

Proving Angle Relationships

Name: _____

G.CO.9 Prove Lines & Angles

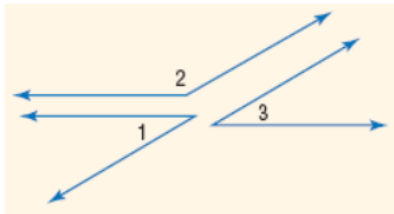
Date: _____ Period: _____

Congruence of Angles

Property	
Reflexive Prop.	For any angle A, $\angle A \cong \angle A$
Symmetric Property	If $\angle A \cong \angle B$, then $\angle B \cong \angle A$
Transitive Prop.	If $\angle A \cong \angle B$ and $\angle B \cong \angle C$ and $\angle A \cong \angle C$

Supplementary & Complementary Angles

Congruent Supplements Theorem



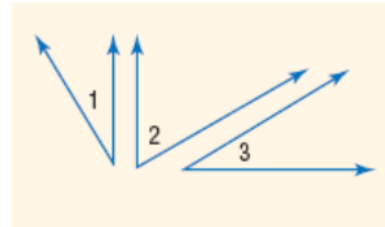
If two angles are Supplements to the same angle (or to congruent (\cong) angles), then they are \cong .

If $m\angle 1 + m\angle 2 = 180^\circ$ and if $m\angle 2 + m\angle 3 = 180^\circ$, then $m\angle 1 = m\angle 3$

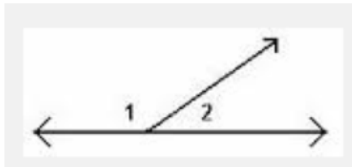
Congruent Complements Theorem

If two angles are Complements to the Same angle (or to \cong angles), then they are \cong .

If $m\angle 1 + m\angle 2 = 90^\circ$ and if $m\angle 2 + m\angle 3 = 90^\circ$, then $m\angle 1 = m\angle 3$



Linear Pair Postulate

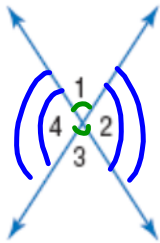


If 2 angles form a linear pair, then they are Supplementary.

$\angle 1$ and $\angle 2$ form a linear pair so $\angle 1$ and $\angle 2$ are Supplementary

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

Vertical Angles Congruence Theorem



If two angles (\angle) are vertical angles, then they are \cong .

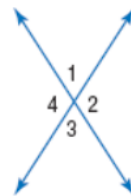
$\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$

Right Angle Theorems

- A. Perpendicular (\perp) lines intersect to form four right/ 90° angles.
- B. All Right angles are \cong .
- C. \perp lines form congruent adjacent angles.
- D. If two angles are Supplementary and \cong , then each angle is a right angle.
- E. If two \cong angles form a linear pair, then they are right angles.

Example 1

In the figure, $\angle 1$ and $\angle 2$ form a linear pair and $\angle 2$ and $\angle 3$ form a linear pair. Prove that $\angle 1$ and $\angle 3$ are congruent.



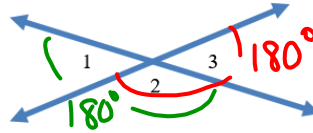
Given: $\angle 1$ and $\angle 2$ form a linear pair.
 $\angle 2$ and $\angle 3$ form a linear pair.

Prove: $\angle 1 \cong \angle 3$

Proof:

Statements	Reasons
1. $\angle 1$ and $\angle 2$ form a linear pair. $\angle 2$ and $\angle 3$ form a linear pair.	1. <u>Given</u>
2. $\angle 1$ is suppl. to $\angle 2$ $\angle 3$ is suppl. to $\angle 2$	2. <u>Def. of a Linear Pair</u>
3. $\angle 1 \cong \angle 3$	3. <u>If 2 \angle's are suppl. to the same \angle, then they are \cong.</u>

3. Given: $\angle 1$ and $\angle 3$ are vertical angles
 Prove: $\angle 1 \cong \angle 3$



Statements	Reasons
1. $\angle 1$ and $\angle 3$ are vert. \angle 's	1. Given
2. $\angle 1$ and $\angle 2$ and $\angle 2$ and $\angle 3$ are linear pairs	2. Def. Linear Pair
3. $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 3 + m\angle 2 = 180^\circ$	3. Linear Pair Post.
4. $\angle 1 \cong \angle 3$	4. \cong Supp. Thm.

4.

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

Statements	Reasons
① $\angle 1$ and $\angle 2$ are Supplements $\angle 3$ and $\angle 4$ are suppl. $\angle 1 \cong \angle 4$	① Given ② Definition of suppl.
② $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 3 + m\angle 4 = 180^\circ$	4
③ $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	③ Substitution
④ $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	④ Substitution
⑤ $\angle 2 \cong \angle 3$	⑤ \cong Supp. thm.