

Lower Secondary Mathematics Competition 3.11.2010



Time: 50 minutes. **No calculator allowed.**

Write all the answers on the separate paper.

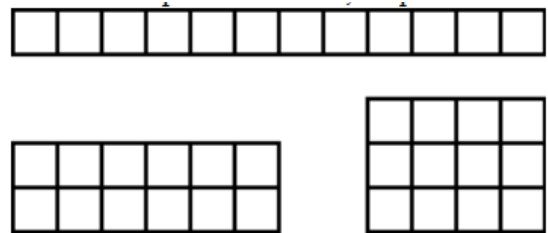
Explain your answer with calculations, drawings or in writing.

Return this paper with your answers.

1. How big is the angle between the arms of the clock when the time is
 - a) 8.00
 - b) 12.45

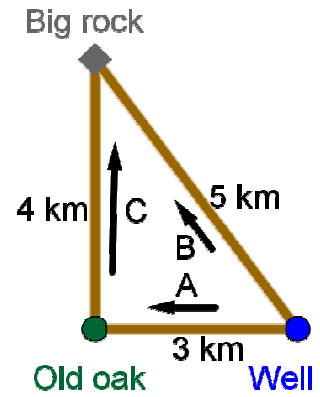
2. Research was done into the hobbies of school students. Out of fifty students
 - 33 played ice hockey
 - 24 played floorball
 - 8 played neither ice hockey nor floorball.How many students played both ice hockey and floorball?

3. Three rectangles can be made of twelve small squares. How many rectangles can be made of 196 small squares? Give the measurements of the rectangles.



4. How many common points can the edges of a quadrilateral and a triangle have? Draw a picture of each case.
5. Last spring the eruption of an Icelandic volcano caused chaos with European flight traffic. About a hundred million cubic metres of ash was thrown out into the air.
 - a) Imagine the ash as a 2 meter thick layer on a motorway. If the road was 50 meters wide, how many kilometres of ash would there be?
 - b) The land area of Europe is about 10 million square kilometres. How thick would the layer of ash be if it had spread evenly all across Europe? Give the answer in millimetres.
 - c) The world's largest container ships carry about 10 000 containers at a time. Three containers can take a combined volume of 100 cubic meters. How many of these ships would have been needed to carry the ash from Iceland?

6. Three backpackers walk along the same triangle-shaped trail. Anna and Bella walk with the same speed, but Clara's speed is twice as big as theirs. Anna and Bella start from the well at 10 o'clock in different directions. Clara starts from the old oak at 11 o'clock at the same moment as Anna passes the oak for the first time. When do Clara and Bella meet for the first time?

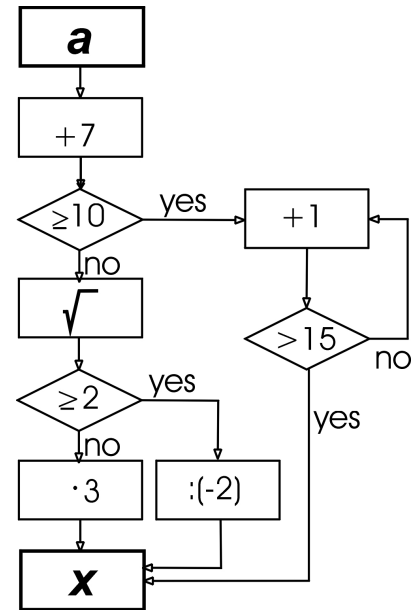


7. Start from point **a**. Follow the arrows. Do the operation marked in the box or continue along the direction shown by the condition.

a) What number is **x**, if $a = -6$?

b) What number is **x**, if $a = \frac{1}{9}$?

c) Which positive numbers **a** all give the same result **x**?



8. On the tax administration's web page on 13th of July 2010 there were the following instructions for calculating the value added tax from a product's price that includes tax.

"The value added tax included in a product's price can be found by using the following formula:

price including tax \times tax rate/100 + tax rate.

Example: Product's price including tax is 5 000 euro and the tax rate is the normal 22 % . One gets the tax by calculating

$5\,000 \times 22/122 = 901,64$ euro.

Product's tax free price is $5\,000 - 901,64 = 4098,36$ euro."

- a) Write a formula for the instruction written in bold as an equation using the following names for the variables:
 a = value added tax
 v = price including tax
 k = tax rate.
- b) How big is the tax if it is calculated precisely according to the instructions?
- c) Correct the formula you made before so that it gives the correct value for the tax given in the example.