


Rotations - Ch. 6-3

You're about to get turned around!


Objective:

To be able to graph rotations on the coordinate plane.

Warm - Up Use the 4 Step Plan :)

- 1. Four friends all shake hands with one another. How many handshakes take place?**
- 2. Liz's house is 4 blocks east and 2 blocks south from best friend's house. Her school is 2 blocks west and 5 blocks north of her house. What is one way she can travel from her friend's house to school?**
- 3. Max, Bud, David, and Anna are a team playing tug-of-war. In how many different ways can they be arranged?**
- 4.  TEST PRACTICE** An elevator went up three floors to pick up passengers. Then it went down eight floors to drop them off in the lobby. On what floor did the elevator start?
 - A. first floor**
 - B. second floor**
 - C. fifth floor**
 - D. eleventh floor**

Warm - Up - Answered

1. Four friends all shake hands with one another. How many handshakes take place?
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ANSWERS

1. ~~24~~ Not 24 -- it is 6 Watch the video:
<http://www.youtube.com/watch?v=dlejOnMP20c>

2. 6 blocks west and then 7 blocks north

3. ~~120~~ Not 120, it's 4! or 24 :)

4. C

What Is a Rotation?

Rotate a Figure About a Point

A **rotation** is a transformation in which a figure is rotated, or turned, about a fixed point. The **center of rotation** is the fixed point. A rotation does not change the size or shape of the figure. So, the preimage and the image are congruent.



Essential Information -Vocab

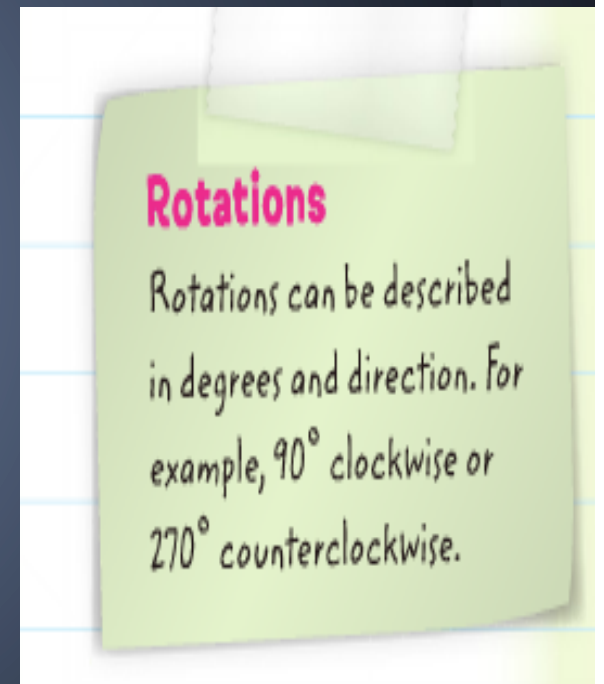
Essential Question:

At the end of this lesson, you will go back to your essential question and reflect on how rotations can be used to describe a change.

Vocabulary:

Rotation: A transformation in which a figure is turned about a fixed point.

Center of Rotation: A fixed point around which shapes move in a circular motion to a new position.



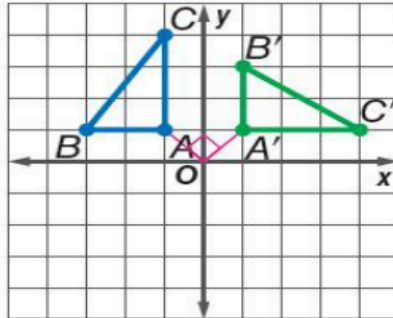
What Is a Rotation? Crucial Information - Key Concept!

Key Concept Rotations About the Origin

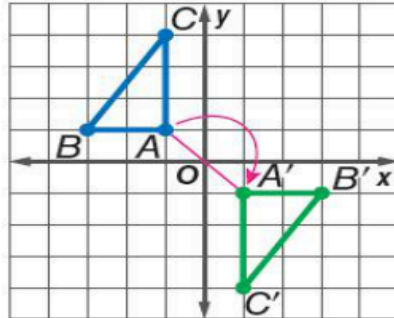
Words A rotation is a transformation around a fixed point. Each point of the original figure and its image are the same distance from the center of rotation.

Models The rotations shown are clockwise rotations about the origin.

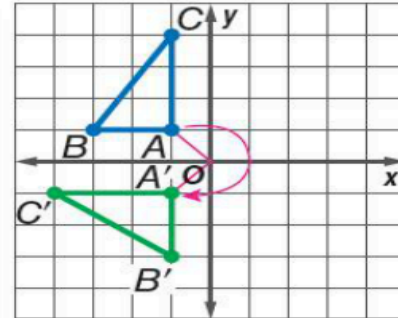
90° Rotation



180° Rotation



270° Rotation



Symbols

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

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

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

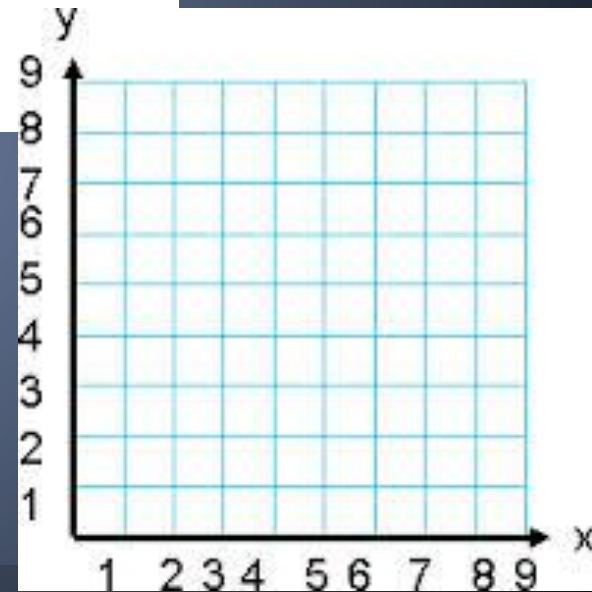
Video About Rotations!

Here is a video showing how to rotate around a point (4mins):

<https://www.youtube.com/watch?v=Lu1Zr1GUwO8>

An Example

Triangle LMN with vertices $L(5, 4)$, $M(5, 7)$, and $N(8, 7)$ represents a desk in Jackson's bedroom. He wants to rotate the desk counterclockwise 180° about vertex L . Graph the figure and its image. Then give the coordinates of the vertices for $\triangle L'M'N'$.



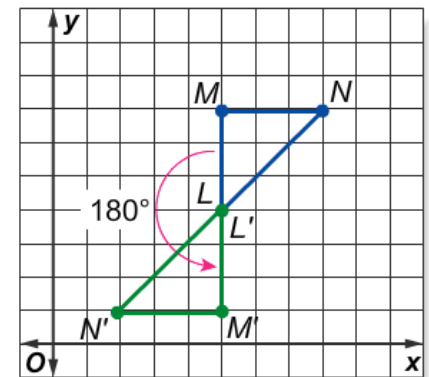
Now an Example Worked

Make sure the angle you create measures 180 degrees. Look at N and N' -- You will see that angle is also 180 degrees

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Graph the original triangle.

Graph the rotated image. Use a protractor to measure an angle of 180° with M as one point on the ray and L as the vertex. Mark off a point the same length as \overline{ML} . Label this point M' as shown.



Repeat Step 2 for point N . Since L is the point at which $\triangle LMN$ is rotated, L' will be in the same position as L .

So, the coordinates of the vertices of $\triangle L'M'N'$ are $L'(5, 4)$, $M'(5, 1)$, and $N'(2, 1)$.

Example Two -- two ways to solve :)

Triangle DEF has vertices $D(-4, 4)$, $E(-1, 2)$, and $F(-3, 1)$. Graph the figure and its image after a clockwise rotation of 90° about the origin. Then give the coordinates of the vertices for $\triangle D'E'F'$.

Try to use the 90 degree short cut -- when you rotate around the origin, you can use the formulas from the key concept :) Try it. Then sketch it out with a protractor to see if it checks!



Example Two Worked

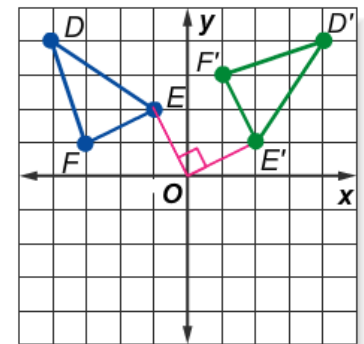
Did you get it
right?

Remember, when
you rotate around
the origin, you can
use the formulas!

Triangle DEF has vertices $D(-4, 4)$, $E(-1, 2)$, and $F(-3, 1)$. Graph the figure and its image after a clockwise rotation of 90° about the origin. Then give the coordinates of the vertices for $\triangle D'E'F'$.

Graph $\triangle DEF$ on a coordinate plane.

Sketch segment \overline{EO} connecting point E to the origin. Sketch another segment, $\overline{E'O}$, so that the angle between point E , O , and E' measures 90° and the segment is the same length as \overline{EO} .



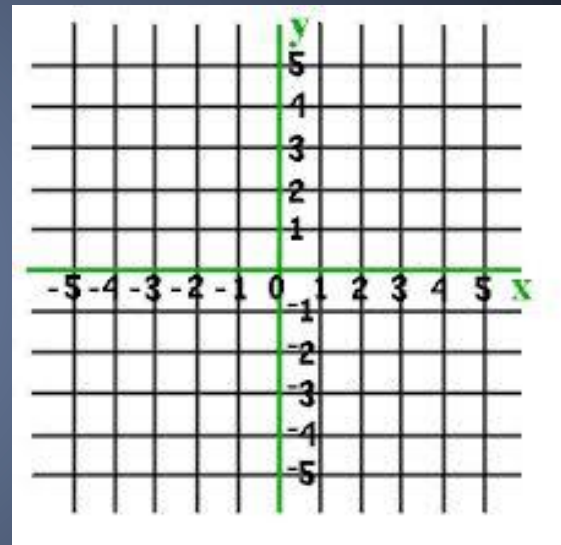
Repeat Step 2 for points D and F . Then connect the vertices to form $\triangle D'E'F'$.

So, the coordinates of the vertices of $\triangle D'E'F'$ are $D'(4, 4)$, $E'(2, 1)$, and $F'(1, 3)$.

Final Example - Around the origin!

Triangle ABC has vertices $A(-4, 1)$, $B(-1, 4)$, and $C(-2, 1)$. Graph the figure and its image after a counterclockwise rotation of 180° about the origin.

Then give the coordinates of the vertices for $\triangle A'B'C'$.



Remember, 180 degrees clockwise is the same as 180 degrees counter clockwise, so don't worry about which way to go :) Also, try the formula first, then check :)

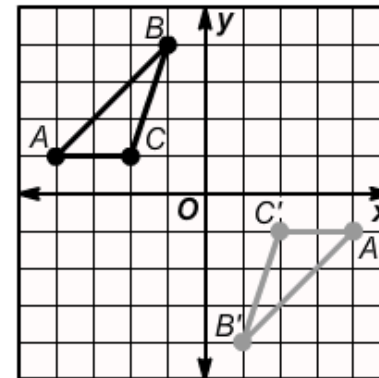
Final Example Worked

Did you use the formula for 180 degree rotation? Just change the sign for both the x and y coordinate :)

Triangle ABC has vertices $A(-4, 1)$, $B(-1, 4)$, and $C(-2, 1)$. Graph the figure and its image after a counterclockwise rotation of 180° about the origin. Then give the coordinates of the vertices for $\triangle A'B'C'$.

Answer

$A'(4, -1)$,
 $B'(1, -4)$,
 $C'(2, -1)$



Homework Time!!!!

Update your response for the essential question based upon what we learned about rotations:

“How can we best show or describe the change in position of a figure.”

Now, check out the homework: Pg. 479 – 482

Problems - 1-5 all and 7-19 odds

Are there any questions before you begin?