Canguro Matemático Costarricense

Cadet Test
Eighth grade

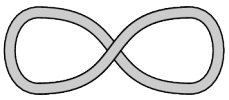
Name of the student:_____

Name of the institution:_____

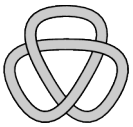
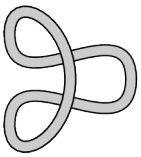
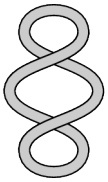
Kangourou Sans Frontières
Costa Rica 2024

3 points

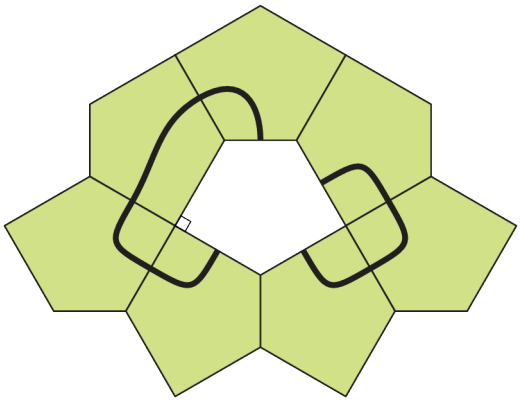
1.



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.

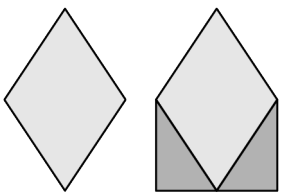


Which of the following tiles can be placed in the space in the shape to produce two closed curves?

(**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.



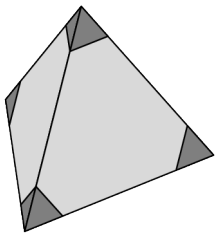
By what percentage has the area increased?

(**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

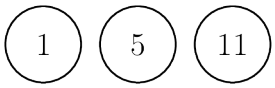
5. Julio cuts off the four corners of a regular tetrahedron, as shown.



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.

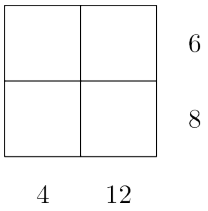
Who gets  ?

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

8. The 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

9. 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

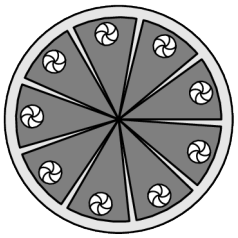
10. The length of a set of four well-parked and fitted supermarket trolleys is 108 cm. The length of a set of ten well-parked and fitted supermarket trolleys is 168 cm.

What is the length of a single supermarket trolley?

(**A**) 60 cm (**B**) 68 cm (**C**) 78 cm (**D**) 88 cm (**E**) 90 cm

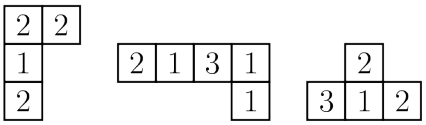
4 points

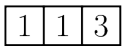
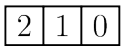
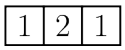
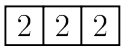
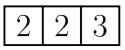
11. Carina baked a cake and cut it into ten equal pieces. She ate one piece and then arranged the remaining pieces evenly, as shown.



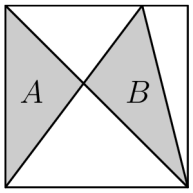
What is the size of the angle between any two pieces?

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

12. Werner can make a 4×4 square, where the sum of the numbers in all four rows and all four columns is the same, from the three pieces shown  and one further piece. Which of the following pieces is needed to complete his square?

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

13. A square has side-length 10 m. It is divided into parts by three straight line segments, as shown.



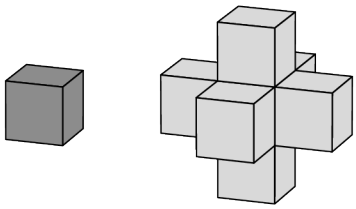
The areas of the two shaded triangles are A and B. What is the value of $A - B$?

(**A**) 0 m^2 (**B**) 1 m^2 (**C**) 2 m^2 (**D**) 5 m^2 (**E**) 10 m^2

14. 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

15. 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.



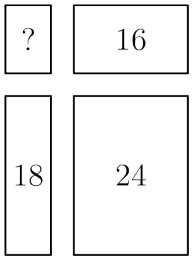
How many extra cubes will he need to complete his extended structure?

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

16. 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

17. 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.



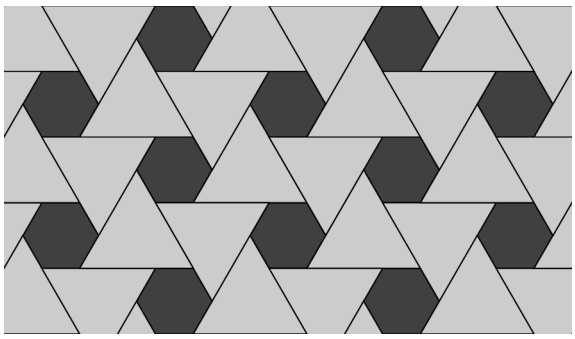
What is the perimeter of the fourth small rectangle?

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

18. 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

19. 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

20. 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

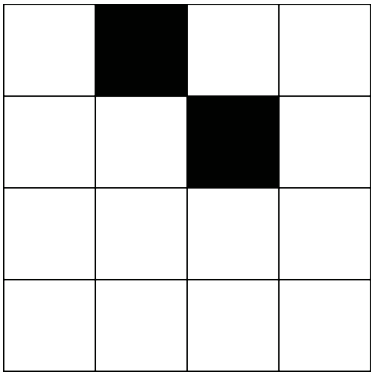
5 points

21. 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

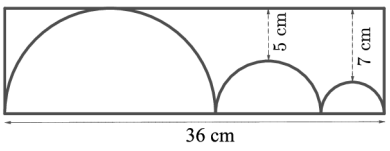
22. Tarek wants to shade two further squares on the diagram shown so that the resulting pattern has a single axis of symmetry.



In how many different ways can he complete his pattern?

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

23. The diagram shows three semi-circles inside a rectangle. The middle semi-circle touches the other two semi-circles which, in turn, each touch a shorter side of the rectangle. The largest semi-circle also touches one of the longer sides of the rectangle. The shortest distances from that side of the rectangle to the other two semi-circles are 5 cm and 7 cm respectively, as shown.



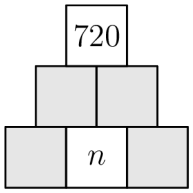
What is the perimeter, in cm, of the rectangle?

(**A**) 82 (**B**) 92 (**C**) 96 (**D**) 108 (**E**) 120

24. 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

25. 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.



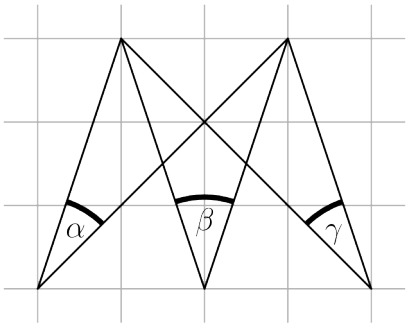
How many different values can the integer n take?

(**A**) 1 (**B**) 4 (**C**) 5 (**D**) 6 (**E**) 8

26. 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?

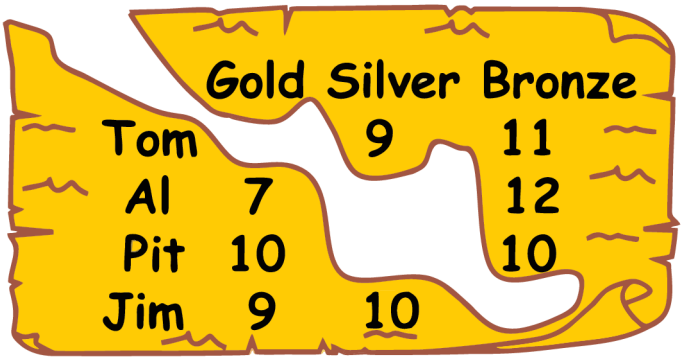
(**A**) 4 (**B**) 12 (**C**) 13 (**D**) 22 (**E**) 29

27. Three angles α, β and γ are marked on squared paper, as shown. What is the value of $\alpha + \beta + \gamma$?



(**A**) 60° (**B**) 70° (**C**) 75° (**D**) 90° (**E**) 120°

28. Captain Flint asked four of his pirates to write on a piece of paper how many gold, silver and bronze coins were in the treasure chest. Their responses are shown in the diagram but unfortunately part of the paper was damaged. Only one of the four pirates told the truth. The other three lied in all their answers. The total number of coins is 30.



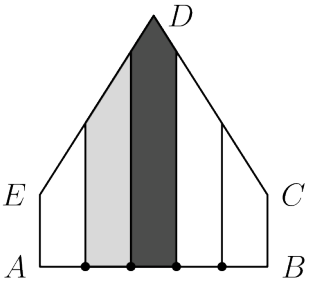
Who told the truth?

(**A**) Tom (**B**) Al (**C**) Pit (**D**) Jim (**E**) we cannot be sure

29. 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

30. In the pentagon $ABCDE$, $\angle A = \angle B = 90°$, $AE = BC$ and $ED = DC$. Four points are marked on AB dividing it into five equal parts. Then perpendiculars are drawn through these points, as shown in the diagram.



The dark shaded region has an area of 13 cm^2 and the light shaded region has an area of 10 cm^2. What is the area, in cm^2, of the entire pentagon?

(**A**) 45 (**B**) 47 (**C**) 49 (**D**) 58 (**E**) 60

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