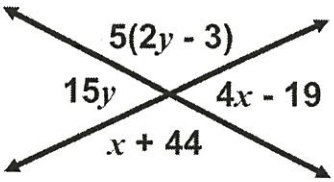
GEOMETRY
Section 2.6: Proving Statements about Angles

Name KEY
Date _____ **Period** _____

1. Solve for each variable.



$15y + 5(2y - 3) = 180$

$15y + 10y - 15 = 180$

$25y - 15 = 180$

$25y = 195$

$y = 7.8$

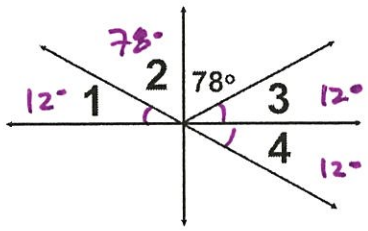
$x + 44 + 4x - 19 = 180$

$5x + 25 = 180$

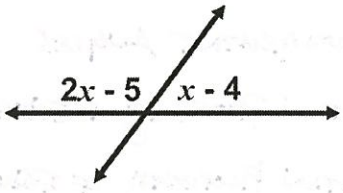
$5x = 155$

$x = 31$

2. Find the measure of the angles in the Diagram that $\angle 1$ and $\angle 2$ are complementary and $\angle 1 \cong \angle 3 \cong \angle 4$.



3. Solve for the value of x.



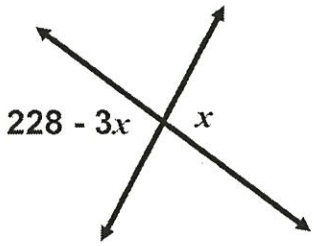
$2x - 5 + x - 4 = 180$

$3x - 9 = 180$

$3x = 189$

$x = 63$

4. Solve for the value of x.



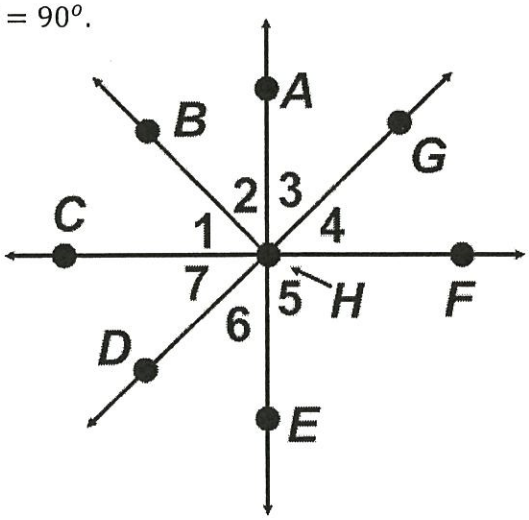
$228 - 3x = x$

$228 = 4x$

$57 = x$

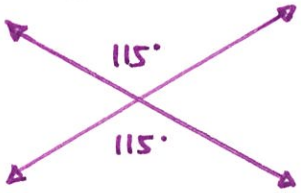
Complete the statement given that $m\angle BHD = m\angle CHE = m\angle EHF = 90^o$.

5. $If\ m\angle 3 = 42^o, then\ m\angle 6 =$ 42° (VERTICAL ANGLES)
6. $If\ m\angle BHE = 142^o, then\ m\angle 1 =$ 52°
7. $If\ m\angle 1 = 37^o, then\ m\angle 6 =$ 37°
8. $If\ m\angle EHG = 132^o, then\ m\angle 7 =$ 42°
9. $If\ m\angle 7 = 51^o, then\ m\angle 3 =$ 39°
10. $If\ m\angle EHB = 153^o, then\ m\angle 2 =$ 27°

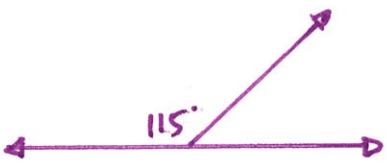


Make a sketch of the given information. Label all angles which can be determined.

11. Vertical angles which measures 115°.

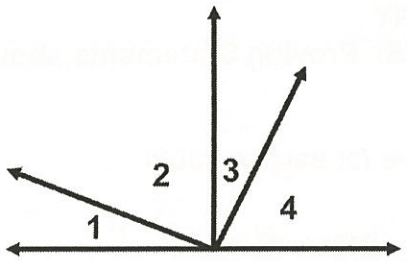


12. A linear pair where one angle measures 115°.



13. Given: $\angle 1$ and $\angle 2$ are complementary
$\angle 1 \cong \angle 3$
$\angle 2 \cong \angle 4$

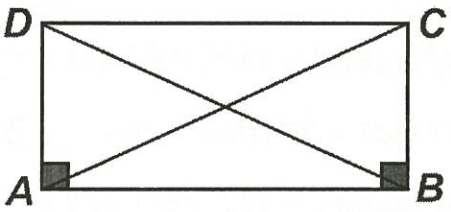
Prove: $\angle 3$ and $\angle 4$ are complementary



	Statements		Reasons
1.	$\angle 1$ and $\angle 2$ are complementary	1.	GIVEN
2.	$m\angle 1 + m\angle 2 = 90^o$	2.	DEF. OF COMPLEMENTARY ANGLES
3.	$\angle 1 \cong \angle 3$	3.	GIVEN
4.	$m\angle 1 = m\angle 3$	4.	DEF. OF CONGRUENT ANGLES
5.	$\angle 2 \cong \angle 4$	5.	GIVEN
6.	$m\angle 2 = m\angle 4$	6.	DEF. OF CONGRUENT ANGLES
7.	$m\angle 3 + m\angle 2 = 90^o$	7.	SUBSTITUTION PROPERTY OF EQUALITY
8.	$m\angle 3 + m\angle 4 = 90^o$	8.	SUBSTITUTION PROPERTY OF EQUALITY
9.	$\angle 3$ and $\angle 4$ are complementary	9.	DEF. OF COMPLEMENTARY ANGLES

14. Given: $\angle DAB$ and $\angle ABC$ are right angles
$\angle ABC \cong \angle BCD$

Prove: $\angle DAB \cong \angle BCD$

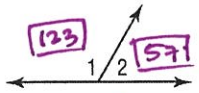


	Statements		Reasons
1.	$\angle DAB$ and $\angle ABC$ are right angles	1.	GIVEN
2.	$\angle DAB \cong \angle ABC$	2.	ALL RIGHT ANGLES ARE CONGRUENT
3.	$\angle ABC \cong \angle BCD$	3.	GIVEN
4.	$\angle DAB \cong \angle BCD$	4.	TRANSITIVE PROPERTY OF CONGRUENCE

Proving Angle Relationships

Find the measure of each numbered angle.

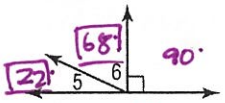
1. $m\angle 2 = 57$



$m\angle 1 = 180 - 57$

$m\angle 1 = 123°$

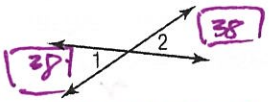
2. $m\angle 5 = 22$



$m\angle 6 = 90° - 22°$

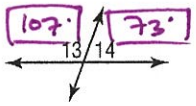
$m\angle 6 = 68°$

3. $m\angle 1 = 38$



$m\angle 2 = 38°$

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



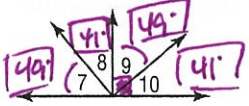
$m\angle 13 + m\angle 14 = 180$

$4x + 11 + 3x + 1 = 180$

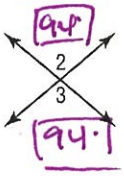
$7x + 12 = 180$

$x = 24$

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



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



$m\angle 2 = m\angle 3$

$4x - 26 = 3x + 4$

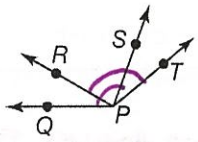
$x = 30$

7. Complete the following proof.

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

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

Proof:



Statements	Reasons
a. $\angle QPS \cong \angle TPR$	a. GIVEN
b. $m\angle QPS = m\angle TPR$	b. DEF. OF CONGRUENT ANGLES
c. $m\angle QPS = m\angle QPR + m\angle RPS$ $m\angle TPR = m\angle TPS + m\angle RPS$	c. ANGLE ADDITION POSTULATE
d. $m\angle QPR + m\angle RPS = m\angle TPS + m\angle RPS$	d. Substitution
e. $m\angle QPR = m\angle TPS$	e. SUBTRACTION PROPERTY OF EQUALITY
f. $\angle QPR \cong \angle TPS$	f. DEF. OF CONGRUENT ANGLES

Deductive Reasoning

Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

1. Given: If a point is the midpoint of a segment, then it divides the segment into two congruent segments. R is the midpoint of $\overline{QS}$
Conclusion: $\overline{QR} \cong \overline{RS}$.

P q P q

LAW OF DETACHMENT

2. Given: If a point is the midpoint of a segment, then it divides the segment into two congruent segments. $\overline{AB} \cong \overline{BC}$
Conclusion: B divides $\overline{AC}$ into two congruent segments.

P q q

NOT VALID

Use the Law of Syllogism to draw a valid conclusion from each set of statements, if possible. If no valid conclusion can be drawn, write *no valid conclusion*.

3. If two angles form a linear pair, ~~then the two angles are supplementary~~.
~~If two angles are supplementary~~, then the sum of their measures is 180.

IF TWO ANGLES FORM A LINEAR PAIR, THEN THE SUM OF THEIR MEASURE IS 180.

4. If a hurricane is Category 5, ~~then winds are greater than 155 miles per hour~~.
~~If winds are greater than 155 miles per hour~~, then trees, shrubs, and signs are blown down.

IF A HURRICANE IS CATEGORY 5, THEN TREES, SHRUBS, AND SIGNS ARE BLOWN DOWN.

Draw a valid conclusion from the statements, if possible. Then state whether your conclusion was drawn using the Law of Detachment or the Law of Syllogism. If no valid conclusion can be drawn, write *no valid conclusion* and explain your reasoning.

5. Given: If a whole number is even, then its square is divisible by 4.
The number I am thinking of is an even number.

P q P

LAW OF DETACHMENT

ITS SQUARE IS DIVISIBLE BY 4.

6. BIOLOGY If an organism is a parasite, ~~then it survives by living on or in a host~~ organism. ~~If a parasite lives in or on a host organism~~, then it harms its host. What conclusion can you draw if a virus is a parasite?

LAW OF SYLLOGISM

IF AN ORGANISM IS A PARASITE, THEN IT HARMS ITS HOST