Transformations: Reflections

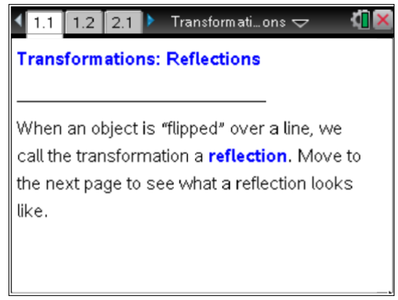
Student Activity

Name ______________

Class ______________

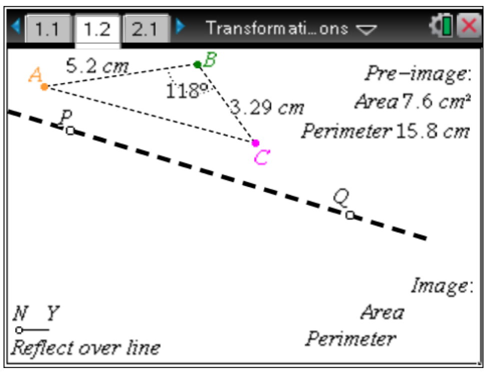
Open the TI-Nspire document *Transformations_Reflections.tns*.

When an object is "flipped" over a line, we call the transformation a reflection. In this lesson, you will visualize what a reflection looks like. Then, you will identify the properties of the object that are preserved in a reflection and determine the coordinates of a triangle that is reflected over the axes in the coordinate plane.



Move to page 1.2.

1. Predict what the reflected image of the triangle over the given line will look like. Draw your sketch in the space below.



2. Drag the reflection slider point so that it is below the letter *Y* (for Yes) to show the reflected image. How does the reflection compare to your prediction in problem 1? Redraw the reflection if necessary.

3. Use page 1.2 to complete the table below.

	$\triangle ABC$	$\triangle A'B'C'$
Side length	$AB =$	$A'B' =$
Angle measure	$\angle B =$	$\angle B' =$
Side length	$BC =$	$B'C' =$
Area		
Perimeter		

4. Two figures are said to be congruent if they have the same size and same shape. Is $\triangle ABC$ congruent to $\triangle A'B'C'$? Explain your reasoning.

5. Change the triangle by dragging one of its vertices and observe the changes in the reflected image. Would this change your answer to question 4? (Is $\triangle ABC$ congruent to $\triangle A'B'C'$?)

6. Drag point P or point Q to move the line of reflection and observe the changes in the reflected image. Would this change your answer to question 4? (Is $\triangle ABC$ congruent to $\triangle A'B'C'$?)

7. An isometry is a transformation that produces an image that is congruent to the pre-image. Is a transformation using reflection an isometry? Explain your reasoning.

8. If the clockwise order of the vertices of the image and the pre-image is the same, the figures are said to have the same orientation.
   a. Do $\triangle ABC$ and $\triangle A'B'C'$ have the same orientation? Why or why not?

   b. Does the shape or location of the pre-image triangle affect your answer to question 8a? Does the location of the reflection line affect your answer to question 8a? Explain your answers.

9. Consider the properties of side length, angle measure, perimeter, area, and orientation.
   a. Which of these properties are preserved in a reflection?

   b. Which of these properties are not preserved in a reflection?

Move to page 2.1.

10. Predict the coordinates of $\triangle A'B'C'$ for each of the reflections in the table below.
    Coordinates of $\triangle ABC$: $A(1, 2)$; $B(6, 4)$; $C(3, 6)$

Reflection	Coordinates of A'	Coordinates of B'	Coordinates of C'
Over the *x*-axis			
Over the *y*-axis			
Over both *x*-axis and *y*-axis			

After you make your predictions, select Δ to show the coordinates to check your results.

11. Select the Hide ∇ arrow to hide the coordinates of the image.
    a. Change the vertices of $\triangle ABC$ so that each vertex is in a different quadrant, and record the new coordinates of the vertices.

       $\triangle ABC$: $A($, $)$; $B($, $)$; $C($, $)$

    b. For these new vertices, again predict the coordinates of $\triangle A'B'C'$ for each of the reflections in the table below. After you make your predictions, select Δ to show the coordinates to check your results.

Reflection	Coordinates of A'	Coordinates of B'	Coordinates of C'
Over the *x*-axis			
Over the *y*-axis			
Over both *x*-axis and *y*-axis			

12. Generalize your results: If the coordinates of point *P* are (x, y), identify the coordinates of point P' if it is reflected over:
    a. the *x*-axis:

    b. the *y*-axis:

    c. both the *x*-axis and the *y*-axis: