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**Lesson 3: Translation (Slide)**

**OBJECTIVES: SWBA to**

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

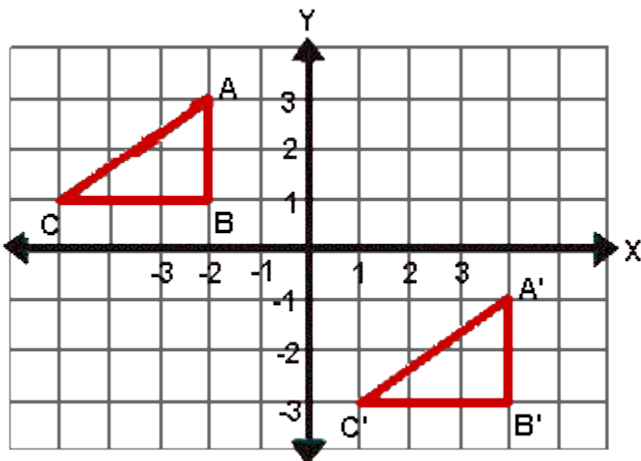
**INTRODUCTION**

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:

$$P(x, y) \longrightarrow P'(x + 7, y - 4)$$

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

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

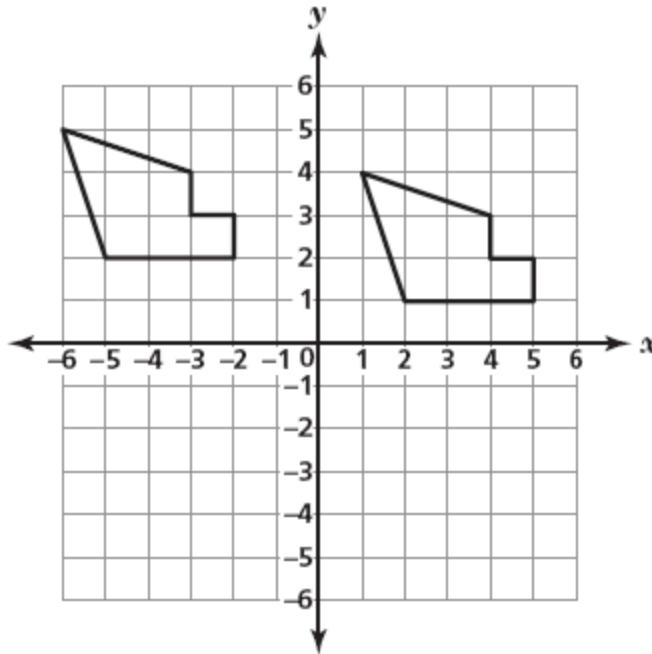
I subtract y - 4, because I am translating triangle ABC 4 units down.

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.

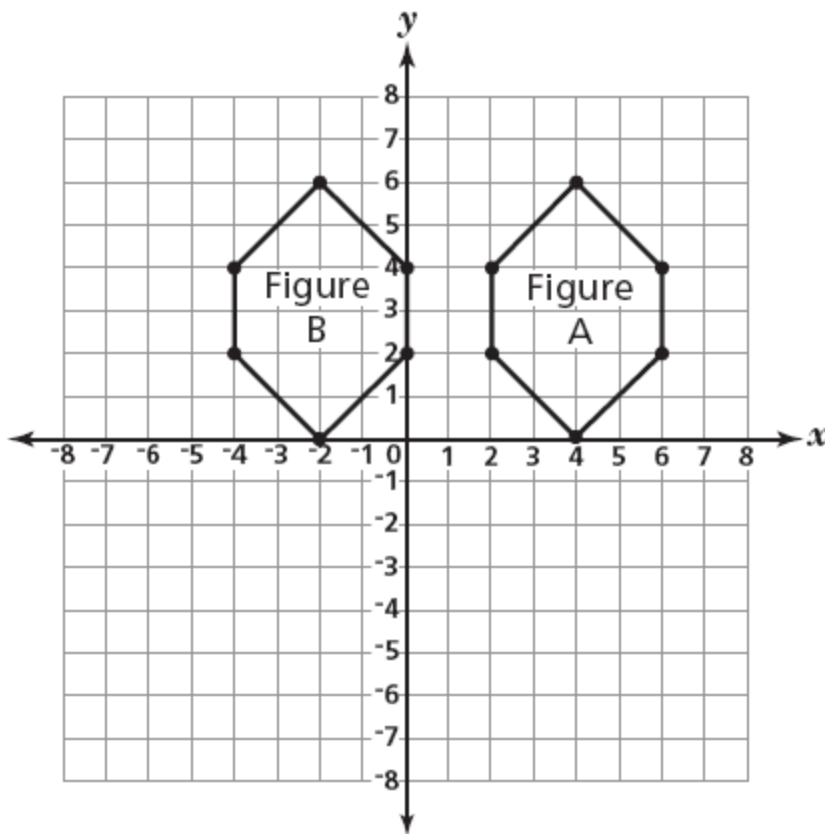
Therefore, we can conclude that the transformation is a **translation**. Yep. This pre-image, whichever you want it to be, say the figure in quadrant #1, was translated 7 units to the left and 1 unit up.

So the notation look like this:  $P(x, y) \rightarrow P'(x-7, x+1)$ . 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:

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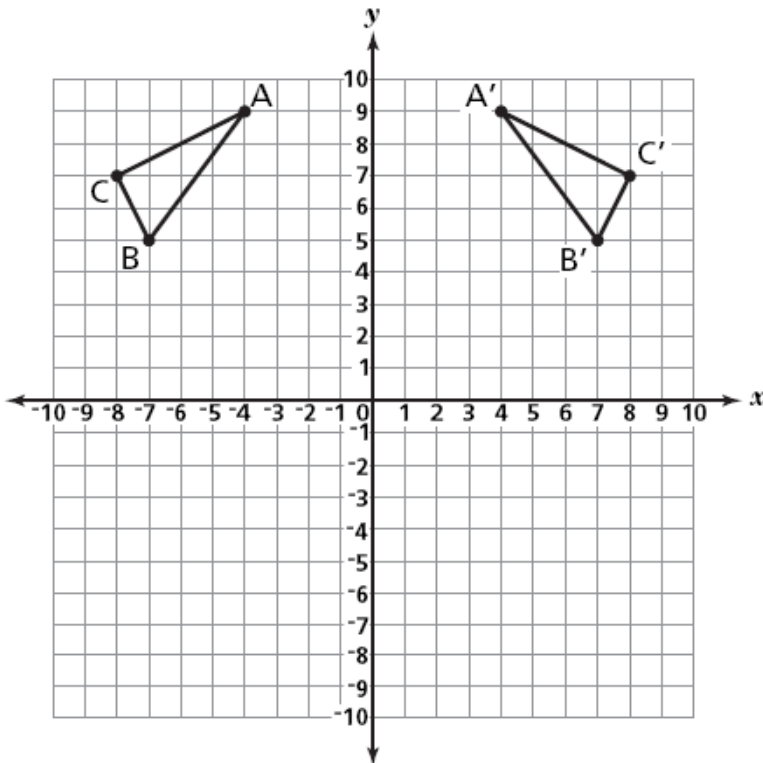
What is the notation used to represent this transformation?

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

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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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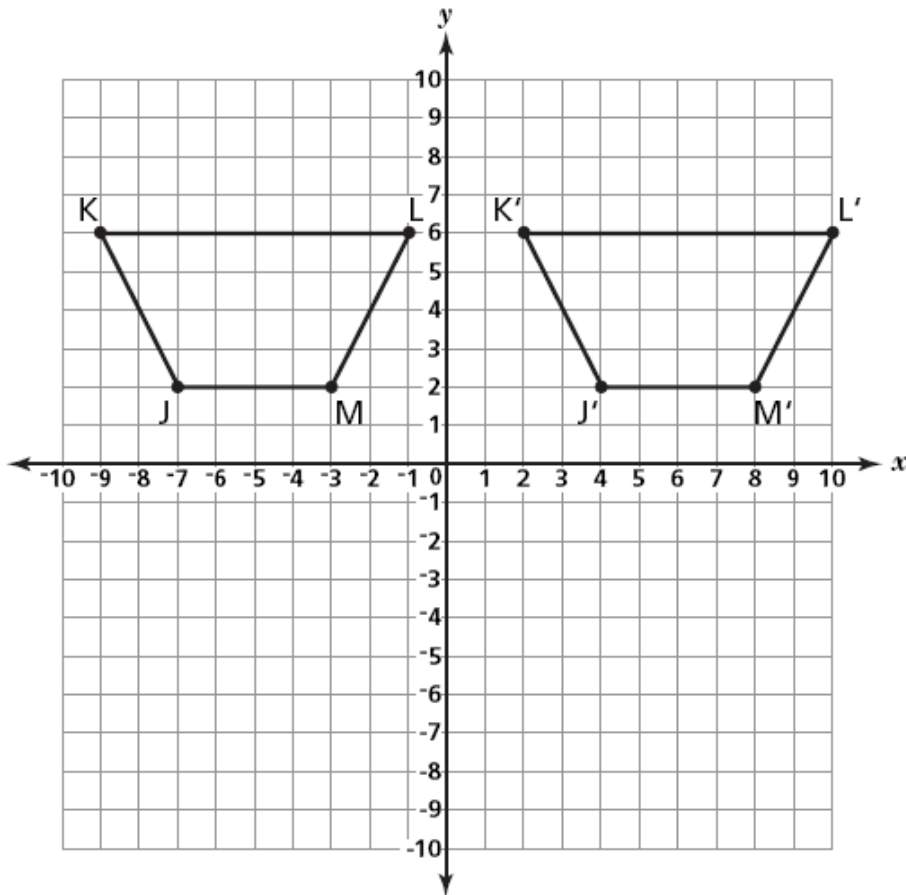
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**Problem 3:**

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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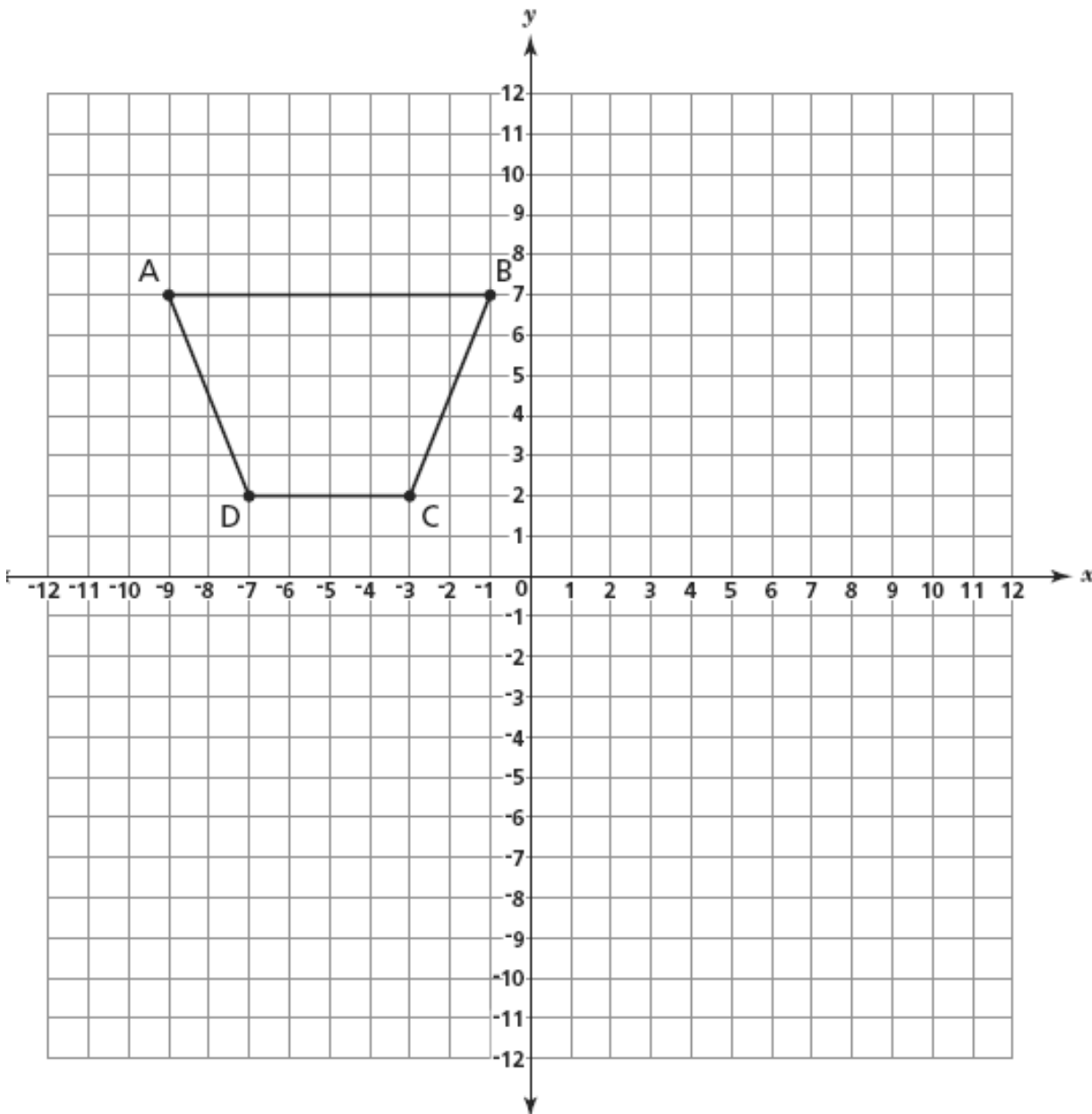
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**Problem 4:**

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'.



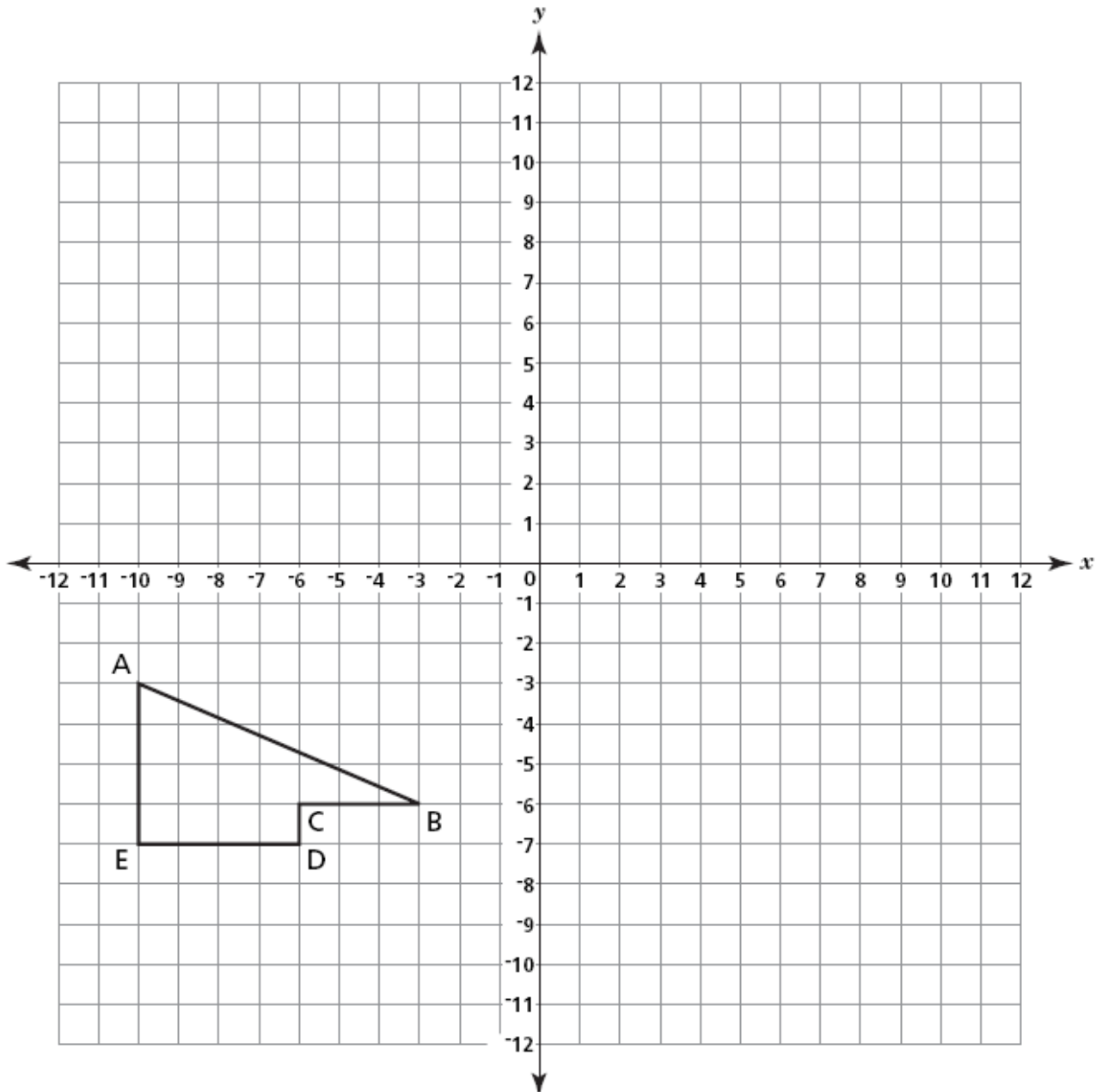
Next Shawn plans to create figure A''B''C''D'' by translating figure A'B'C'D' 2 units up and 8 units to the right. What will be the coordinates of point A''?

**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  $A'B'C'D'E'$ .

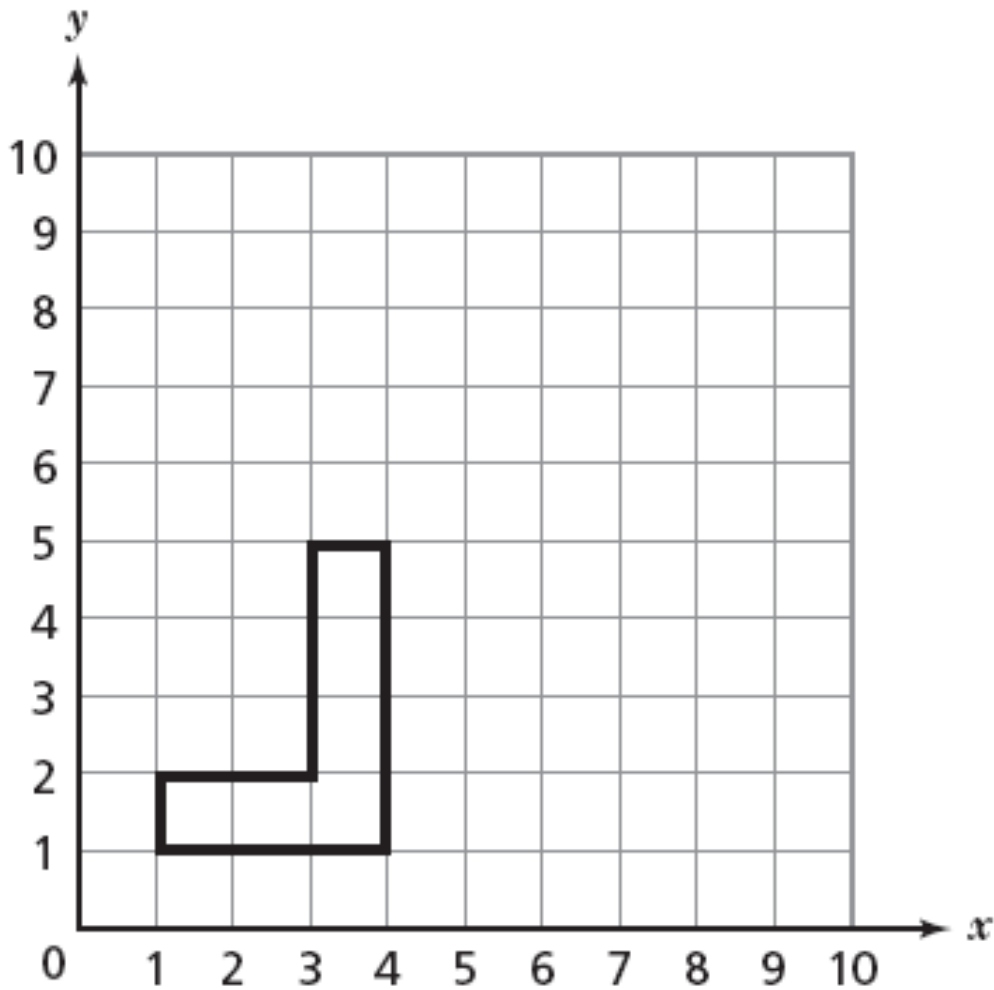




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**Problem 6:**

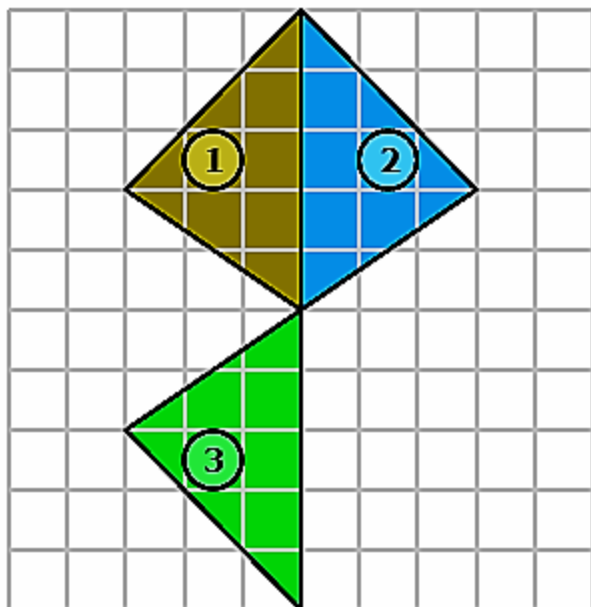
Shane uses a grid to decide how to arrange his living room furniture. The shape and position of Shane's sofa are shown on the grid below. He moves the sofa 4 units to the right and 2 units up. On the grid below, draw the new location of Shane's sofa.



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**Problem 7: 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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**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)