Mathematics competition for the seventh graders of Satakunta, 7-11 March, 2022

- The time allotted is 50 minutes.
- The allowed tools are writing and drawing instruments, i.e. pencil, paper, eraser, ruler and compass. Calculators and mathematical tables are not allowed.
- Each problem has exactly one correct answer. Wrong answer is not punished.
- The problems are not ordered in increasing difficulty, but the first problems are likely to be easier than the last ones.

1. Compute $2€ + 6 \cdot 3€ - 50c$.

    a) $-30€$ **b)** $19.50€$ **c)** $20.50€$ **d)** $23.50€$ **e)** $30€$

2. One hundred litres of mineral water is bottled. First, ten 1.5-liter bottles of mineral water are filled and then the rest of the mineral water is bottled to 0.5-liter bottles. How many 0.5-liter bottles of mineral water are obtained?

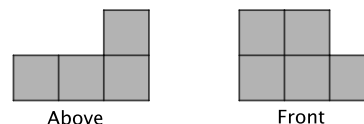   **a)** 43   **b)** 85   **c)** 100   **d)** 170   **e)** 200

3. In which of the following figures does the colored area correspond to number $\frac{1}{3}$?
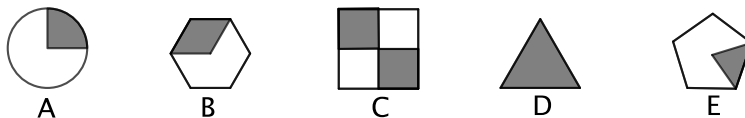
    a) A   **b)** B   **c)** C   **d)** D   **e)** E

4. An object consists of similar cubes which are placed on top of each other and side by side. It is portrayed from above and front. How many cubes are there in the object?

    a) 3   **b)** 4   **c)** 5   **d)** 6   **e)** 7

**5.** A clock is running slow: the clock hands move with 80% pace of the normal. When the clock shows that an hour has passed, how long has it really been?

    a) 48 min   **b)** 50 min   **c)** 1hr 15 min   **d)** 1hr 20 min   **e)** 1hr 25 min

6. Let us color the four triangles in the picture with red and blue in the following way: Each triangle is completely red or completely blue. Two triangles, which are colored with the same color, do not have a common side. How many different ways are there to do such a coloring?

    a) 0   **b)** 1   **c)** 2   **d)** 3   **e)** 4
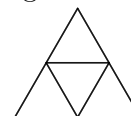
7. Eetu is going to visit his grandmother and he needs black, white and gray pairs of socks with him. In total, he needs ten pairs of socks. Further, he also needs more black pairs than white pairs and more white pairs than gray pairs. Which one of the following numbers fulfils the following two conditions: (i) Eetu definitely needs at least that many pairs of black socks. (ii) The number is the largest one among the numbers which satisfy condition (i).

    a) 3   **b)** 4   **c)** 5   **d)** 6   **e)** 7

8. There are only 5 cent coins and 20 cent coins in a wallet. There are 20 coins of each type of coin. How many different ways are there to pay a purchase of one euro using these coins?

(Ways to pay are interpreted to be the same if they contain the same number of coins of each type. For example, all the ways, in which exactly five coins of 20 cents are used, are interpreted to be the same way.)

a) 2   **b)** 3   **c)** 4   **d)** 5   **e)** 6

9. In a mathematics competition, exactly half of the contestants are awarded with a medal. Gold, silver and bronze medals are shared with ratio 1 : 2 : 3. If there are 600 contestants, in which positions are the contestants awarded with a gold medal?

a) from first to 50th   **b)** from first to 60th   **c)** from first to 100th
d) from first to 300th   **e)** from 50th to 100th

10. When the sum $2022 + 2022 + 2022 + \ldots + 2022$, where the number 2022 appears 2022 times, is computed, what is the last digit (indeed, the number representing ones) of the obtained number?

**a)** 0   **b)** 1   **c)** 2   **d)** 3   **e)** 4

11. There are cheaters, who always lie, and honest persons, who always tell the truth, sitting around a table. Each of them says the following: "A person sitting to my right is a cheater." Which one of the followings is a possible number of people sitting around the table?

a) 1   **b)** 99   **c)** 1111   **d)** 2022   **e)** None of the previous.

12. We denote $a \otimes b = a + a \cdot b \cdot b$. For example, $1 \otimes 2 = 1 + 1 \cdot 2 \cdot 2 = 1 + 4 = 5$. Compute $3 \otimes 4$.

a) 14   **b)** 27   **c)** 51   **d)** 93   **e)** 144

13. Which one of the following shapes has the longest perimeter?
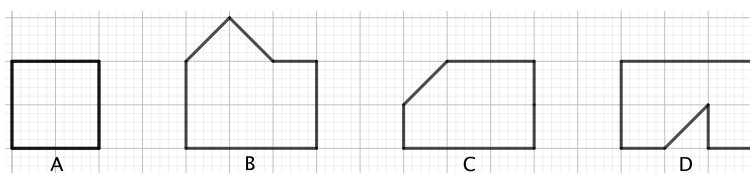
a) A   **b)** B   **c)** C   **d)** D   **e)** The problem cannot be solved with the given data.

14. There are red and orange fruit candies and black salty liquorices, at least three pieces of each, in a candy bag. Three friends share the candies. First they share the orange candies in such a way that each of them gets the same amount of candies. Some positive amount, but less than three, of candies is left over. The same happens when the red and black candies are shared in a similar way. At the end, the number of the leftover candies is divisible by three and they can be shared equally among the three friends. In total there are 18 candies.

Which one of the followings is a possible number of red candies?

a) 2   **b)** 6   **c)** 8   **d)** 11   **e)** None of the previous.

15. In triangle ABC altitudes beginning at vertices A, B and C are about 4.4m, 7m and 6m long, respectively. What is the correct order of the lengths of sides AB, BC and CA of the triangle?

a) $AB < BC < CA$ **b)** $BC < CA < AB$ **c)** $BC < AB < CA$
d) The problem cannot be solved with the given data.
e) None of the previous.