

# 1.3 - Distance and Midpoints

## Goals Aligned to Common Core State Standards:

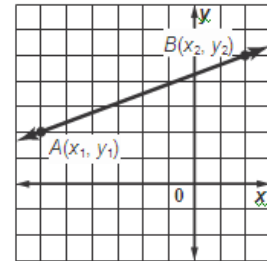
- You will identify and model distance, midpoint, and segment bisector.
- You will find the midpoint on a line segment and the distance between two points.
- You will construct a line that bisects a segment to find the midpoint of a given segment.

## Distance

- Length** or **Measure** of two endpoints
- The distance from A to B is the same distance as B to A.

Distance Formula on a coordinate plane

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



Use the Distance Formula to find the distance between the pair of points.

3. A(-2, -1), B(1, 3)

$$d = \sqrt{(1 - (-2))^2 + (3 - (-1))^2}$$

$$d = \sqrt{(3)^2 + (4)^2}$$

$$d = \sqrt{25}$$

$$d = 5$$

4. M(1, -2), N(9, 13)

$$d = \sqrt{(1 - 9)^2 + (-2 - 13)^2}$$

$$d = \sqrt{(-8)^2 + (-15)^2}$$

$$d = \sqrt{64 + 225}$$

$$d = \sqrt{289}$$

$$d = 17$$



- The **midpoint** of a segment is The point in the middle of the 2 endpoints  
The ratio of a midpoint is: 1 : 2
- Segment **Bisector**: Cuts into 2 = parts

## Midpoint (coordinate plane)

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

Why does the midpoint formula divide by 2?

dividing by 2 finds the middle

**Find the coordinates of the midpoint of a segment having the given endpoints.**

7. R(-12, 8), S(6, 12)

$$\left( \frac{-12+6}{2}, \frac{8+12}{2} \right) = \left( \frac{-6}{2}, \frac{20}{2} \right) = (-3, 10)$$

8. P(-2,4), Q(4,1)

$$\left( \frac{-2+4}{2}, \frac{4+1}{2} \right) = (1, 2.5)$$

## Simplify Radicals

1.)  $\sqrt{20}$

$$\sqrt{4 \cdot 5} = 2\sqrt{5}$$

2.)  $\sqrt{30}$

$$\sqrt{3 \cdot 10} = \sqrt{3 \cdot 2 \cdot 5} = \sqrt{30}$$

3.)  $\sqrt{40}$

$$\sqrt{4 \cdot 10} = 2\sqrt{10}$$

4.)  $\sqrt{72}$

$$\sqrt{36 \cdot 2} = 6\sqrt{2}$$

$$\sqrt{9 \cdot 8} = 3\sqrt{8} = 3\sqrt{4 \cdot 2} = 3 \cdot 2\sqrt{2} = 6\sqrt{2}$$