

MATHEMATICS COMPETITION FOR THE SEVENTH
GRADERS OF OULU REGION 27 FEBRUARY – 3 MARCH 2023

- 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 one correct answer. Wrong answers do not reduce points.
- The problems are not ordered in increasing difficulty, but the first problems are likely to be easier than the last ones.

1. Compute $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + 9 - 10$.

- a) 55 b) -5 c) -55 d) -15 e) 5

2. Compute $5 + 55 + 555 + 5555 + 55555 + 555555$.

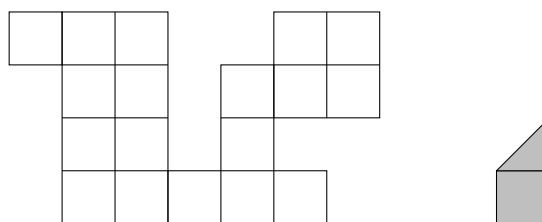
- a) 5555550 b) 1010105 c) 612050 d) 617280 e) 557205

3. If the following numbers are ordered in increasing order from the smallest to the largest, then which number is in the middle?

$$\frac{1}{2}, \quad \frac{10}{22}, \quad \frac{110}{222}, \quad \frac{112}{221}, \quad \frac{211}{112}$$

- a) $\frac{1}{2}$ b) $\frac{10}{22}$ c) $\frac{110}{222}$ d) $\frac{112}{221}$ e) $\frac{211}{112}$

4. Aino wants to tile the white area in the figure below with grey tiles shaped as illustrated. How many tiles does Aino need?

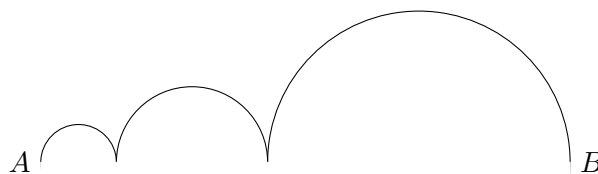


- a) 11 b) 12 c) 13 d) 14 e) 15

5. Essi and Oiva play the following coin flipping game: Essi flips a coin until she gets tails, after which the coin is passed to Oiva and the game continues in the same way. After the coin has been flipped for a total of 20 times, the coin is passed over to Oiva for the third time. In total, how many heads have Essi and Oiva gotten during the game?

- a) 15 b) 16 c) 17 d) 18 e) 19

6. A frog starts from point A and leaps to point B as shown in the figure below. Each leap is shaped like a semicircle where the highest leap is one meter high and each leap is twice as high as the previous one. What is the distance, in meters, between the points A and B ?



- a) 1 b) $2\frac{1}{2}$ c) $3\frac{1}{3}$ d) $3\frac{1}{2}$ e) 4

7. The numbers $a, b, c, d, e, f, g, h, i$ and j are integers. If

$$a + b + c + d + e + f + g + h + i + j = 50,$$

then at most how many of the numbers $a, b, c, d, e, f, g, h, i$ and j can be smaller than 5?

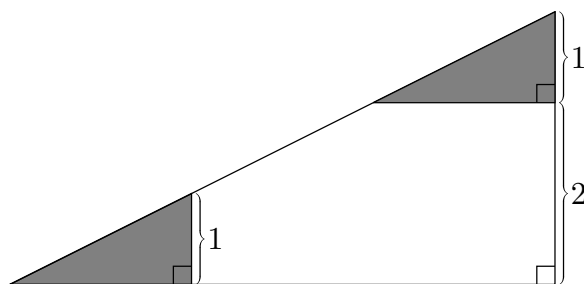
- a) 1 b) 3 c) 5 d) 7 e) 9

8. What is the largest possible value for the expression below, if you can freely choose each of the symbols \clubsuit , \diamond and \spadesuit to represent either addition, subtraction, multiplication or division?

$$\frac{8 \diamond 1}{6 \clubsuit 2} \spadesuit 2$$

- a) $\frac{9}{2}$ b) 6 c) 5 d) $\frac{15}{4}$ e) $\frac{11}{3}$

9. The combined area of the grey regions in the figure below is 2. What is the area of the white region?



- a) 4 b) 5 c) 6 d) 7 e) 8

10. Matti has 15 socks, nine pairs of pants and four shirts in his laundry basket. Matti takes clothes from the basket one at a time, at random, without putting them back in. How many clothes does Matti have to take to be sure that he gets at least two socks, at least one pair of pants and at least one shirt?

- a) 24 b) 25 c) 26 d) 27 e) 28

11. Veeti's rating in a competitive video game is expressed as an integer. During a school day, Veeti's rating increases by 80 units and during a free day, it increases either by 100 or 200 units. How many free days did Veeti have during a week, if he started with a rating of 0 and after the week he has a rating of 740?

- a) 1 b) 2 c) 3 d) 4 e) 5

12. Let us sum up all of the integers obtained by rearranging the digits in the integer

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in such a way that zero is never the first digit. What is the last digit of the integer obtained in this way?

- a) 1 b) 2 c) 3 d) 4 e) 5

13. Leenu, Liinu and Tiinu have each chosen an integer. They have all chosen different integers and each tells us something about their chosen integer. However, one of them is lying!

Tiinu says that her integer is the smallest of them. Liinu tells us that her integer is larger than Leenu's, but not the largest one. Leenu says that her integer is the largest of them.

Arrange the integers chosen by Leenu, Liinu and Tiinu in increasing order from the smallest to the largest.

- a) Leenu, Liinu and Tiinu b) Leenu, Tiinu and Liinu c) Liinu, Leenu and Tiinu
d) Liinu, Tiinu and Leenu e) Tiinu, Liinu and Leenu

14. A forest has 800 trees of equal height. Each year, the forest is thinned out by cutting down half of those trees which are at least 3 meters tall, and planting a 20 cm tall sapling for every tree which was cut down. At the start, each tree is 5 meters tall and every tree grows one meter a year. After the forest has been thinned out five times, how many trees have been cut down in total?

- a) 400 b) 650 c) 775 d) 1000 e) 1175

15. Consider a regular octagon, with an area of A . By joining two of its corners with a line segment, we obtain a triangle, whose longest side has a length of 1. What is the area of this triangle?

- a) 1 b) $\frac{A-1}{4}$ c) $\frac{A}{8}$ d) $\frac{A-1}{8}$ e) $\frac{A+1}{8}$