Dear Family,

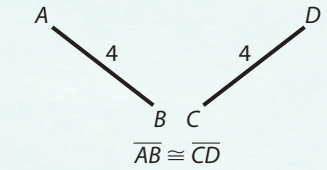
Your child is learning about transformations and congruence.

In the last lesson, your child learned about transformations. Three transformations that move a figure from one place to another are:

- a translation, which moves a figure up, down, left, or right.
- a reflection, which flips a figure across a line called the *line of reflection*.
- a rotation, which turns a figure about a point called the *center of rotation*.

These transformations produce images that are congruent to the original figure. When two figures have the same side lengths and angles measures, they are congruent.

- The two segments, $\overline{AB}$ and $\overline{CD}$, are congruent because they both have a length of 4 units. "$\overline{AB} \cong \overline{CD}$" is read "segment AB is congruent to segment CD."
- The two angles are congruent because they both measure 60 degrees. "$\angle E \cong \angle F$" is read "angle E is congruent to angle F."



$\overline{AB} \cong \overline{CD}$

$\angle E \cong \angle F$

Consider the following example:

The coordinates of the vertices of $\triangle ABC$ are $A(1, 0)$, $B(5, 3)$, and $C(5, 0)$. The triangle is rotated 180° clockwise about the origin to form $\triangle A'B'C'$. What are the coordinates of $\triangle A'B'C'$? Are $\triangle ABC$ and $\triangle A'B'C'$ congruent?

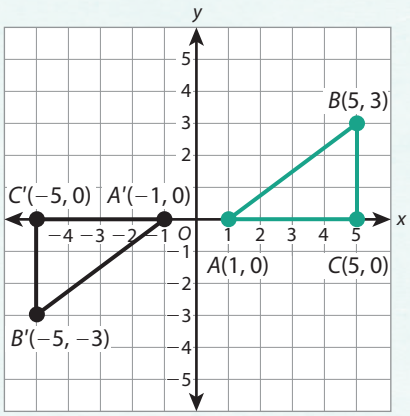
On the next page you will see how your child can use the coordinate plane to analyze the two triangles.

NEXT

Transformations and Congruence: Sample Solution

The coordinates of the vertices of $\triangle ABC$ are $A(1, 0)$, $B(5, 3)$, and $C(5, 0)$. The triangle is rotated 180° clockwise about the origin to form $\triangle A'B'C'$. What are the coordinates of $\triangle A'B'C'$? Are $\triangle ABC$ and $\triangle A'B'C'$ congruent?

First, plot $\triangle ABC$ by graphing the given vertices, $A(1, 0)$, $B(5, 3)$, and $C(5, 0)$. Next, plot $\triangle A'B'C'$, read "triangle A prime, B prime, C prime." To plot $\triangle A'B'C'$, rotate each of the vertices 180° about the origin.



To rotate a point, draw or imagine a line from the point to the origin. Keeping one end at the origin, turn that line 180°. The other end of the line is the location of the rotated point.

- $A(1, 0)$ is transformed to $A'(-1, 0)$.
- $B(5, 3)$ is transformed to $B'(-5, -3)$.
- $C(5, 0)$ is transformed to $C'(-5, 0)$.

Next, compare the triangles to see whether they are congruent.

- Each side of the triangle is congruent to the corresponding side of its rotated image: $\overline{AB} \cong \overline{A'B'}$, $\overline{BC} \cong \overline{B'C'}$, $\overline{AC} \cong \overline{A'C'}$.
- Each angle of the triangle is congruent to the corresponding angle of its rotated image: $\angle A \cong \angle A'$, $\angle B \cong \angle B'$, $\angle C \cong \angle C'$.

This means that $\triangle ABC$ and $\triangle A'B'C'$ are congruent.

Answer: The graph shows that the 180° clockwise rotation of $\triangle ABC$ is $\triangle A'B'C'$ with coordinates $A'(-1, 0)$, $B'(-5, -3)$, and $C'(-5, 0)$. The corresponding sides and angles of the triangles are congruent, so $\triangle ABC \cong \triangle A'B'C'$.

Vocabulary

congruent exactly equal in size and shape.