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Midpoint and Endpoint of a Line Segment Examples

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The Midpoint Formula

For a segment with endpoints (x_1, y_1) and (x_2, y_2)

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

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Example 1

Determine the midpoint of a line segment with endpoints (-3, 8) and (5, 2).

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Step 1: Substitute coordinate points into the formula.

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

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Step 2: Compute the data.

$$(1,5)$$

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Step 3: The solution is the coordinate for the midpoint.

$(1,5)$ is the midpoint of $(-3,8)$ and $(5,2)$.

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Example 2

Given one endpoint of a line segment is (1,2) and the midpoint of the line segment is (3,4), find the other endpoint of a line segment.

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Step 1: Substitute coordinate points into the formula.

$$(3,4)=\left(\frac{1+x_2}{2},\frac{2+y_2}{2}\right)$$

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Step 2: Separate the *x*- and *y*-coordinates and solve each equation for *x* and *y*, respectively.

$$3 = \frac{1 + x_2}{2} \qquad 4 = \frac{2 + y_2}{2}$$

$$6 = 1 + x_2 \qquad 8 = 2 + y_2$$

$$5 = x_2 \qquad 6 = y_2$$

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Step 3: The solution is the coordinate for the other endpoint.

$(5,6)$ is the coordinate of the other endpoint.