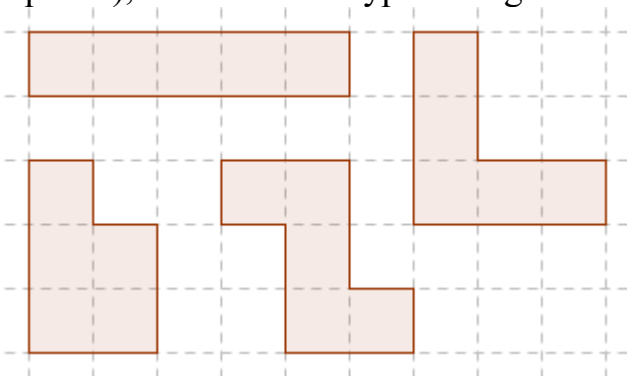
Problem 1

Scale 2 : 1

You have been provided with 16 pentominotiles (tiles , which consist of five squares), four different types of figures.

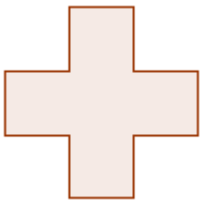


A

Use four identical figures to form a magnified view of that figure in the scale 2: 1. Do this with as many kinds of tiles with the same shape as possible.

B

Use four identical figures to form a cross



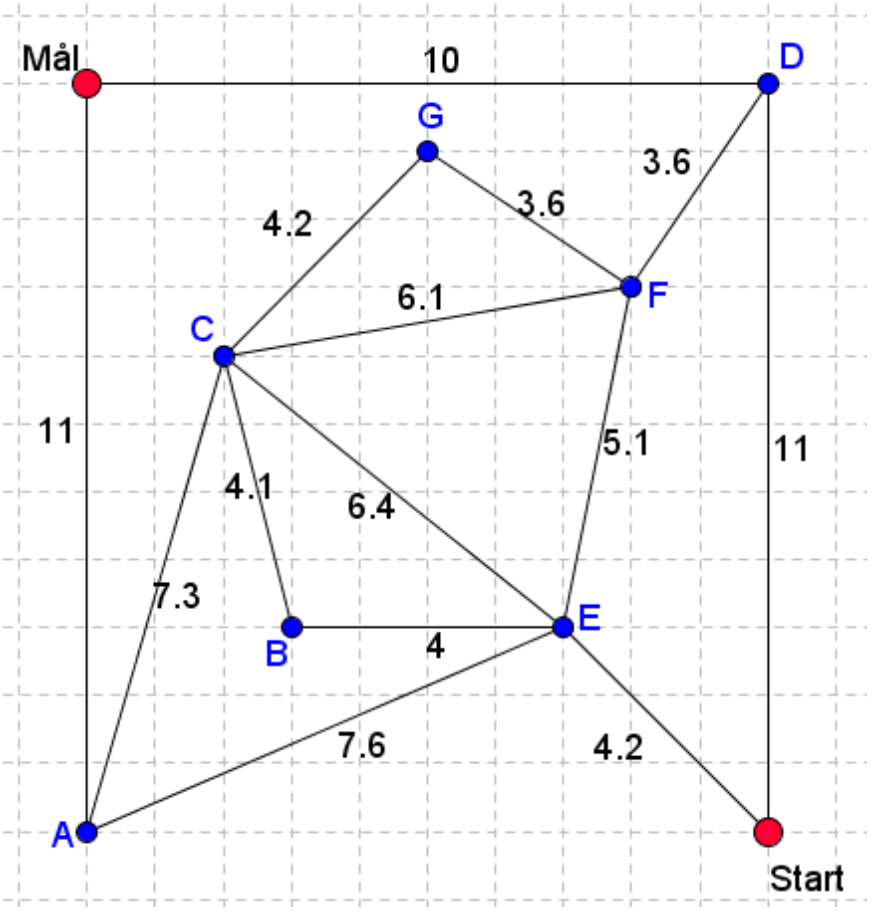
Do also this with as many kinds of tiles with the same shape as possible.

Problem 2

The shortest way

The task is to find the shortest way from Start to Mål on the plate that has been given to you.
All points from A to G should be crossed and only the given roads you see on the plate are allowed to take.

Give your solution with the string attached to the plate.
You should try to find the shortest way while passing all points A to G.



Problem 3

The number in the center

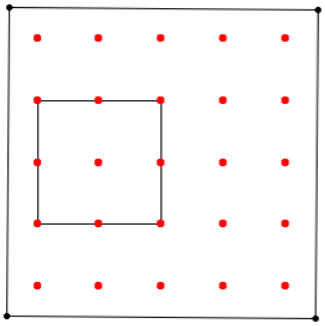
Suppose we have five different positive integers arranged in order of the smallest first and the largest at the end. The average of the four largest numbers is 8 and the average of the four smallest numbers is 5.

What numbers may be the middle number (median) of the given sets of numbers?

For each answer, ie. different proposal on which the middle number is, you should also specify the other four numbers so that all five numbers qualify the terms above!

Problem 4

Play with squares

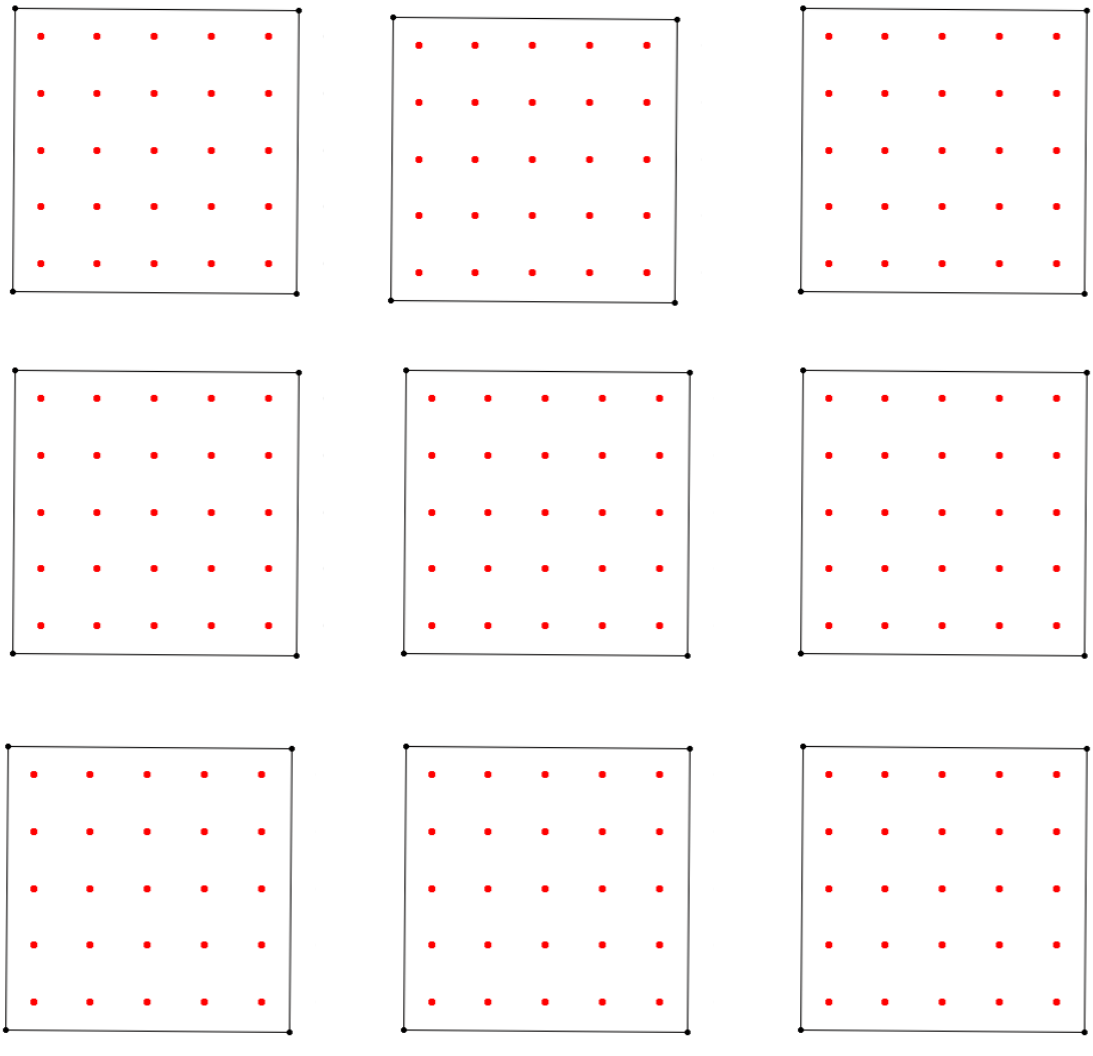


On a 5 x 5 board you shall move around a rubber band and construct squares. Here is an example

The square, showed above, has the area 4 a.u.

Your task is to find squares of other sizes.
How many squares of different sizes can you find at a 5 x 5 board?

Draw each square with different size, you have found, in the figures below.



Problem 5

The nearest neighbours to an integer number.

With the nearest neighbours to an integer number, we mean the number that is one step before and that is one step after the number. For example 14 and 16 are the closest neighbours to the number 15.

And 14 is possible to divide with 2 and 7 and 16 is for example possible to divide with 4 and 8. That means that someone of these neighbors are multiples of 2, 4, 7 and 8.

Determine the smallest (positive) integer that satisfies the condition that one of that integers closest neighbors are evenly divisible by 5, 7, 11 and 13.

Extra Problem

Strange way of calculate fractions

Jonas had his own method to multiply two fractions with single-digit numerator and denominator. He put the two numerators to a two digit number and the same way he did with denominators:

$$\frac{1}{4} \cdot \frac{8}{5} = \frac{18}{45}$$

His teacher said that this way was not so good but actually, if you simplify the answer, ie. divide the numerator and denominator by 9, then the answer is correct.

$$\frac{18}{45} = \frac{18/9}{45/9} = \frac{2}{5} \qquad \frac{1}{4} \cdot \frac{8}{5} = \frac{1 \cdot 8}{4 \cdot 5} = \frac{8}{20} = \frac{2}{5}$$

On the other hand, if you choose other numbers
you may of course be completely wrong with this method

$$\frac{2}{3} \cdot \frac{1}{4} \neq \frac{21}{34}$$

Your task is to search for more examples of one digit numbers where Jonas method works. Numerator and denominator must be different numbers.

The team that will found the most examples wins.
If two teams have the same number of examples, it is considered to be something better if you have examples of both

- where all four single-digit numbers are different and
- where the same number appears more than once