Geometry Unit 2: Lesson 2-7 Proving Segment Relationships

Goals: --Write proofs involving segment addition.
--Write proofs involving segment congruence.

OAS: G.RL.1.1 Understand the use of undefined terms, definitions, postulates, and theorems in logical arguments/proofs.

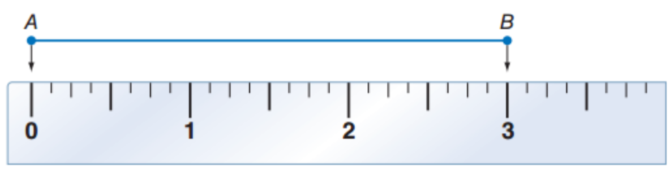
Vocabulary (none)

Ruler Postulate:

Postulate 2.8 Ruler Postulate

Words The points on any line or line segment can be put into one-to-one correspondence with real numbers.

Symbols Given any two points *A* and *B* on a line, if *A* corresponds to zero, then *B* corresponds to a positive real number.

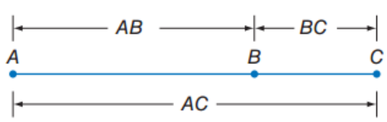


Segment Addition Postulate:

Postulate 2.9 Segment Addition Postulate

Words If *A*, *B*, and *C* are collinear, then point *B* is between *A* and *C* if and only if $AB + BC = AC$.

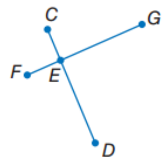
Symbols



Use the segment addition postulate

Example 1 Use the Segment Addition Postulate

Prove that if $\overline{CE} \cong \overline{FE}$ and $\overline{ED} \cong \overline{EG}$ then $\overline{CD} \cong \overline{FG}$.



Given: $\overline{CE} \cong \overline{FE}$; $\overline{ED} \cong \overline{EG}$

Prove: $\overline{CD} \cong \overline{FG}$

Proof:

$\overline{CE} \cong \overline{FE}$ *and* $\overline{ED} \cong \overline{EG}$	Given
$CE = FE$ *and* $ED = EG$	Definition of Congruence
$CE + ED = CD$	Segment Addition Postulate
$FE + EG = CD$	Substitution (from steps 2 and 3)
$FE + EG = FG$	Segment Addition Postulate
$CD = FG$	Substitution (from steps 4 and 5)
$\overline{CD} \cong \overline{FG}$	Definition of congruence

**Sometimes if you have trouble, you can work backwards if it helps.

Segment Congruence

Theorem 2.2 Properties of Segment Congruence

Reflexive Property of Congruence	$\overline{AB} \cong \overline{AB}$
Symmetric Property of Congruence	If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$.
Transitive Property of Congruence	If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.

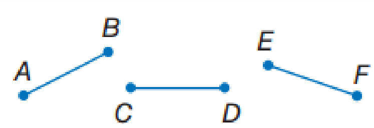
similar to:

Property	Segments	Angles
Reflexive	$AB = AB$	$m\angle 1 = m\angle 1$
Symmetric	If $AB = CD$, then $CD = AB$.	If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$.
Transitive	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then $m\angle 1 = m\angle 3$.

Proof Transitive Property of Congruence

Given: $\overline{AB} \cong \overline{CD}$; $\overline{CD} \cong \overline{EF}$

Prove: $\overline{AB} \cong \overline{EF}$



Paragraph Proof:

Since $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, $AB = CD$ and $CD = EF$ by the definition of congruent segments. By the Transitive Property of Equality, $AB = EF$. Thus, $\overline{AB} \cong \overline{EF}$ by the definition of congruence.