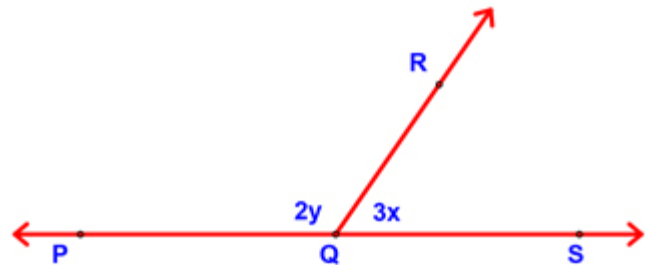
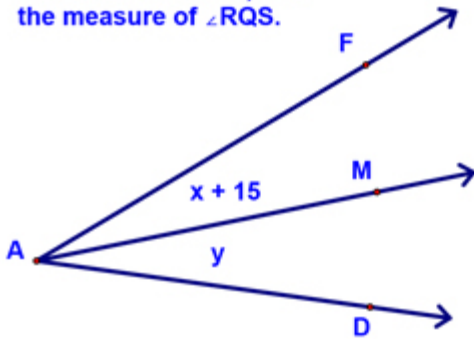




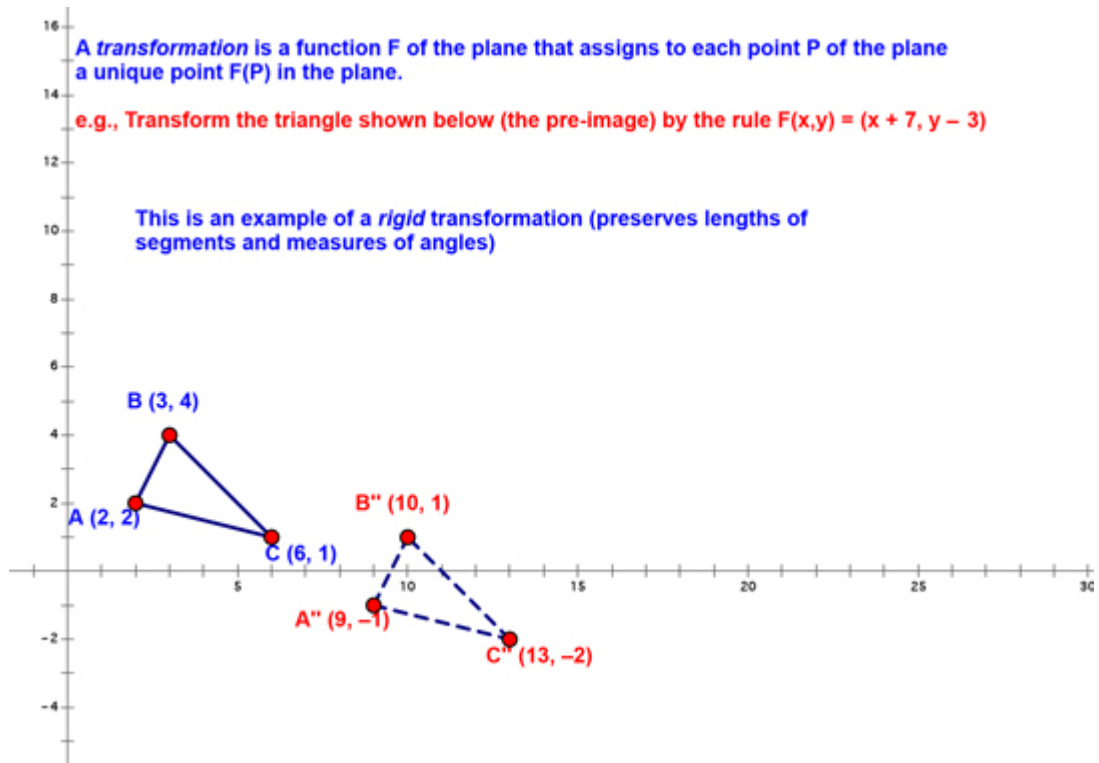
Transformations & Symmetry - Lesson 1-6

Today, have a lot of notes! Here's a warmup to start:

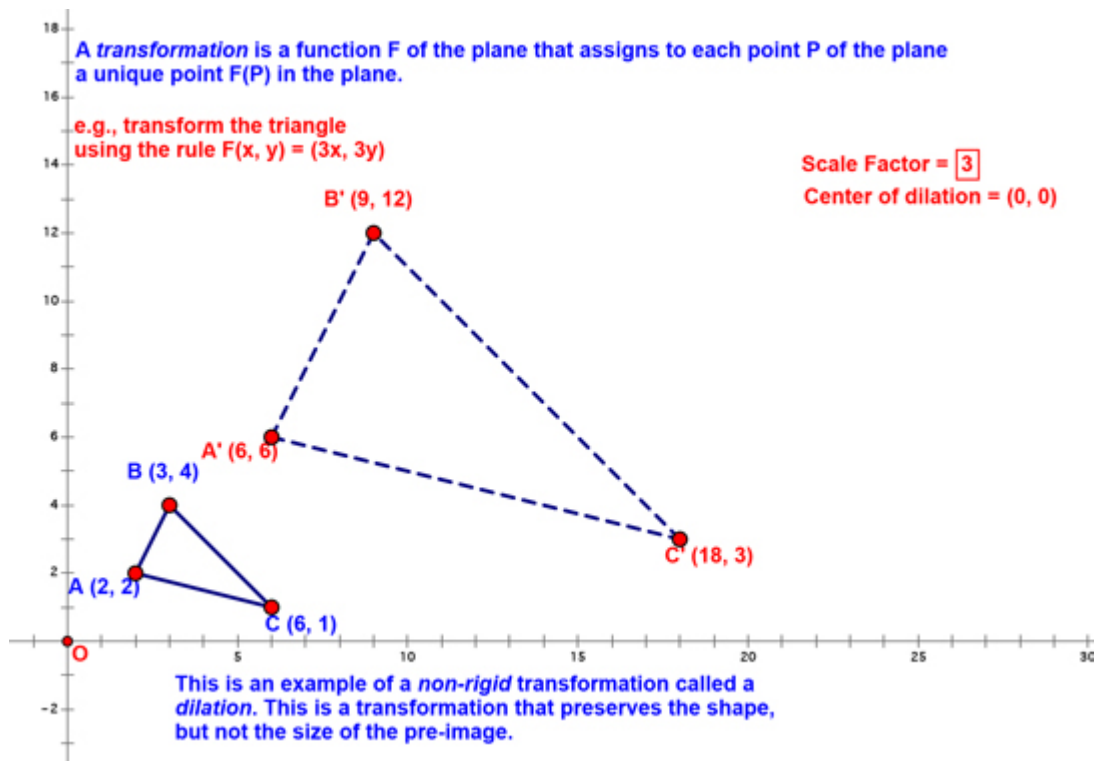
If \overrightarrow{AM} bisects $\angle FAD$, find the measure of $\angle RQS$.



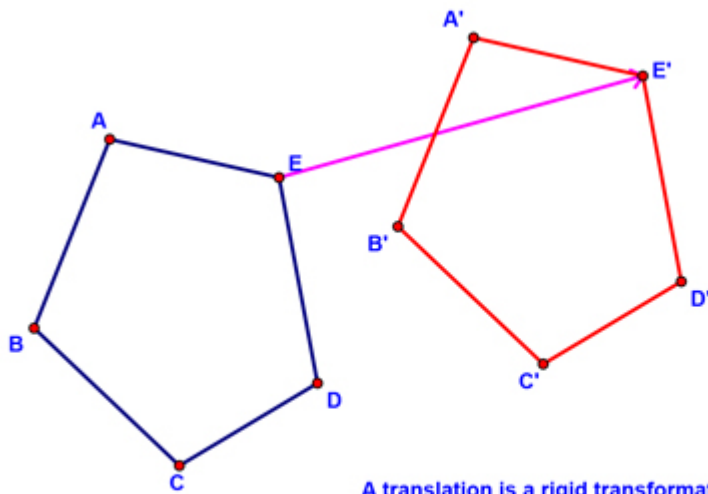
Let's start the lesson by defining a *rigid transformation* and showing an example:



Next, let's learn about a non-rigid transformation and showed an example...something called a *dilation*.



This year, we'll only be studying rigid transformations! Of these, there are three types you'll need to know: *translations*, *rotations*, and *reflections*. Here's the definition of a translation:



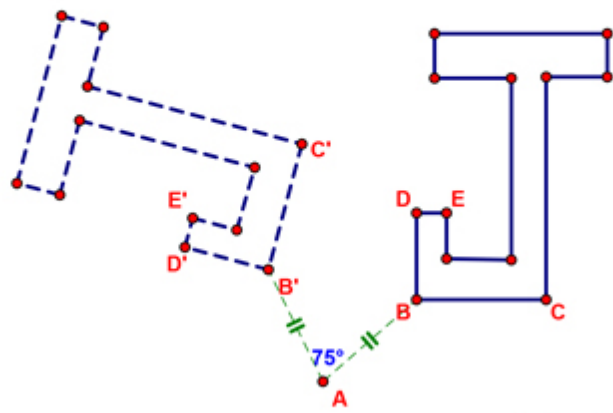
A translation is a rigid transformation that moves all points of the pre-image the same direction and distance to the image.

Now, we'll define rotations. For these, we noted a few things we need to know:

Rotations

For any rotation, you need to know

- the center of rotation,
- the direction (assume counter-clockwise unless told differently), and
- the number of degrees rotated.

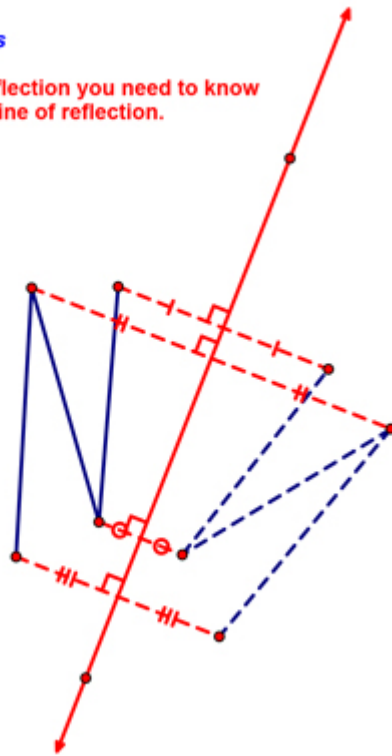


Center of rotation is A
Degrees = 75[°]

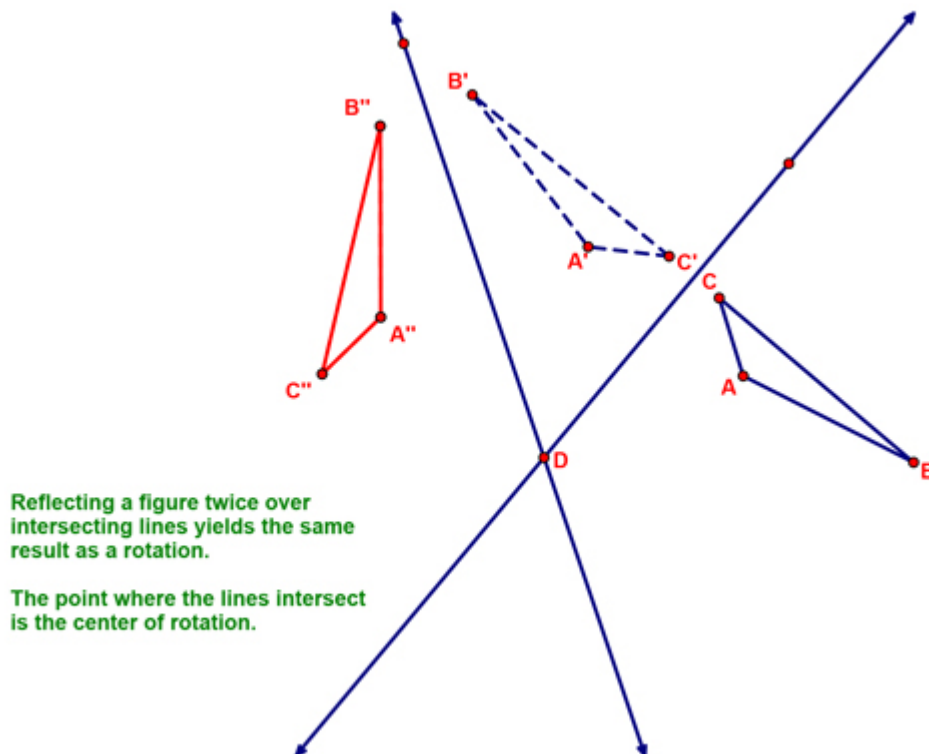
And now, reflections. For these, we need a pre-image and a line over which we can reflect!

Reflections

For any reflection you need to know
- the line of reflection.



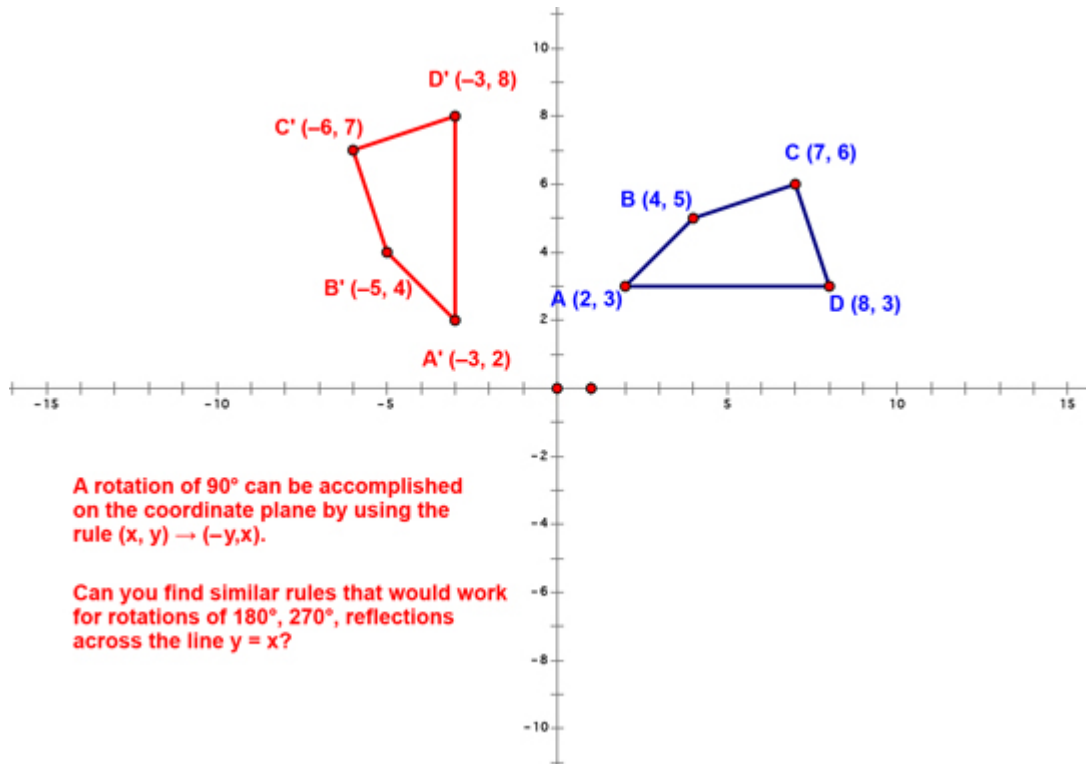
Next, I show you how two reflections, over intersecting lines, give the same result as a rotation!
Can you determine the degree the pre-image was rotated to form the image here? (It's 117°)



Reflecting a figure twice over
intersecting lines yields the same
result as a rotation.

The point where the lines intersect
is the center of rotation.

There are some special rules that you can use when performing specific transformations on the coordinate plane:



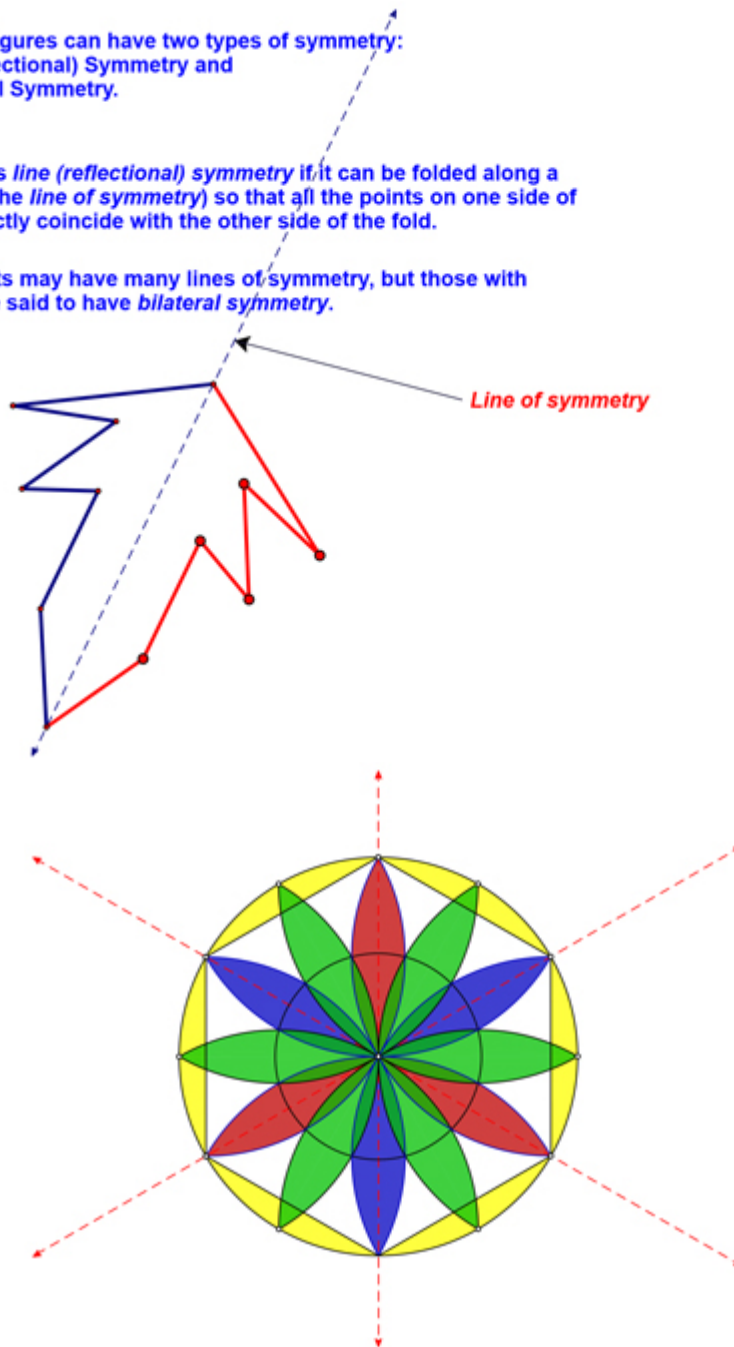
The other rules, in case you were wondering, are $(x, y) \rightarrow (-x, -y)$ for 180° rotation, $(x, y) \rightarrow (y, -x)$ for 270° rotation and $(x, y) \rightarrow (y, x)$ for a reflection across the line $y=x$.

Now let's talk about different types of symmetry...starting with *line symmetry*:

Geometric figures can have two types of symmetry:
- Line (reflectional) Symmetry and
- Rotational Symmetry.

A design has *line (reflectional) symmetry* if it can be folded along a line (called the *line of symmetry*) so that all the points on one side of the fold exactly coincide with the other side of the fold.

Some objects may have many lines of symmetry, but those with only one are said to have *bilateral symmetry*.



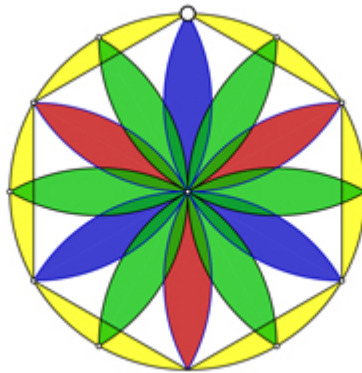
And FINALLY we'll wrap up by discussing rotational symmetry:

Geometric figures can have two types of symmetry:

- Line (reflectional) Symmetry and
- Rotational Symmetry.

An object has *rotational symmetry* if it can be traced and rotated less than a complete cycle about a point so that the tracing can be made to fit exactly onto the original. The number of times the tracing matches the original design in a complete cycle determines what degree of rotational symmetry the design has.

A design has *point symmetry* if it can be made to coincide with itself after a half turn (180° rotational symmetry).



What degree rotational symmetry does the first diagram have? The second?

Whew! That is a lot for one day!