

Rotations Rotations  
Rotations Rotations

# Transformations

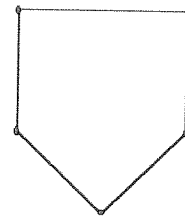
## Translations

Reflections

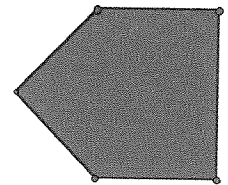
**Rotation:** to rotate an object is to turn it around a given point (center) without changing its distance from that point.

For example:

Given the given center and the yellow pentagon, we can rotate the pentagon 90 degrees around the center and produce the red pentagon.



90 degrees  
center



Your turn:

Given the curve below, rotate it 180 degrees around the center below.



Let's explore rotation further. Open the Geometer's Sketchpad on your computer and follow the directions below.

- Construct a scalene triangle:
  - select the point icon on the left of the screen and create 3 points
  - select all three points using the arrow tool (be sure they are highlighted) and go the **Construct** menu select **Segments**.
- Create a separate point (this will be your center of rotation):
  - select the point icon
  - create a point ANYWHERE on the sketch
- Mark your center of rotation:
  - select the point you just created
  - go to the **transform** menu and select **mark center**
- Rotate your triangle:
  - select all parts of the triangle
  - go to the **transform** menu and select **rotate**
  - enter a positive degree amount to rotate the object clockwise or a negative degree

amount to rotate the object counterclockwise. (try 90 first)

5. Label all points (if not already labeled):

(a) select the letter icon (A) on the left

(b) click on all points to create their label (notice that image points are labeled with ')

After manipulating the triangle for a few minutes, answer the questions below.

**Rotation Questions...be as descriptive as possible.**

(Be sure your triangle has been rotated 90 degrees to answer the questions)

1. Select all parts of the original triangle. Move the triangle around the center.

(a) What happens to the image when the triangle is moved closer to the center of rotation?

*I think...*

*Actually...*

(b) What happens as you move the triangle around the center in a circle?

*I think...*

*Actually...*

2. Now select just a vertex of the original triangle.

(a) What happens to the image when the point is moved closer to the center of rotation?

*I think...*

*Actually...*

(b) What happens as you move the point around the center in a circle?

*I think...*

*Actually...*

3. Try to make a point and its image the same point. In how many places does this happen? \_\_\_\_\_ Where does this happen?

*I think...*

*Actually...*

4. Select all parts of the image and delete them. Now rotate the triangle 180 degrees.

(a) Change the angle of rotation to 180 degrees. What happens when a point from the original triangle is dragged onto the image of a different point?

*I think...*

*Actually...*

(b) What other angles might this work for? Try some if necessary.

*I think...*

*Actually...*

5. What angle could we rotate the triangle so that the image and the original appear to be the same triangle? Is this the only angle that produces this effect?

*I think...*

*Actually...*