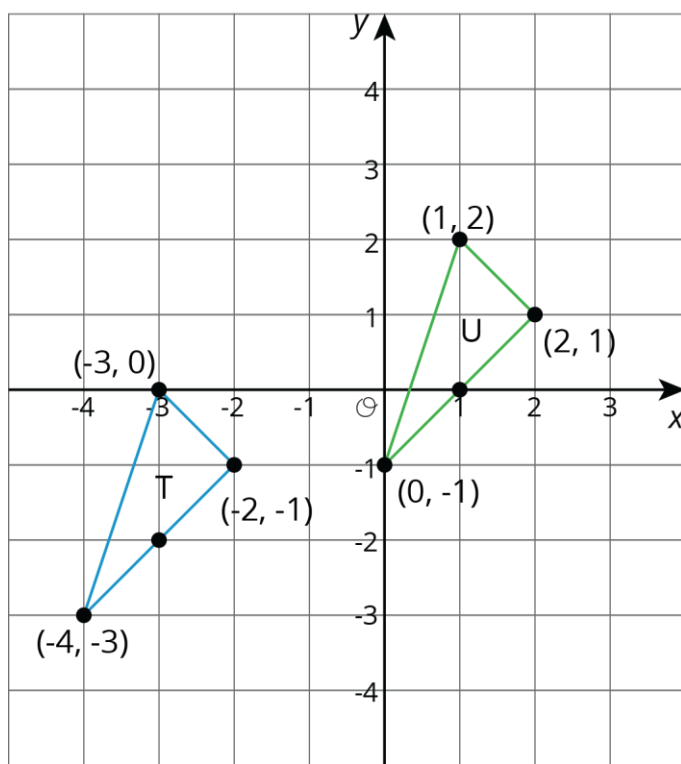


Unit 1, Lesson 5: Coordinate Moves

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

5.1: Translating Coordinates

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



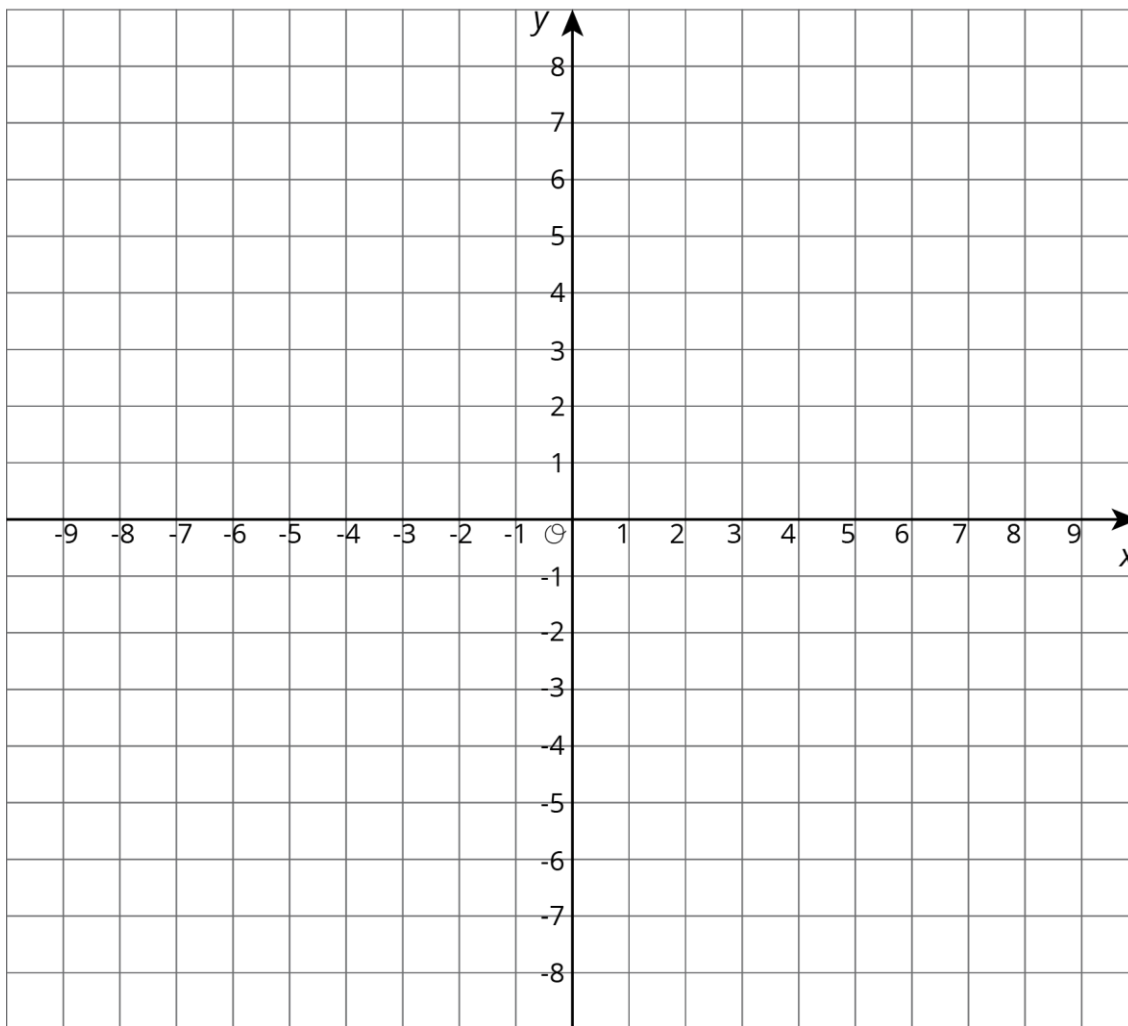
1. Translate $(-3, 0)$ to $(1, 2)$.
2. Translate $(2, 1)$ to $(-2, -1)$.
3. Translate $(-4, -3)$ to $(0, -1)$.
4. Translate $(1, 2)$ to $(2, 1)$.

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5.2: Reflecting Points on the Coordinate Plane



1. Here is a list of points

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

On the coordinate plane:

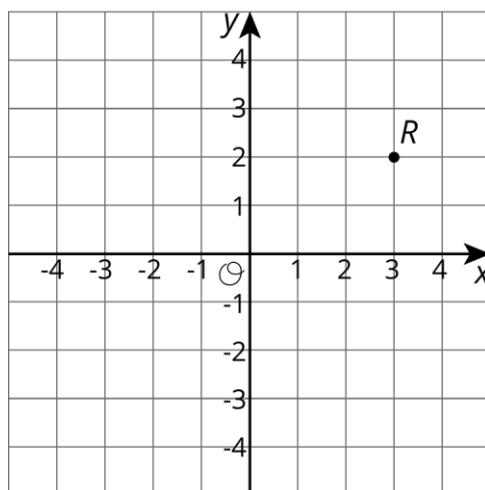
- Plot each point and label each with its coordinates.
- Using the x -axis as the line of reflection, plot the image of each point.

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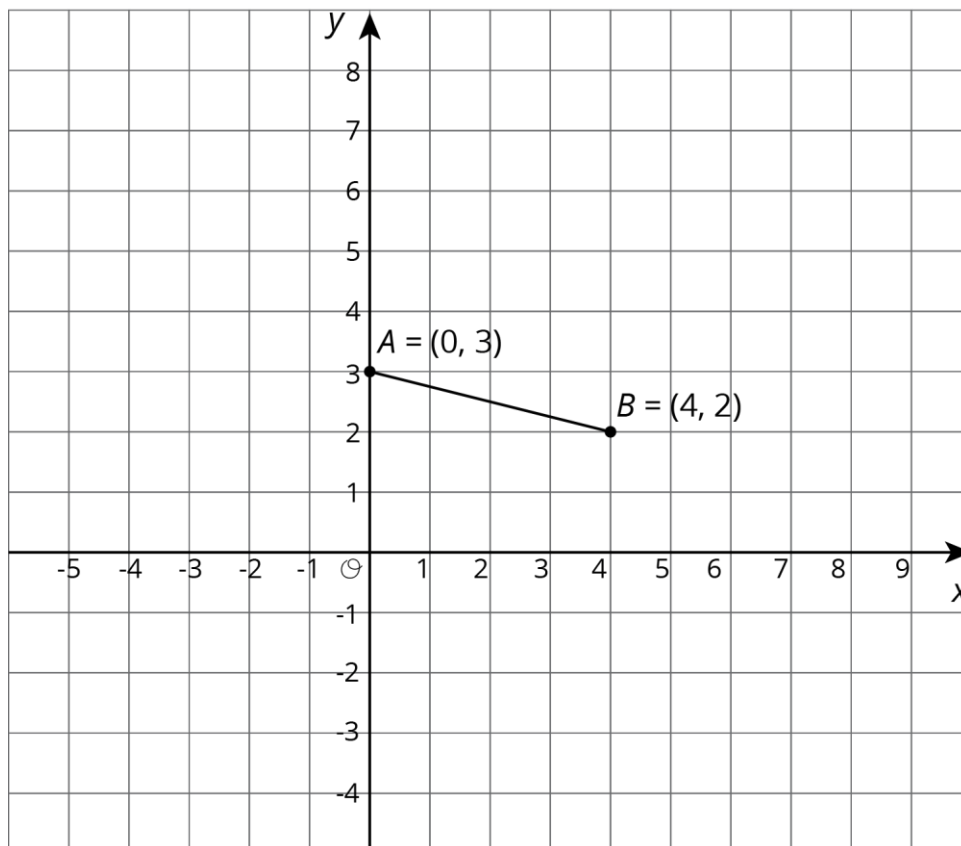
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- c. Label the image of each point with its coordinates.
- d. Include a label using a letter. For example, the image of point A should be labeled A' .
2. If the point $(13,10)$ were reflected using the x -axis as the line of reflection, what would be the coordinates of the image? What about $(13, -20)$? $(13,570)$? Explain how you know.
3. The point R has coordinates $(3,2)$.
- a. 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.
- b. Check your answer by finding the image of R on the graph.



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

5.3: Transformations of a Segment



Apply each of the following transformations to segment AB .

1. Rotate segment AB 90 degrees counterclockwise around center B . Label the image of A as C . What are the coordinates of C ?
2. Rotate segment AB 90 degrees counterclockwise around center A . Label the image of B as D . What are the coordinates of D ?
3. Rotate segment AB 90 degrees 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-degree counterclockwise rotations of segment AB . What is the same about the images of these rotations? What is different?

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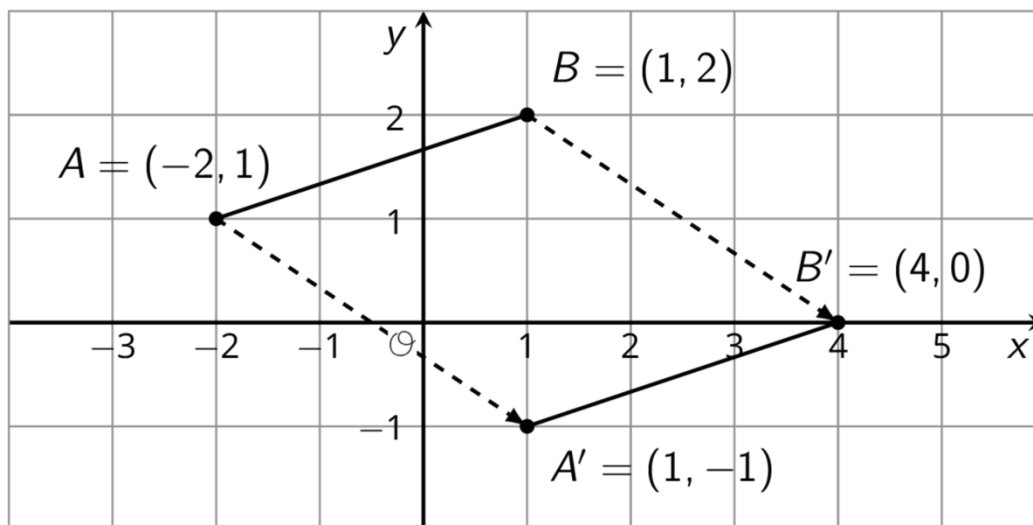
Are you ready for more?

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

Lesson 5 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.

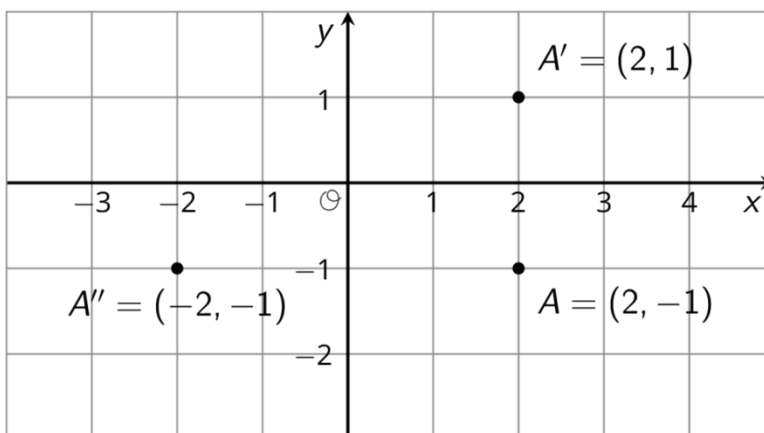


Reflecting a point across an axis changes the sign of one coordinate. For example, reflecting the point A whose coordinates are $(2, -1)$ across the x -axis changes the sign of the y -coordinate, making its image the point A' whose coordinates are $(2, 1)$. Reflecting the point A across the y -axis changes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

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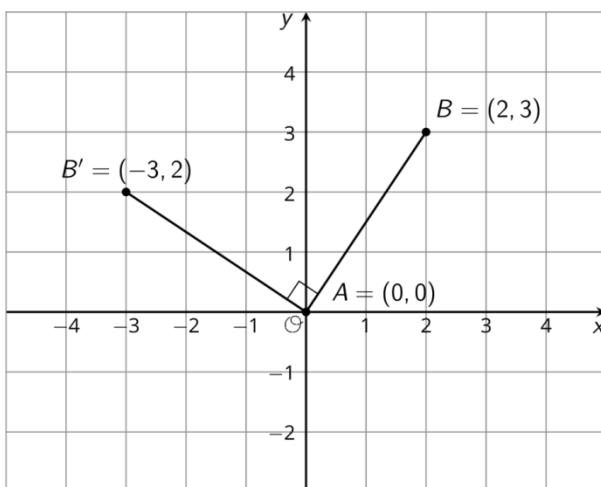
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Reflections across other lines are more complex to describe.

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