Translation and Reflection

Strand:	Geometry
Topic	Translating and reflecting right triangles and rectangles on the coordinate plane
Primary SOL:	7.7 The student will apply translations and reflections of right triangles or rectangles in the coordinate plane.
Related SOL:	7.6

Materials

- Graph paper or individual whiteboard with the coordinate plane
- Tracing paper or patty paper (optional)
- Translation activity sheet (attached)
- Reflection activity sheet (attached)
- Translation Reflection activity sheet (attached)

Vocabulary

coordinate plane, horizontal, negative, ordered pair, origin, polygon, positive, vertical, x-axis, y-axis (earlier grades)

image, pre-image, prime notation, reflection, translation (7.7)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Introduce the lesson by discussing moves on a checkerboard. Note that a move is made by sliding the game piece to a new position. Explain that the move does not affect the size or shape of the game piece. Use this to lead into a discussion on translations. Review horizontal and vertical moves. Review moving in a positive or negative direction on the coordinate plane.
2. Distribute the Translation activity sheet, and have students graph the rectangle. Guide students in completing the sheet. Emphasize the use of prime notation for the translated figure.
3. Introduce reflection by discussing mirror images.
4. Distribute the Reflection activity sheet, and have students graph the triangle. Guide students in completing the sheet. Emphasize the use of prime notation for the translated figure.
5. Distribute the Translation Rotation activity sheet, and have students graph the rectangle. Guide students in completing the sheet.
6. Give students additional practice. Individual whiteboards with a coordinate grid or coordinate grids in a clear protector could be used for this practice.

Assessment

- **Questions**
  - How does translating a figure affect the size, shape, and position of that figure?
  - How does rotating a figure affect the size, shape, and position of that figure?

- What are the differences between a translated polygon and a reflected polygon?

- **Journal/Writing Prompts**
  - Describe what a right triangle looks like after being reflected over the *y*-axis. How does this differ from an equilateral triangle?
  - Give a practical situation that represents a translation and then a reflection.

- **Other**
  - Give students a rectangle and its translation, and ask the students to describe the translation.
  - Pair students. Have one partner choose a right triangle, draw it on the coordinate plane, describe its original position, translate, and reflect the right triangle several times, and list the steps. Challenge the second partner to return the right triangle to its original location.

Extensions and Connections (for all students)

- Have students find pictures that show reflections and describe the reflections.
- Create a tessellation by translating and/or reflecting a figure.

Strategies for Differentiation

- Review previous vocabulary and preteach new vocabulary that is essential to the lesson.
- Assign students a partner for collaborative work during activities.
- Provide certain students with 2–3 completed examples of graphing activity sheets, as needed, to use as a reference.
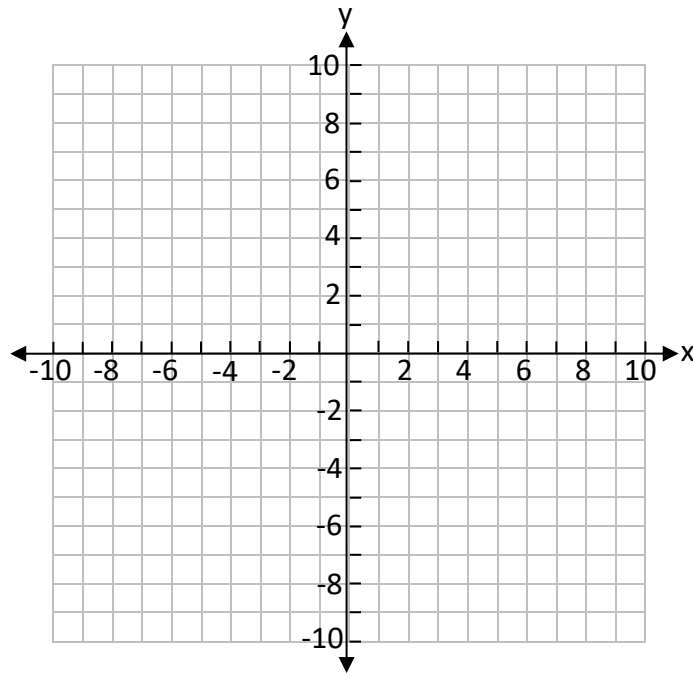- Provide patty paper to reflect images and figures with students.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Translation

Name _____ **Date** _____

1. Graph, label and connect these points: A(2,2), B(2,4), C(6,2), D(6,4).

2. Graph a new rectangle on the same coordinate plane, translating it 4 units horizontally and 5 units vertically. List the coordinates of A′(,) B′(,) C′(,) D′(,).
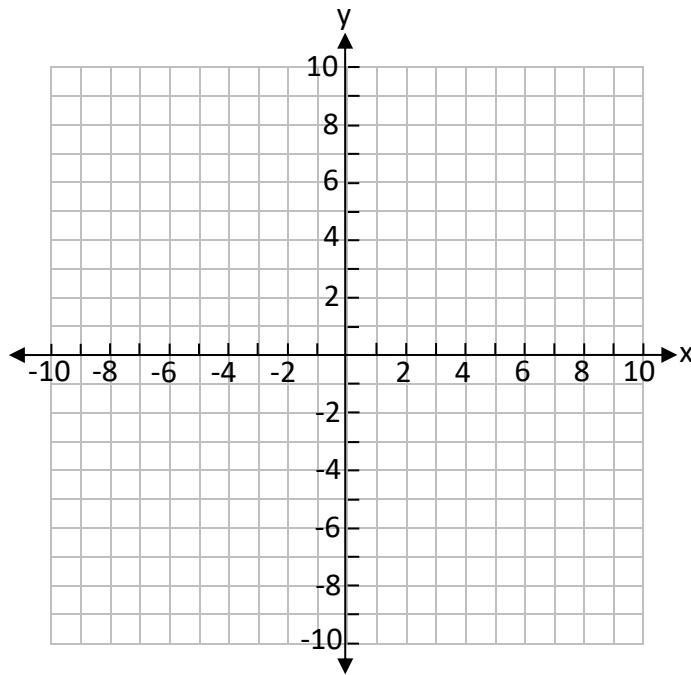
    What do you notice about the coordinates?

3. Based upon the original image, graph a new rectangle on the same coordinate plane, translating it –6 units horizontally and 2 units vertically. Describe the new figure.

Reflection

Name _____   **Date** _____

1. Graph and connect these points: A(2,2), B(2,6), C(6,2).

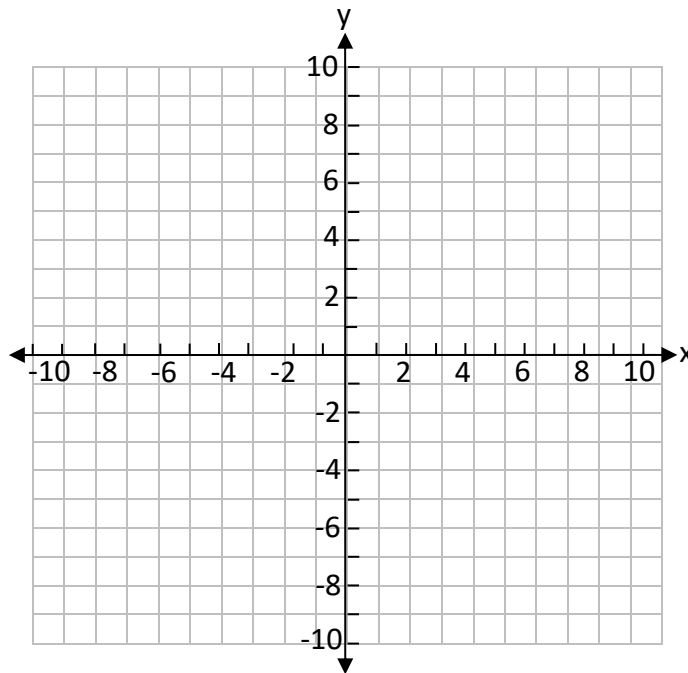2. Reflect the triangle across the *y*-axis. List the coordinates of A'(,) B'(,) C'(,).

   What do you notice about the coordinates?

3. Reflect the original triangle across the x-axis. What do you notice about the original figure and the reflected figure? What do you notice about the ordered pairs?

Translation Reflection

Name _____ **Date** _____

1. Graph and connect these points: A(–5,2), B(–1,2), C(-1,4), D(–5,4).

2. Reflect the rectangle across the y-axis. Next translate it 4 units horizontally and –5 units vertically. List the coordinates of A′(,) B′(,) C′(,) D′(,).

   What do you notice about the coordinates?

3. Translate the original figure 6 units horizontally and 2 units vertically. Next, reflect the rectangle across the *x*-axis. Describe the new figure.