

4.5 Prove Statements about Segments and Angles

pp. 234 – 236



VOCABULARY

Proof

A logical argument that show a statement is true

Two-column proof

A proof that has numbered statements and corresponding reasons that show an argument in logical order.

Postulate

A rule that is accepted without proof

Theorem

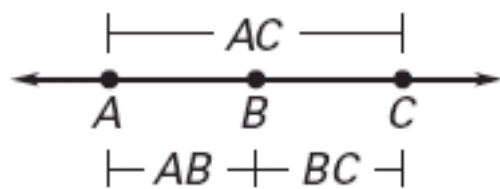
A statement that can be proven



SEGMENT ADDITION POSTULATE

If B is between A and C ,
then $AB + BC = AC$.

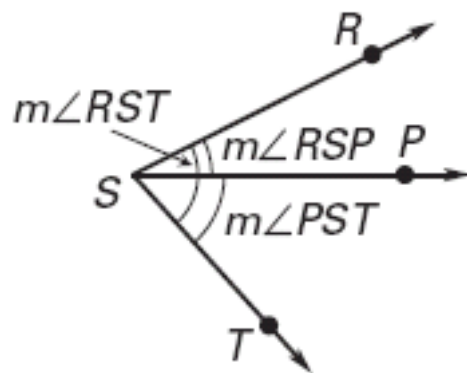
If $AB + BC = AC$, then B is
between A and C .



ANGLE ADDITION POSTULATE

Words If P is in the interior of $\angle RST$,
then the measure of $\angle RST$ is
equal to the sum of the measures
of \angle _____ and \angle _____.

Symbols If P is in the interior of $\angle RST$,
then $m\angle RST = m\angle$ _____ $+ m\angle$ _____.



THEOREM 4.1 CONGRUENCE OF SEGMENTS

Segment congruence is reflexive, symmetric, and transitive.

Reflexive For any segment AB , _____.

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

Transitive If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then _____.

THEOREM 4.2 CONGRUENCE OF ANGLES

Angle congruence is reflexive, symmetric, and transitive.

Reflexive For any angle A , _____.

Symmetric If $\angle A \cong \angle B$, then _____.

Transitive If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then _____.

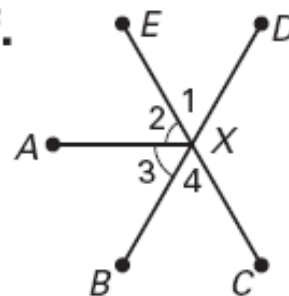


Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$



Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____

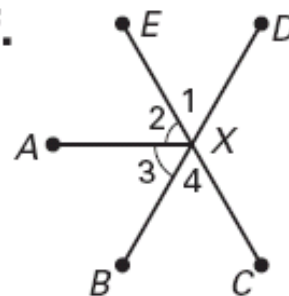


Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$



Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____
2. $m\angle AXD$ $= m\angle$ ___ $+ m\angle$ ___	2. Angle Addition Postulate

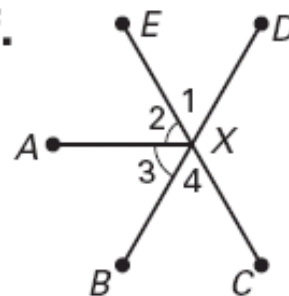


Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$



Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____
2. $m\angle AXD$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	2. Angle Addition Postulate
3. $m\angle AXC$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	3. Angle Addition Postulate

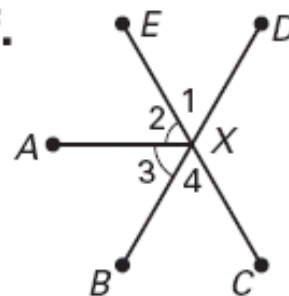


Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$



Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____
2. $m\angle AXD$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	2. Angle Addition Postulate
3. $m\angle AXC$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	3. Angle Addition Postulate
4. $m\angle 1 + m\angle 2$ $= m\angle 3 + m\angle 4$	4. _____ _____

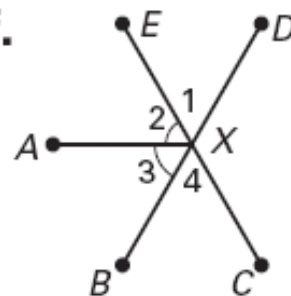


Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$

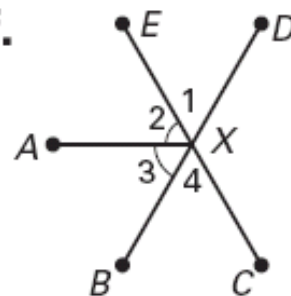


Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____
2. $m\angle AXD$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	2. Angle Addition Postulate
3. $m\angle AXC$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	3. Angle Addition Postulate
4. $m\angle 1 + m\angle 2$ $= m\angle 3 + m\angle 4$	4. _____ _____
5. $m\angle 2 = m\angle 3$	5. _____



Example 1 Write a two-column proof

Use the diagram to write a two-column proof.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$ Prove $m\angle 1 = m\angle 4$ 

Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. _____
2. $m\angle AXD$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	2. Angle Addition Postulate
3. $m\angle AXC$ $= m\angle \underline{\quad} + m\angle \underline{\quad}$	3. Angle Addition Postulate
4. $m\angle 1 + m\angle 2$ $= m\angle 3 + m\angle 4$	4. _____ _____
5. $m\angle 2 = m\angle 3$	5. _____
6. $m\angle 1 + m\angle \underline{\quad}$ $= m\angle 3 + m\angle 4$	6. Substitution Property of Equality

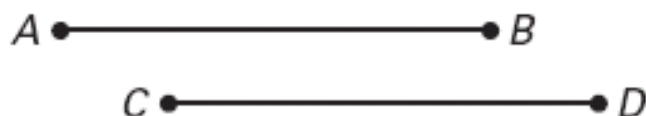


Example 2**Symmetric Property of Congruence**

Prove the Symmetric Property of Segment Congruence.

Given $\overline{AB} \cong \overline{CD}$

Prove $\overline{CD} \cong \overline{AB}$



Statements

Reasons

1. $\overline{AB} \cong \overline{CD}$

1. _____

2. _____

2. Definition of congruent segments

3. _____

3. Symmetric Property of Equality

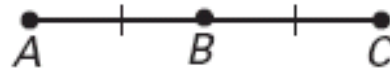
4. $\overline{CD} \cong \overline{AB}$

4. Definition of congruent segments



1. Three steps of a proof are shown. Give the reasons for the last two steps.

Given $BC = AB$



Prove $AC = AB + AB$

Statements	Reasons
1. $BC = AB$	1. Given
2. $AC = AB + BC$	2. _____ _____
3. $AC = AB + AB$	3. _____ _____



2. Prove the Reflexive Property of Segment Congruence.

Given \overline{AB} is a line segment.

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

Statements	Reasons
1. \overline{AB} is a line segment.	1. _____
2. AB is the length of _____.	2. Definition of the length of a segment
3. $AB = AB$	3. _____ _____
4. $\overline{AB} \cong \overline{AB}$	4. _____ _____

Homework

Textbook pp. 219 – 220 1 – 3 all, 5, 6, 8

****In proofs you must draw the pictures! Also**

Draw columns & the statements & reasons.

