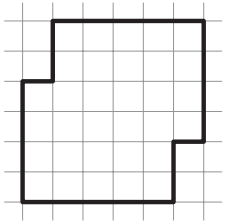
For each problem the recommended grades are specified in the parentheses (a student is allowed to solve the problems for older grades; if a student solves a problem intended for younger grades, the solution will be ignored).

1. (6) Fill in some numeral (in letters!), so this sentence would be true.

`There are _____ vowels in this sentence.`

2. (6–7) Ilya absolutely dislikes math problems about speed and doesn‘t remember any formulae. When he was asked, what distance would a train cover, he tried multiplying speed and time, add them up and even divide speed by time. "I always get the same number! It must be the right answer!" exclaimed Ilya. Prove that Ilya also can‘t do arithmetic.

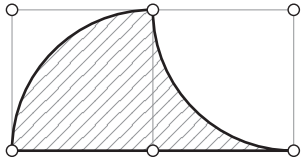
3. (6–8) Is it possible to cut the figure on picture into four identical parts while cutting along the lines of the squares?



4. (7–9) The conference was attended by the representatives of two competing companies, Index and Zoogle, Alexey, Boris and Vladimir. The representatives of the same company always tell the truth to each other, but lie to the competitors. Alexey said to Boris, "I‘m from Index". Boris replied, "Oh! You and Vladimir work for the same company!" Is it possible to figure out where Vladimir works?

5. (8–10) In the park during the two years of landscaping work the old trees were being cut down and the new ones were being planted. The project managers claim that in this two years the average increase in the number of trees is 15 %. The ecologists say that in this two years the number of trees has decreased by 10 %. Can both be true? (If the number of trees per year has increased, then the gain is considered positive, if it decreases, then it is considered negative. The managers calculate the average increase as $(a+b)/2$, where a is the first year increase given in percentage , and b is the second year increase given in percentage.)

6. (9–11) You need to divide the curvilinear triangle in the picture into 2 parts of equal area, having drawn one line with a compass. This can be done by selecting one of the marked points as the center and drawing an arc through another marked point. Find a way to do this and prove that it is a suitable solution.



7. (10–11) The shares of the company "Horns‘n‘hoofs" change their value every day: they become more expensive a times every first day, and then become cheaper by b rubles every second day. Their value has been equal to N rubles three times already. Prove that sooner or later their value will be N for the fourth time.

8. (11) The house has $8N$ floors. There are two elevators next to each other, in each of them the buttons are arranged in the form of a rectangle $N \times 8$ (N rows, 8 columns), but they are numbered in different ways: one from the bottom up and from the left to the right, and in the other one from the left to the right and from the bottom up (example for $N = 3$ is given in the picture). Danya presses the button of his floor without looking at the numbers, because this button is located at the same place in both elevators. On which floor can he live? (For example, for $N = 3$ answer is 1 and 24. Give all possible options depending on N.)

17	18	19	20	21	22	23	24
9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	8

3	6	9	12	15	18	21	24
2	5	8	11	14	17	20	23
1	4	7	10	13	16	19	22

Don’t forget to **sign** your work (please, write the card number, your last name, school and grade) before **submitting** the work. You do not have to submit the sheet with the tasks. The tasks, their solutions and the results of the competition will be published at *http://turlom.olimpiada.ru* after November 20.