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# 2-7 Study Guide and Intervention

## *Proving Segment Relationships*

**Segment Addition** Two basic postulates for working with segments and lengths are the Ruler Postulate, which establishes number lines, and the Segment Addition Postulate, which describes what it means for one point to be between two other points.

| | |
|---|---|
| **Ruler Postulate** | The points on any line or line segment can be put into one-to-one correspondence with real numbers. |
| **Segment Addition Postulate** | If $A$, $B$, and $C$ are collinear, then point $B$ is between $A$ and $C$ if and only if $AB + BC = AC$. |



**Example** **Write a two-column proof.**


**Given:** $Q$ is the midpoint of $\overline{PR}$.
$R$ is the midpoint of $\overline{QS}$.

**Prove:** $PR = QS$

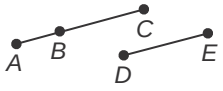
**Proof:**

| Statements | Reasons |
|---|---|
| **1.** $Q$ is the midpoint of $\overline{PR}$. | **1.** |
| **2.** $R$ is the midpoint of $\overline{QS}$. | **2.** |
| **3.** $PQ = QR$ | **3.** |
| **4.** $QR = RS$ | **4.** |
| **5.** $PQ + QR = QR + RS$ | **5.** |
| **6.** $PQ + QR = PR$, $QR + RS = QS$ | **6.** |
| **7.** $PR = QS$ | **7.** |

## Exercises

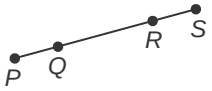
**Complete each proof.**

1. **Given:** $BC = DE$
**Prove:** $AB + DE = AC$
**Proof:**




| Statements | Reasons |
|---|---|
| **1.** $BC = DE$ | **1.** _____ |
| **2.** _____ | **2.** Seg. Add. Post. |
| **3.** $AB + DE = AC$ | **3.** _____ |

2. **Given:** $Q$ is between $P$ and $R$, $R$ is between $Q$ and $S$, $PR = QS$.
**Prove:** $PQ = RS$
**Proof:**




| Statements | Reasons |
|---|---|
| **1.** $Q$ is between $P$ and $R$. | **1.** Given |
| **2.** $PQ + QR = PR$ | **2.** _____ |
| **3.** $R$ is between $Q$ and $S$. | **3.** _____ |
| **4.** _____ | **4.** Seg. Add. Post. |
| **5.** $PR = QS$ | **5.** _____ |
| **6.** $PQ + QR = QR + RS$ | **6.** _____ |
| **7.** $PQ + QR - QR = QR + RS - QR$ | **7.** _____ |
| **8.** _____ | **8.** Substitution |

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# 2-7 Study Guide and Intervention *(continued)*

## *Proving Segment Relationships*

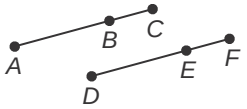
**Segment Congruence** Remember that segment measures are reflexive, symmetric, and transitive. Since segments with the same measure are congruent, congruent segments are also reflexive, symmetric, and transitive.

| | |
|---|---|
| **Reflexive Property** | $\overline{AB} \cong \overline{AB}$ |
| **Symmetric Property** | If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$. |
| **Transitive Property** | If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$. |

**Example** **Write a two-column proof.**

**Given:** $\overline{AB} \cong \overline{DE}$; $\overline{BC} \cong \overline{EF}$

**Prove:** $\overline{AC} \cong \overline{DF}$




**Proof:**

| Statements | Reasons |
|---|---|
| **1.** $\overline{AB} \cong \overline{DE}$ | **1.** |
| **2.** $\overline{BC} \cong \overline{EF}$ | **2.** |
| **3.** $AB = DE$ | **3.** |
| **4.** $BC = EF$ | **4.** |
| **5.** $AB + BC = DE + EF$ | **5.** |
| **6.** $AB + BC = AC$, $DE + EF = DF$ | **6.** |
| **7.** $AC = DF$ | **7.** |
| **8.** $\overline{AC} \cong \overline{DF}$ | **8.** |

## Exercises

**Justify each statement with a property of congruence.**

**1.** If $\overline{DE} \cong \overline{GH}$, then $\overline{GH} \cong \overline{DE}$.

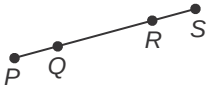
**2.** If $\overline{AB} \cong \overline{RS}$ and $\overline{RS} \cong \overline{WY}$ then $\overline{AB} \cong \overline{WY}$.

**3.** $\overline{RS} \cong \overline{RS}$

**4.** Complete the proof.

**Given:** $\overline{PR} \cong \overline{QS}$

**Prove:** $\overline{PQ} \cong \overline{RS}$




**Proof:**

| Statements | Reasons |
|---|---|
| **a.** $\overline{PR} \cong \overline{QS}$ | **a.** _____ |
| **b.** $PR = QS$ | **b.** _____ |
| **c.** $PQ + QR = PR$ | **c.** _____ |
| **d.** _____ | **d.** Segment Addition Postulate |
| **e.** $PQ + QR = QR + RS$ | **e.** _____ |
| **f.** _____ | **f.** Subtraction Property |
| **g.** _____ | **g.** Definition of congruence of segments |