Rotation

In the rotation task your teacher has given three things:

- **Figure to be rotated** (triangle, quadrilateral...)
- **Where is the center of rotation** (figurines inside, outside, in a crown, on page...)
- **Angle of rotation**

As the angle of rotation we have to watch whether the specified angle positive or negative.

If the angle is positive, we rotated in the opposite direction of movement clockwise +

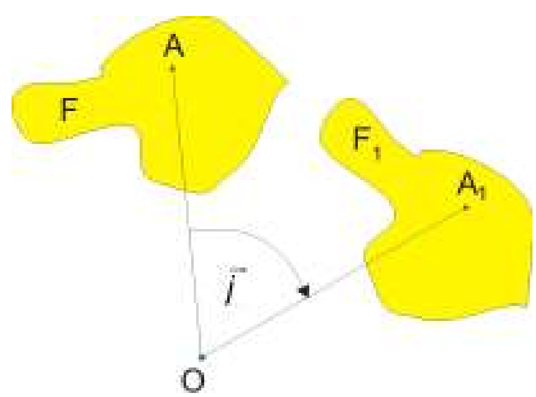
If the angle is negative, rotation in the direction we're moving clockwise −

So here is a corner called the oriented angle, and is a little different way of marking, oriented at angle to put the sign vector: $\vec{\alpha}$ - this is the oriented angle **alpha**, $\vec{\varphi}$ - this is the oriented angle **fi**, etc..

We, of course, we insist on marking this corner, And again, you do as required by your professor!

Rotation itself is usually celebrated with $R_{O,\vec{\varphi}}$, where is the point O center of rotation and $\vec{\varphi}$ the oriented angle.

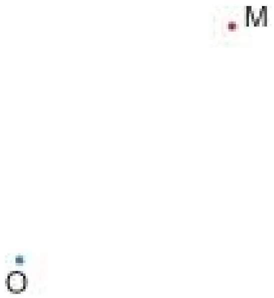
Definition of rotation of said:

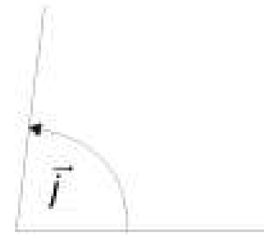


If this flat figure F, the point O the wing angle $\vec{\varphi}$ and if the figures $F`$ set of all points at which the rotation $R_{O,\vec{\varphi}}$ mapped point figure $F$, then we say that the figure F rotation $R_{O,\vec{\varphi}}$ maps in figure $F`$. This is denoted by:

$$\boxed{R_{O,\vec{\varphi}}(F) = F`}$$

Come to rotate a point around the M points O for arbitrary positive angle $\vec{\varphi}$, to learn the procedure:





We rotation around the point O, which is the center of rotation, A walk in the opposite direction of movement clockwise as the positive angle.

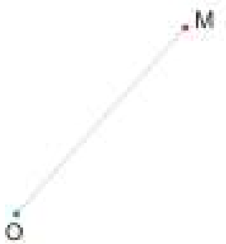
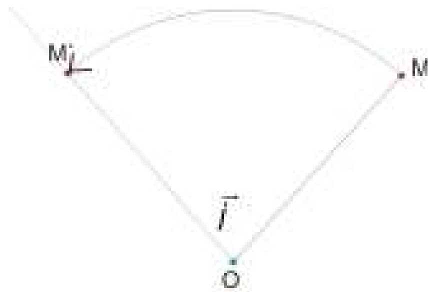


Figure 1

Pictures 2



Pictures 3

First merge center of rotation O point M (Figure 1)

Convey a given angle $\vec{\varphi}$ **but the careful direction of.** OM one arm of the angle, a point O the topic. (Pictures 2.)

Sting in the compass point O (Center of rotation) , we take the distance to M port and transfer it to another branch applied angle (Picture 3.) **In this way we get the point M `.**

It is not difficult, is not? But beware, this procedure must work for each topic given figures!

Example 1

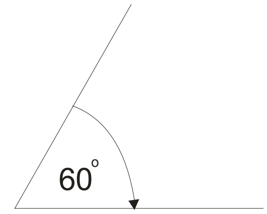
Given along AB rotate around the point O (no longer belongs**) the angle of** -60^0 **.**

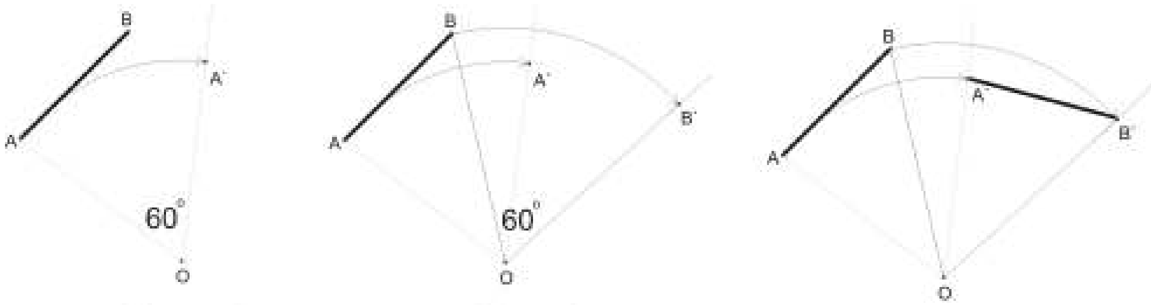
<u>Solution:</u>

We have planned and where we draw the picture in the notebook!

Angle is negative, rotation goes in the clockwise, and draw along the left side of the notebook...

Of course, the first "side" angle of draw 60 degrees.





Pictures 1 Pictures 2 Pictures 3

Described procedure first issues A longer rotate AB. (Picture 1.)

Then we rotate the vertices of B (Picture 2.)

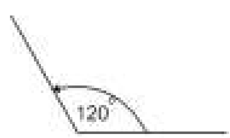
Merge points obtained A`B` and our solutions.

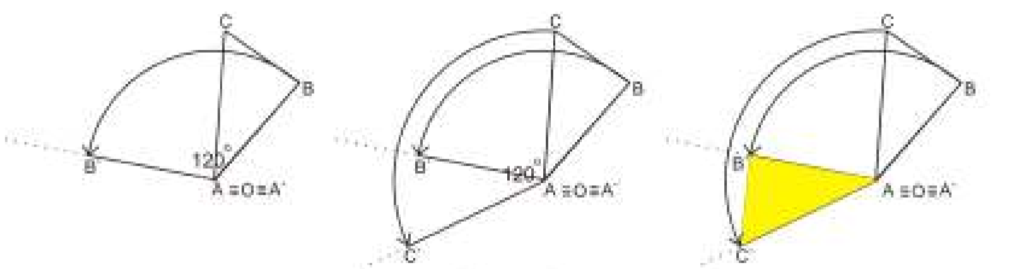
Example 2

Given triangle **ABC and angle** $\alpha = 120^0$**. Rotate the triangle ABC for the angle if the center of rotation coincides with one of the vertices of a triangle.**

<u>**Solution:**</u>

Let the center of rotation coincides with the vertices A. Then it will be $A \equiv O \equiv A`$. For points B and C must process...





Pictures 1 Pictures 2 Pictures 3

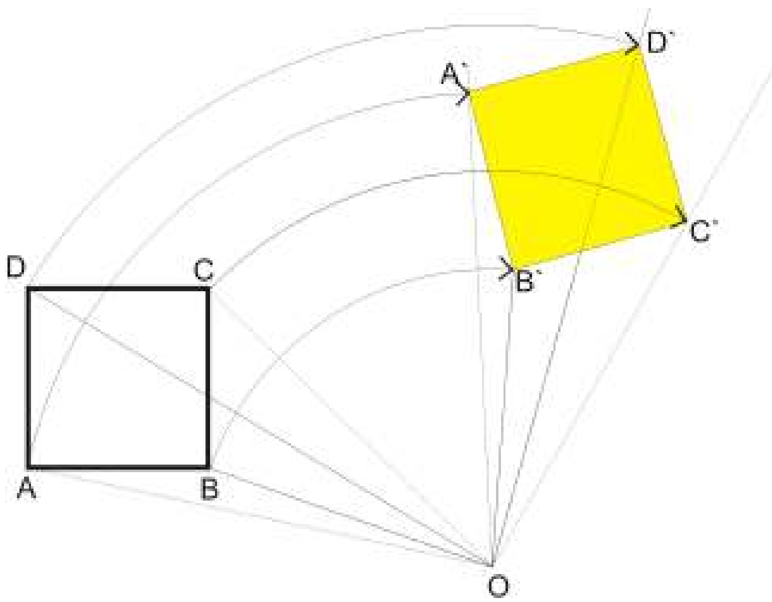
Pictures 1

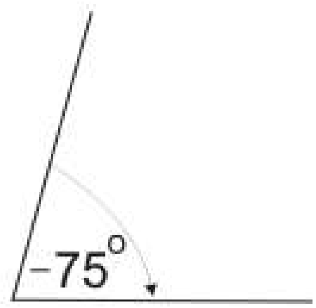
Example 3

Rotated square ABCD some points O which is outside the square, the angle -75^0.

<u>Solutions:</u>

Again plan how it will look like pictures, do clockwise...



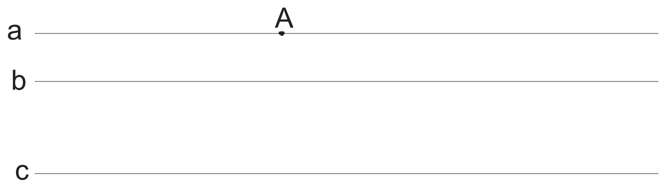


Example 4

Construct equilateral triangle whose vertices belonging to the three given the parallel rights.

Solution:

Draw three parallel straight: a,b i c. Take A point that belongs to the right a.



The idea is to rotate right around the point c to A 60^0. The rotated right c `will cut right bu the point B and get one page of a triangle.

Now, for the rotation law is sufficient to rotate its normal, but we will, it would be clearer, take two arbitrary points, example M and N on the line c, and they rotate around the point A.

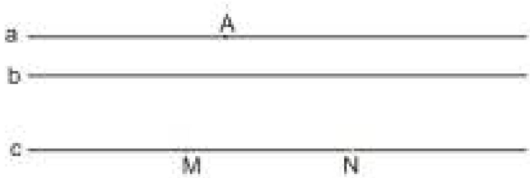
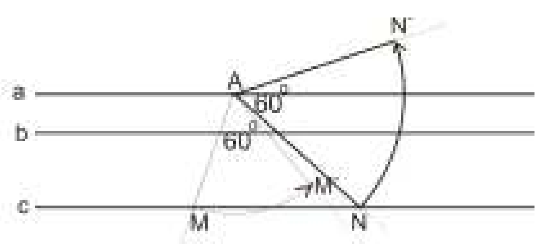


Figure 1



Pictures 2

In Figure 1 We take two arbitrary points, and the 2nd picture them to rotate about point A to 60^0. Merging M` and N` get real c`.

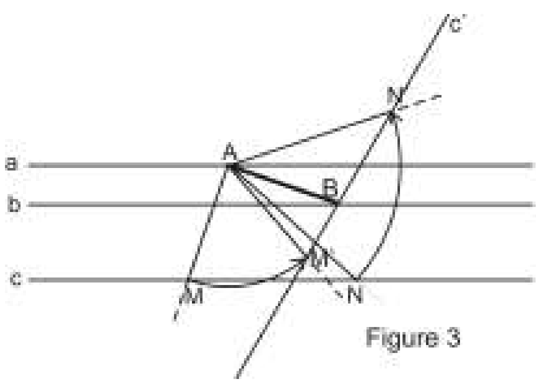
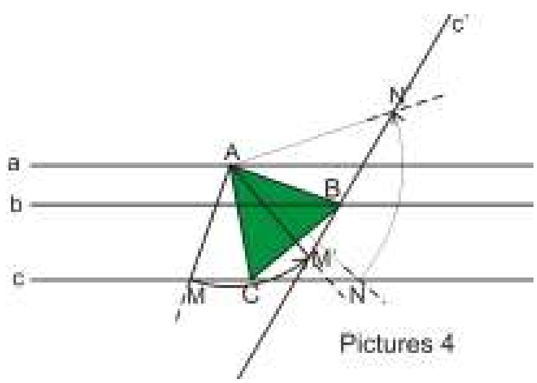


Figure 3



Pictures 4

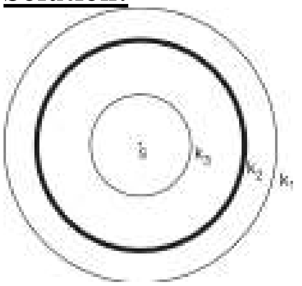
Rights c` cuts right to the point b in point B. We have one page of a triangle AB. (Figure 3.)

Now simply take it the distance and cut right c or A or B. Get themes C, and requested the triangle ABC.

Example 5

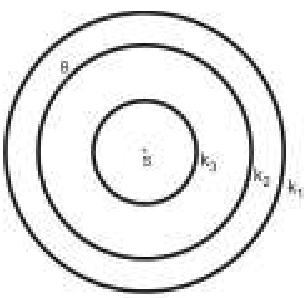
Date three circles k_1, k_2 and k_3 with a common center S (concentric circle). Construct equilateral triangle ABC vertices which belong to the order given circles.

<u>Solution:</u>

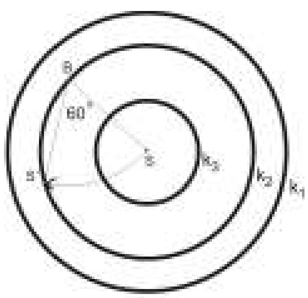


The idea is that the circle k_2 take an arbitrary point B and rotate it around the center S for -60^0.

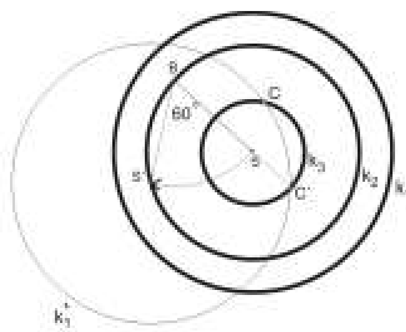
We will get the point S` which is the center of the circle $k_1$`, that is, we rotate the circle k_1 about point B -60^0.



Pictures 1

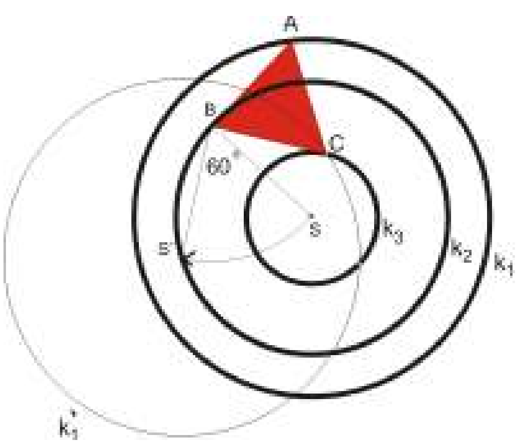


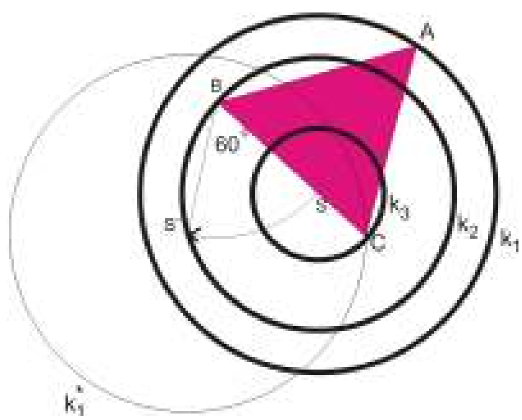
Pictures 2



Pictures 3

Circle k_1` cutting circle $k_3$ in two points ( C and C`) . This tells us that we have two solutions!





Merge BC and That page requested an equilateral triangle. Take the length of the page and cut a circle k_1, or from the scalp B or C. We got the first solution.

For other solutions like we do this....