

*Analytic Geometry**February 1, 2016*

Describing Rigid Motions and Predicting the Effects

EQ: What are the differences between rigid and non-rigid motions?

MCC9-12.G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Feb 10-4:01 PM

Key Concepts:

Rigid motions are transformations that don't affect an object's shape and size.

Examples of rigid motions are translations, reflections, and rotations.

Transformations that are non-rigid motions includes dilations, stretches, & compressions.

Translations are sometimes called a slide. The figure is moved horizontally and/or vertically. The orientation of the figure stays the same. And connecting the corresponding vertices of the preimage and image will result in a set of parallel lines.

Translating a Figure Given the Horizontal and Vertical Shift

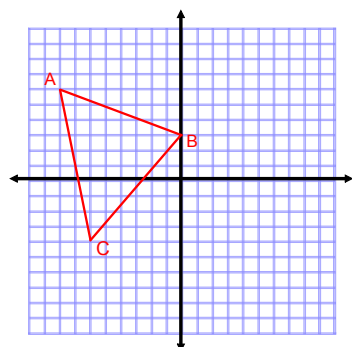
- 1) Place your pencil on a vertex and count horizontally the number of units the figure is to be translated
- 2) Without lifting your pencil, count vertically the number of units the figure is to be translated.
- 3) Mark the image vertex on the coordinate plane.
- 4) Repeat this process for all vertices of the figure.
- 5) Connect the image vertices.

Feb 13-2:45 PM

Examples of Translations

1. Translate the figure horizontally 4 units and vertically -3 units.

$$T_{\langle 4, -3 \rangle}(\triangle ABC)$$



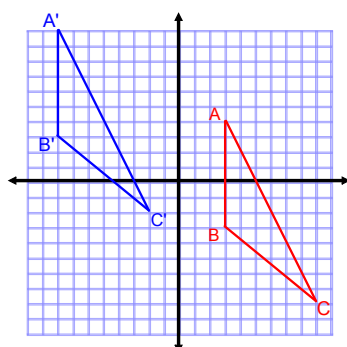
Vertices of the image:

$$A' = \underline{\quad (-4, 3) \quad}$$

$$B' = \underline{\quad (4, 0) \quad}$$

$$C' = \underline{\quad (-2, -7) \quad}$$

2. Describe the transformation that maps $\triangle ABC$ onto $\triangle A'B'C'$.



Preimage

Image

$$A = \underline{\quad (3, 4) \quad}$$

$$A' = \underline{\quad (-8, 10) \quad}$$

$$B = \underline{\quad (3, -3) \quad}$$

$$B' = \underline{\quad (-8, 3) \quad}$$

$$C = \underline{\quad (9, -8) \quad}$$

$$C' = \underline{\quad (-2, -2) \quad}$$

$$T_{\langle -11, 6 \rangle}(\triangle ABC) = \triangle A'B'C'$$

Sep 11-5:01 PM

Reflections are sometimes called a flip and they create a mirror image of the original figure over a reflection line. A reflection line can pass through the figure, be on the figure, or be outside the figure. The corresponding vertices of the preimage and image are equidistant from the line of reflection and the line of reflection is the perpendicular bisector of the segments that connect the corresponding vertices.

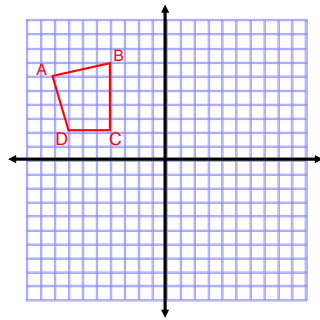
Reflecting a Figure over a Given Reflection Line

1. Draw the reflection line on the same coordinate plane as the figure.
2. If the reflection line is horizontal or vertical, count the number of units one vertex is from the line and count the same number of units on the opposite side of the line. Place the image vertex there. Repeat this process for all vertices.
3. If the reflection line is diagonal, draw lines from each vertex that are perpendicular to the reflection line extending beyond the line of reflection. Copy each segment from the vertex to the line of reflection onto the perpendicular line on the other side of the reflection line and mark the image vertices.
4. Connect the image vertices.

Jan 29-7:52 AM

Examples of Reflections

1. Reflect figure ABCD over the y-axis. $R_{y\text{-axis}}(ABCD) = A'B'C'D'$



Vertices of the image:

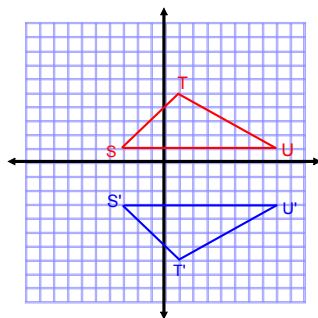
$A' = \underline{(8, 6)}$

$B' = \underline{(4, 7)}$

$C' = \underline{(4, 2)}$

$D' = \underline{(7, 2)}$

2. What transformation maps ΔSTU onto $\Delta S'T'U'$?



Preimage	Image
----------	-------

$S = \underline{(-1, 5)}$	$S' = \underline{(1, -5)}$
---------------------------	----------------------------

$T = \underline{(1, 7)}$	$T' = \underline{(1, -7)}$
--------------------------	----------------------------

$U = \underline{(5, 5)}$	$U' = \underline{(5, -5)}$
--------------------------	----------------------------

$R_{\underline{x\text{-axis}}}(\Delta STU) = \Delta S'T'U'$

Jan 29-7:52 AM

Homework: Worksheet

On-line and textbook help references: p. 181 - 182

- <http://regentsprep.org/regents/math/geometry/gt2/trans.htm>

- <https://www.khanacademy.org/math/geometry/transformations/exploring-rigid-transformations/v/translations-of-polygons>

- <http://www.mathsisfun.com/geometry/translation.html>

Sep 19-3:53 PM