

Section 1.2: Using Segments and Congruence

EQ: What are congruent segments?

**postulate**

A rule accepted without proof

**axiom**

Another word for postulate

**coordinate**

The number associated to a point  $(x, y) = (5, -1)$

**distance**

Formula used to find length; Given  $(x_1, y_1)$  and  $(x_2, y_2)$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

**between**

When 3 points are collinear then there is a point between the other two



pt. B is between pt A and pt C  
\* Not necessarily mdpt.

**congruent segments**

Segments that are the same length

Congruent symbol  $\cong$

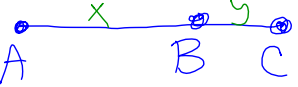
**Ruler Postulate:**

The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the coordinate of the point. The distance between points A and B, written as  $AB$ , is the absolute value of the difference of the coordinates of A and B.

**Segment Addition Postulate:**

If B is between A and C, then  $AB + BC = AC$ .

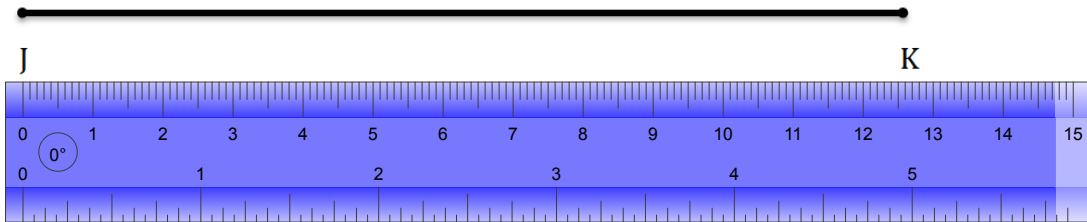
If  $AB + BC = AC$ , then B is between A and C.



$$x + y = \text{length of } \overline{AC}$$

$$x + y = AC$$

A1. Measure segment  $JK$  to the nearest tenth of a centimeter.



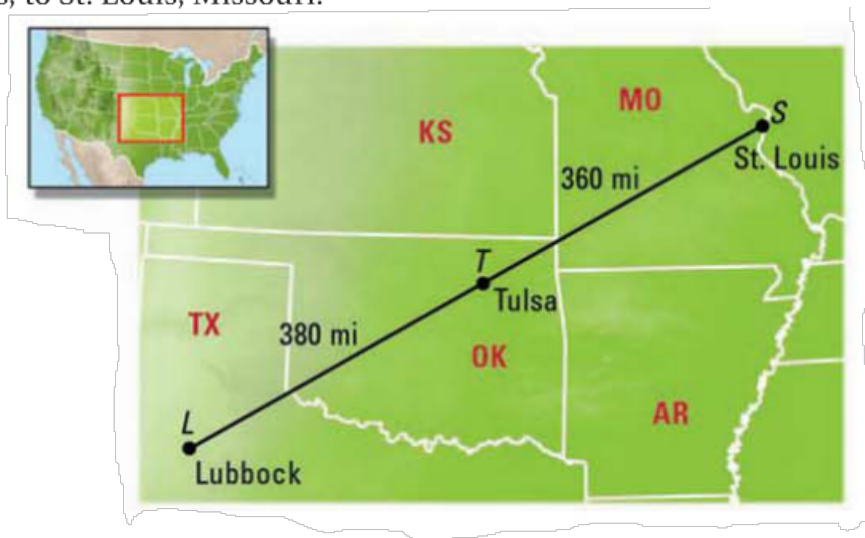
$$JK = 12.6 \text{ cm}$$

$JK$  = represents length  
(no topbar)

$\overline{JK}$  = segment  $JK$

### Apply the Segment Addition Postulate

**MAPS** The cities shown on the map lie approximately in a straight line. Use the given distances to find the distance from Lubbock, Texas, to St. Louis, Missouri.



A2. On the map to below, it appears that Milwaukee, Oshkosh, and Wausau lie approximately in a straight line. If Milwaukee and Wausau are 188.1 miles apart and Oshkosh and Wausau are 102.9 miles apart, how many miles apart are Oshkosh and Milwaukee?

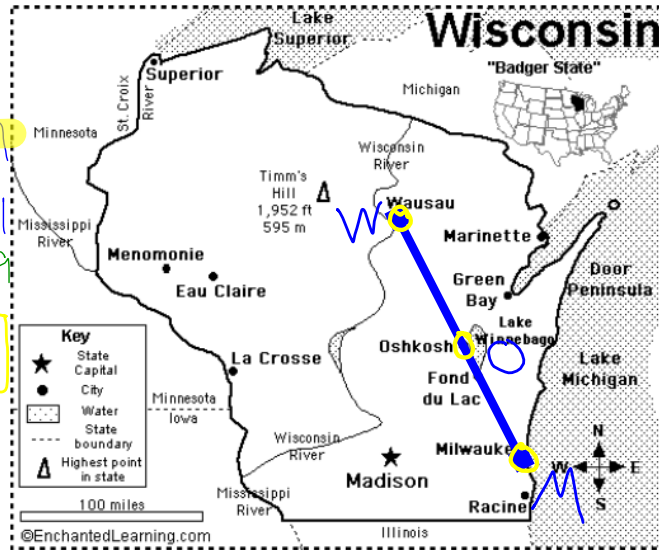
Seg. Add. Postulate

$$WO + OM = WM$$

$$102.9 + OM = 188.1$$

$$-102.9 \quad -102.9$$

$$OM = 85.2 \text{ mi}$$



Use the diagram to find GH.



$$FG + GH = FH$$

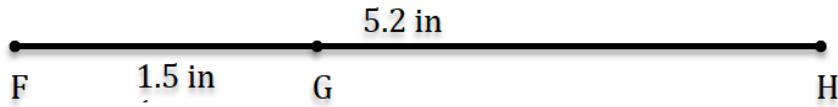
$$21 + GH = 36$$

$$-21 \quad -21$$

$$GH = 15 \text{ in}$$

\* Segment Addition Postulate

A3. Use the diagram to the left to find  $GH$ .



$FG + GH = FH$  ← Seg. Add. Postulate

$$1.5 + GH = 5.2$$

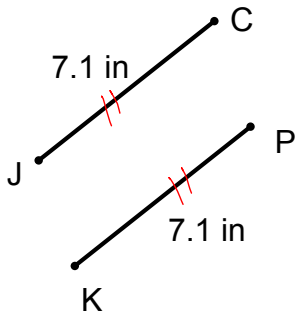
$$-1.5 \qquad -1.5$$

$GH = 3.7 \text{ in}$

## Congruent Segments



Segments with the same length are said to be "congruent segments"

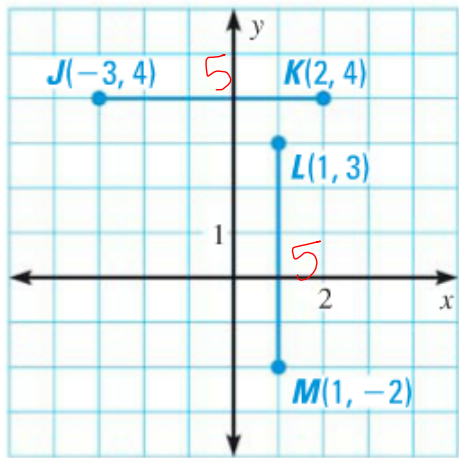


"segment JC is equal in length to segment KP"

"segment JC is congruent to segment KP"

\* Mark  $\cong$   
with tick  
marks

Plot  $J(-3, 4)$ ,  $K(2, 4)$ ,  $L(1, 3)$ , and  $M(1, -2)$  in a coordinate plane. Then determine whether  $\overline{JK}$  and  $\overline{LM}$  are congruent.



$$JK = 5$$

$$LM = 5$$

$$\therefore \overline{JK} \cong \overline{LM}$$

because  $JK = LM = 5$  units

A4. Plot  $J(-3, 4)$ ,  $K(2, 4)$ ,  $L(-2, 2)$  and  $M(1, -2)$  on a coordinate plane. Then determine whether  $\overline{JK}$  and  $\overline{LM}$  are congruent.

$$JK = 5 \text{ units}$$

$$LM = ?$$

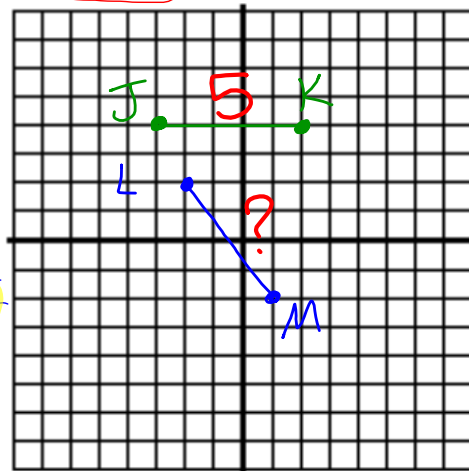
$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$LM = \sqrt{(-2 - 1)^2 + (2 - (-2))^2}$$

$$LM = \sqrt{(-3)^2 + (4)^2}$$

$$LM = \sqrt{9 + 16} = \sqrt{25}$$

$$LM = 5 \text{ units}$$



$\overline{JK} \cong \overline{LM}$  because  
 $JK = LM = 5$  units.

A5. In the diagram, points A, B, C, and D are **collinear**, points C, X, Y, and Z are **collinear**,  $AB = BC = CX = YZ$ ,  $AD = 54$ ,  $XY = 22$ , and  $XZ = 33$ . Find the indicated **length**.

a.  $AB = 11$  un

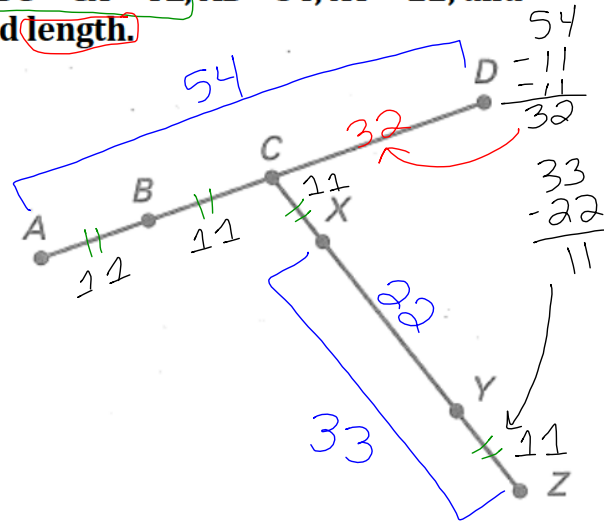
b.  $BD = 43$  un

c.  $CY = 33$  un

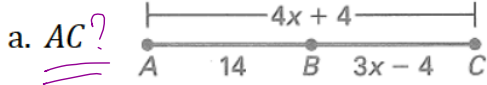
d.  $CD = 32$  un

e.  $XC = 11$  un

f.  $CZ = 44$  un



A6. Find the indicated **length**.



$AB + BC = AC$

$$14 + 3x - 4 = 4x + 4$$

$$\begin{array}{r} 3x + 10 = 4x + 4 \\ -3x \quad -4 \quad -3x \quad -4 \\ \hline 6 = x \end{array}$$

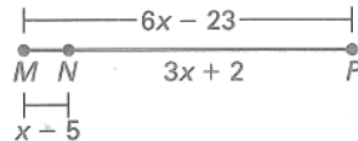
$6 = x$

$AC = 4x + 4$

$4(6) + 4$

$AC = 28$  un

b.  $NP?$



$MN + NP = MP$

$$x - 5 + 3x + 2 = 6x - 23$$

$$\begin{array}{r} 4x - 3 = 6x - 23 \\ -4x \quad +23 \quad -4x \quad +23 \\ \hline 20 = 2x \end{array}$$

$\frac{20}{2} = \frac{2x}{2} \quad x = 10$

$NP = 3x + 2$

$3(10) + 2$

$30 + 2 = NP = 32$  un

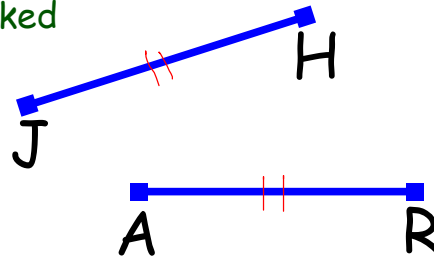
EQ: What are congruent segments?

Section 1.2 Summary:

Congruent segments are segments with the same length.

Congruent segments can be marked in a figure using tick marks.

Use the congruent symbol when using segment notation



We can say  $\overline{JH} \cong \overline{AR}$

because  $\overline{JH} = \overline{AR}$

Use the equal sign to state that two lengths are the same