1-3 Measuring Segments

Content Standard
G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
Also G.GPE.6

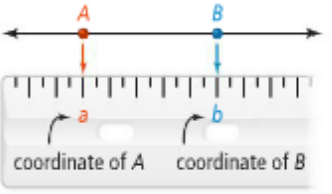
Objective To find and compare lengths of segments

Essential Understanding You can use number operations to find and compare the lengths of segments.

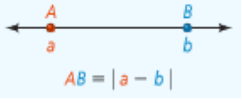
take note

Postulate 1-5 Ruler Postulate

Every point on a line can be paired with a real number. This makes a one-to-one correspondence between the points on the line and the real numbers. The real number that corresponds to a point is called the **coordinate** of the point.



The Ruler Postulate allows you to measure lengths of segments using a given unit and to find distances between points on a number line. Consider $\overleftrightarrow{AB}$ at the right. The **distance** between points A and B is the absolute value of the difference of their coordinates, or $|a - b|$. This value is also AB, or the length of $\overline{AB}$.



Problem 1 Measuring Segment Lengths

What is ST?

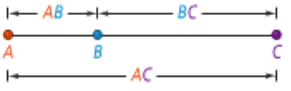
4 + 8

ST = 12

take note

Postulate 1-6 Segment Addition Postulate

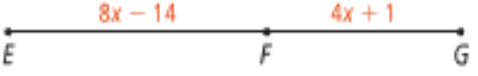
If three points A, B, and C are collinear and B is between A and C, then $AB + BC = AC$.



part + part = whole

Problem 2 Using the Segment Addition Postulate

Algebra If $EG = 59$, what are EF and FG?



$EF + FG = EG$

$8x - 14 + 4x + 1 = 59$

$12x - 13 = 59$

$12x = 72$

$x = 6$

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

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

When numerical expressions have the same value, you say that they are equal (=). Similarly, if two segments have the same length, then the segments are **congruent (≅) segments.**

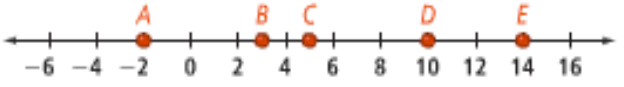
This means that if $AB = CD$, then $\overline{AB} \cong \overline{CD}$. You can also say that if $\overline{AB} \cong \overline{CD}$, then $AB = CD$.

$AB = CD$ → $\overline{AB} \cong \overline{CD}$

≅

Problem 3 Comparing Segment Lengths

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



$AC = 7$

$BD = 7$

$\overline{AC} \cong \overline{BD}$

= ≅

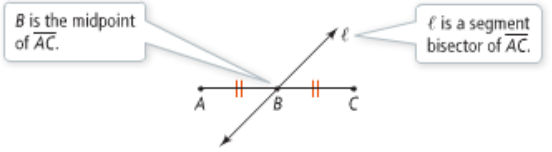
≠ ≇

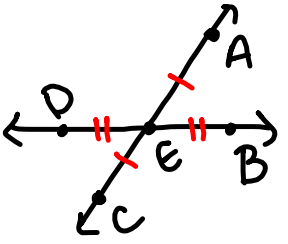
$AC = 7$

$DE = 4$

$\overline{AC} \ncong \overline{DE}$

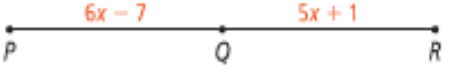
The **midpoint** of a segment is a point that divides the segment into two congruent segments. A point, line, ray, or other segment that intersects a segment at its midpoint is said to *bisect* the segment. That point, line, ray, or segment is called a **segment bisector.**





Problem 4 Using the Midpoint

Algebra Q is the midpoint of $\overline{PR}$. What are PQ, QR, and PR?



$PQ \cong QR$

$6x-7=5x+1$

$x-7=1$

$x=8$

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

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

$PR=41+41=82$

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