Worksheet – *Section 2-8 Proving Angle Relationships*

Objectives:

- Understand the **Angle Addition Postulate** and use it to find unknown angle measures
- Understand **Supplements and Compliments** and use to find unknown angle measures
- Use algebra to find unknown angle measure
- Use **angle relation theorems** to prove relationships with 2 column proofs

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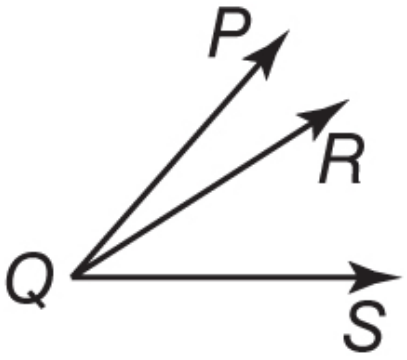
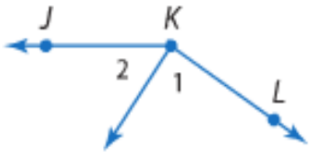
Angle Addition Postulate

R is in the interior of ∠*PQS* if and only if $m\angle PQR + m\angle RQS = m\angle PQS$.



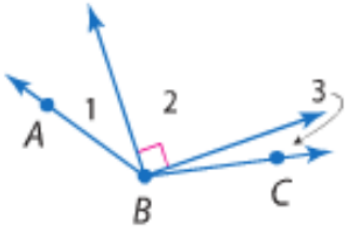
Example:

Find the measure of angle 1 if the measure of angle 2 is 56 degrees and

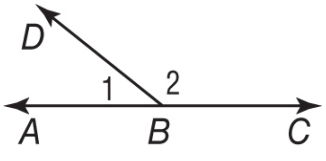


Practice:

If and , find the measure of angle 3. Justify each step.



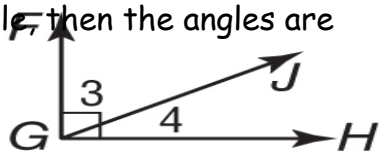
Supplements and Complements



- If two angles forma linear pair, then they are supplementary angle

  If $\angle 1$ and $\angle 2$ form a linear pair, then $m\angle 1 + m\angle 2 = 180$.

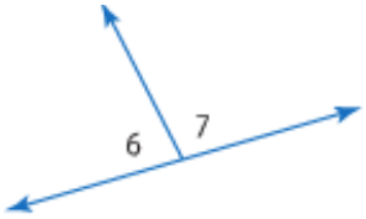
- If the noncommon sides of two adjacent angles form a right angle, then the angles are complementary angles.



  If $\perp$, then $m\angle 3 + m\angle 4 = 90$.

Example:

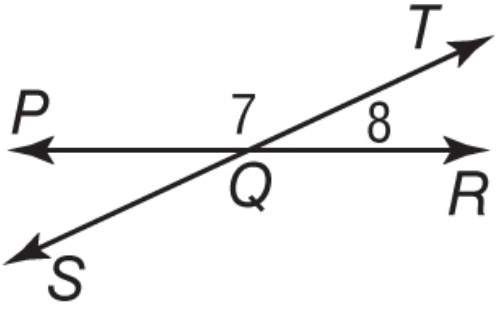
Suppose and form a linear pair. If and . Find x, , and .
Justify each step



Practice:

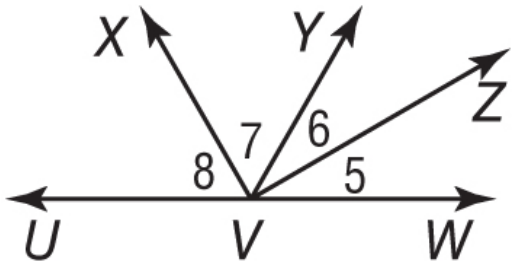
a. Find the measure of each numbered angle.

$m\angle 7 = 5x + 5$,
$m\angle 8 = x - 5$



b. Find the measure of each numbered angle.

$m\angle 5 = 5x$,
$m\angle 6 = 4x + 6$,
$m\angle 7 = 10x$,
$m\angle 8 = 12x - 12$



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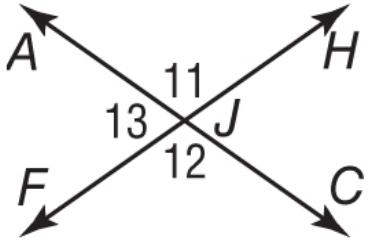
c. Find the measure of each numbered angle.

$m\angle 11 = 11x$,
$m\angle 13 = 10x + 12$



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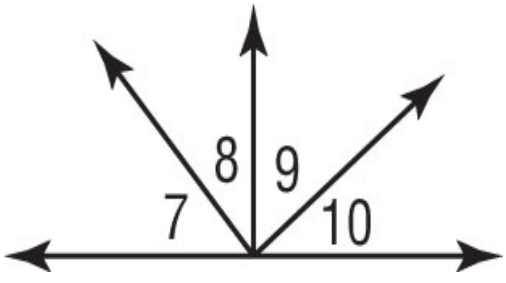
d. Find the measure of each numbered angle.

and are complimentary
and



<u>Proving Angle Relationships</u>

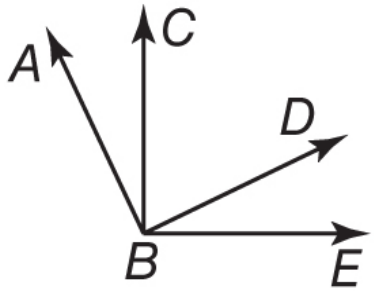
The following theorems hold true for angles and can be used in proofs dealing with angles

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 (Definition of Perpendicular lines)	Perpendicular lines intersect to form four right angles.
Theorem (Definition of right angles)	All right angles are congruent.
Theorem (Definition of Perpendicular lines)	Perpendicular lines form congruent adjacent angles.

<u>Example:</u> Write a two-column proof.

Given: $\angle ABC$ and $\angle CBD$ are complementary.
$\angle DBE$ and $\angle CBD$ form a right angle.

Prove: $\angle ABC \cong \angle DBE$



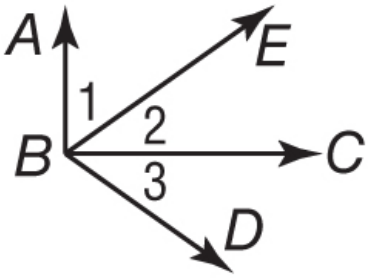
Statements	**Reasons**

Example:

Complete each proof.

1. Given: $\perp$; $\angle 1$ and $\angle 3$ are complementary.

Prove: $\angle 2 \cong \angle 3$



Proof:

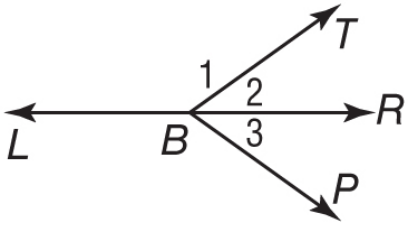
Statements	Reasons
a. $\perp$, $\angle 1$ and $\angle 3$ are complementary	**a.** _____
b. _____	**b.** Definition of $\perp$
c. $m\angle ABC = 90$	**c.** Def. of right angle
d. $m\angle ABC = m\angle 1 + m\angle 2$	**d.** _____
e. $90 = m\angle 1 + m\angle 2$	**e.** Substitution
f. $\angle 1$ and $\angle 2$ are compliments	**f.** _____
g. $\angle 2 \cong \angle 3$	**g.** _____

Practice:

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

Prove: $\angle 2 \cong \angle 3$

Proof:

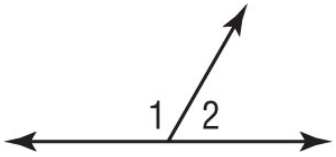


Statements	Reasons
a. $\angle 1$ and $\angle 2$ form a linear pair. $m\angle 1 + m\angle 3 = 180$	**a.** Given
b. _____	**b.** Def. of Linear Pair
c. $\angle 1$ is suppl. to $\angle 3$.	**c.** _____
d. _____	**d.** Congruent Supplements

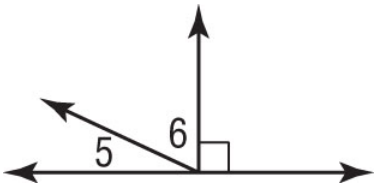
Homework Problems

Find the measure of each numbered angle and name the theorems that justify your work.

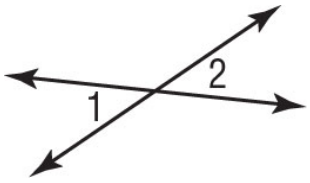
1. $m\angle 2 = 57$



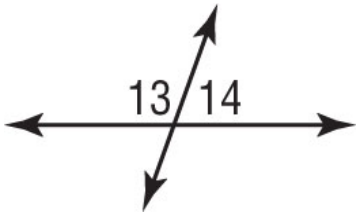
2. $m\angle 5 = 22$



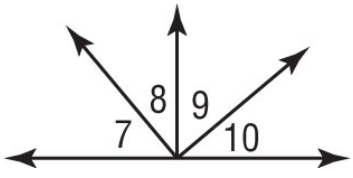
3. $m\angle 1 = 38$



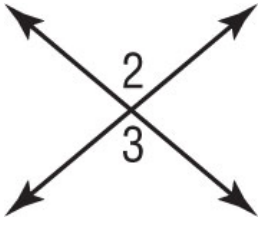
4. $m\angle 13 = 4x + 11$, $m\angle 14 = 3x + 1$



5. $\angle 9$ and $\angle 10$ are complementary. $\angle 7 \cong \angle 9$, $m\angle 8 = 41$



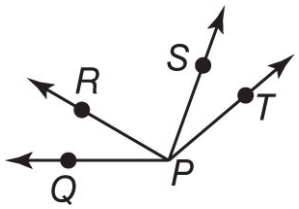
6. $m\angle 2 = 4x - 26$, $m\angle 3 = 3x + 4$



7. Complete the following proof.

Given: $\angle QPS \cong \angle TPR$

Prove: $\angle QPR \cong \angle TPS$



Proof:

Statements	Reasons

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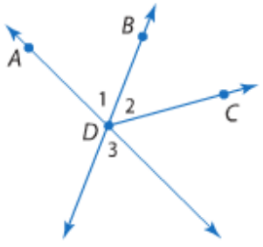
7. Complete the following proof.

Given: bisects

Prove: $\angle 2 \cong \angle 3$



Proof:

Statements	Reasons