Reasoning and Proof – Proving Angles

Notes Section 2.4 Name________________

Theorem 2-5: Congruence of angles is reflexive, symmetric, and transitive.

Reflexive Property

$\angle 1 \cong \angle 1$

Symmetric Property

If $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$

Transitive Property

If $\angle 1 \cong \angle 2$ and $\angle 2 \cong \angle 3$,

then $\angle 1 \cong \angle 3$

Theorem 2-6: Angles supplementary to the same angle or to congruent angles are congruent.

If $\angle 1$ and $\angle 2$ are supplementary,

$\angle 3$ and $\angle 2$ are supplementary

then $\angle 1 \cong \angle 3$

Theorem 2-7: Angles complementary to the same angle or to congruent angles are congruent.

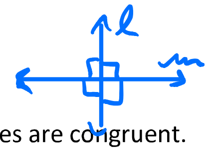
If $\angle 1$ and $\angle 2$ are complementary,

$\angle 3$ and $\angle 2$ are complementary

then $\angle 1 \cong \angle 3$

Theorem 2-9: Perpendicular lines intersect to form four right angles.

If $\ell \perp m$, then



Theorem 2-10: All right angles are congruent.

If $\angle 1$ and $\angle 2$ are right angles,

then $\angle 1 \cong \angle 2$

1. Prove transitive part of theorem 2-5:

Given $\angle 1 \cong \angle 2$, $\angle 2 \cong \angle 3$ Prove $\angle 1 \cong \angle 3$

	Statement		Reason
#1)	$\angle 1 \cong \angle 2$ $\angle 2 \cong \angle 3$	#1)	GIVEN
#2)	$m\angle 1 = m\angle 2$ $m\angle 2 = m\angle 3$	#2)	Def'n of congruent angles
#3)	$m\angle 1 = m\angle 3$	#3)	Transitive P.o.E
#4)	$\angle 1 \cong \angle 3$	#4)	Def'n of congruent angles

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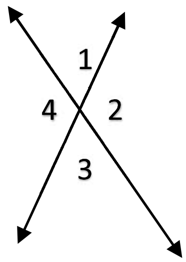
2. Prove Vertical Angles Theorem:

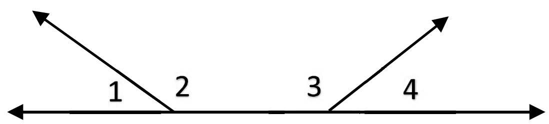


Given $\angle 1$ and $\angle 2$ form a linear pair
$\angle 2$ and $\angle 3$ form a linear pair

Prove $\angle 1 \cong \angle 3$

Statement	Reason
#1) $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	#1) GIVEN
#2) $\angle 1$ and $\angle 2$ are supplementary $\angle 2$ and $\angle 3$ are supplementary	#2) Supplement Theorem
#3) $\angle 1 \cong \angle 3$	#3) Angles supplementary to the same angle are $\cong$

3. Prove theorem 2-6 – Angles supplementary to congruent angles are congruent.



Given $\angle 1$ and $\angle 2$ are supplementary
$\angle 3$ and $\angle 4$ are supplementary
$\angle 1 \cong \angle 4$

Prove $\angle 2 \cong \angle 3$

Statement	Reason
#1) $\angle 1$ and $\angle 2$ are supplementary $\angle 3$ and $\angle 4$ are supplementary $\angle 1 \cong \angle 4$	#1) GIVEN
#2) $m\angle 1 + m\angle 2 = 180$ $m\angle 3 + m\angle 4 = 180^\circ$	#2) Def'n of Supplementary
#3) $m\angle 1 = m\angle 4$	#3) Def'n of $\cong$ $\angle$s
#4) $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	#4) Substitution P.E
#5) $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	#5) Substitution P.E
#6) $m\angle 2 = m\angle 3$	#6) Subtraction P.E
#7) $\angle 2 \cong \angle 3$	#7) Def'n of $\cong$ $\angle$s