

Lesson 1-4: Midpoints and Bisectors

Monday, August 29, 2022 9:09 PM

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1.4
Midpoint



Midpoints and Bisectors



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**Florida's B.E.S.T. Standards for
Mathematics**

MA.912.GR.3.3



Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals.

MA.912.GR.5.2

Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment.

Content Objective

Students will find midpoints and bisect line segments.

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Learn

Midpoints on a Number Line

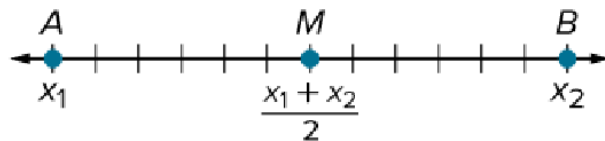
The **midpoint** of a segment is the point halfway between the endpoints of the segment. A point is **equidistant** from other points if it is the same distance from them. The midpoint separates the segment into two segments with a ratio of 1:1.

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Learn**Midpoints on a Number Line****Key Concept: Midpoint on a Number Line**

If $\overline{AB}$ has endpoints at x_1 and x_2 on a number line, then the midpoint M of $\overline{AB}$ has coordinate $M = \frac{x_1 + x_2}{2}$.

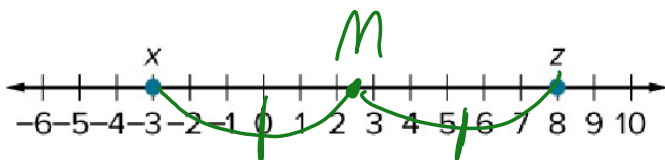


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Example 1

Find the Midpoint on a Number Line

Find the coordinate of the midpoint of $\overline{XZ}$.

$$-\frac{3 + 8}{2} \quad \frac{5}{2} = 2.5$$



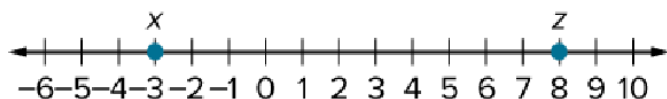
Students, draw anywhere on this slide!

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Example 1

Find the Midpoint on a Number Line



$$\begin{aligned} M &= \frac{x_1 + x_2}{2} \\ &= \frac{8 + (-3)}{2} \\ &= \frac{5}{2} \text{ or } 2.5 \end{aligned}$$

Midpoint Formula

Substitution

Simplify.

The coordinate of the midpoint of $\overline{XZ}$ is 2.5.

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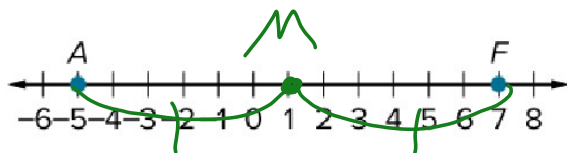
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Example 1

Find the Midpoint on a Number Line

Check

What is the coordinate of the midpoint of $\overline{AF}$?



$$-\frac{5+7}{2} = \frac{2}{2} = 1$$



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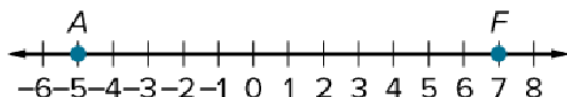


Example 1

Find the Midpoint on a Number Line

Check

What is the coordinate of the midpoint of $\overline{AF}$?



1

Learn

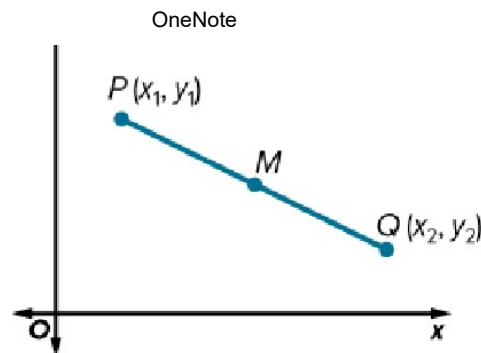
Midpoints on the Coordinate Plane

Key Concept: Midpoint Formula on the Coordinate Plane

If $\overline{PQ}$ has endpoints at $P(x_1, y_1)$



If P has endpoints at $P(x_1, y_1)$ and $Q(x_2, y_2)$ on the coordinate plane, then the midpoint M of $\overline{PQ}$ has coordinates $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.



Example 3

Find the Midpoint on the Coordinate Plane

Find the coordinates of M , the midpoint of $\overline{AB}$, for

$A(-2, 1)$ and $B(8, 3)$.

$$\begin{array}{c} x_1 \\ -2 \end{array} \quad \begin{array}{c} y_1 \\ 1 \end{array} \quad \begin{array}{c} x_2 \\ 8 \end{array} \quad \begin{array}{c} y_2 \\ 3 \end{array}$$

$$(3, 2)$$

$$\frac{-2 + 8}{2}$$

$$\frac{6}{2}$$

$$(3)$$

$$\frac{1 + 3}{2}$$

$$\frac{4}{2}$$

$$(2)$$



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Example 3

Find the Midpoint on the Coordinate Plane

$$\begin{aligned}
 M &= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\
 &= \left(\frac{-2 + 8}{2}, \frac{1 + 3}{2} \right) \\
 &= \left(\frac{6}{2}, \frac{4}{2} \right) \text{ or } (3, 2)
 \end{aligned}$$

Midpoint Formula

Substitution

Simplify.

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Example 3

Find the Midpoint on the Coordinate Plane

Check

Find the coordinates of B , the midpoint of $\overline{AC}$, for $A(-3, -2)$ and $C(5, 10)$.

$$\begin{aligned}
 &\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \\
 &\frac{-3 + 5}{2}, \frac{-2 + 10}{2} \\
 &\frac{2}{2}, \frac{8}{2} \\
 &(1, 4)
 \end{aligned}$$



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