Exploring Transformations

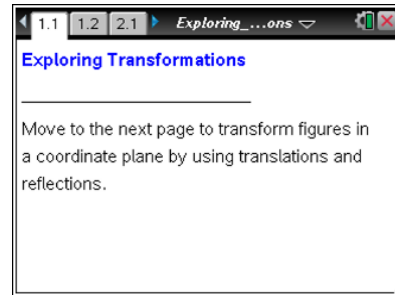**Student Activity**

Name _____

Class _____

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

In this activity, you will translate and reflect shapes in the coordinate plane. You will begin with a triangle with vertices *A*(1, 2), *B*(4, 7), and *C*(7, 3).

Move to page 1.2.

1. Drag point *H* left and right to translate the triangle horizontally. Drag point *V* up and down to translate the triangle vertically.
    a. Identify the coordinates of points *B'* and *C'* if the triangle is translated 4 units to the left. How would you determine the coordinates mathematically?

    b. Identify the coordinates of points *B'* and *C'* if the triangle is translated 4 units to the left and 5 units down. How would you determine the coordinates mathematically?

2. How must you translate △*ABC* for point *B'* to have coordinates (3, 9)?

3. Herschel moved point *A* to produce a new triangle. He then translated △*ABC* left 2 and down 5.
    a. Where would Herschel have placed point *A* for the coordinates of point *A'* to be (–4, –3)?

    b. Explain how you can determine the coordinates of point *A* mathematically.

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4. Reflect the triangle over the *x*-axis.
    a. Identify the coordinates of points *B'* and *C'* after the triangle is reflected over the *x*-axis.

    b. How would you determine the coordinates mathematically?

5. Reset the figure by moving the point back to the *N* position. Reflect the triangle over the *y*-axis.
    a. Identify the coordinates of points *B'* and *C'* after the triangle is reflected over the *y*-axis.

    b. How would you determine the coordinates mathematically?

6. Describe how a reflection is different from a translation.

7. Reset the figure by moving the point back to the *N* position.
    a. Predict the coordinates of points *A'*, *B',* and *C'* if the triangle is reflected over both the *x*-axis and the *y*-axis.

    b. Reflect the figure over both the *x*-axis and the *y*-axis and test your predictions.

    c. How would you determine the coordinates of *A'*, *B',* and *C'* mathematically?

Move to page 3.1.

8. Drag the points labeled *V* and *H* so that the **L** lies completely in Quadrant IV. What translations are needed so that the image of **L** lies completely in Quadrant IV?

Move to page 4.1.

9. Move the **L** to Quadrant IV by using the open circles in the upper left corner of the screen.
    a. What transformations were necessary for the image of **L** to appear in Quadrant IV?

    b. Does the order in which the **L** is reflected matter? Why or why not?

10. In the transformations on pages 3.1 and 4.1, why do you think that the letter **L** was used to illustrate the concept of transformations rather than the letter **H?**
    a. Justify your answer mathematically or with a sketch.

    b. What other letters would be good choices to illustrate transformations using reflections?

    c. What letters are *not* good choices to illustrate transformations using reflections? Explain your answer.