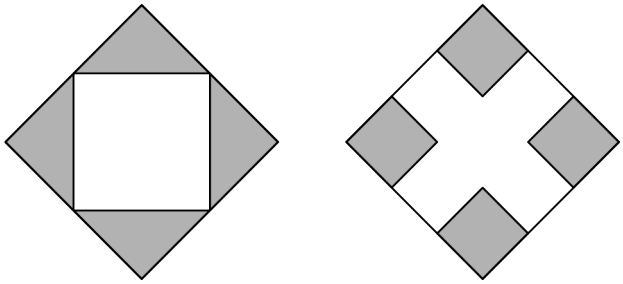
7. A fruit bowl contains five types of fruit:  , , , and . Al likes  . Bok likes  ,  ,  and  . Cam likes  ,  ,  and  . Don likes  ,  and  . Eva likes  and  .

The fruit is shared so that everyone gets a different type of fruit and everyone gets a type of fruit that they like.

Who gets  ?

(**A**) Al (**B**) Bok (**C**) Cam (**D**) Don (**E**) Eva

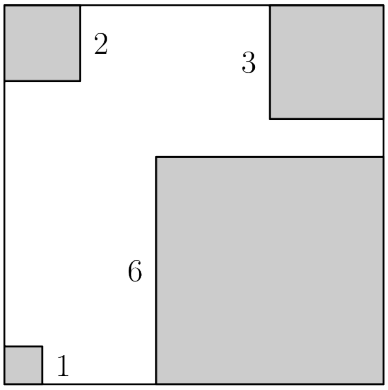
8. The diagram shows two large squares with the same area. Part of each square is shaded, as shown.



In the first square, the midpoints of adjacent sides are joined. In the second square, four smaller squares all with side-lengths equal to a third of the side-lenght of the large square are shaded. The area shaded in the first square is 9. What is the area shaded in the second square?

(**A**) 4 (**B**) 8 (**C**) 9 (**D**) 10 (**E**) 12

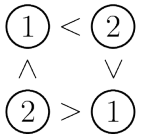
9. Christian has cut four small squares from the corners of the larger square, so that the remaining area is half of the area of the original square. The side-lenghts of the small squares are shown in the diagram.



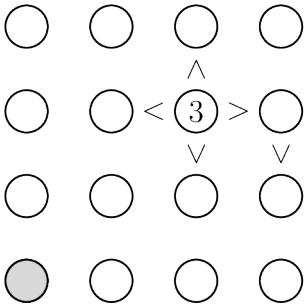
What is the perimeter of the remaining shape?

(**A**) 36 (**B**) 40 (**C**) 44 (**D**) 48 (**E**) 52

10. Ria wants to complete the puzzle shown so that each row and each column contain the numbers 1, 2, 3 and 4 exactly once. She wants to place the numbers so that the greater than and less symbols ($>$ and $<$) give a correct relationship between the two values either side of them. The symbols work in all directions, as shown in the example:



What number should she place in the gray circle?



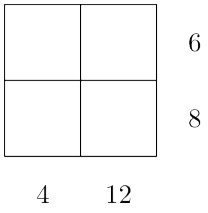
(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 4 (**E**) 2 or 3

4 points

11. The weight restriction notice for an elevator says it can carry either 12 adults or 20 children. According to the weight restrictions, what is the largest number of children that can ride in the elevator with nine adults?

(**A**) 3 (**B**) 4 (**C**) 5 (**D**) 6 (**E**) 8

12. Four different positive integers are placed on a grid and then covered up. The products of the integers in each row and in each column are shown in the diagram.



What is the sum of the four integers?

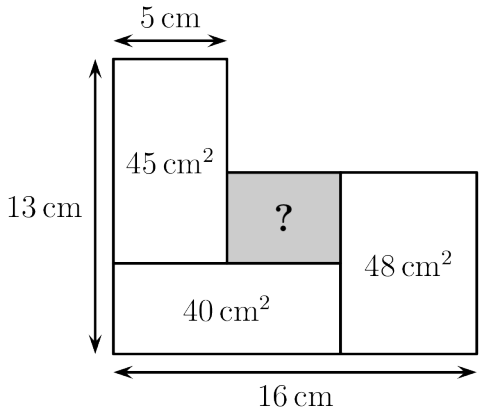
(**A**) 10 (**B**) 12 (**C**) 13 (**D**) 14 (**E**) 15

13. There are three identical special dice on the table.

What is the sum of the numbers on the faces that touch the table?

(**A**) 26 (**B**) 40 (**C**) 43 (**D**) 47 (**E**) 56

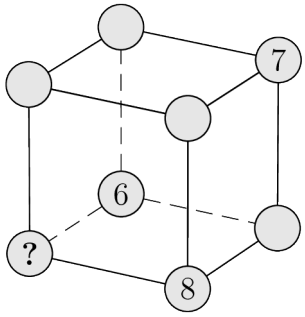
14. The diagram shows four touching rectangles.



What is the area of the shaded rectangle?

(**A**) 12 cm^2 (**B**) 14 cm^2 (**C**) 16 cm^2 (**D**) 18 cm^2 (**E**) 20 cm^2

15. A cube with the filled in numbers is given. Mary wants to write the numbers 1 to 8 on the vertices of the cube. She wants the sum of the numbers of the vertices around each face to be the same. She has already written the numbers 6, 7 and 8, as shown.



What number should she write on the vertex marked with the questionmark?

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

16. A grandmother has some candies. She decides to divide them so that each of his grandchildren had a bag that contain the same number of candies. She puts the largest possible number of candies in each bag and, when she is done, she sees that there are 20 candies in each bag and 12 candies are left over. What is the smallest possible number of candies she could have?

(**A**) 52 (**B**) 232 (**C**) 272 (**D**) 411 (**E**) 432

17. Dan plans to cut a rope into 12 equal pieces and marks points where he needs to cut. Muhammad plans to cut the same rope into 16 equal pieces and marks points where he needs to cut. Then Maya cuts the rope at all the marked points. How many pieces does Maya get?

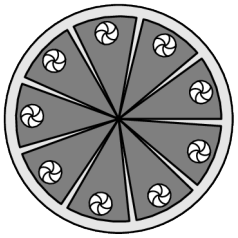
(**A**) 24 (**B**) 25 (**C**) 27 (**D**) 28 (**E**) 29

18. Emma is playing with the seven caterpillar puzzle pieces shown.

She wants to build a caterpillar that has one head, one tail and either one, two or three puzzle pieces in between. How many different caterpillars could Emma build?

(**A**) 10 (**B**) 14 (**C**) 16 (**D**) 18 (**E**) 20

19. Carina baked a cake and cut it into ten equal pieces. She ate one piece and then arranged the remaining pieces evenly, as shown.



What is the size of the angle between any two pieces?

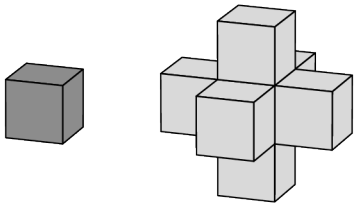
(**A**) 5° (**B**) 4° (**C**) 3° (**D**) 2° (**E**) 1°

20. Paula the penguin goes fishing every day and always brings back twelve fish for her two chicks. Each day, she gives the first chick she sees seven fish and gives the second chick five fish, which they eat. In the last few days one chick has eaten 44 fish.
How many has the other chick eaten?

(**A**) 34 (**B**) 40 (**C**) 46 (**D**) 52 (**E**) 58

5 points

21. Johan had a large number of identical cubes. He made the structure on the right by taking a single cube and then sticking another cube to each face. He wants to make an extended structure in the same way so that each face of his original structure will have a cube stuck to it.



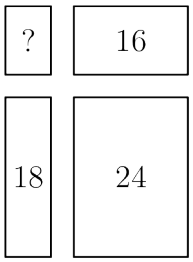
How many extra cubes will he need to complete his extended structure?

(**A**) 18 (**B**) 16 (**C**) 14 (**D**) 12 (**E**) 10

22. A kangaroo jumps up a mountain and then jumps back down along the same route. It covers three times the distance with each downhill jump as it does with each uphill jump. Going uphill, it covers 1 metre per jump. In total, the kangaroo makes 2024 jumps. What is the total distance, in metres, that the kangaroo jumps?

(**A**) 506 (**B**) 1012 (**C**) 2024 (**D**) 3036 (**E**) 4048

23. Gerard cuts a large rectangle into four smaller rectangles. The perimeters of three of these smaller rectangles are 16, 18 and 24, as shown in the diagram.



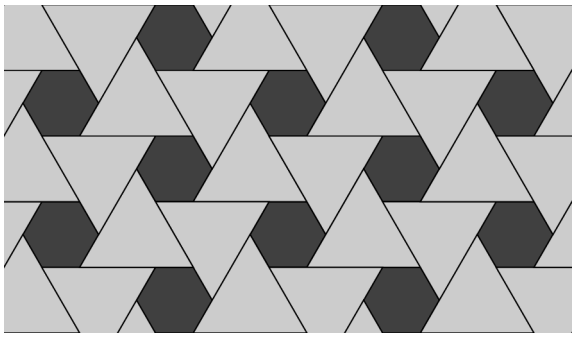
What is the perimeter of the fourth small rectangle?

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

24. 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

25. 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

26. Nine cards numbered from 1 to 9 were placed facedown on the table. Aleksa, Bart, Clara and Deindra each picked up two of the cards. Aleksa said "My numbers add up to 6". Bart said "The difference between my numbers is 5". Clara said "The product of my numbers is 18". Deindra said "One of my numbers is twice the other one". All four made a true statement. Which number was left on the table?

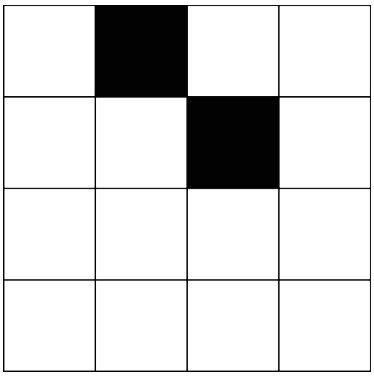
(**A**) 1 (**B**) 3 (**C**) 6 (**D**) 8 (**E**) 9

27. The digits 0 - 9 can be drawn with horizontal and vertical segments, as shown.

Greg chooses three different digits. In total, his digits have 5 horizontal segments and 10 vertical segments. What is the sum of his three digits?

(**A**) 9 (**B**) 10 (**C**) 14 (**D**) 18 (**E**) 19

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



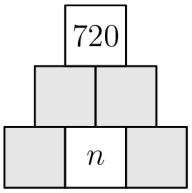
In how many different ways can he complete his pattern?

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

29. A group of 50 students sit in a circle. They throw a ball around the circle. Each student who gets the ball throws it to the 6th student sitting anti-clockwise from where they are sitting, who catches it. Freda catches the ball 100 times. In that time, how many students never get to catch the ball?

(**A**) 0 (**B**) 8 (**C**) 10 (**D**) 25 (**E**) 40

30. Donggyu wants to complete the diagram so that each box in the middle and top rows will contain the product of the values in the two boxes below it and each box contains a positive integer. He wants the value in the top box to be 720.



How many different values can the integer n take?

(**A**) 1 (**B**) 4 (**C**) 5 (**D**) 6 (**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