



Math Virtual Learning

**Grade 8**

**Geometric Transformations: Translations**

April 14, 2020



Math 8

Lesson: April 14, 2020

**Objective/Learning Target:**

I can describe the effect of translations of two-dimensional figures using coordinates.

# Warm Up



(←) Translations can be seen **in nature**. The hexagonal sections of a honeycomb are the same size, the same shape and face in the same direction.

(→) As you go down a **slide**, you are undergoing a translation. You are moving a given distance in a given direction. You do not change your size, shape or the direction in which you are facing (hopefully!).



**Can you come up with a real-world example? Where have you seen translations in your life? Can you find one right now around you?**

# Warm Up *continued*

Some more real life examples of translations are:



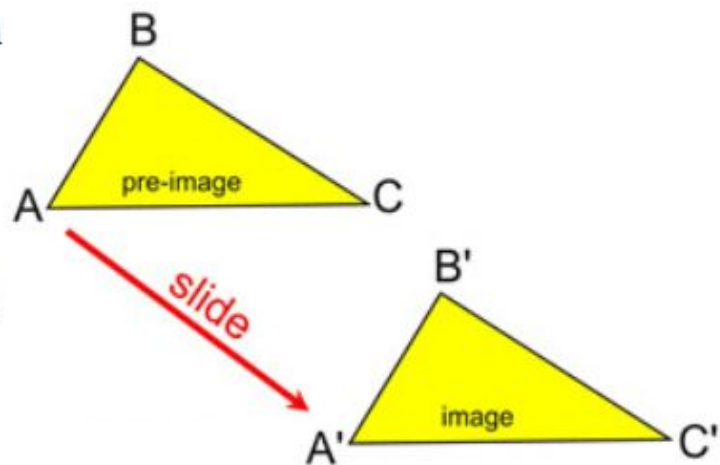
- the movement of an aircraft as it moves across the sky
- the lever action of a sink tap (faucet)
- sewing with a sewing machine
- punching decorative studs into belts
- throwing a shot-put

Reminder:

Translations are SLIDES!!

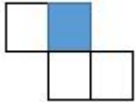
A **translation** moves ("slides") an object a fixed distance in a given direction without changing its size or shape, and without turning it or flipping it.

- The original object is called the **pre-image**, and the translation is called the **image**.
- The image is usually labeled using a *prime* symbol, such as  $A'B'C'$ .
- Translations may be described by their movement, such as 5 units to the right and 2 units down.
- An object and its translation have the **same shape and size**, and **face in the same direction**.
- In Latin, the word "translate" means "*carried across*".

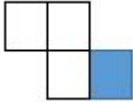


Which of these would correctly show a translation of the image?

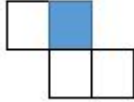
1. Original Figure



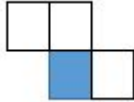
A



B



C



2. Original Figure



A



B



C



**Example 1:** Find the coordinates of the point  $(3, -5)$  after a translation 4 units to the right and 2 units down

**Think about it....**

- Moving a point 4 units right would be **positive 4 units on the x-axis.**
- Moving a point 2 units down would be moving **negative 2 on the y-axis**

$(3, -5)$  ← Original Point

$(3 + 4, -5 - 2)$  Add 4 to x value and subtract 2 from y value

$= (7, -7)$  ← New Point

Try these: On a separate sheet of paper, find the coordinates of each point after a translation of **4 units left** and **3 units up**. Answers on the next page.

A.  $(0, 5)$

B.  $(-2, -3)$

C.  $(4, -1)$

## Solution:

Try these: On a separate sheet of paper, find the coordinates of each point after a translation of 4 units left and 3 units up. (Notice this would be -4 on the x-coordinate and +3 on the y-coordinate)

A.  $(0, 5)$

$(0, 5)$  Original point

$(0 - 4, 5 + 3)$

$= (-4, 8)$  **Solution**

B.  $(-2, -3)$

$(-2, -3)$  Original point

$(-2 - 4, -3 + 3)$

$= (-6, 0)$  **Solution**

C.  $(4, -1)$

$(4, -1)$  Original point

$(4 - 4, -1 + 3)$

$= (0, 2)$  **Solution**



**Example 2:** Find the coordinates of the point  $(-3, -4)$  after a translation using the rule  $(x + 2, y + 6)$ . ← That's Translation Notation

1. Use the rule:  $(x, y) \rightarrow (x+a, y+b)$  For this example:  $(x, y) \rightarrow (x+2, y+6)$

2. Plug in the  $x$  and  $y$  values to find the translated point.

$$(-3, -4) \longrightarrow \begin{array}{l} x = -3 \\ y = -4 \end{array} \longrightarrow (-3+2, -4+6)$$

3. Use the given operations to find the next point.

$$(-3+2, -4+6) \longrightarrow (-1, 2)$$

Try these: On a separate sheet of paper, find the coordinates of each point after a translation of  $(x, y) \rightarrow (x-3, y+5)$ . Answers on the next page.

A.  $(8, 6)$

B.  $(-5, 3)$

C.  $(7, -2)$

## Solution:

On a separate sheet of paper, find the coordinates of each point after a translation of  $(x, y) \rightarrow (x-3, y+5)$ .

A.  $(8, 6)$

$(8, 6)$  Original point

$(8-3, 6+5)$

$= (5, 11)$  **Solution**

B.  $(-5, 3)$

$(-5, 3)$  Original point

$(-5-3, 3+5)$

$= (-8, 8)$  **Solution**

C.  $(7, -2)$

$(7, -2)$  Original point

$(7-3, -2+5)$

$= (4, 3)$  **Solution**

# Practice

*Answer Key provided on the next page*

**Find the coordinates of the points of each figure after the given translation.**

1) translation: 7 units right and 7 units down  
 $E(-2, 3)$

2) translation: 2 units left  
 $W(-1, 1)$

3) translation:  $(x, y) \rightarrow (x - 1, y - 3)$   
 $G(-1, 4)$

4) translation:  $(x, y) \rightarrow (x, y + 5)$   
 $U(5, 0)$

**Write a rule to describe each translation. Use words for #5-6, and translation notation for #7-8.**

5)  $D(-5, 1)$  to  $D'(-1, -5)$

6)  $S(2, 4)$  to  $S'(0, -4)$

7)  $G(-2, 0)$  to  $G'(-4, 0)$

8)  $U(-1, 5)$  to  $U'(5, 4)$

**Challenge: Find or write the coordinates of the points of each figure after the given translation.**

9) translation:  $(x, y) \rightarrow (x - 1, y + 2)$   
 $E(-3, -3), F(-2, 1), G(-1, -4)$

10)  $C(-3, -3), D(-3, 1), E(1, 0)$   
to  
 $C'(1, 1), D'(1, 5), E'(5, 4)$

# Practice *Answer Key*

**Find the coordinates of the points of each figure after the given translation.**

1) translation: 7 units right and 7 units down

$$E(-2, 3)$$

$$E'(5, -4)$$

2) translation: 2 units left

$$W(-1, 1)$$

$$W'(-3, 1)$$

3) translation:  $(x, y) \rightarrow (x - 1, y - 3)$

$$G(-1, 4)$$

$$G'(-2, 1)$$

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

$$U(5, 0)$$

$$U'(5, 5)$$

**Write a rule to describe each translation. Use words for #5-6, and translation notation for #7-8.**

5)  $D(-5, 1)$  to  $D'(-1, -5)$

translation: 4 units right and 6 units down

6)  $S(2, 4)$  to  $S'(0, -4)$

translation: 2 units left and 8 units down

7)  $G(-2, 0)$  to  $G'(-4, 0)$

translation:  $(x, y) \rightarrow (x - 2, y)$

8)  $U(-1, 5)$  to  $U'(5, 4)$

translation:  $(x, y) \rightarrow (x + 6, y - 1)$

**Challenge: Find or write the coordinates of the points of each figure after the given translation.**

9) translation:  $(x, y) \rightarrow (x - 1, y + 2)$

$$E(-3, -3), F(-2, 1), G(-1, -4)$$

$$E'(-4, -1), F'(-3, 3), G'(-2, -2)$$

10)  $C(-3, -3), D(-3, 1), E(1, 0)$

to

$$C'(1, 1), D'(1, 5), E'(5, 4)$$

translation:  $(x, y) \rightarrow (x + 4, y + 4)$

# Additional Resources:

[Translations Lesson and Additional Practice](#)

[Translate Points](#)