MATHEMATICS WITHOUT BORDERS

AGE GROUP 2

SPRING 2020

INSTRUCTIONS

1. Please **DO NOT OPEN** the contest papers until the Exams Officer has given permission.

2. There are 20 questions with an open answer in the test.

3. Please write your answers in the ANSWER SHEET.

4. Each correctly solved problem earns 2 points, a partial solution earns 1 point, and unanswered or wrong answer gets 0 points.

5. The use of calculators or other electronic devices, as well as books containing formulae is NOT allowed during the course of the contest.

6. Working time: not more than 60 minutes. In the case of an equal number of solved problems, the higher ranked participant will be the one who has spent less time solving the problems.

7. No contest papers and draft notes can be taken out by any contestant.

8. Students are NOT allowed to receive help by the Exams Officer or by anyone else during the contest.

WE WISH YOU ALL SUCCESS!

Problem 1. Find □, if

$$4 + 4 + 4 + 6 = \square \times 6.$$

Problem 2. Place the same number in all the squares □ so that the following would be correct:

$$\square + \square + \square + 6 = \square \times 5.$$

What is this number?

Problem 3. How many numbers are missing?

$$12, 14, 16, \ldots, 22, 24, 26$$

Problem 4. How many two-digit numbers are smaller than the number equal to $6 \times 3 - 1$?

Problem 5. How many of the symbols „+“ must be replaced with „×“, so that the equation would be correct?

$$2 + 3 + 4 + 5 = 26$$

Problem 6. In how many ways can we express the number 8 as the sum of equal numbers?

Problem 7. Some boys and girls are playing in a playground. There are 21 girls and 3 times less boys. How many children are there in total?

Problem 8. John came up with the following puzzle: * + 7 = **.

(the sum of a one-digit number and 7 is a two-digit number)

Peter replaced the star symbols with digits and got the following correct equation:

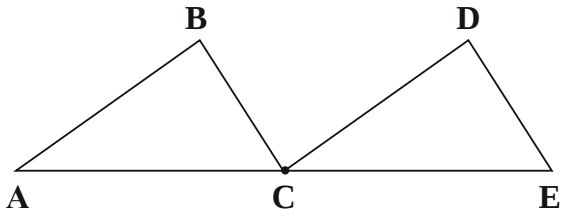
$$9 + 7 = 16.$$

How many other such replacements are possible?

Problem 9. What is the greatest possible product of several numbers with a sum of 8?

Problem 10. John wrote down the following numbers:
1 one-digit number, 2 two-digit numbers, 3 three-digit numbers, followed by another one-digit number, 2 more two-digit numbers, 3 more three-digit numbers, etc. How many three-digit numbers did John write, if he wrote 53 numbers in total?

Problem 11. Place the numbers 1, 2, 3, 4 and 8 at the vertices of the triangles *ABC* and *CDE*, so that the product of the numbers in the vertices of each triangle would be 24. Find the number that has been written in the common vertex C.



Problem 12. There are as many even numbers from 17 to 27 as there are odd numbers from 28 to the even number X. Find the number X.

Problem 13. Three different points *A*, *B* and *C* lie on a straight line. There are 3 line segments with two of the points *A*, *B* and *C* as their endpoints *(AB*, *BC* and *AC)*.

If $AB + BC + AC = 22$ *cm*, find the length of the longest of the three line segments.

Problem 14. The perimeter of an isosceles triangle is 19 cm. If the length of its leg is 5 cm, find the greatest side length in cm.

Problem 15. The length of a rectangle is 5 cm greater than its width. The perimeter of the rectangle is 34 cm. Find the length of its greater side in cm.

Problem 16. I have 3 apples. I also have scales, which I can use to measure the total weight of each two of the three apples. What is the least number of times we need to weigh the apples in order to find out the total weight of all 3 apples?

Problem 17. John calculated the products received after multiplying each of the one-digit numbers to the same number:

$$0\times0,\ 1\times1,\ 2\times2,\ 3\times3,\ ...,\ 9\times9.$$

How many digits are NOT ones digits of the products?

Problem 18. Which operation symbol should we replace ☺ with, in order for the following to be correct?

$$(17☺1) \div 4 - 1 = 3$$

Problem 19. At least how many digits should we remove from the expression $6 \times 8 \times 10$ in order to get the least possible product?

Problem 20. Which sum, smaller than 11 eurocents, and greater than 1 eurocent, cannot be paid using 4 coins of 2 eurocent and two coins of 5 eurocents?