8.2.6 Lesson Date: _____

Rotations of 180 Degrees

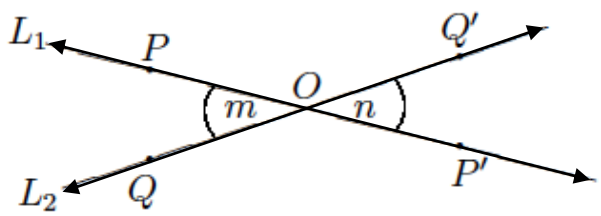
Student Objectives

- I know that a rotation of 180 degrees about the origin moves a point on the coordinate plane (a, b), to $(-a, -b)$.
- I know that a rotation of 180 degrees around a point, not on the line, produces a line parallel to the given line.

Classwork

Example 1

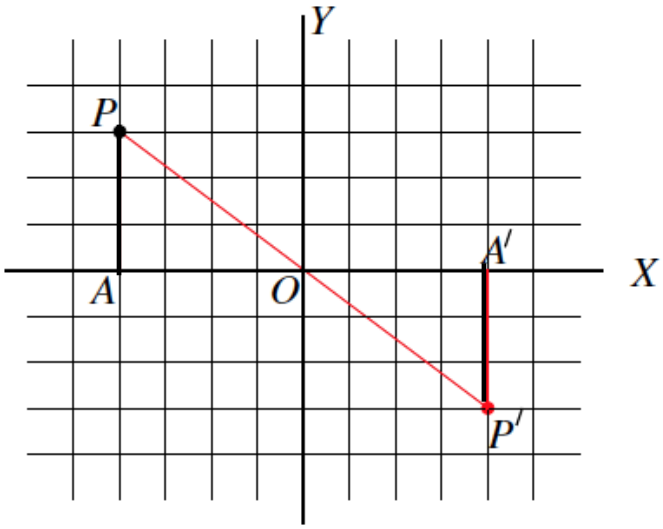
The picture below shows what happens when there is a rotation of 180° around center O.



Angles *m* and *n* are called _____ angles. Their measures are _____, because rotations are _____.

Example 2

The picture below shows what happens when there is a rotation of 180° around center O, the origin of the coordinate plane.



Find the coordinates of

P A

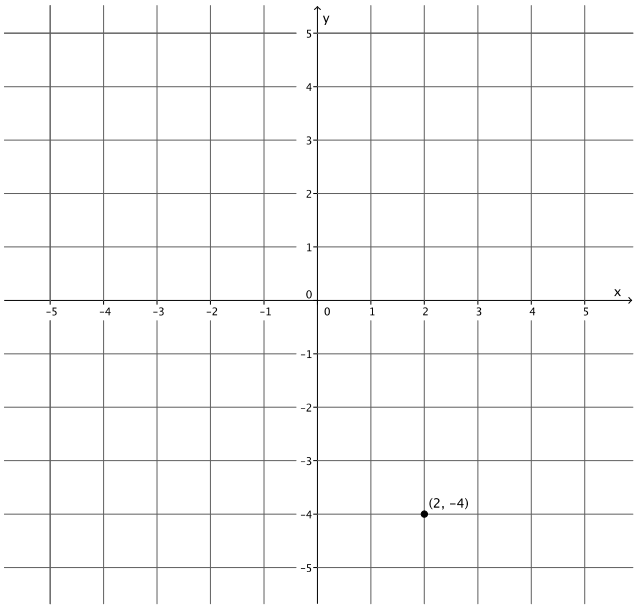
P' A'

What do you notice?

Exercises

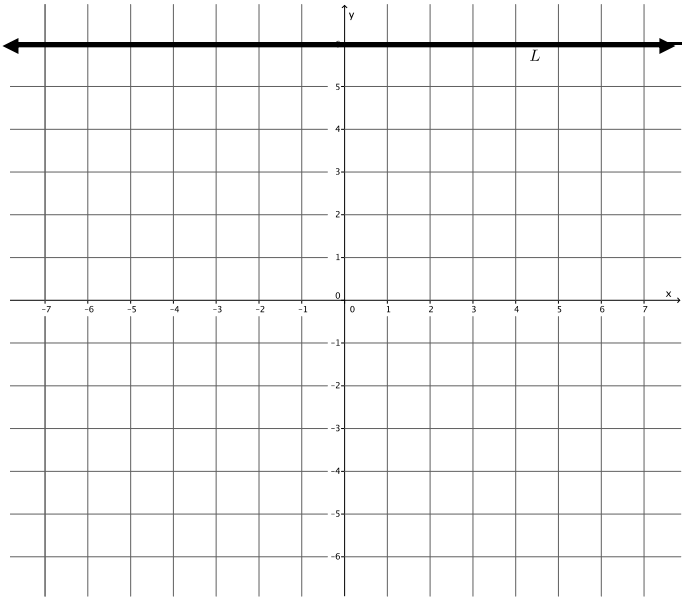
1. Using your transparency, rotate the plane 180 degrees, about the origin. Let this rotation be $Rotation_0$. What are the coordinates of $Rotation_0(2, -4)$?

2. Let $Rotation_0$ be the rotation of the plane by 180 degrees, about the origin. <u>Without</u> using your transparency, find $Rotation_0(-3, 5)$.

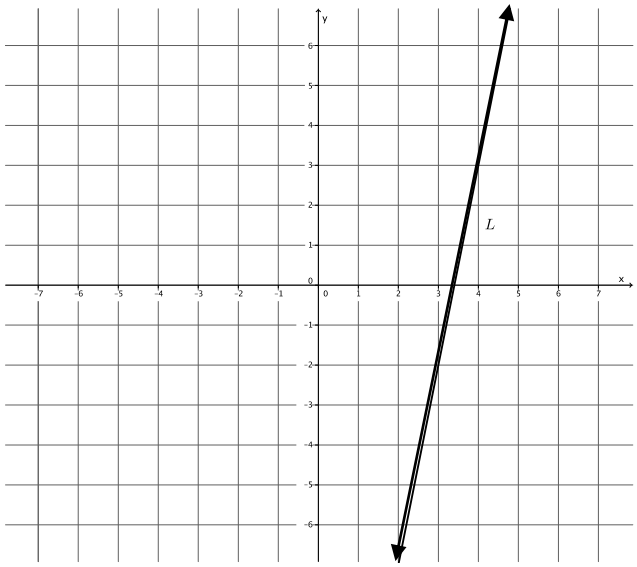


3. Let $Rotation_0$ be the rotation of 180 degrees around the origin. Let L be the line passing through $(-6, 6)$ parallel to the x-axis. Find $Rotation_0(L)$. Use your transparency if needed. Is L parallel to $Rotation_0(L)$?

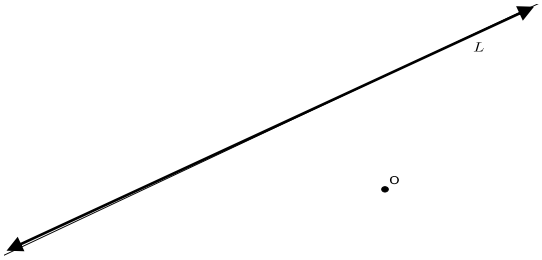
4. Let $Rotation_0$ be the rotation of 180 degrees around the origin. Let M be the line passing through $(7,0)$ parallel to the y-axis. Find $Rotation_0(M)$. Use your transparency if needed. Is M parallel to $Rotation_0(M)$?



5. Let $Rotation_0$ be the rotation of 180 degrees around the origin. Is L parallel to $Rotation_0(L)$? Use your transparency if needed.



6. Let $Rotation_0$ be the rotation of 180 degrees around the origin. Is L parallel to $Rotation_0(L)$? Use your transparency if needed.



Lesson Summary

- A rotation of 180 degrees around O is the rigid motion so that if P is any point in the plane, then the three points, P, O, and $Rotation(P)$ are *collinear* (i.e., lie on the same line).
- Given a 180-degree rotation, R_0, around the origin O, and a point P with coordinates (a, b), then $R_0(P)$ is the point with coordinates $(-a, -b)$.

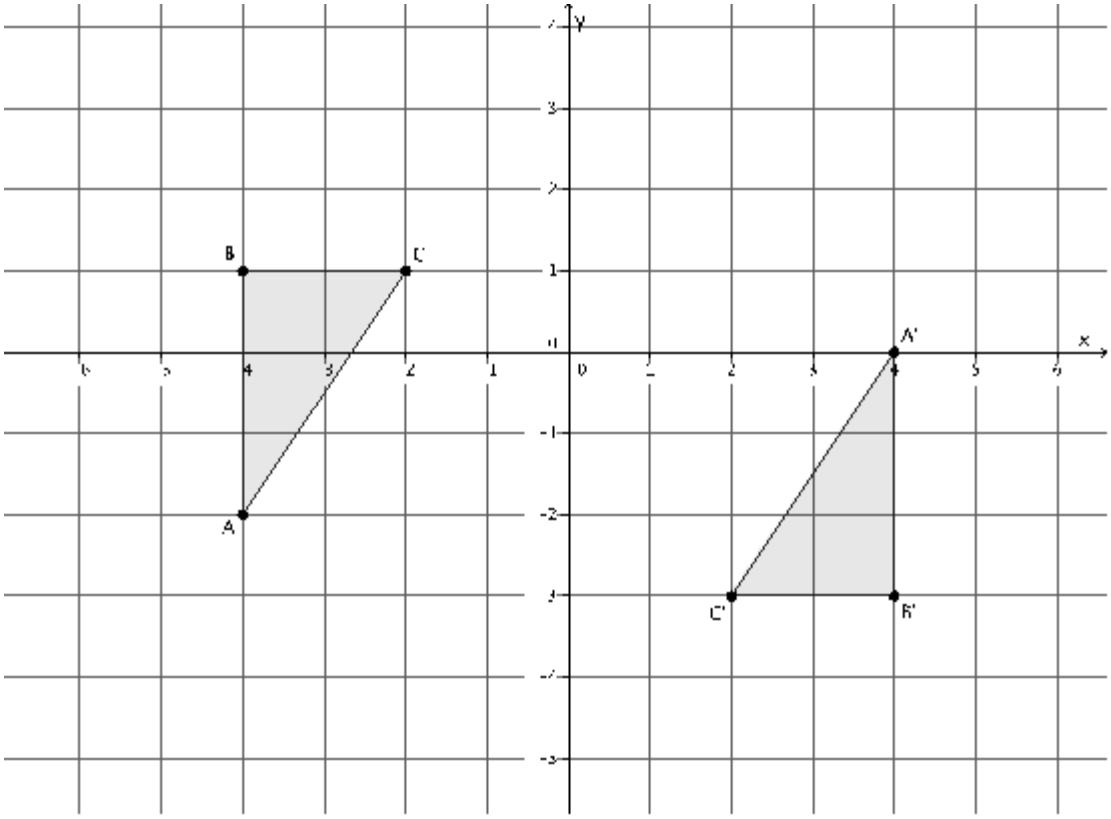
Theorem: Let O be a point not lying on a given line L. Then the 180-degree rotation around O maps L to a line parallel to L.

Advanced Math 7 Period _____ Name: _____

8.2.6 Homework Set Date: _____

Homework Homework Homework Homework Homework

Use the following diagram for problems 1–5. Use your transparency, as needed.



1. Looking only at $\overline{BC}$, is it possible that a 180° rotation would map $\overline{BC}$ onto $\overline{B'C'}$? Why or why not?

2. Looking only at $\overline{AB}$, is it possible that a 180° rotation would map $\overline{AB}$ onto $\overline{A'B'}$? Why or why not?

3. Looking only at $\overline{AC}$, is it possible that a 180° rotation would map $\overline{AC}$ onto $\overline{A'C'}$? Why or why not?

4. Connect point B to point B', point C to point C', and point A to point A'. What do you notice? What do you think that point is?

5. Would a rotation map triangle ABC onto triangle $A'B'C'$? If so, define the rotation (i.e., degree and center). If not, explain why not.

6. The picture below shows right triangles ABC and $A'B'C'$, where the right angles are at B and B'. Given that $m\overline{AB} = m\overline{A'B'} = 1$, and $m\overline{BC} = m\overline{B'C'} = 2$, $\overline{AB}$ is not parallel to $\overline{A'B'}$, is there a 180° rotation that would map ΔABC onto $\Delta A'B'C'$? Explain.