

TOPIC: 2.6 Prove Statements about Segments and Angles

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DATE:

ESSENTIAL QUESTION: How do you write a geometric proof?

QUESTIONS:

VOCABULARY:

**Proof**  
A logical argument that shows a statement is true

**Two-Column Proof**  
A proof written as # statements & corresponding reasons that show an argument in logical order

**Theorem**  
A true statement that follows as a result of other true statements

Use the theorems as reasonings to prove a statement.

**Theorem 2.1 Congruence of Segments:**

Segment congruence is reflexive, symmetric, and transitive.

**Reflexive:** For any segment  $\overline{AB}$ ,  $\overline{AB} \cong \overline{AB}$

**Symmetric:** If  $\overline{AB} \cong \overline{CD}$ , then  $\overline{CD} \cong \overline{AB}$

**Transitive:** If  $\overline{AB} \cong \overline{CD}$  and  $\overline{CD} \cong \overline{EF}$ , then  $\overline{AB} \cong \overline{EF}$

**Theorem 2.2 Congruence of Angles:**

Angle congruence is reflexive, symmetric, and transitive.

**Reflexive:** For any angle A,  $\angle A \cong \angle A$

**Symmetric:** If  $\angle A \cong \angle B$ , then  $\angle B \cong \angle A$

**Transitive:** If  $\angle A \cong \angle B$  and  $\angle B \cong \angle C$ , then  $\angle A \cong \angle C$

Name the property shown

**A1. Name the property illustrated by each statement.**

a. If  $\angle RST \cong \angle MNP$ , then  $\angle MNP \cong \angle RST$ . ∠ symmetry

b. If  $\overline{XY} = \overline{AB}$  and  $\overline{XY} = \overline{GH}$ , then  $\overline{AB} = \overline{GH}$ . Transitive of Segments

c.  $\overline{EF} = \overline{EF}$  Reflexive of Segments

SUMMARY:

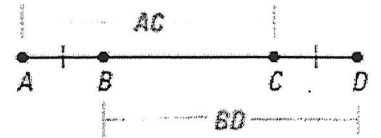
Begin with the given information, then write statements paired with a reason, which could be a property, postulate or theorem.

QUESTIONS:

Prove the statement using:  
 1. Definitions  
 2. postulates  
 3. theorems

**Two-Column Proof Example:** Write a two-column proof.  
 Use the diagram for given information. Prove that  $AC = BD$ .

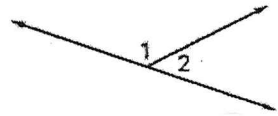
<u>Statements</u>	<u>Reason</u>
1. $AB = CD$	1. Given
2. $AC = AB + BC$	2. Segment Add Postulate
3. $BD = BC + CD$	3. Segment Addition Postulate
4. $BD = BC + AB$	4. Substitution
5. $AC = BD$	5. Transitive



**A2. Complete the proof.**

Given:  $\angle 1$  and  $\angle 2$  are a linear pair.  
 Prove:  $m\angle 1 = 180 - m\angle 2$ .

<u>Statements</u>	<u>Reasons</u>
1. $\angle 1$ and $\angle 2$ are linear pair	1. Given
2. $\angle 1$ and $\angle 2$ are supplementary	2. The angles in a linear pair are supplementary angles.
3. $m\angle 1 + m\angle 2 = 180^\circ$	3. <u>Def. of Supplementary <math>\angle</math>'s</u>
4. $m\angle 1 = 180 - m\angle 2$	4. Subtraction



**A3. Use the given information and the diagram to prove the statement.**

Given:  $2 * m\angle ABC = m\angle ABD$

Prove:  $\angle ABC \cong \angle CBD$

<u>Statements</u>	<u>Reasons</u>
1. $2 * m\angle ABC = m\angle ABD$	1. Given
2. $m\angle ABC + m\angle ABC = m\angle ABD$	2. Def. of Multiplication
3. $m\angle ABC + m\angle CBD = m\angle ABD$	3. Angle Addition Postulate
4. $m\angle ABC + m\angle ABC = m\angle ABC + m\angle CBD$	4. Transitive
5. $m\angle ABC = m\angle CBD$	5. Subtraction
6. $\angle ABC \cong \angle CBD$	6. Definition of $\cong$ angles

