

Practice with Examples

For use with pages 102–107

GOAL Write reasons for steps in a proof about segments**VOCABULARY**

A true statement that follows as a result of other true statements is called a **theorem**.

A **two-column proof** has numbered statements and reasons that show the logical order of an argument.

A proof can be written in paragraph form, called a **paragraph proof**.

Theorem 2.1 Properties of Segment Congruence

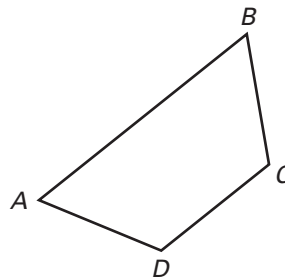
Segment congruence is reflexive, symmetric, and transitive.

EXAMPLE 1 *Using Congruence*

Use the diagram and the given information to complete the missing steps and reasons in the proof.

Given: $AD = 8$, $BC = 8$, $\overline{BC} \cong \overline{CD}$

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



Statements	Reasons
1. a.	1. Given
2. $BC = 8$	2. b.
3. c.	3. Transitive property of equality
4. d.	4. Definition of congruent segments
5. $\overline{BC} \cong \overline{CD}$	5. e.
6. $\overline{AD} \cong \overline{CD}$	6. f.

SOLUTION

- | | | | |
|-------------|--------------------------------------|--------------|--|
| a. $AD = 8$ | b. Given | c. $AD = BC$ | d. $\overline{AD} \cong \overline{BC}$ |
| e. Given | f. Transitive property of congruence | | |

Practice with Examples

For use with pages 102–107

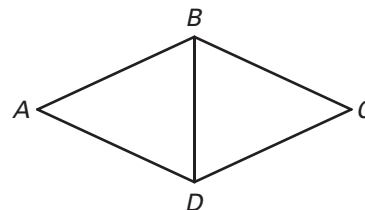
Exercise for Example 1

Use the diagram and the given information to write a proof.

1. Given: $\overline{BC} \cong \overline{CD}$, $\overline{AD} \cong \overline{CD}$,

$$AD = 12, AB = 12$$

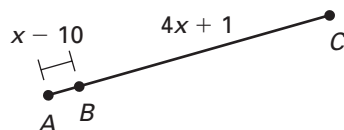
Prove: $\overline{BC} \cong \overline{BA}$



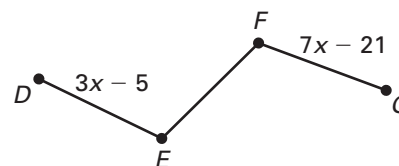
EXAMPLE 2 Using Algebra

Solve for the variable using the given information. Explain your steps.

- a. $AC = 91$



- b. $\overline{DE} \cong \overline{EF}$, $\overline{EF} \cong \overline{GF}$



SOLUTION

- a. Since the entire segment AC has length 91, the two segments which make up AC must have lengths which add up to 91.

$$AB + BC = AC \quad \text{Given}$$

$$x - 10 + 4x + 1 = 91 \quad \text{Substitution}$$

$$5x - 9 = 91 \quad \text{Simplify.}$$

$$5x = 100 \quad \text{Addition property of equality}$$

$$x = 20 \quad \text{Division property of equality}$$

- b. Because $\overline{DF} \cong \overline{EF}$ and $\overline{EF} \cong \overline{GF}$, $\overline{DE} \cong \overline{GF}$ by the transitive property of congruence. By definition of congruence $DE = GF$.

$$3x - 5 = 7x - 21 \quad \text{Substitution}$$

$$3x + 16 = 7x \quad \text{Addition property of equality}$$

$$16 = 4x \quad \text{Subtraction property of equality}$$

$$x = 4 \quad \text{Division property of equality}$$

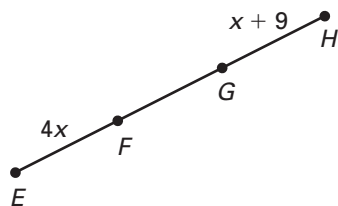
Practice with Examples

For use with pages 102–107

Exercises for Example 2

Solve for the variable using the given information.

2. Given: $\overline{EG} \cong \overline{HF}$



3. Given: $\overline{IP} \cong \overline{JO}$, $\overline{LM} \cong \overline{IP}$

