

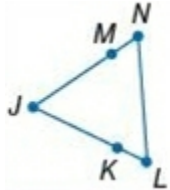
## 2-7 Proving Segment Relationships

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. ?
b. ?	b. Def. of congruent segments
c. $LK + KJ = NM + MJ$	c. ?
d. ?	d. Segment Addition Postulate
e. $LJ = NJ$	e. ?
f. $\overline{LJ} \cong \overline{NJ}$	f. ?

ANSWER:

Statements	Reasons
a. $\overline{LK} \cong \overline{NM}$ , $\overline{KJ} \cong \overline{MJ}$	a. ? <b>Given</b>
b. ?	b. Def. of congruent segments
c. $LK + KJ = NM + MJ$	c. ? <b>Add. Prop.</b>
d. ?	d. Segment Addition Postulate
e. $LJ = NJ$	e. ? <b>Subs.</b>
f. $\overline{LJ} \cong \overline{NJ}$	f. ? <b>Def. <math>\cong</math> segs.</b>

b.  $LK = NM$ ,  $KJ = MJ$

d.  $LJ = LK + KJ$ ;  $NJ = NM + MJ$

2. **PROOF** Prove the following.

Given:  $\overline{WX} \cong \overline{YZ}$

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



ANSWER:

Given:  $\overline{WX} \cong \overline{YZ}$

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

Proof:

Statements (Reasons)

- $\overline{WX} \cong \overline{YZ}$  (Given)
- $WX = YZ$  (Def.  $\cong$  segs.)
- $XY = XY$  (Refl. Prop.)
- $WX + XY = XY + YZ$  (Add. Property)
- $WY = WX + XY$ ;  $XZ = XY + YZ$   
(Seg. Add. Post.)
- $WY = XZ$  (Subs.)
- $\overline{WY} \cong \overline{XZ}$  (Def.  $\cong$  segs.)

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

Given:  $C$  is the midpoint of  $\overline{AE}$ .

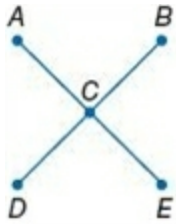
$C$  is the midpoint of  $\overline{BD}$ .

$\overline{AE} \cong \overline{BD}$

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

Proof:

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Statements	Reasons
a. <u>    ?</u>	a. Given
b. $AC = CE, BC = CD$	b. <u>    ?</u>
c. $AE = BD$	c. <u>    ?</u>
d. <u>    ?</u>	d. Segment Addition Postulate
e. $AC + CE = BC + CD$	e. <u>    ?</u>
f. $AC + AC = CD + CD$	f. <u>    ?</u>
g. <u>    ?</u>	g. Substitution
h. <u>    ?</u>	h. Division Property
i. $\overline{AC} \cong \overline{CD}$	i. <u>    ?</u>

ANSWER:

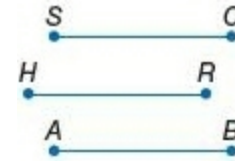
Statements	Reasons
a. <u>    ?</u>	a. Given
b. $AC = CE, BC = CD$	b. <u>    ?</u> <b>Def of midpoint</b>
c. $AE = BD$	c. <u>    ?</u> <b>Def <math>\cong</math> segs.</b>
d. <u>    ?</u>	d. Segment Addition Postulate
e. $AC + CE = BC + CD$	e. <u>    ?</u> <b>Subs.</b>
f. $AC + AC = CD + CD$	f. <u>    ?</u> <b>Subs.</b>
g. <u>    ?</u> <b><math>2AC = 2CD</math></b>	g. Substitution
h. <u>    ?</u> <b><math>AC = CD</math></b>	h. Division Property
i. $\overline{AC} \cong \overline{CD}$	i. <u>    ?</u> <b>Def <math>\cong</math> segs.</b>

a.  $C$  is the midpoint of  $\overline{AE}$ .  $C$  is the midpoint of  $\overline{BD}$ .  $\overline{AE} \cong \overline{BD}$

d.  $AE = AC + CE, BD = BC + CD$

**PROOF** Prove the following.

9. If  $\overline{SC} \cong \overline{HR}$  and  $\overline{HR} \cong \overline{AB}$ , then  $\overline{SC} \cong \overline{AB}$ .



ANSWER:

Given:  $\overline{SC} \cong \overline{HR}$  and  $\overline{HR} \cong \overline{AB}$

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

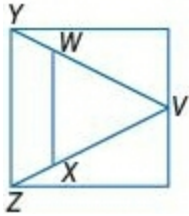
Proof:

Statements (Reasons)

- $\overline{SC} \cong \overline{HR}$  and  $\overline{HR} \cong \overline{AB}$  (Given)
- $SC = HR$  and  $HR = AB$  (Def. of  $\cong$  segs.)
- $SC = AB$  (Trans. Prop.)
- $\overline{SC} \cong \overline{AB}$  (Def. of segs.)

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10. If  $\overline{VZ} \cong \overline{VY}$  and  $\overline{WY} \cong \overline{XZ}$ , then  $\overline{VW} \cong \overline{VX}$ .



ANSWER:

Given:  $\overline{VZ} \cong \overline{VY}$  and  $\overline{WY} \cong \overline{XZ}$

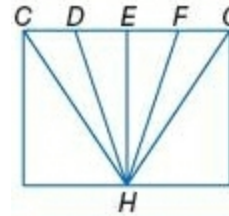
Prove:  $\overline{VW} \cong \overline{VX}$ .

Proof:

Statements (Reasons)

1.  $\overline{VZ} \cong \overline{VY}$  and  $\overline{WY} \cong \overline{XZ}$  (Given)
2.  $VZ = VY$  and  $WY = XZ$  (Def. of  $\cong$  segs.)
3.  $VZ = VX + XZ$  and  $VY = VW + WY$  (Seg. Add. Postulate)
4.  $VX + XZ = VW + WY$  (Subs.)
5.  $VX + WY = VW + WY$  (Subs.)
6.  $VX = VW$  (Subtraction Property of Equality)
7.  $VW = VX$  (Symm. Prop.)
8.  $\overline{VW} \cong \overline{VX}$ . (Def. of  $\cong$  segs.)

11. If  $E$  is the midpoint of  $\overline{DF}$  and  $\overline{CD} \cong \overline{FG}$ , then  $\overline{CE} \cong \overline{EG}$ .



ANSWER:

Given:  $E$  is the midpoint of  $\overline{DF}$  and  $\overline{CD} \cong \overline{FG}$ .

Prove:  $\overline{CE} \cong \overline{EG}$

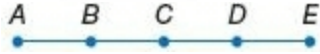
Proof:

Statements (Reasons)

1.  $E$  is the midpoint of  $\overline{DF}$  and  $\overline{CD} \cong \overline{FG}$ . (Given)
2.  $DE = EF$  (Def. of midpoint)
3.  $CD = FG$  (Def. of  $\cong$  segs.)
4.  $CD + DE = EF + FG$  (Add. Prop.)
5.  $CE = CD + DE$  and  $EG = EF + FG$  (Seg. Add. Post.)
6.  $CE = EG$  (Subs.)
7.  $\overline{CE} \cong \overline{EG}$  (Def. of  $\cong$  segs.)

## 2-7 Proving Segment Relationships

12. If  $B$  is the midpoint of  $\overline{AC}$ ,  $D$  is the midpoint of  $\overline{CE}$ ,  
and  $\overline{AB} \cong \overline{DE}$ , then  $AE = 4AB$ .



**ANSWER:**

Given:  $B$  is the midpoint of  $\overline{AC}$ ,  $D$  is the midpoint of  $\overline{CE}$ , and  $\overline{AB} \cong \overline{DE}$

.

Prove:  $AE = 4AB$

Proof:

Statements (Reasons)

1.  $B$  is the midpoint of  $\overline{AC}$ ,  $D$  is the midpoint of  $\overline{CE}$ , and  $\overline{AB} \cong \overline{DE}$ .

(Given)

2.  $AB = BC$  and  $CD = DE$  (Def. of midpoint)

3.  $AB = DE$  (Def. of  $\cong$  segs.)

4.  $AC = AB + BC$  and  $CE = CD + DE$  (Seg. Add. Post.)

5.  $AE = AC + CE$  (Seg. Add. Post.)

6.  $AE = AB + BC + CD + DE$  (Subs.)

7.  $AE = AB + AB + AB + AB$  (Subs.)

8.  $AE = 4AB$  (Subs.)