

## Lesson 2.1 – Moving Shapes Around - Translations

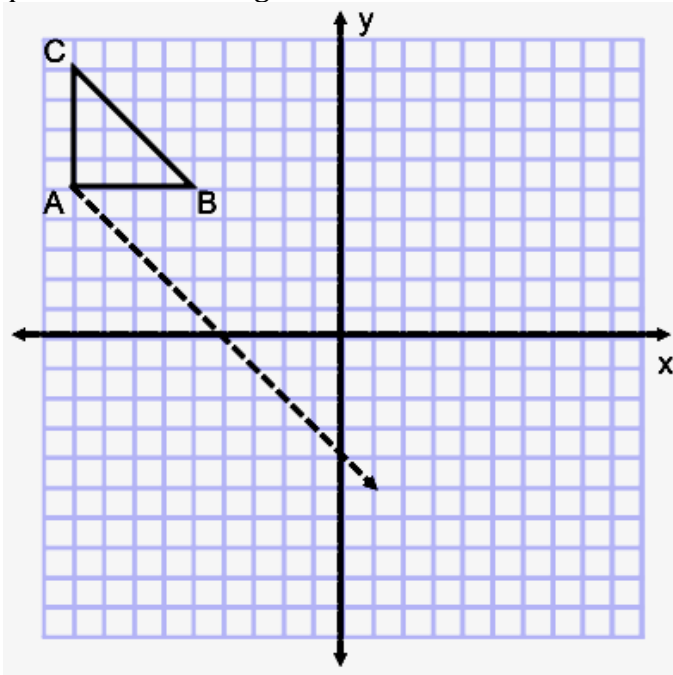
We will use the coordinate plane to help us understand how shapes can be moved. Before we begin to move objects, we need to acquaint ourselves with the coordinate plane. The **coordinate plane** is typically divided into four sections by two axes. The two axes are frequently labeled 'x' and 'y'. The **x - axis** is horizontal and is perpendicular to the **y - axis**. The **y - axis** is vertical and is perpendicular to the **x - axis**. The point where the two axes meet is called the **origin**. The ray formed by the x - axis and the origin that extends out to the right of the y - axis contains positive values for x. The ray formed by the x - axis and the origin that extends out to the left of the y - axis contains negative values for x. The ray formed by the y - axis and the origin that extends out above the x - axis contains positive values for y. The ray formed by the y - axis and the origin that extends down below the x - axis contains negative values for y.

The four sections are called quadrants. The **quadrants** are often labeled using the Roman numerals I, II, III, and IV. Quadrant I contains positive values for x and y. Quadrant II contains negative values for x and positive values for y. Quadrant III contains negative values for x and negative values for y. Quadrant IV contains positive values for x and negative values for y.

**Set 1** - Use the information above to label the quadrants (I, II, III, IV), the axes (x and y), and plot the given points.

	<p>Plot the points.</p> <p>A( 2, 3 )          B( -2, 3 )          C( 2, -3 )          D( -2, -3 )          E( 5, -7 )          F( 6, -4 )          G( -8, 1 )          H( 1, 10 )          I( -5, -5 )          J( -3, -9 )          K( 0, 6 )          L( 9, -1 )</p>
<p>Looking at set 1, in what direction are the quadrants labeled (circle one)?</p> <p>clockwise                  counter-clockwise</p>	<p>Which quadrant contains the most points?</p> <p>Which quadrants contain the least points?</p> <p>Which point did not plot into a quadrant?</p>

**Set 2-** Use the dotted **vector** to *slide* point A to image A'. Use the same vector to *translate* points B and C and label the images B' and C'. Connect the points to form triangle A'B'C' and answer the questions on the right.



In what quadrant does triangle ABC lie?

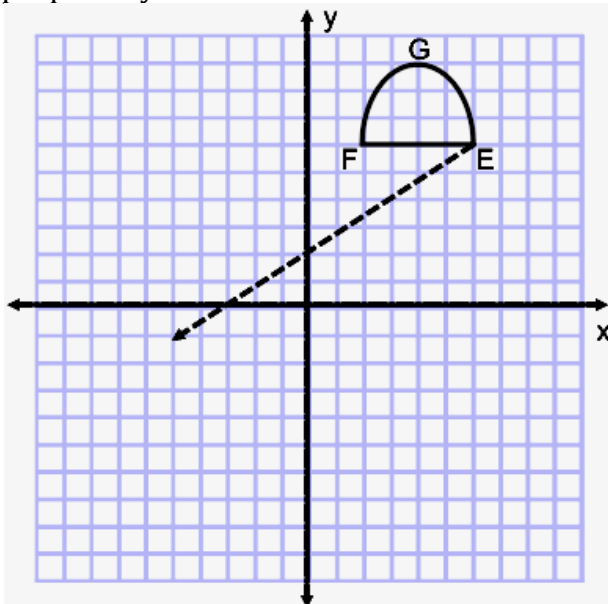
In what quadrant does triangle A'B'C' lie?

State the length of the line segments AB and A'B'. Is AB congruent to A'B'?

State the length of the line segments CA and C'A'. Is CA congruent to C'A'?

Use a ruler to measure BC and B'C' and state their measures. Are these two segments congruent?

**Set 3-** Use the dotted vector to translate the shape EFG. Label the image of shape EFG appropriately.



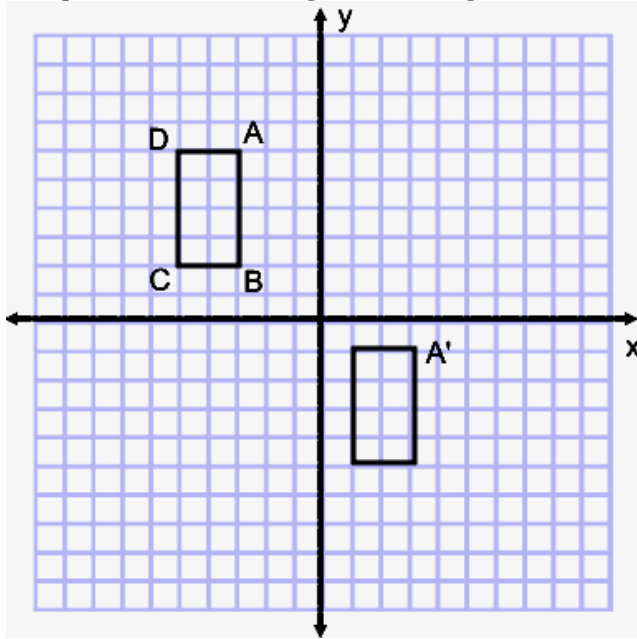
In what quadrant does shape EFG lie?

In what quadrants does shape E'F'G' lie?

State the measures of the line segments EF and E'F'. Is EF congruent to E'F'?

The shape EFG is translated \_\_\_\_ units down and \_\_\_\_ units to the left.

**Set 4-** In the diagram below, rectangle ABCD has been translated. Draw a dotted line to represent the vector that point A traveled along to arrive at point A'. Then label the rest of the points for the image of rectangle ABCD.



In what quadrant does rectangle ABCD lie?

In what quadrant does rectangle A'B'C'D' lie?

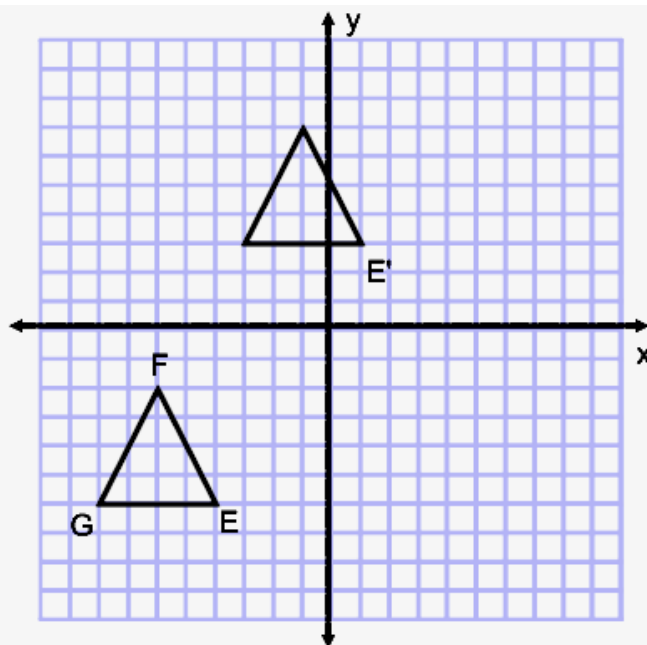
The point A is translated \_\_\_\_ units down and \_\_\_\_ units to the right to arrive at point A'.

Do points B, C, and D travel the same amount of units down and the same amount of units to the right?

Plot point  $K(-8, -1)$ . Use point  $K$  to draw  $\overrightarrow{KL}$  in quadrant III to represent the vector used in this translation.

State the perimeter of rectangle ABCD and rectangle A'B'C'D'.

**Set 5-** In the diagram below, triangle EFG has been translated. Draw a dotted line to represent the vector that point E traveled along to arrive at point E'. Then label the rest of the points for the image of triangle EFG.



In what quadrants does triangle E'F'G' lie?

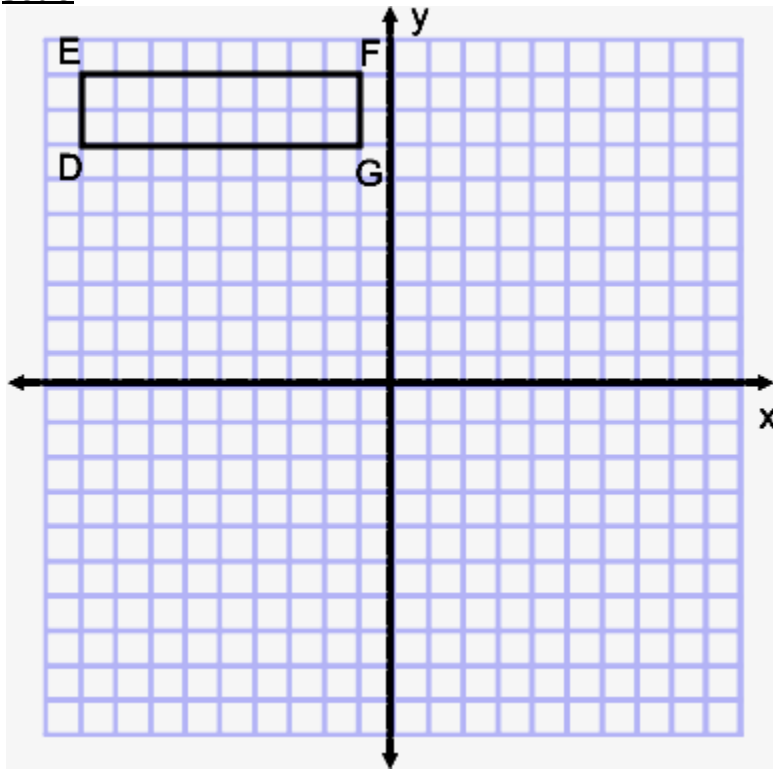
The point E is translated \_\_\_\_ units up and \_\_\_\_ units to the right to arrive at point E'.

Do points F and G travel the same amount of units up and the same amount of units to the right?

Plot point  $K(3, -10)$ . Use point  $K$  to draw  $\overrightarrow{KL}$  in quadrant IV to represent the vector used in this translation.

Is the length of segment GE equal in measure to the length of G'E'? State their measures.

**Set 6**



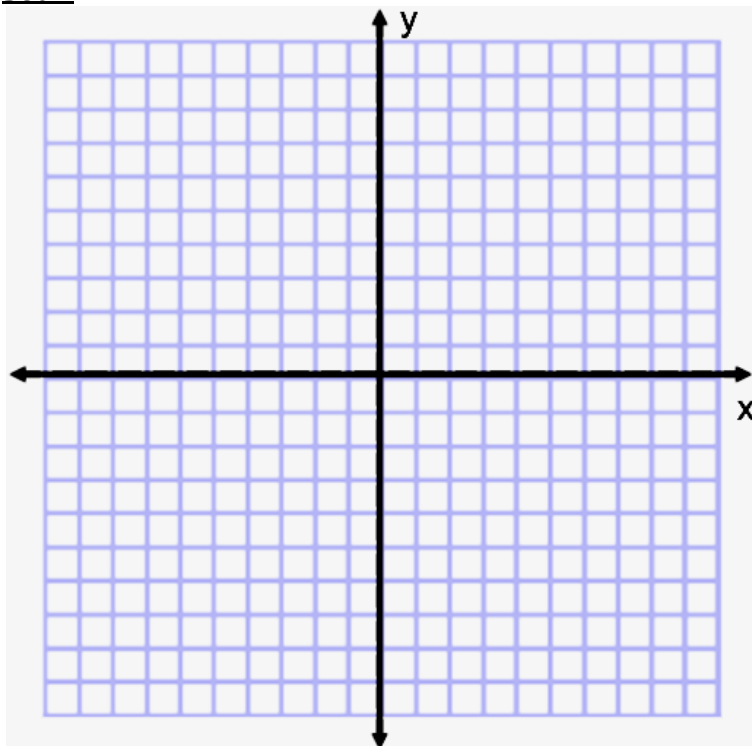
Translate rectangle DEFG 6 units to the right and 5 units down. Label the image appropriately.

In which quadrants does the image lie?

Is rectangle DEFG congruent to its image? Explain.

Draw  $\overrightarrow{AB}$  in quadrant III to represent the vector used in this translation.

**Set 7**

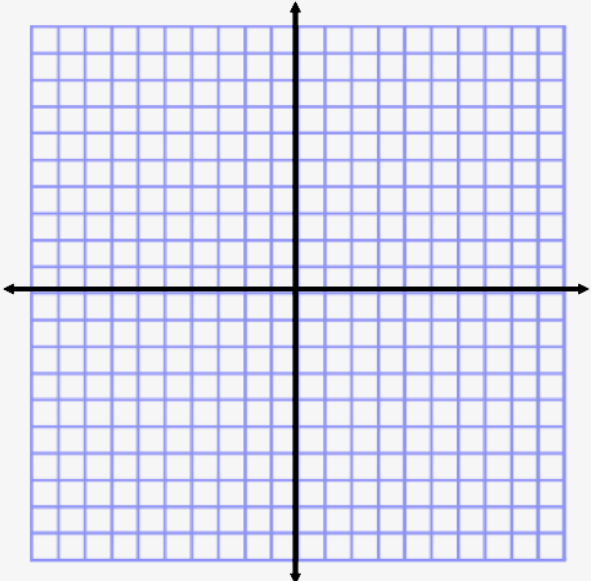
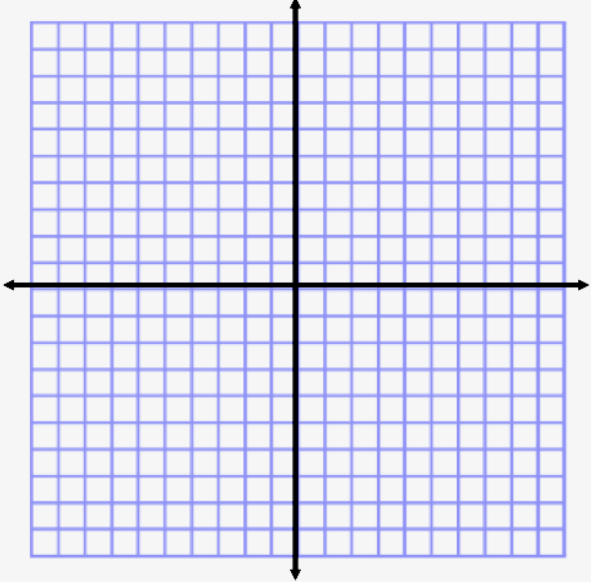
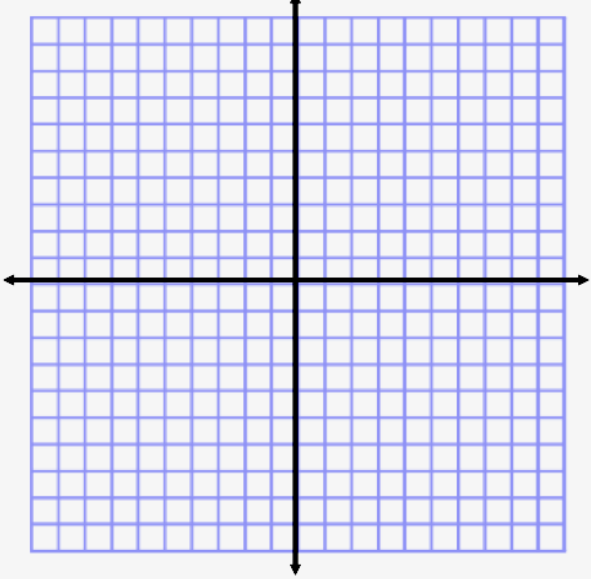


Plot the points A( 2, -8 ), B( 6, -3 ) and C( 9, -7 ). Connect the points to form triangle ABC.

Translate triangle ABC 10 units to the left and 3 units up. Label the image appropriately.

In which quadrant does the image lie?

Draw  $\overrightarrow{XY}$  in quadrant I to represent the vector used in this translation.

	<p><b>R#1</b> Label the axes. Plot the following points, connect the points to form triangle DEF: D( -4, -1) , E ( -1, -1) , F(-2, -6).</p> <p>Translate triangle DEF 5 units to the right and 7 units up. Label the new triangle D'E'F'.</p> <p>Triangle DEF translated from quadrant ___ to its image triangle D'E'F' in quadrant ____.</p>
	<p><b>R#2</b> Label the axes. Plot the following points, connect the points to form triangle XYZ: X( 5, -2) , Y ( 2, 0) , Z(1, -6).</p> <p>Translate triangle XYZ 8 units to the left and 4 units up. Label the new triangle X'Y'Z'.</p> <p>Triangle XYZ translated from quadrant ___ to its image triangle D'E'F' in quadrants ____ and ____.</p>
	<p><b>R#3</b> Label the axes. Plot the following points, connect the points to form square ABCD: A( 2, 2) , B( 6, 2) , C(6, 6) , D(2, 6)</p> <p>Translate square ABCD from quadrant I to quadrant III so that the image is completely in quadrant III. Label the image.</p> <p>Draw <math>\overrightarrow{XY}</math> in quadrant IV to represent the vector you used in this translation.</p>