



Line Segments



Lesson Objectives



Content Objective

Students will calculate measures of line segments.

Language Objectives

- Students use *negative* and *positive* to talk about calculating measures of line segments.
- To optimize output, students participate in MLR1: Stronger and Clearer Each Time.

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.

LINE SEGMENT

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Line Segment $\overline{CD}$

The part of a line between two points. Line segments do not continue forever like lines, they have a beginning and an end.

We use the two endpoints to name a line and draw a bar (without arrows) on the top.

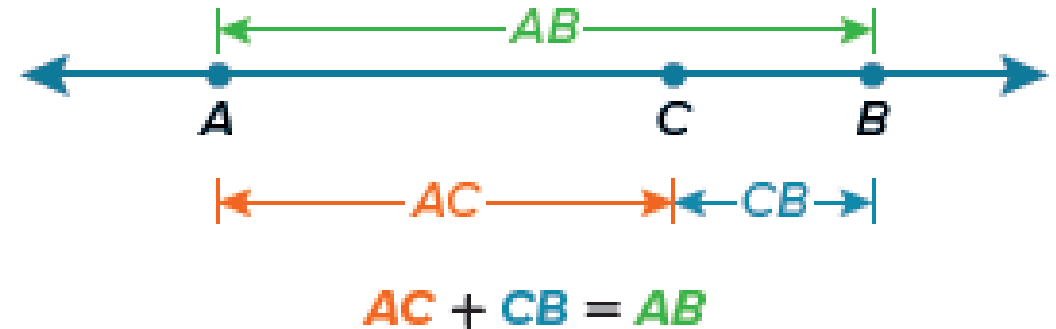
Learn

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 $AC + CB = AB$.

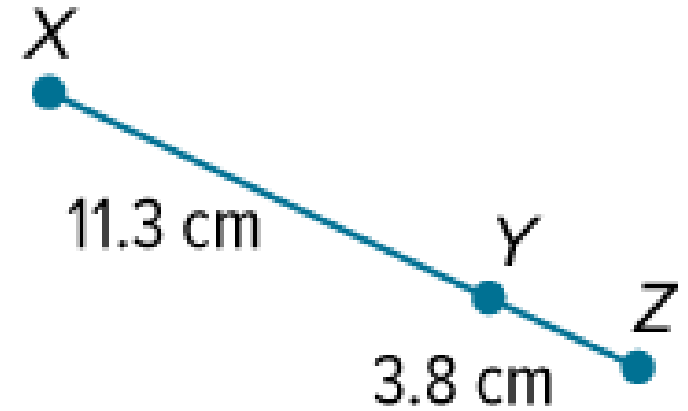
In the example above, line segment AB , also written $\overline{AB}$, has endpoints A and B and contains point C . AB is the measure of $\overline{AB}$, AC is the measure of $\overline{AC}$, and CB is the measure of $\overline{CB}$.



Example 1

Find Measurements by Adding

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



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 .

$$XY + YZ = XZ$$

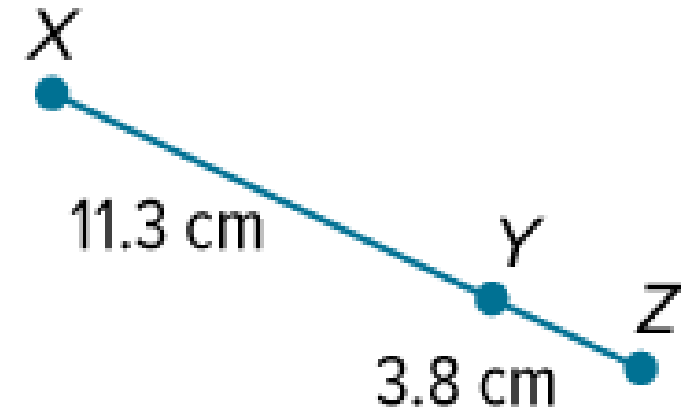
$$11.3 + 3.8 = XZ$$

$$15.1 \text{ cm} = XZ$$

Betweenness of points

Substitution

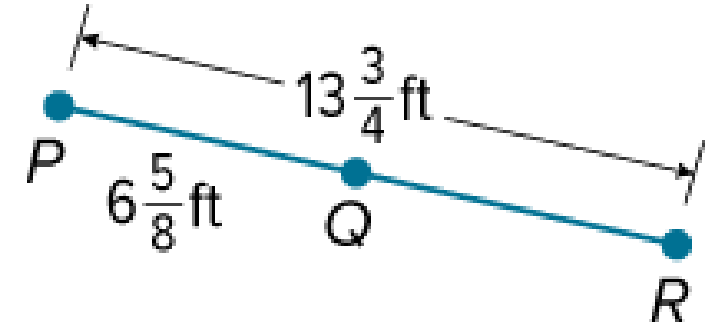
Add.



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 .

$$PQ + QR = PR$$

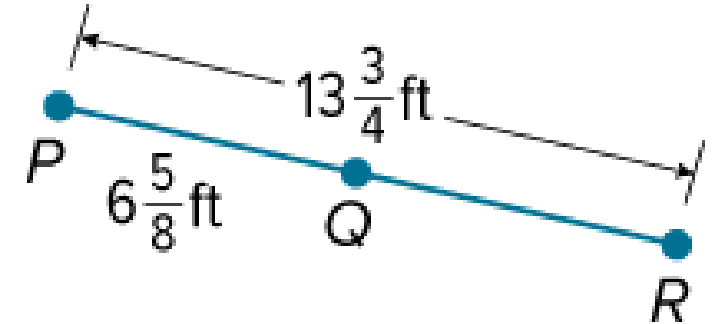
$$6\frac{5}{8} + QR = 13\frac{3}{4}$$

$$QR = 7\frac{1}{8}$$

Betweenness of points

Substitution

Subtract $6\frac{5}{8}$ from each side and simplify.



So, the measure of $\overline{QR}$ is $7\frac{1}{8}$ feet.



Example 3

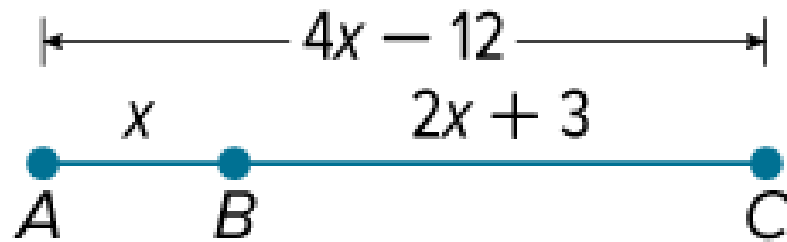
Write and Solve Equations to Find Measurements

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

Write and Solve Equations to Find Measurements

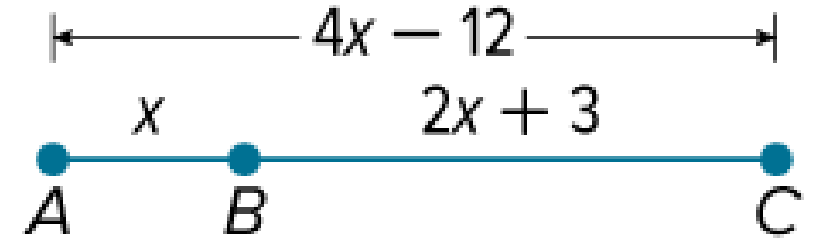
- Step 1** Sketch two points and label them *A* and *C*.
Connect the points.
- Step 2** Sketch point *B* between points *A* and *C*.
- Step 3** Label segments *AB*, *BC*, and *AC* with their given measures.



Example 3

Write and Solve Equations to Find Measurements

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



$$AC = AB + BC$$

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

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

$$x - 12 = 3$$

$$x = 15$$

Betweenness of points

Substitution

Combine like terms.

Subtract $3x$ from each side. Simplify.

Add 12 to each side. Simplify.



Learn

Line Segment Congruence

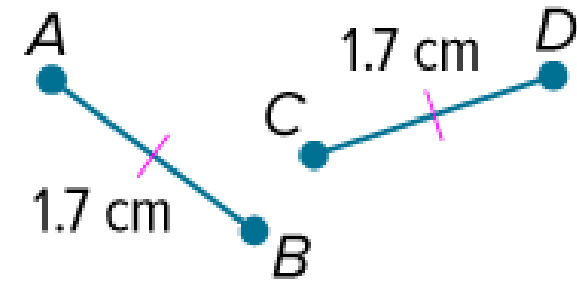
If two geometric figures have exactly the same shape and size, then they are **congruent**. Two segments that have the same measure are **congruent segments**.

Learn

Line Segment Congruence

Key Concept: Congruent Segments

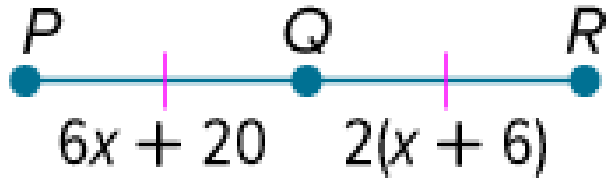
$\cong$ is read *is congruent to*. Tick marks on the figure also indicate congruence. Use a consecutive number of tick marks for each new pair of congruent segments in a figure.



Example 5

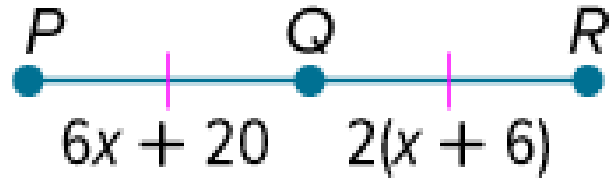
Write and Solve Equations by Using Congruence

Find the value of x .



Example 5

Write and Solve Equations by Using Congruence



$$PQ = QR$$

$$6x + 20 = 2(x + 6)$$

$$6x + 20 = 2x + 12$$

$$4x = -8$$

$$\frac{4x}{4} = \frac{-8}{4}$$

$$x = -2$$

Definition of congruence

Substitution

Distributive Property

Subtract $2x$ and 20 from each side. Simplify.

Divide each side by 4 .

Simplify.