Geometry A

1.2 Notes – Use Segments and Congruence

Name: Key

Date: ______________ Period: ______________

LEARNING TARGETS

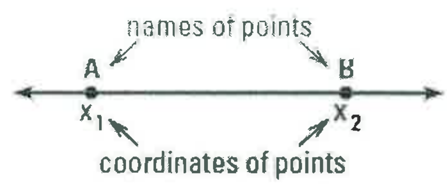
- I can use the Ruler Postulate to find lengths of segments. (CC.9-12.G.CO.1)
- I can use the Segment Addition Postulate to find lengths of segments. (CC.9-12.G.CO.1)
- I can use segment postulates to identify congruent segments. (CC.9-12.G.CO.7)

In Geometry, a rule that is accepted without proof I called a ***postulate*** or an ***axiom.*** A rule that can be proven is called a ***theorem***. Let's start by looking at some geometric postulates.

POSTULATE *For Your Notebook*

POSTULATE 1 Ruler Postulate

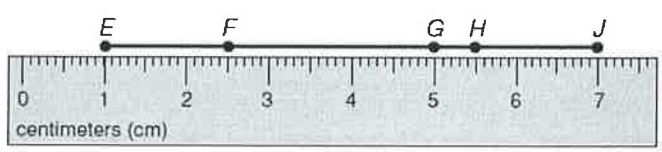
The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the **coordinate** of the point.



The **distance** between points *A* and *B*, written as *AB*, is the absolute value of the difference of the coordinates of *A* and *B*.

The Ruler Postulate is helpful when trying to find lengths of segments. We can find the lengths of segments by looking at the **distance** between two points.

The **distance** between any two points is the **length** of the segment that connects them.



The distance between *E* and *J* is *EJ*, the length of $\overline{EJ}$. To find the distance, subtract the numbers corresponding to the points and then take the absolute value.

$$EJ = |7 - 1|$$
$$= |6|$$
$$= 6 \text{ cm}$$

__Example 1__ – Use the figure above to find each length:

A) EG = 4 cm

$= |5 - 1|$

$= |4|$

$= 4$

B) EF = 1.5 cm

$= |2.5 - 1|$

$= |1.5|$

$= 1.5$

C) FH = 3 cm

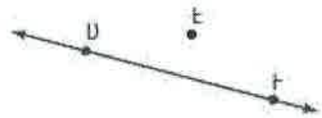
$= |5.5 - 2.5|$

$= |3|$

$= 3$

When 3 points are collinear, you can say that one point is **between** the other two.

Point B is between points A and C.



Point E is not between points D and F.

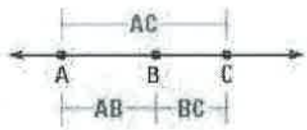
POSTULATE *For Your Notebook*

POSTULATE 2 Segment Addition Postulate

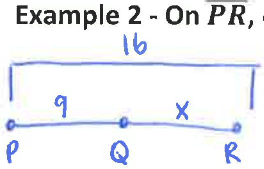
If B is between A and C, then $AB + BC = AC$.

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

piece + piece = whole



Example 2 - On $\overline{PR}$, Q is between P and R. If PQ = 9, QR = x, and PR = 16, please find QR.



$PQ + QR = PR$

$\cancel{9} + x = 16$

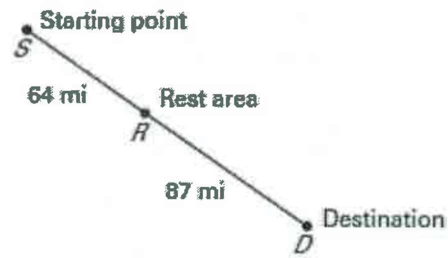
$-\cancel{9} \quad -9$

$\boxed{x = 7}$

$\boxed{QR = 7}$

Example 3 – Apply the Segment Addition Postulate

The locations shown lie in a straight line. Find the distance from the starting point to the destination.



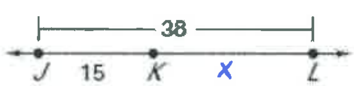
$SR + RD = SD$

$64 + 87 = SD$

$151 = SD \Rightarrow \boxed{\text{distance} = 151 \text{ miles}}$

Example 4 – Find a length.

A) Use the diagram to find KL.



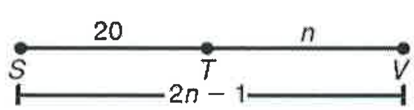
$JK + KL = JL$

$\cancel{15} + x = 38$

$-\cancel{15} \quad -15$

$x = 23 \Rightarrow \boxed{KL = 23}$

B) Use the diagram to find SV.



$ST + TV = SV$

$20 + \cancel{n} = 2n - 1$

$-\cancel{n} \quad -n$

$20 = n - \cancel{1}$

$+1 \quad +\cancel{1}$

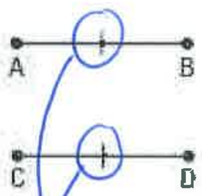
$\boxed{21 = n}$

$SV = 2(21) - 1$

$SV = 42 - 1$

$\boxed{SV = 41}$

CONGRUENT SEGMENTS Line segments that have the same length are called **congruent segments.** In the diagram below, you can say "the length of $\overline{AB}$ is equal to the length of $\overline{CD}$," or you can say "$\overline{AB}$ *is congruent to* $\overline{CD}$." The symbol $\cong$ means "is congruent to."

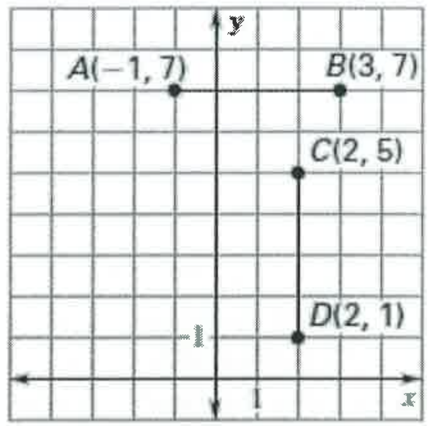


Tickmarks mean same length

Lengths are equal.	Segments are congruent.
$=$	$\cong$
↑	↑
"is equal to"	"is congruent to"

Example 4 – Compare segments for congruence

Use the diagram to determine whether $\overline{AB}$ and $\overline{CD}$ are congruent.



- To find length of a horizontal segment, you can subtract the x-coordinates. To find AB:

  $3 - -1 = 3 + 1 = 4 \Rightarrow AB = 4$

- To find the length of a vertical segment, you can subtract the y-coordinates. To find CD:

  $5 - 1 = 4 \Rightarrow CD = 4$

So $\overline{AB} \cong \overline{CD}$ because they have the same length