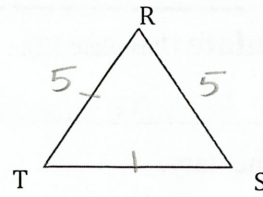


Example #6: Prove

**Given:**  $RT = 5$ ,  $RS = 5$ ,  $\overline{RT} \cong \overline{TS}$

**Prove:** The perimeter of  $\triangle PGT$  is  $3 \cdot \overline{PT}$   
 $\overline{RS} \cong \overline{TS}$



Statement	Reason
1. $RT = 5, RS = 5, \overline{RT} \cong \overline{TS}$	1. Given
2. $RT = TS$	2. Def <sup>n</sup> of congruent segments
3. $RS = RT$	3. Transitive Property of =
4. $RS = TS$	4. Transitive Property of =
5. $\overline{RS} \cong \overline{TS}$	5. Def <sup>n</sup> of congruent segments

## Chapter 2.7: Prove Angle Pair Relationships

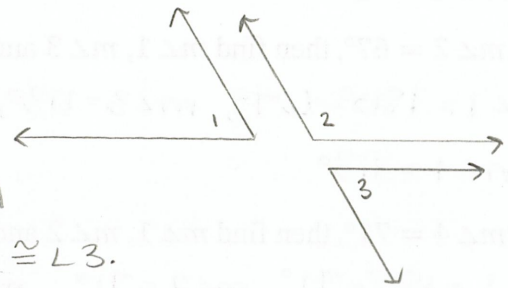
Objective: I can prove angle pair relationships

### Right Angles Congruence Theorem (Theorem 2.3):

All right angles are Congruent

### Congruent Supplements Theorem (Theorem 2.4):

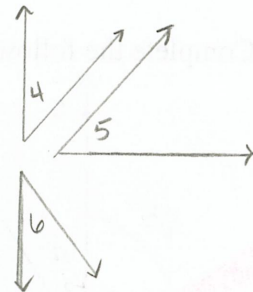
If two angles are supplementary to the same angle  
 (or to congruent angles), then they are congruent.



If  $\angle 1$  and  $\angle 2$  are supplementary and  $\angle 2$  and  $\angle 3$  are supplementary, then  $\angle 1 \cong \angle 3$ .

### Congruent Complements Theorem (Theorem 2.5):

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



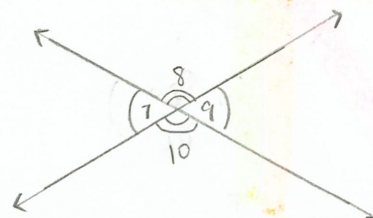
If  $\angle 4$  and  $\angle 5$  are complementary and  $\angle 5$  and  $\angle 6$  are complementary, then  $\angle 4 \cong \angle 6$ .

### Vertical Angles Congruence Theorem (Theorem 2.6):

Vertical Angles are congruent

$$\angle 7 \cong \angle 9$$

$$\angle 8 \cong \angle 10$$



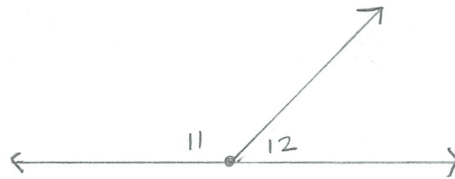
**Linear Pair Postulate** (Postulate 12):

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

$\angle 11$  and  $\angle 12$  are a linear pair

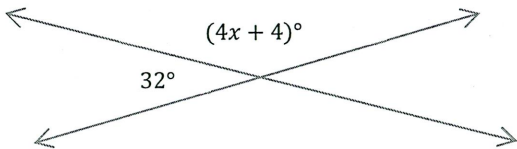
$\therefore \angle 11$  and  $\angle 12$  are supplementary

$m\angle 11 + m\angle 12 = 180^\circ$



Example #1: Find  $x$ .

Symbol for therefore



$32 + 4x + 4 = 180^\circ$

$4x + 36 = 180^\circ$

$-36 \quad -36$

$\frac{4x}{4} = \frac{144}{4}$

$x = 36$

Example #2: Use the diagram to answer the question.

a. If  $m\angle 1 = 112^\circ$ , then find  $m\angle 2$ ,  $m\angle 3$  and  $m\angle 4$ .

$m\angle 2 = 180^\circ - 112^\circ$ ,  $m\angle 3 = 112^\circ$ ,  $m\angle 4 = 68^\circ$

$m\angle 2 = 68^\circ$

b. If  $m\angle 2 = 67^\circ$ , then find  $m\angle 1$ ,  $m\angle 3$  and  $m\angle 4$ .

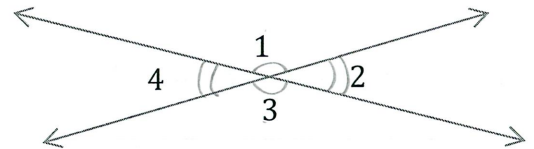
$m\angle 1 = 180^\circ - 67^\circ$ ,  $m\angle 3 = 113^\circ$ ,  $m\angle 4 = 67^\circ$

$m\angle 1 = 113^\circ$

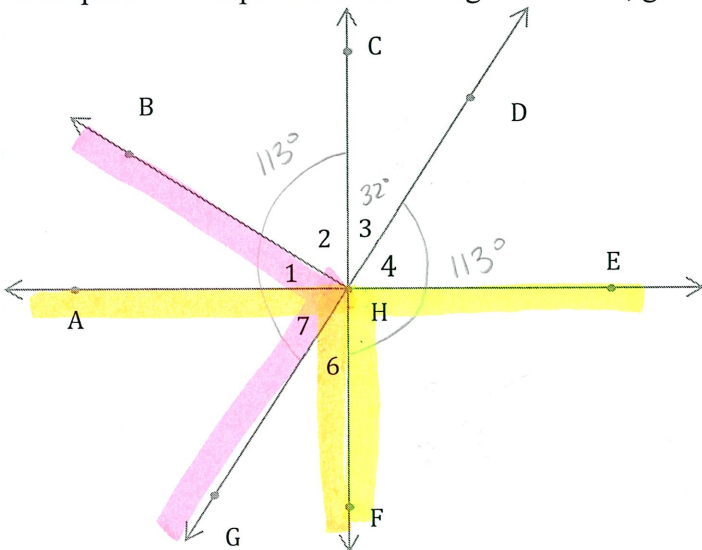
c. If  $m\angle 4 = 71^\circ$ , then find  $m\angle 1$ ,  $m\angle 2$  and  $m\angle 3$ .

$m\angle 1 = 180^\circ - 71^\circ$ ,  $m\angle 2 = 71^\circ$ ,  $m\angle 3 = 109^\circ$

$m\angle 1 = 109^\circ$



Example #3: Complete the following statements, given that  $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$ .



a. If  $m\angle 6 = 27^\circ$ , then  $m\angle 1 = \underline{27^\circ}$   
 $m\angle 7 = 90^\circ - 27^\circ = 63^\circ$ ;  $m\angle 1 = 90^\circ - 63^\circ = 27^\circ$

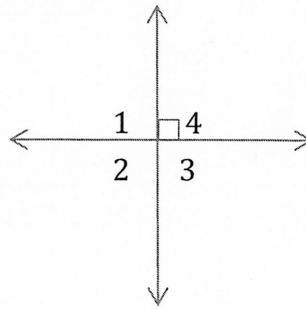
b. If  $m\angle 3 = 32^\circ$ , then  $m\angle 2 = \underline{58^\circ}$   
 $m\angle 2 = 90^\circ - 32^\circ$

c. If  $m\angle DHF = 113^\circ$ , then  $m\angle CHG = \underline{113^\circ}$

Example #4: Write a Proof.

**Given:**  $\angle 4$  is a right angle

**Prove:**  $\angle 2$  and  $\angle 4$  are supplementary.



Statement	Reason
1. $\angle 4$ is a right angle	1. Given
2. $m\angle 4 = 90^\circ$	2. Def <sup>n</sup> of a right angle
3. $\angle 2 \cong \angle 4$	3. Vertical $\angle$ 's Congruence Thm
4. $m\angle 2 = m\angle 4$	4. Def <sup>n</sup> of congruent angles
5. $m\angle 2 = 90^\circ$	5. Transitive Property
6. $m\angle 2 + m\angle 4 = 180^\circ$	6. Angle Addition
7. $\angle 2$ and $\angle 4$ are supplementary	7. Def <sup>n</sup> of Supplementary angles

Example #5: Write a Proof

**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. $m\angle 1 + m\angle 2 = 180^\circ$ ; $m\angle 3 + m\angle 4 = 180^\circ$	2. Def <sup>n</sup> of Supplementary angles
3. $m\angle 1 = m\angle 4$	3. Def <sup>n</sup> of congruent angles
4. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	4. Transitive Property
5. $m\angle 4 + m\angle 2 = m\angle 3 + m\angle 4$	5. Substitution
6. $-m\angle 4$ <span style="margin-left: 150px;"><math>-m\angle 4</math></span>	6. Subtraction Prop. of Equality
7. $m\angle 2 = m\angle 3$	7. Substitution
8. $\angle 2 \cong \angle 3$	8. Def <sup>n</sup> of congruent angles

