Geometry: Unit 1:Transformations

Rotations

Warmup

- In words, describe how these transformations (given in their notations) would move each point.

1. $T: (x, y) \rightarrow (x - 3, y + 5)$ Every Point…

2. R_x Every Point…

3. R_y Every Point…

Rotations

- **Objective**: Students will be able to do the following, regarding geometric transformations.
  - Write Transformations Symbolically and justify their choice.
  - Explain the movement of points for a given transformation.
  - Draw an image under each transformation.

http://www.pbslearningmedia.org/resource/muen-math-g-rotation/rotation/

Isometry: A Reminder

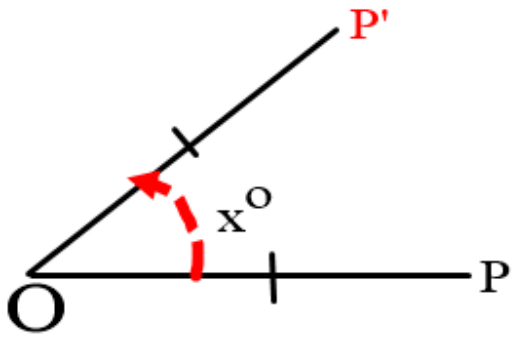
- An Isometric Transformation has the following properties preserved:
  - Distance (All lengths stay the same)
  - Angle measure (All angles stay the same)
  - Parallelism (All lines that are parallel stay parallel)
  - Collinearity (All points on a line remain on a line)

- In short, the transformed figure (**Image**) is the same shape and size as the original figure (**Pre-Image**).

Rotations

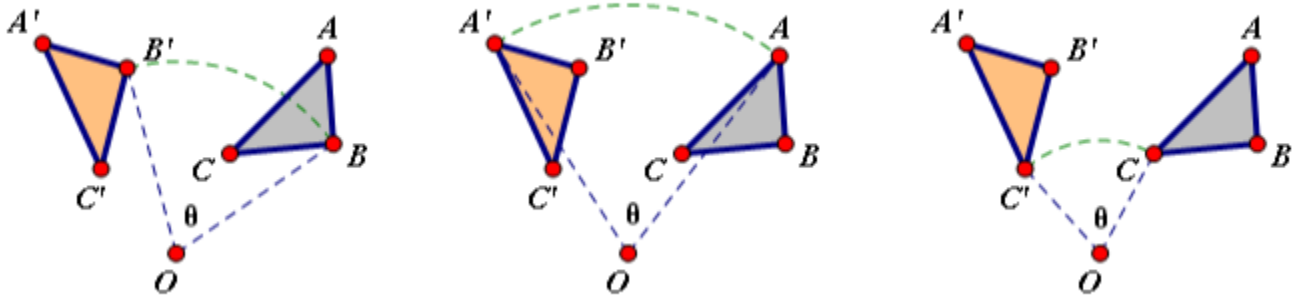
- A **rotation** is an isometric transformation that turns a point around a circle along a fixed point called the center of rotation. Rays drawn from the center of rotation to a point and its image form an angle called the angle of rotation.
- For a counterclockwise rotation about a point O through x°, we write $R_{(O,x)}$. A counterclockwise rotation is considered positive, and a clockwise rotation is considered negative.

$R_{(O,\, x^o)}$



Rotations

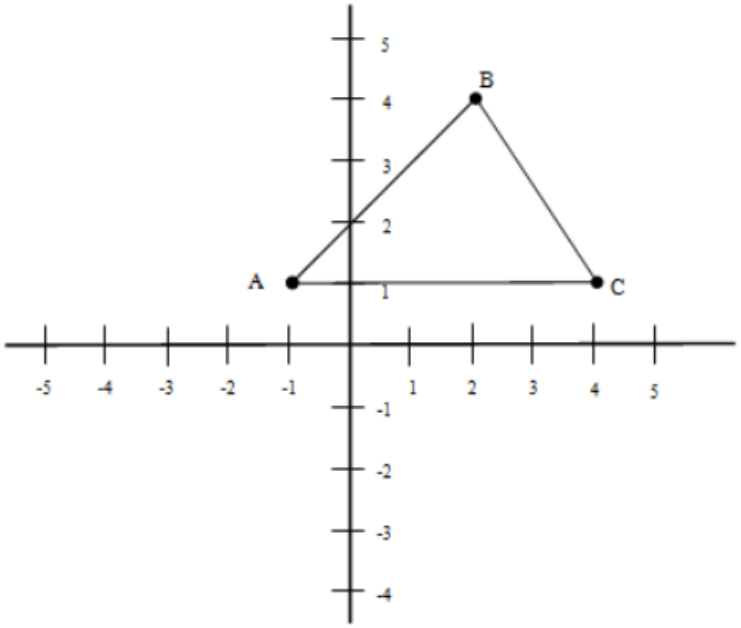
- An object and its rotation are the same shape and size, but the figures may be turned in different directions.



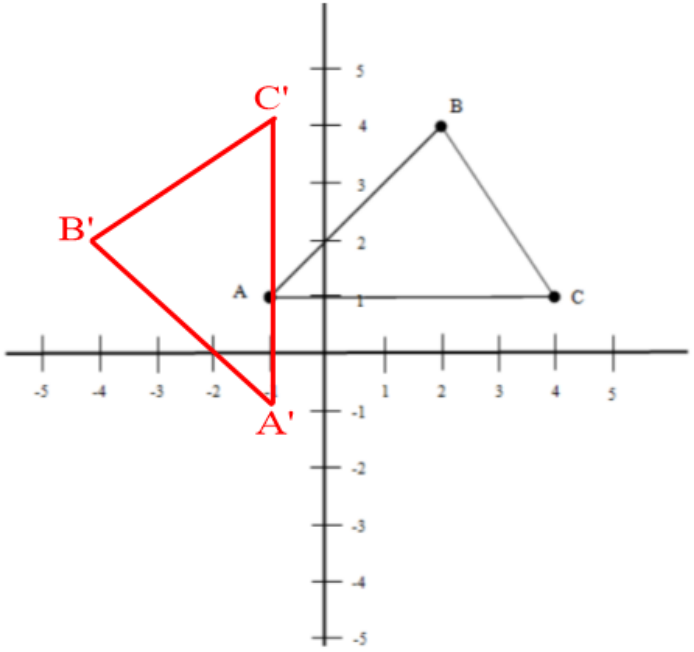
Rotations Example

- Given ΔABC with *A(-1,1), B(2,4), C(4,1)*, rotate $\Delta \boldsymbol{ABC}$ **90°** about the **origin**.

Pre-Image



Image



Rules for Rotation

- There are four main rotations: $90°$, $180°$, $270°$, and $360°$. Rotations of degrees beyond $360°$ are simply repeats of the ones before it. Here are some rules for you to remember how points are changed when they are reflected by those four specific measures.

$R_{O,90°}: (x, y) \rightarrow (-y, x)$ *This is also $R_{O,-270°}$

$R_{O,180°}: (x, y) = H_O: (x, y) \rightarrow (-x, -y)$

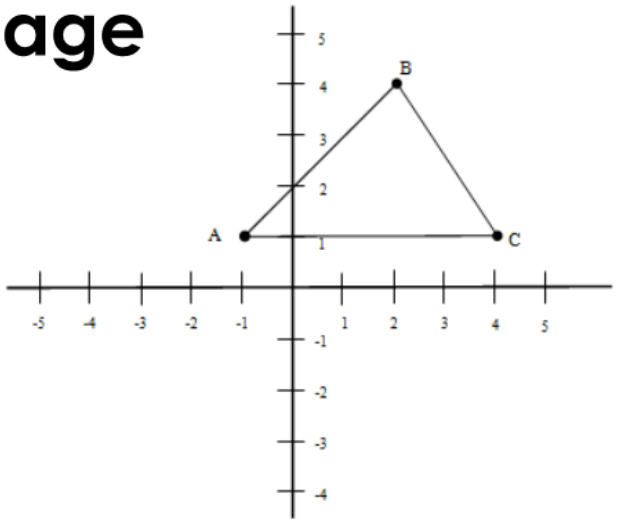
$R_{O,270°}: (x, y) \rightarrow (y, -x)$ *This is also $R_{O,-90°}$

$R_{O,360°}: (x, y) \rightarrow (x, y)$

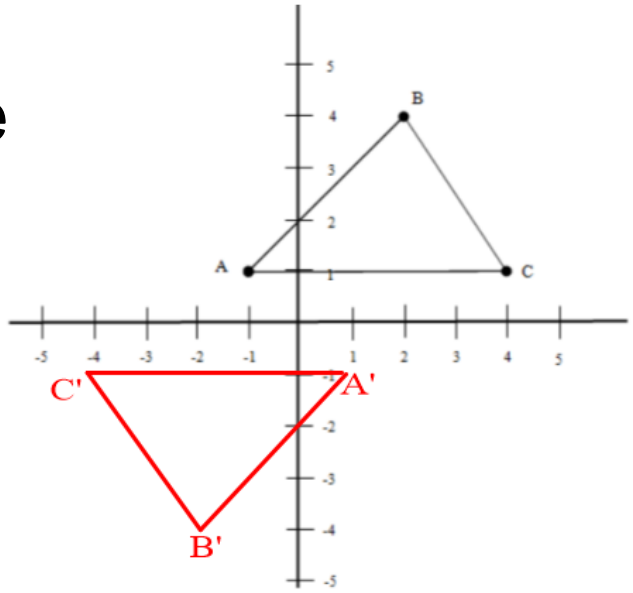
Half-Turn

- A rotation about point *O* through $\mathbf{180°}$ is called a **half-turn** about *O* and is usually denoted by $\boldsymbol{H_O}$.
- This is a general notation depicting the effect a half-turn has on any given point: $H_0: (x, y) \rightarrow (-x, -y)$.
- This is an application of a half-turn on ΔABC from the previous example.

Pre-Image



Image



Exit Ticket

- In words, describe how these transformations (given in their notations) would move each point.

1. $R_{O,-90°}$ Every point…

2. $R_{O,90°}$ Every point…

3. H_O Every point…

Classroom Activity

- Go to page 589 of your textbook.
- Work through problems 1-8, 12-15 of the "Classroom Exercises" section with your group. For 15, don't read aloud, write down what each expression is saying.
- When you are done, explain in your own words what a rotation does to a point. Be brief, but not lazy (i.e. Don't say "It Rotates it").