Mathematics Competition for the Seventh Graders of Turku Region, 4–8 March, 2019

- 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 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 $-97 + 198$.

a) -1 **b)** 1 **c)** 11 **d)** 101 **e)** 111

2. Compute $\frac{2}{6} \cdot \frac{33}{22} \cdot \frac{1}{5}$.

a) $\frac{1}{8}$ **b)** $\frac{1}{10}$ **c)** $\frac{36}{33}$ **d)** $\frac{2}{5}$ **e)** 2

3. A flight from Helsinki to Beijing takes 7 hours and 35 minutes. The local time in Beijing is five hours ahead of the local time in Helsinki. If the flight takes off from Helsinki at 18:20, then what is the local time in Beijing when the flight lands there?

a) 05:45 **b)** 06:55 **c)** 15:45 **d)** 18:55 **e)** 20:55

4. A deciliter of flour weighs about 65 g, and a deciliter of oatmeal weighs about 35 g. A recipe for an apple pie requires, in deciliters, half as much oatmeal as flour. If 520 g of flour is used, how much oatmeal should be used?

a) 100 g **b)** 140 g **c)** 220 g **d)** 740 g **e)** 320 g

5. A conference has 60 participants. The conference lasts five days and has two coffee breaks every day. Half of the participants drink a large cup of coffee during each coffee break. One package of coffee is enough for 40 large cups of coffee. How many packages of coffee need to be bought in order to have enough coffee for all the coffee breaks?

a) 7 **b)** 8 **c)** 9 **d)** 10 **e)** 12

6. Compute the sum of all the numbers in the table.

10	20	30	40	50
20	40	60	80	100
30	60	90	120	150
40	80	120	160	200
50	100	150	200	250

a) 500 **b)** 1000 **c)** 2250 **d)** 3560 **e)** 4550

7. An island has 30 000 inhabitants of which 80 % speak Swedish as their native language, and the rest speak Finnish as their native language. 1000 new inhabitants move to the island. Which of the following is certainly true after the immigration? Swedish is the native language of

a) exactly 80 % **b)** at most 77 % **c)** at least 81 % **d)** exactly 78.6 %
e) None of the previous

8. In a certain year, the month of March has exactly four Mondays and four Fridays. What day of the week is the 31st day of March?

a) Monday **b)** Tuesday **c)** Wednesday **d)** Thursday **e)** Friday

9. In how many ways can one choose positive integers x, y, z and w so that

$$x^2 + y^2 = 2(z^2 + w^2)?$$

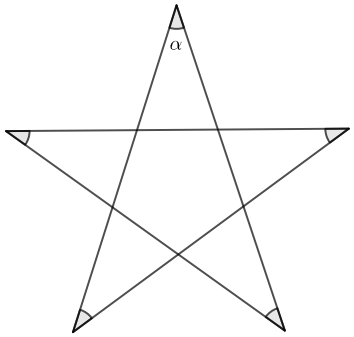
a) 1 **b)** 18 **c)** 63 **d)** 100 **e)** more than 100

10. We have five identical blue blocks and two identical red blocks. In how many ways can we construct from these blocks a vertical tower seven blocks high when it is required that the two red blocks are not next to each other?

a) 10 **b)** 12 **c)** 14 **d)** 15 **e)** 20

11. All the angles marked in the star diagram are equal to α, and all the sides in the diagram are equally long. How large is the angle α?

a) 34° **b)** 35° **c)** 30° **d)** 45° **e)** 36°



12. The average of three numbers is 10 and the average of two other numbers is 5. What is the average of all five numbers?

a) 3 **b)** 5 **c)** 6.5 **d)** 7.5 **e)** 8

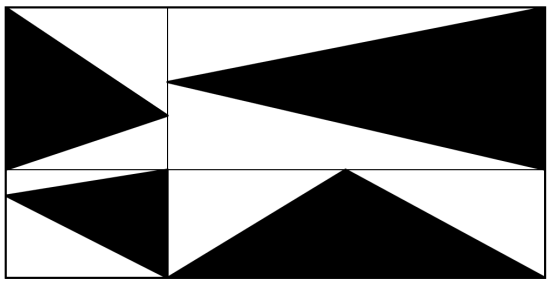
13. On a certain street, there are houses. Each of the houses has been labeled with one of the digits 1, 2, ..., 9, as well as one of the letters A, B or C. No two houses have the same combination of a digit and a letter. What is the largest possible number of houses on the street?

a) 1 **b)** 3 **c)** 9 **d)** 12 **e)** 27

14. How many pairs of integers such that the sum of the integers is 2019 and the product of the integers is 2019 are there?

a) 0 **b)** 1 **c)** 10 **d)** 100 **e)** more than 1000

15. The area of a rectangle is 1 and it has been divided into four parts by segments parallel to the sides. Compute the area of the black region.



a) $\frac{1}{4}$ **b)** $\frac{3}{8}$ **c)** $\frac{1}{3}$ **d)** $\frac{7}{16}$ **e)** $\frac{1}{2}$