



Kangourou sans Frontières 2014
Training Team competition

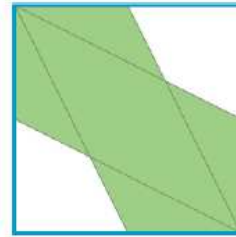
Questions (English)

1. Peter's list

Peter made a list with all four-digit numbers that are multiple of 11 and are formed with four different digits. Peter's list is in increasing order. Which is the last number in Peter's list?

2. The necktie

The side of the square in the picture has length 9. Each of the segments inside the square that is a boundary segment of the shaded region joins some vertex of the square with the middle point of some side. What is the area of the shaded region?



3. The proportion

The equality $11 : 43 = 15 : 55$ is not correct. However, it becomes correct if you add a same positive integer number to each of its terms. Which one?

4. Many digits for a product

How many digits does the product $9.999.999.999 \times 9.876.543.210$ have?

5. Shooting

At a shooting competition Charles scored 99 points. He hit 5, 8 and 10-point areas of the target. He scored 8 points as many times as he scored 10 points. How many times did Charles hit the target?

6. The trapezoid

In an isosceles trapezoid, the measure of the angle formed by the long basis with the oblique sides is 45 degrees. The two bases are 137 and 40 meters long. What is, in centimeters, the height of the trapezoid?

7. The triangular array

A triangular array contains the positive integers, as follows: first row: 1; second row: 2, 3; third row: 4, 5, 6; fourth row: 7, 8, 9, 10; and so on. In which row 2014 appears?

8. The bath

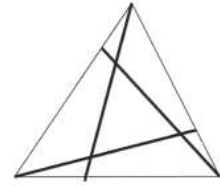
A tap fills a bath in 5 minutes. Another tap fills that bath in 6 minutes. Without stop, the full bath streams empty in 3 minutes. The stop is not put in the bath. Both taps are turned open.

How long does it take before the bath is full?

Write 0000 if you believe that the bath will never get full.

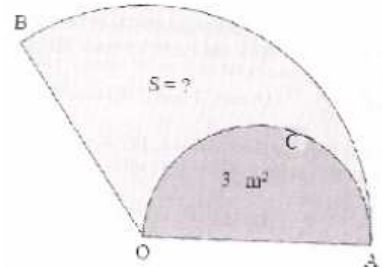
9. Triangles and quadrilaterals

A big triangle is divided by three segments into four triangles and three quadrilaterals. The sum of the perimeters of the quadrilaterals is equal to 25 cm. The sum of the perimeters of the four triangles is equal to 20 cm. The perimeter of the big triangle is equal to 19 cm. What is the sum of the lengths of the segments?



10. The garden to be watered

See the picture. A sprinkler, located at point O , sprays water in a sector of circle (the measure of angle AOB is 120 degrees). Another sprinkler, located at the midpoint of segment AO , waters the garden in the shape of a semi-circle OCA , whose area is 3 m^2 , contained in the sector above. What is, in m^2 , the surface area S of the garden watered only by the first sprinkler?



11. Marc and Henry walking

Marc's steps are four times longer than Henry's. While Marc makes three steps, Henry makes 10. In a race Marc started only after Henry made 20 steps. They got the finish at the same time. How many steps did Marc make in the race?

12. How to write a date

In Italy there is a usual way to write down the date: the day is written before the month. For instance, 15/06 means the 15th of June. At the contrary, in United States of America the usual way is the reverse: 03/05 means the 5th of March. For how many writings we cannot decide which day they indicate, if we don't know which country they refer to?

13. The painted cube

Paula built a large cube from several small white cubes. Then she painted black the faces of the large cube. It turned out that some small cubes got exactly one black face and that their number equals the number of the small cubes that remained totally white. How many small cubes were used by Paula?

14. Only zeros or ones

What is the number of all sequences of length 8 with terms 0 and 1 (not necessarily both of them), which contain no two consecutive 0's?

15. Rolling a dice

A dice is rolled over a table and the points on its five visible faces are added and written down. This action is repeated one or more times. Finally, all the written numbers are added to get a number S as the result. Which is the largest integer that cannot be obtained as S ?

Write 0000 if you believe that numbers different from S exist as large as you wish.