LESSON 1.5

NAME ______________________ DATE ____________

Reteaching with Practice

For use with pages 34–42

GOAL **Bisect a segment and bisect an angle**

VOCABULARY

The **midpoint** of a segment is the point that divides, or **bisects,** the segment into two congruent segments.

A **segment bisector** is a segment, ray, line, or plane that intersects a segment at its midpoint.

A **construction** is a geometric drawing that uses a limited set of tools, usually a **compass** and a **straightedge.**

An **angle bisector** is a ray that divides an angle into two adjacent angles that are congruent.

The Midpoint Formula:
If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint of $\overline{AB}$ has coordinates $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

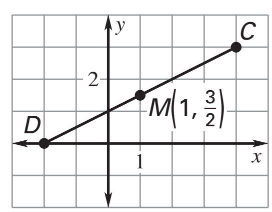
EXAMPLE 1 Finding the Coordinates of the Midpoint of a Segment

Find the coordinates of the midpoint of $\overline{CD}$ with endpoints $C(4, 3)$ and $D(-2, 0)$.

SOLUTION

Use the Midpoint Formula as follows.

$$M = \left(\frac{4 + (-2)}{2}, \frac{3 + 0}{2}\right)$$
$$= \left(1, \frac{3}{2}\right)$$



Exercises for Example 1

Find the coordinates of the midpoint of the segment whose endpoints are given.

1. $E(4, -4), F(1, 7)$ **2.** $G(2, 9), H(-3, 6)$ **3.** $I(-8, 3), J(3, 0)$

EXAMPLE 2 Finding the Coordinates of the Endpoint of a Segment

The midpoint of $\overline{KL}$ is $M(6, -2)$. One endpoint is $K(4, 3)$. Find the coordinates of the other endpoint.

NAME _______________________________ DATE ___________

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SOLUTION

Let (x, y) be the coordinates of L. Use the Midpoint Formula to write equations involving x and y.

$$\frac{4 + x}{2} = 6 \qquad\qquad \frac{3 + y}{2} = -2$$

$$4 + x = 12 \qquad\qquad 3 + y = -4$$

$$x = 8 \qquad\qquad y = -7$$

So, the other endpoint of the segment is $L(8, -7)$.

Exercises for Example 2

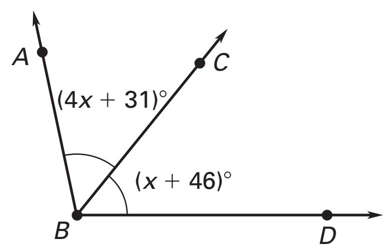
Find the coordinates of the other endpoint of a segment with the given endpoint and midpoint *M*.

4. $N(-1, 5), M(0, 1)$ **5.** $P(6, -4), M(3, 10)$ **6.** $R(-7, -3), M(0, 0)$

EXAMPLE 3

Finding the Measure of an Angle

In the diagram, $\overrightarrow{BC}$ bisects $\angle ABD$. Solve for x.



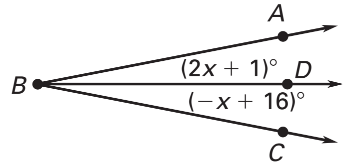
SOLUTION

$m\angle ABC = m\angle CBD$	Congruent angles have equal measures.
$(4x + 31)° = (x + 46)°$	Substitute given measures.
$4x = x + 15$	Subtract 31° from each side.
$3x = 15$	Subtract x from each side.
$x = 5$	Divide each side by 3.

Exercises for Example 3

$\overrightarrow{BD}$ bisects $\angle ABC$. Find the value of *x*.

7.



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