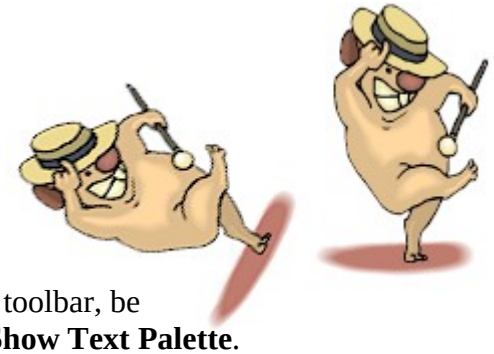
Rotations (Using Geometer's Sketchpad 4.0)



Discover what happens when you rotate a triangle.

Open software and set up: Open Geometer's Sketchpad 4.0.

Expand the screen to full screen view. On the left vertical toolbar, be sure that the arrow is clicked. Under **DISPLAY**, choose **Show Text Palette**.

Set the graph grid: Under **GRAPH**, choose **Grid Form**, **Square Grid**.

Plot the points for the triangle: Under **GRAPH**, choose **Plot Points** and plot (2,1), (6,2), (3,4). In the drop down box for Plot Points, use your mouse (or TAB key) to enter the coordinates. Hit PLOT.

Complete the triangle: To draw the triangle, highlight (by clicking on) the three points. Choose **CONSTRUCT, Segments**. If you would like to label your triangle vertices, choose the A from the left vertical toolbar, and click on each point.

Highlight the three vertices only of the triangle. Choose **CONSTRUCT**, **Interior**. Adjust your color by right clicking in the triangle interior and choosing a new color.

Measure the coordinates: Highlight one point. Be sure only the point is highlighted. Under **MEASURE**, choose **Coordinates**. This will place the coordinates on the screen. Repeat this process for each of the points.

Mark the point of rotation: Highlight the origin. Under **TRANSFORM**, choose **Mark center**. We are getting ready to rotate the triangle about the origin.

Rotate the figure: You will need to select the triangle by drawing a marquee around the figure. With your arrow clicked, use your mouse to click a starting corner to draw a box (marquee) around the triangle. The triangle will become highlighted. Under **TRANSFORM**, choose **Rotate** and enter 90º.

Now investigate:

1. Measure the coordinates of the image triangle. What do you notice?_____

   _____

   Generalize your hypothesis into a rule that will illustrate the changes in the coordinates:

   Rotation: $R_{O,90^\circ}\ (x, y) \rightarrow (\quad , \quad)$

2. Was the rotation clockwise or counterclockwise?_____

3. Highlight one side of the original triangle. Choose MEASURE, Length. Record this length. _____
   Highlight the corresponding side in the image triangle. MEASURE, Length. Record this length. _____
   Do the sides of a triangle maintain their lengths through a rotation?_____

4. Choose an angle in the original triangle by highlighting three vertices in order. Choose MEASURE, Angle. Record this measurement. _____
   Highlight the corresponding angle in the image triangle. MEASURE, Angle. Record this measurement. _____
   Do the angles of a triangle maintain their measurements through a rotation?_____

5. Delete everything except the original triangle. Rotate the original triangle 180º.
   Measure the coordinates of the image triangle. What do you notice?_____
   _____
   Generalize your hypothesis into a rule that will illustrate the changes in the coordinates:

Rotation: $R_{O,180^\circ}\ (x, y) \rightarrow (\quad , \quad)$

6. Delete everything except the original triangle. Rotate the original triangle 180º.
   Measure the coordinates of the image triangle. What do you notice?_____
   _____
   Generalize your hypothesis into a rule that will illustrate the changes in the coordinates:

Rotation: $R_{O,270^\circ}\ (x, y) \rightarrow (\quad , \quad)$