1.3 Measuring Segments

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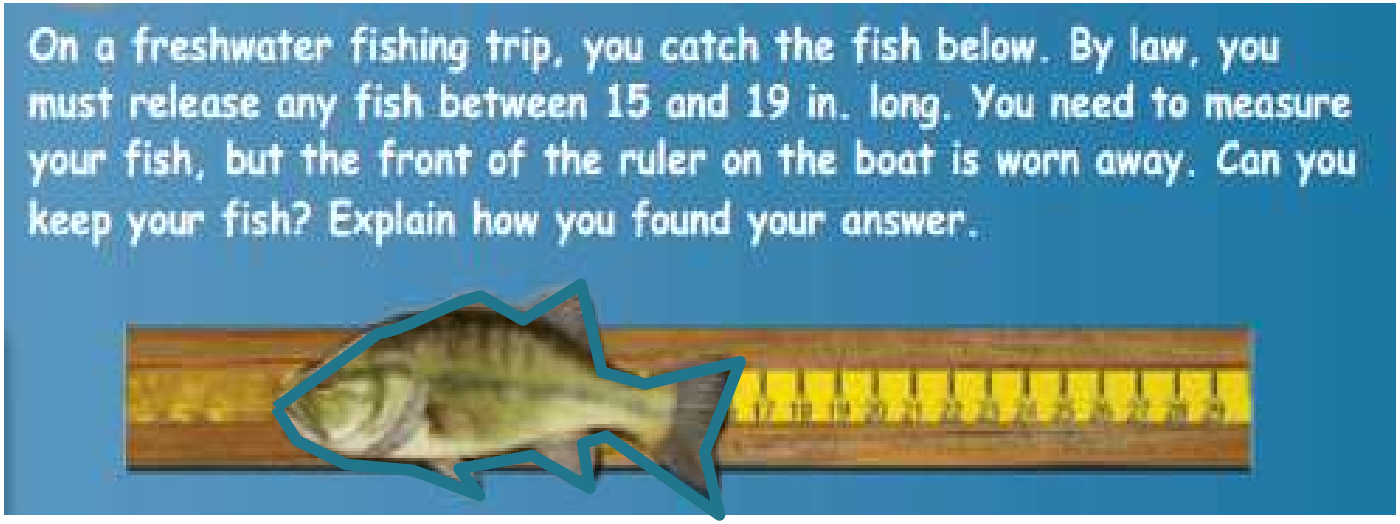
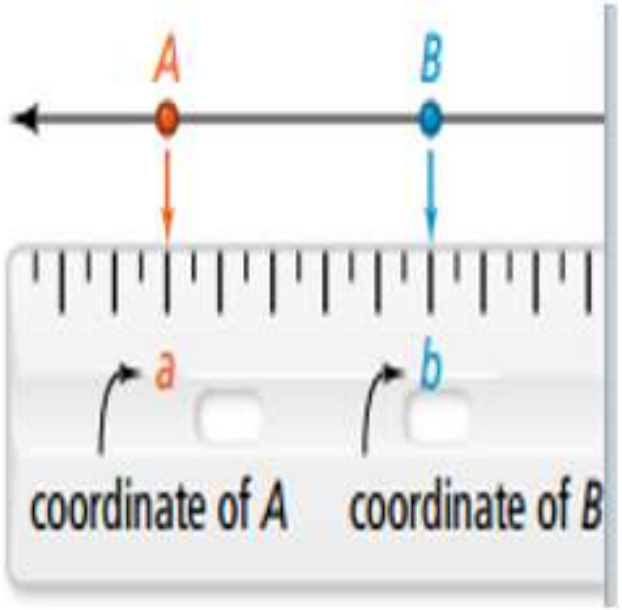


Yes, it is not between 15–19 in. long. The tail of the fish reaches to the 16 in. mark, and the space in the front of the fish is more than one inch, so it is less than 15 inches long.

Also, you can move the fish towards the end of the ruler.
The fish will end up between 17 and 29 in.
29 – 17 = 12, so the fish is 12 in.

Review: Ruler Postulate

- Every point on a line can be paired with a real number. The real number that corresponds to a point is called the **coordinate** of the point.



- Basically this postulate says that we can assign a "length" to an object. (We can measure things).

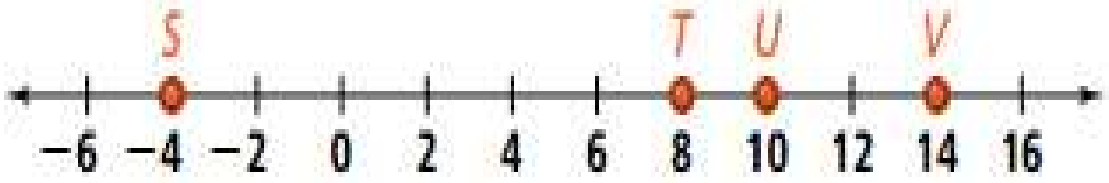
- The use of an actual ruler is always an **estimate** because:
  - There's human error.
  - We can only measure at the smallest increment on the ruler… For instance, how do you know that something measures 15 inches exactly? Maybe it's really 14.999 in. or 15.000001 in.

Distance

- The **distance** between points A and B is the absolute value of the difference of their coordinates, or $|a - b|$.

- Note:
  - $\overline{AB}$ refers to the segment AB.
  - **AB** refers to the length or distance of $\overline{AB}$
    - AB $= |a - b|$

Example 1



What is *ST?*

$|-4-8| =$
$|-12| =$
12

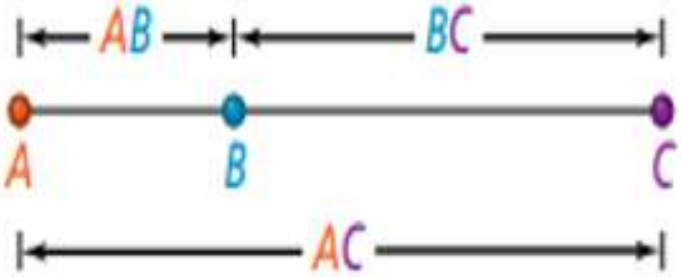
What is *SU?*

$|-4-10| =$
$|-14| =$
14

Measures in Geometry are ALWAYS positive!!!

Segment Addition Postulate

- If three points A, B, and C are collinear and B is between A and C, then **AB + BC = AC.**

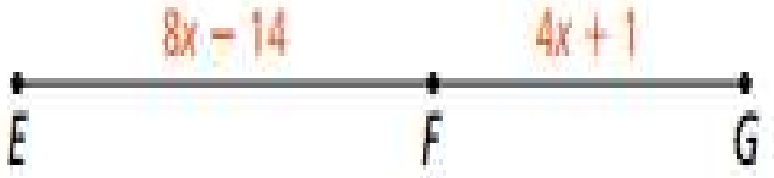


Part + Part = Whole

Example 2:

- If *EG = 59*, what are *EF* and *FG ?*

$$EF + FG = EG$$
$$8x - 14 + 4x + 1 = 59$$
$$12x - 13 = 59$$
$$12x = 72$$
$$x = 6$$



Plug it in!!!

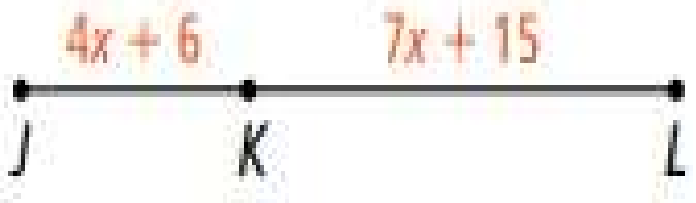
$EF = 8x - 14 = 8(6) - 14 = 34$

$FG = 4x + 1 = 4(6) + 1 = 25$

You Try!

In the diagram, *JL = 120.* What are *JK* and *KL?*

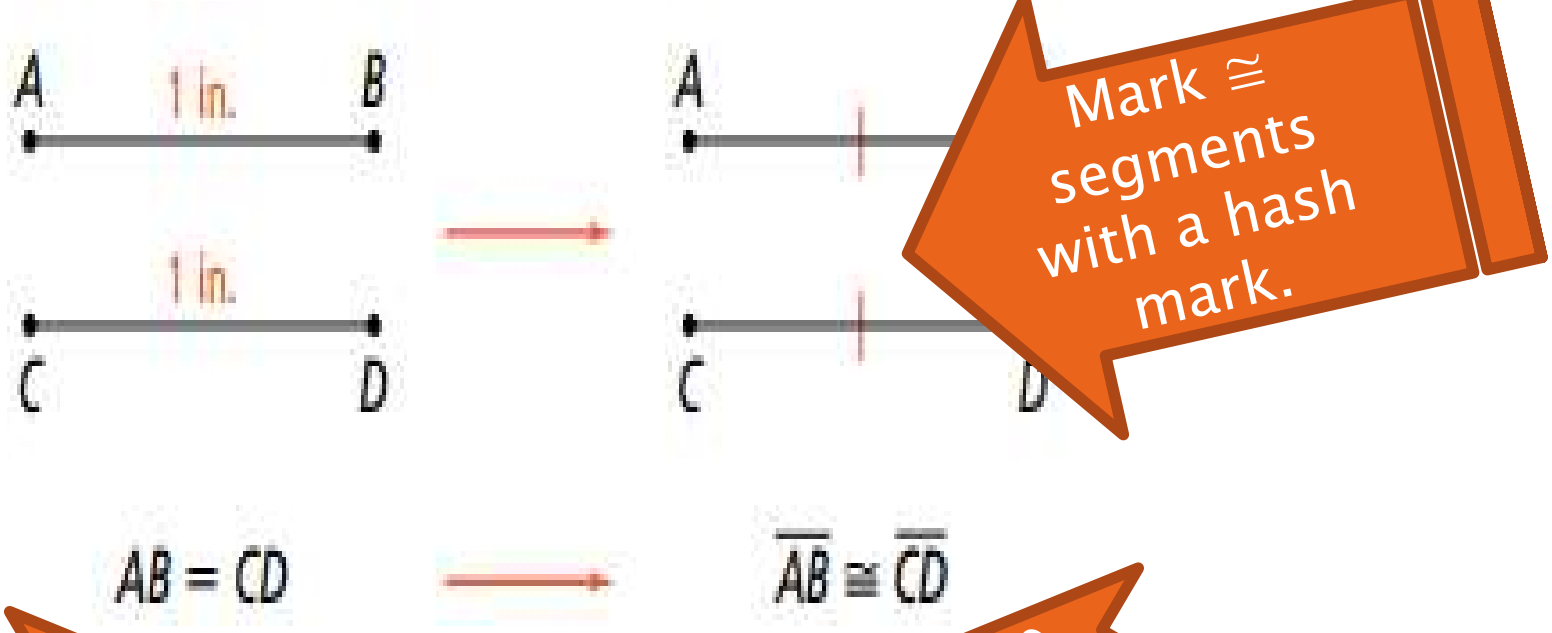
$$JK + KL = JL$$
$$4x + 6 + 7x + 15 = 120$$
$$11x + 21 = 120$$
$$11x = 99$$
$$x = 9$$



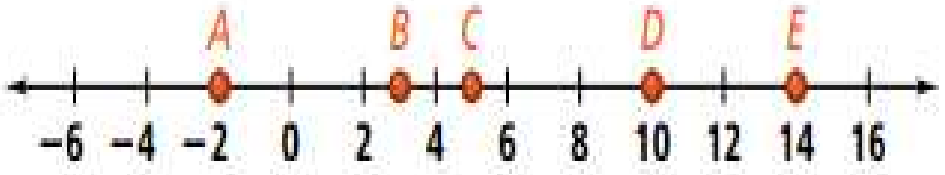
$JK = 4x + 6 = 4(9) + 6 = 42$

$KL = 7x + 15 = 7(9) + 15 = 78$

Congruent ≅ Segments



Example 3



- Are $\overline{AC}$ and $\overline{BD}$ congruent??

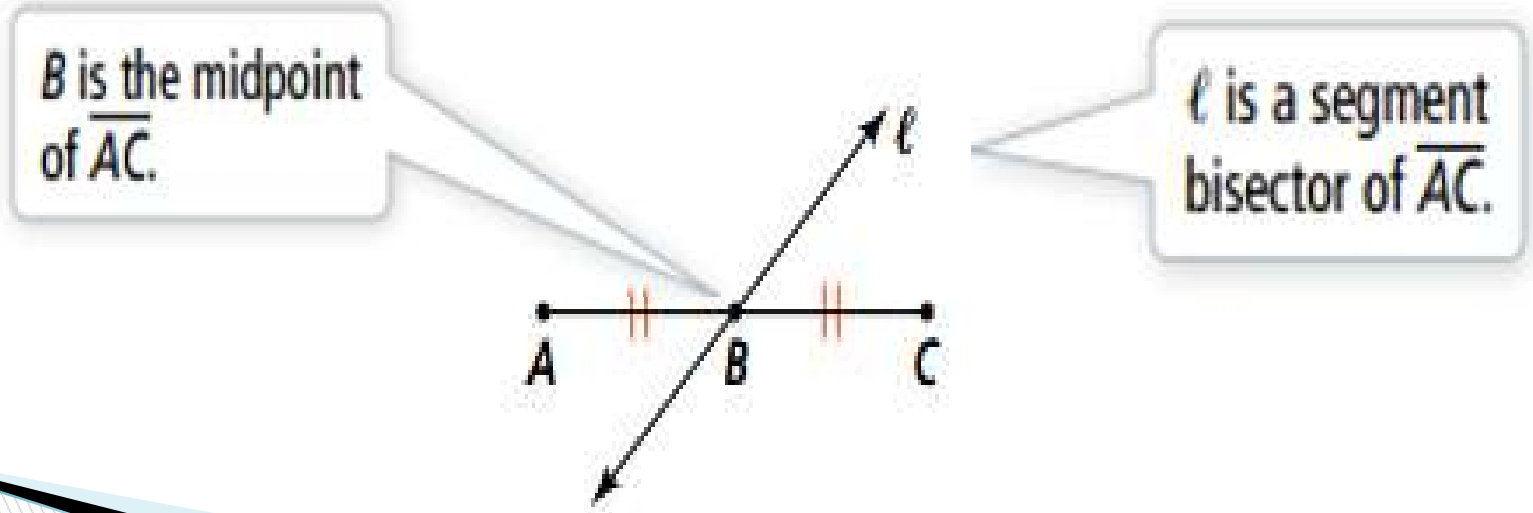
AC = |−2 − 5|
= |−7|
= 7

BD = |3 − 10|
= |−7|
= 7

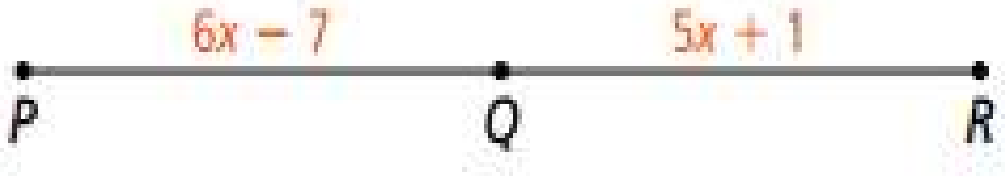
YES!!! AC ≅ BD

Vocabulary

- The **midpoint** of a segment is a point that divides the segment into 2 congruent segments.
- A **segment bisector** is either a point, line, ray, or other segment that intersects a segment at its midpoint. (ℓ **bisects** the segment)



Example 4



- *Q* is the midpoint of *PR*. What are *PQ, QR and PR?*

$$6x - 7 = 5x + 1$$
$$-5x \qquad -5x$$
$$x - 7 = 1$$
$$+7 \quad +7$$
$$x = 8$$

$PQ = 6x - 7$
$= 6(8) - 7$
$= 41$

$QR = 5x + 1$
$= 5(8) + 1$
$= 41$

$PR = 41 + 41$
$= 82$