Geometry 2.7
Write proofs involving segment addition
Write proofs involving segment congruence

Given - - -
Prove - - -

postulate
✗ ruler postulate
✶ segment addition postulate
2-column proof

activity: scrambled proofs

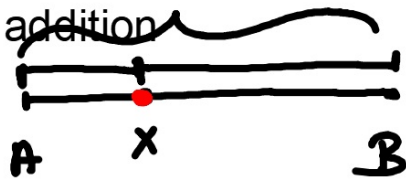| Statement	Reason
1. Given ..	- .
n. Prove ---	.

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

A   X   B

Collinear & also
The lengths have to add up!

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

Addition property (Smato)

$$5=5$$
$$+3 \quad +3$$
$$\overline{8 = 8}$$

$$3=3$$
$$-1 \quad -1$$
$$\overline{2 = 2}$$

add the same amount to both sides (addition property)
part + part = whole thing   (segment addition)
Hint: before you can substitute, you need something to substitute *with...*
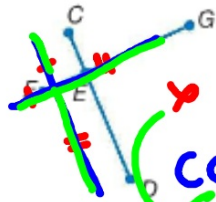
Example 1 Use the Segment Addition Postulate

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:

(handwritten annotations:)
CE = FE
+ED +EG
(CE+ED) = (FE + EG)

CE + ED = CD
FE + EG = FG

Statements	Reasons
1. $\overline{CE} \cong \overline{FE}$; $\overline{ED} \cong \overline{EG}$	1. Given
2. $CE = FE$; $ED = EG$	2. Definition of congruence
3. $CE + ED = CD$	3. Segment Addition Postulate
4. $FE + EG = CD$	4. Substitution (Steps 2 & 3)
5. $FE + EG = FG$	5. Segment Addition Postulate
6. $CD = FG$	6. Substitution (Steps 4 & 5)
7. $\overline{CD} \cong \overline{FG}$	7. Definition of congruence

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GuidedPractice

Copy and complete the proof.

1. Given: $\overline{JL} \cong \overline{KM}$

   Prove: $\overline{JK} \cong \overline{LM}$

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   Proof:

Statements	Reasons
a. $\overline{JL} \cong \overline{KM}$	a. Given
b. $JL = KM$	b. *def* $\cong$
c. $JK + KL = \underline{JL}$; $KL + LM = \underline{KM}$	c. Segment Addition Postulate
d. $JK + KL = KL + LM$	d. *Subs*
e. $JK + KL - KL = KL + LM - KL$	e. Subtraction Property of Equality
f. $JK = LM$	f. Substitution
g. $\overline{JK} \cong \overline{LM}$	g. Definition of congruence

Theorem 2.2 Properties of Segment Congruence

$a = a$

Reflexive Property of Congruence $\overline{AB} \cong \overline{AB}$

$a = b \qquad b = a$

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

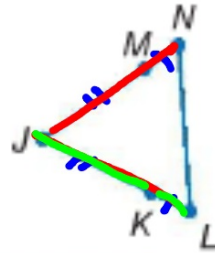Transitive Property of Congruence   If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.

1. **CCSS ARGUMENTS** Copy and complete the proof.

→ **Given:** $\overline{LK} \cong \overline{NM}, \overline{KJ} \cong \overline{MJ}$

→ **Prove:** $\overline{LJ} \cong \overline{NJ}$

Proof:

Statements	Reasons
a. $\overline{LK} \cong \overline{NM}, \overline{KJ} \cong \overline{MJ}$	a. _given_
b. $LK = NM \quad KJ = MJ$	b. Def. of congruent segments
c. $LK + KJ = NM + MJ$ $\quad LK + KJ = JL$	c. _add_
d. $\quad NM + MJ = NJ$	d. Segment Addition Postulate
e. $LJ = NJ$	e. _Subs_
f. $\overline{LJ} \cong \overline{NJ}$	f. _def $\cong$_