Math 8

Unit 10 - Angles

Extra Help: Thursday, February 28, 7:40am

Wednesday, March 6, 2:40pm

Monday March 11, 7:40am

	Date	Lesson	Topic	Homework
M	2/25	1	Complementary, Supplementary and Vertical Angles	
Т	2/26	2	Complementary, Supplementary and Vertical Angles	
W	2/27	3	Angles Mixed Review	FAMILY CONNECT NIGHT
T	2/28	4	Parallel Lines Angle Relationships and Measures	
F	3/1	5	Parallel Lines Finding an Angle Algebraically	
M	3/4		Quiz	
T	3/5	6	Triangles – Interior Angles	
W	3/6	7	Triangles – Exterior Angles	
T	3/7	8	Triangles – Exterior Angles (Day 2)	
F	3/8	9	Parallel Lines and Triangles	
M	3/11		Review	Please Study!
T	3/12		Test	

Lesson 1 – Complementary, Supplementary and Vertical Angles

Aim: How can I determine the measure of an angle?

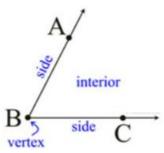
ANGLE REVIEW

VOCABULARY:

An <u>Angle</u> is formed by the intersection of two rays or line segments (called sides) with a common endpoint (called the vertex).

<u>Naming Angles</u>: An angle is named using three letters, where the middle letter corresponds to the vertex of the angle.

The angle at the right may be referred to as <ABC or <CBA.



Types of Angles:

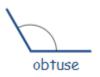
An acute angle has a measure less than 90°



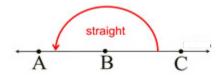
A right angle has a measure of 90°



An obtuse angle has a measure greater than 90^{0} but less than 180^{0}

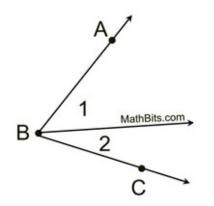


A straight angle has a measure of 180°



There are some special relationships between "pairs" of angles.

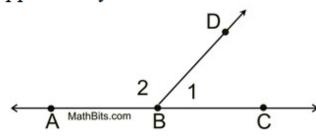
Adjacent Angles are two angles that share a common vertex, a common side, and no common interior points. (They share a vertex and side, but do not overlap.)



∠1 and ∠2 are adjacent angles.

∠ABC and ∠1 are NOT adjacent angles. (∠ABC overlaps ∠1.)

A Linear Pair is two adjacent angles whose non-common sides form opposite rays.

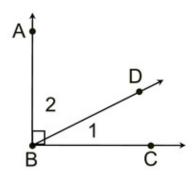


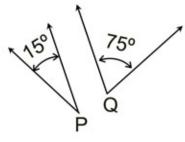
∠1 and ∠2 form a linear pair.

The line through points A, B and C is a straight line.

 $\angle 1$ and $\angle 2$ are supplementary.

Complementary Angles are two angles the sum of whose measures is 90°.



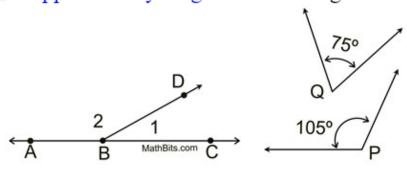


Complementary angles can be placed so they form perpendicular lines, or they may be two separate angles.

 $\angle 1$ and $\angle 2$ are complementary. $\angle P$ and $\angle Q$ are complementary.

 $\overline{AB} \perp \overline{BC}$

Supplementary Angles are two angles the sum of whose measures is 180°.

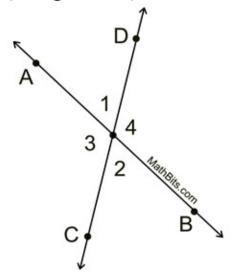


Supplementary angles can be placed so they form a linear pair (straight line), or they may be two separate angles.

 $\angle 1$ and $\angle 2$ are supplementary. $\angle P$ and $\angle Q$ are supplementary.

The line through points A, B and C is a straight line.

 Vertical Angles are two angles whose sides form two pairs of opposite rays (straight lines).



Vertical angles are located across from one another in the corners of the "X" formed by the two straight lines.

∠1 and ∠2 are vertical angles. ∠3 and ∠4 are vertical angles.

Vertical angles are **not** adjacent. $\angle 1$ and $\angle 3$ are not vertical angles (they are a linear pair).

Vertical angles are always equal in measure.

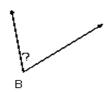
Guided Practice

Exercise 1- Reviewing Complementary Angles

1. Angles A and B are complementary find the measure of angle B.

Show work:

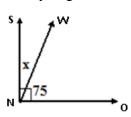




2. Find the measure of the missing angle.

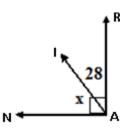
The _____ symbol lets us know these are complementary angles.

Show work:



3. Solve for x.

Show work:



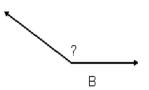
Exercise 2- Reviewing Supplementary Angles

1. Angles A and B are supplementary find the measure of angle B.

The _____ lets us know these are supplementary angles.

Show work:





2. Find the measure of the missing angle.

35° X

The ______ lets us know these are supplementary angles.

Show work:

3. The following is a straight angle.

Name the missing angle _____

G	H	J
•	²³ K	

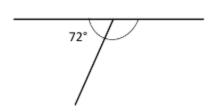
Find the missing angle measure _____

Show work:

Exercise 3- Reviewing Linear Pairs

1. Find the measure of the missing angle.

Show work:



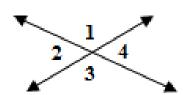
Exercise 4- Reviewing Vertical Angles

1. Given:

$$m \angle 1 = 115^{\circ}$$

 $m \angle 3 = x$

Find the $m \leq 2$

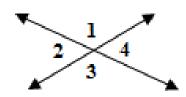


2. Given:

$$m \angle 1 = 126^{\circ}$$

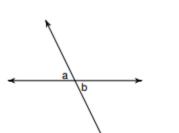
 $m \angle 3 = x$

Find the $m \angle 2$

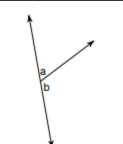


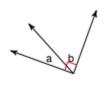
Independent Practice

1. <u>Identify the relationship</u> of the angle pairs: complementary, supplementary, vertical, and/or adjacent.

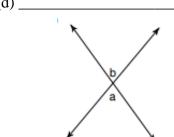


(b) _____ (c) ____

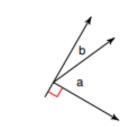


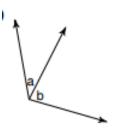


(d)_

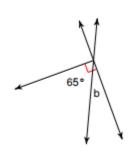


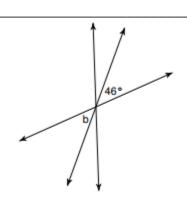
(e) _____ (f) ____

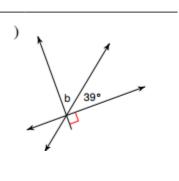


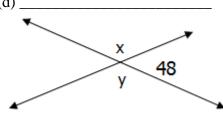


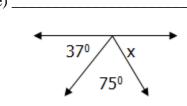
2. Given the diagram below; <u>determine the missing value</u> for the angles.

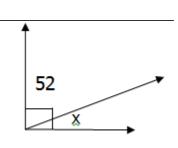




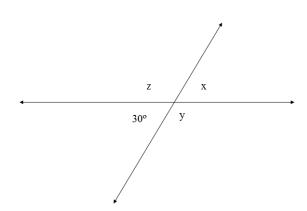








3. (a) Determine the missing angle measurement and <u>explain</u> how you arrived at your answer:



X = _____, Y= _____, Z = _____

because, _____

x° 10° 50°

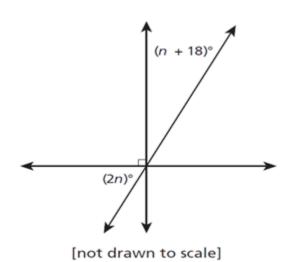
Show your work (equation).

Angle $x = \underline{\hspace{1cm}}$,

because, _____

4. What is the value of n, in the diagram below?

Show your work (equation).



Continued Practice

- 1) Complete the statement: Two parallel lines . . .
 - a) meet at 3 points

c) meet at 1 point

b) meet at 2 points

- d) never meet
- 2) Find the complement of each angle:
 - a) 45° _____

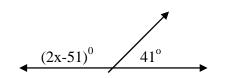
- b) 30° _____
- c) 89° _____

- 3) Find the supplement of each angle:
 - a) 120° _____

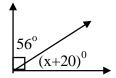
- b) 25° ____
- c) 90° _____

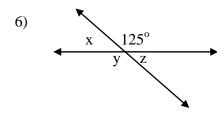
 $\underline{\text{Directions}}$: Determine the number that represents x, y, or z in each diagram below. Show all work to receive full credit for your homework! (Setting up an equation will help)

4)



5)





<u>Lesson 2 – Complementary, Supplementary and Vertical Angles</u>

Aim: How can I determine the measure of an angle?

Warm Up: fill in the following blanks-

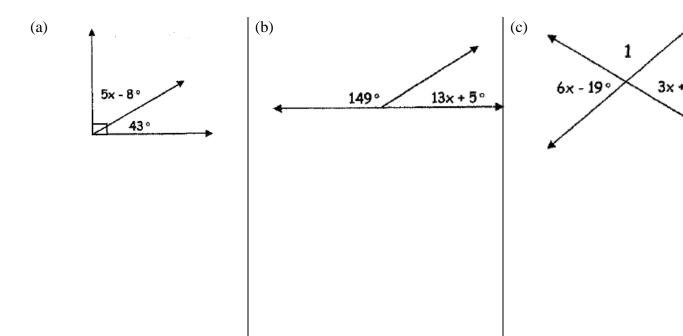
- Vertical angles are _____
- Angles that share a common vertex and a common side are _____ angles
- The measure of complementary angles is _______
- The measure of supplementary angles is _____

Guided Practice:

Exercise 1- Given the information provided below, fill in the table:

Angle	Complement	Supplement	Vertical
43°			
	51°		
		162°	
			13°

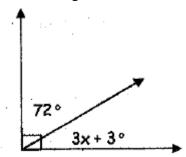
Exercise 2- given the information below, solve for x.



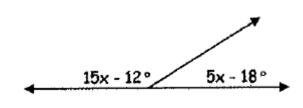
Independent Practice:

1. Solve for x, given the diagram:

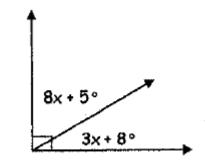
(a)



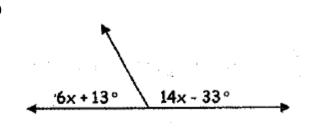
(b)



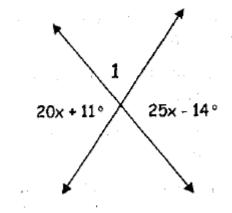
(c)



(d)

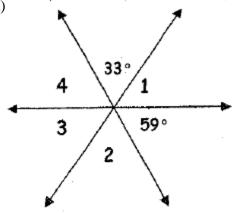


(e)

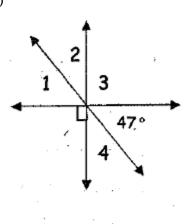


2. Solve for the missing angle values:

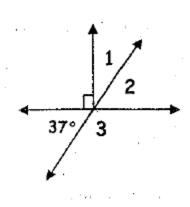
(a)



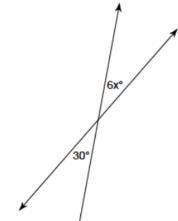
(b)



(c)

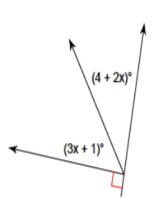


3. Solve for x:



(4 + 5x)°

 $(x + 2)^{\circ}$

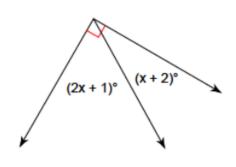


Demonstrate your understanding:

4. The $m \angle A$ is complementary to the $m \angle B$. The $m \angle C$ is complementary to the $m \angle B$. If $m \angle A = 62^\circ$, what is the $m \angle B$ and the $m \angle C$?

5. The $m \angle D$ is supplementary to the $m \angle E$. The $m \angle F$ is supplementary to the $m \angle E$. If $m \angle F = 113^\circ$, what is the $m \angle D$ and the $m \angle E$?

6. Mrs. Flowers gave her students the following problem. Below is the response from one of her students. Do you agree or disagree? **Explain.**



$$2x + 1 + x + 2 = 180$$

$$3x + 3 = 180$$

$$-3 = -3$$

$$3x = 177$$

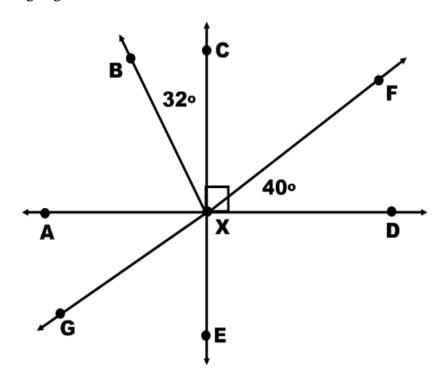
$$3$$

$$x = 59$$

CHALLENGE QUESTION:

Given the diagram below, determine the missing angles:

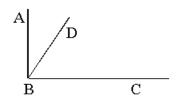
- (a) $m \angle CXF =$
- (b) $m \angle BXA =$
- (c) $m\angle AXG =$
- (d) $m \angle GXE =$
- (e) $m \angle EXD =$



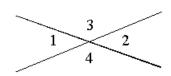
<u>Lesson 3 – Angles Mixed Review</u>

Review Complementary, Supplementary, & Vertical Angles

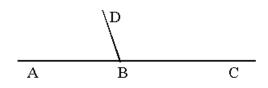
- 1) What is the supplement of a 42° angle? _____
- 2) What is the complement of a 83° angle? _____
- 3) An angle measures 57°, what does a angle vertical to it measure? _____



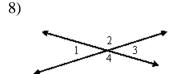
4) If $m < ABD = 35^{\circ}$, what is the m < CBD?



- 5) If angle 3 measures 122°, what does angle 4 measure?
- 6) If angle 3 measures 122°, what does angle 1 measure?



7) If angle DBC measures 108°, what does angle DBA measure?



$$< 1 = 4x - 25$$

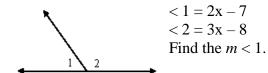
 $< 3 = 2x + 13$
Find the measure of < 1

9)

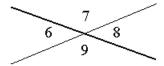
$$< 1 = 2x - 7$$

 $< 2 = 3x - 8$.
Find the measure of < 2

10)



- 11) Which two angles are complementary? _____
- 12) Which two angles are supplementary?



- 13) Name a pair of congruent angles.
- 14) Name a pair of supplementary angles.
- 15) If 2 angles are complementary and one angle is 89°, find its complement.
- 16) If 2 angles are complementary and one angle is 5x°, find its complement.
- 17) If 2 angles are supplementary and one angle is 89°, find its supplement.
- 18) If 2 angles are supplementary and one angle is 5x°, find its supplement._____
- 19) Two complementary angles are in a ratio of 4:11. Find each angle.

20) Two supplementary angles are in a 2:7 ratio. Find the larger angle.

21) Two vertical angles measure 8x + 6 and 4x + 22. Solve for x

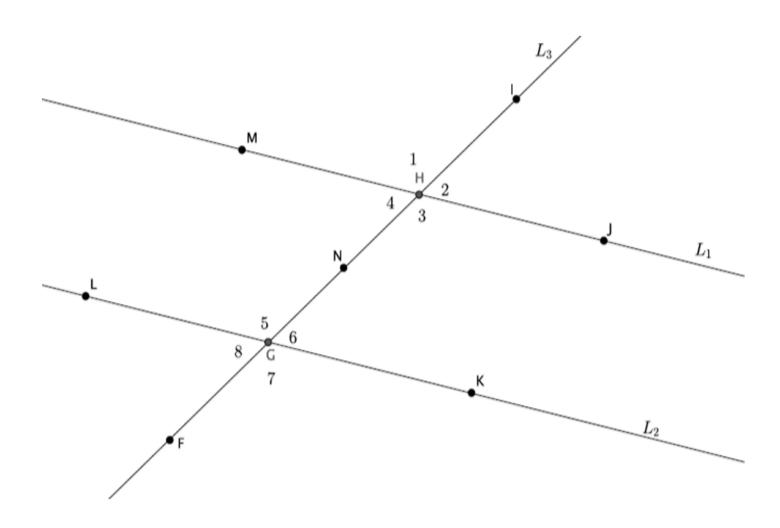
Lesson 4 – Parallel Lines; Angle Relationships and Measures

Aim: What angle relationships exist when a parallel line is cut by a transversal?

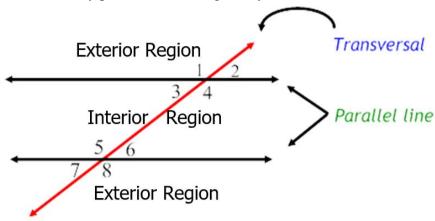
Warm Up: Use the diagram below to list all the pairs of vertical angles. Use the angle numbers (1-8) to list of the vertical angles.

Pairs of Vertical Angles are: < ____ and < ____ ; < ___ and < ____ < ___ and < ____ ; < ___ and < ____

If the measure of $<1 = 125^{\circ}$ and the measure of $<6 = 55^{\circ}$, then find the measure of all the other *six* angles. Write angle measures directly in diagram.



Guided Practice: Angle Pairs formed by parallel lines being cut by a transversal

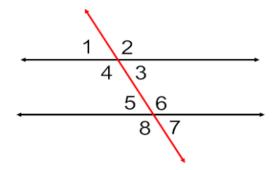


Exercise 1- If $m<1 = 130^{\circ}$, find measure of the following angles:

m<2 _____

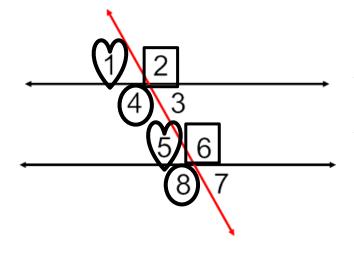
m<3 _____

m<4

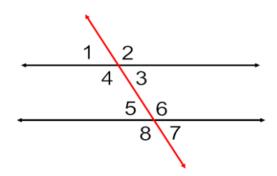


Corresponding Angles:

These angles are congruent angles located on the same side of the transversal. One is in interior region and one is in exterior region at different vertices.



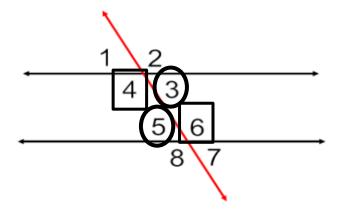
List all pairs of **corresponding angles** below:



Alternate Interior Angles:

These angles are congruent angles located between the parallel lines in the interior region and on opposite sides of the transversal & at different vertices.

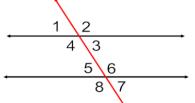
List all pairs of alternate interior angles in the diagram:



Alternate Exterior Angles:

These angles are **congruent angles** located in the **exterior region** and on **opposite sides of the transversal** & at **different vertices.**

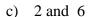
List all pairs of alternate exterior angles in the diagram:



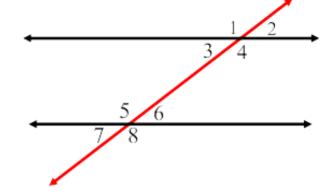
Exercise 2- Name the following relationship between each of the following angle pairs:











- e) 4 and 5
- f) 3 and 7

- g) 4 and 8
- h) 1 and 2

Independent Practice:

1. If the $m<1=60^{\circ}$, find the measure of each of the other angles in the diagram below? Name the angle relationship to <1 that may have been used to determine each angle measurement.

m<2 = _____ b/c they are _____

m<3 = _____ b/c they are _____

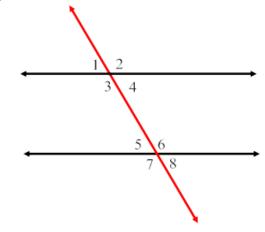
m<4 = _____ b/c they are _____

m<5 = _____ b/c they are _____

m<6 = _____ b/c they are _____

m<7 = _____ b/c they are _____

m<8 = _____ b/c they are _____



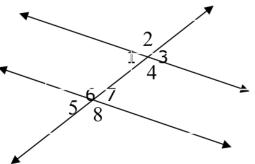
2. Classify each of the angle pairs in the figure as alternate interior, alternate exterior, corresponding, vertical, or supplementary.









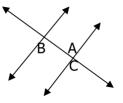


3. Which of the following is true when parallel lines are cut by a transversal?

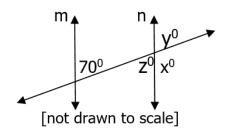
- (1) Vertical angles are supplementary?
- (2) Alternate exterior angles are supplementary
- (3) Alternate interior angles are complementary
- (4) Corresponding angles have the same measure.

4. Which statement is **not true** concerning angles A,B, and C in the diagram shown.

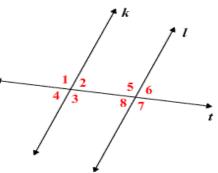
- (1) angle B and angle C are alternate exterior angles
- (2) angle A and angle C are vertical angles
- (3) angle A and angle B are alternate interior angles
- (4) angle B and angle C are corresponding angles



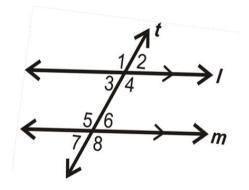
5. Lines m and n are parallel in the figure below. What is the measure of angle x? <u>Explain</u> how you arrived at your answer.



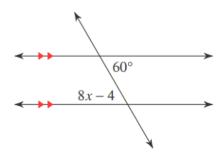
6. In the diagram below, lines k and l are parallel and line t is the transversal. State all the angles that must be congruent to angle 1. Explain your reasoning.



7. Lines l and m are parallel and cut by transversal t. The m<8=115 $^{\circ}$. Find the measure of the other angles in diagram.

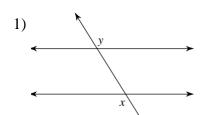


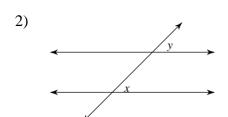
8. Challenge: Solve for *x*

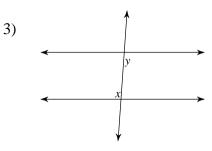


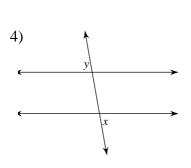
Lesson 4 Homework

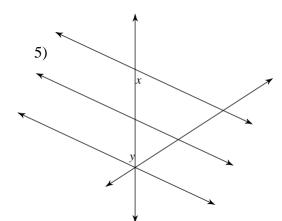
Identify each pair of angles as corresponding, alternate interior, or alternate exterior.

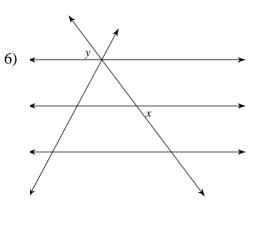




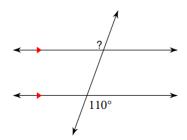


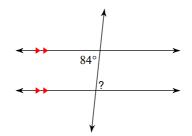


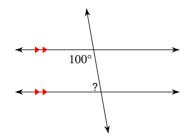


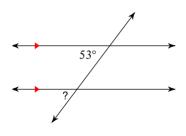


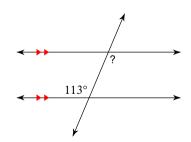
Find the measure of each of the indicated angles:

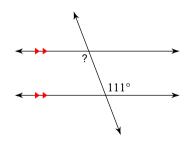












<u>Lesson 5 – Parallel Lines; Finding an Angle Algebraically</u>

Aim: How can we use properties of angle pairs to determine missing angles?

Warm Up: Given the diagram below,

$$\begin{array}{c|c}
 & 1/8 \\
\hline
 & 2/7 \\
\hline
 & 3/6 \\
\hline
 & 4/5
\end{array}$$

If
$$m \angle 7 = 100^{\circ}$$
, then $m \angle 3 =$

If
$$m \angle 3 = 140^{\circ}$$
, then $m \angle 8 =$

If
$$m \angle 7 = 175^{\circ}$$
, then $m \angle 6 =$ _____

If
$$m \angle 4 = 30^{\circ}$$
, then $m \angle 1 = \underline{\hspace{1cm}}$

If
$$m \angle 7 = 120^{\circ}$$
, then $m \angle 5 =$ _____

If
$$m \angle 4 = 40^{\circ}$$
, then $m \angle 2 = \underline{\hspace{1cm}}$

If
$$m\angle 4 = 20^\circ$$
, then $m\angle 7 =$ _____ If $m\angle 7 = 125^\circ$, then $m\angle 4 =$ _____

If
$$m \angle 7 = 125^{\circ}$$
, then $m \angle 4 =$

Guided Practice:

When looking for the value of x or an angle measurement that consists of algebraic expressions in a diagram such as the ones you see on this page, you must set up an equation to answer the problem. To do this, you must know the angle relationship between the angles that you are working with.

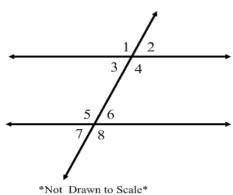
- Are they supplementary (sum to 180°) OR complementary(sum to 90°)?
- Are they congruent to each other? vertical, alternate interior, alternate exterior, or corresponding angles.

If you know the relationship, then you can set up an equation to find the value of x.

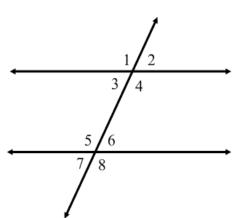
Exercise 1- Based off the diagram below, answer the following questions:

What is the angle relationship between < 4 and < 5?

The m<4 = 5x-10 and the m<5 = 3x + 40. Find the m<5.



a) What is the name of the relationship between Angle 2 and Angle 7?

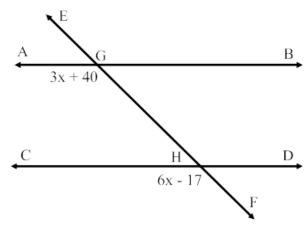


b) The m<2 = 6x and the m<7 = 2x + 40. Find m<7

c) What is m<5? _____

Exercise 3- In the figure below, \overrightarrow{EF} intersects parallel lines \overrightarrow{AB} and \overrightarrow{CD} at G and H.

- a) What is the name of the relationship of $\angle AGH$ and $\angle CHF$?
- b) What is the value of x?



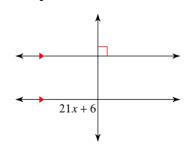
Not Drawn to Scale

- c) What is the $\angle CHF$?
- d) Find the measure of all the other angle?

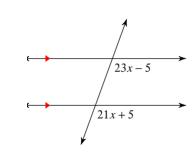
Independent Practice:

1. Given the problems below, solve for x:

(a)



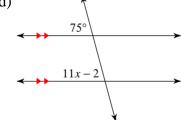
(c)



 $(b) \qquad \qquad -1 + 14x$

12x + 17

(d)



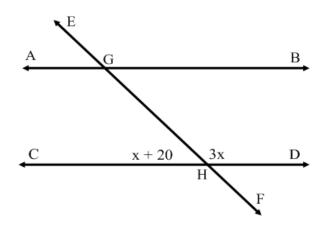
2. In the accompanying diagram, parallel lines \overrightarrow{AB} and \overrightarrow{CD} are intersected \overrightarrow{EF} by at G and H. respectively. m < CHG = x + 20 and m < DHG = 3x.

a)
$$m < CHG =$$

b)
$$m < DHG = ____$$

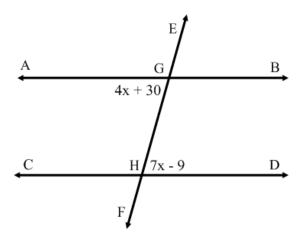
c)
$$m < AGH =$$

d)
$$m < FHD =$$



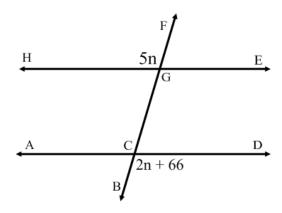
Not Drawn to Scale

3. In the accompanying diagram, parallel lines \overline{AB} and \overline{CD} are intersected by transversal \overline{EF} at G and H, respectively. If m < AGH = 4x + 30 and m < GHD = 7x - 9, what is the value of x?



Not Drawn to Scale

4. In the accompanying diagram, parallel lines \overline{HE} and \overline{AD} are intersected by transversal \overline{BF} at G and C, respectively. If m < HGF = 5n and m < BCD = 2n + 66, what is m < HGF and m < FGE?

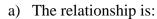


Not Drawn to Scale

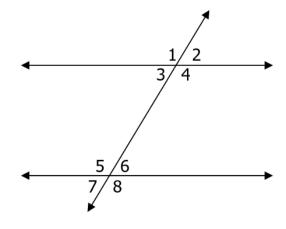
Lesson 5 Homework

<u>Directions</u>: Answer all questions and be sure to show your work to receive credit.

1. Given: m < 3 = 3x + 30 and m < 7 = 5x



b) The equation is:

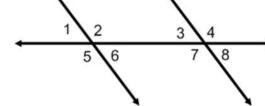


Not Drawn To Scale

c) The measure of angle 3 =

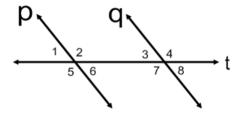
2. If the m < 5 = 5x + 15 and the m < 4 = 6x - 10.

- a) The relationship is:
- b) The equation is



c) The measure of angle 6 =

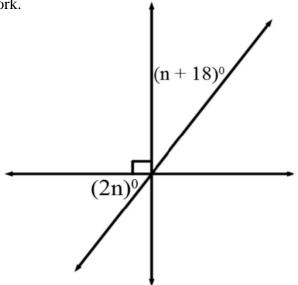
- 3. In the diagram below, lines p and q are parallel. Which angles must be congruent to <3?
 - (1) 8 only
 - (2) 1, 6 and 8 only
 - (3) 1, 2, 4 and 8 only
 - (4) 2, 6, 7, and 8 only



4. What is the value of n in the diagram below? Show all work.



- (2) 24
- (3) 42
- (4) 48



Review: Show all work.

5. Without solving, determine how many solutions for each equation below. Show needed work. If there is **one solution**, **solve the equation completely** and state the solution.

a.)
$$7x + 3 = 2x + 3$$

b.)
$$8(w-4) = 2(4w-16)$$

6. Simplify the following:

$$\frac{x^5x^3}{x^2}$$

<u>Lesson 6 – Triangles – Interior Angles</u>

Aim: How can I classify triangles? / How can I find interior angles?

Warm Up: Which of the following is true when parallel lines are cut by a transversal?

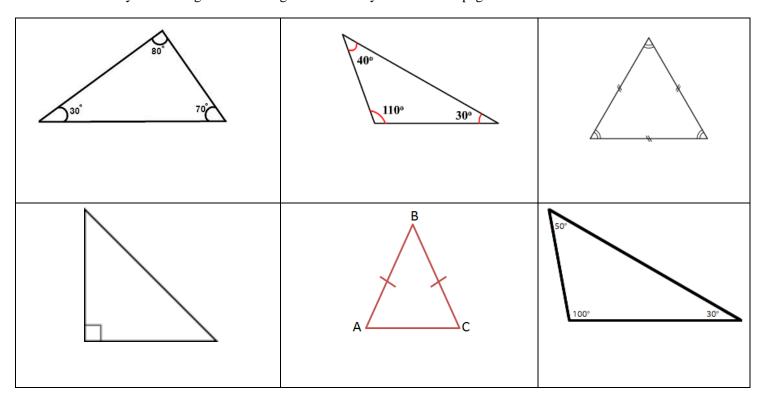
- (5) Vertical angles are supplementary?
- (6) Alternate exterior angles are supplementary
- (7) Alternate interior angles are complementary
- (8) Corresponding angles have the same measure.

Guided Practice:

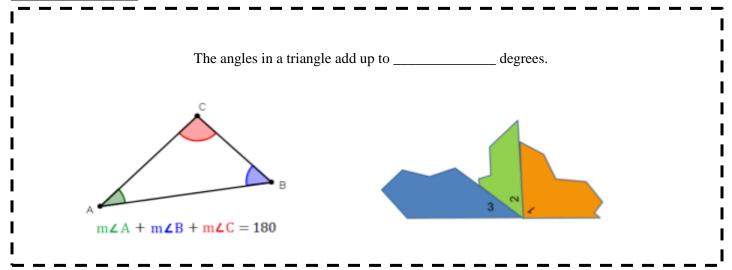
There are many different types of triangles that you may have already learned about.

Types of Triangles Name of Triangle Definition Picture					
Name of Triangle	Definition	<u>Picture</u>			
Equilateral Triangle					
Isosceles Triangle					
Scalene Triangle					
Acute Triangle					
Right Triangle					
Obtuse Triangle					

Exercise 1- Classify each triangle below using the vocabulary from the first page of this handout.

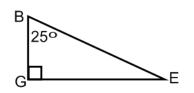


Angles in a Triangle

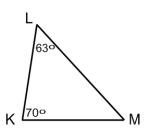


Exercise 1- Show all your work, for the following problems.

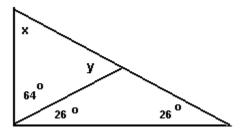
(a) Given the measure of m < EBG = 25, determine the m < BEG..

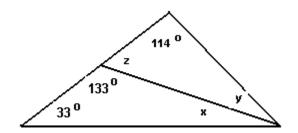


(b) What is the m < LMK?

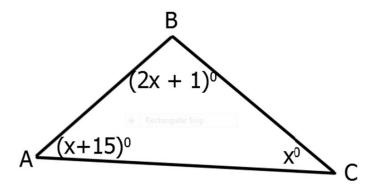


Exercise 2- Solve for all missing angles





Exercise 3- Find the measure of each angle in triangle ABC. Show all work.

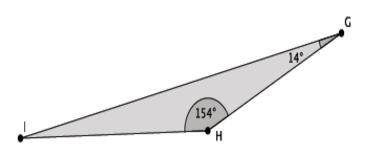


Exercise 4- The measures, in degrees, of the three angles of a triangle are x, x+10, and 2x-6. Find the measure of each angle.

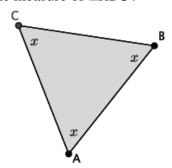
Exercise 5- In $\triangle BED$, the measure of < E is 21 **less than** four times the m < B, and the measure of < D is 1 **more than** five times the measure of < B. Find the measure, in degrees, of each angle of $\triangle BED$.

Independent Practice:

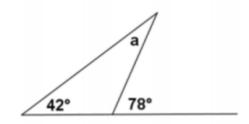
1. Find the measure of < HIG

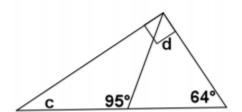


2. What is the measure of $\angle ABC$?

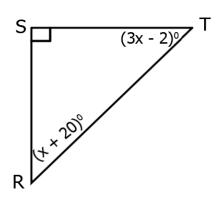


3. Determine the value of the missing angles:





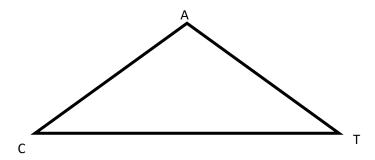
4. Given $\triangle TSR$ is a right triangle, with $\angle T = 3x - 2$, $\angle R = x + 20$. Determine the $m \angle R$ and $m \angle T$.



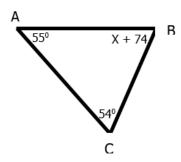
Lesson 6 Homework

Exercise 1- Given right triangle ABC, with $m \angle CAB = 34^{\circ}$, what is the measure of $\angle BCA$

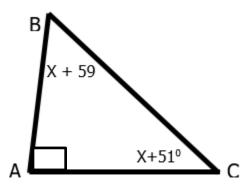
Exercise 2- The triangle below is an isosceles triangle. What is the measure of angle C and angle T if the measure of angle A is 110° ?



Exercise 3- Find the value of x in the triangle below. Then find the measure of angle R



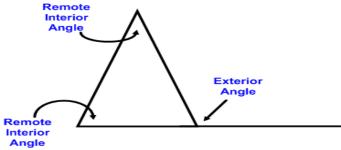
Exercise 5- Find the value of x in the triangle below. Then find the measure of angles B and C.



Lesson 7 – Triangles – Exterior Angles

Aim: What relationship exists between the measure of an exterior angle and the measure of its two remote interior angles?

Discovery: An **interior angle** of a triangle is formed by two sides of the triangle. An **exterior angle** of a triangle is formed by one side of the triangle and the extension of an adjacent side. Each exterior angle has **two** *remote interior angles*. A **remote interior angle** is an interior angle that is not **adjacent (next)** to the exterior angle.



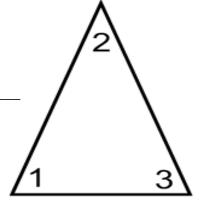
There is a special relationship between the measure of an exterior angle and the measures of its two remote interior angles.

- 1) Extend the base of the triangle to the right and label the exterior angle as < 4.
- 2) The **Triangle Sum Theorem** states:

$$m < 1 + m < 2 + m < 3 =$$

3) < 3 and < 4 are _____ angles

Therefore
$$m < 3 + m < 4 = ____.$$



4) Use the equations in step 2 and step 3 to complete the following equation:

$$m<1+m<2+$$
_____ = ____+ $m<4$

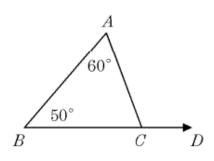
What conclusions can you come up with?

Guided Practice:

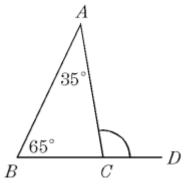
The Exterior Angle Theorem states that the ______ of the two remote _____ angles will

equal the _____ angle.

Exercise 1- In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$. If $m \angle A = 60$ and $m \angle B = 50$, find $m \angle ACD$.



Exercise 2- In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$. If $m \angle A = 35$ and $m \angle B = 65$, find $m \angle ACD$



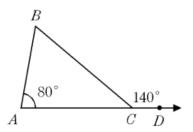
Exercise 3- In the accompanying diagram of $\triangle ABC$, the measure of exterior angle BCD is 110 and $m \angle BAC = 50$. Find $m \angle ABC$

 $\begin{array}{c|c}
B \\
\hline
50^{\circ} \\
\hline
C \\
I
\end{array}$

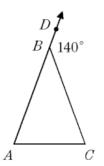
Exercise 4- Given triangle ABC, with \overrightarrow{BC} extended to D, $m \angle A = 20$, $m \angle ACD = 70$, what is the $m \angle B$?

Independent Practice:

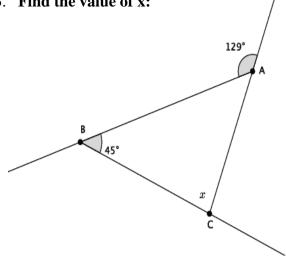
1. In the diagram shown, $m \angle BCD = 140$ and $m \angle BAC = 80$. Find $m \angle ABC$.



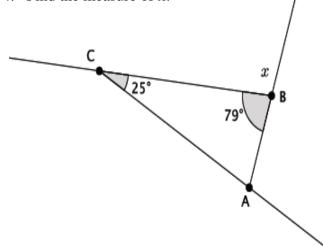
2. In the accompanying diagram of isosceles triangle ABC, $\overline{AB} \cong \overline{CB}$, point D is on \overline{AB} , and $m\angle CBD = 140$. Find $m\angle A$.



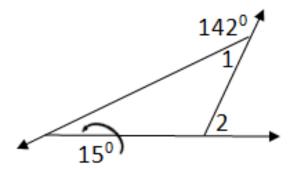
3. Find the value of x:



4. Find the measure of x:



5. Given the diagram below, find the measure of angle 1 and angle 2:



<u>Lesson 8 – Triangles – Exterior Angles (Day 2)</u>

Aim: What relationship exists between the measure of an exterior angle and the measure of its two remote interior angles?

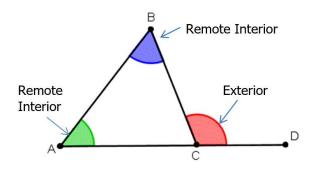
Warm Up: Given triangle DOG, with \overrightarrow{OG} extended to S, $m \angle D = 25$, $m \angle DGS = 68$, what is the $m \angle O$?

Guided Practice:

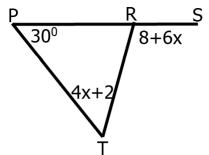
Remember!!!

Exterior Angle Theorem states the sum of the two remote interior angles equals the exterior angle.

$$m < A + m < B = m < BCD$$



Exercise 1- State the angles, using three letter notation then use algebra to solve for x and find the measure of the missing angles.



Exercise 2- State the angles, using three letter notation then use algebra to solve for x and find the measure of

m < *TUA* =_____

the missing angles.

5x+10 589
\
\ /
\ /
\ /
Lx+2 Y U
/ "

 Remote Angles ______ & _____

 Exterior Angle ______

 X = ______

 m < STU = ______</td>

Exercise 3- State the angles, using three letter notation then use algebra to solve for x and find the measure of

the missing angles. C 15x+5 120° 22x+4

D

 Remote Angles ______ & _____

 Exterior Angle ______

 X = ______

 m < DCB = ______</td>

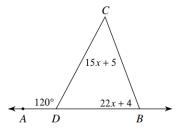
 m < CBD = ______</td>

Explain, in words, how you are able to determine the measure of angle CDB.

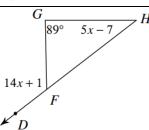
Independent Practice:

Solve for x, and all the angles in the diagram represented by an expression.

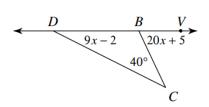
1.



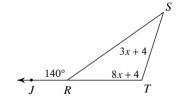
2.

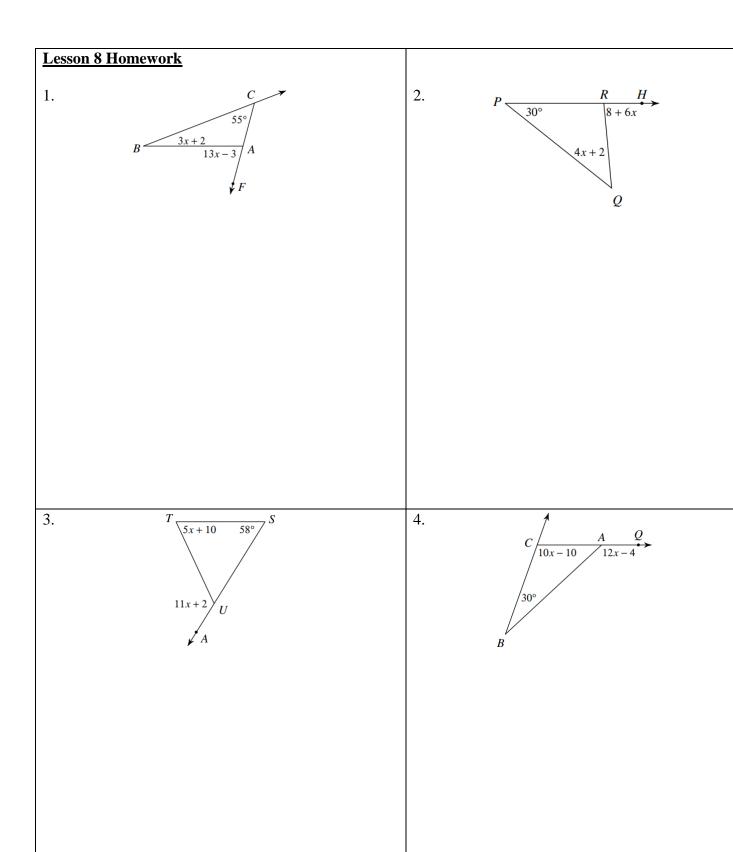


3.



4.





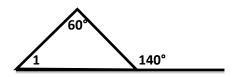
Lesson 9 – Parallel Lines and Triangles

Aim: I can solve problems using properties of parallel lines and triangles

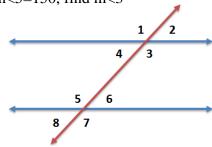
Guided Practice:

Using properties of Parallel Lines and Triangles

1. Find the measure of <1:



2. If m < 5 = 150, find m < 3



- 3) The sum of the interior angles of a triangle is ______ degrees.
- 4) The sum of two supplementary angles is ______ degrees.
- 5) Line a is parallel to line b, find the following:

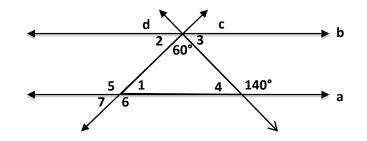
$$m < 1 =$$

$$m < 1 =$$
_____ $m < 5 =$ _____

$$m < 2 =$$
_____ $m < 6 =$ _____

$$m < 6 =$$

$$m < 3 =$$
_____ $m < 7 =$ _____



6) Line b is parallel to line c, if $m \angle 1 = 60^{\circ}$ and $m \angle 3 = 50^{\circ}$, then:

$$m \angle 1 = \underline{\hspace{1cm}}$$

$$m \angle 2 = \underline{\hspace{1cm}}$$

$$m \angle 2 = \underline{\hspace{1cm}} m \angle 9 = \underline{\hspace{1cm}}$$

$$m \angle 3 = \underline{\hspace{1cm}}$$

$$m \angle 3 = \underline{\hspace{1cm}} m \angle 10 = \underline{\hspace{1cm}}$$

$$m \angle 4 = \underline{\hspace{1cm}}$$

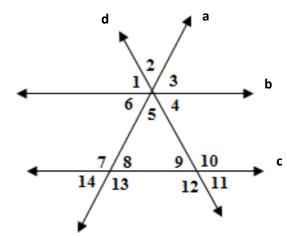
$$m \angle 5 = \underline{\hspace{1cm}} m \angle 12 = \underline{\hspace{1cm}}$$

$$m \angle 6 =$$

$$m \angle 6 = \underline{\hspace{1cm}} m \angle 13 = \underline{\hspace{1cm}}$$

$$m \angle 7 =$$

$$m \angle 7 = \underline{\hspace{1cm}} m \angle 14 = \underline{\hspace{1cm}}$$



7) If Line AB is parallel to line CD, m<5 = 40 and m<4 = 30, find the measures of the other angles in the figure.

$$m \angle 1 = \underline{\qquad} \qquad m \angle 8 = \underline{\qquad}$$
 $m \angle 2 = \underline{\qquad} \qquad m \angle 9 = \underline{\qquad}$

$$m \angle 3 =$$

$$m \angle 3 = \underline{\qquad} \qquad m \angle 10 = \underline{\qquad}$$

$$m \angle 11 = _$$

$$m \angle 7 =$$

8) Given line a is parallel to line b: Find the measures of the following angles:

$$m \angle 1 = \underline{\hspace{1cm}} m \angle 7 = \underline{\hspace{1cm}}$$

$$m \angle 2 = \underline{\hspace{1cm}}$$

$$m \angle 3 =$$

$$m \angle 9 =$$

$$m \angle 4 =$$

$$m \angle 5 = \underline{\hspace{1cm}}$$

$$m \angle 11 = \underline{\hspace{1cm}}$$

$$m \angle 6 =$$

$$m \angle 6 = \underline{\hspace{1cm}} m \angle 12 = \underline{\hspace{1cm}}$$

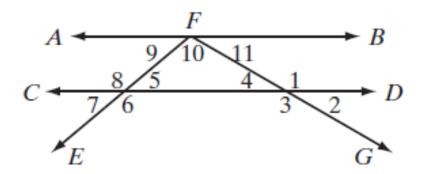
9) Given parallelogram MNOR, if $m \angle 1 = 80^{\circ}$, and $m \angle 2 = 60^{\circ}$, find the measures of all of the other angles if line NR is parallel to line OQ. (Remember opposite angles in a parallelogram are congruent)

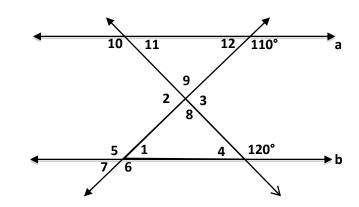
$$m \angle 3 = \underline{\hspace{1cm}} m \angle 7 = \underline{\hspace{1cm}}$$

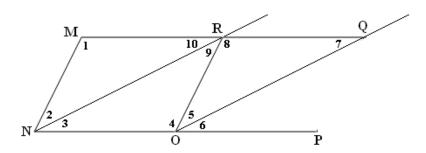
$$m \angle 4 = m \angle 8 =$$

$$m \angle 5 = \underline{\hspace{1cm}} m \angle 9 = \underline{\hspace{1cm}}$$

$$m \angle 6 = \underline{\qquad} \qquad m \angle 10 = \underline{\qquad}$$







Lesson 9 Homework

1) If $m \angle 1 = 70^{\circ}$ and $m \angle 6 = 80^{\circ}$, then:

$$m \angle 1 = _{70}^{\circ}$$

$$m \angle 11 = \underline{30}^{\circ}$$

$$m \angle 2 =$$

$$m \angle 3 =$$

$$m \angle 13 =$$

$$m \angle 4 =$$

$$m \angle 14 = _{___}$$

$$m \angle 5 =$$

$$m \angle 6 = _80^{\circ}$$

$$m \angle 16 = ____$$

$$m \angle 17 =$$

$$m \angle 8 =$$

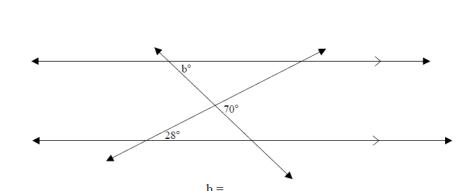
$$m \angle 18 =$$

$$m \angle 9 =$$

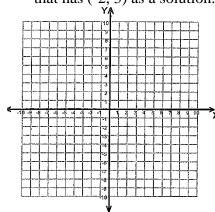
$$m \angle 19 =$$

$$m \angle 10 = \underline{\hspace{1cm}}$$

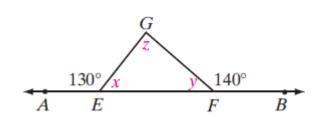
2) Find the measure of angle b:



3) Draw a system of equations that has (-2, 3) as a solution.

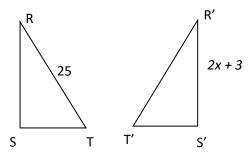


4) Find the measure of angles x, y and z.

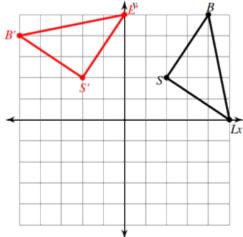


Properties of Transformations

1) $\Delta R'S'T'$ is a reflection of ΔRST . Find the value of x.

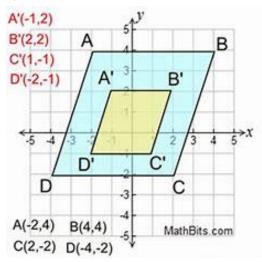


2) Name the specific transformation.



If the length of B'S'=3x + 10 and the length of BS is 160, write an equation that can be used to find the value of x.

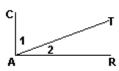
3) Name the transformation. _



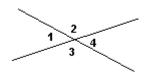
If m < A = 140, and the m < A' = 2x + 30, find the value of x.

Review - Unit 10 Angles

Given: $\overline{CA} \perp \overline{AR}$



1/2

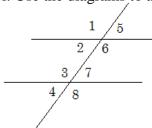


- 1) $m \angle 1 = 56^{\circ}$, find $m \angle 2$.
- 5) $m \angle 2 = 56^{\circ}$, find $m \angle 1$.
- 9) m $\angle 1 = 56^{\circ}$, find angles 2, 3, and 4.

- 2) $m \angle 1 : m \angle 2 = 7 : 2$, find $m \angle 2$.
- 6) $m \angle 1 : m \angle 2 = 4 : 2$, find $m \angle 2$.
- **10**) m $\angle 1 = 3x 20$ and m $\angle 4 = x + 10$, find m $\angle 1$.

- 3) $m \angle 1 = 3x + 15$ and $m \angle 2 = x + 5$, find $m \angle 1$
- 7) $m \angle 1 = x + 30$ and $m \angle 2 = 2x + 30$, find $m \angle 1$.
- 11) $m \angle 2 = 6x + 10$ and $m \angle 3 = x + 30$, find $m \angle 3$.

The following two lines are parallel. Use the diagrams to answer questions 12 - 15.



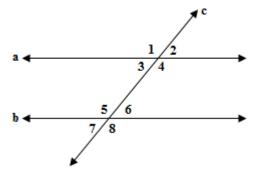
- 12) $\angle 2 = 70^{\circ}$, find $\angle 7$
- 13) $\angle 8 = 105^{\circ} find \angle 3$
- 14) $\angle 6 = 145^{\circ}$, find $\angle 7$

Name the relationship _____

- 15) Name all the angles that are supplementary to $\angle 2$.
- 16) Write the equation would you use to solve for x if <2 = 3x + 10 and <4 = 2x + 3?

Use the diagram below to answer the following questions 17 - 19 if $a \parallel b$.

17) If $m \angle 3 = 3x - 10$ and $m \angle 6 = x + 80$, find x.



18) If $m \angle 2 = 5x$ and $m \angle 6 = x + 20$, find $m \angle 2$.

19) If $m \angle 3 = 3x - 10$ and $m \angle 5 = 2x + 40$, find $m \angle 5$.

20) Which of the following represents a linear equation?

A)
$$y = x^2 - 2x - 8$$

A)
$$y = x^2 - 2x - 8$$
 B) $y = 3x^2 - 6x - 8$ C) $y = 9x^2 - 2$ D) $y = 2x - 8$

C)
$$y = 9x^2 - 3$$

D)
$$y = 2x - 8$$

- 21) What is the image of the point (2, 5) under the translation that shifts (x,y) to (x+3, y-2)?
 - A) (3,5)
- B) (-1, 3)
- C) (5, 2)
- D) (5,3)
- 22) What is the slope for the given points: A (6, -5), B (3, -7)?

A)
$$-\frac{2}{3}$$
 B) $-\frac{3}{2}$ C) $\frac{3}{2}$ D) $\frac{2}{3}$

B)
$$-\frac{3}{2}$$

C)
$$\frac{3}{2}$$

D)
$$\frac{2}{3}$$

- 23) The slope of the line y = 3 is
 - A) Zero Slope
- B) No Slope C) Positive Slope
 - D) Negative Slope
- 24) Which equation is the same as 2x + y = 5

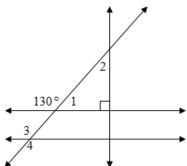
A)
$$y = 2x + 5$$

A)
$$y = 2x + 5$$
 B) $y = 2x - 5$ C) $y = -2x + 5$ D) $y = -2x - 5$

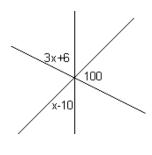
C)
$$y = -2x + 5$$

D)
$$y = -2x - 5$$

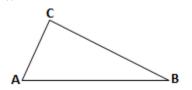
25. In the figure on the right, the horizontal lines are parallel. Find the measure of each angle and explain how you know.



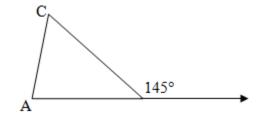
26. Using the diagram to find the value of x.



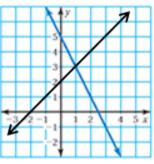
27. Solve for *x* if $m \angle C = (x + 10)^{\circ}$, $m \angle A = (2x - 30)^{\circ}$, and $m \angle B = x^{\circ}$



28. What is the measure of angle A if $m \angle C = 75^{\circ}$?



- **29.** Use the system to the right:
- **A.** Determine the number of solutions.
- **B.** State the solution to the system.
- **C.** Write the equation of each line.



D. Using your answers from part **C**, solve the system algebraically to prove your answer to part **B**.