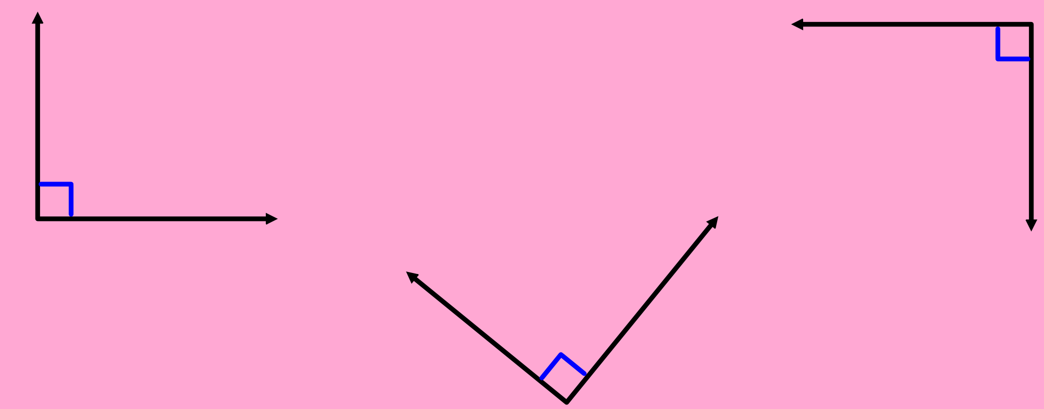
2.7 PROVE ANGLE PAIR RELATIONSHIPS

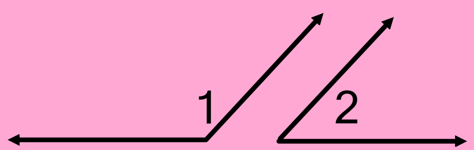
Theorem 2-3: Right Angles Congruence Theorem

All right angles are congruent.



Theorem 2-4: Congruent Supplements Theorem

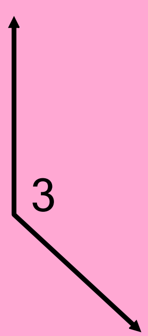
If 2 angles are supplementary to the same angle (or to congruent angles), then they are congruent.



$\angle 1$ & $\angle 2$ are supp.

$\angle 3$ & $\angle 2$ are supp.

$\angle 1 \cong \angle 3$



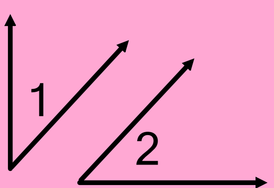
Given: Angles 1 & 3 are supplementary and angles 2 & 3 are supplementary

Prove: Angles 1 and 2 are congruent

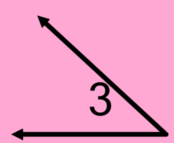
STATEMENTS	REASONS
1. $\angle 1$ & $\angle 3$ are supplementary $\angle 2$ & $\angle 3$ are supplementary	1. Given
2. $m\angle 1 + m\angle 3 = 180$ $m\angle 2 + m\angle 3 = 180$	2. Def. of supplementary angles
3. $m\angle 1 + \underline{m\angle 3} = m\angle 2 + \underline{m\angle 3}$	3. Substitution Property
4. $m\angle 1 = m\angle 2$	4. Subtraction Property
5. $\angle 1 \cong \angle 2$	5. Def. of congruent angles

<u>Theorem 2-5: Congruent Complements Theorem</u>

If 2 angles are complementary to the same angle (or to congruent angles), then they are congruent.



$\angle 1$ & $\angle 2$ are comp.
$\angle 3$ & $\angle 2$ are comp.
$\downarrow$
$\angle 1 \cong \angle 3$



<u>Postulate 12</u>

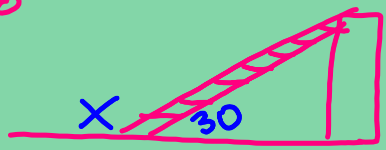
If two angles form a linear pair, then they are supplementary.

Example 1

If $\angle 1$ and $\angle 2$ form a linear pair and $m\angle 1 = 72$, find $m\angle 2$.

$$\begin{array}{r} 180 \\ -\ 72 \\ \hline \end{array}$$

$m\angle 2 = 108°$



Example 2

The angle formed by a ladder & the ground measures 30. Find the measure x of the larger angle formed by the ladder & the ground.

150°

Theorem 2.6:

Vertical Angles Congruence Theorem

Vertical angles are congruent.

Example 3

If $\angle 7$ and $\angle 8$ are vertical angles and $m\angle 7 = 3x + 6$ and $m\angle 8 = x + 26$, find $m\angle 7$ and $m\angle 8$.

$$3x + 6 = \cancel{x} + 26$$
$$-x \qquad -\cancel{x}$$
$$2x + 6 = 26$$
$$-6 \qquad -6$$
$$\frac{2x}{2} = \frac{20}{2}$$
$$x = 10$$

$m\angle 7 = 3(10) + 6$

$m\angle 7 = 36°$

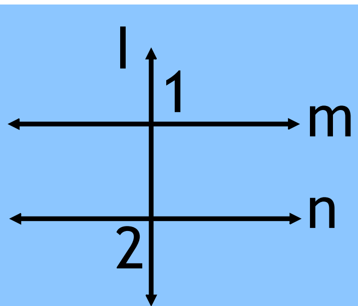
$m\angle 8 = 10 + 26$

$m\angle 8 = 36°$

Example 4

Given: $l \perp m$, $l \perp n$

Prove: $\angle 1 \cong \angle 2$

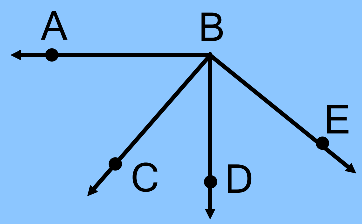


Statements	Reasons
① $l \perp m$, $l \perp n$	① given
② $\angle 1$ is a right $\angle$ $\angle 2$ is a right $\angle$	② def of $\perp$
③ $\angle 1 \cong \angle 2$	③ all right $\angle$s $\cong$

Example 5

Given: ∠ABD is a right angle
∠CBE is a right angle

Prove: ∠ABC ≅ ∠DBE

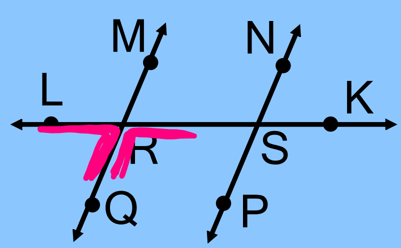


Statements	Reasons
1. ∠ABD is a right ∠, ∠CBE is a right ∠	1. given
2. m∠ABD = 90, m∠CBE = 90	2. def of right angle
3. m∠ABD = m∠CBE	3. substitution prop.
4. m∠ABC + m∠CBD = m∠ABD, m∠CBD + m∠DBE = m∠CBE	4. angle add. post.
5. m∠ABC + m∠CBD = m∠CBD + m∠DBE	5. subst. prop.
6. m∠ABC = m∠DBE	6. subtraction prop.
7. ∠ABC ≅ ∠DBE	7. def of ≅

Example 6

Given: ∠QRS & ∠PSR are supplementary

Prove: ∠QRL ≅ ∠PSR



Statements	Reasons
1. ∠QRS & ∠PSR are supp.	1. given
2. m∠QRS + m∠PSR = 180	2. def. of supp.
3. m∠QRL + m∠QRS = 180	3. linear pair post.
4. m∠QRS + m∠PSR = m∠QRL + m∠QRS	4. subst. prop.
5. m∠PSR = m∠QRL	5. subtraction prop.
6. m∠QRL = m∠PSR	6. symmetric prop.
7. ∠QRL ≅ ∠PSR	7. def. of ≅