



# Reflections Lesson 5: Coordinates & Eqs

Name \_\_\_\_\_

## Student Activity

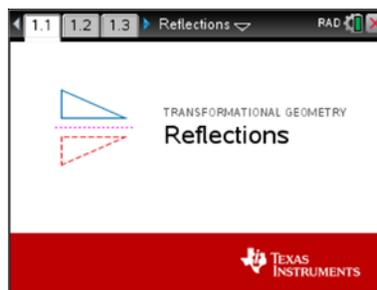


Class \_\_\_\_\_

In this lesson, you will investigate the coordinates of vertices of triangles that have been reflected about the line  $y = -x$  and lines of the form  $y = mx + b$ ,  $x = c$ , and  $y = c$ , and look for patterns.

Open the document: *Reflections.tns*.

**It is important the Reflections Tour be done before any Reflections lessons.**



PLAY INVESTIGATE EXPLORE DISCOVER

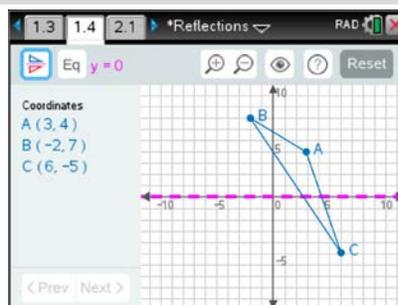
Move to page 1.4. ( **ctrl** ▶ three times)

On the handheld, press **ctrl** ▶ and **ctrl** ◀ to navigate through the pages of the lesson.  
(On the iPad®, select the page thumbnail in the page sorter panel.)

1. Press **menu** to open the menu.

(On the iPad®, tap the wrench icon  to open the menu.)

Press **1** (1: Templates), **6** (6: Equation).



2. On the handheld, press the **≡** key to open the equation dropdown menu. Press **enter** to see the equation choices. Use the ▲ ▼ buttons on the clickpad to highlight the equation type desired.

Press **enter** on that selection. For this example use ' $y = mx + b$ '.

(On the iPad®, tap the **Eq** icon to open the menu.)

Press **tab** once to select the input box for the coefficient of x. Press **(-)** **1**, then **enter**.

a. Reflect  $\triangle ABC$  about the line  $y = -x$ . (click on  or press **R**). Zoom  in (**+**) or out (**-**) as needed.

Record the Original coordinates (first measures displayed) in the first row of the table below.

Discuss in your group the patterns that you notice among the corresponding coordinates.

Line $y = -x$	A	B	C	A'	B'	C'
Original						
Figure 1						

Before continuing, discuss which coordinates changed and how? Which coordinates did not change?



b. Investigate and mentally make note of the coordinates by grabbing and moving each of the three vertices of  $\triangle ABC$  (**A**, **B**, **C**) and the entire shape (**S**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the previous table. Look for patterns.

c. The following points are reflected about the line  $y = -x$ .

Based upon your observations, what are the coordinates of the reflected points:

$(-3, 5) \rightarrow$  \_\_\_\_\_  $(-2, -7) \rightarrow$  \_\_\_\_\_ '  $\rightarrow$  ' means "maps to"

d. Discuss observations within your group and write a generalization (in words) as to what happens to the coordinates of a point that is reflected about the line  $y = -x$ .

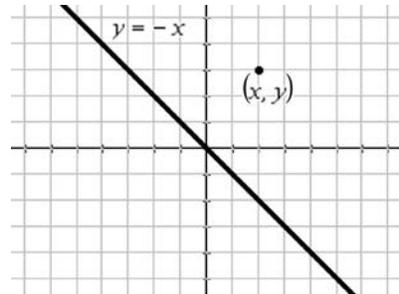
e. Generalize what was written in part d above, but using symbols.

If a point with coordinates  $(x, y)$  is reflected about the line  $y = -x$ , the coordinates of the image point will be \_\_\_\_\_.

That is,  $(x, y) \rightarrow$  \_\_\_\_\_.

Complete the sketch to the right.

Complete the sketch below:



3. Change the line of reflection to the **vertical line,  $x = 2$**  by pressing  $\boxed{=}$ . Press  $\boxed{\uparrow \text{shift}} \boxed{\text{tab}}$  to go back to the equation dropdown menu.

Press  $\boxed{\text{enter}}$  to open the menu. Press  $\blacktriangledown$  to move to ' $x = c$ '. Press  $\boxed{\text{enter}}$ .

Press  $\boxed{\text{tab}}$ , then  $\boxed{2}$ ,  $\boxed{\text{enter}}$ .

a. Record the Original coordinates in the table below. Look for patterns.

Vertical line $x = 2$	A	B	C	A'	B'	C'
Original						
Figure 1						
Figure 2						

Before continuing, discuss which coordinates changed and how? Which coordinates did not change?



b. Investigate and mentally make note of the coordinates by grabbing and moving each of the three vertices of  $\triangle ABC$  (**A**, **B**, **C**) and the entire shape (**S**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the previous table.

Look for patterns.

c. Investigate and mentally make note of the coordinates by grabbing and moving each of the three vertices of  $\triangle ABC$  (**A**, **B**, **C**) and the entire shape (**S**) to create different shaped triangles. Record a set of data observed in row "Figure 2" in the previous table.

Look for patterns.

d. The following points are reflected about the line  $x = 2$ .

Based upon your observations, what are the coordinates of the reflected points:

$(3, -5) \rightarrow$  \_\_\_\_\_  $(-2, -7) \rightarrow$  \_\_\_\_\_

e. Discuss observations within your group and write a generalization (in words) as to what happens to the coordinates of a point that is reflected about the line  $x = 2$ .

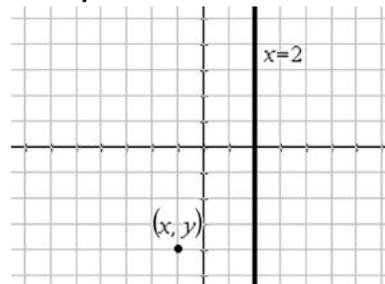
f. Generalize what was written in part e above, but using symbols.

If a point with coordinates  $(x, y)$  is reflected about the line  $x = 2$ , the coordinates of the image point will be \_\_\_\_\_.

That is,  $(x, y) \rightarrow$  \_\_\_\_\_

Complete the sketch to the right.

**Complete the sketch below:**



4. Change the line of reflection to the **horizontal line,  $y = 3$**  by pressing  $\boxed{=}$ . Press  $\boxed{\hat{u} \text{ shift}} \boxed{\text{tab}}$  to go back to the equation dropdown menu. Press  $\boxed{\text{enter}}$  to open the menu. Press  $\blacktriangledown$  to move to 'y = c'. Press  $\boxed{\text{enter}}$ . Press  $\boxed{\text{tab}}$ , then  $\boxed{3}$  and  $\boxed{\text{enter}}$ .

a. Record the Original coordinates in the following table. Look for patterns.



- b. Investigate and mentally make note of the coordinates by grabbing and moving each of the three vertices of  $\triangle ABC$  (**A**, **B**, **C**) and the entire shape (**S**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the following table. Look for patterns.

Horizontal line $y = 3$	A	B	C	A'	B'	C'
Original						
Figure 1						

Before continuing, discuss which coordinates changed and how? Which coordinates did not change?

- c. The following points are reflected about the line  $y = 3$ .

Based upon your observations, what are the coordinates of the reflected points:

$(-3, 5) \rightarrow$  \_\_\_\_\_  $(-2, -7) \rightarrow$  \_\_\_\_\_

- d. Discuss observations within your group and write a generalization (in words) as to what happens to the coordinates of a point that is reflected about the line  $y = 3$ .

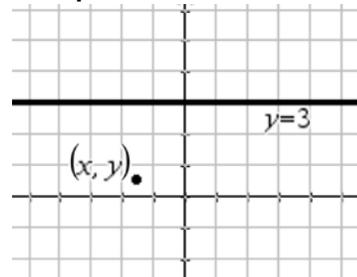
- e. Generalize what was written in part d above, but using symbols.

If a point with coordinates  $(x, y)$  is reflected about the line  $y = x$ , the coordinates of the image point will be \_\_\_\_\_.

That is,  $(x, y) \rightarrow$  \_\_\_\_\_.

Complete the sketch to the right.

Complete the sketch below:



- 5. Based upon the last two exercises, make generalizations:

- a. If a point is reflected about the line  $x = a$ , and the coordinates of the pre-image are  $(x, y)$ , what are the coordinates of the image in terms of **a**? \_\_\_\_\_
- b. If a point is reflected about the line  $y = b$ , and the coordinates of the pre-image are  $(x, y)$ , what are the coordinates of the image in terms of **b**? \_\_\_\_\_