

Lesson 11.4- SWBAT determine the midpoint of a line.

Kick off-  
Directions: Are the following lines parallel, perpendicular or neither?

1) Line 1: (0, -4) & (-5, 1)  
Line 2: (0, 3) & (-1, 2)

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{(1) - (-4)}{(-5) - (0)} = \frac{5}{-5} = -1$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{(2) - (3)}{(-1) - (0)} = \frac{-1}{-1} = 1$$

3) Factor completely:  $3b^3 - 5b^2 + 2b$

$$b(3b^2 - 5b + 2)$$

$$3b^2 - 3b - 2b + 2 = 3b(b-1) - 2(b-1)$$

$$(3b-2)(b-1)$$

$m = \frac{4}{3}$   
 $y = \frac{3}{4}x - \frac{6}{4}$   
 $M = \frac{3}{4}$   
NEITHER

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Midpoint of a Line

Example 1: Find the midpoint between (-7, 6) and (-1, 6).

$$\frac{6}{2} = 3 \quad (-4, 6)$$

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

$$\frac{10}{2} = 5 \quad (2, -2)$$

$$\frac{6}{2} = 3$$

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Example 3: Find the midpoint between (5, 7) and (-1, -1).

$$\frac{x_1 + x_2}{2} = \frac{5 + (-1)}{2} = \frac{4}{2} = 2$$

$$\frac{y_1 + y_2}{2} = \frac{7 + (-1)}{2} = \frac{6}{2} = 3$$

Formula:

$$\text{MIDPOINT} \left\{ \begin{array}{l} \frac{x_1 + x_2}{2} \\ \frac{y_1 + y_2}{2} \end{array} \right.$$

(2, 3)

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1) What is the midpoint of a line segment whose endpoints are (3, -4) and (5, -1)?

$$\frac{x_1 + x_2}{2} = \frac{3 + 5}{2} = \frac{8}{2} = 4$$

$$\frac{y_1 + y_2}{2} = \frac{-4 + (-1)}{2} = \frac{-5}{2} = -2.5$$

(4, -2.5)

2) What is the midpoint of a line segment whose endpoints are (0, -1) and (-7, -3)?

$$\frac{x_1 + x_2}{2} = \frac{-7 + 0}{2} = \frac{-7}{2} = -3.5$$

$$\frac{y_1 + y_2}{2} = \frac{-1 + (-3)}{2} = \frac{-4}{2} = -2$$

(-3.5, -2)

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3) What is the other endpoint of a line segment whose midpoint is (5, 1) and endpoint is (2, 5)?

$$\frac{x_1 + x_2}{2} = 5 \Rightarrow \frac{2 + x}{2} = 5 \Rightarrow 2 + x = 10 \Rightarrow x = 8$$

$$\frac{y_1 + y_2}{2} = 1 \Rightarrow \frac{5 + y}{2} = 1 \Rightarrow 5 + y = 2 \Rightarrow y = -3$$

(8, -3)

4) What is the other endpoint of a line segment whose midpoint is (4, 8) and endpoint is (9, -10)?

$$\frac{x_1 + x_2}{2} = 4 \Rightarrow \frac{9 + x}{2} = 4 \Rightarrow 9 + x = 8 \Rightarrow x = -1$$

$$\frac{y_1 + y_2}{2} = 8 \Rightarrow \frac{-10 + y}{2} = 8 \Rightarrow -10 + y = 16 \Rightarrow y = 26$$

(-1, 26)

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5) What is the midpoint of a line segment whose endpoints are (-4, 4) and (-2, 2)?

6) What is the midpoint of a line segment whose endpoints are (-1, 1) and (5, -5)?

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7) What is the other endpoint of a line segment whose midpoint is  $(-9, -10)$  and endpoint is  $(-1, 9)$ ?

8) What is the midpoint of a line segment whose endpoints are  $(2, -1)$  and  $(-6, 0)$ ?

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9) What is the other endpoint of a line segment whose midpoint is  $(-10, -2)$  and endpoint is  $(5, 2)$ ?

10) What is the other endpoint of a line segment whose midpoint is  $(4, 8)$  and endpoint is  $(-6, 4)$ ?

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