



MATHEMATICS WITHOUT BORDERS

AGE GROUP 5

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. Calculate

$$(100 \times 22 + 118 \times 26) \div (25 \times 22 + 59 \times 13).$$

Problem 2. What is the ones digit of the following number?

$$22 \times 333 \times 666 + 77 \times 555 + 2018$$

Problem 3. The sum of 11 consecutive numbers is 275. What is the 10th number?

Problem 4. A number is made up of 9 thousands, 121 hundreds, 11 tens and 89 ones. What is the number?

Problem 5. The number 403 can be expressed as the product of two two-digit numbers. Which is the greater number?

Logical Thinking

Problem 6. At first there were 100 stacks of hay in a field. The farmers piled the stacks into larger stacks by turning every 6 stacks into 1, and did that with as many stacks as possible. How many stacks of hay were there in the end?

Problem 7. How many three-digit numbers satisfy the following two conditions?

- (1) The number is divisible by 3;
- (2) The number is expressed as the product of two equal multipliers.

Problem 8. There are 18 marbles identical in size. Only one of them is lighter than the others. At least how many times should we weigh the marbles on the scales (without weights), in order to find the lighter marble?



Problem 9. Each number in the following sequence (after the second number), is equal to the sum of the two numbers that precede it. Find the sum of the missing 4 numbers.

_, _, _, 11, _, 30

Problem 10. The distance between two towns is 22 km. Two cyclists leave from each of the towns at the same time and head towards each other. One of them is cycling at 20 km/h and the other is cycling at 12 km/h. What will the distance between them be in 45 minutes?

Geometry

Problem 11. What is the greatest possible number of rectangles that can be formed using 7 straight lines?

Problem 12. Ivan built a rectangle by using 12 identical squares, each with a side length of 1 cm. Find each of the possible perimeters in centimeters.

Problem 13. The points A , B and C lie on a straight line in such a way that:

- The distance from point A to point B is 6 cm;
- The distance from point C to point A is 2 cm;
- The distance from the midpoints of the segments AB and AC is 4 cm.

Find the length of the segment BC in centimeters.

Problem 14. There are three isosceles triangles with lengths expressed in integer centimeters and with a perimeter of 16 cm. Find the greatest side length among these triangles in centimeters.

(Hint: The sum of any two side lengths of a triangle is always greater than the third side.)

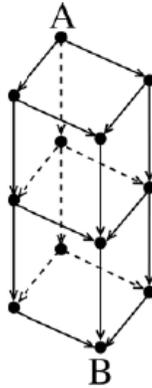
Problem 15. What is the greatest possible area (in square centimeters) of a rectangle with a perimeter of 16 cm?

Combinatorics

Problem 16. Ivan wrote down all three-digit numbers (the digits within a number are not repeated) by using the digits 0, 1, 2 and 3. How many of them are even?

Problem 17. All possible five-digit numbers have been written using two digits 2 and three digits 3. In how many of these numbers are the digits “2” NOT next to each other?

Problem 18. In how many ways can we go from point A to point B, by moving along the arrows?



Problem 19. Four points have been placed along a straight line, and three points have been placed along a parallel straight line. How many triangles have their vertices among the given points?

Problem 20. Find the sum of all natural numbers, which when divided by 5, leave a remainder equal to the quotient.