

Chapter 1 Geometry

1-6 Midpoint and Distance in the Coordinate Plane

Objective:

Develop and apply the formula for midpoint

Use the Distance Formula and the Pythagorean theorem to find the distance between two points.

Essential Question:

How can we use distances and midpoints to help plan trips?

Definitions/Terminology

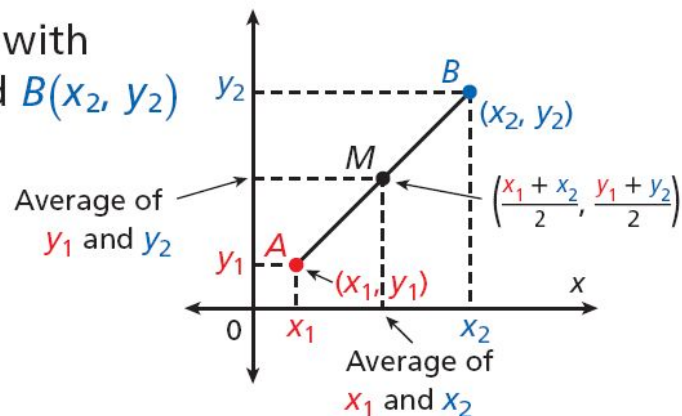
Coordinate Plane: A region that is divided into four regions by a horizontal line (x-axis) and a vertical line (y-axis). The locations, or coordinates, of a point are given by an ordered pair (x, y).

Definition in my own words:	Example:

Midpoint Formula

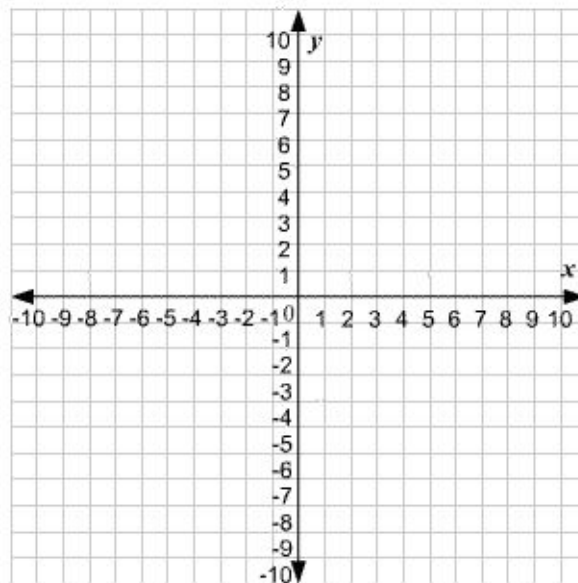
The midpoint M of \overline{AB} with endpoints $A(x_1, y_1)$ and $B(x_2, y_2)$ is found by

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right).$$



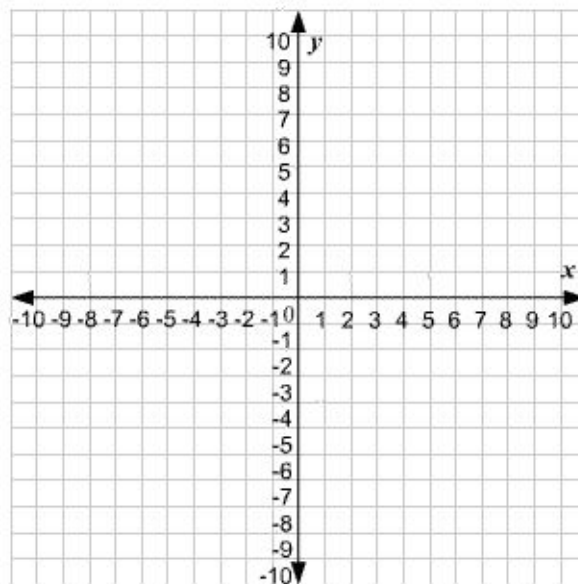
Example 1: Find the coordinates of a midpoint

1A. Find the coordinates of the midpoint of \overline{PQ} with endpoints $P(-8, 3)$ and $Q(-2, 7)$.



Check it out! Example 1

1a. Find the coordinates of the midpoint of \overline{EF} with endpoints $E(-2, 3)$ and $F(5, -3)$.

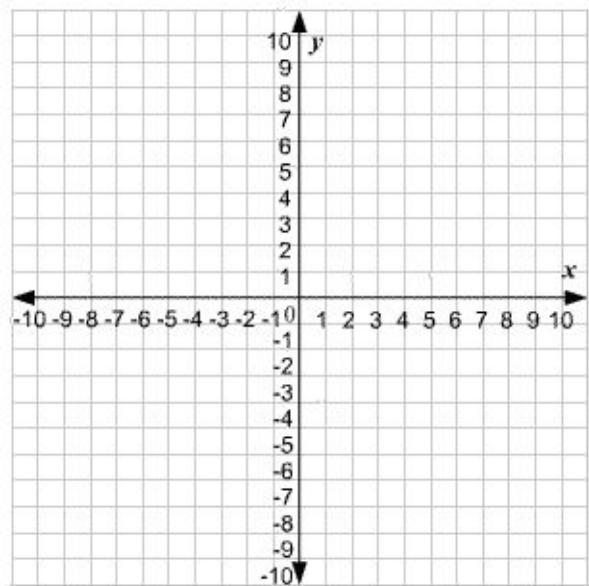


1Challenge

Find the coordinates of the midpoint of \overline{NB} with endpoints $N(p - 4, d + 1)$ and $B(p + 6, 3d - 1)$.

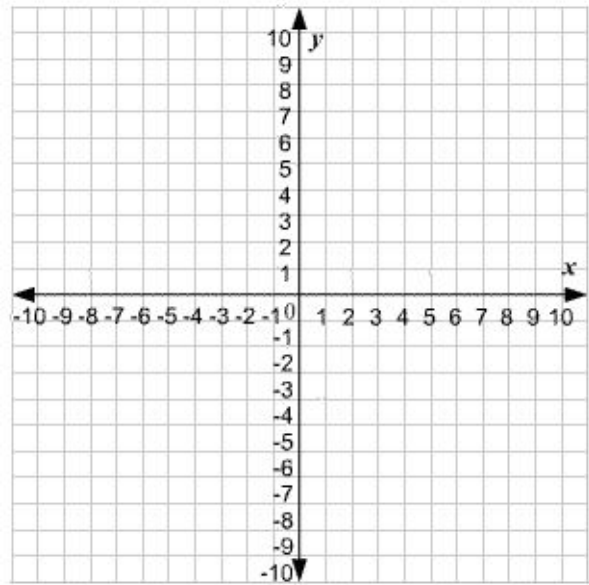
Example 2: Finding the Coordinates of an Endpoint

2A. M is the midpoint of \overline{XY} . X has coordinates $(2, 7)$ and M has coordinates $(6, 1)$. Find the coordinates of Y .



Check it out! Example 2

2a. S is the midpoint of \overline{RT} . R has coordinates (-6, -1) and S has coordinates (-1, 1). Find the coordinates of T.



2Challenge

S is the midpoint of \overline{RT} . R has coordinates $(3n - 8, 2r)$ and S has coordinates $(2n, 1)$. Find the coordinates of T.

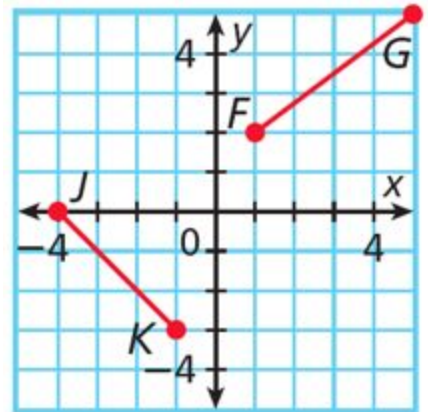
Distance Formula

In a coordinate plane, the distance d between two points (x_1, y_1) and (x_2, y_2) is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

Example 3: Using the Distance Formula

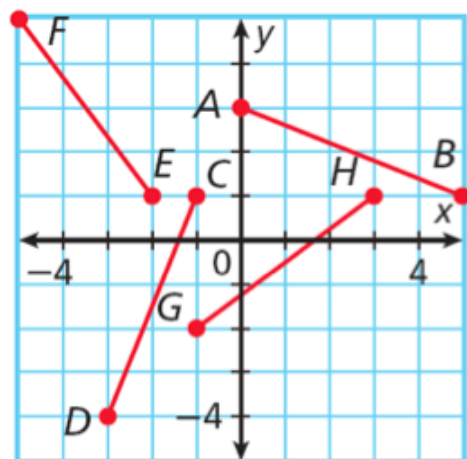
3A. Find FG and JK . Then, determine whether $\overline{FG} \cong \overline{JK}$.



Check it out! Example 3

3a. Find EF and GH . Then, determine whether

$$\overline{EF} \cong \overline{GH}.$$



Example 4: Finding Distance in the Coordinate Plane

4A. Use the Distance Formula and the Pythagorean Theorem to find the distance, to the nearest tenth, from $D(3, 4)$ to $E(-2, -5)$.

Check it out! Example 4

**4a. Use the Distance Formula and the Pythagorean Theorem to find the distance, to the nearest tenth, from R to S .
 $R(3, 2)$ and $S(-3, -1)$**

4b. Use the Distance Formula and the Pythagorean Theorem to find the distance, to the nearest tenth, from R to S .
 $R(-4, 5)$ and $S(2, -1)$