

Warm-Up: Determine if the figures below have rotational symmetry. If they do, then list their order and magnitude.



Rotational Symmetry: Yes No

Order: 2

Magnitude: 180°



Rotational Symmetry: Yes No

Order: 4

Magnitude: 90°



Rotational Symmetry: Yes No

Order: 6

Magnitude: 60°

6.1 Symmetry Homework

Name: _____

Determine whether the following have Reflectional Symmetry. If yes, draw the line(s) of symmetry.

1.



Reflectional Symmetry: Yes / No

2.



Reflectional Symmetry: Yes / No

3.



Reflectional Symmetry: Yes / No

4.



Reflectional Symmetry: Yes / No

5.



Reflectional Symmetry: Yes / No

6.



Reflectional Symmetry: Yes / No

Determine whether the following have Rotational Symmetry. If yes, indicate the point of symmetry and state the order and magnitude.

7.



Rotational Symmetry: Yes / No

Order: _____

Magnitude: _____

8.



Rotational Symmetry: Yes / No

Order: _____

Magnitude: _____

9.



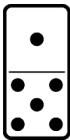
Rotational Symmetry: Yes / No

Order: _____

Magnitude: _____

Determine whether the following have Rotational Symmetry. If yes, indicate the point of symmetry and state the order and magnitude.

10.



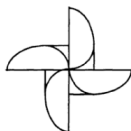
Rotational Symmetry: Yes / No
Order: _____
Magnitude: _____

11.



Rotational Symmetry: Yes / No
Order: _____
Magnitude: _____

12.



Rotational Symmetry: Yes / No
Order: _____
Magnitude: _____

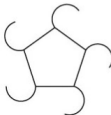
Determine the type(s) of symmetry found in the figures below.

13.



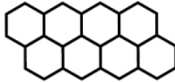
Reflectional Symmetry: Yes / No
Rotational Symmetry: Yes / No
Translational Symmetry: Yes / No

14.



Reflectional Symmetry: Yes / No
Rotational Symmetry: Yes / No
Translational Symmetry: Yes / No

15.



Reflectional Symmetry: Yes / No
Rotational Symmetry: Yes / No
Translational Symmetry: Yes / No

16. Determine if whether the following capital letters have a vertical line of symmetry, horizontal line of symmetry, 180° rotational symmetry, or no Symmetry. Circle all answers which apply.

	<u>Reflectional Symmetry</u>		<u>Rotational Symmetry</u>
D	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry
A	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry
E	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry
O	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry
Z	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry
H	Vertical Line of Symmetry	Horizontal Line of Symmetry	180° Rotational Symmetry

Transformations

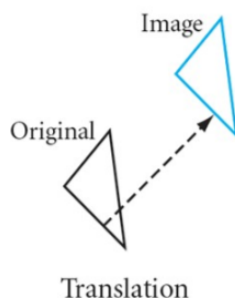
Objectives

- Learn about transformations
- Identify and create translations, rotations, and reflections of figures in the plane

TRANSFORMATION: Functions which map points of a pre-image onto its image.

- The original position of a point, a line, a line segment, or a figure **BEFORE** a transformation is called its **PRE-IMAGE**.
- The new position of a point, a line, a line segment, or a figure **AFTER** a transformation is called its **IMAGE**.

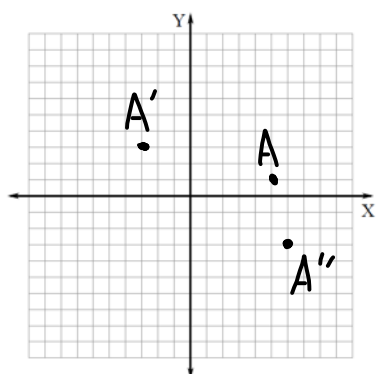
Today we will focus on identifying and creating translations of figures in the plane.



TRANSLATIONS: Any pre-image which is moved from one location to another location on the coordinate plane without changing its shape, size, or orientation.
or slide

On the coordinate plane below...

- Graph the coordinate pre-image (5, 1) and label it with the letter A.
- Translate point A 8 units to the left and 2 units up.
Label that image A' (pronounced A prime).
- Translate point A 1 unit to the right and 4 units down.
Label that image A'' (pronounced A double prime).



(5, 1)

List the transformation rule and coordinates of each of the resulting images:

Transformation Rule for A': $(x-8, y+2)$

New coordinates of A': $(-3, 3)$

Transformation Rule for A'': $(x+1, y-4)$

New coordinates of A'': $(6, -3)$

In general, list the transformation rule for each of the following translations:

Up $(x, y) \rightarrow (x, y+a)$

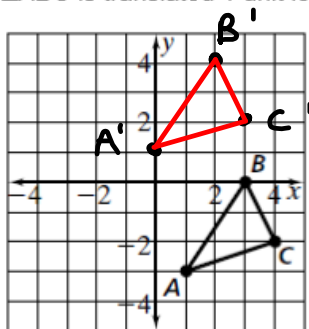
Down $(x, y) \rightarrow (x, y-a)$

Right $(x, y) \rightarrow (x+a, y)$

Left $(x, y) \rightarrow (x-a, y)$

Examples

1. $\triangle ABC$ is translated 1 unit left and 4 units up. Draw the image $\triangle A'B'C'$.



What are the coordinates of:

$$A \ (1, -3) \rightarrow A' \ (0, 1)$$

$$B \ (3, 0) \rightarrow B' \ (2, 4)$$

$$C \ (4, -2) \rightarrow C' \ (3, 2)$$

As a general rule this translation could be written as $(x, y) \rightarrow (x - 1, y + 4)$.

2. $\triangle JKL$ has coordinates $J(0, -2)$, $K(-3, 4)$, and $L(5, -1)$.

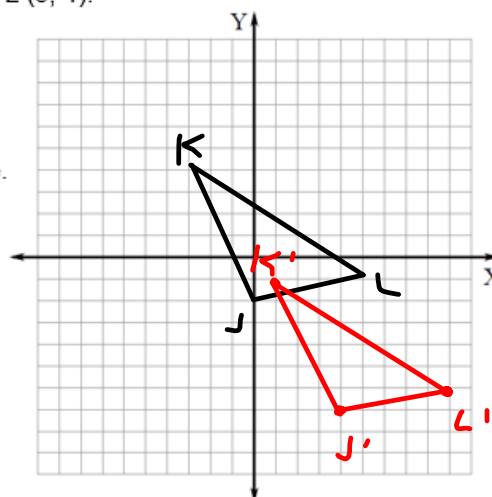
- Draw $\triangle JKL$.
- Draw the image $\triangle J'K'L'$ after a translation of 4 units to the right and 5 units down. Label the triangle.
- What are the coordinates of:

$$J \ (0, -2) \rightarrow J' \ (4, -7)$$

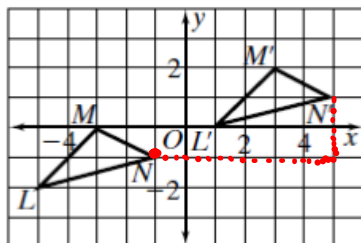
$$K \ (-3, 4) \rightarrow K' \ (1, -1)$$

$$L \ (5, -1) \rightarrow L' \ (9, -6)$$

- Rule: $(x, y) \rightarrow (x + 4, y - 5)$

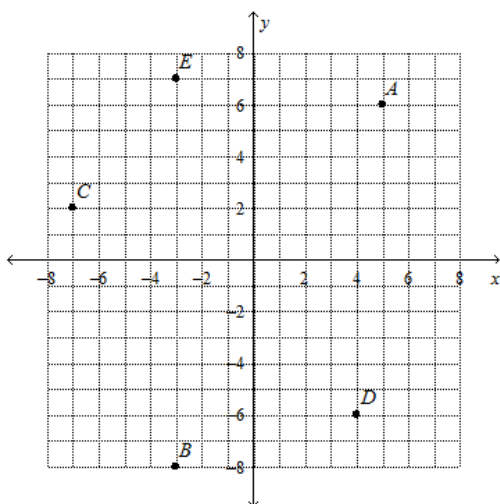


3. Write a general rule which describes the translation shown below. $\triangle LMN$ is the original triangle.



$$(x, y) \rightarrow (x + 6, y + 2)$$

4. Use the grid below to answer questions.



- a. Find the rule to describe the translation from point A to point B.

$$(x, y) \rightarrow (x - 8, y - 14) \quad \text{arrow notation}$$

- b. Find the rule to describe the translation from point C to point D.

$$(x, y) \rightarrow (x + 11, y - 8)$$

- c. Find the rule to describe the translation from point E to point A.

$$(x, y) \rightarrow (x + 8, y - 1)$$

5. a) Use arrow notation to write a rule for the given translation.

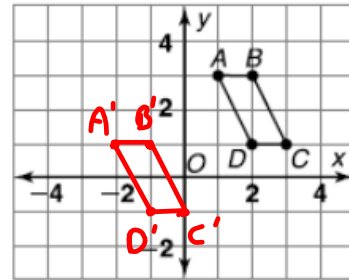
$$(x, y) \rightarrow (x-3, y-2)$$

- b) Graph and label the image after the translation.

- c) Name the coordinates of the image.

$$\begin{array}{ll} A' (-2, 1) & B' (-1, 1) \\ C' (0, -1) & D' (-1, -1) \end{array}$$

left 3 units, down 2 units



6. a) Graph points $T(0, 3)$, $U(2, 4)$ and $V(5, -1)$ and connect the points to make a triangle.

- b) Translate $\triangle TUV$ using the rule $(x, y) \rightarrow (x-3, y-1)$.

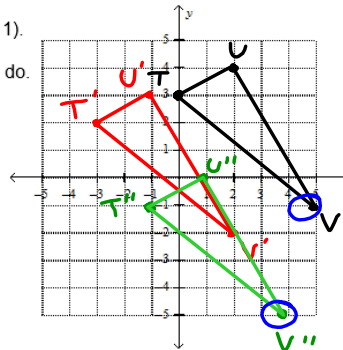
- c) In words, describe what the rule is asking you to do.

Move each point left 3,
down 1.

- d) Draw the image $\triangle T'U'V'$.

- e) Identify the coordinates of $\triangle T'U'V'$.

$$T' (-3, 2) \quad U' (-1, 3) \quad V' (2, -2)$$



- f) Using the image of $\triangle T'U'V'$ perform an additional translation using the rule $(x, y) \rightarrow (x+2, y-3)$. right 2, down 3

- g) State the new coordinates of $\triangle T''U''V''$.

$$T'' (-1, -1) \quad U'' (1, 0) \quad V'' (4, -5)$$

- h) Write a general rule which describes the translation of $\triangle TUV$ onto $\triangle T''U''V''$.

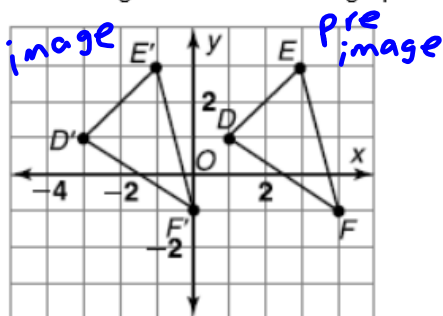
$$(x, y) \rightarrow (x-1, y-4)$$

$$(x-3, y-1)$$

$$(x+2, y-3)$$

$$(x-1, y-4)$$

7. Use arrow notation to write a general rule that describes the translation of the pre-image onto the image as shown on the graph.



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

8. Write the general rule which describes the translation of the pre-image onto the image with the coordinates listed below.

C (-2, 4) U (0, -1) B (5, -3)
C' (0, -3) U' (2, -8) B' (7, -10)

$$(x, y) \rightarrow (x + 2, y - 7)$$

Homework:

Transformations Day 1 - Translations HW