

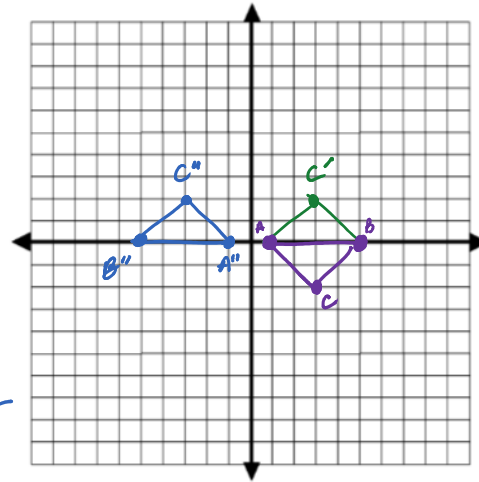
Rotations

Wednesday, November 30, 2016 1:47 PM

Geometry H Rotations

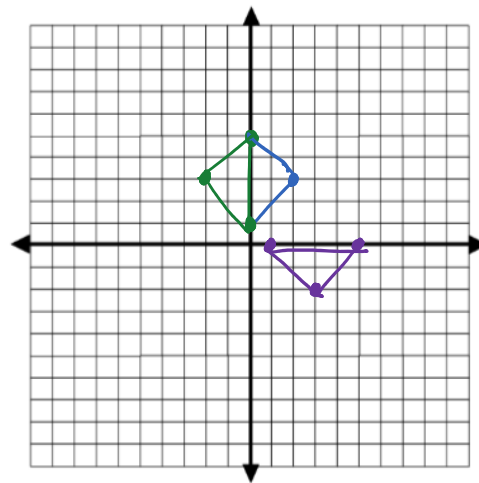
- A. Plot the points A(1, 0), B(5, 0), and C(3, -2)**
 1st: Reflect ABC over x-axis to A'B'C'.
 2nd: Reflect A'B'C' over y-axis to A''B''C''.
 Compare ABC to A''B''C''.

Rotation comes from reflecting over 2 intersecting lines.



$(1,0) \rightarrow (-1,0)$
 $(5,0) \rightarrow (-5,0)$
 $(3,-2) \rightarrow (-3,2)$

- B. Plot the points A(1, 0), B(5, 0), and C(3, -2)**
 1st: Reflect ABC over $y = x$ to A'B'C'.
 2nd: Reflect A'B'C' over the y-axis to A''B''C''.
 Compare ABC to A''B''C''.



$(1,0) \rightarrow (0,1)$
 $(5,0) \rightarrow (0,5)$
 $(3,-2) \rightarrow (2,3)$

Use a 90° rotation to derive 180° + 270° formulas!

Generalize:

$180^\circ : (x,y) \rightarrow (-x,-y)$ $90^\circ : (x,y) \rightarrow (-y,x)$

Is it a rotation?

$(x,y) \xrightarrow{90^\circ} (-y,x) \xrightarrow{90^\circ} (-x,-y) \xrightarrow{90^\circ} (y,-x) \xrightarrow{90^\circ} (x,y)$



NO



NO



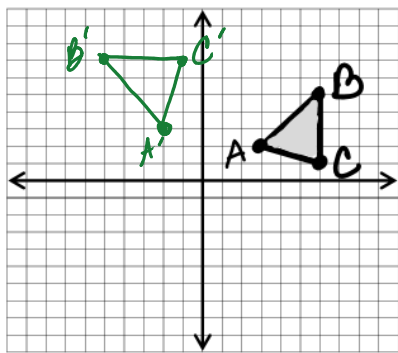
yes



yes

$$(x, y) \rightarrow (-y, x)$$

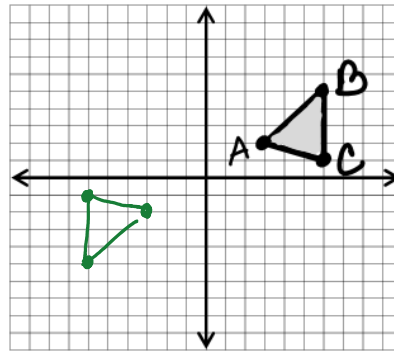
1. Rotate $\triangle ABC$, 90° about the origin



$$\begin{aligned} (3, 2) &\rightarrow (-2, 3) \\ (6, 5) &\rightarrow (-5, 6) \\ (6, 1) &\rightarrow (-1, 6) \end{aligned}$$

$$A'(-2, 3) \quad B'(-5, 6) \quad C'(-1, 6)$$

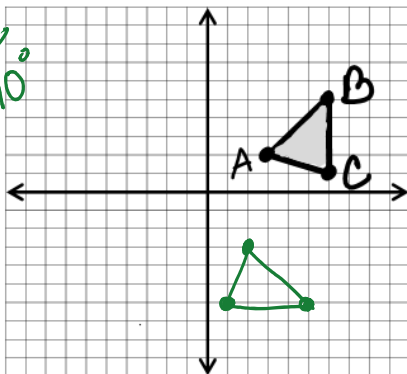
2. Rotate $\triangle ABC$ 180° about the origin



$$A'(-3, -2) \quad B'(-6, -5) \quad C'(-6, -1)$$

3. Rotate $\triangle ABC$, -90° about the origin

Same as 270°

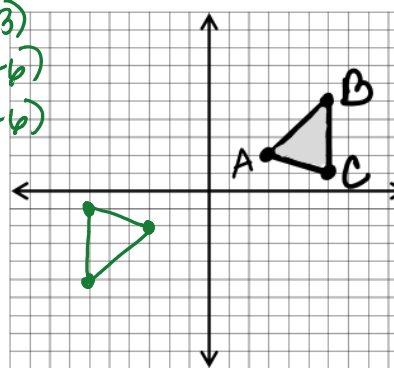


$$\begin{aligned} (3, 2) &\rightarrow (2, 3) \\ (6, 5) &\rightarrow (5, 6) \\ (6, 1) &\rightarrow (1, 6) \end{aligned}$$

$$A'(2, 3) \quad B'(5, 6) \quad C'(1, 6)$$

4. Rotate $\triangle ABC$, -180° about the origin

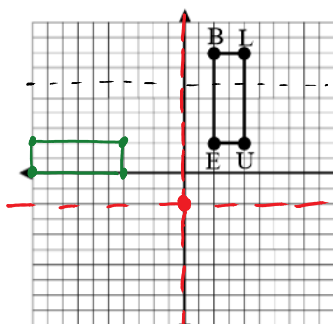
Same as 180°



$$A'(-3, -2) \quad B'(-6, -5) \quad C'(-6, -1)$$

Let's get crazy!

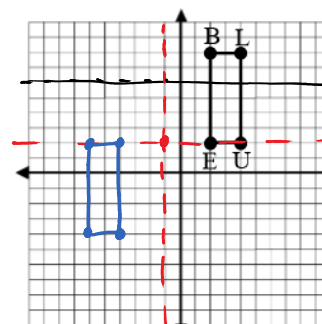
5. Rotate 90° about $(0, -2) = R_{(90^\circ, (0, -2))}$



$$\begin{aligned} B: (2, 10) &\rightarrow (-10, 2) \\ L: (4, 10) &\rightarrow (-10, 4) \\ U: (4, 4) &\rightarrow (-4, 4) \\ E: (2, 4) &\rightarrow (-4, 2) \end{aligned}$$

$$(x, y) \rightarrow (-y, x)$$

6. Rotate 180° about $(-1, 2) = R_{(180^\circ, (-1, 2))}$



$$\begin{aligned} B: (3, 6) &\rightarrow (-5, 6) \\ L: (5, 6) &\rightarrow (-3, 6) \\ U: (5, 0) &\rightarrow (-3, 0) \\ E: (3, 0) &\rightarrow (-5, 0) \end{aligned}$$

$$(x, y) \rightarrow (-x, -y)$$