2-8 Study Guide and Intervention

Proving Angle Relationships

Supplementary and Complementary Angles There are two basic postulates for
working with angles. The Protractor Postulate assigns numbers to angle measures, and the
Angle Addition Postulate relates parts of an angle to the whole angle.

Protractor Postulate	Given any angle, the measure can be put into one-to-one correspondance with real numbers between 0 and 180.	
Angle Addition Postulate		

The two postulates can be used to prove the following two theorems.

Supplement Theorem		
Complement Theorem		

Example 1 **If ∠1 and ∠2 form a
linear pair and $m\angle2 = 115$, find $m\angle1$.**
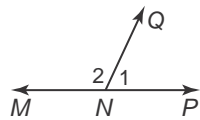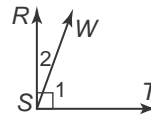
$m\angle1 + m\angle2 = 180$

$m\angle1 + 115 = 180$

$m\angle1 = 65$

Example 2 **If ∠1 and ∠2 form a
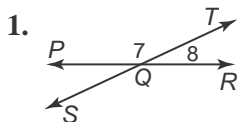right angle and $m\angle2 = 20$, find $m\angle1$.**

$m\angle1 + m\angle2 = 90$

$m\angle1 + 20 = 90$
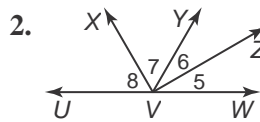
$m\angle1 = 70$

Exercises

**Find the measure of each numbered angle and name the theorem that justifies
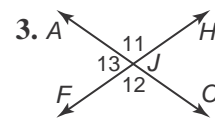your work.**

1.

$m\angle7 = 5x + 5,$

$m\angle8 = x - 5$

2.

$m\angle5 = 5x, m\angle6 = 4x + 6,$

$m\angle7 = 10x,$

$m\angle8 = 12x - 12$

3.

$m\angle11 = 11x,$

$m\angle13 = 10x + 12$
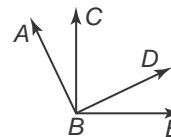
2-8 Study Guide and Intervention *(continued)*
Proving Angle Relationships

Congruent and Right Angles The Reflexive Property of Congruence, Symmetric
Property of Congruence, and Transitive Property of Congruence all hold true for angles.
The following theorems also hold true for angles.

Congruent Supplements Theorem	Angles supplement to the same angle or congruent angles are congruent.
Congruent Compliments Theorem	Angles compliment to the same angle or to congruent angles are congruent.
Vertical Angles Theorem	If two angles are vertical angles, then they are congruent.
Theorem 2.9	Perpendicular lines intersect to form four right angles.
Theorem 2.10	All right angles are congruent.
Theorem 2.11	Perpendicular lines form congruent adjacent angles.
Theorem 2.12	If two angles are congruent and supplementary, then each angle is a right angle.
Theorem 2.13	If two congruent angles form a linear pair, then they are right angles.

Example **Write a two-column proof.**

Given: ∠ABC and ∠CBD are complementary.
  ∠DBE and ∠CBD form a right angle.
Prove: ∠ABC ≅ ∠DBE

Statements	Reasons
1. ∠ABC and ∠CBD are complementary. ∠DBE and ∠CBD form a right angle.	**1.**
2. ∠DBE and ∠CBD are complementary.	**2.**
3. ∠ABC ≅ ∠DBE	**3.**

Exercises

Complete each proof.

1. Given: $\overline{AB} \perp \overline{BC}$;
  ∠1 and ∠3 are
  complementary.
Prove: ∠2 ≅ ∠3
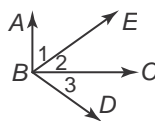
Proof:

Statements	Reasons
a. $\overline{AB} \perp \overline{BC}$	**a.** _____
b. _____	**b.** Definition of ⊥
c. $m\angle ABC = 90$	**c.** Def. of right angle
d. $m\angle ABC = m\angle 1 + m\angle 2$	**d.** _____
e. $90 = m\angle 1 + m\angle 2$	**e.** Substitution
f. ∠1 and ∠2 are compl.	**f.** _____
g. _____	**g.** Given
h. ∠2 ≅ ∠3	**h.** _____

2. Given: ∠1 and ∠2
  form a linear pair.
  $m\angle 1 + m\angle 3 = 180$
Prove: ∠2 ≅ ∠3
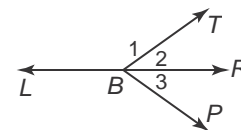
Proof:

Statements	Reasons
a. ∠1 and ∠2 form a linear pair. $m\angle 1 + m\angle 3 = 180$	**a.** Given
b. _____	**b.** Suppl. Theorem
c. ∠1 is suppl. to ∠3.	**c.** _____
d. _____	**d.** ∡ suppl. To the same ∠ or ≅ ∡ are ≅.