EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

In Topic C, students extend their understanding of the number line to the **coordinate plane** and identify points in all four **quadrants**. They locate and label points whose **ordered pairs** differ only by the sign (positive or negative) of one or both **coordinates** and recognize symmetry across both axes. For example, the points $(2, 7)$ and $(2, -7)$ represent a **reflection** across the x-axis. Students also draw and label the coordinate plane, using all necessary components (**origin**, axes, appropriate scale), and determine the lengths of line segments by counting or by using their understanding of absolute value.

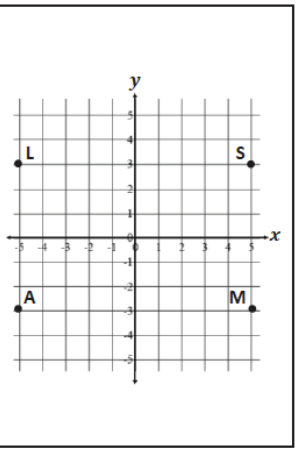
You can expect to see homework that asks your child to do the following:

- Notice relationships between the first and second coordinates in an ordered pair. For example, in the ordered pair $(15, 9)$, the first and second coordinates have a greatest common factor of 3.
- Name the quadrant in which a specific point lies and locate points in specific quadrants.
- Reflect a point over a given axis, label the image, and analyze the relationship between the coordinates in the ordered pair for each point.
- Find the length of a line segment with given endpoints.
- Given the length of a line segment and the ordered pair for one endpoint, determine a possible ordered pair of the other endpoint.
- Given the ordered pairs of two vertices (corner points) in a rectangle and its perimeter, determine the ordered pairs of the other two vertices.

SAMPLE PROBLEMS *(From Lessons 16 and 19)*

In each column, write the coordinates of the points that are related to the given point by the criteria listed in the first column of the table. Point S $(5, 3)$ has been reflected over the x- and y-axes for you as a guide, and the resulting images are shown on the coordinate plane. Use the coordinate grid to help you locate each point and its corresponding coordinates.

Given Point:	$S(5,3)$	$(-2,4)$	$(3,-2)$	$(-1,-5)$
The given point is reflected across the x-axis.	$M(5,-3)$	$(-2,-4)$	$(3,2)$	$(-1,5)$
The given point is reflected across the y-axis.	$L(-5,3)$	$(2,4)$	$(-3,-2)$	$(1,-5)$
The given point is reflected first across the x-axis and then across the y-axis.	$A(-5,-3)$	$(2,-4)$	$(-3,2)$	$(1,5)$
The given point is reflected first across the y-axis and then across the x-axis.	$A(-5,-3)$	$(2,-4)$	$(-3,2)$	$(1,5)$



1. When the coordinates of two points are (x, y) and $(-x, y)$, what **line of symmetry** do the points share? Explain.

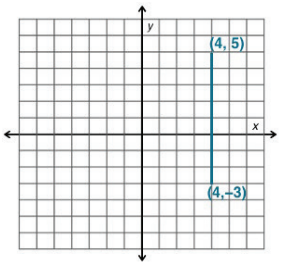
   They share the y-axis as their line of symmetry because the y-coordinates are the same and the x-coordinates are opposites. This means the points will be the same distance from the y-axis but on opposite sides.

2. When the coordinates of two points are (x, y) and $(x, -y)$, what line of symmetry do the points share? Explain.

   They share the x-axis as their line of symmetry because the x-coordinates are the same and the y-coordinates are opposites. This means the points will be the same distance from the x-axis but on opposite sides.

SAMPLE PROBLEMS *(continued)*

3. On the coordinate plane, locate and label (4, 5) and (4, −3). Draw a line segment to connect the points. How long is the line segment that you drew? Explain.



The length of the line segment is 8 units. The endpoints are on opposite sides of the x-axis. I added the absolute values of the second coordinates together, so the distance from end to end is 8 units. I could have counted the units, which would also result in a length of 8 units.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here is a tip to help you get started.

- Make a coordinate grid on the floor. (Tiled floors work great!) Label both axes from −5 to 5. Have your child make 10 ordered-pair cards by writing one ordered pair on a note card or flash card. Choose one card. Have your child find and stand at that location on the grid and state the quadrant where the point lies. (See Models section below.) Then, have your child stand at the location of the point that differs by one sign. For example, if he is at the location (1, 3), he would move to (1, −3) or (−1, 3). Ask him to discuss the similarities and differences in the coordinates. For example, if the ordered pairs are (1, 3) and (1, −3), they have the same x-coordinate but opposite y-coordinates. Then, ask your child to discuss the similarities and differences in the location of the two points. For example, each point is 1 unit to the right of the y-axis and 3 units away from the x-axis. Finally, what line of symmetry do the points share? (See Sample Problems.)

TERMS

Coordinate: The location of a point on the coordinate plane, written (x, y). The first number is always the x-value of the point (left/right), and the second number is always the y-value of the point (up/down). In the image in the Models section, (−3, 1) is located 3 units to the left of 0 (along the x-axis) and 1 unit up (along the y-axis).

Line of symmetry: The imaginary line through an image such that, when folded on that line, the two halves are mirror images of each other.

Ordered pair: Two numbers written in a given fixed order, usually as (x, y).

Origin: The point where the two axes intersect in the coordinate plane. Its coordinates are (0, 0).

Quadrant: Any of the four equal areas created by dividing a plane by an x-axis and a y-axis. They are numbered I, II, III, and IV, starting in the top right quadrant and moving counterclockwise. (See image in Models section.)

Reflection: Creates a mirror image of a geometric figure on the opposite side of—and the same distance from—the line of reflection (the x-axis or y-axis). Reflections are also referred to as *flips* because they flip the image over the line of reflection.

MODELS

Coordinate Plane