Lesson 18

NAME:

Transformations on the Coordinate Plane

Start by navigating to the Online Lesson for instructions.

Objectives

- Reflect a figure over the x- and/or y- axis on the coordinate plane
- Translate a figure on the coordinate plane

Why?

Reflecting and translating figures and points are the mathematical backbone of two-dimensional and three-dimensional graphics. It is used to position, orient, and move objects. It helps us understand symmetry, direction, and distance. Reflecting and translating show us how math describes real-world movement such as flipping an image in a mirror or sliding a game piece. Many standard forms of equations in higher level mathematics use the notion of translation and reflection.

Explore

Transformations on the Coordinate Plane

Fill in the notes as you watch the video in the Online Lesson.

- The Coordinate Plane is made up by a horizontal number line, the _____, and a vertical number line, the _____.
- Each coordinate _____ represents a point on the coordinate plane.
- A _____ is a mirror image after a shape or graph has been flipped over the line of reflection.
- A translation is a _____, either horizontal, vertical, or both, on the coordinate plane.

To reflect a figure over the x-axis:

- Label each vertex as (x, y).
- Each point (x, y) will become _____ in the reflected image.

To reflect a figure over the y-axis:

- Label each vertex as (x, y).
- Each point (x, y) will become _____ in the reflected image.

To translate a point horizontally:

- _____ the horizontal translation from the _____-coordinate to move the point to the left.
- _____ the horizontal translation to the _____-coordinate to move the point to the right.

To translate a point vertically:

- Subtract the vertical translation from the _____-coordinate to move the point _____.
- Add the vertical translation to the _____-coordinate to move the point _____.
- To translate a figure, translate each _____ based on the given translation.

Example 1

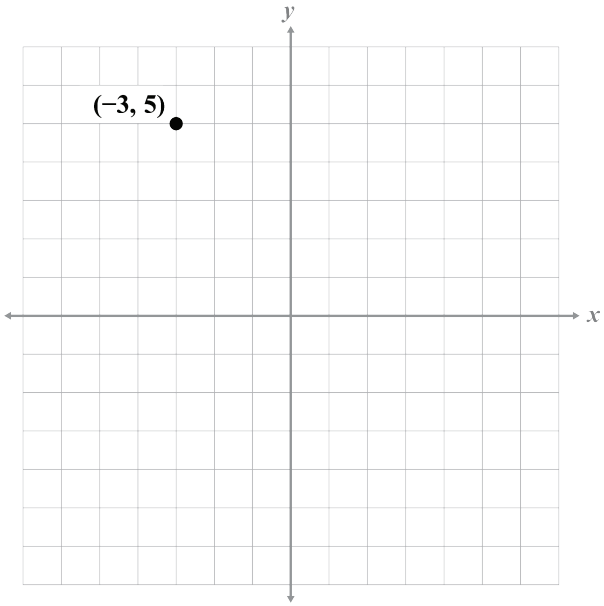
Complete the example as you watch the video in the Online Lesson.

Reflect or translate the coordinate $(-3, 5)$ on the graph.

A) Reflect over the x-axis.

Plan

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

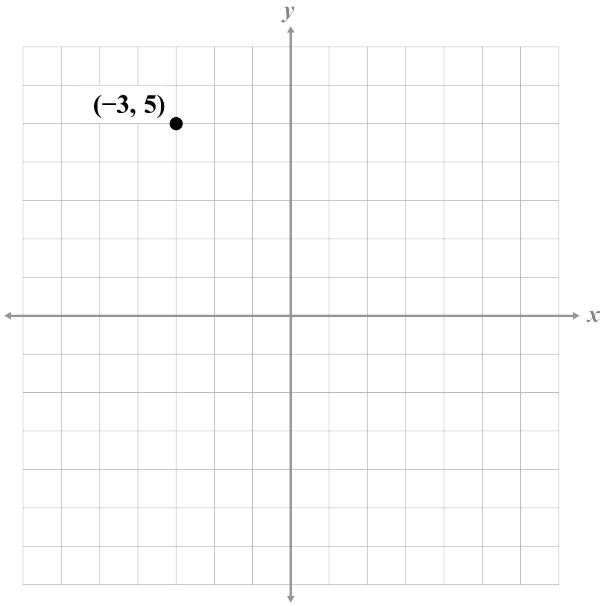


B) Translate right two units, down eight units.

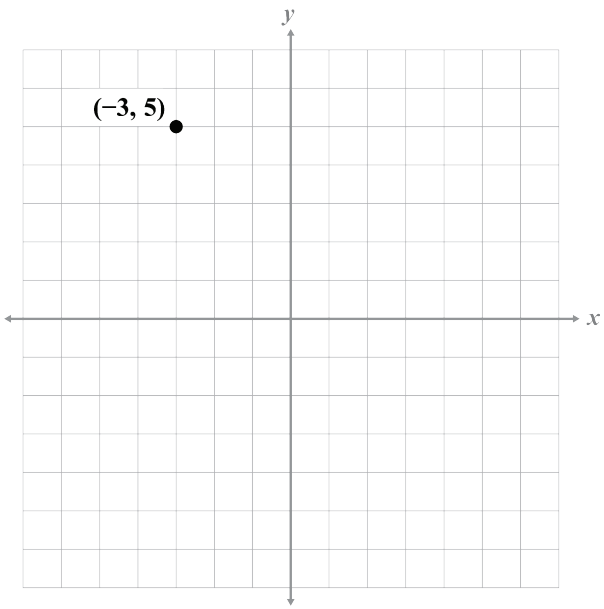
Plan

Translate right: add 2 units to x-coordinate.

Translate down: subtract 8 units from y-coordinate.



C) Translate left three units, up one unit.



Plan

Translate left: subtract 3 units from x-coordinate.

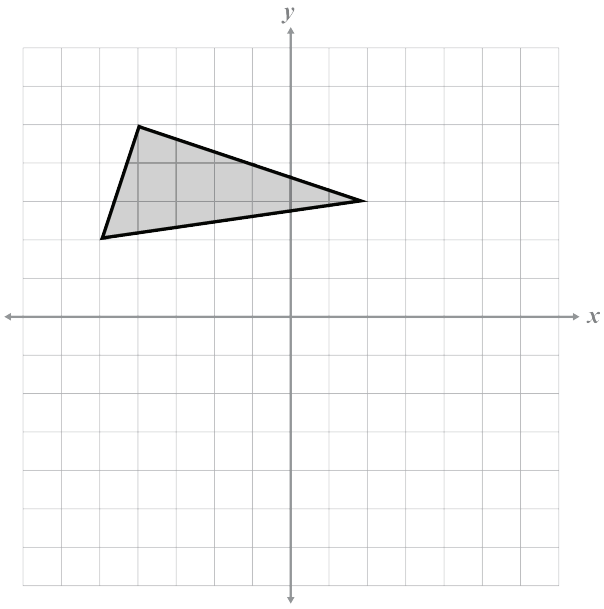
Translate up: add 1 unit to y-coordinate.

Example 2

Complete the example as you watch the video in the Online Lesson.

Reflect the figure over the given axis.

A) Reflect the figure over the x-axis.

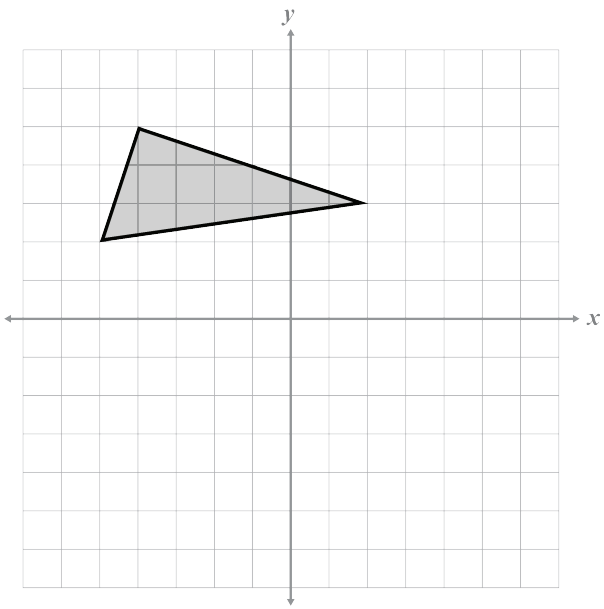


Plan

Label each vertex (x, y).

Plot the reflected points $(x, -y)$.

B) Reflect the figure over the y-axis.



Plan

Label each vertex (x, y).

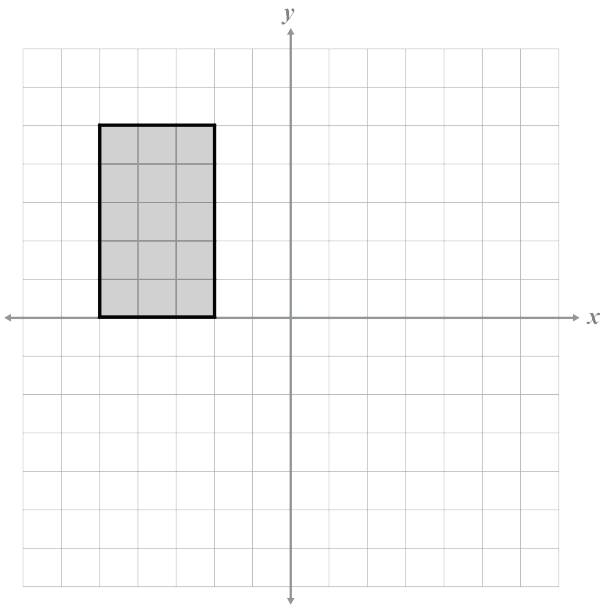
Plot the reflected points $(-x, y)$.

Example 3

Complete the example as you watch the video in the Online Lesson.

Translate the figure.

Translate 5 units right and 6 units down.



Plan

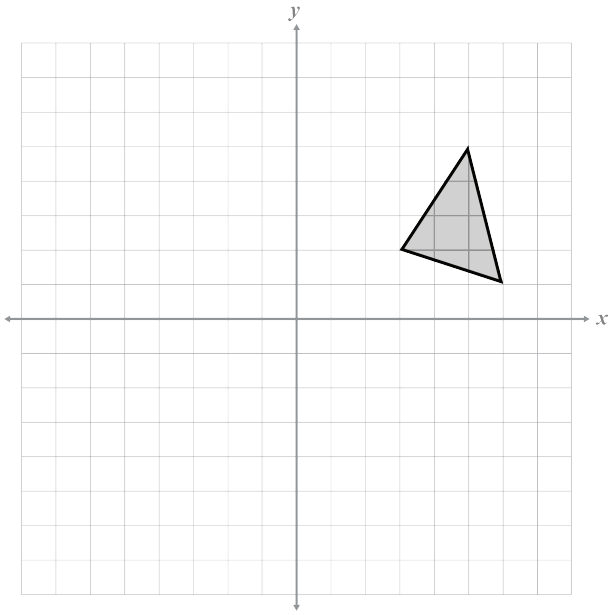
Label each vertex (x, y).

Shift each vertex $(x + 5, y - 6)$.

Practice

Reflect the figure over the given axis. Label the vertices of both the original figure and the reflected figure.

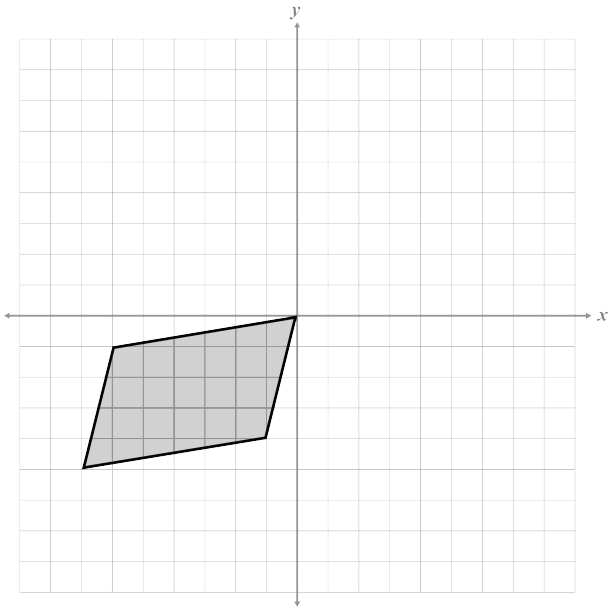
1) Reflect over the x-axis.



2) Reflect over the y-axis.

Reflect the figure over the given axis.

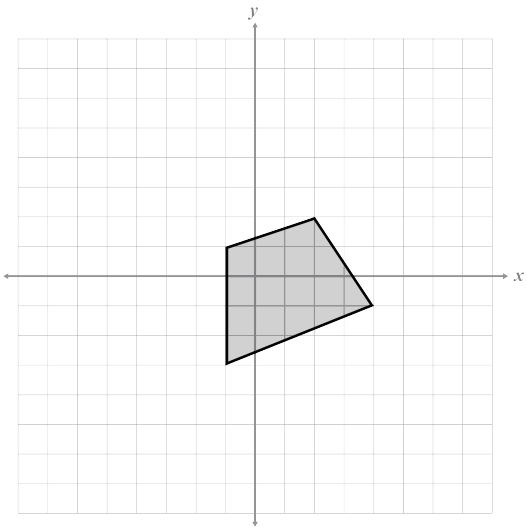
3) Reflect over the y-axis.



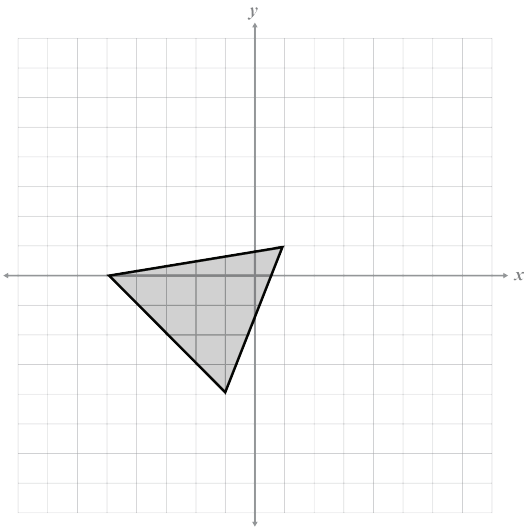
4) Reflect over the x-axis.

Translate the figure. Label the vertices of the original figure and the translated figure.

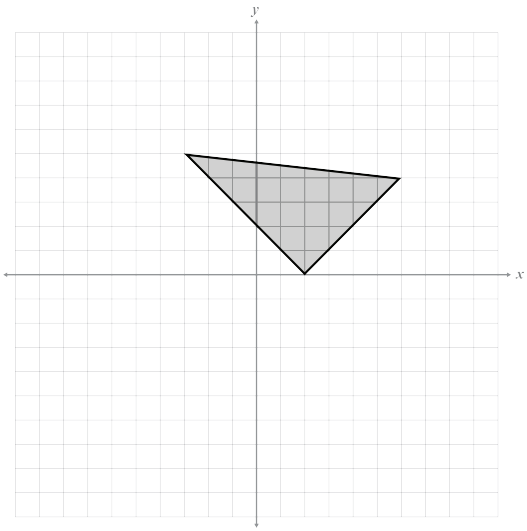
5) Translate the figure three units right and five units up.



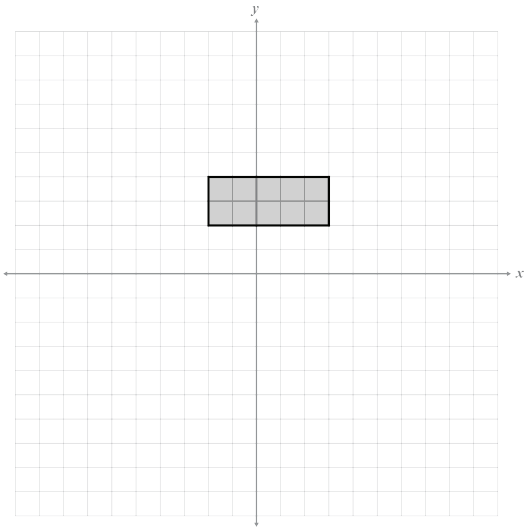
6) Translate the figure two units left and six units up.



7) Translate the figure six units left and three units down.



8) Translate the figure four units right and four units up.



To continue, return to the Online Lesson.