

Canguro Matemático Costarricense



Junior Test
Ninth grade

Student name: _____

Name of the school: _____






Kangourou Sans Frontières
Costa Rica 2021

3 points

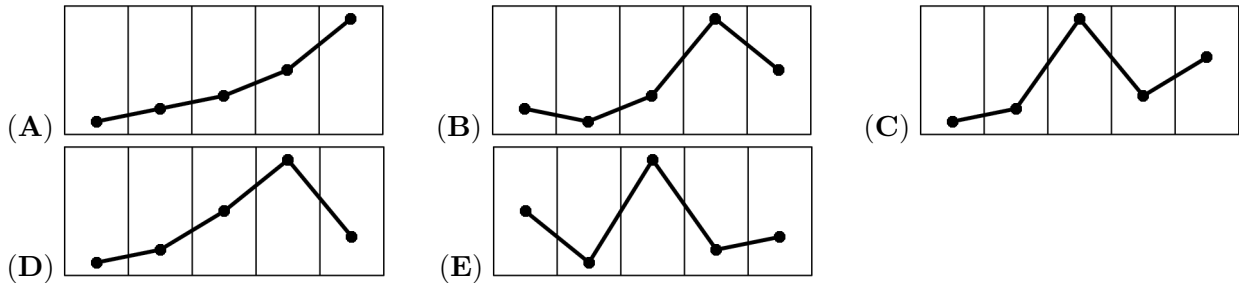
1. Each year, the third Thursday in March is named Kangaroo Day. The dates of Kangaroo Day for the next few years are shown below, with one error. Which date is wrong?

- (A) 2022 17 March (B) 2023 16 March (C) 2024 14 March
 (D) 2025 20 March (E) 2026 19 March

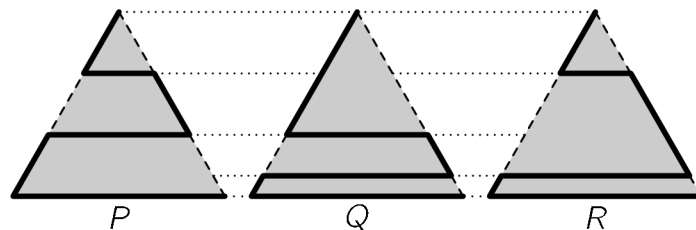
2. Jenny looks at her weather app that shows the predicted weather and maximum temperatures for the next five days.

				
-1 °C	-2 °C	0 °C	6 °C	2 °C
Fri	Sat	Sun	Mon	Tue

Which of the following represents the corresponding graph of maximum temperatures?



3. A park is shaped like an equilateral triangle. A cat wants to walk along one of the three indicated paths (thicker lines) from the upper corner to the lower right corner. The lengths of the paths are P, Q and R, as shown.



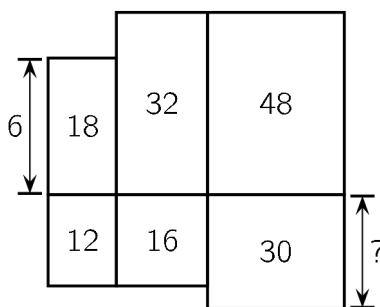
Which of the following statements about the lengths of the paths is true?

- (A) $P < Q < R$ (B) $P < R < Q$ (C) $P < Q = R$ (D) $P = R < Q$ (E) $P = Q = R$

4. The halftime score of a handball match was 9 : 14, thus the visiting team was leading by five goals. As a consequence of coach instructions received at halftime, the home team dominated in the second half and scored twice as many goals as their opponents. The home team won the match by one goal. What was the final score of the match?

- (A) 20 : 19 (B) 21 : 20 (C) 22 : 21 (D) 23 : 22 (E) 24 : 23

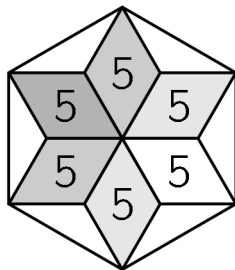
5. Six rectangles are arranged as shown. The top left-hand rectangle has height 6 cm. The numbers within the rectangles indicate their areas in cm^2 .



What is the height of the bottom right-hand rectangle?

- (A) 4 cm (B) 5 cm (C) 6 cm (D) 7.5 cm (E) 10 cm

6. Six congruent rhombuses, each of area 5 cm^2 , form a star. The tips of the star are joined to draw a regular hexagon, as shown.



What is the area of the hexagon?

- (A) 36 cm^2 (B) 40 cm^2 (C) 45 cm^2 (D) 48 cm^2 (E) 60 cm^2

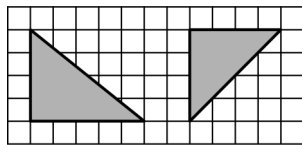
7. In a jazz band, Giuseppe plays the saxophone, Sergio plays the trumpet, and Eliana sings. They are all the same age. There are three more members of the jazz band, who are 19, 20 and 21 years old respectively. The average age of the jazz band is 21. How old is Eliana?

- (A) 20 (B) 21 (C) 22 (D) 23 (E) 24

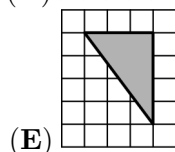
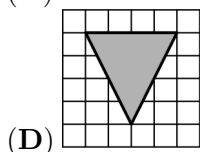
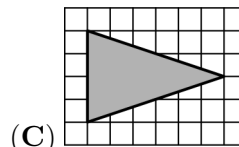
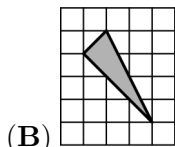
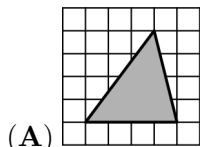
8. The little kangaroo has chosen a special number. She gets the same result when she subtracts $\frac{1}{10}$ from her number as she does when she multiplies it by $\frac{1}{10}$. What is her number?

- (A) $\frac{1}{100}$ (B) $\frac{1}{11}$ (C) $\frac{1}{10}$ (D) $\frac{11}{100}$ (E) $\frac{1}{9}$

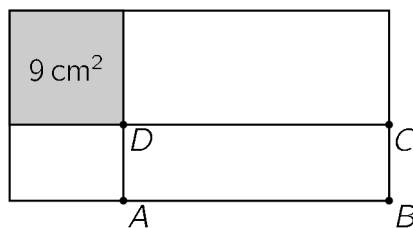
9. Ally drew three triangles on a grid. Exactly two of them have the same area, exactly two of them are isosceles, and exactly two are right-angled triangles. Two of the triangles are shown.



Which could be the third one?



10. A rectangle with perimeter 30 cm is divided into four parts by a vertical line and a horizontal line. One of the parts is a square of area 9 cm^2 , as shown in the figure.

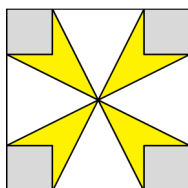


What is the perimeter of rectangle ABCD?

- (A) 14 cm (B) 16 cm (C) 18 cm (D) 21 cm (E) 24 cm

4 points

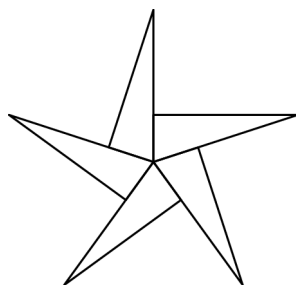
11. The area of the large square is 16 cm^2 and the area of each small square is 1 cm^2 .



What is the total area of the yellow flower?

- (A) 3 cm^2 (B) $\frac{7}{2}\text{ cm}^2$ (C) 4 cm^2 (D) $\frac{11}{2}\text{ cm}^2$ (E) 6 cm^2

12. Five identical right-angled triangles can be arranged so that their larger acute angles touch to form the star shown in the diagram.



It is also possible to form a different star by arranging more of these triangles so that their smaller acute angles touch. How many triangles are needed to form the second star?

- (A) 10 (B) 12 (C) 18 (D) 20 (E) 24

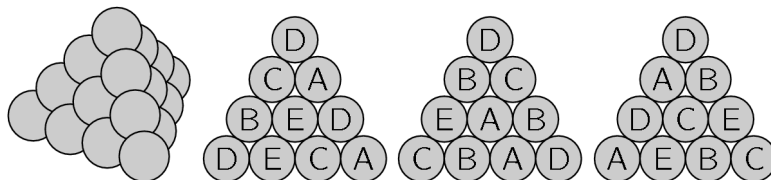
13. There are 20 questions in a quiz. Each correct answer scores 7 points, each wrong answer scores -4 points, and each question left blank scores 0 points. Eric took the quiz and scored 100 points. How many questions did he leave blank?

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

14. A box of fruit contains twice as many apples as pears. Christy and Lily divided them up so that Christy had twice as many pieces of fruit as Lily. Which one of the following statements is always true?

- (A) Christy took at least one pear.
 (B) Christy took twice as many apples as pears.
 (C) Christy took twice as many apples as Lily.
 (D) Christy took as many apples as Lily got pears.
 (E) Christy took as many pears as Lily got apples.

15. A triangular pyramid is built with 20 cannon balls, as shown. Each cannon ball is labelled with one of A, B, C, D or E. There are four cannon balls with each type of label. The picture shows the labels on the cannon balls on three of the faces of the pyramid.



What is the label on the hidden cannon ball in the middle of the fourth face?

- (A) A (B) B (C) C (D) D (E) E

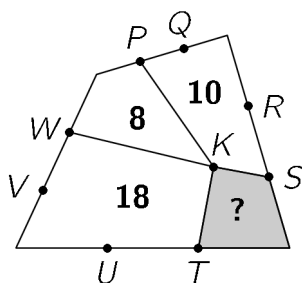
16. In a tournament each of the six teams plays one match against every other team. In each round of matches, three take place simultaneously. A TV station has already decided which match it will broadcast for each round, as shown in the diagram.

1	2	3	4	5
A–B	C–D	A–E	E–F	A–C

In which round will team D play against team F?

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

17. The diagram shows a quadrilateral divided into four smaller quadrilaterals with a common vertex K . The other labelled points divide the sides of the large quadrilateral into three equal parts. The numbers indicate the areas of the corresponding small quadrilaterals.



What is the area of the shaded quadrilateral?

- (A) 4 (B) 5 (C) 6 (D) 6.5 (E) 7

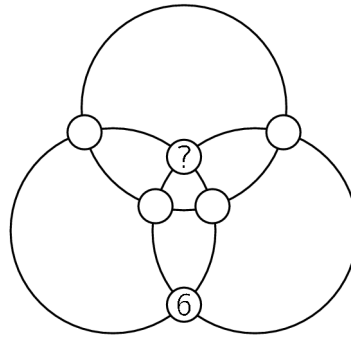
18. Tom had ten sparklers of the same size. He lit one first. When only a tenth of it remained, he lit the second one. When only a tenth of that remained, he lit the third one, and so on. Sparklers burn at the same speed along their entire length. One sparkler will burn in 2 minutes. How long did it take for all 10 sparklers to burn down?

- (A) 18 min 20 sec (B) 18 min 12 sec (C) 18 min (D) 17 min (E) 16 min 40 sec

19. Ahmad walks up 8 steps going up either 1 or 2 steps at a time. There is a hole on the 6th step, so he cannot use this step. In how many different ways can Ahmad reach the top step?

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

20. The numbers from 1 to 6 are placed in the circles at the intersections of three rings. The position of number 6 is shown. The sums of the numbers on each ring are the same.



What number is placed in the circle with the question mark?

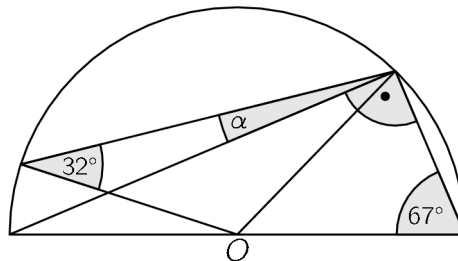
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

5 points

21. 2021 has a remainder of 5 when divided by 6, by 7, by 8, and by 9. How many positive integers, less than 2021, have this property?

- (A) 4 (B) 3 (C) 2 (D) 1 (E) none

22. The figure shows a semicircle with center O . Two of the angles are given.



What is the size, in degrees, of the angle α ?

- (A) 9° (B) 11° (C) 16° (D) 17.5° (E) 18°

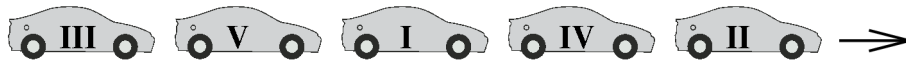
23. In a team competition, there are five teams waiting to start. Each team consists of either only boys or only girls. The number of team members are 9, 15, 17, 19 and 21. After all members of the first team have started, the number of girls not started yet is three times the number of boys not started yet. How many members are on the team that has already started?

- (A) 9 (B) 15 (C) 17 (D) 19 (E) 21

24. Five cars participated in a race, starting in the order shown.



Whenever a car overtook another car, a point was awarded. The cars reached the finish line in the following order:



What is the smallest number of points in total that could have been awarded?

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

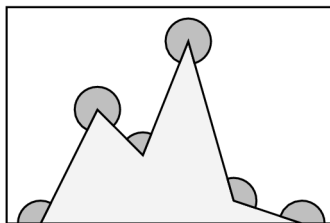
25. A 3×3 square initially has the number 0 in each of its cells. In one step all four numbers in one 2×2 subsquare such as the shaded one, for example, are then increased by 1. This operation is repeated several times to obtain the arrangement on the right. Unfortunately some numbers in this arrangement are hidden.

0	0	0		18	
0	0	0		47	
0	0	0	13		?

What number is in the square with the question mark?

- (A) 14 (B) 15 (C) 16 (D) 17 (E) 19

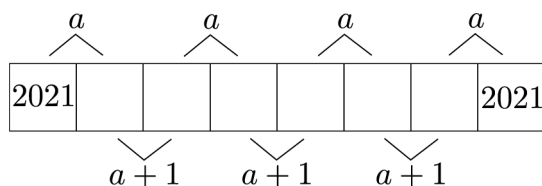
26.



What is the sum of the six marked angles in the picture?

- (A) 360° (B) 900° (C) 1080° (D) 1120° (E) 1440°

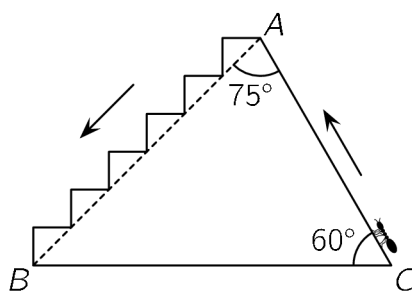
27. There are eight boxes in the strip shown. Numbers in adjacent boxes have sum a or $a + 1$ as shown. The numbers in the first box and the eighth box are both 2021.



What is the value of a ?

- (A) 4041 (B) 4042 (C) 4043 (D) 4044 (E) 4045

28. An ant climbs from C to A on path CA and descends from A to B on the stairs, as shown in the diagram.



What is the ratio of the lengths of the ascending and descending paths?

- (A) 1 (B) $1/2$ (C) $1/3$ (D) $\sqrt{2}/2$ (E) $\sqrt{3}/3$

29. The numbers a , b and c satisfy $a+b+c = 0$ and $abc = 78$. What is the value of $(a+b)(b+c)(c+a)$?

- (A) -156 (B) -39 (C) 78 (D) 156
(E) none of the previous

30. Let N be the smallest positive integer whose sum of its digits is 2021. What is the sum of the digits of $N + 2021$?

- (A) 10 (B) 12 (C) 19 (D) 28 (E) 2021

Name: _____

School: _____

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

