

Proving Segment Relationships Notes

Definition of Congruent Segments:

If $\overline{AB} \cong \overline{CD}$, then $AB = CD$.

If $AB = CD$, then $\overline{AB} \cong \overline{CD}$

Segment Addition Postulate:



If E is between D and F, then $DE + EF = DF$.

Definition of Midpoint:



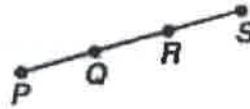
If M is the midpoint of \overline{PQ} , then $\overline{PM} \cong \overline{MQ}$

Definition of Bisector:

If \overline{AN} bisects \overline{CX} at N, then $\overline{CN} \cong \overline{NX}$

Examples:

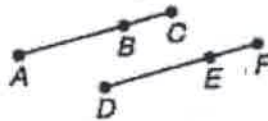
Given: Q is the midpoint of \overline{PR} .
 R is the midpoint of \overline{QS} .



1. Prove: $PR = QS$

Statements	Reasons
1. Q is the midpoint of \overline{PR} .	1. Given
2. $PQ = QR$	2. Definition of midpoint
3. R is the midpoint of \overline{QS} .	3. Given
4. $QR = RS$	4. Definition of midpoint
5. $PQ + QR = QR + RS$	5. Addition Property
6. $PQ + QR = PR, QR + RS = QS$	6. Segment Addition Postulate
7. $PR = QS$	7. Substitution

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



2. Prove: $\overline{AC} \cong \overline{DF}$

Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. $AB = DE$	2. definition of congruence
3. $\overline{BC} \cong \overline{EF}$	3. Given
4. $BC = EF$	4. definition of congruence
5. $AB + BC = DE + EF$	5. addition property
6. $AB + BC = AC, DE + EF = DF$	6. segment addition postulate
7. $AC = DF$	7. substitution
8. $\overline{AC} \cong \overline{DF}$	8. definition of congruence

Examples Cont.

Given: Q is between P and R , R is between Q and S , $PR = QS$.



Prove: $PQ = RS$

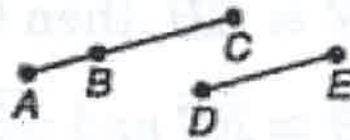
Statements	Reasons
a. Q is between P and R .	a. Given
b. $PQ + QR = PR$	b. Segment Addition Post.
c. R is between Q and S .	c. Given
d. $QR + RS = QS$	d. Seg. Add. Post.
e. $PR = QS$	e. Given
f. $PQ + QR = QR + RS$	f. Substitution
g. $PQ + QR - QR = QR + RS - QR$	g. Subtraction property
h. $PQ = RS$	h. Substitution

3.

Practice:

Given: $BC = DE$

Prove: $AB + DE = AC$



Statements	Reasons
a. $BC = DE$	a. Given
b. $AB + BC = AC$	b. Seg. Add. Post.
c. $AB + DE = AC$	c. Substitution

1.

Practice Cont.

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

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



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

Justify each statement with a property of congruence.

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

2. If $\overline{AB} \cong \overline{RS}$ and $\overline{RS} \cong \overline{WY}$, then $\overline{AB} \cong \overline{WY}$. Transitive Property

3. $\overline{RS} \cong \overline{RS}$ Reflexive Property