Lesson 1.2 Line Segments

MA.912.GR.5.1

Construct a copy of a segment or an angle.

Content Objective

Students will calculate measures of line segments.

Learn
Betweenness of Points

A **line segment** is a measurable part of a line that consists of two points, called endpoints, and all of the points between them. The two endpoints are used to name the segment.

For any two real numbers a and b, there is a real number n between a and b such that $a < n < b$. This relationship also applies to points on a line and is called **betweenness of points.**
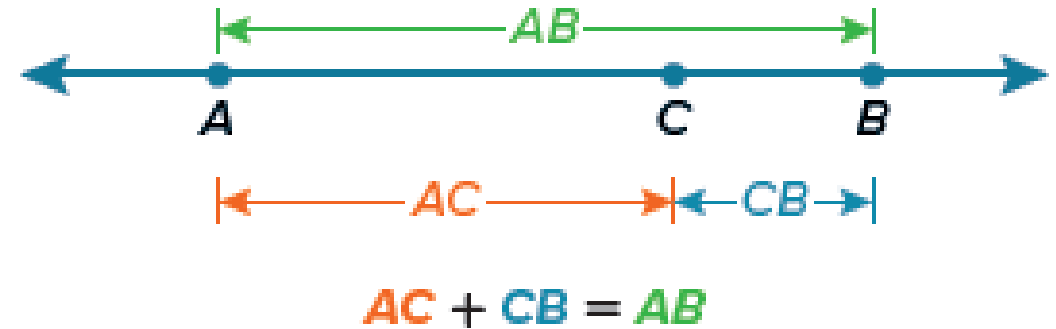
Key Concept: Betweenness of Points

Point *C* is between *A* and *B*

if and only if *A*, *B*, and *C* are
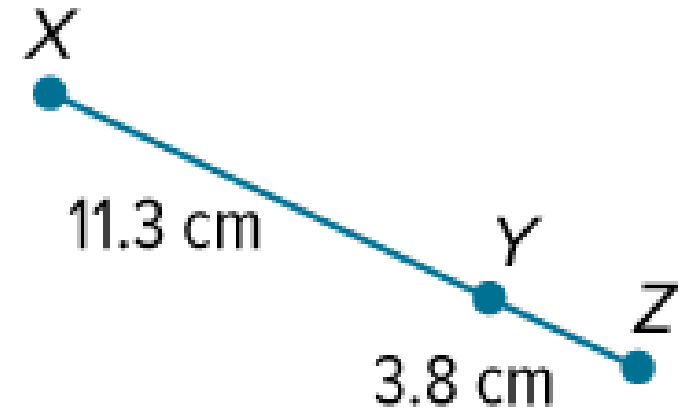
collinear and *AC* + *CB* = *AB*.

In the example above, line segment *AB*, also written $\overline{AB}$, has endpoints *A* and *B* and contains point *C*. *AB* is the measure of $\overline{AB}$, *AC* is the measure of $\overline{AC}$, and *CB* is the measure of $\overline{CB}$.

Example 1
Find Measurements by Adding

Find the measure of $\overline{XZ}$.

X

11.3 cm

Y

Z

3.8 cm

Example 1
Find Measurements by Adding

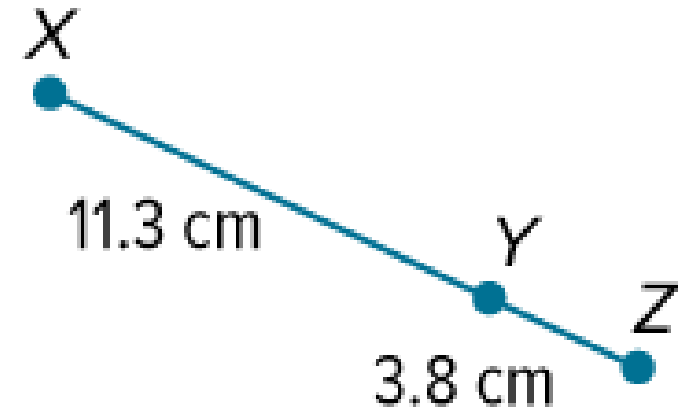XZ is the measure of $\overline{XZ}$. Point Y is between X and Z. Find XZ by adding XY and YZ.

$XY + YZ = XZ$	Betweenness of points
$11.3 + 3.8 = XZ$	Substitution
$15.1 \text{ cm} = XZ$	Add.

Example 1
Find Measurements by Adding
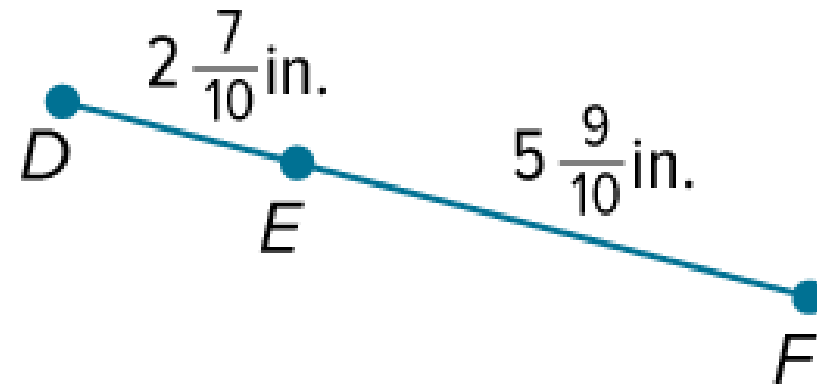
Check

Find the measure of $\overline{DF}$.

$2\frac{7}{10}$ in.

$5\frac{9}{10}$ in.

D

E

F

Example 1
Find Measurements by Adding

Check

Find the measure of $\overline{DF}$. $8\frac{3}{5}$ in.

$2\frac{7}{10}$ in.

$5\frac{9}{10}$ in.

D

E

F
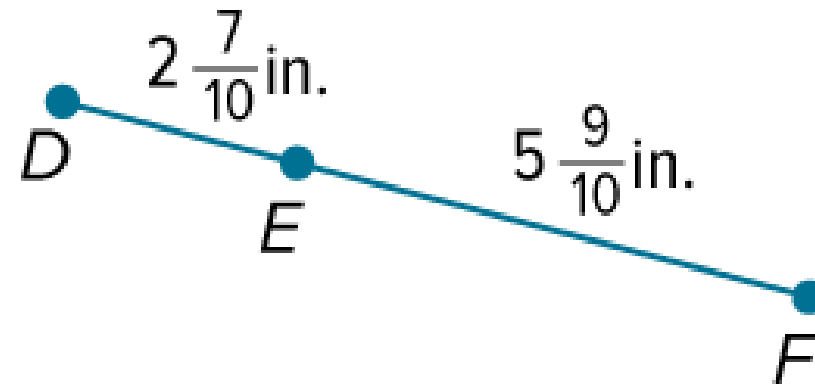
Example 2
Find Measurements by Subtracting

Find the measure of $\overline{QR}$.
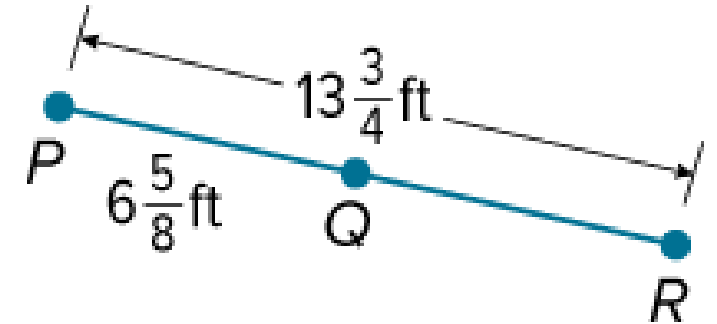
Example 2
Find Measurements by Subtracting

Point Q is between points P and R.

$PQ + QR = PR$ **Betweenness of points**

$6\dfrac{5}{8} + QR = 13\dfrac{3}{4}$ **Substitution**

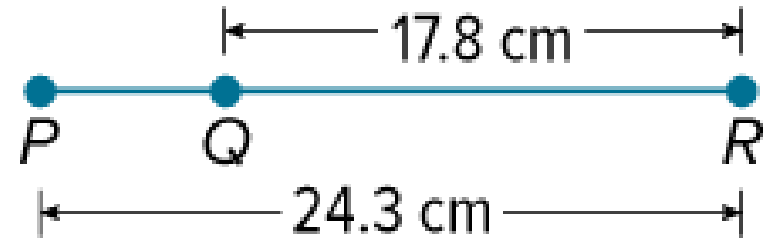$QR = 7\dfrac{1}{8}$ **Subtract $6\dfrac{5}{8}$ from each side and simplify.**
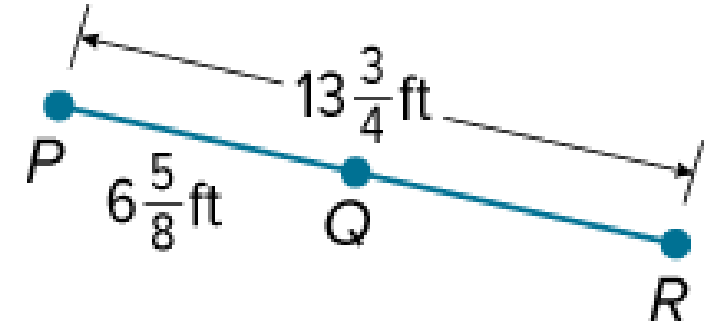
So, the measure of $\overline{QR}$ is $7\dfrac{1}{8}$ feet.

Example 2
Find Measurements by Subtracting

Check

Find the measure of $\overline{PQ}$. Round your answer to the nearest tenth, if necessary.
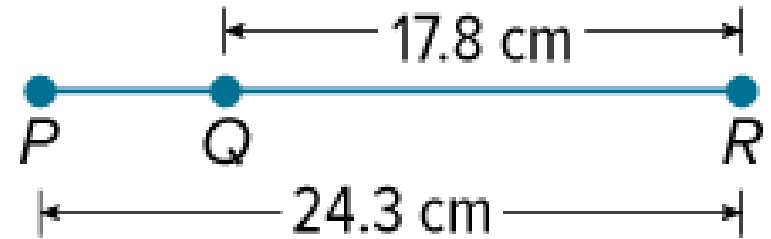
Example 2
Find Measurements by Subtracting

Check

Find the measure of $\overline{PQ}$. Round your answer to the nearest tenth, if necessary. **6.5 cm**

Example 3
Write and Solve Equations to Find Measurements

Find the value of x and BC if B is between A and C, $AC = 4x - 12$, $AB = x$, and $BC = 2x + 3$.

Example 3

Example 3
Write and Solve Equations to Find Measurements
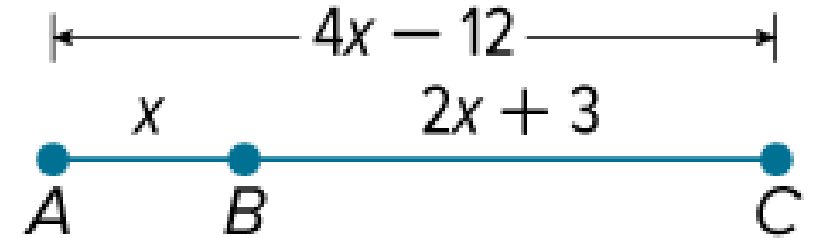
Step 1   **Sketch two points and label them *A* and *C*. Connect the points.**

Step 2   **Sketch point *B* between points *A* and *C*.**

Step 3   **Label segments *AB, BC,* and *AC* with their given measures.**
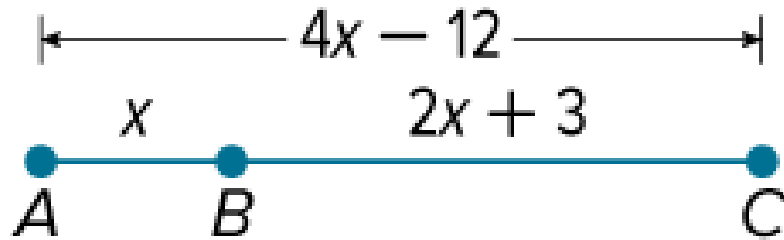
Example 3
Write and Solve Equations to Find Measurements

Step 4   **Use betweenness of points to write an equation and solve for *x*.**

$AC = AB + BC$ Betweenness of points

$4x - 12 = x + 2x + 3$ Substitution

$4x - 12 = 3x + 3$ Combine like terms.

$x - 12 = 3$ Subtract $3x$ from each side. Simplify.

$x = 15$ Add 12 to each side. Simplify.

If two geometric figures have exactly the same shape and size, then they are **congruent**. Two segments that have the same measure are **congruent segments**.
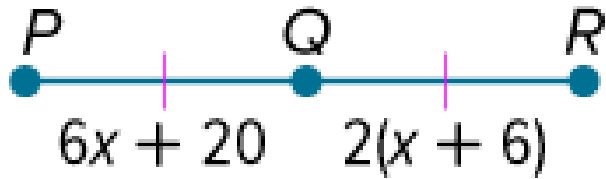
Key Concept: Congruent Segments

$\cong$ is read *is congruent to*. Tick marks on the figure also indicate congruence. Use a consecutive number of tick marks for each new pair of congruent segments in a figure.
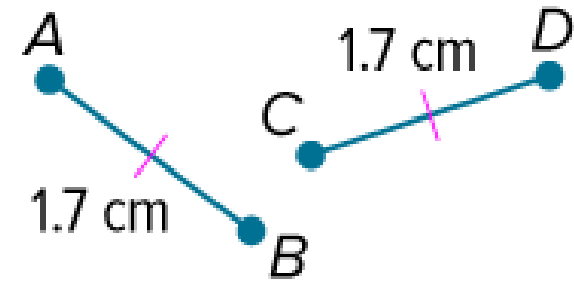
Example 5
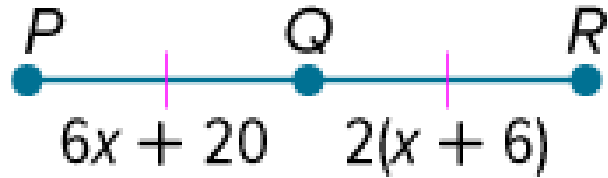Write and Solve Equations by Using Congruence

Find the value of *x*.

$$P \qquad Q \qquad R$$
$$6x + 20 \quad 2(x + 6)$$

Example 5
Write and Solve Equations by Using Congruence

$PQ = QR$ — Definition of congruence

$6x + 20 = 2(x + 6)$ — Substitution

$6x + 20 = 2x + 12$ — Distributive Property

$4x = -8$ — Subtract $2x$ and 20 from each side. Simplify.

$\dfrac{4x}{4} = \dfrac{-8}{4}$ — Divide each side by 4.

$x = -2$ — Simplify.