

Transformations Unit

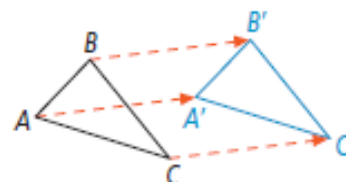
9-1 Transformations

Vocabulary

-Transformation, Preimage, Image, Prime Point, Isometry, Translation

Translation

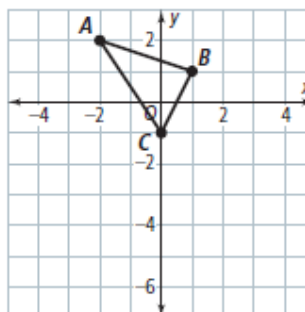
A **translation** is a transformation that maps all points of a figure the same distance in the same direction.



Rules for Translations

Rules look like this: $(x,y) \rightarrow (x + 3, y - 4)$. The rule gives directions about how far to move on the x and y axis.

Got It? What are the images of the vertices of $\triangle ABC$ for the translation $(x, y) \rightarrow (x + 1, y - 4)$? Graph the image of $\triangle ABC$.



Writing a Rule for Translations

Got It? The translation image of $\triangle LMN$ is $\triangle L'M'N'$ with $L'(1, -2)$, $M'(3, -4)$, and $N'(6, -2)$. What is a rule that describes the translation?

9-2 Reflections

Vocabulary

Reflection, Line of Reflection, Orientation

Graphing a Line Review

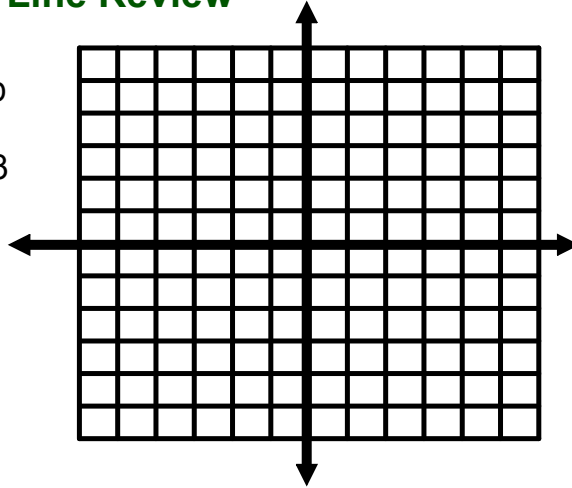
$$y = mx + b$$

$$y = \frac{1}{2}x - 3$$

$$y = x$$

$$y = -2$$

$$x = 4$$

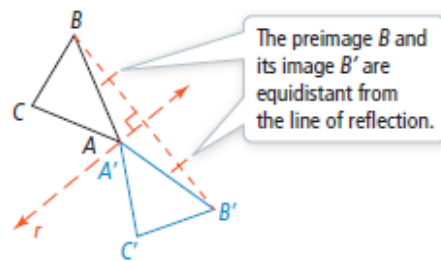


Reflections

Reflection across a line r , called the line of reflection, is a transformation with these two properties:

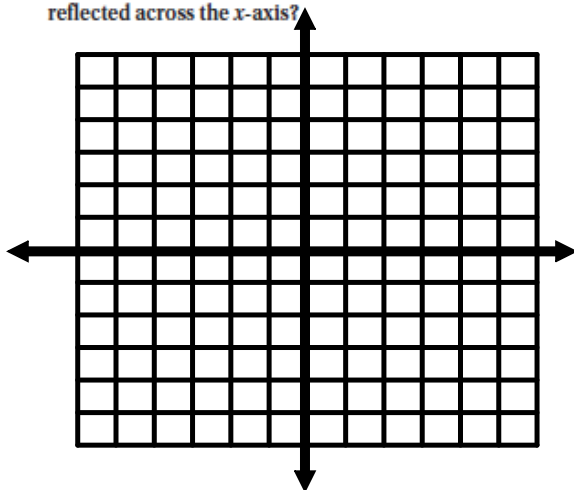
- If a point A is on line r , then the image of A is itself (that is, $A' = A$).
- If a point B is not on line r , then r is the perpendicular bisector of $\overline{BB'}$.

A reflection across a line is an isometry.



Reflecting a Figure Across a Line

Got It? Graph points $A(-3, 4)$, $B(0, 1)$, and $C(4, 2)$. What is the image of $\triangle ABC$ reflected across the x -axis?



9-3 Rotations

Vocabulary

-Rotation, Center of Rotation, Angle of Rotation

Rotations

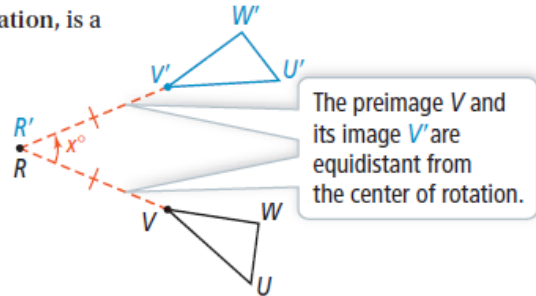
A rotation of x° about a point R , called the center of rotation, is a transformation with these two properties:

- The image of R is itself (that is, $R' = R$).
- For any other point V , $RV' = RV$ and $m\angle VRV' = x$.

The positive number of degrees a figure rotates is the angle of rotation.

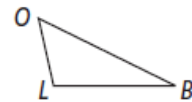
A rotation about a point is an isometry.

A rotation moves in a COUNTER CLOCKWISE DIRECTION!



Drawing a Rotation Image

Got It? What is the image of $\triangle LOB$ for a 50° rotation about B ?



Step 1 Use a protractor to draw a 50° counterclockwise angle with vertex B and side \overline{BO} .

Step 2 Use a compass to construct $\overline{BO'} \cong \overline{BO}$.

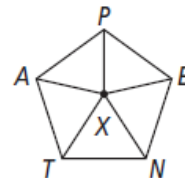
Step 3 Use a protractor to draw a 50° angle with vertex B and side \overline{BL} .

Step 4 Use a compass to construct $\overline{BL'} \cong \overline{BL}$.

Step 5 Draw $\triangle L'O'B'$.

Identifying a Rotation Image

Got It? Point X is the center of regular pentagon $PENTA$. What is the image of E for a 144° rotation about X ?



Finding an Angle of Rotation

Got It? Hubcaps of car wheels often have interesting designs that involve rotations. What is the angle of rotation about C that maps M to Q ?



9-5 Dilations

Vocabulary

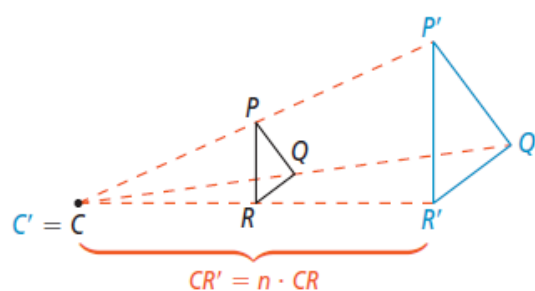
-Dilation, Reduction, Enlargement, Scale Factor, Center of Dilation

Dilation

A dilation with center C and **scale factor** n , $n > 0$, is a transformation with these two properties:

- The image of C is itself (that is, $C' = C$).
- For any other point R , R' is on \overrightarrow{CR} and $CR' = n \cdot CR$, or $n = \frac{CR'}{CR}$.

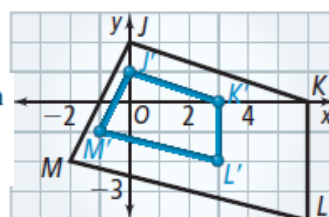
The image of a dilation is similar to its preimage.



Finding a Scale Factor

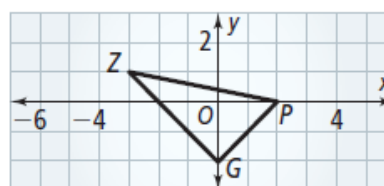
Preimage x Scale Factor = Image

Got It? $J'K'L'M'$ is a dilation image of $JKLM$. The center of dilation is O . Is the dilation an *enlargement* or a *reduction*? What is the scale factor of the dilation?



Finding a Dilation Image

Got It? What are the images of the vertices of $\triangle PZG$ for a dilation with center $(0, 0)$ and scale factor $\frac{1}{2}$?



Using Scale Factor to Find Length

Got it? A seed is magnified 8 times to form an image that is 15 inches long. How long is the seed?

9-6 Compositions of Reflections

Vocabulary

-Composition of Transformations, Glide Reflection

Finding a Glide Reflection Image

Got It? What is the image of $\triangle TEX$ for a glide reflection where the translation is $(x, y) \rightarrow (x + 1, y)$ and the line of reflection is $y = -2$?

