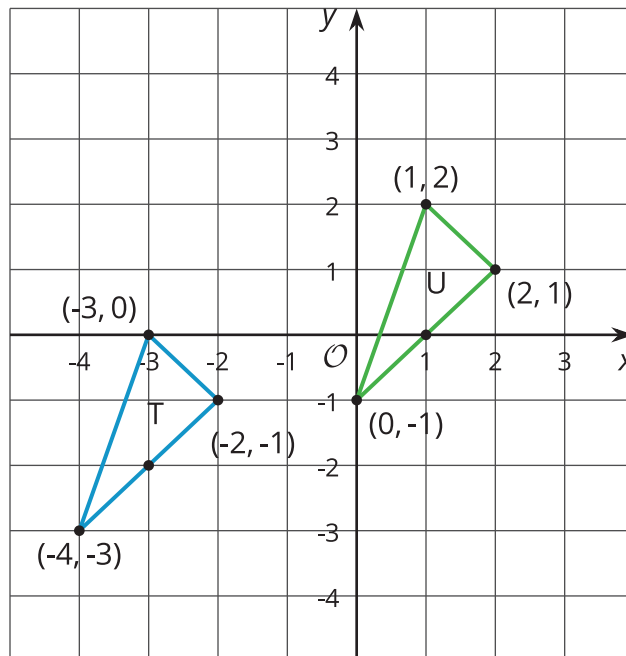


Coordinate Moves

Let's transform some figures and see what happens to the coordinates of points.

4.1 Translating Coordinates

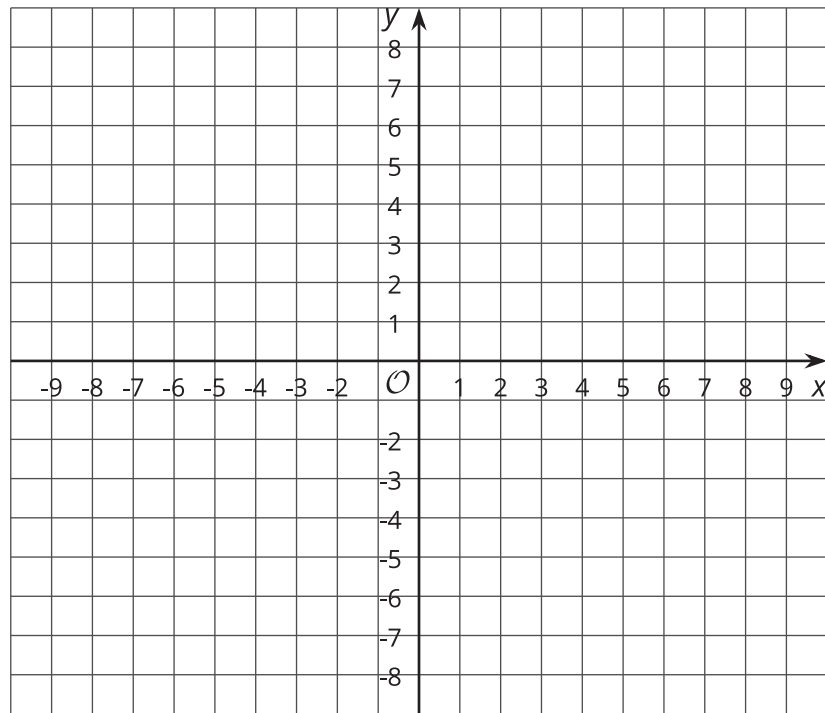
Select all of the translations that take Triangle T to Triangle U. There may be more than one correct answer.



- A. Translate $(-3, 0)$ to $(1, 2)$.
- B. Translate $(2, 1)$ to $(-2, -1)$.
- C. Translate $(-4, -3)$ to $(0, -1)$.
- D. Translate $(1, 2)$ to $(2, 1)$.

4.2

Reflecting Points on the Coordinate Plane



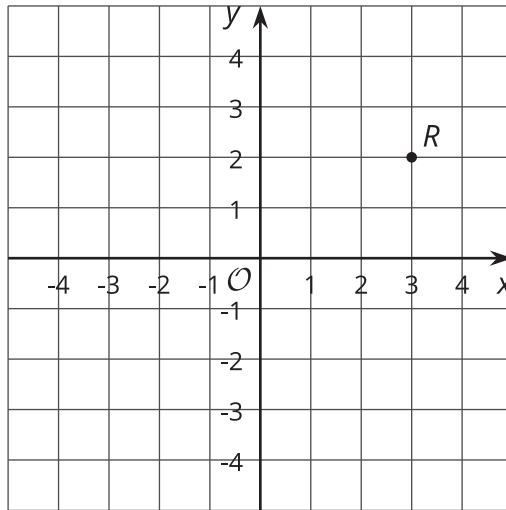
1. Here is a list of points:

$A(0.5, 4)$, $B(-4, 5)$, $C(7, -2)$, $D(6, 0)$, $E(0, -3)$

On the coordinate plane:

- Plot each point and label each with its coordinates.
 - Using the x -axis as the line of reflection, plot the image of each point.
 - Label the image of each point with its coordinates.
 - Include a label using a letter. For example, the image of point A should be labeled A' .
2. If the point $(13, 10)$ were reflected using the x -axis as the line of reflection, what would be the coordinates of the image? What about $(13, -20)$? $(13, 570)$? Explain how you know.

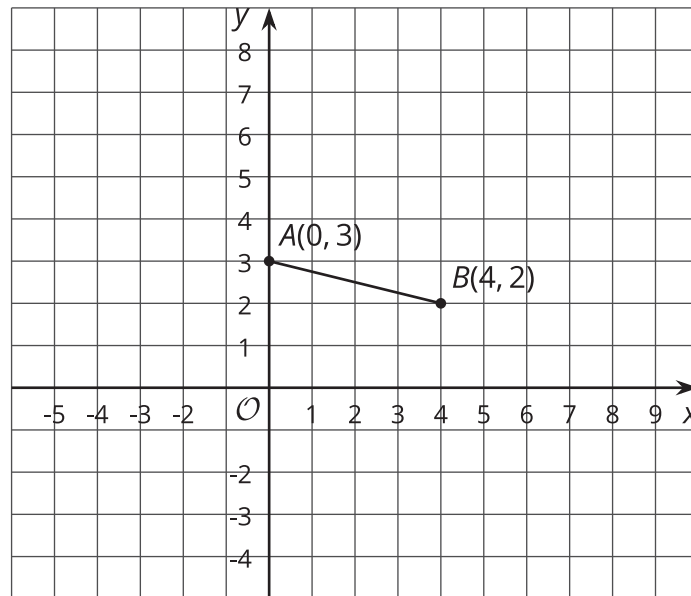
3. The point R has coordinates $(3, 2)$.
- Without graphing, predict the coordinates of the image of point R if point R were reflected using the y -axis as the line of reflection.
 - Check your answer by finding the image of R on the graph.



- Label the image of point R as R' .
 - What are the coordinates of R' ?
4. Suppose you reflect a point using the y -axis as the line of reflection. How would you describe its image?

4.3

Transformations of a Segment



Apply each of the following transformations to segment AB .

1. Rotate segment AB 90° counterclockwise around center B . Label the image of A as C . What are the coordinates of C ?
2. Rotate segment AB 90° counterclockwise around center A . Label the image of B as D . What are the coordinates of D ?
3. Rotate segment AB 90° clockwise around $(0, 0)$. Label the image of A as E and the image of B as F . What are the coordinates of E and F ?
4. Compare the two 90° counterclockwise rotations of segment AB . What is the same about the images of these rotations? What is different?

**Are you ready for more?**

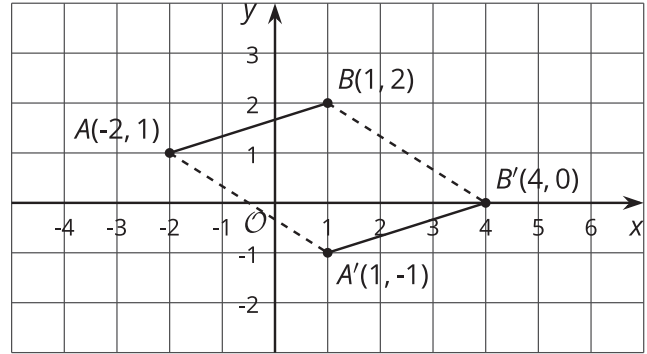
Suppose EF and GH are line segments of the same length. Describe a sequence of transformations that moves EF to GH .

Lesson 4 Summary

We can use coordinates to describe points and find patterns in the coordinates of transformed points.

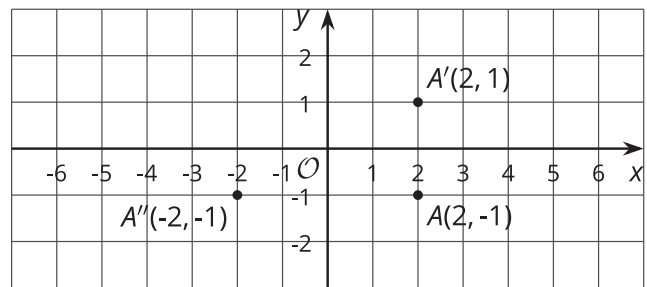
We can describe a translation by expressing it as a sequence of horizontal and vertical translations.

For example, segment AB is translated right 3 and down 2.



Reflecting a point across an axis changes the sign of one coordinate.

For example, reflecting the point A whose coordinates are $(2, -1)$ across the x -axis changes the sign of the y -coordinate, making its image the point A' whose coordinates are $(2, 1)$. Reflecting the point A across the y -axis changes the sign of the x -coordinate, making the image the point A'' whose coordinates are $(-2, -1)$.



Reflections across other lines are more complex to describe.

We don't have the tools yet to describe rotations in terms of coordinates in general. Here is an example of a 90° rotation with center $(0, 0)$ in a counterclockwise direction.

Point A has coordinates $(0, 0)$. Segment AB is rotated 90° counterclockwise around A . Point B with coordinates $(2, 3)$ rotates to point B' whose coordinates are $(-3, 2)$.

