Geometry

Transformations

Ch. 9 Handout 9.1

Transformation

A **transformation of a geometric figure is a change in its position, shape, or size. For example, when you assemble a jigsaw puzzle, you often move the puzzle pieces by **flipping them**, **sliding them**, or **turning them**. Each move is a type of transformation.

In a transformation, the **pre-image is the original figure and the resulting figure is an **image**. An **isometry** is a transformation in which the pre-image and image are congruent.

Four types of Transformation

1. Translations -- move pre-image up, down, or sideways
2. Reflections -- reflected image in a mirror appears "backwards"
3. Rotations -- spin around a center
4. Enlargements -- make pre-image bigger or smaller

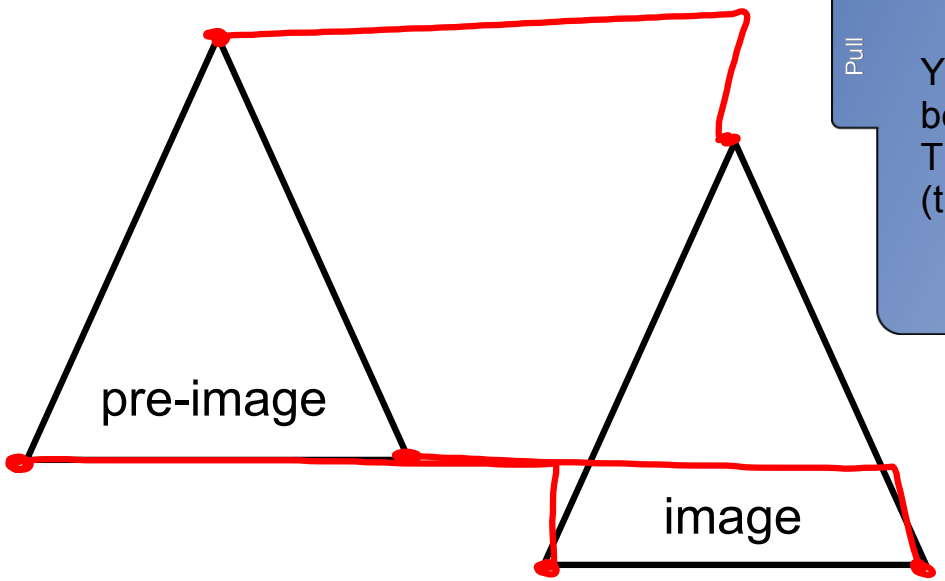
Translation

A **translation** is a transformation consisting of a constant offset with no rotation or distortion. In other words, a **translation** is a transformation in which a geometric figure is "moved" so that it is not turned or changed in any way. A **translation** (slide) is an isometry that maps all points of the figure the same distance in the same direction.

-- movement will be up, down, or sideways

-- translated shape should be congruent to the original shape

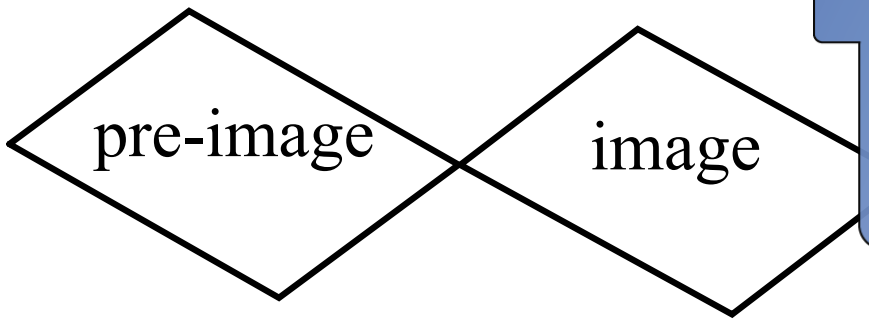
Does the transformation appear to be an isometry and what type of transformation is this?



Pull

Yes, corresponding parts appear to be congruent.
The transformation is a slide (translation).

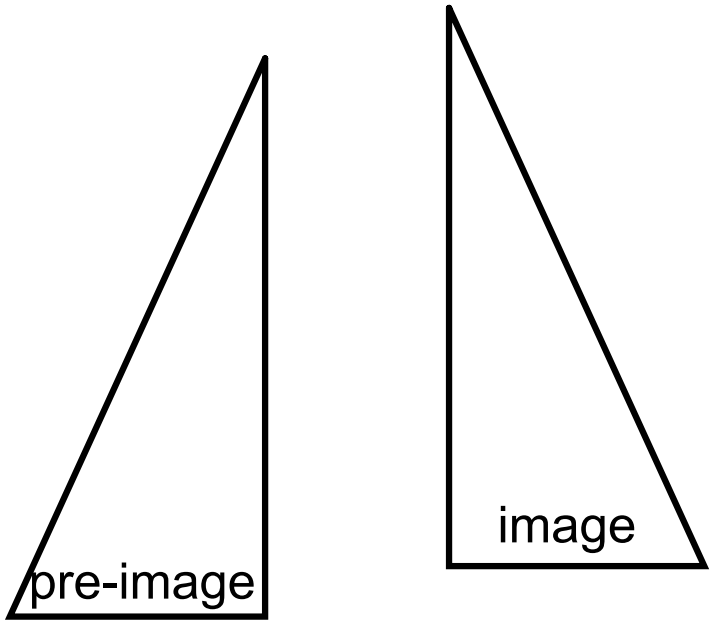
Does the transformation appear to be an isometry and what type of transformation is this?



Pull

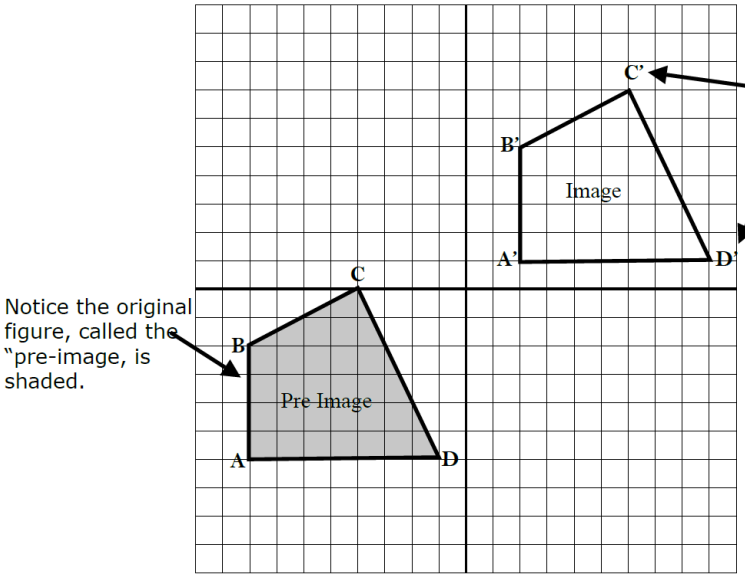
Yes, corresponding parts appear to be congruent.
The transformation is a flip (translation).

Does the transformation appear to be an isometry and what type of transformation is this?



Pull

Here is some of the language of transformations. Complete each sentence.



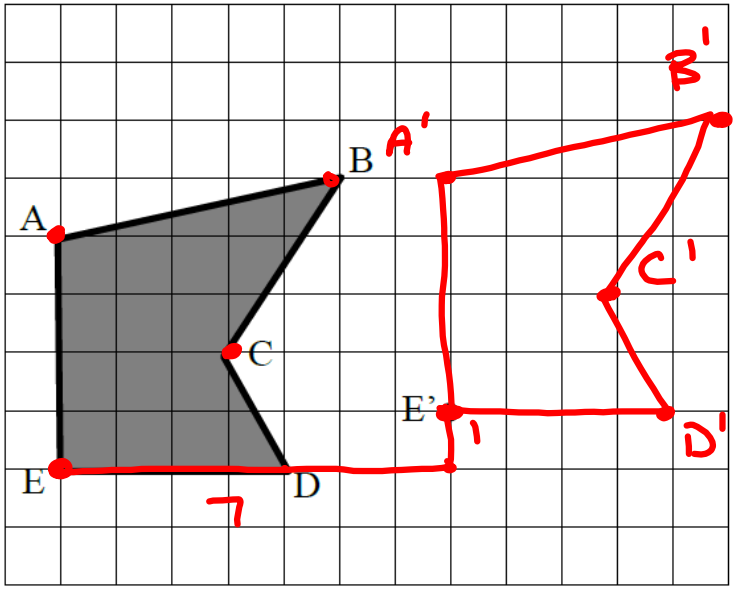
Notice the translated figure, called the "image," is labeled A' B' etc. We say "A Prime" "B prime" etc.

Notice the original figure, called the "pre-image, is shaded.

2. A is taken to A'.
3. $\overline{CD}$ is taken to $\overline{C'D'}$.
4. B maps to B'.
5. $\triangleleft BCD$ maps to $\triangleleft B'C'D'$.
6. C` is the image of C.
7. A`B`C`D` is the image of ABCD.
8. Does the image of ABCD appear to be isometric? yes ($\cong$).

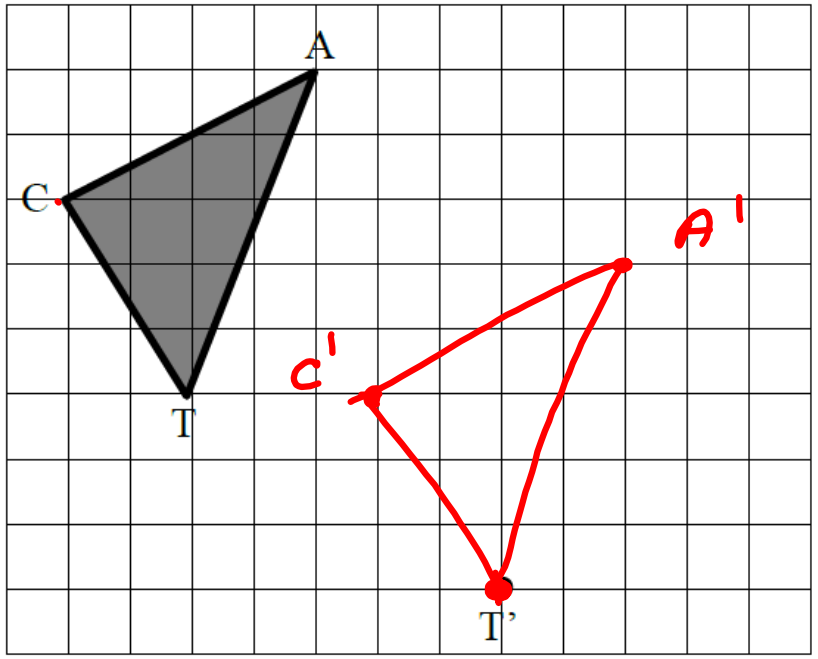
Perform each translation.

9. Translate ABCDE $\rightarrow$ A`B`C`D`E`

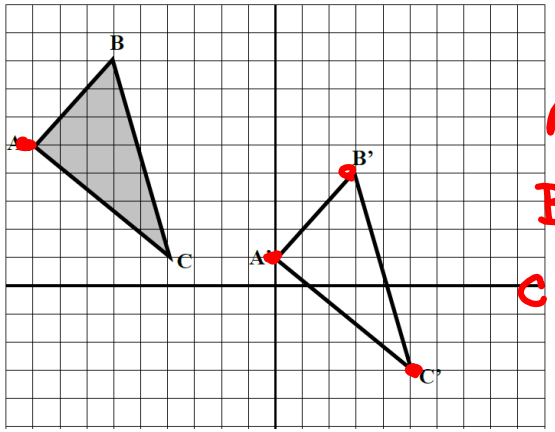


Perform each translation.

10. Translate CAT C`A`T



A translation can be expressed by a function. Look at the triangle below. It has been translated according to the following function: (x, y) (x + 9, y - 4) That is to say, that each point of the triangle has been translated 9 in the x direction (to the right), and -4 in the y direction (down).



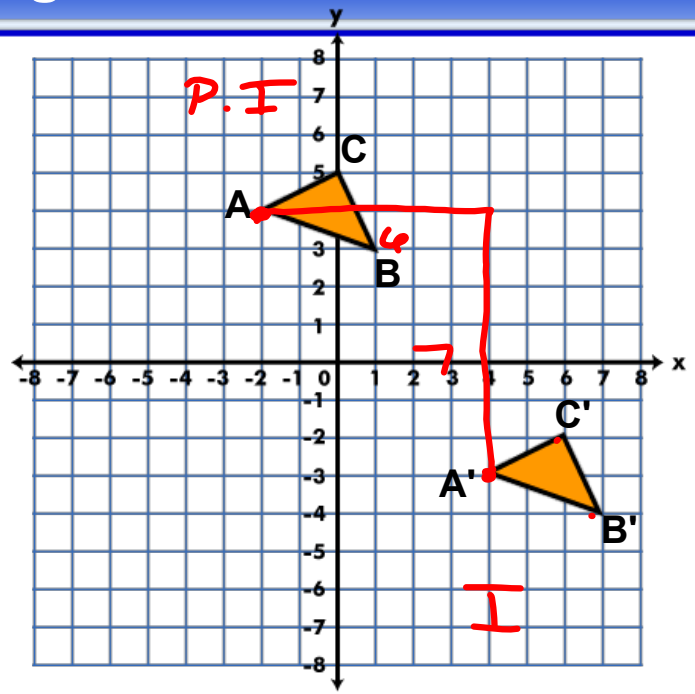
$(x, y) \rightarrow (x+9, y-4)$

$A(-9, 5) \rightarrow (-9+9, 5-4) \rightarrow A'(0, 1)$

$B(-6, 8) \rightarrow (-6+9, 8-4) \rightarrow B'(3, 4)$

$C(-4, 1) \rightarrow (-4+9, 1-4) \rightarrow C'(5, -3)$

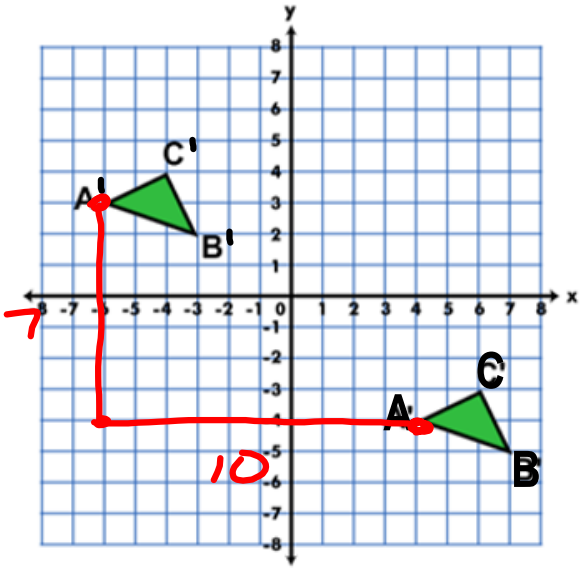
Describe this transformation and then write a geometric function that describes each translation.



$(x, y) \rightarrow (x+6, y-7)$

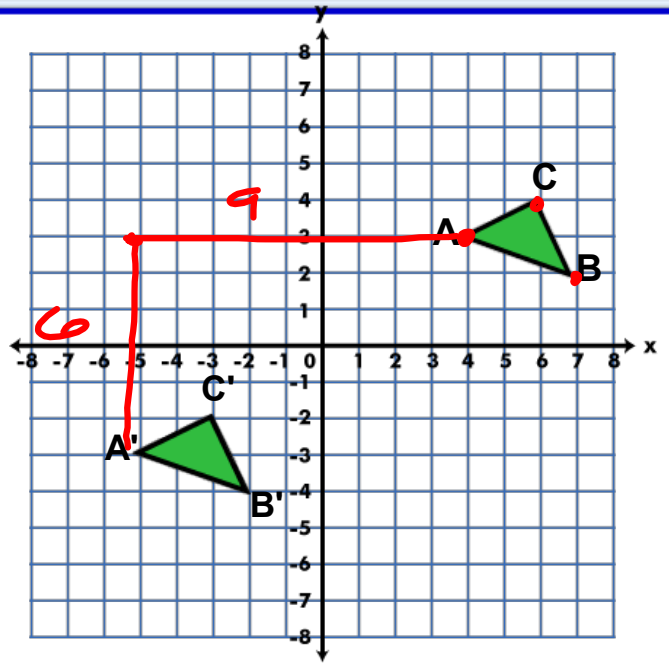
Describe this translation and then write a geometric function that describes each translation.

$(x, y) \rightarrow (x - 10, y + 7)$



Describe this translation and then write a geometric function that describes each translation.

$(x, y) \rightarrow (x - 9, y - 6)$



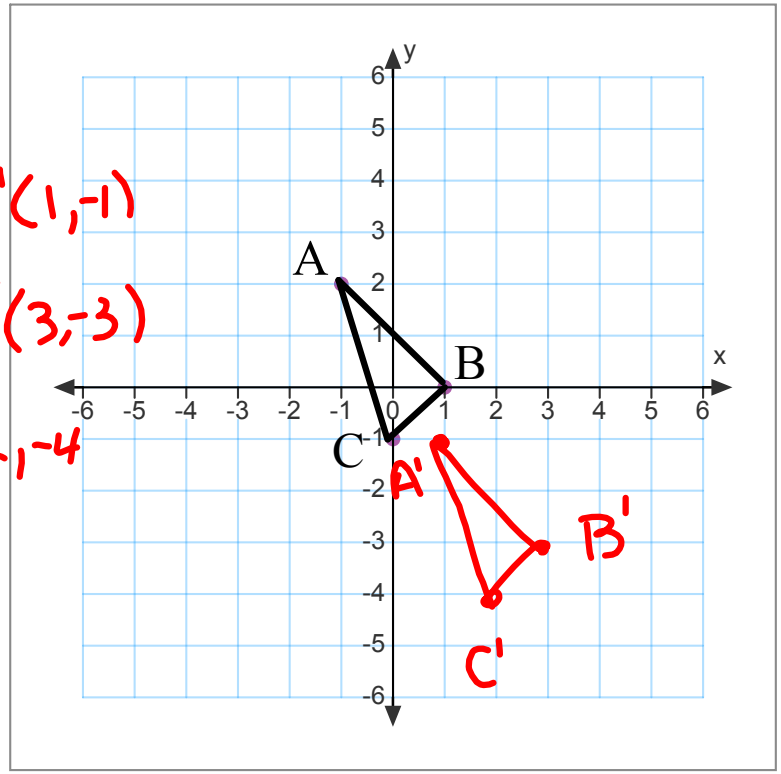
Find the image of ΔABC under the translation.

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

A(-1, 2) → (-1+2, 2-3) → A'(1, -1)

B(1, 0) → (1+2, 0-3) → B'(3, -3)

C(0, -1) → (0+2, -1-3) → C'(2, -4)



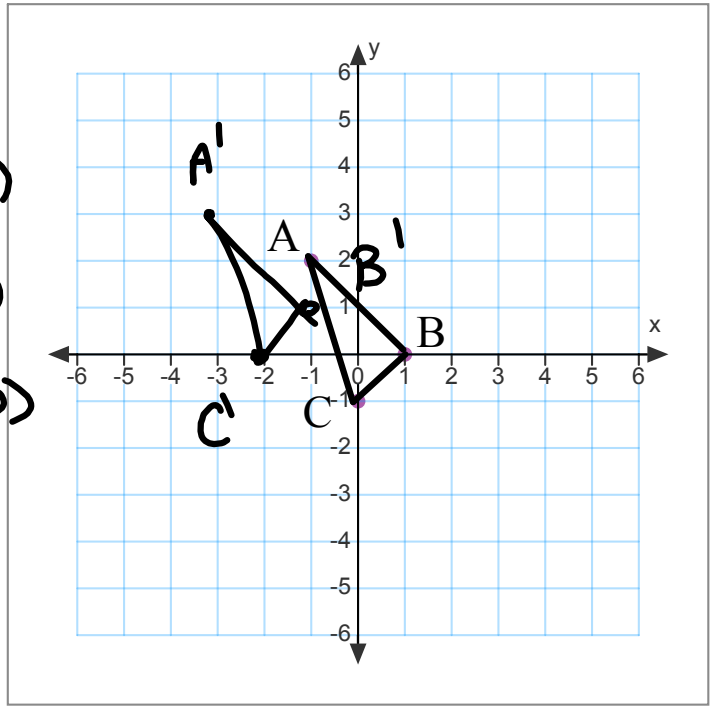
Find the image of ΔABC under the translation.

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

$A(-1,2) \rightarrow (-1-2, 2+1) \rightarrow A'(-3,3)$

$B(1,0) \rightarrow (1-2, 0+1) \rightarrow B'(-1,1)$

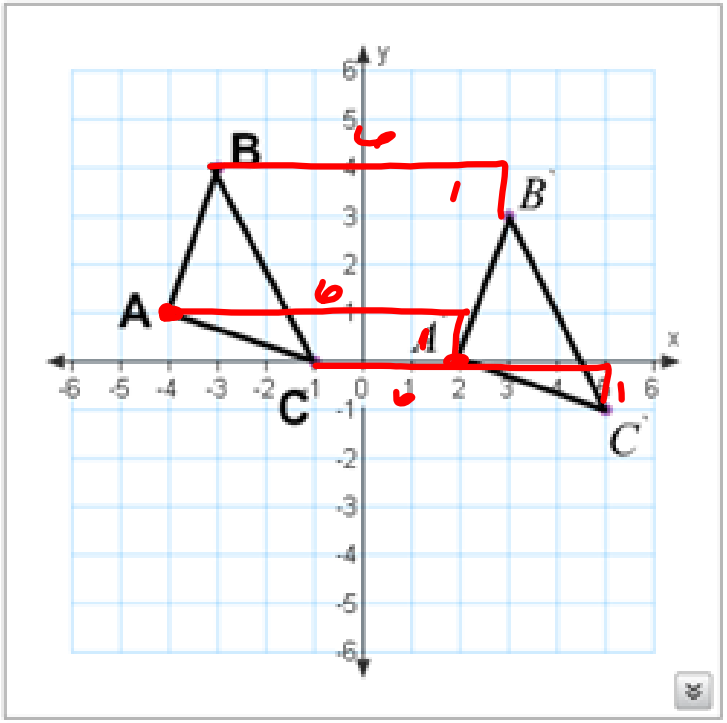
$C(0,-1) \rightarrow (0-2, -1+1) \rightarrow C'(-2,0)$



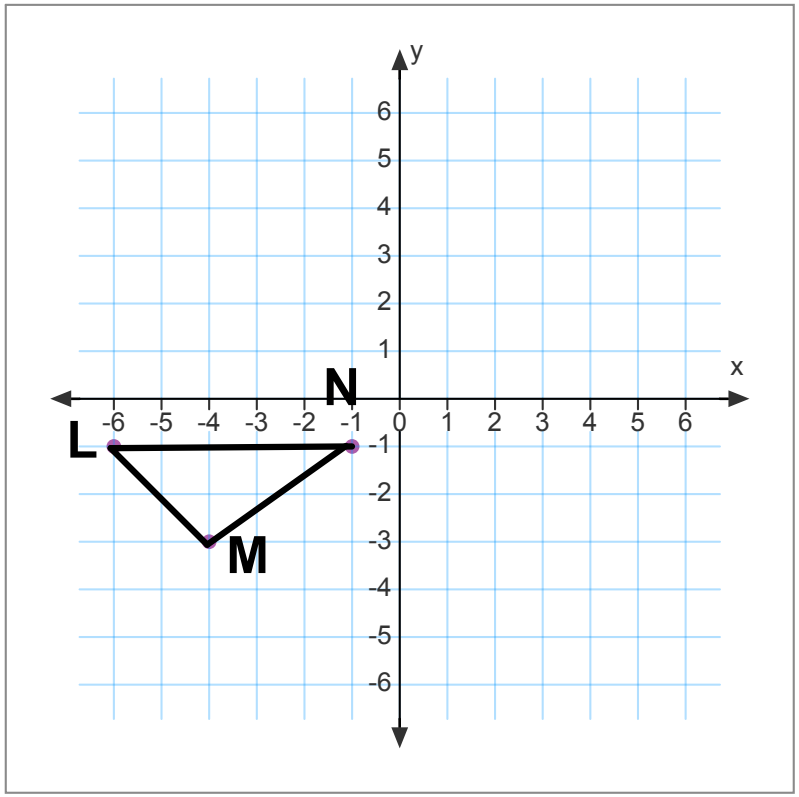
Writing a rule to describe a translation:

Write a rule to describe the translation $\Delta ABC \rightarrow \Delta A`B`C`$.

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



Use the rule $(x, y) \rightarrow (x+7, y-1)$ to find the translation image of ΔLMN. Graph the image $\Delta L`M`N`$.



Attachments

Translation.pdf