

2.6: Proving Statements about Angles

Objective: Use angle congruence properties
 Prove Properties about special pairs of angles

Warm-up: 1) a right angle 2) complement of 42°
 3) supp. of 42° 4) Two \cong angles that are comp
 5) Two \cong angles that are supp.

Theorem 2.2 Properties of Angle Congruence

Angle congruence is reflexive, symmetric, and transitive

Reflexive: $\angle A \cong \angle A$

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 $\angle A \cong \angle C$

Proof of this Theorem



Given: $\angle A \cong \angle B$

$\angle B \cong \angle C$

Prove: $\angle A \cong \angle C$

Statement / Proof

1) $\angle A \cong \angle B$	1) Given
2) $\angle B \cong \angle C$	2) Given
3) $m\angle A = m\angle B$	3) Def. of congruent angles
4) $m\angle B = m\angle C$	4) Def. of congruent angles
5) $m\angle A = m\angle C$	5) Transitive Property of congruence
6) $\angle A \cong \angle C$	6) Def. of congruent angles

Theorem 2.3 Right Angle Congruence Theorem

All right angles are congruent

Proof of Theorem 2.3



Given: $\angle 1$ and $\angle 2$ are right angles
 Prove: $\angle 1 \cong \angle 2$

Statement	Reason
1) $\angle 1$ and $\angle 2$ are right angles	1) Given
2) $m\angle 1, m\angle 2 = 90^\circ$	2) Definition of right angles
3) $m\angle 1 = m\angle 2$	3) Transitive Property of equality
4) $\angle 1 \cong \angle 2$	4) Def of congruence

Theorem 2.4 Congruent Supplements Theorem

If two angles are supplementary to the same angle (or congruent \angle 's) then they are congruent

$$\text{If } m\angle 1 + m\angle 2 = 180^\circ$$

$$\text{and } m\angle 2 + m\angle 3 = 180^\circ,$$

$$\text{then } \angle 1 \cong \angle 3$$



Proof of Theorem 2.4



Given: $\angle 1$ and $\angle 2$ are supp
 $\angle 3$ and $\angle 4$ are supp
 $\angle 1 \cong \angle 4$

Prove: $\angle 2 \cong \angle 3$

Statement	Reason
1) $\angle 1$ and $\angle 2$ are supp $\angle 3$ and $\angle 4$ are supp	1) Given
2) $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 3 + m\angle 4 = 180^\circ$	2) Def. of supp. angles
3) $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3) Transitive property of equality
4) $\angle 1 \cong \angle 4$	4) Given
5) $m\angle 1 = m\angle 4$	5) Def of congruent angles
6) $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	6) Substitution Property of equality
7) $m\angle 2 = m\angle 3$	7) Subtraction Property of equality
8) $\angle 2 \cong \angle 3$	8) Def of congruent angles

Theorem 2.5 Congruent Complements Theorem

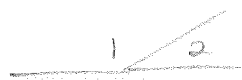
If two angles are complementary to the same angle (or to congruent angles) then the two angles are congruent



If $m\angle 4 + m\angle 5 = 90^\circ$ and
 $m\angle 5 + m\angle 6 = 90^\circ$ then
 $\angle 4 \cong \angle 6$

Postulate 12 Linear Pair Postulate

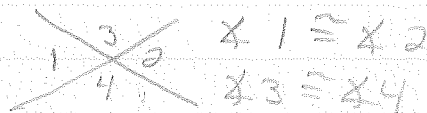
If two angles form a linear pair, then they are supplementary



$$m\angle 1 + m\angle 2 = 180^\circ$$

Theorem 2.6 Vertical Angles Theorem

Vertical Angles are congruent



Proof of Theorem 2.6

Given: $\angle 5$ and $\angle 6$ are a linear pair
 $\angle 6$ and $\angle 7$ are a linear pair



Prove: $\angle 5 \cong \angle 7$

Statement	Reason
1) $\angle 5, \angle 6$ are linear pair $\angle 6, \angle 7$ are linear pair	1) Given
2) $\angle 5, \angle 6$ are supp.	2) linear pair postulate
3) $\angle 6, \angle 7$ are supp.	3) linear pair postulate
4) $\angle 5 \cong \angle 7$	4) Congruent Supplements Theorem

Closure: What properties do angles have? What is true about all right angles? If two angles are supp. to the same angle, then what?

Homework: 2.6B