Transformations--Translation **8. G.3** **Saturday, October 25, 2014**

Name: _____ Class: _____ Date: _____

Lesson 2: Translation (Slide)

OBJECTIVES: SWBA to

Describe of a translations on two-dimensional figures using coordinates. **(8. G.3)**

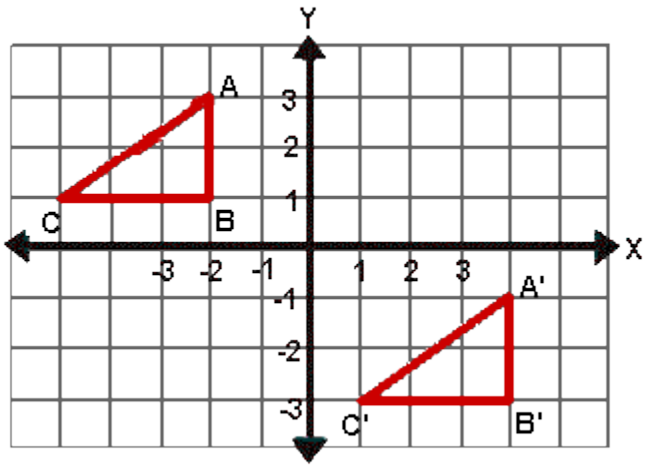
INTRODUCTION

Last week we talked about how geometric transformations are integral parts of our daily lives. Last week we focused on reflection. Today we will talk about translation. The word "translation" means "move" without rotating, shrinking, enlarging, or changing orientation—just moving! Translation is one of the most common transformations in our daily lives. For instance, some professions use geometry translations in order to do their job properly. For example, computer imaging, something that is used nowadays for creating animations, video games, designing is created using the geometrical concepts of transformations. Also, translations are used in mapping. Mapping is an essential element in professions such as surveying, navigation, and astronomy. From sketching to calculating distances, they use transformations—reflections, translations, rotations, and dilations to accomplish their job. In addition, professions such as medicine benefit from geometric imaging. Technologies such as CT scans and MRIs, which are used both for diagnosis and surgical aids, employ a lot of geometric transformations.

MINI-LESSON/Vocabulary (I DO):

Today, we are going to explore the geometric transformation called translation or slide. To translate or slide a shape or object I simply move every point of the shape in the **same distance** and in the same **direction!** The move can be one-directional or dual-directional. That is, I can move the coordinates of each point in either one or two directions: right and down, or right and up, or left and down, or left and up. And again, just like in a reflection, the object or shaper or original picture is called the ***pre-image*** and the shape or object or image resulting from the translation is called the ***image***. The image is always label using the ***prime notation*** (`).

Let me show you with an example.



Every vertex or corner in the pre-image or triangle ABC was translated 7 units to the right and 4 units down.

This is notation used to express a translation of 7 units to the right and 4 units down on a given point or vertex in the pre-image ABC:

P (x, y) ----------→P'(x +7, y-4)

We add or subtract to the x-coordinate if I move to the right (+) or to the left (-). I add to the y-coordinate if I move up (+) or down

I add x +7, because I am translating triangle ABC 7 units to the right.

I a subtract y-4, because I am translating triangle ABC 4 units down.

This is a two-step translation because I moved the pre-image in two directions.

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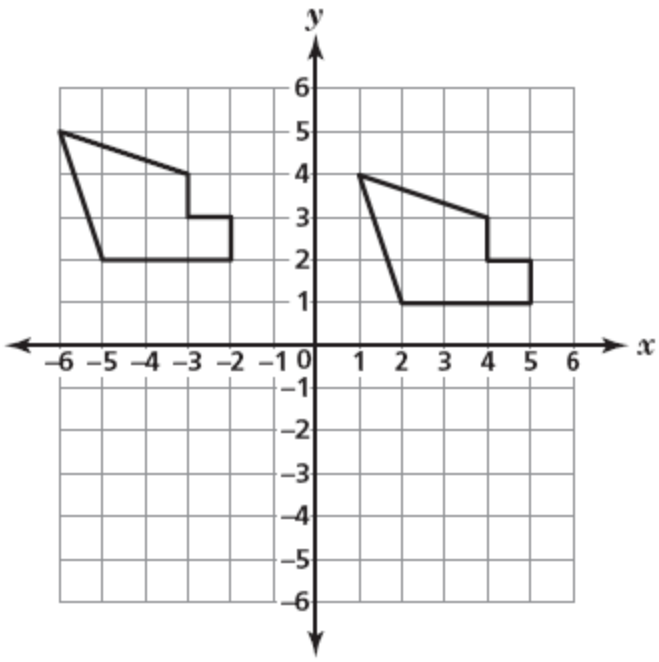
Guide Practice (We do):

Which term **best** describes the transformation shown below?



Solution: Ask these questions:

Q 1: Did the shape change orientation?

> **Answer:** No. This means that the transformation is not reflection because reflect reverse the pre-image. It is neither a rotation because rotation changes the direction of the pre-image.

Q2: Did the image changed size?

> **Answer:** No. Therefore, the transformation cannot be dilation.

Therefore, we can conclude that the transformation is a ***translation***. Yep. This pre-image, whichever you want it to be, say the figure in quadrant #1, was translated 7 units to the left and 1 unit up.

So the notation look like this: P (x, y) →P'(x-7, x+1). Remember, x is either going to the right (+) or left (-), and y is going either up (+) or down (-).

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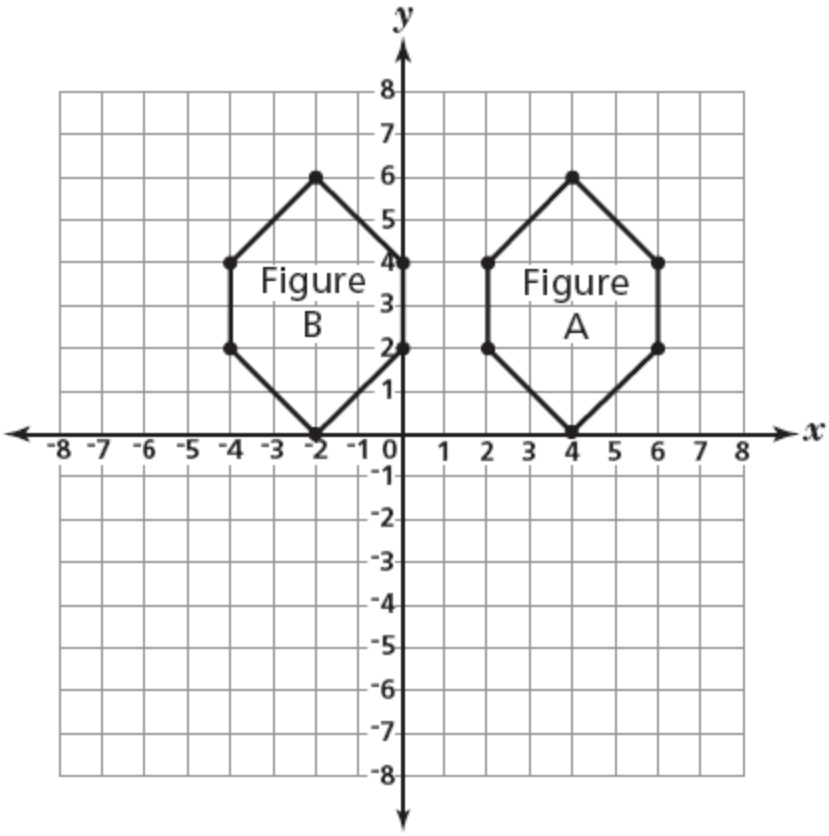
Summarize what you have taught the students one more time—Assess for understanding by show of thumbs up/down

Independent Practice (We Do):

Problem 1:

Ana drew two figures on the coordinate grid shown below.



Which transformation did Ana apply to Figure A to get Figure B?

Explain:

_____

_____

_____

What is the notation used to represent this transformation?

P (x, y) → P' (,)

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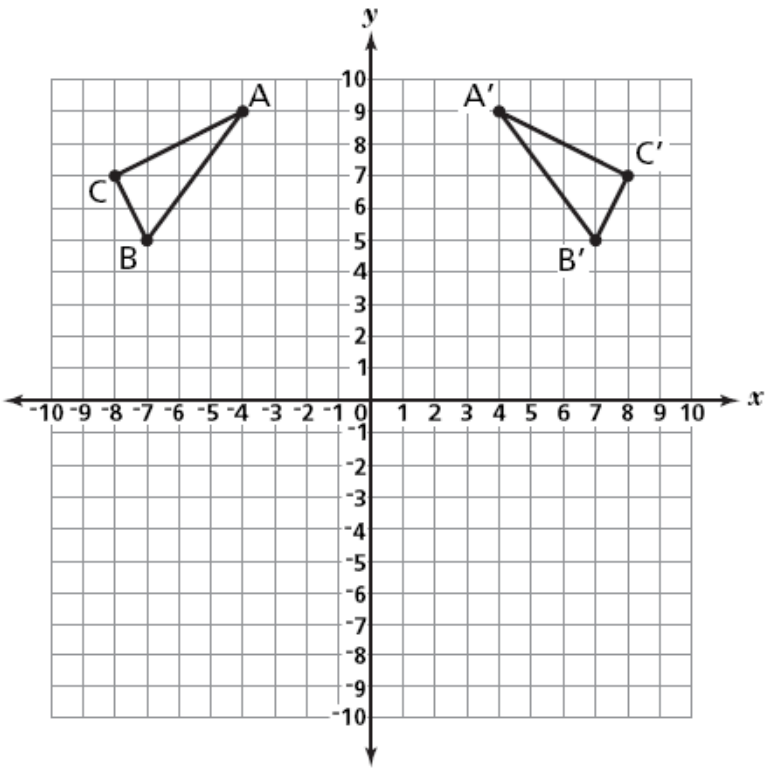
Problem 2:

Triangle ABC and triangle A′B′C′ are plotted on the coordinate plane below.



What is the name of the transformation applied to triangle ABC that resulted in triangle A′B′C′ ?

Answer _____

On the lines below, describe how the coordinates of point A changed to the coordinates of point A′.

_____

_____

_____

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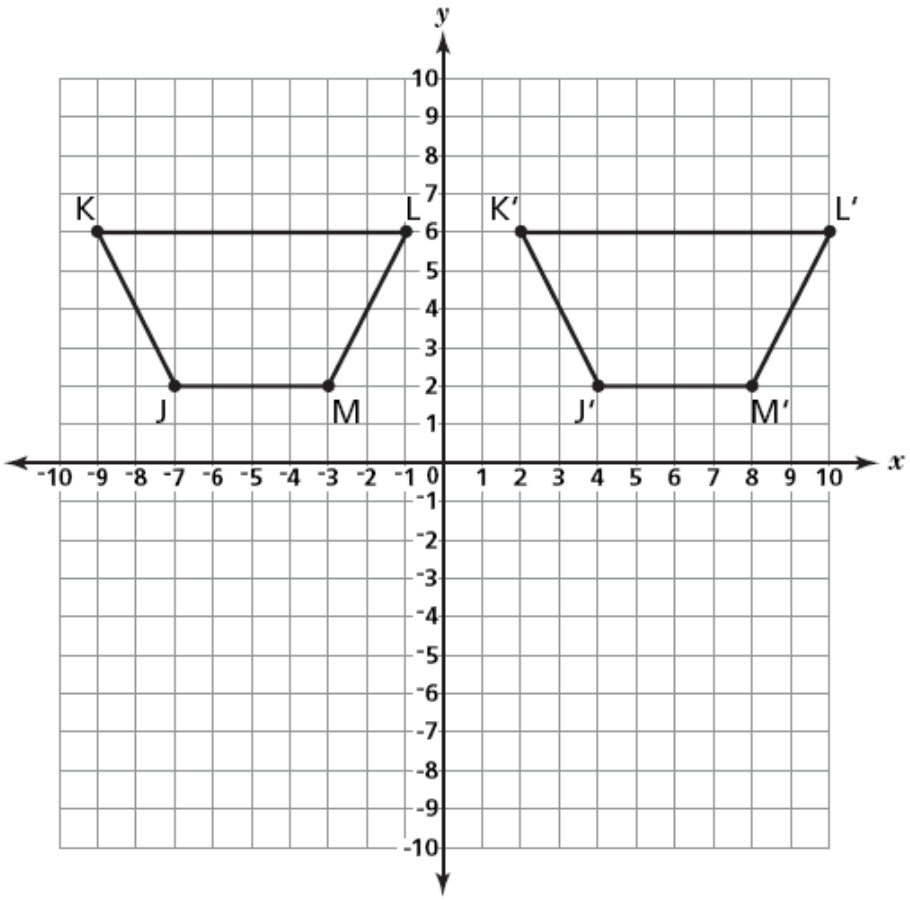
Problem 3:

Trapezoid JKLM and its transformation trapezoid J'K'L'M' are plotted on the grid below.



Part A

Name the transformation that was applied to trapezoid JKLM to get trapezoid J'K'L'M'.

Answer _____

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Part B

On the lines below, explain how you determined what transformation was applied to trapezoid JKLM to get trapezoid J'K'L'M'.

_____

_____

_____

_____

_____

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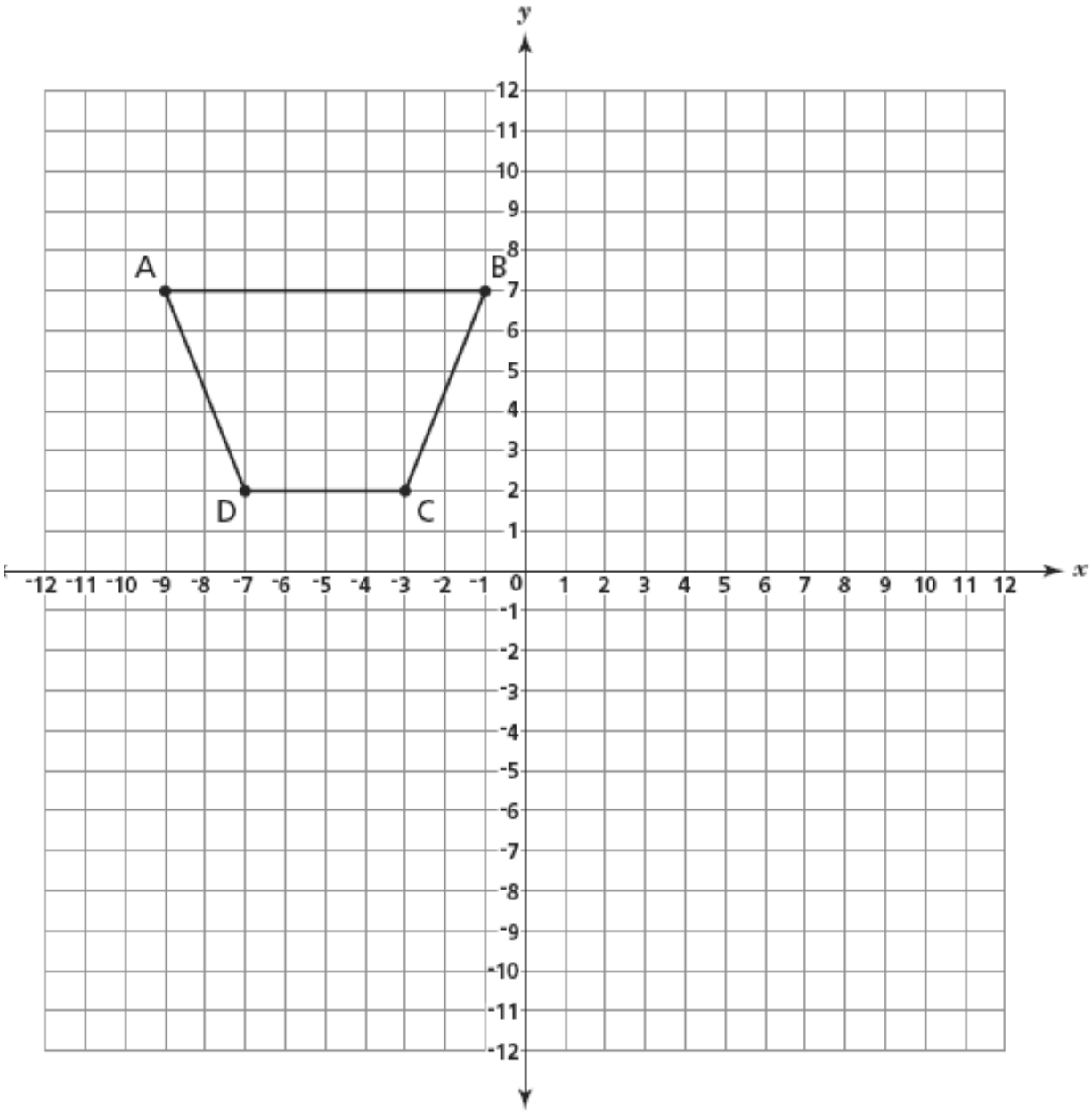
Problem 4:

Shawn drew figure ABCD. He plans to create figure A'B'C'D' by translating figure ABCD 6 units down and 4 units to the right. On the coordinate plane below, draw and label Shawn's figure A'B'C'D'.



Next Shawn plans to create figure A"B"C"D" by translating figure A'B'C'D' 2 units up and 8 units to the right. What will be the coordinates of point A"?

Answer _____

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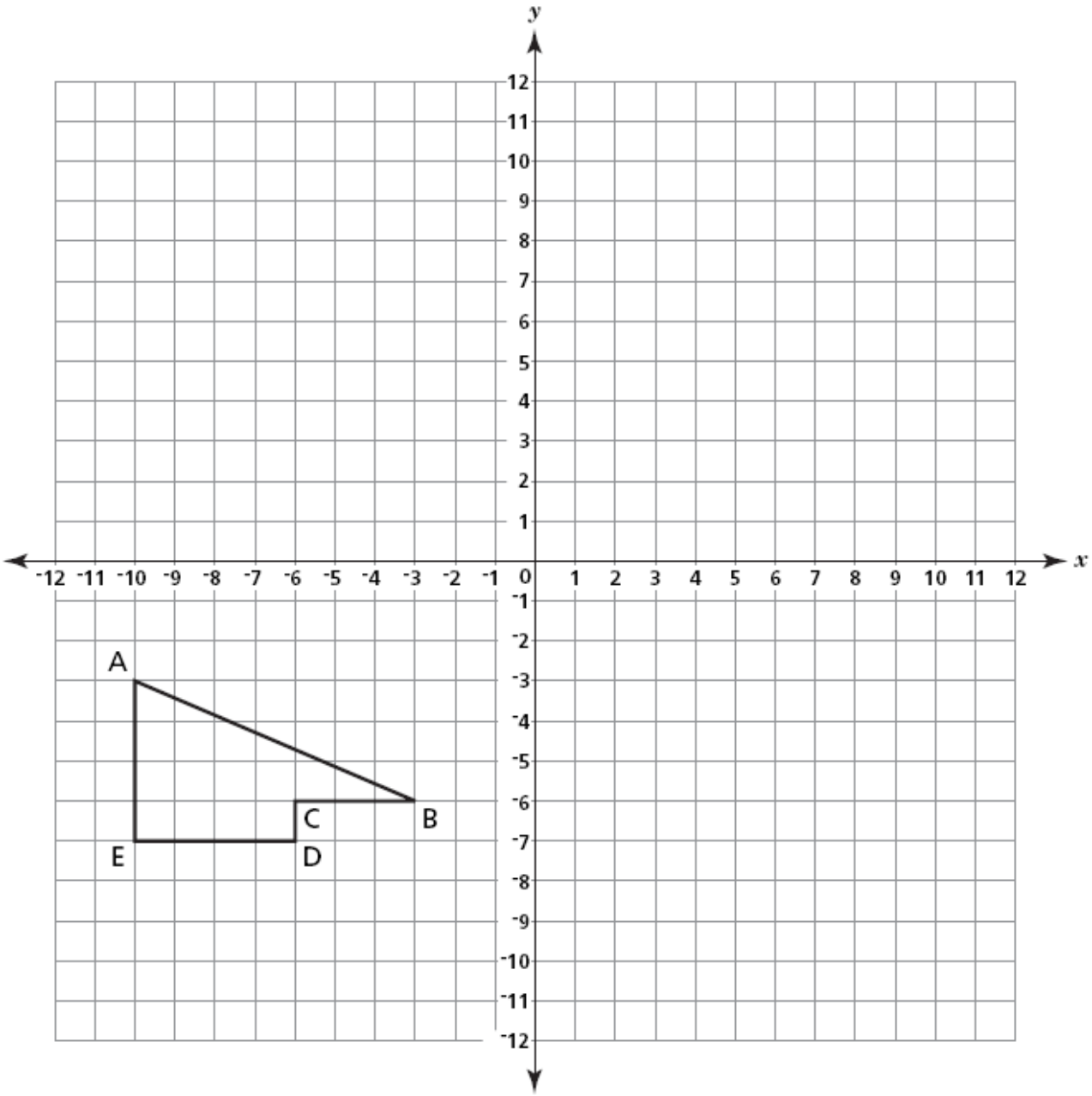
Problem 5:

On the coordinate plane below, draw the image of polygon ABCDE translated 8 units to the right and 4 units up. Label the image A′B′C′D′E′.



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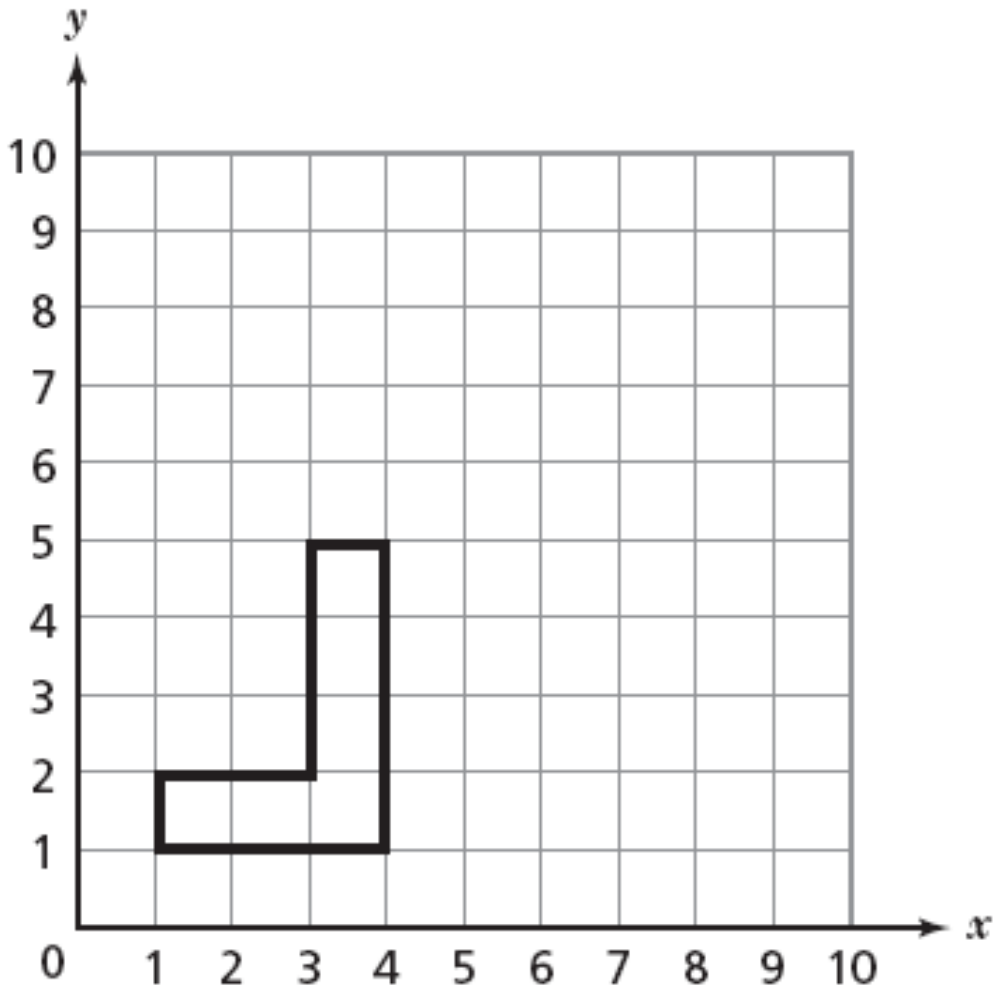
Problem 6:

Shane uses a grid to decide how to arrange his living room furniture. The shape and position of Shane's sofa are shown on the grid below. He moves the sofa 4 units to the right and 2 units up. On the grid below, draw the new location of Shane's sofa.



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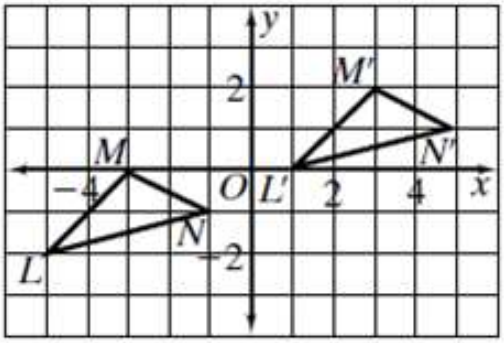
Problem 7:

Write a description of the rule $(x, y) \rightarrow (x-7, y+4)$.

A translation 7 units to the right and 4 units up
B translation 7 units to the left and 4 units down
C translation 7 units to the right and 4 units down
D translation 7 units to the left and 4 units up

Problem 8:

Write a general rule which describes the translation shown below. ΔLMN is the original triangle.



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

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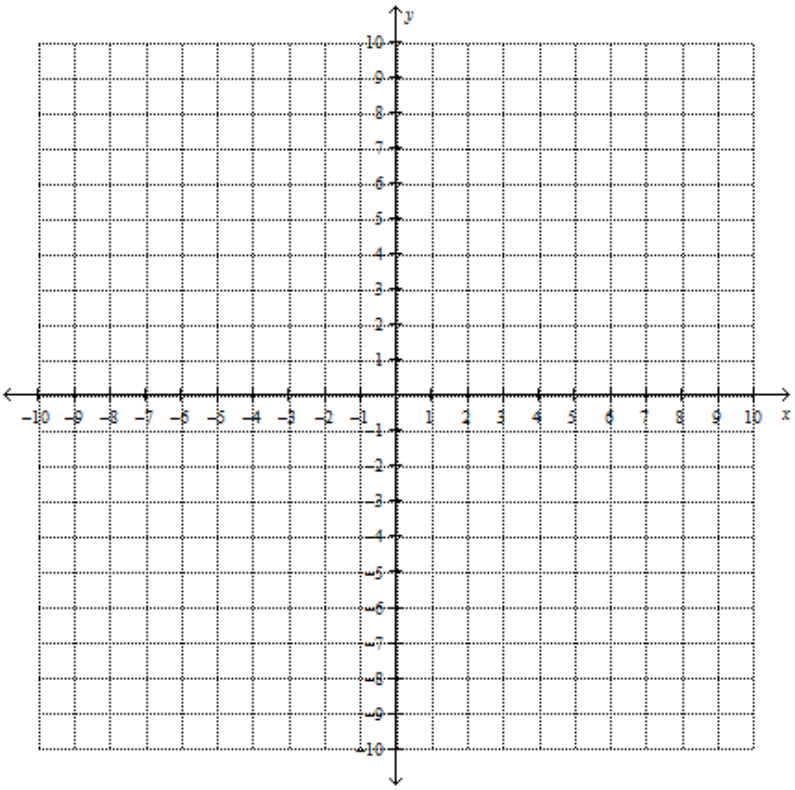
Problem 9:

ΔJKL has coordinates J (0, 2), K (3, 4), and L (5, 1).

a) Draw ΔJKL.

b) Draw the image $\Delta J'K'L'$ after a translation of 4 units to the left and 5 units up. Label the triangle.



What are the coordinates of?

J (0, 2) → J' _____

K (3, 4) → K' _____

L (5, 1) → L' _____

Rule: (x, y) → (,)

Tell me more about this figure, is it congruent or similar? Explain how you know.

Translation Location

	Add	Subtract
x coordinate		
y coordinate		

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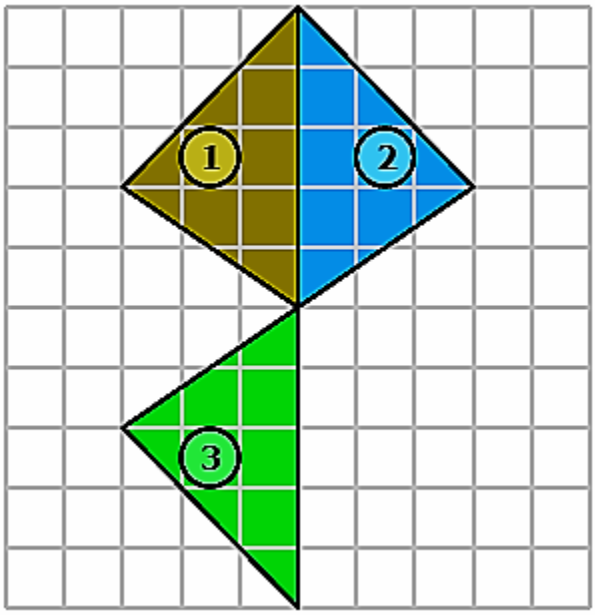
Problem 10: Challenge

Study the picture below.



What combination of transformations can be used to get from 1 to 2 to 3? Explain the steps you took to get from 1 to 2 to 3.

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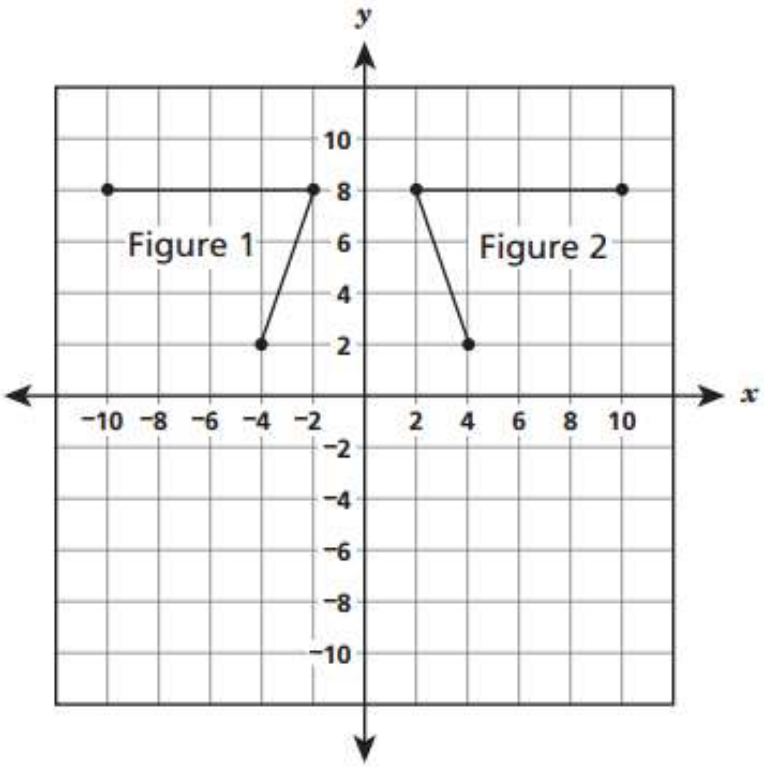
Let's Review what we have learned so far.

Problem 11:

Figure 1 can be transformed to create Figure 2 using a single transformation.



Which transformation can be used to accomplish this?

A dilation

B rotation

C reflection

D translation

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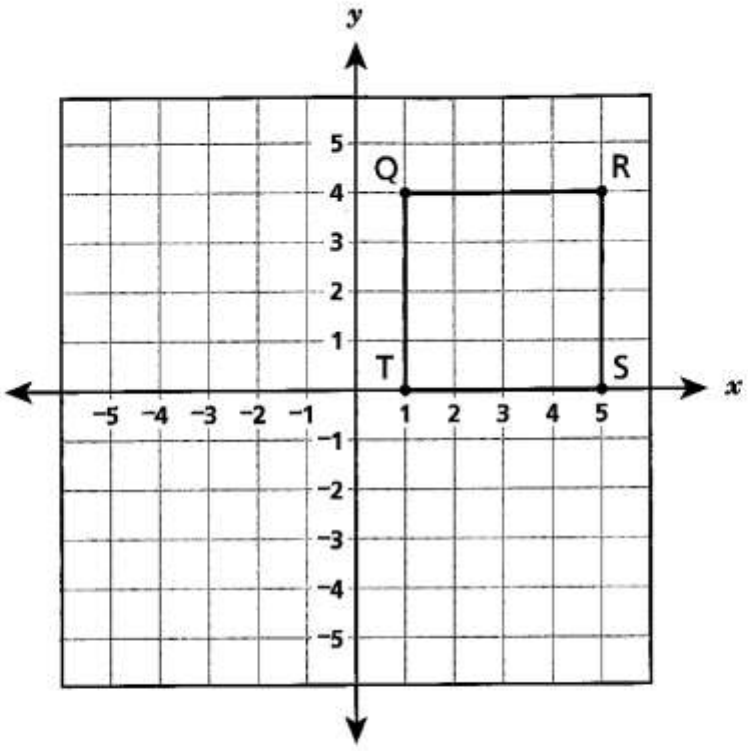
Problem 12:

Paul transformed square QRST to create square Q'R'S'T'.



After the transformation, vertex Q' was located at (−1, −4) and vertex R' was located at (−5, −4). Which transformation could Paul have applied?

A a translation 2 units left and 8 units down

B a translation 8 units down and 10 units left

C a reflection over the *x*-axis and then a translation 2 units left

D a reflection over the *x*-axis and then a reflection over the *y*-axis

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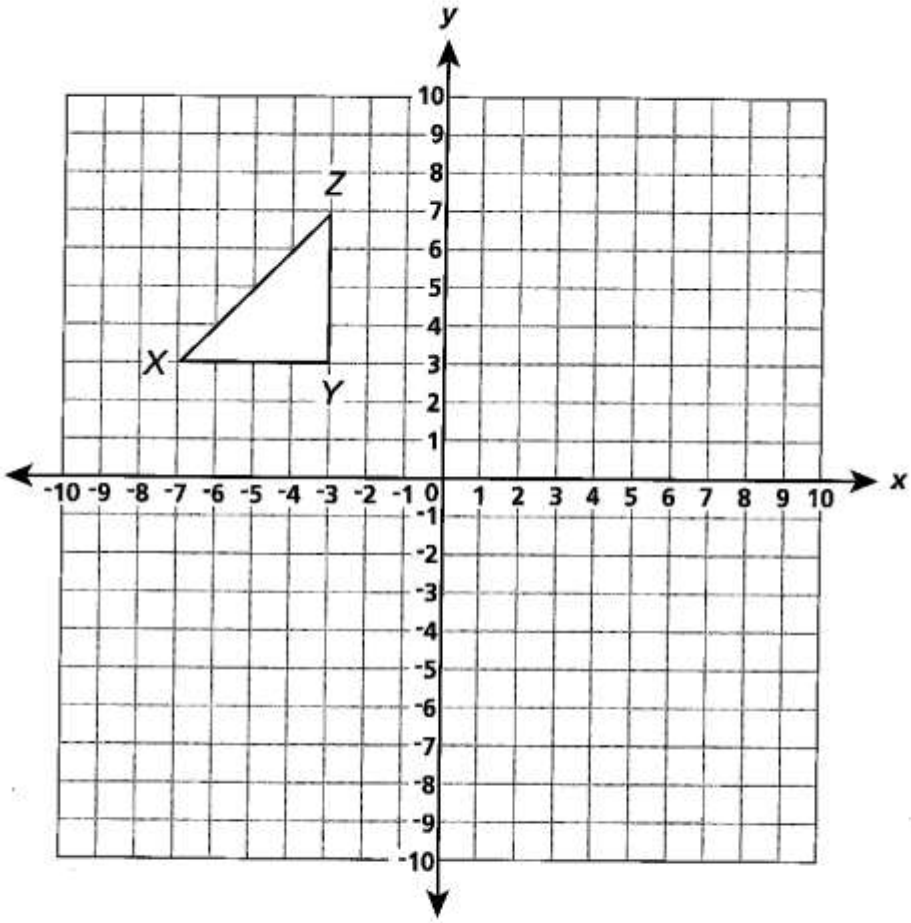
Problem 13:

Giselle will transform $\triangle XYZ$, shown below, using only rotations, reflections, and translations.



The vertices of $\triangle XYZ$ have integer coordinates. What is the length of the image of $\overline{XY}$ after Giselle transforms the figure?

A any length less than 4 units

B exactly 4 units

C any length greater than 4 units

D any length

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Final Summary

In a U-Shape:

1. Re-state the objective to assess if students learn it
2. Elicit from students what they have learned and what they want to learn more about.
3. Tie what they learn to the lesson, and upcoming lessons (Next Saturday, they will learn about rotations)