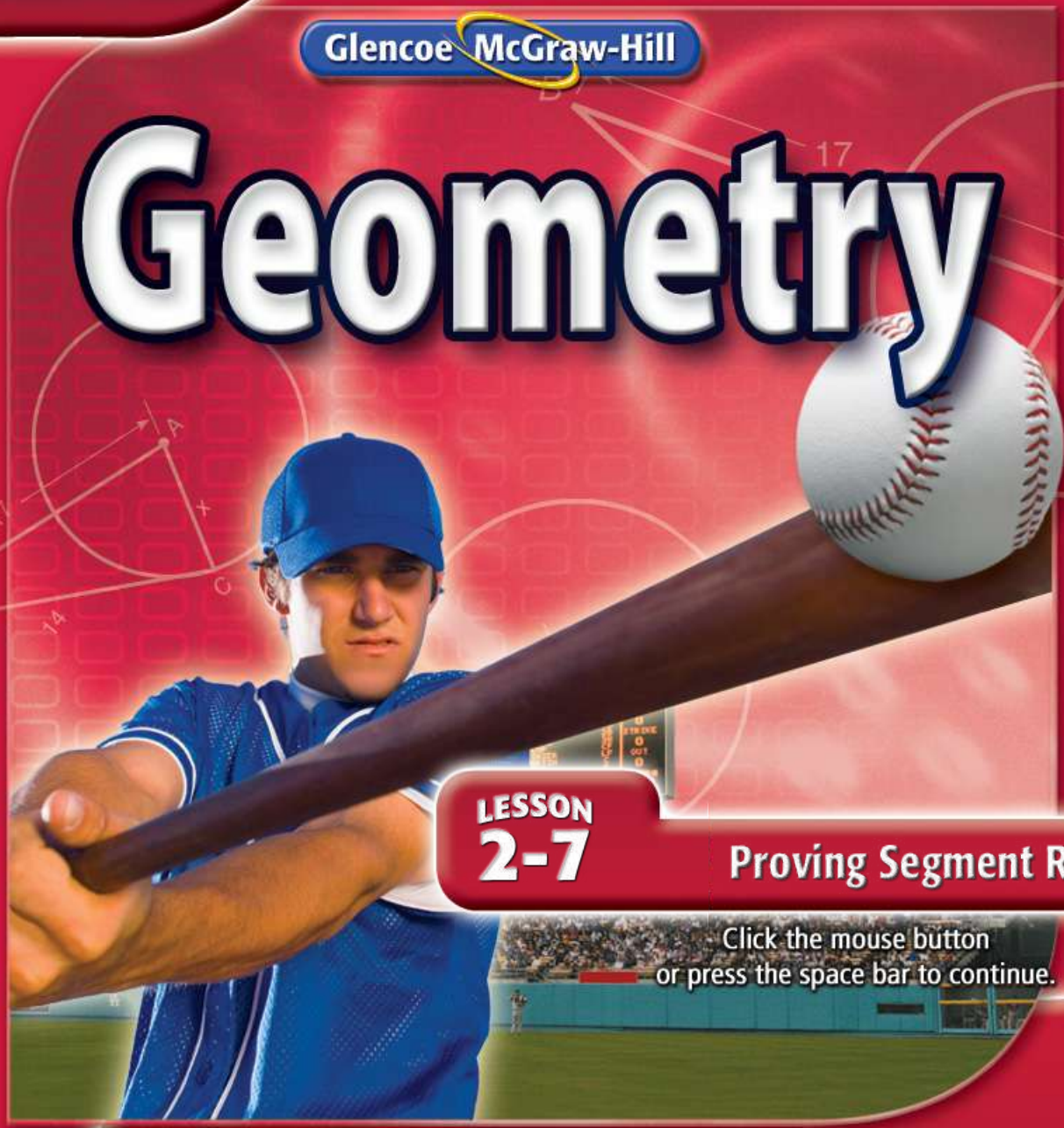
Interactive Classroom

Glencoe McGraw-Hill

Geometry



LESSON 2-7

Proving Segment Relationships

Click the mouse button or press the space bar to continue.

Lesson Menu

5-Minute Check

Over Lesson 2–6

CheckPoint

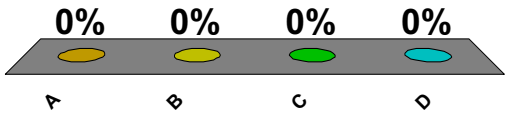
1 State the property that justifies the statement.
$2(LM + NO) = 2LM + 2NO$

A. Distributive Property

B. Addition Property

C. Substitution Property

D. Multiplication Property



5-Minute Check

Over Lesson 2–6

CheckPoint

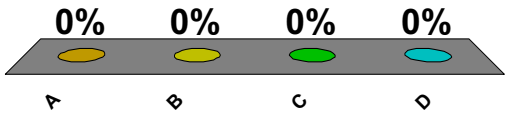
2 State the property that justifies the statement.
If $m\angle R = m\angle S$, then $m\angle R + m\angle T = m\angle S + m\angle T$.

A. Distributive Property

B. Substitution Property

C. Addition Property

D. Transitive Property



5-Minute Check

Over Lesson 2–6

CheckPoint

3 State the property that justifies the statement.

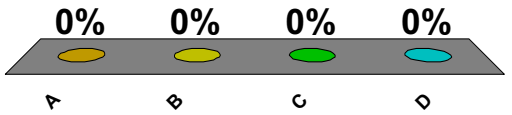
If $2PQ = OQ$, then $PQ = \frac{1}{2}OQ$.

A. Multiplication Property

B. Division Property

C. Distributive Property

D. Substitution Property



5-Minute Check

Over Lesson 2–6

CheckPoint

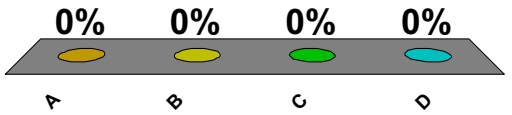
4 State the property that justifies the statement.
$m\angle Z = m\angle Z$

A. Reflexive Property

B. Symmetric Property

C. Transitive Property

D. Substitution Property



5-Minute Check

Over Lesson 2–6

CheckPoint

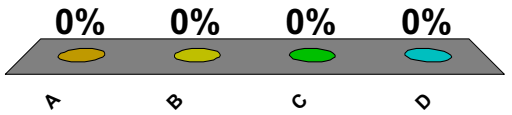
5 State the property that justifies the statement.
If $BC = CD$ and $CD = EF$, then $BC = EF$.

A. Reflexive Property

B. Symmetric Property

C. Substitution Property

D. Transitive Property



5-Minute Check

Over Lesson 2–6

CheckPoint

Standardized Test Practice

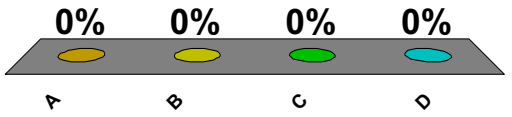
6 Which statement shows an example of the Symmetric Property?

A. $x = x$

B. If $x = 3$, then $x + 4 = 7$.

C. If $x = 3$, then $3 = x$.

D. If $x = 3$ and $x = y$, then $y = 3$.



Then

You wrote algebraic and two-column proofs. (Lesson 2–6)

Now

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

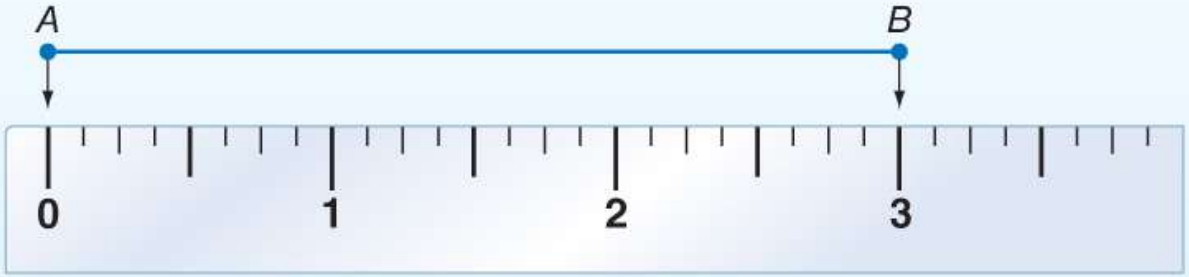
Postulate 2.8

For Your FOLDABLE

Ruler Postulate

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

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



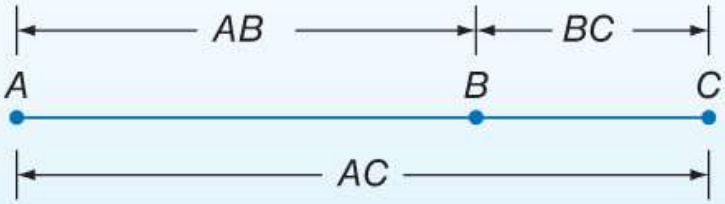
Postulate 2.9

For Your FOLDABLE

Segment Addition Postulate

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

Model



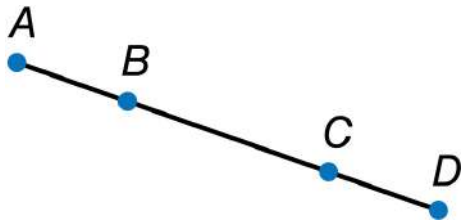
EXAMPLE 1

Use the Segment Addition Postulate

Prove that if $\overline{AB} \cong \overline{CD}$, then $\overline{AC} \cong \overline{BD}$.

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

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



Proof:

Statements	Reasons
1. $\overline{AB} \approx \overline{CD}$	1. Given
2. $AB = CD$	2. Definition of congruent segments
3. $BC = BC$	3. Reflexive Property of Equality
4. $AB + BC = AC$	4. Segment Addition Postulate

EXAMPLE 1 Use the Segment Addition Postulate

Proof:

Statements	Reasons
5. $CD + BC = AC$	5. Substitution Property of Equality
6. $CD + BC = BD$	6. Segment Addition Postulate
7. $AC = BD$	7. Transitive Property of Equality
8. $\overline{AC} \cong \overline{BD}$	8. Definition of congruent segments

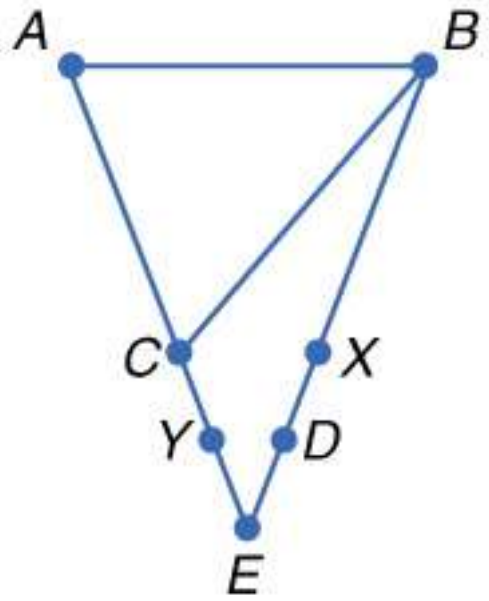
EXAMPLE 1 Check Your Progress

CheckPoint

Prove the following.

Given: $AC = AB$
$AB = BX$
$CY = XD$

Prove: $AY = BD$



EXAMPLE 1 Check Your Progress

CheckPoint

Which reason correctly completes the proof?
Proof:

Statements	Reasons
1. $AC = AB, AB = BX$	1. Given
2. $AC = BX$	2. Transitive Property
3. $CY = XD$	3. Given
4. $AC + CY = BX + XD$	4. Addition Property
5. $AC + CY = AY;$ $BX + XD = BD$	5. _____?_____
6. $AY = BD$	6. Substitution

EXAMPLE 1 Check Your Progress

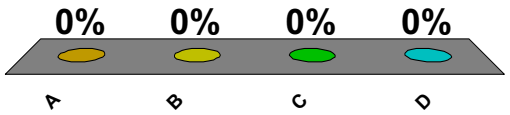
CheckPoint

A. Addition Property

B. Substitution

C. Definition of congruent segments

D. Segment Addition Postulate



Theorem 2.2 Properties of Segment Congruence

For Your FOLDABLE

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 $\overline{AB} \cong \overline{EF}$.

Proof Transitive Property of Congruence

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

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

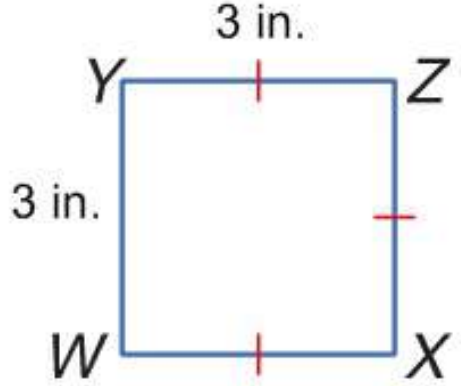
Paragraph Proof:

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.

Real-World Example 2

Proof Using Segment Congruence

BADGE Jamie is designing a badge for her club. The length of the top edge of the badge is equal to the length of the left edge of the badge. The top edge of the badge is congruent to the right edge of the badge, and the right edge of the badge is congruent to the bottom edge of the badge. Prove that the bottom edge of the badge is congruent to the left edge of the badge.



Given: $WY = YZ$

$\overline{YZ} \cong \overline{XZ}$

$\overline{XZ} \cong \overline{WX}$

Prove: $\overline{WX} \cong \overline{WY}$

Real-World Example 2

Proof Using Segment Congruence

Proof:

Statements	Reasons
1. $WY = YZ$	1. Given
2. $\overline{WY} \cong \overline{YZ}$	2. Definition of congruent segments
3. $\overline{YZ} \cong \overline{XZ}$; $\overline{XZ} \cong \overline{WX}$	3. Given
4. $\overline{YZ} \cong \overline{WX}$	4. Transitive Property
5. $\overline{WX} \cong \overline{WY}$	5. Substitution

Real-World Example 2 | Check Your Progress | CheckPoint

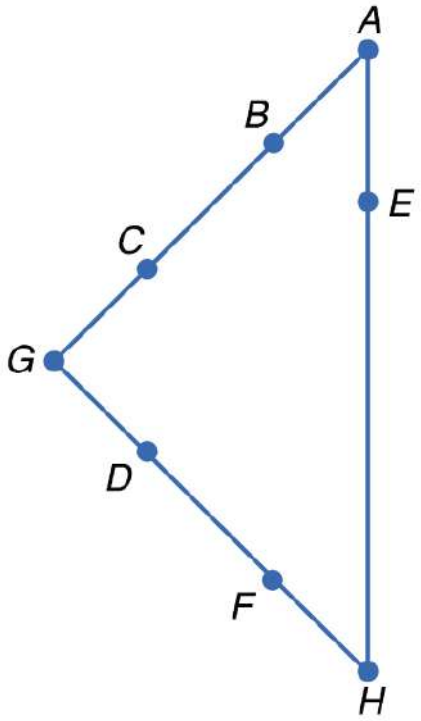
Prove the following.

Given: $\overline{GD} \cong \overline{BC}$

$\overline{BC} \cong \overline{FH}$

$\overline{FH} \cong \overline{AE}$

Prove: $\overline{AE} \cong \overline{GD}$



Real-World Example 2 | Check Your Progress | CheckPoint

Which choice correctly completes the proof?

Proof:

Statements	Reasons
1. $\overline{GD} \cong \overline{BC}$, $\overline{BC} \cong \overline{FH}$	1. Given
2. $\overline{GD} \cong \overline{FH}$	2. Transitive Property
3. $\overline{FH} \cong \overline{AE}$	3. Given
4. $\overline{GD} \cong \overline{AE}$	4. Transitive Property
5. $\overline{AE} \cong \overline{GD}$	5. _____?_____

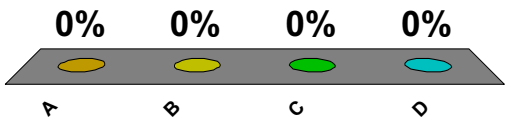
Real-World Example 2 | Check Your Progress | CheckPoint

A. Substitution

B. Symmetric Property

C. Segment Addition Postulate

D. Reflexive Property



Click the mouse button to return to the Lesson Menu.