

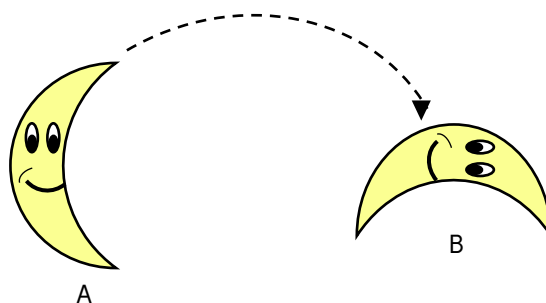
**Lesson 2.01 Introduction to Transformations**

Students will be able to:

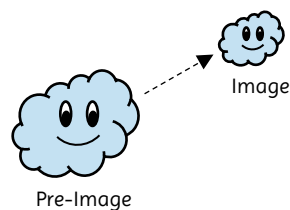
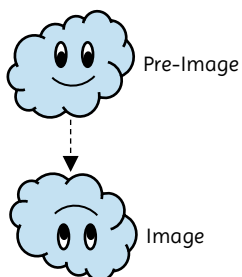
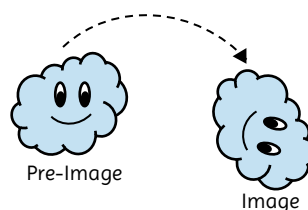
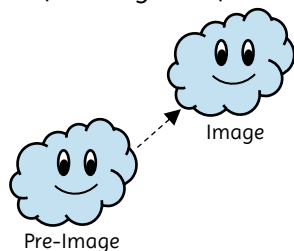
- Content Objective: Define translation, rotation, reflection, and dilation.
- Language Objective: Explain how the definition of rigid motion relates to translations, rotations, reflections, but not dilations.


**Warm Up**

Given the illustration below, explain how figure A has been transformed to get figure B?


**Vocabulary Review**

Name each of the following transformations shown below.


**Investigate**

Using the images from the vocabulary review, how is a dilation different from a translation, rotation, and reflection? Explain.



## Graphic Organizer

**Transformation**

• A function,  $F$ , that takes points in the plane as inputs,  $p$ , and gives points as outputs,  $F(p)$ .

• 
$$\begin{array}{ccc} & \text{Transformation} & \\ \text{Pre-Image} & \text{----->} & \text{Image} \\ A & & A' \text{ (A Prime)} \end{array}$$

**Rigid Motion**

• Moves figures to a new location without changing the size or shape (preserves congruence).

- Translation
- Rotation
- Reflection


**Skill 1: Translations & Coordinate Notation**

Given each of the following points:

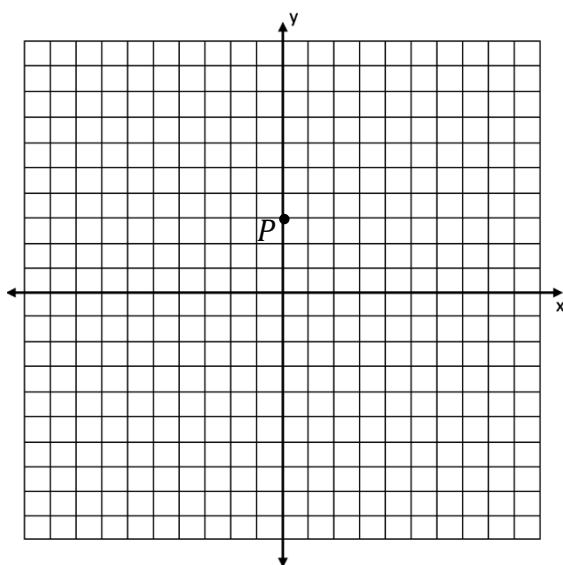
- i. Identify the translation shown given the functions below by circling the correct direction and writing the number of units.
- ii. State the image,  $P'$  and  $A'$ , as ordered pairs  $(x, y)$ .
- iii. Plot and label the image on the axes provides.

a.  $P(0,3)$

$$F(x, y) \rightarrow (x + 1, y - 2)$$

$P'$ : \_\_\_\_\_

Translation: Right/Left \_\_\_\_\_ Up/Down \_\_\_\_\_

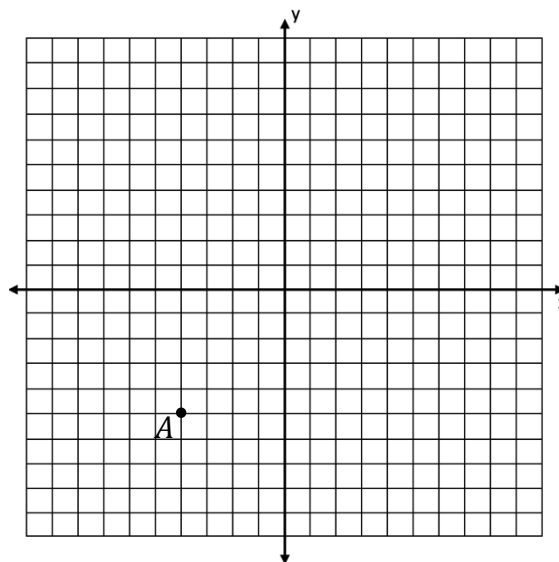


b.  $A(-4, -5)$

$$T(x, y) \rightarrow (x - 3, y + 2)$$

$A'$ : \_\_\_\_\_

Translation: Right/Left \_\_\_\_\_ Up/Down \_\_\_\_\_




**Exercise 1: Translations & Coordinate Notation**

Given each of the following points:

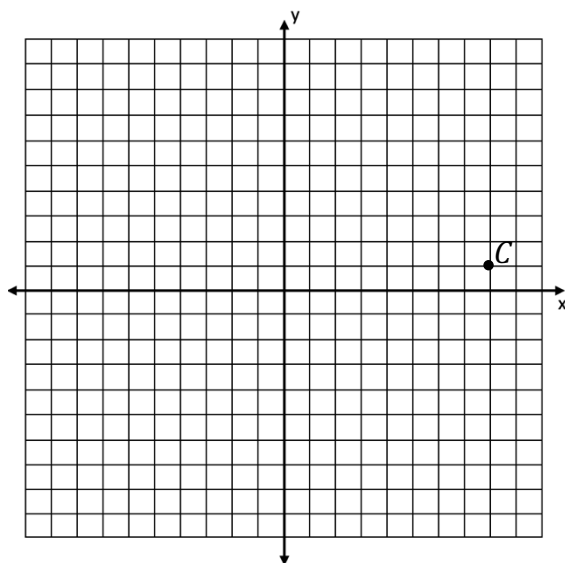
- Identify the translation shown given the functions below by circling the correct direction and writing the number of units.
- State the image,  $C'$  and  $K'$ , as ordered pairs  $(x, y)$ .
- Plot and label the image on the axes provided.

a.  $C(8,1)$

$$T(x, y) \rightarrow (x - 11, y - 4)$$

$C'$ : \_\_\_\_\_

Right/Left \_\_\_\_\_ Up/Down \_\_\_\_\_

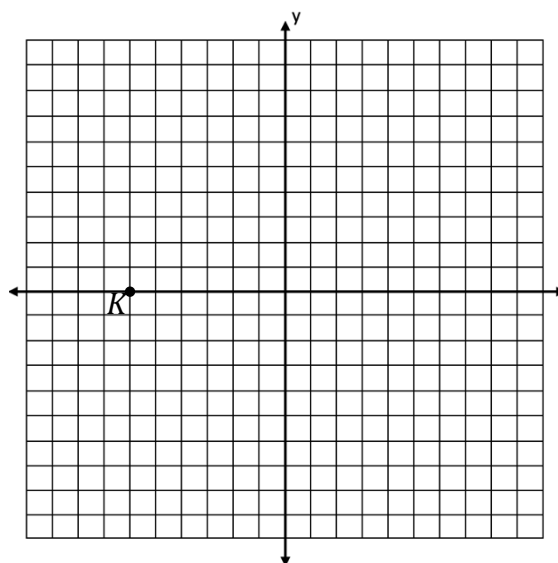


b.  $K(-6,0)$

$$F(x, y) \rightarrow (x - 3, y + 2)$$

$K'$ : \_\_\_\_\_

Right/Left \_\_\_\_\_ Up/Down \_\_\_\_\_


**Skill 2: Reflections & Coordinate Notation**

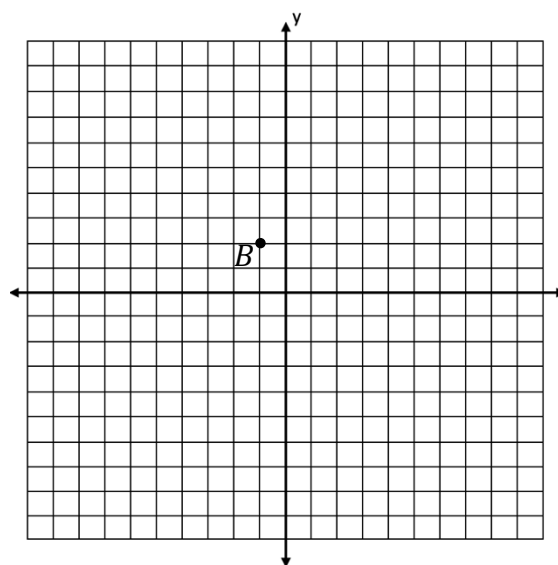
Shown graphed below is the point  $B(-1,2)$ .

- a. Graph, label, and state point  $B'$ , the image after reflecting  $B$  over the x-axis.

$$B(-1,2) \rightarrow B'(\quad, \quad)$$

- b. In general, what rule can we write when reflecting a point,  $(x, y)$  over the x-axis? Fill in the notation below.

$r_{x\text{-axis}}(x, y) \rightarrow (\quad, \quad)$




**Exercise 2: Reflections & Coordinate Notation**

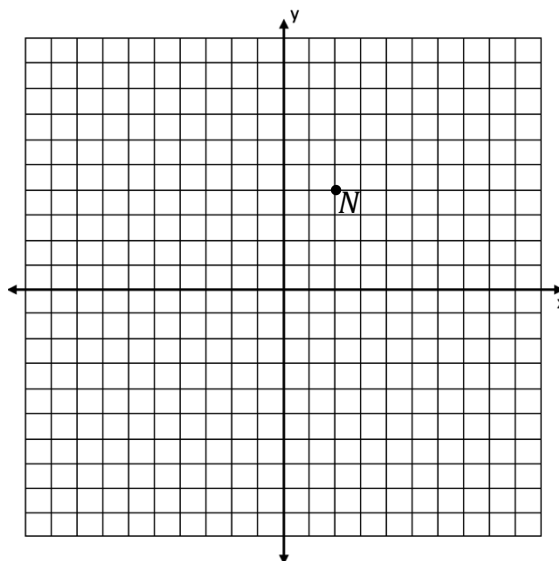
Shown graphed below is the point  $N(2,4)$ .

- a. Graph, label, and state point  $B'$ , the image after reflecting  $N$  over the  $y$ -axis.

$$N(2,4) \rightarrow N'(\quad, \quad)$$

- b. In general, what rule can we write when reflecting a point,  $(x, y)$  over the  $y$ -axis? Fill in the notation below.

$$\text{r}_{y\text{-axis}}(x, y) \rightarrow (\quad, \quad)$$


**Talk it Out**

Given is  $\triangle ABC$  shown graphed below with vertices  $A(1, -2)$ ,  $B(8, -2)$ , and  $C(5, 5)$ .

- a. Fill in the chart below and graph  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after the transformation:

$$F(x, y) \rightarrow (x + 1, y - 6).$$

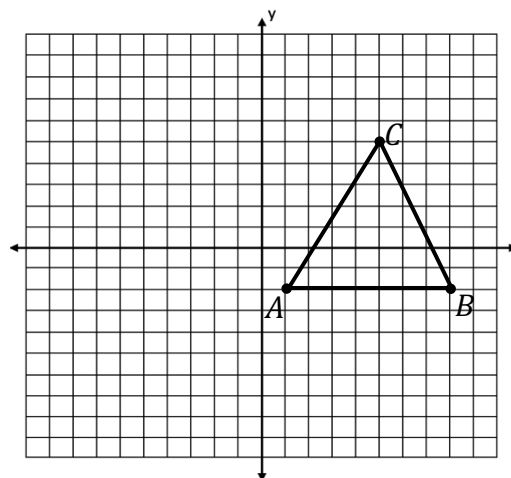
Pre-Image	Translation	Image
$A(1, -2)$		$A'(\quad, \quad)$
$B(8, -2)$		$B'(\quad, \quad)$
$C(5, 5)$		$C'(\quad, \quad)$

- b. Fill in the chart below and graph  $\triangle A''B''C''$ , the image of  $\triangle ABC$  after the transformation:

$$G(x, y) \rightarrow \left(\frac{x}{2}, \frac{y}{2}\right).$$

Pre-Image	Dilation	Image
$A(1, -2)$		$A''(\quad, \quad)$
$B(8, -2)$		$B''(\quad, \quad)$
$C(5, 5)$		$C''(\quad, \quad)$

- c. Which transformation did not change the shape or size of the original triangle? This is called a **rigid motion**.



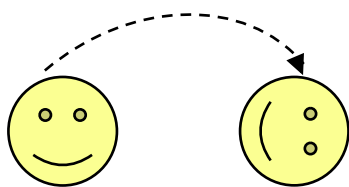


## 2.01- Problem Set

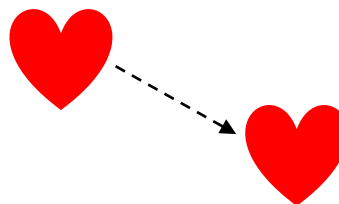
Name: \_\_\_\_\_

1. Identify the transformation being shown for each of the following images.

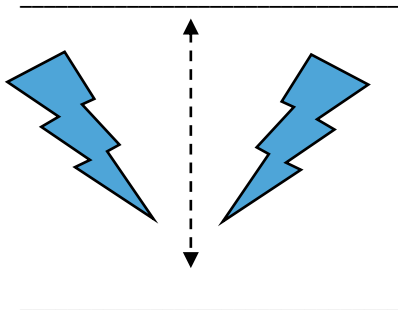
a.



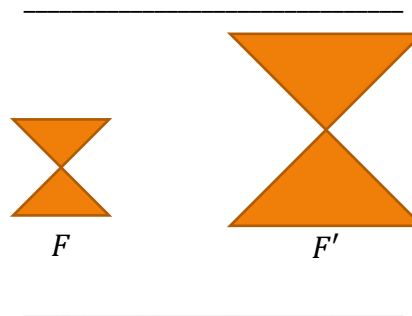
b.



c.



d.


 2. Given the point  $K$  below and the transformation shown in coordinate notation, complete the following.

$$K(1, -3)$$

$$F(x, y) \rightarrow (x + 0, y + 6)$$

- a. Identify the **translation** shown given coordinate notation above. (State the direction and units)
- b. State the image  $K'$  as an ordered pair. Show the work that leads to your answer.

- c. Shown below is point  $K$ . Plot the image,  $K'$ , on the axes provided.
- d. What other transformation will map  $K$  to  $K'$ ? Is this a rigid motion?

