

Finding Midpoint

The formula for finding the midpoint between points (x_1, y_1) and (x_2, y_2) is $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$.

Example: Find the midpoint between $(5, 8)$ and $(3, 2)$.

1. Label the x's and y's.

2. Substitute into the equation.

3. Simplify

$$\begin{array}{cc} (5, 8) & (3, 2) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$M = \left(\frac{5+3}{2}, \frac{8+2}{2} \right)$$

$$= \left(\frac{8}{2}, \frac{10}{2} \right)$$

$$= \boxed{(4, 5)}$$

Example: Find the midpoint between $(-2, 7)$ and $(3, -1)$

$$\begin{array}{cc} (-2, 7) & (3, -1) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$M = \left(\frac{-2+3}{2}, \frac{7-1}{2} \right)$$

$$= \left(\frac{1}{2}, \frac{6}{2} \right)$$

$$= \boxed{(.5, 3)}$$

Finding Distance between Two Points

To find the distance between two points, we need to use the formula $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ for points (x_1, y_1) and (x_2, y_2)

Example: Find the distance between $(4, 1)$ and $(7, 5)$.

1. Label the x's and y's
2. Substitute into the equation.
3. Simplify. Round to the nearest hundredth (two decimal places) if necessary.
4. Don't forget units! Use "units" if no units are given.

$$\begin{array}{cc} (4, 1) & (7, 5) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$D = \sqrt{(7-4)^2 + (5-1)^2}$$

$$= \sqrt{3^2 + 4^2}$$

$$= \sqrt{9 + 16}$$

$$= \sqrt{25}$$

$$= 5$$

$$\boxed{5 \text{ units}}$$

Example: Find the distance between $(8, -1)$ and $(-2, 5)$

$$\begin{array}{cc} (8, -1) & (-2, 5) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$D = \sqrt{(5 - (-1))^2 + (-2 - 8)^2}$$

$$= \sqrt{6^2 + (-10)^2}$$

$$= \sqrt{36 + 100}$$

$$= \sqrt{136}$$

$$\approx 11.66$$

$$\boxed{11.66 \text{ units}}$$