

Translations and Coordinate Geometry (Optional)

1.
 - a. Select **Show Axes** from the **Draw** toolbox to turn on the coordinate axes.
 - b. Select **Define Grid** from the **Draw** toolbox then click on the axes to turn on the coordinate grid.
 - c. Select Triangle tool from the **Lines** toolbox. Construct a triangle with vertices on grid points. Label the vertices A, B and C.
 - d. Select **Equation & Coordinates** in the **Measure** toolbox, then click once on each vertex to show the coordinates of the vertex.
 - e. Now translate the triangle.
 - Select **Vector** from the **Lines** toolbox. Draw a vector starting and ending on grid points.
 - Select the **Translation** tool from the **Transformations** toolbox.
 - Select the triangle (the object to translate).
 - Select the vector by which to translate the triangle.
 - f. Label the corresponding image vertices A', B', and C' and display the coordinates of each point.

2.
 - a. Record the coordinates of the vertices, the change in x and the change in y in the table below

Vertex	Pre-image	Image	Δx	Δy
A				
B				
C				

- b. Display the coordinates of the endpoints of the vector.
 - c. What is the change in x from the initial point of the vector to the endpoint of the vector?
 - d. What is the change in y from the initial point of the vector to the endpoint of the vector?
 - e. Describe the relationship between the vector and the image and pre-image.
3.
 - a. On a new screen, repeat problems 1 and 2 above. Use the table below to record your results.

Vertex	Pre-image	Image	Δx	Δy
A				
B				
C				

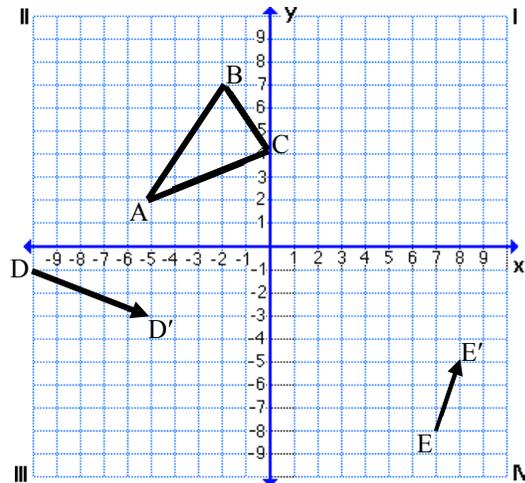
- b. $\Delta x =$ _____ $\Delta y =$ _____
 - c. Describe the relationship between the vector and the image and pre-image.

Translations and Coordinate Geometry (Optional) (Continued)

4. If an ordered pair represents one of the vertices of the pre-image (x, y) and the translation vector has change in x written as Δx , and a change in y written as Δy , write the rule that gives the coordinates of the image.

$$(x, y) \rightarrow (\quad , \quad)$$

5. a. On a new screen, construct a triangle with its vertices at grid points. Label the vertices D, E, and F. Display the coordinates of each vertex.
- b. Construct a translation vector, v_1 , starting and ending on grid points. Translate $\triangle DEF$ using this vector. Label the corresponding vertices of the image D', E' and F'. Display the coordinates of each vertex.
- c. Construct another translation vector, v_2 , starting and ending on grid points. Translate $\triangle D'E'F'$ using this new vector. Label the corresponding vertices of the newest image D'', E'' and F''.
- d. What is the rule for the first translation? What is the rule for the second translation?
- e. What single translation is the same as (equivalent to) translating by v_1 and then by v_2 ?
6. Applying one translation to a figure and then applying a second translation to its image is called a **composition** of translations.
7. a. On the grid below, what are the coordinates of A, B and C? Now translate the triangle using the vector $\overline{DD'}$. What are the coordinates of the image triangle A'B'C'?



- b. Now translate the image triangle by vector $\overline{EE'}$. What are the coordinates of A'', B'' and C''?

- Answers:
2.
 - a.-d. Answers will vary. The differences in the x- and y-coordinates should be constant in all responses.
 - e. The vector for each point of the pre-image to the image will be the same.
 3.
 - a.-b. Answers will vary. The differences in the x- and y-coordinates should be constant in all responses.
 - c. The vector for each point of the pre-image to the image will be the same.
 4. $(x + \Delta x, y + \Delta y)$
 5.
 - d. Add the x- and y-coordinates from v_1 to each vertex of $\triangle DEF$ for the first translation. Add the x- and y-coordinates from v_2 to each vertex of $\triangle DEF$ for the second translation.
 - e. The single translation would be to use the sum of the two vectors, $v_1 + v_2$.
 7.
 - a. A (-5, 2), B (-2, 7), and C (0, 4)
A' (0, 0), B' (3, 5), and C' (5, 2)
 - b. A'' (1, 3), B'' (4, 8), and C'' (6, 5)