Midpoint Mania

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Task 1: The Midpoint Formula

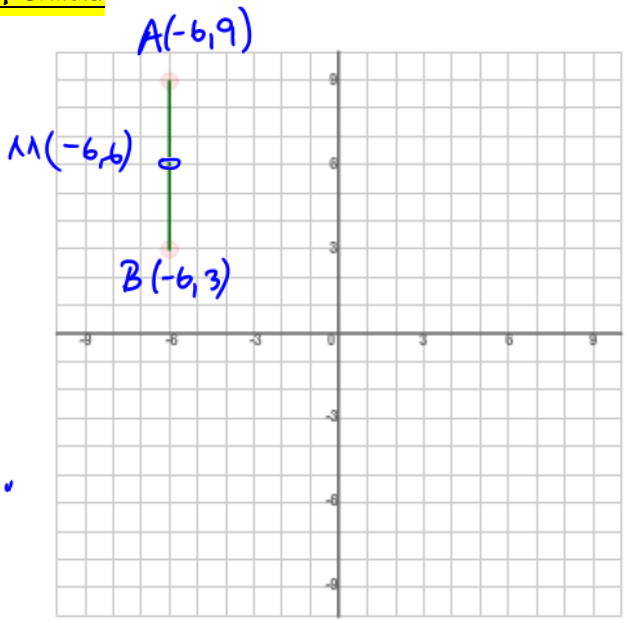
VERTICAL LINE SEGMENTS

What is the midpoint of the line segment AB?

A (-6, 9)

B (-6, 3)

M (-6 , 6)



How can the midpoint be determined using a mathematical calculation instead of counting the number of squares?

Answer:

The only coordinate that changes is "y"

$M(x,y) = \left(-6, \frac{9+3}{2}\right)$

$= (-6, 6)$

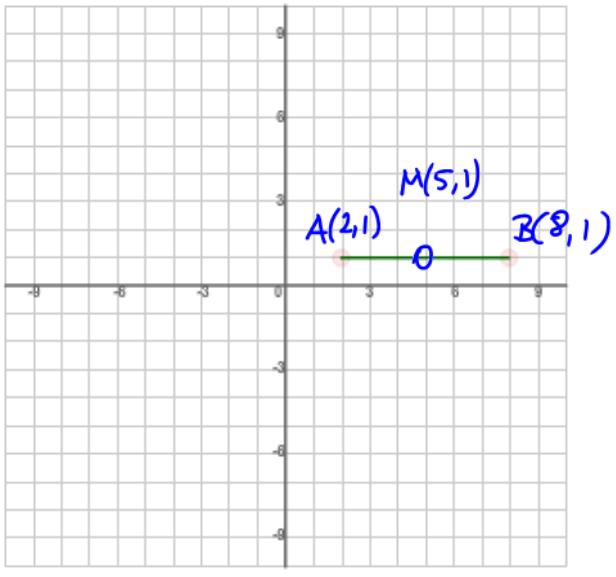
HORIZONTAL LINE SEGMENTS

What is the midpoint of the line segment AB?

A (2, 1)

B (8, 1)

M (5 , 1)



How can the midpoint be determined using a mathematical calculation instead of counting the number of squares?

Answer:

y-remains the same → average x

$M(x,y) = \left(\frac{2+8}{2}, 1\right)$

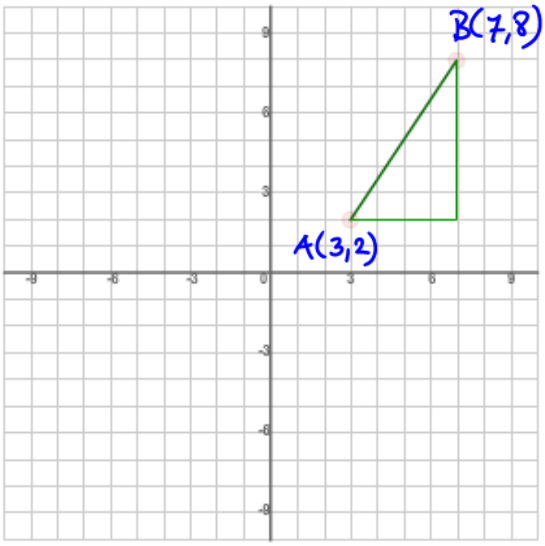
$= (5, 1)$

DIAGONAL LINE SEGMENTS

What is the midpoint of the line segment AB?

A (3, 2)

B (7, 8)



First, find the middle of x values

$\frac{3+7}{2} = \frac{10}{2} = 5$

Next, find the middle of y values

$\frac{8+2}{2} = \frac{10}{2} = 5$

Midpoint = (5, 5)

Summary: The midpoint of a line segment can be found by determining the average of x's and the average of the y's

Formula for the Midpoint of a Line Segment:

midpoint = (average of x values, average of y values)

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

Task 2: Practice

- Complete the 5 practice examples in Discovering Midpoints.

Task 3: Application

M is the midpoint of line segment UP. The coordinates of U are (-2, 3) and the coordinates of M are (1, 0). Find the coordinates of P.

$$\text{midpoint } M_{UP} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$(1, 0) = \left(\frac{-2+x}{2}, \frac{3+y}{2}\right)$

$2 \cdot 1 = \frac{-2+x}{2} \cdot 2$

$2 + 2 = -2 + x + 2$

$x = 4$

$2 \cdot 0 = \frac{3+y}{2} \cdot 2$

$0 - 3 = 3 + y - 3$

$-3 = y$

$\therefore P(4, -3)$