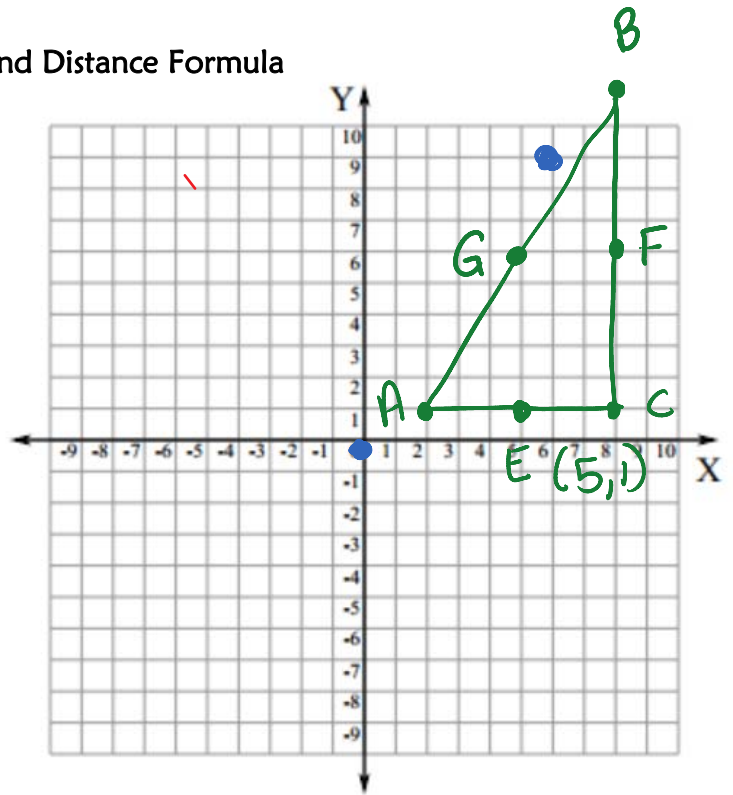


Part 1: Midpoints with Coordinates

1) Graph and label the following points:

A (2, 1), B (8, 11) and C (8, 1)



2) Locate and label point E, the midpoint of \overline{AC} .

What is the relationship between coordinate points A, C, and E?

$E(5, 1)$, E is halfway between B & C.

Avg. of x's & avg. of y's

3) Locate and label point F, the midpoint of \overline{BC} .

What is the relationship between B, C, and F?

$F(8, 6)$, avg. of x-coordinates & average of the y-coordinates.

4) Based on your findings from #2-3, locate point G, the midpoint of \overline{AB} . What is the coordinate point of G?

$$x: \frac{2+8}{2} = \frac{10}{2} = 5 \quad y: \frac{1+11}{2} = \frac{12}{2} = 6 \quad G(5, 6)$$

5) In your own words, explain how to find the midpoint of a segment.

Avg. of x-coordinates

Avg. of y-coordinates

6) Let's come up with a Midpoint Formula:

Given (x_1, y_1)

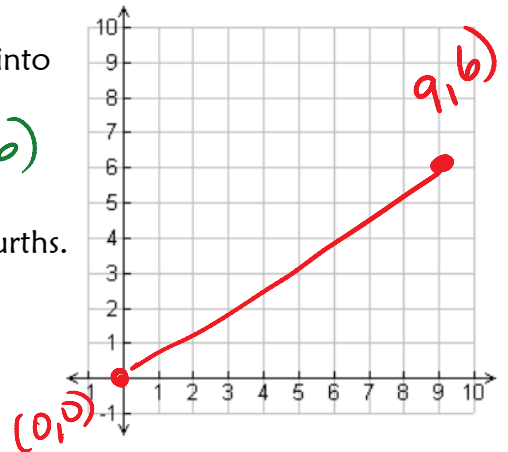
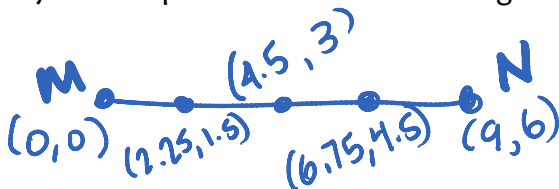
(x_2, y_2)

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

7) Extend: Find two points on segment \overline{MN} that divide the segment into three congruent parts when M (0, 0) and N (9, 6).



8) Describe a way to find points that divide the segment \overline{MN} into fourths.



Part 2: Midpoint Practice Problems

1) Find the midpoint of \overline{CD} when C (-2, -1) and D (4, 3).

$$\left(\frac{-2+4}{2}, \frac{-1+3}{2} \right)$$

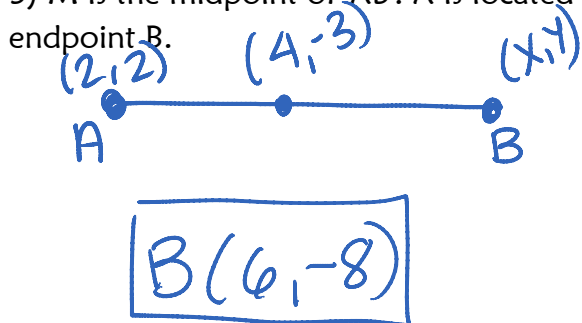
$$\boxed{(1, 1)}$$

2) Find the midpoint of \overline{MN} when M (-4, 3) and N (4, -9)

$$\left(\frac{-4+4}{2}, \frac{3+(-9)}{2} \right)$$

$$\boxed{(0, 3)}$$

3) M is the midpoint of \overline{AB} . A is located at (2, 2) and the midpoint is at (4, -3). Find the other endpoint B.



$$\frac{2+x}{2} = 4$$

$$2+x = 8$$

$$x = 6$$

$$\frac{2+y}{2} = -3$$

$$2+y = -6$$

$$y = -8$$

Part 3: Distance Formula

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

1) Use the diagram to find the distance of \overline{AB} and \overline{CD} .

$$\overline{AB} = 8 \text{ (count!)}$$

$$\overline{CD} = \sqrt{(7-3)^2 + (2-9)^2}$$

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

$$= \sqrt{16 + 49} \quad \boxed{= \sqrt{65}}$$

2) Find the distance between J (-5, -2) and K (-3, -9).

$$d = \sqrt{(-3+5)^2 + (-9+2)^2}$$

$$d = \sqrt{2^2 + (-7)^2} \quad \boxed{d = \sqrt{53}}$$

$$d = \sqrt{4 + 49}$$

