

MATHEMATICS COMPETITION FOR THE SEVENTH
GRADERS OF HELSINKI, 9–13 FEBRUARY 2015

- The time allotted is 50 minutes.
- The allowed tools are writing and drawing instruments, i.e. pencil, eraser, ruler and compass. Calculators and mathematical tables are not allowed.
- Each problem is worth one point. Wrong answers are 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 $2014 - 153$.

- a) 1761 b) 1765 c) 1811 d) 1861 e) 1865

2. Compute $23 \cdot 81$.

- a) 1761 b) 1763 c) 1863 d) 1961 e) 1965

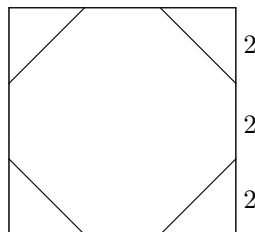
3. The number 24894 is multiplied by three. What is the digit representing the tens in the result?

- a) 4 b) 1 c) 8 d) 3 e) 7

4. If $\frac{3}{5}x - \frac{9}{11} = 0$, then what is x ?

- a) $\frac{45}{33}$ b) $\frac{33}{45}$ c) $\frac{12}{16}$ d) $\frac{27}{55}$ e) $\frac{55}{27}$

5. The four triangles of the picture are isosceles. How large a portion do they cover of the area of the square?



- a) $\frac{1}{9}$ b) $\frac{2}{9}$ c) $\frac{1}{3}$ d) $\frac{4}{9}$ e) $\frac{5}{9}$

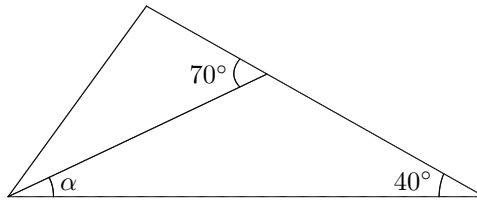
6. The number 100 is written as the sum of two consecutive integers. What is the largest of these two integers?

- a) 15 b) 50 c) 51 d) 75
e) The number 100 cannot be written as the sum of two consecutive integers.

7. Mikko and Ella have apples and oranges. Mikko has two apples more than he has oranges, and Ella has only oranges. Furthermore, Ella has as many oranges as Mikko has apples, and together Mikko and Ella have exactly 40 fruits. How many apples are there?

- a) 10 b) 14 c) 20 d) impossible situation e) there are many possible answers

8. Solve for α .



- a) 20° b) 25° c) 30° d) 35° e) Cannot be done with the given data.

9. A triangle and a square have equal circumferences. The sides of the triangle have lengths 3.7 cm, 2.4 cm and 5.9 cm. What is the area of the square?

- a) 9 cm^2 b) 6 cm^2 c) 3 cm^2 d) $5\sqrt{2} \text{ cm}^2$ e) 8 cm^2

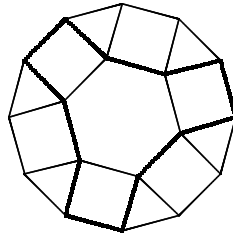
10. Maya is 12 years old and three times the age of her little brother. How old is Maya when she is twice the age of her brother?

- a) 14 years b) 14.5 years c) 15 years d) 15.5 years e) 16 years

11. Trains operating between Duckburg and Goosetown depart in both cities once an hour on the hour. A journey between the cities takes exactly 4 hours. Matti travelled from Duckburg to Goosetown and he looked out through the window during the entire trip. How many trains travelling from Goosetown to Duckburg did he see during the trip? (Here we ignore trains which are just arriving to Duckburg or just departing from Goosetown.)

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

12. There is a regular hexagon, equilateral triangles and squares in the following picture. How large a portion of the area of the figure is enclosed by the thick line?



- a) 45% b) 50% c) 55% d) 60% e) 65%

13. A number is multiplied by two. After that two is added to the result, then ten is subtracted, and finally we divide by three. The final result is 2. What was the original number?

- a) -1 b) $\frac{2}{3}$ c) 7 d) $\frac{10}{3}$ e) 14

14. What is $a + b + c$, if

$$a^3 = 1 + 7, \quad 3^3 = 1 + 7 + b, \quad \text{and} \quad 4^3 = 1 + 7 + c?$$

- a) 58 b) 110 c) 75 d) 77 e) 79

15. We know that $0 < x \leq 1$ and $1 \leq y \leq 2$. For which choice of z can we be sure that $z > 2$, $z \geq x + y$ and $z \leq y + 3$?

- a) $3\frac{1}{2}$ b) $3\frac{3}{4}$ c) 3 d) all of the previous three e) none of the previous