



## **MATHEMATICS WITHOUT BORDERS**

**AGE GROUP 3**

**AUTUMN 2018**

### **INSTRUCTIONS**

1. Please **DO NOT** open the test papers before receiving the proctor's permission.
2. The test contains 20 problems with open answers.
3. You must write down your answers in the **ANSWER SHEET**.
4. You will get 2 points for each correct answer, 1 point for an incomplete answer, and 0 points for a wrong or missing answer.
5. Using calculators, phones or other electronic devices, as well as books or formula sheets is **NOT ALLOWED**.
6. You have 60 minutes to complete the test. In the case of two students having the same number of points, the student who completed the test quicker will get a higher ranking place.
7. Taking the test papers and any other notes out of the room is **NOT ALLOWED**.
8. Receiving any help from a proctor or anyone else during the competition is **NOT ALLOWED**. The organisers insist on honesty and fair play on the part of all participants in the tournament.

**GOOD LUCK!**

## Arithmetics

**Problem 1.** Place brackets in the following expression to make it correct:

$$70 - 40 + 20 = 10.$$

Write down the correct expression in the answer sheet.

**Problem 2.** Ivan added all odd one-digit numbers and Peter added all even one-digit numbers. By how much is Ivan's sum greater than Peter's sum?

**Problem 3.** Calculate the sum of the one-digit numbers  $\Delta$  and  $\square$  if

$$7 + 7 + 7 + 7 = \square \times \Delta.$$

**Problem 4.** Chris multiplied the number 3 by 3. Then, Diana subtracted 5 from Chris' product. Peter divided Diana's difference by an odd number. What quotient did they get?

**Problem 5.** Find the unknown factor ( $\square$ ).

$$(3 + 3 + 3 + 3) + (4 + 4 + 4 + 4) + 7 + 7 = \square \times 7$$

## Logical Thinking

**Problem 6.** Vanya has two cats at home. Each cat gave birth to 5 kittens. How many cats does Vanya have now?

**Problem 7.** The distance between each two pillars in the same row in a vineyard is the same. The distance between the first and the fifth pillar in the same row is 20 meters. How many meters is the distance between the first and the 10<sup>th</sup> pillar in this row?

**Задача 8.** Each of the boys in a family has 2 sisters, and each of the girls has 3 brothers. How many children are there in this family?

**Problem 9.** A builder was trying to hammer a nail at a 5 cm distance from one end of a plank of wood with a length of 21 cm, but got distracted and hammered the nail at a 5 cm distance from the opposite end. How many centimeters away from the place he was originally aiming for did he hammer the nail?

**Problem 10.** Alec, Boris and Claire participated in a mathematics competition and all three of them got a different number of points. Their friend Steven asked them who got the most points. Here are their guesses:

Alec: *“Claire has the most points.”*

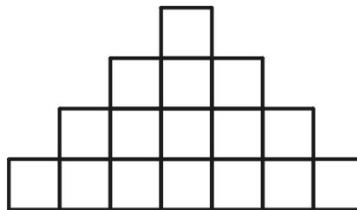
Boris: *“Alec has the most points.”*

Claire: *“I have the most points.”*

If only one of the statements is true, who made a correct guess?

### Geometry

**Problem 11.** The figure below is made up of 16 squares. The perimeter of each square is 4 cm. How many centimeters is the perimeter of the whole figure?

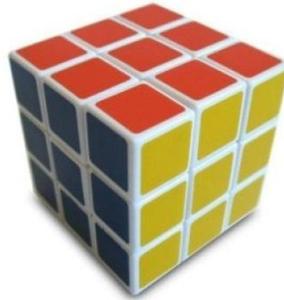


**Problem 12.** Find the length of the leg of an isosceles triangle with a base length of 2 cm and a perimeter of 12 cm.

**Problem 13.** An equilateral triangle has a perimeter of 6 cm, and a square has a side which is 2 cm longer than the side of the triangle. How many centimeters is the perimeter of the square?

**Problem 14.** The points  $A$ ,  $B$  and  $C$  lie on a straight line. The point  $C$  lies between the points  $A$  and  $B$ . The length of the segment  $AB$  is 3 cm. The length of the segment  $AC$  is 1 cm. Calculate the length in millimeters of the segment that has the midpoints of the segments  $AB$  and  $BC$  as its endpoints.

**Problem 15.** A Rubik's cube is made up of 27 cubes. How many of them are invisible? (Hint: A cube is considered visible if we can see at least one of its faces).



### Combinatorics

**Problem 16.** A grasshopper can make straight jumps of 1 meter, 2 meters and 3 meters. In how many ways can the grasshopper get from one flower to another flower which is 6 meters away by using all three types of jumps?

**Problem 17.** Ivan has a blue, a green, and a red shirt, as well as a blue and a black pair of trousers. In how many different ways can he combine his shirts and trousers so that they are of different colors?

**Problem 18.** How many two-digit numbers are there, which are smaller than 50 and only contain odd digits?

**Problem 19.** Peter placed a one-digit number in the square  $\square$ , in such a way that the difference of  $(5 - \square)$  is a divisor of 8. How many such numbers can Peter place in the square?

**Problem 20.** How many different two-digit numbers containing different digits can we build using two of the following digits: 1, 2, 3 and 4?