9-1 Distance and Midpoints

Distance Formula

The distance between two points on the coordinate plane is

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

- \( x_2 \) is the second point's x term
- \( x_1 \) is the first point's x term
- \( y_2 \) is the second point's y term
- \( y_1 \) is the first point's y term

ex. Find the distance between E(-4, 0) and F(3, -1)

\[ d = \sqrt{(3 - (-4))^2 + ((-1) - 0)^2} \]
\[ d = \sqrt{7^2 + (-1)^2} \]
\[ d = \sqrt{49 + 1} \]
\[ d = \sqrt{50} \]
\[ d = 5\sqrt{2} \]
Midpoint Formula

To find the midpoint on the coordinate plane use the following formula

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

ex. Find the coordinates of M, the midpoint of GH, for G(5, 12) and H(-4, 8)

\[
M = \left( \frac{5 + (-4)}{2}, \frac{12 + 8}{2} \right)
M = \left( \frac{1}{2}, \frac{20}{2} \right)
M = \left( \frac{1}{2}, 10 \right)
\]

ex. Find the coordinates of D if E(-6, 4) is the midpoint of DF and F has coordinates (-5, -1)

Use slope to find the other point if you're given one endpoint and the midpoint.