



# Reflections Lesson 4: Grid & Coordinates

Name \_\_\_\_\_

## Student Activity

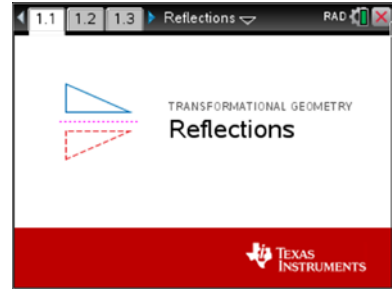


Class \_\_\_\_\_

In this lesson, you will investigate the coordinates of vertices of triangles that have been reflected about different lines 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



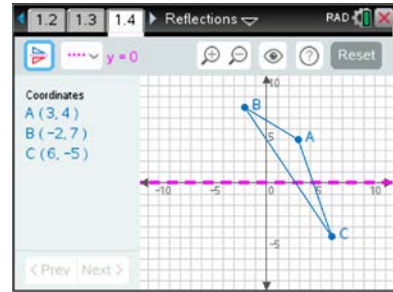
Move to page 1.4. ( **ctrl** ▶ three times)




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), **5** (5: Grid & Coordinates).



2. Reflect  $\triangle ABC$  about the **horizontal line,  $y = 0$** . (click on  or press **R**). Zoom  in (**+**) or  out (**-**) as needed.

a. Record the Original coordinates (first measures displayed) in the first row of the table below. Look for patterns among the coordinates.

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.

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

Horizontal Line	A	B	C	A'	B'	C'
<b><math>y = 0</math></b>						
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 **horizontal line,  $y = 0$** .  
Based upon your observations, what are the coordinates of the reflected points:

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

'  $\rightarrow$  ' means "maps to"

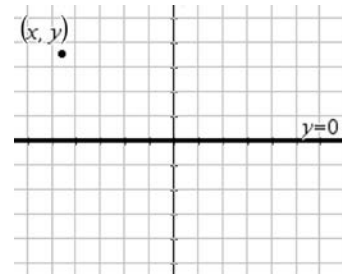
- d. Discuss observations within your group and write a generalization (in words) as to what happens to the coordinates of a point that is reflected about the **x-axis (the line  $y = 0$ )**.
- e. Generalize what was written in part d above, but using symbols.  
If a point with coordinates  $(x, y)$  is reflected about the line  **$y = 0$** , the coordinates of the image point will be \_\_\_\_\_.

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

'  $\rightarrow$  ' means "maps to"

Complete the sketch to the right.

**Complete the sketch below:**



To change the line of reflection, use the appropriate shortcut key:

- H Horizontal line       I Vertical line       J Slanted line

(On the iPad®, tap the Reflection Line dropdown menu icon and select the line of reflection.)

3. Change the line of reflection to the **vertical line,  $x = 0$** . (press the letter  I ).
- a. Record the Original coordinates in the table below. 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.  
Discuss in your groups the patterns that you notice among the corresponding coordinates.

Vertical Line $x = 0$	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 **vertical line,  $x = 0$** .  
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 **y-axis** (the **line  $x = 0$** ).

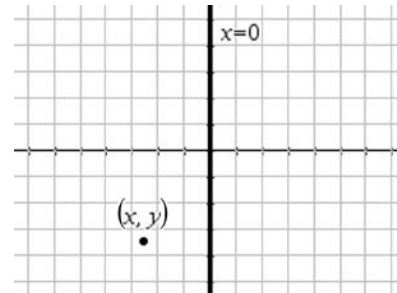
- e. Generalize what was written in part d above, but using symbols.  
If a point with coordinates  $(x, y)$  is reflected about the line  **$x = 0$** , the coordinates of the image point will be \_\_\_\_\_.

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

' $\rightarrow$ ' means "maps to"

Complete the sketch to the right.

**Complete the sketch below:**



4. Change the line of reflection to the **slanted line,  $y = x$** . (press the letter **J**).
- Record the Original coordinates in the table below. Look for patterns.
  - 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.  
Discuss in your groups the patterns that you notice among the corresponding coordinates.

Slanted 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?

- c. The following points are reflected about the line  **$y = x$** . Based upon your observations, what are the coordinates of the reflected points:

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



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  $y = x$ .

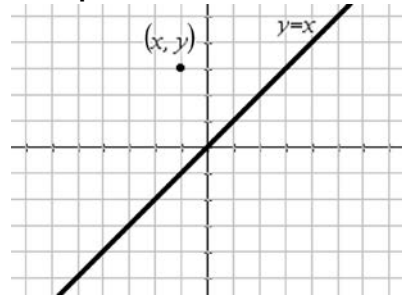
e. Generalize what was written in part d above, but using symbols.  
If a point with coordinates  $(x, y)$  is reflected about the line  $y = x$ , the coordinates of the image point will be \_\_\_\_\_.

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

' $\rightarrow$ ' means "maps to"

Complete the sketch to the right.

Complete the sketch below:



5. Answer each of the following:

a. The following points are **reflected about the x-axis**. Write the coordinates of the image:

$(-4, 3) \rightarrow$  \_\_\_\_\_       $(0, -5) \rightarrow$  \_\_\_\_\_       $(-2, -1) \rightarrow$  \_\_\_\_\_

b. The following points are **reflected about the line  $x = 0$** . Write the coordinates of the image:

$(-5, 4) \rightarrow$  \_\_\_\_\_       $(-6, -3) \rightarrow$  \_\_\_\_\_       $(-2, 0) \rightarrow$  \_\_\_\_\_

c. The following points are **reflected about the line  $y = x$** . Write the coordinates of the image:

$(-7, -4) \rightarrow$  \_\_\_\_\_       $(6, -3) \rightarrow$  \_\_\_\_\_       $(-2, -2) \rightarrow$  \_\_\_\_\_

6. The coordinates of a point and its image after a reflection about a line are given. Describe the line of reflection in as many ways as possible.

a.  $(3, -2) \rightarrow (3, 2)$  \_\_\_\_\_

b.  $(4, -5) \rightarrow (-5, 4)$  \_\_\_\_\_

c.  $(-1, 4) \rightarrow (1, 4)$  \_\_\_\_\_

d.  $(0, -8) \rightarrow (-8, 0)$  \_\_\_\_\_