

Lesson 1.4 Midpoints and Bisectors

Tuesday, September 05, 2023 11:58 PM

Click Link Below to Open the Interactive Pear Deck PowerPoint

<https://app.peardeck.com/student/twdlwjdqi>



Lesson 1.4
Midpoints

Lesson 1.4 Midpoints and Bisectors

Workbook pages 31-40

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.

Copyright © McGraw Hill

This material may be reproduced for licensed classroom use only and may not be further reproduced or distributed.

Learn

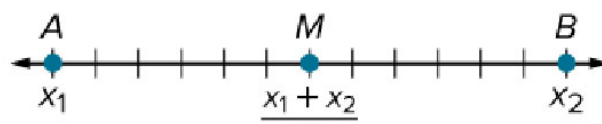
Midpoints on a Number Line

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.

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 $M = \frac{x_1 + x_2}{2}$.



Example 1

Find the Midpoint on a Number Line

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

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

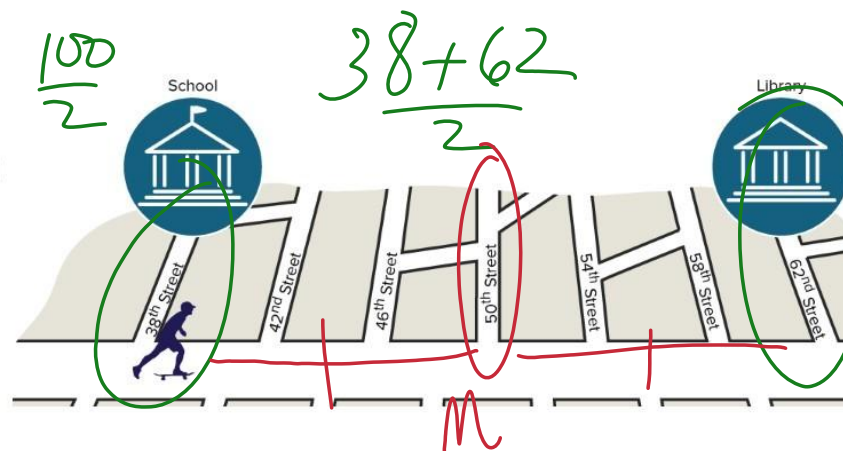
Example 2

Midpoints in the Real World

Check

DISTANCE Kenneth travels from his school on 38th Street to the library on 62nd Street. He stops halfway there to take a break. Where does Kenneth stop to rest?

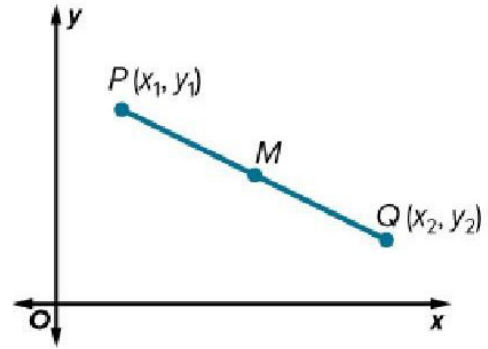
50

**Learn**

Midpoints on the Coordinate Plane

Key Concept: Midpoint Formula on the Coordinate Plane

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

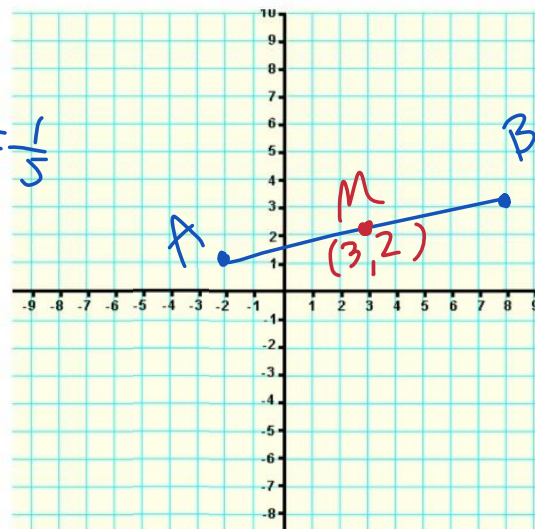
Find the Midpoint on the Coordinate Plane

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

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

$$\begin{array}{r} x_1 + x_2 \\ -2 + 8 \\ \hline 6 \\ \hline 2 \end{array}, \begin{array}{r} y_1 + y_2 \\ 1 + 3 \\ \hline 4 \\ \hline 2 \end{array}$$

Slope
Rise $\frac{2}{10} = \frac{1}{5}$
Run $\frac{-2}{2} = -1$



Midpoint $\left(\frac{6}{2}, \frac{4}{2}\right)$
 $(3, 2)$

Example 3

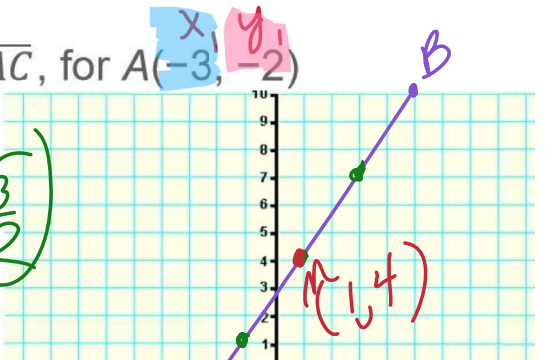
Find the Midpoint on the Coordinate Plane

Check

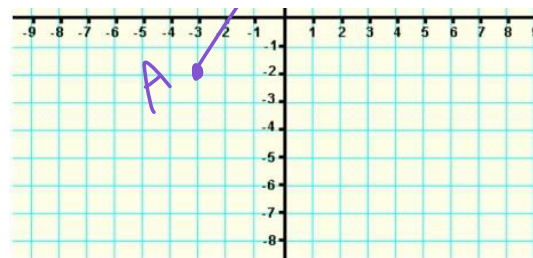
Find the coordinates of B , the midpoint of $\overline{AC}$, for $A(-3, -2)$ and $C(5, 10)$.

$$\begin{array}{r} x_1 + x_2 \\ -3 + 5 \\ \hline 2 \\ \hline 2 \end{array}, \begin{array}{r} y_1 + y_2 \\ -2 + 10 \\ \hline 8 \\ \hline 2 \end{array}$$

Slope
Rise $\frac{12}{8} = \frac{3}{2}$
Run $\frac{4}{4} = 1$



Midpoint $(1, 4)$



Example 4

Find Missing Coordinates

Find the coordinates of A if $P(3, \frac{1}{2})$ is the midpoint of $\overline{AB}$ and B has coordinates $(8, 3)$. *Use the midpoint Formula & Graph to prove using the slope!

$$\frac{x_1 + x_2}{2} = 3$$

$$\frac{x + 8}{2} = 3$$

$$x + 8 = 6$$

$$x = -2$$

$$\frac{y + 3}{2} = 0.5$$

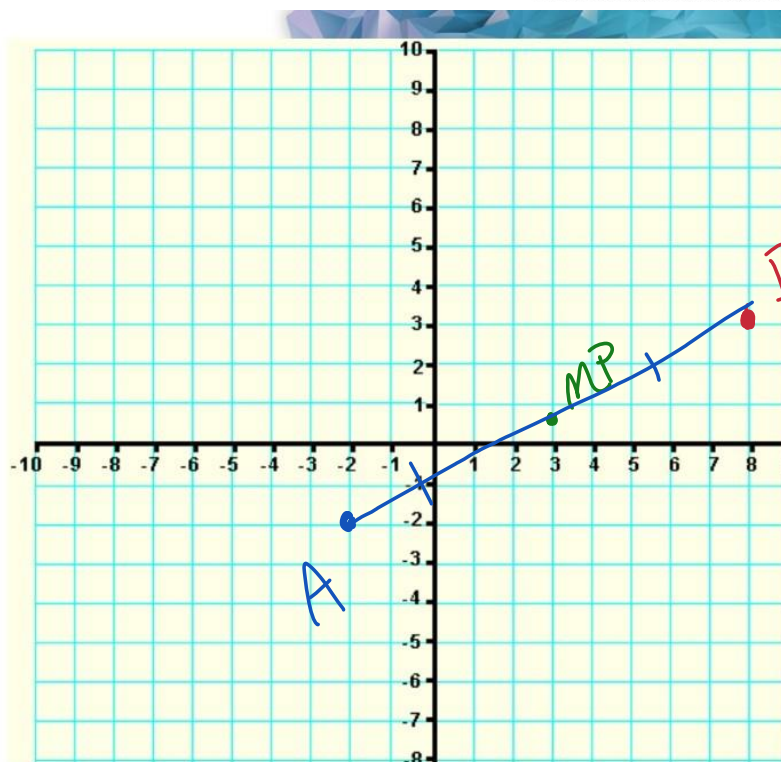
$$y + 3 = 1$$

$$y = -2$$



Example 4

Find Missing Coordinates



Example 4

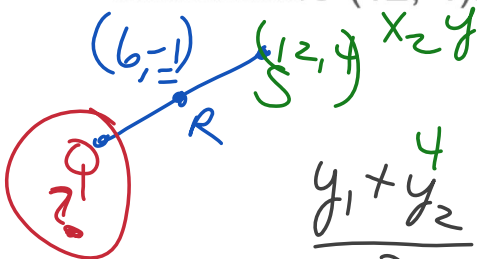
Find Missing Coordinates

Check

$?x, y$

= Midpoint

Find the coordinates of Q if $R(6, -1)$ is the midpoint of $\overline{QS}$ and S has coordinates $(12, 4)$. Use the midpoint formula and graph to prove.


$$\frac{x_1 + x_2}{2} = 6$$
$$\frac{y_1 + y_2}{2} = -1$$
$$\frac{x + 12}{2} = 6$$
$$\frac{y + 4}{2} = -1$$
$$x + 12 = 12$$
$$y + 4 = -2$$
$$x = 0$$
$$y = -6$$

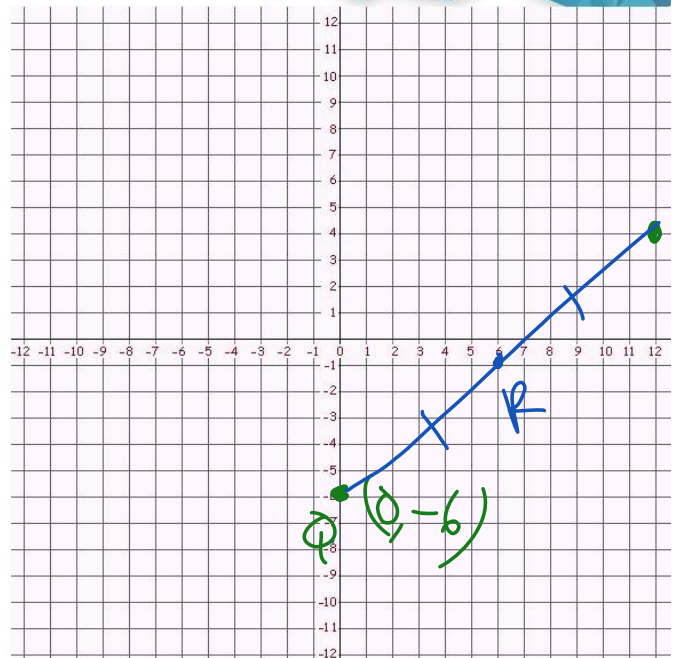
$(0, -6)$

McGraw Hill | Midpoints and Bisectors

This material may be reproduced for licensed classroom use only and may not be further reproduced or distributed.

Example 4

Find Missing Coordinates



McGraw Hill | Midpoints and Bisectors

This material may be reproduced for licensed classroom use only and may not be further reproduced or distributed.

Learn

Bisectors

Because the midpoint separates a segment into two congruent segments, we can say that the midpoint **bisects**

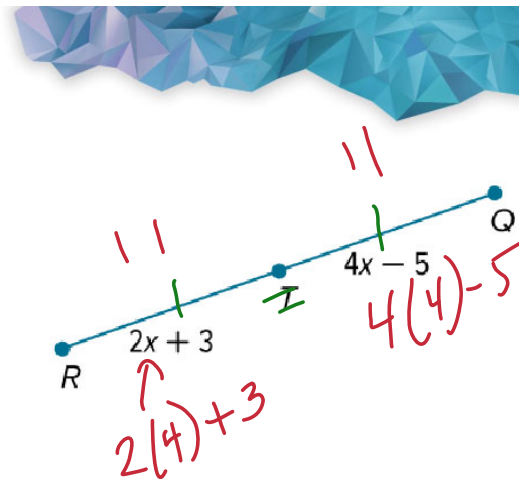
the segment. Any segment, line, plane, or point that bisects a segment is called a **segment bisector**.

Example 5

Find Missing Measures

Find the measure of $\overline{RT}$ if T is the midpoint of $\overline{RQ}$.

$$\begin{array}{r}
 2x + 3 = 4x - 5 \\
 \hline
 -2x + 8 = -4x \\
 \hline
 8 = -2x \\
 \hline
 -4 = -x \\
 \hline
 x = 4
 \end{array}$$



Example 5

Find Missing Measures

Check

Find the measure of $\overline{RS}$ if S is the midpoint of $\overline{RT}$.



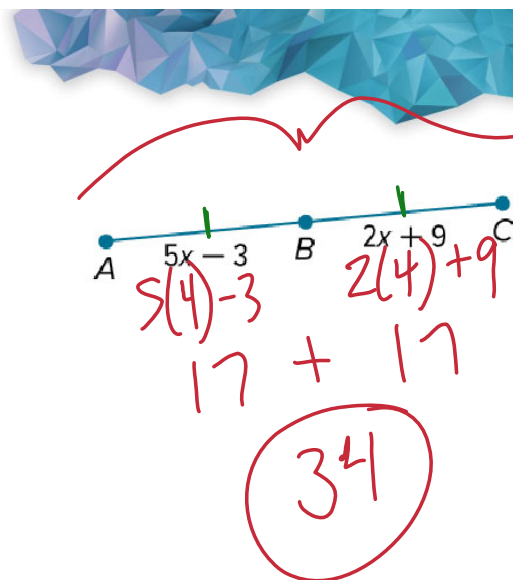
Example 6

Find the Total Length

Find the measure of $\overline{AC}$ if B is the midpoint of $\overline{AC}$.

$$x = 4$$

$$\begin{array}{r} 5x - 3 = 2x + 9 \\ -2x \quad -2x \\ \hline 3x - 3 = 9 \\ +3 \quad +3 \\ \hline 3x = 12 \\ \hline x = 4 \end{array}$$



Example 6

Find the Total Length

Check

Find the measure of $\overline{AC}$ if B is the midpoint of $\overline{AC}$. Round your answer to the nearest tenth, if necessary.

