Chapter 2 Notes – Segments and Angles Name____________________________________
Basic Geometry

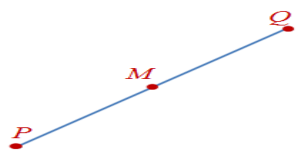
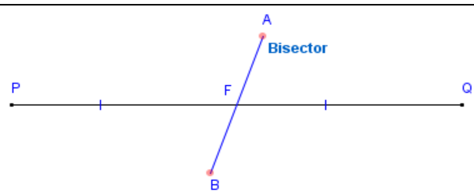
2.1 Segment Bisectors

Goal: Bisect a segment. Find the coordinates of the midpoint of a segment.

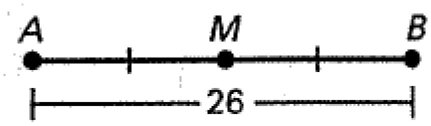
Midpoint: A point that divides a segment into ____

Segment Bisector: a segment, ray, line, or plane that intersects a segment at the ____________________

Bisect: to divide into ____ or to _________________________

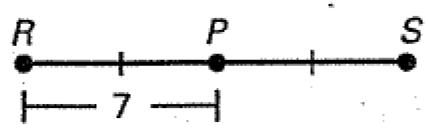
	**__________ is the midpoint of _____________**
	**_________ is a bisector of ________________**

Example 1: M is the midpoint of $\overline{AB}$. Find AM and MB.



AM = _________ MB = _________

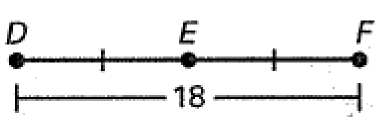
Example 2: P is the midpoint of $\overline{RS}$. Find PS and RS.



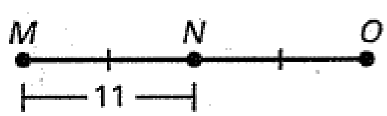
PS = _________ RS = ________

How is example 1 different from example 2?

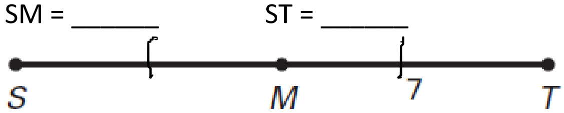
a) DE = _____ EF = _____



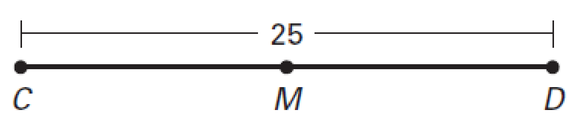
b) NO = _______ MO = _______



c) SM = ______ ST = ______



d) CM = ______ MD = _______

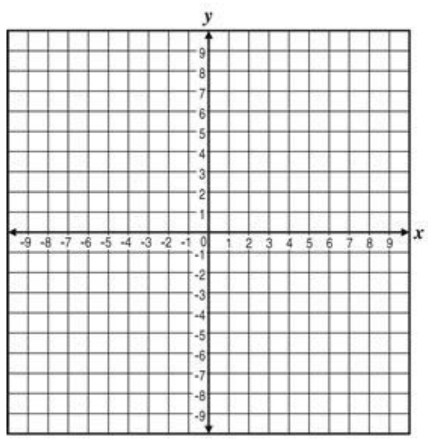


The Midpoint Formula	
The coordinates of the midpoint are the _________________ of the x-coordinates and the y-coordinates of the endpoints.	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Plot the coordinates, then use the midpoint formula to find the coordinates of the midpoint.

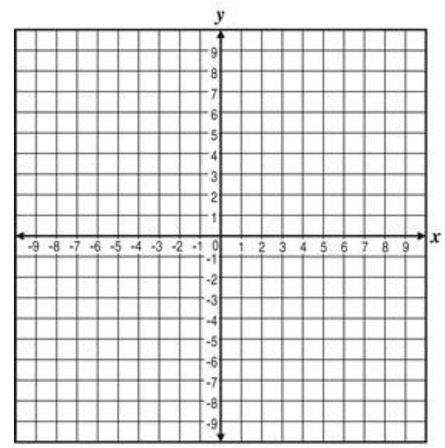
a) $(1, 2)\ and\ \ (7, 4)$

Midpoint: _____________



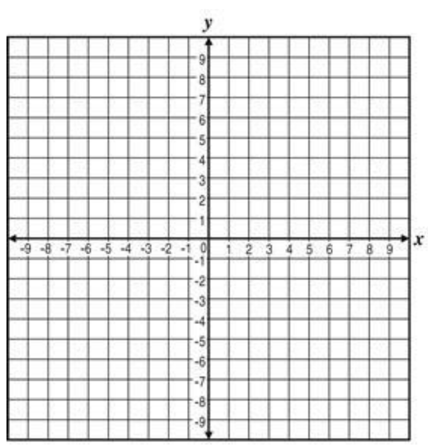
c) $(-2, 3)\ and\ (5, -1)$

Midpoint: _______________



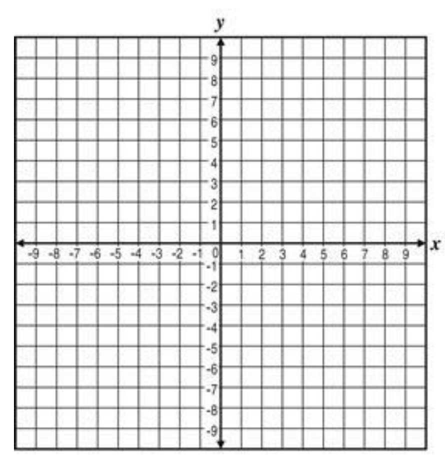
b) $(0, -2)\ and\ (4, 0)$

Midpoint: _______________



d) $(-1, 2)\ and\ (-4, 1)$

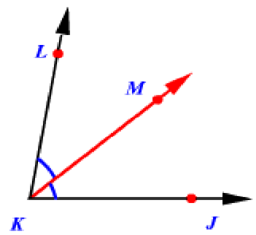
Midpoint: _______________



2.2 Angle Bisectors

Goal: Use properties of angle bisectors to find missing measures.

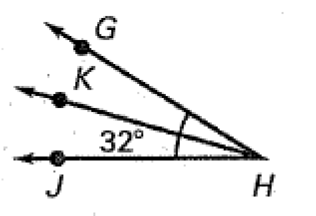
Angle Bisector: is a __________ that divides an angle into two angles that are __________________

	________ bisects ∠________ so ∠________ ≅ ∠_________

$\overrightarrow{HK}$ bisects $\angle GHJ$. Find $m\angle GHK$ and $m\angle KHJ$.

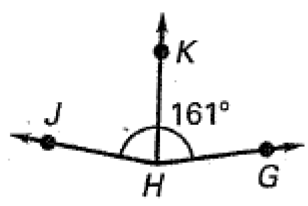
a) $m\angle GHK$ = _______

$m\angle KHJ =$ _______



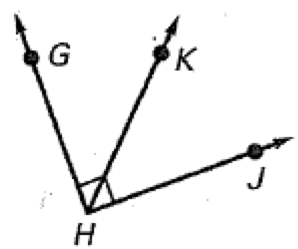
b) $m\angle GHK$= _______

$m\angle KHJ =$ _______



c) $m\angle GHK$ = _______

$m\angle KHJ =$ _______

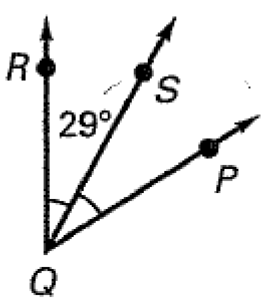


$\overrightarrow{QS}$ bisects $\angle PQR$. Find $m\angle SQP$ and $m\angle PQR$. Then tell whether $\angle PQR$ is acute, right, obtuse, or straight.

a) $m\angle SQP$ = _______

$m\angle PQR =$ _______

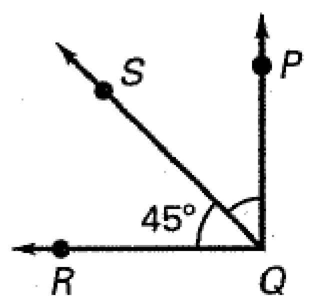
Classify: ______________



b) $m\angle SQP$= _______

$m\angle PQR =$ _______

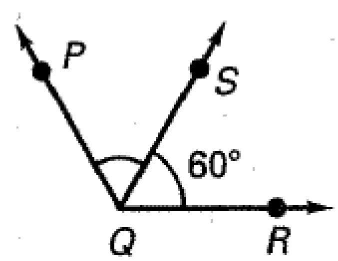
Classify: ______________



c) $m\angle SQP$ = _______

$m\angle PQR =$ _______

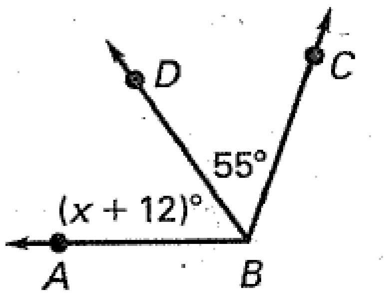
Classify: ____________



$\overrightarrow{BD}$ bisects $\angle ABC$. Find the value of x and then the measure of each missing angle.

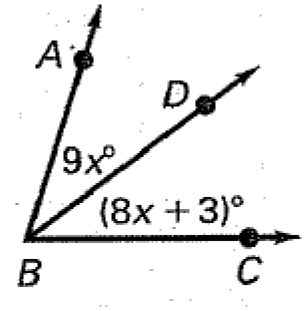
a) x = ______ $m\angle ABD =$ ______

$m\angle ABC =$ ______



b) x = ______ $m\angle DBC =$ ______

$m\angle ABD =$ ______ $m\angle ABC =$ ______



Draw a picture of the situation, then find the indicated information.

a) If $\overrightarrow{SH}$ is the bisector of $\angle TSR$ and $m\angle TSR = 62°$, then what is $m\angle TSH$?

b) $\overrightarrow{RT}$ is the bisector of $\angle ARC$
If $m\angle ART = (\frac{1}{2}x + 24)°$,
and $m\angle TRC = (3x - 46)°$,
then find x and $m\angle ART$.

c) $\overrightarrow{EF}$ is the bisector of $\angle AEC$.
If $m\angle AEF = (5x - 17)°$,
and $m\angle FEC = (3x + 13)°$,
then find x and $m\angle FEC$.

<u>2.3 Complementary and Supplementary Angles</u>

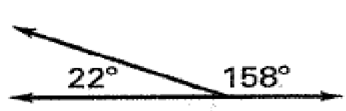
Goal: Find measures of complementary and supplementary angles.

Angle Pairs	
Complementary Angles: two angles whose sum of their measures is _________	
Supplementary Angles: two angles whose sum of their measures is _________	
Adjacent Angles: two angles that share a common vertex and ____________, but have no common interior points.	

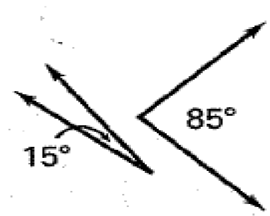
Think of a way to help you remember the difference between complementary and supplementary!

State whether the angles are complementary, supplementary, or neither.

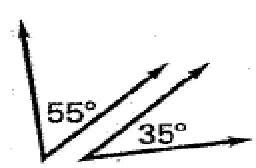
a) ___________________



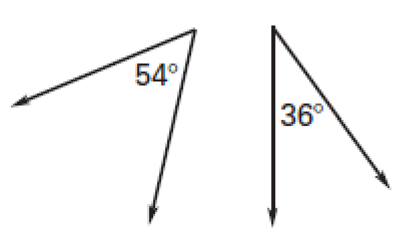
b) _____________________



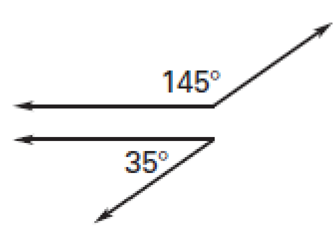
c) _____________________



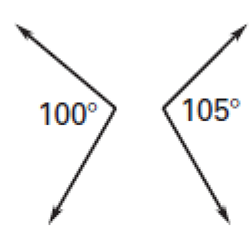
d) ___________________



e) _____________________

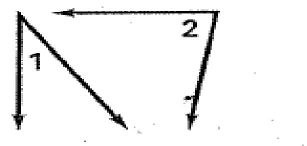


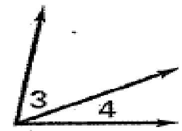
f) ____________________

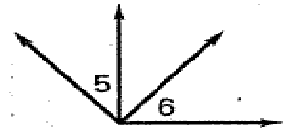


Tell whether the numbered angles are adjacent or nonadjacent.

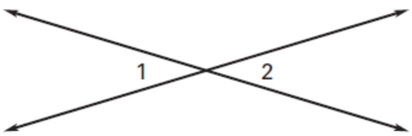
a) ___________________ b) _____________________ c) __________________

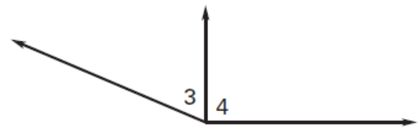






d) ___________________ e) _____________________





Find the complement or supplement of each angle.

a) $m\angle A = 47°$

Complement of $\angle A =$ ______________

b) $m\angle B = 68°$

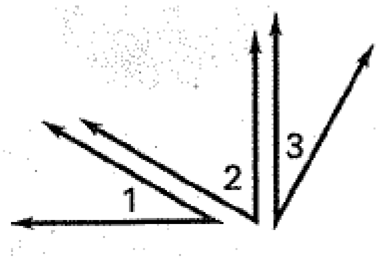
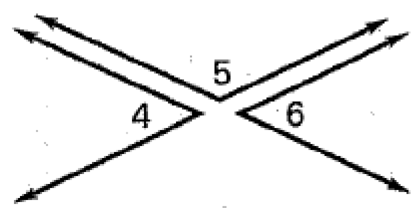
Complement of $\angle B =$ ______________

c) $m\angle C = 133°$

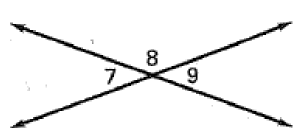
Supplement of $\angle C =$ ______________

d) $m\angle D = 13°$

Supplement of $\angle D =$ ______________

<u>**Congruent Complements Theorem**</u>**:** If two angles are complementary to the same angle, then they are ________________. **Symbols** If $m\angle 1 + m\angle 2 = 90°$ and $m\angle 2 + m\angle 3 = 90°$, then $\angle$__ $\cong \angle$__.	
<u>**Congruent Supplements Theorem**</u>**:** If two angles are supplementary to the same angle, then they are ________________. **Symbols** If $m\angle 4 + m\angle 5 = 180°$ and $m\angle 5 + m\angle 6 = 180°$, then $\angle$__ $\cong \angle$__.	

$\angle 7$ and $\angle 8$ are supplementary, and $\angle 8$ and $\angle 9$ are supplementary. Name a pair of congruent angles. Explain your reasoning.



Solution

$\angle 7$ and $\angle 9$ are both ________________ to $\angle 8$. So, from the Congruent _______________ Theorem, it is true that $\angle$__ $\cong \angle$__.

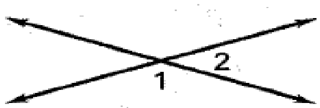
2.4 Vertical Angles

Goal: Find measures of angles formed by intersecting lines.

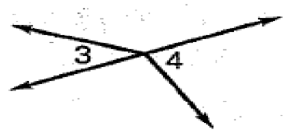
Vertical Angles: two angles that are not ___________________ and their sides are formed by two ________________________ lines	
Linear Pair: two ______________________ angles whose noncommon sides are on the same __________________	

Determine whether the labeled angles are vertical angles, a linear pair, or neither.

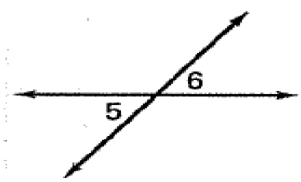
a) ___________________



b) _____________________

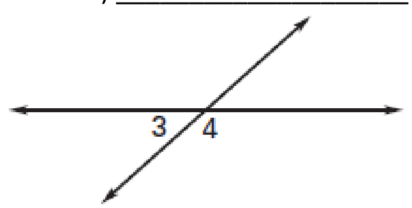


c) __________________

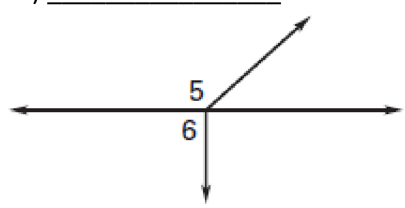


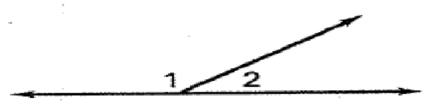
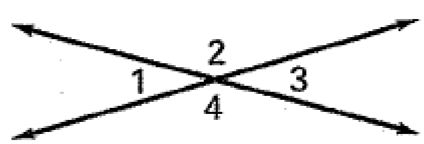
d) ___________________

e) _____________________



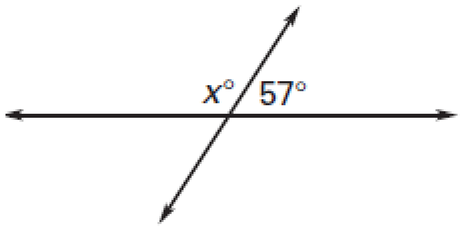
f) _________________



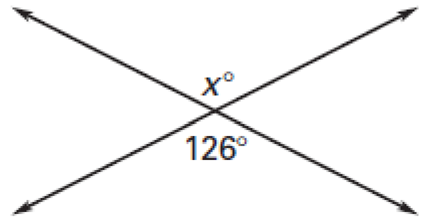
Linear Pair Postulate: If two angles form a linear pair, then they are _________________________. __________ + _________ = _____________	
Vertical Angles Theorem: Vertical angles are ______________________ ________ ≅ _______ and ________ ≅ ________	

Use the linear pair postulate and the vertical angles theorem to find the value of the variable.

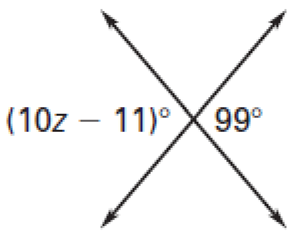
a) Type of Angles: ________________ x = ______



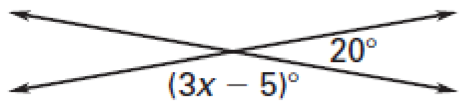
b) Type of Angles: ________________ x =____



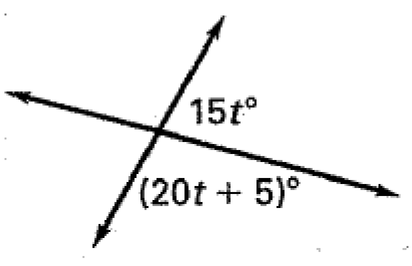
c) Type of Angles: ________________ z = ______



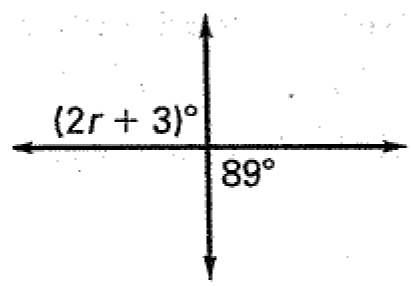
d) Type of Angles: ________________ x =____



e) Type of Angles: ________________ t = ______

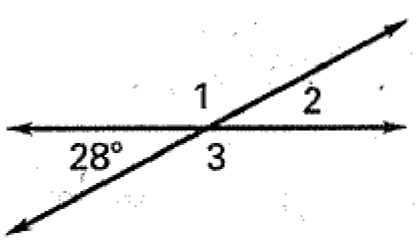


f) Type of Angles: ________________ r =____

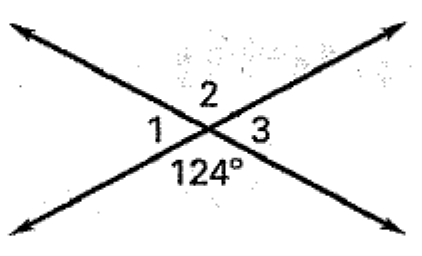


Find the measure of each missing angle.

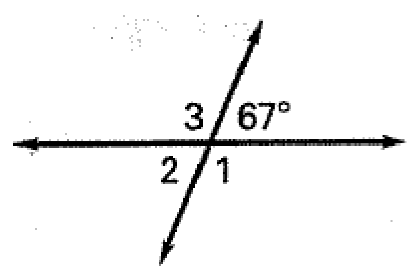
a)



b)



c)



2.5 If-Then Statements and Deductive Reasoning

Goal: Use if-then statements and apply laws of logic.

If-then statement: a statement with two parts: an ____________ part that contains the hypothesis and a ________________ part that contains the conclusion.

Hypothesis: the ________ part of an if-then statement

Conclusion: the _________ part of an if then statement

For each statement, underline the hypothesis and circle the conclusion.

a) If you attend T. F. Riggs High School, then your mascot is the Governors.

b) If it is raining outside, then there are clouds in the sky.

c) If you are in Basic Geometry, then Ms. Blaseg and Ms. Vockrodt are your teachers.

Rewrite each statement as an if-then statement.

a) I will buy the CD if it costs less than $15.

____

b) A right angle measures 90 degrees.

____

c) All games involving zombies are fun to play.

____

d) I will give my dog a treat if she behaves.

____

Follow up: In a sentence that contains a hypothesis and a conclusion, is the conclusion always stated at the end of the sentence? Explain.

Law of Detachment	Law of Syllogism
Law of Detachment: If the hypothesis of a true if-then statement is true, then the conclusion is ________________________	**Law of Syllogism:** If the following two statements are true, then the third statement is ____________________________ If *statement p*, then *statement q*. If *statement q*, then *statement r*. If these statements are true, If *statement p*, then *statement r*. then this statement is true.

What can you conclude from the following statements?

a) If you wash the cotton t-shirt in hot water, then it will shrink. You wash the cotton t-shirt in hot water.

Conclusion: ____

b) If x has a value of 7, then 2x-3 has a value of 11. The value of x is 7.

Conclusion: ____

c) If you study at least 2 hours for the test, then you will pass the test. You study 3 hours for the test.

Conclusion: ____

d) If you participate in class every day Ms. Blaseg will be happy. You participate in class.

Conclusion: ____

Use the Law of Syllogism to write a statement that follows the pair of true statements.

a) If I throw the stick, then my dog will go fetch it.
If my dog fetches the stick, then my dog will bring it back to me.

Conclusion: ____

b) If the juice is knocked over, then it will spill on the carpet.
If the juice spills on the carpet, then it will stain the carpet.

Conclusion: ____

c) If you give a mouse a cookie, he's going to ask for a glass of milk.
If you give him the milk, he'll probably ask for a straw.

Conclusion: ____

2.6 Properties of Equality and Congruence

Goal: Use properties of equality and congruence.

Properties of Equality and Congruence		
Reflexive Property	**Equality** $AB = AB$ $m\angle A =$ ______	**Congruence** $\overline{AB} \cong \overline{AB}$ $\angle A \cong$ ______
Symmetric Property	**Equality** If $AB = CD$, then $CD = AB$. If $m\angle A = m\angle B$, then ______________.	**Congruence** If $\overline{AB} \cong \overline{CD}$, and $\overline{CD} \cong \overline{AB}$. If $\angle A \cong \angle B$, then __________.
Transitive Property	**Equality** If $AB = CD$ and $CD = EF$, then $AB = EF$. If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then ____________.	**Congruence** If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$. If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then __________.

Name the property that each statement illustrates.

a) ___________________________ $DE = DE$

b) ___________________________ If $\angle P \cong \angle Q$ and $\angle Q \cong \angle R$, then $\angle P \cong \angle R$.

c) ___________________________ $\angle P \cong \angle P$

d) ___________________________ If $m\angle S = m\angle T$, then $m\angle T = m\angle S$.

e) ___________________________ If $DF = FG$ and $FG = GH$, then $DF = GH$.

f) ___________________________ If $\angle G \cong \angle Z$, then $\angle Z \cong \angle G$.

Use the property to complete the statement.

Reflexive Property of Equality: $m\angle A =$ ___.

Symmetric Property of Equality: If $EF = GH$, then ____ = ____.

Transitive Property of Equality: If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then ____ = ____.

Reflexive Property of Congruence: ____ $\cong \overline{KL}$

Symmetric Property of Congruence: If $\angle 5 \cong \angle 6$, then ____ $\cong$ ____.

Transitive Property of Congruence: If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then ____ $\cong$ ____.

Properties of Equality		
Addition Property	Adding a number to each side of an equation produces an equivalent equation	Example: If x – 3 = 7, then x = 10
Subtraction Property	Subtracting a number to each side of an equation produces an equivalent equation	Example: If y + 5 = 11, then y = 6
Multiplication Property	Multiplying a number to each side of an equation by the same nonzero number produces an equivalent equation	Example: If 1/4x = 6, then x = 24
Division Property	Dividing a number to each side of an equation by the same nonzero number produces an equivalent equation	Example: If 8x = 16, then x = 2
Substitution Property	Substituting a number to each side of an equation produces an equivalent equation	Example: If x = 7, then 2x + 4 = 2(7) + 4 = 18

Name the property that each statement illustrates.

a) ______________________________ If $m\angle 1 = m\angle 4$, then $m\angle 1 - 30° = m\angle 4 - 30°$.

b) ______________________________ If $LM = NP$, then $2 \cdot LM = 2 \cdot NP$.

c) ______________________________ If $XY = EF$, then $XY + 7 = EF + 7$.

d) ______________________________ If $m\angle A = m\angle B$, then $\frac{m\angle A}{3} = \frac{m\angle B}{3}$.

e) ______________________________ If $CD = 4$, then $CD + 12 = 4 + 12$.

f) ______________________________ If $m\angle S = 45°$, then $m\angle S + 35° = 80°$.

g) ______________________________ If $m\angle K = 9°$, then $3(m\angle K) = 27°$.

h) ______________________________ If $AB = 12$, then $2 \cdot AB + 3 = 2(12) + 3$.