CCM6+7+ 2015-16

Unit 10 Angle Relationships

Name_____

Teacher_____

Projected Test Date _____

CCM6 Plus/7 Plus – Unit 10: Angle Relationships and Geometric Properties Vocabulary

Acute Angle	An angle that measures less than 90 degrees
Acute Triangle	A triangle whose angles are all less than 90°
Adjacent Angles	Angles that share a vertex and a side but no points in their interiors
Alternate Exterior Angles	Pairs of angles found on the exterior of two lines and on opposite sides of the transversal
Alternate Interior Angles	Pairs of angles found on the interior of two lines and on opposite sides of the transversal
Angle	Two rays meet at an endpoint
Angle Sum Theorem	The sum of the interior angles of any triangle is equal to 180°
Angle Angle Criterion	If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar
Complementary Angles	Two angles whose sum is 90 degrees
Congruent Angles	Angles that have the same measure
Congruent Triangles	Triangles whose corresponding sides are congruent and corresponding angles are congruent - these triangles are the same shape and size
Corresponding	Similar in character, form or function
Corresponding Angles	A pair of angles formed by a transversal and two lines
Deductive Reasoning	To arrive at a conclusion using facts, definitions, rule or properties
Equilateral Triangle	A triangle with three congruent sides
Exterior Angle	An angle formed by a side and the extension of an adjacent side
Intersecting	A single point where two lines meet or cross
Interior Angle	An angle inside a polygon
Isosceles Triangle	A triangle with at least two congruent sides
Line Segment	A straight line with exactly two endpoints
Non-adjacent Angles	Two angles that do not have a common side or a common vertex (not touching)
Obtuse Angle	An angle that measures more than 90 degrees but less than 180
Obtuse Triangle	A triangle with one obtuse angle

Parallel	Side by side lines, surfaces, or objects having the same continuous distance apart
Parallel lines	Lines that lie in the same plane but never intersect
Perpendicular	Intersecting to form right angles
Protractor	An instrument used to measure angles in degrees
Ray	A part of a line with exactly one endpoint
Remote Interior Angles	The remote interior angles are the two angles that are inside the triangle and opposite from the exterior angle
Right Angle	An angle that measures exactly 90°
Right Triangle	A triangle with one right angle
Same Side Interior Angles	Lie on the same side of the transversal between the other two lines
Scalene Triangle	A triangle with no congruent sides
Straight Angle	An angle that measures exactly 180°
Supplementary Angles	Two angles whose sum is 180 degrees
Transversal	A line that cuts through two or more parallel lines
Triangle	A closed figure consisting of three line segments
Triangle Exterior Angle Theorem	The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles
Triangle Sum Theorem	The three angles of any triangle will always total 180^0
Vertical Angles	A pair of non-adjacent angles formed by the intersection of two straight lines; vertical angles are congruent

Acute Angle		
Obtuse Angle		
Straight Angle		
Right Angle		
Reflex Angle		
Acute Triangle		
Obtuse Triangle		
Right Angle		
Complementary Angles		
Supplementary Angles		
Vertical Angles		
Triangle		

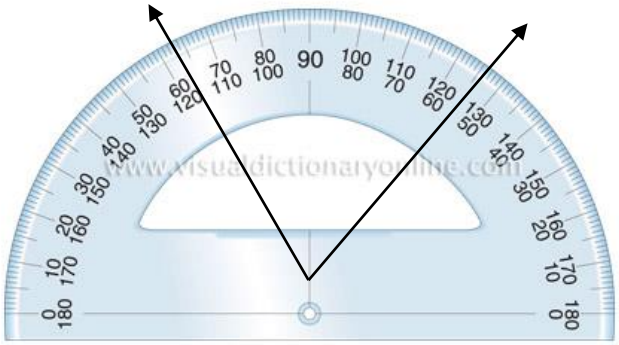
Protractor		
Compass **(in geometry)**		
Scalene Triangle		
Isosceles Triangle		
Equilateral Triangle		
Ray		

Angle		
Line		
Line Segment		
Vertex		
Adjacent Angles		

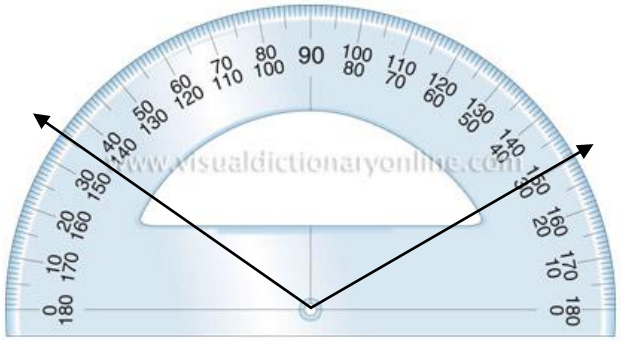
Measuring Angles

Write the measure of each given angle below.

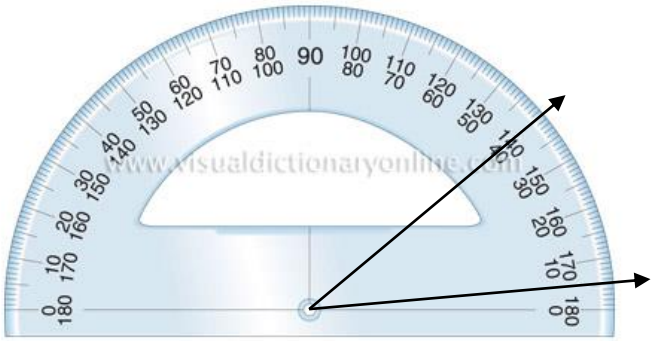
1. Measure = _____



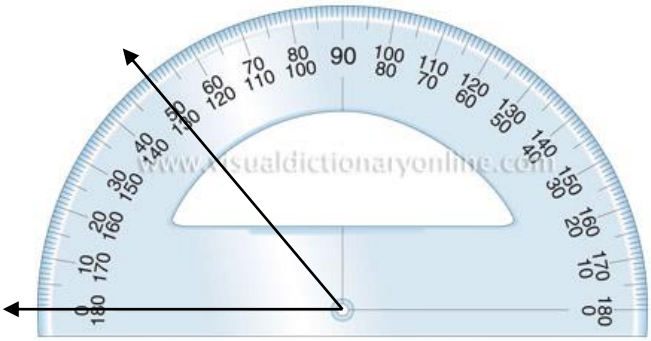
2. Measure = _____



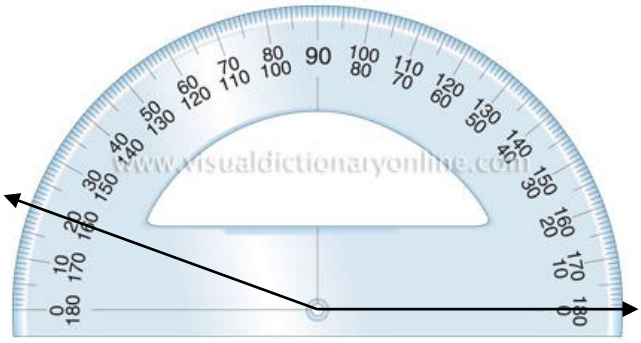
3. Measure = _____



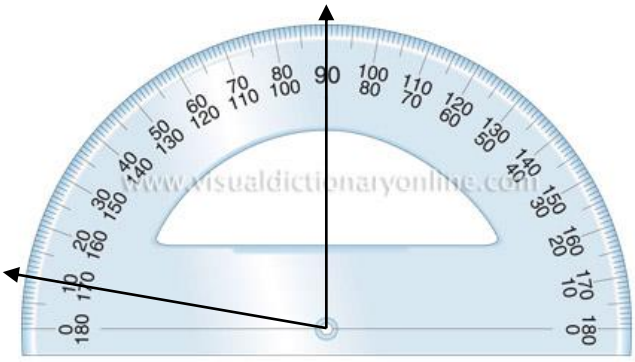
4. Measure = _____



5. Measure = _____



6. Measure = _____

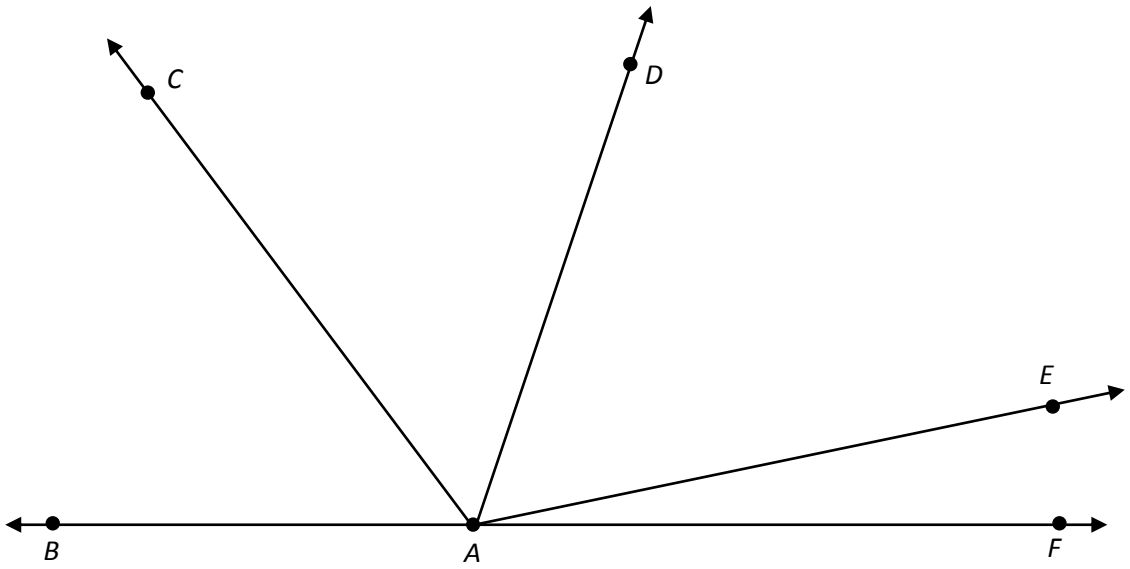


On a separate page, using a protractor, draw the following angles and label them with the given letter as the vertex.

A) 125^0 **B) 30^0** **C) 165^0** **D) a right angle**

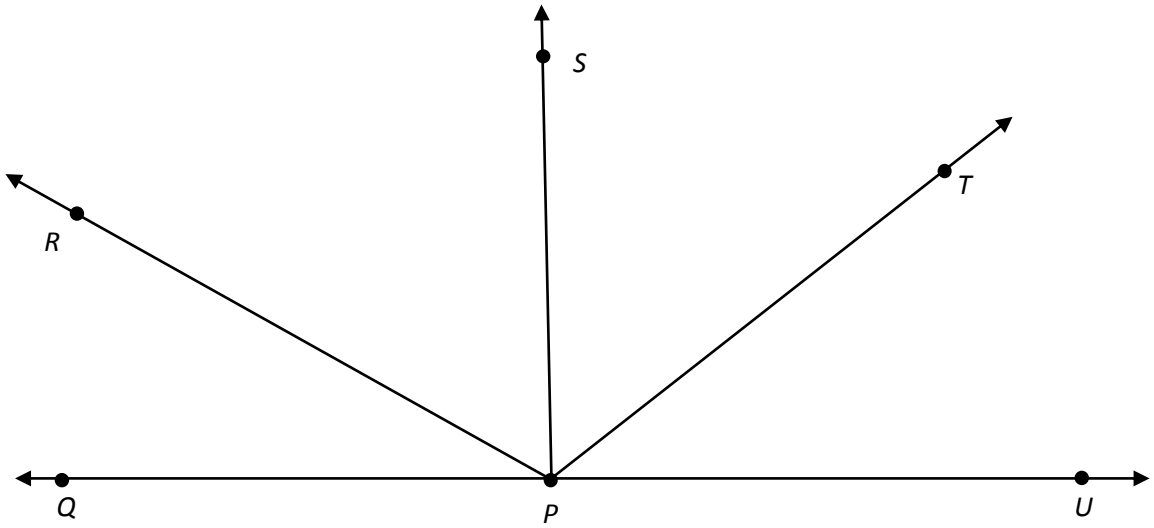
Drawing the angles from the bottom of page 6:

Find the measure of each angle in degrees.



$m\angle CAB$ = _____ $m\angle DAB$ = _____ $m\angle EAB$ = _____

$m\angle CAF$ = _____ $m\angle DAF$ = _____ $m\angle EAF$ = _____



$m\angle RPQ$ = _____ $m\angle SPQ$ = _____ $m\angle TPQ$ = _____

PRACTICE MEASURING ANGLES

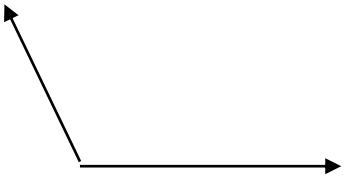
Part 1:

Fill the blank with the appropriate vocabulary word.

1. A(n) _____ angle is an angle that measures less than 90°.
2. A(n) _____ angle is an angle that measures more than 90°.
3. A(n) _____ angle is an angle that measures exactly 90°.

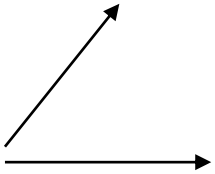
Part 2:

For each angle, first write an estimate measurement, then the actual measurement, and last identify the type of angle.



Estimated Measure:_____
Actual Measure: _____

Type of Angle: _____

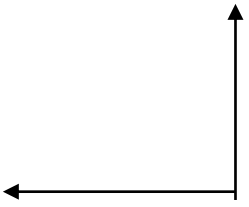


Estimated Measure:_____
Actual Measure: _____

Type of Angle: _____

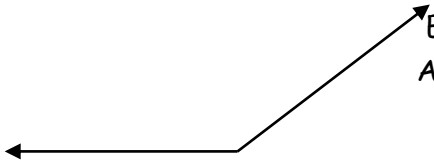
Estimated Measure:_____
Actual Measure: _____

Type of Angle: _____



Estimated Measure:_____
Actual Measure: _____

Type of Angle: _____

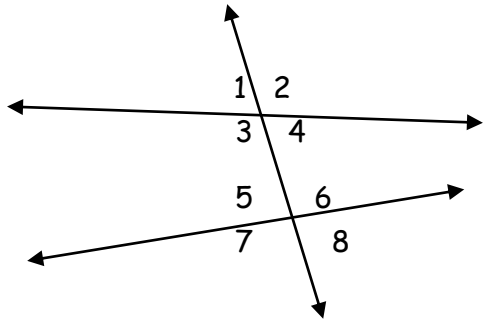


Estimated Measure:_____
Actual Measure: _____

Part 3:

Using the figure below, name the set(s) of angles that are obtuse and the set(s) of angles that are acute.

6.



OBTUSE ANGLES:

_____

ACUTE ANGLES:

_____

Part 4: Reflection

Based on today's vocabulary, what are some things you think that we will study? What are your strengths and weaknesses in this area? How might you plan to study the vocabulary piece of this unit?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

ANGLES

Complementary Angles: _____

_____

Supplementary Angles:_____

_____

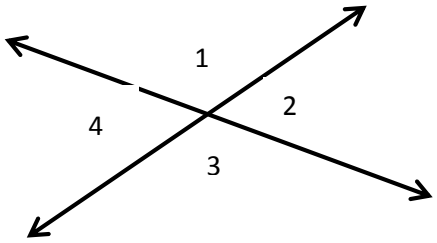
Vertical Angles:_____

_____

Adjacent Angles:_____

_____

Find the missing angles in the following examples. Make sure you tell the reason that you know each measure.



$m\angle 1$ = 120° because given

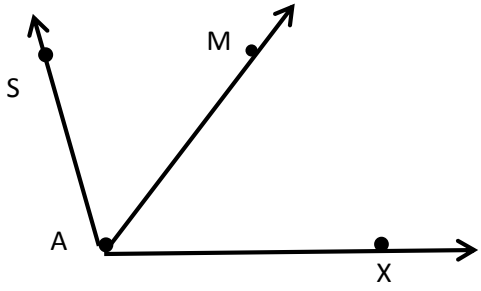
$m\angle 2$ = _____ because _____

$m\angle 3$ = _____ because _____

$m\angle 4$ = _____ because _____

Is there more than one way to solve this? _____Explain:_____

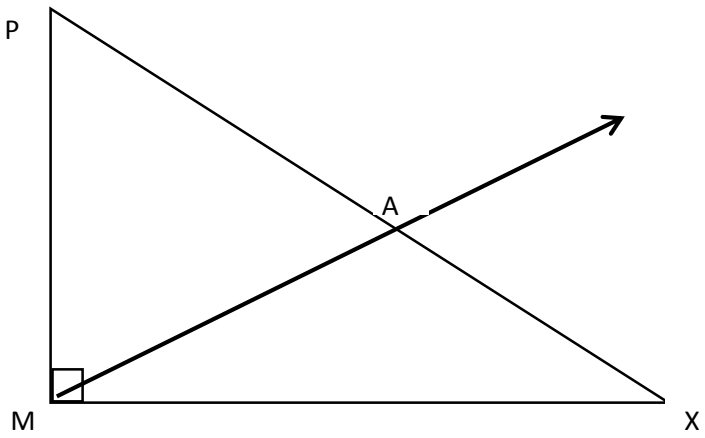
Use what you know to find the angle measures on the following problem.



$m\angle$ SAX is 118^0 and the $m\angle$ MAX is 65^0

Find the measure of $\angle$ SAM

Find the missing measures of all angles below and label them on the drawing.

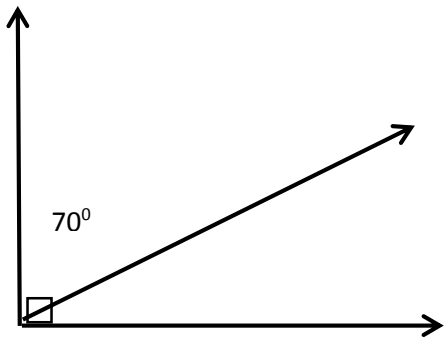


***m*∠ PMA = 65^0 and *m*∠ PAM = 60^0**

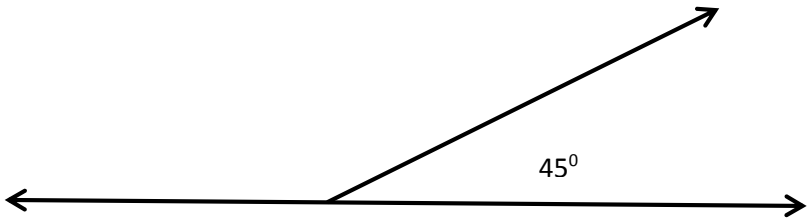
m∠ AMX = _____

m∠ MAX = _____

Find the missing measure below.

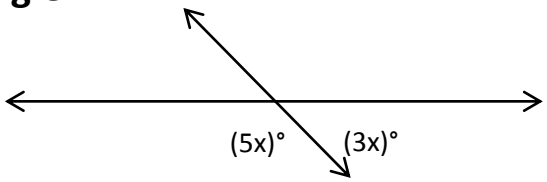


Find the missing measure below.



Challenge. Find the value of x in the diagram. Then find the measure of each angle.

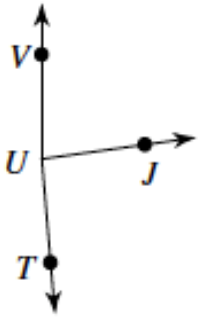
1.



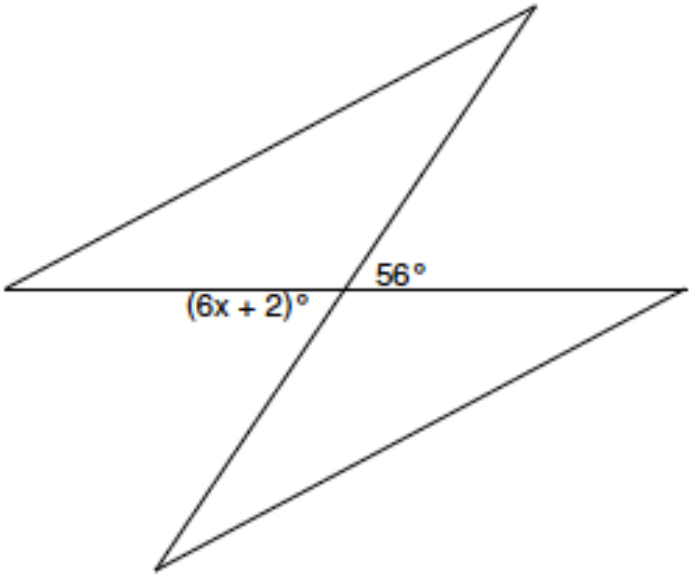
2. $m\angle$ VUT = 175°

$m\angle$ VUJ= 17x – 3,

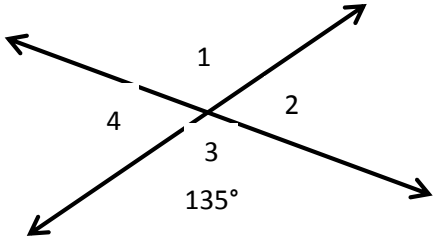
$m\angle$ JUT = 17x + 8. Find x then find the measure of each angle.



3.



Find the missing angles in the following. Make sure you tell the reason that you know each measure.



$m\angle 1$ = 135° because given

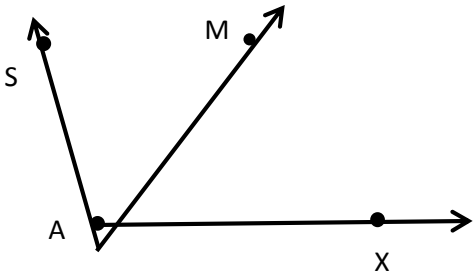
$m\angle 2$ = _____ because _____

$m\angle 3$ = _____ because _____

$m\angle 4$ = _____ because _____

Is there more than one way to solve this? _____Explain:_____

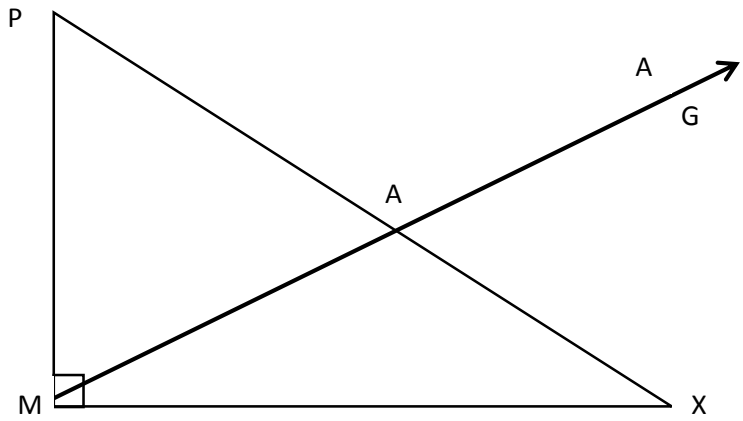
2. Use what you know to find the angle measures on the following problem.



$m\angle SAX$ is 100^0 and the $m\angle MAX$ is 70^0

Find the measure of $\angle SAM$

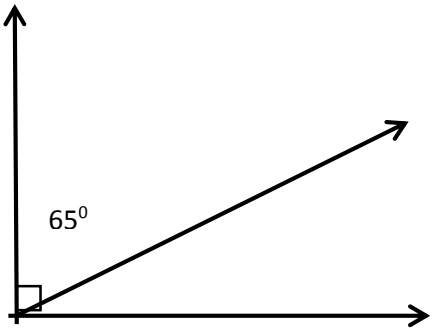
3. Find the missing measures of all angles below and label them on the drawing.



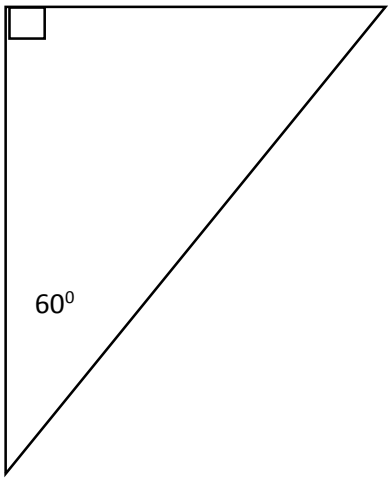
$m\angle AMX = 30^0$ and $m\angle PAG = 100^0$

Find the missing measures below.

4.

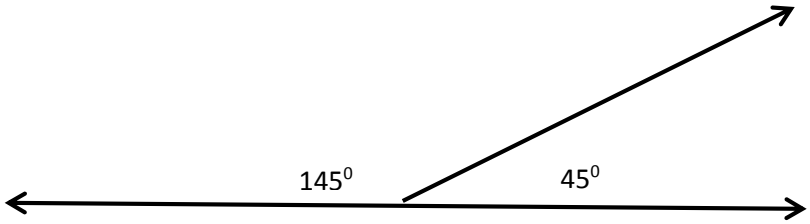


5.

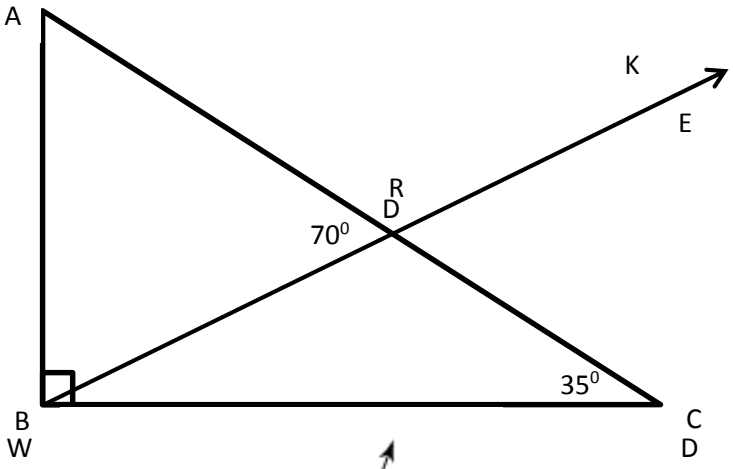


Find the missing measure below.

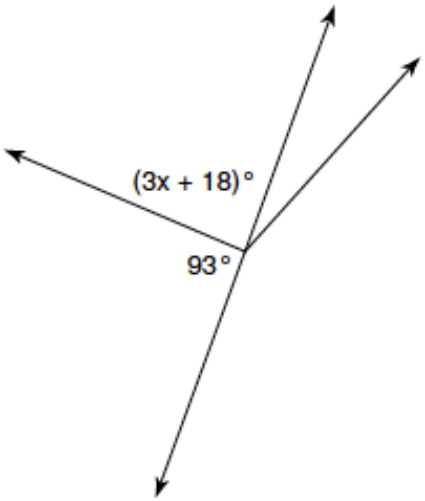
6.



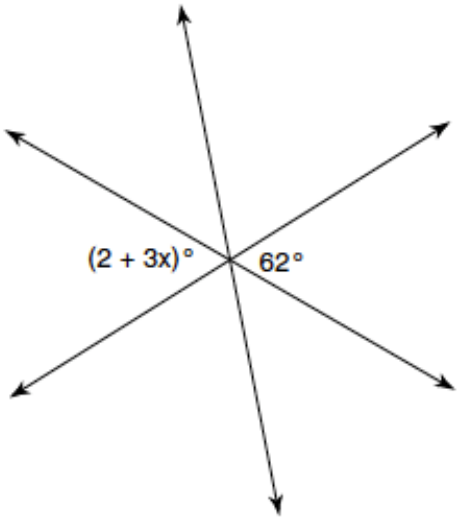
7.



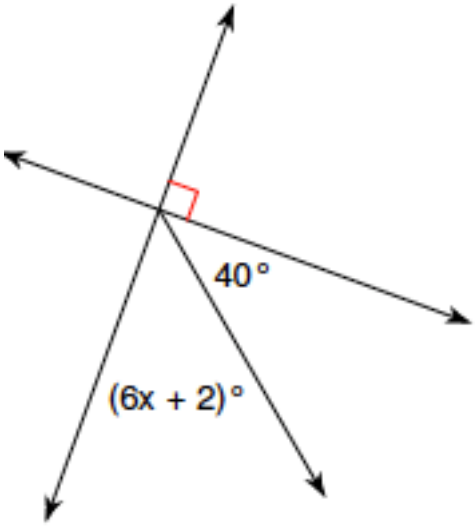
8.



9.



10.



Vocabulary Review: Write in words and draw a diagram to define each of the following words.

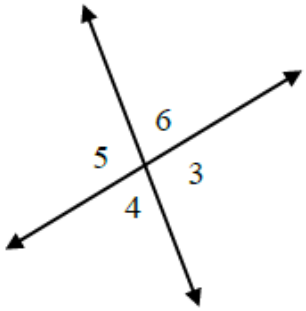
1. Complementary Angles

2. Supplementary Angles

3. Adjacent Angles

4. Vertical Angles

Use the figure to the right to answer the following questions.



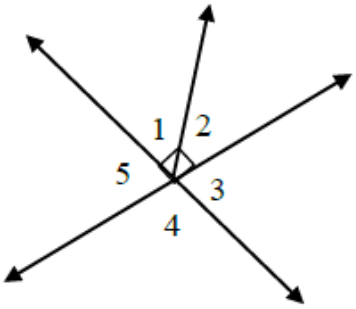
6. If $m\angle 5 = 95°$. *Then* $m\angle 6 =$ _____.

7. If $m\angle 3 = 115°$ then $m\angle 6 =$ _____.

9. If $m\angle 6 = 2x$ *and* $m\angle 4 = 78$, *then* $x =$ _____.

10. $m\angle 5 = 4x + 12$ *and* $m\angle 4 = x + 8$, *then* $x =$ ____. *What is the measure of Angle 5?* _____ *What is the measure of angle 4?* _____

Use the figure below to answer the following questions yes or no?



9. Are $\angle 1$ and $\angle 2$ complementary angles? _____

10. Are $\angle 2$ and $\angle 3$ adjacent angles? _____

11. Are $\angle 2$ and $\angle 4$ vertical angles? _____

12. Are $\angle 5$ and $\angle 3$ vertical angles? _____

13. Are $\angle 3$ and $\angle 4$ supplementary angles? _____

For each given angle find its complement and supplement. If none exists, write "none".

15. $m\angle A = 54°$ comp: _____ supp: _____

16. $m\angle A = 95°$ comp: _____ supp: _____

17. $m\angle A = 90°$ comp: _____ supp: _____

18. $m\angle A = 112°$ comp: _____ supp: _____

For questions 19 – 24 set up and label a diagram, solve for the variable, and then find the angles given.

19. $\angle 1$ and $\angle 2$ are supplementary angles. If $m\angle 1 = 3x + 12$ *and* $m\angle 2 = 7x - 32$, *find* $x, m\angle 1$ *and* $m\angle 2$.

Equation used to solve: _____

x = _____

$m\angle 1$ _____

$m\angle 2$ _____

20. $\angle 1$ and $\angle 2$ are complementary. *If* $m\angle 1 = 6x + 2$ and $m\angle 2 = 4x + 8$, find x, $m\angle 1$ and $m\angle 2$.

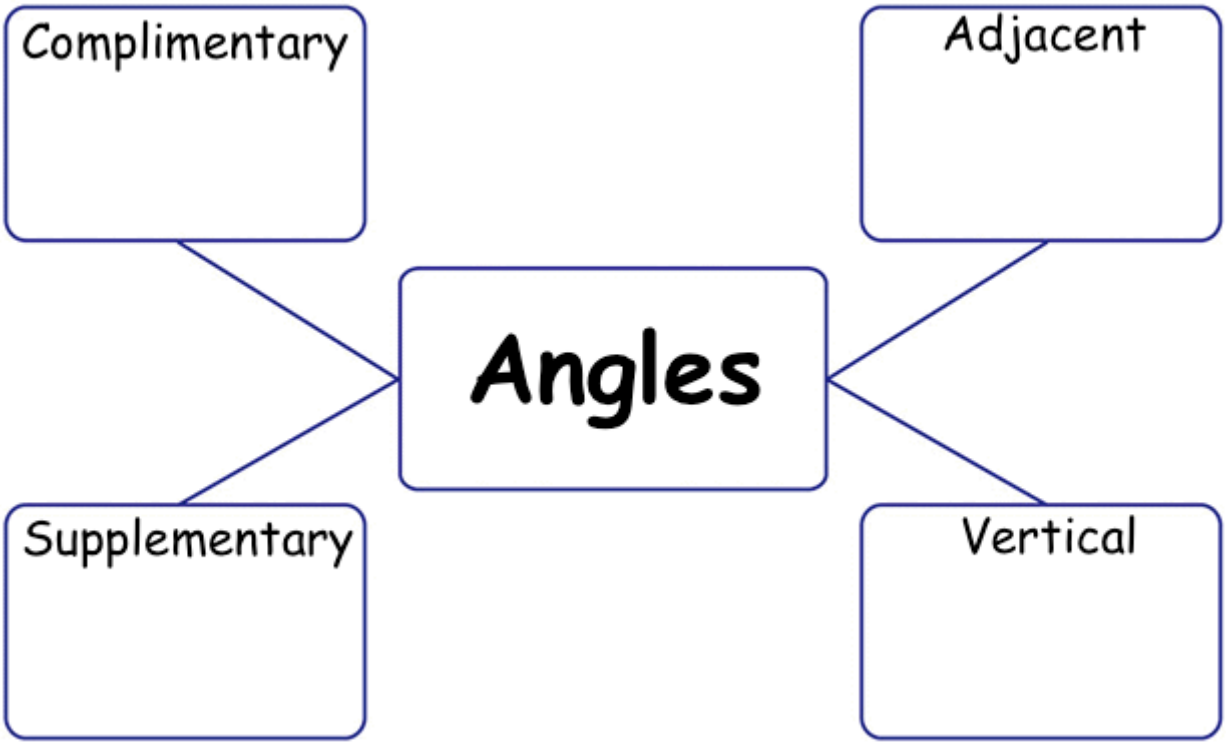
Equation used to solve: _____

x = _____

$m\angle 1$ _____

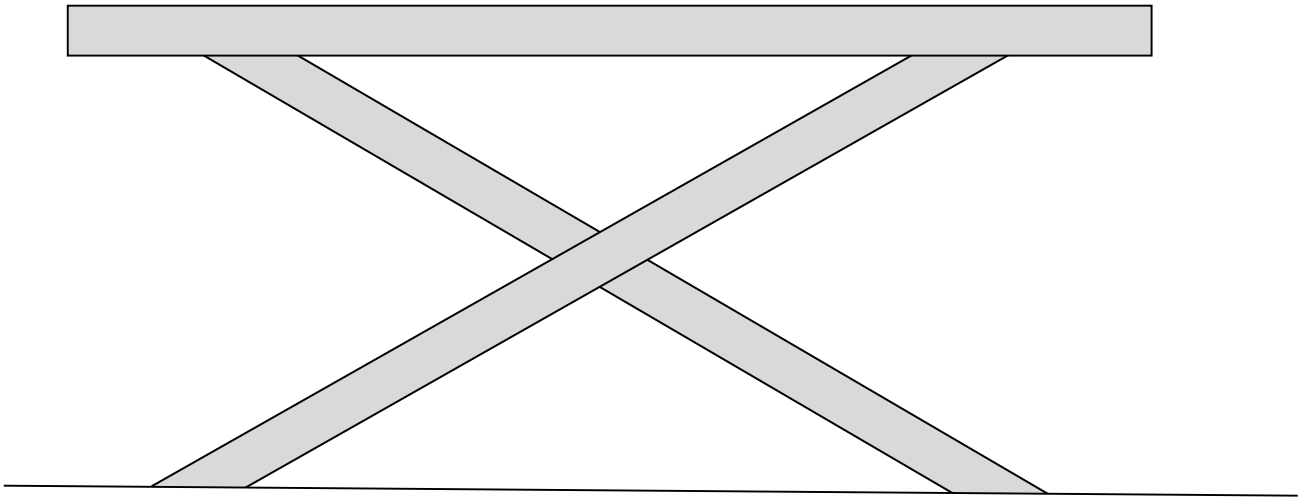
$m\angle 2$ _____

Concept Map: Angles Name:



Building A Bench

You are building a bench to add to the flower garden at the local library. The seat of the bench will be parallel to the ground. The legs that you are creating will be two boards crossed to make an x shape under the seat of the bench. The angle at the top part of the x will need to be 150^0 to safely support the bench seat and make it the right height. Draw a sketch below of the bench and then fill in all of the angle measures for the 12 angles that are formed by the crossed boards that are supporting the bench seat. Include the angles created by the ground and the bottom of the supports.

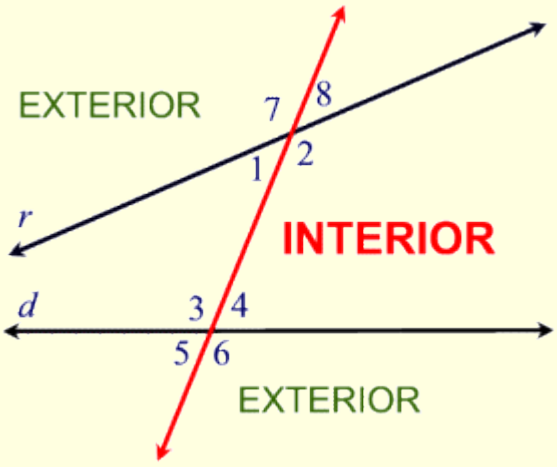


Angles Created from Parallel Lines cut by a Transversal Line

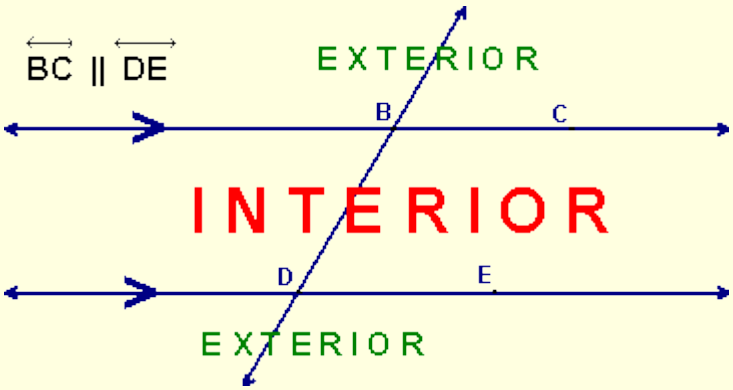
A **transversal** is a line that intersects two or more lines (in the same plane). When lines intersect, angles are formed in several locations. Certain angles are given "names" that describe "where" the angles are located in relation to the lines. These names describe angles whether the lines involved are parallel or not parallel.

Remember that:
- the word **INTERIOR** means **BETWEEN** the lines.
- the word **EXTERIOR** means **OUTSIDE** the lines.
- the word **ALTERNATE** means **"alternating sides"** of the transversal.

When the lines are NOT parallel ...



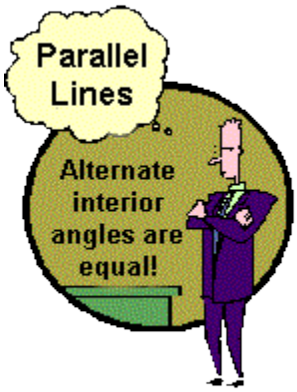
When the lines are parallel...



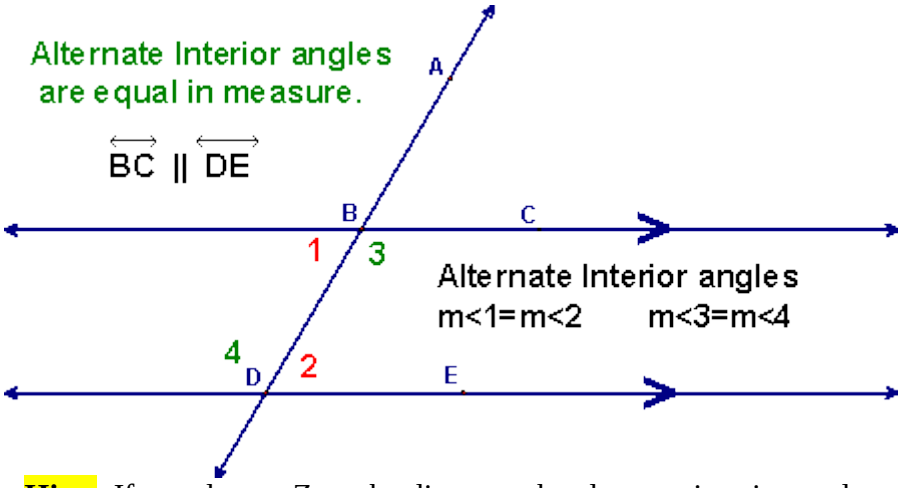
When the lines are parallel:

Alternate Interior Angles (measures are equal)

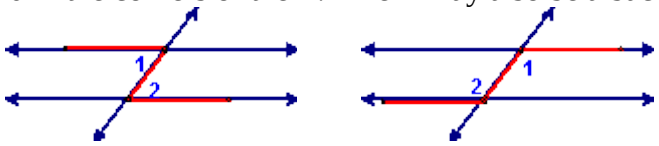
The name clearly describes "where" these angles are located.



Look carefully at the diagram below:



Hint: If you draw a Z on the diagram, the alternate interior angles are found in the corners of the Z. The Z may also be a backward Z.



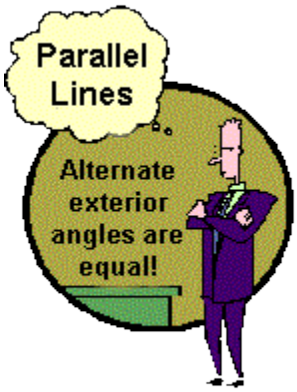
Theorem: If two parallel lines are cut by a transversal, the alternate interior angles are congruent.

Theorem: If two lines are cut by a transversal and the alternate interior angles are congruent, the lines are parallel.

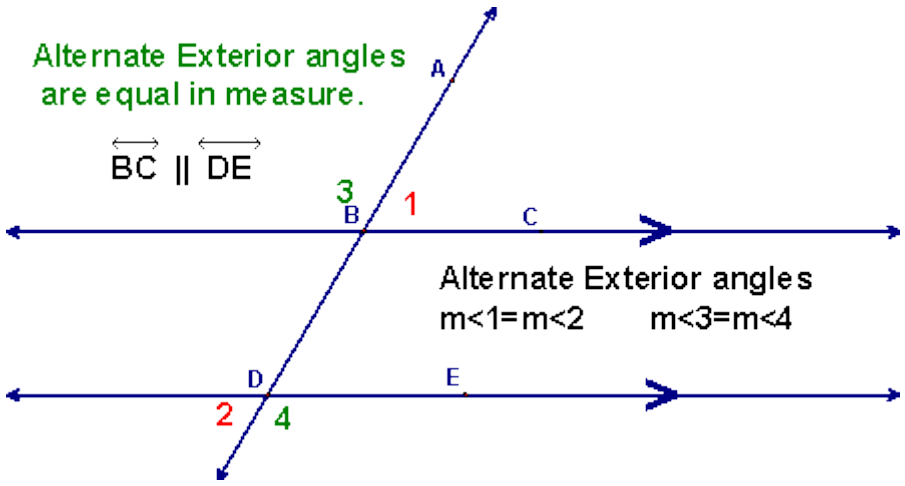
When the lines are parallel:

Alternate Exterior Angles (measures are equal)

The name clearly describes "where" these angles are located.



Look carefully at the diagram below:



Theorem: If two parallel lines are cut by a transversal, the alternate exterior angles are congruent.

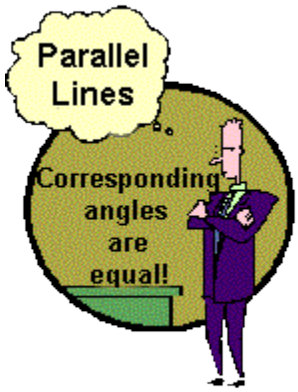
Theorem: If two lines are cut by a transversal and the alternate exterior angles are congruent, the lines are parallel.

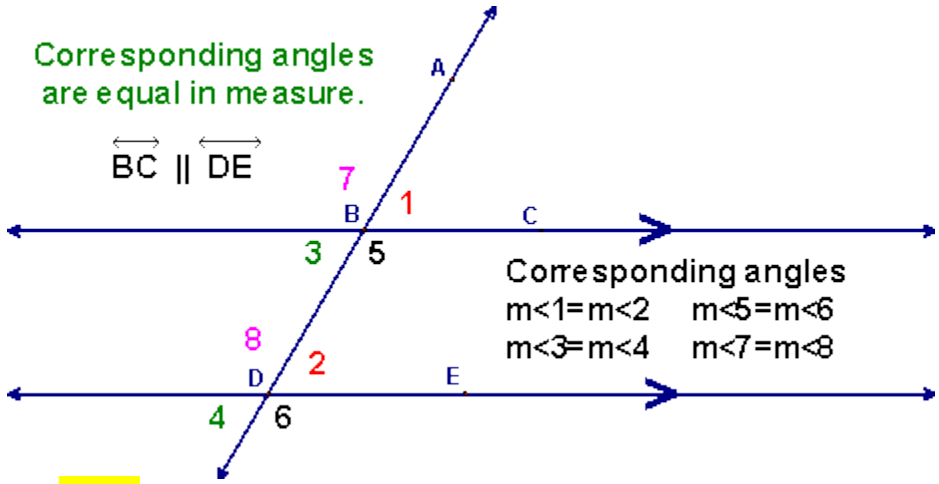
When the lines are parallel:

Corresponding Angles (measures are equal)

Unfortunately, the name of these angles does not clearly indicate "where" they are located. They are located:
- on the SAME SIDE of the transversal
- one INTERIOR and one EXTERIOR
- and they are NOT adjacent (*they don't touch*).

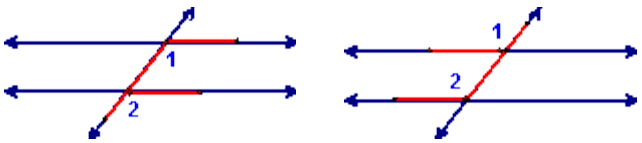
(They lie on the same side of the transversal, in corresponding positions.)





Hint: If you took a picture of one corresponding angle and slid the angle up (or down) the same side of the transversal, you would arrive at the other corresponding angle.

Also: If you draw an F on the diagram, the corresponding angles can be found in the "corners" of the F. The F may be backward and/or upside-down.



DRAW CIRCLES to find CORRESPONDING ANGLES!

Theorem: If two parallel lines are cut by a transversal, the corresponding angles are congruent.

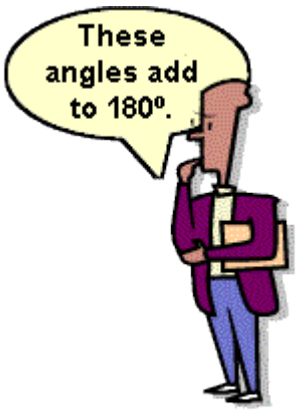
Theorem: If two lines are cut by a transversal and the corresponding angles are congruent, the lines are parallel.

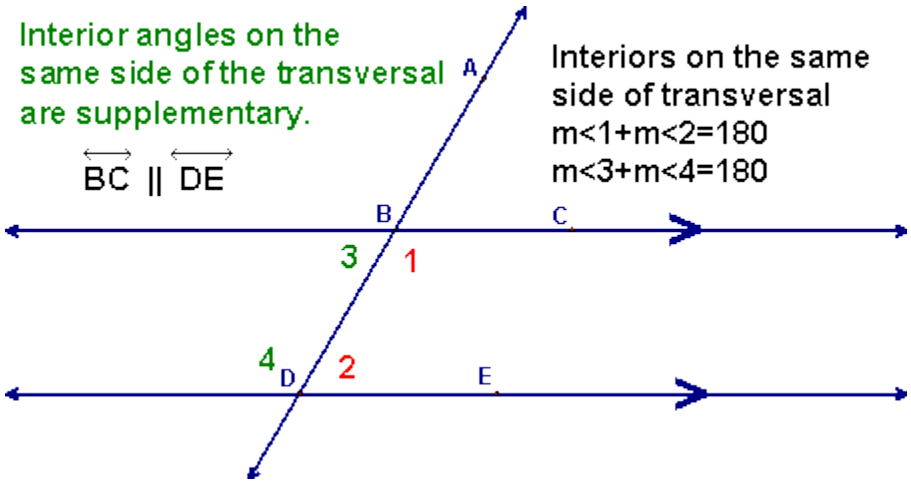
When the lines are parallel:

Interior Angles on the Same Side of the Transversal

(measures are supplementary)

Their "name" is simply a description of where the angles are located.





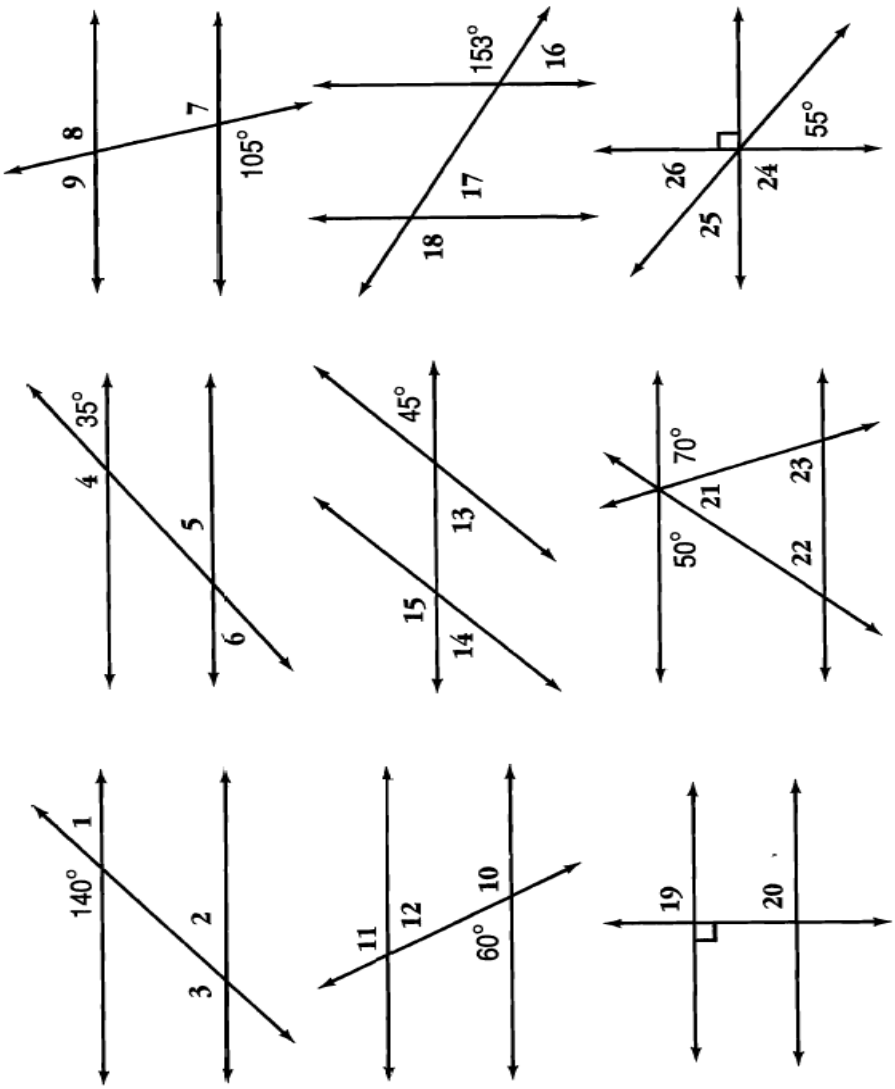
Theorem: If two parallel lines are cut by a transversal, the interior angles on the same side of the transversal are supplementary.

Theorem: If two lines are cut by a transversal and the interior angles on the same side of the transversal are supplementary, the lines are parallel.

Why Couldn't the Two Elephants Go Swimming Together?

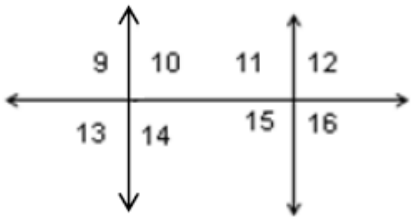
Give the measure of each numbered angle. Find your answer in the Code Key and notice the letter next to it. Write this letter in the box containing the number of the angle. (Assume that lines in each figure that do not intersect are parallel.)

CODE KEY	
27°	A
35°	O
40°	R
45°	Y
50°	I
55°	P
60°	T
70°	U
75°	F
90°	N
105°	H
120°	E
135°	K
140°	L
145°	S
153°	D



12	7	10	14	8	16	18	6	20	3	13	25	19	11	26	17	22	1	5	9	21	2	23	24	15	4

Use the figure at the right to answer problems 1- 8.



Classify each pair of angles as one of the following:

(a) alternate interior angles (b) corresponding angles

(c) alternate exterior angles (d) vertical angles

(e) supplementary angles (f) none

1. _____ ∠9 & ∠16

2. _____ ∠15 & ∠11

3. _____ ∠10 & ∠15

4. _____ ∠12 & ∠15

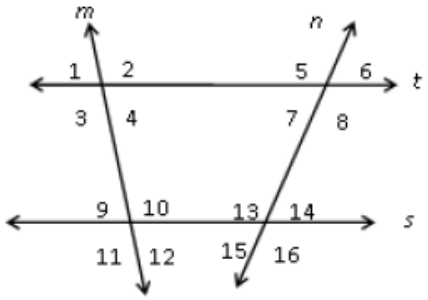
5. _____ ∠9 & ∠11

6. _____ ∠9 & ∠15

7. _____ ∠13 & ∠14

8. _____ ∠14 & ∠11

9. m∠2 = 97° m∠6 = 83°



m∠ 3 = _____ m∠ 5 = _____

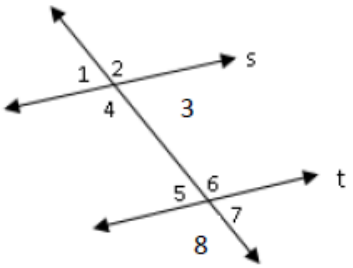
m∠10 = _____ m∠ 7 = _____

m∠ 9 = _____ m∠16 = _____

Find the value of x given that s // t

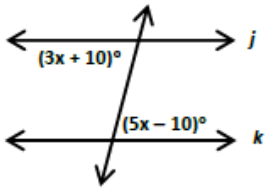
10. m∠4 = 77°, m∠8 = 4x + 57

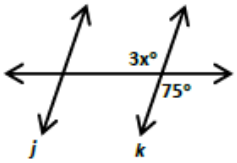
11. m∠3 = 5x + 13, m∠5 = 53°

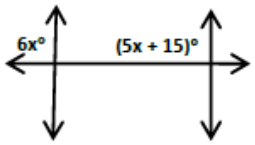


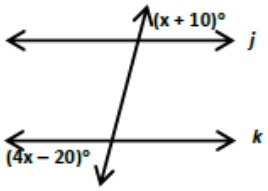
12. m∠1 = 6x - 5, m∠7 = 115°

Find the value of x that makes j || k.

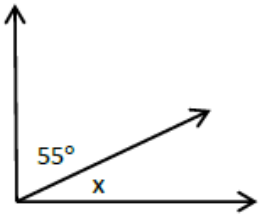
13. 

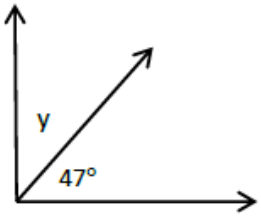
14. 

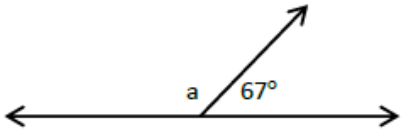
15. 

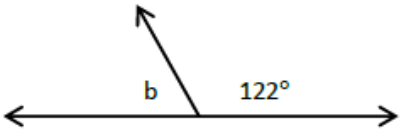
16. 

Determine the missing angles.

17. 

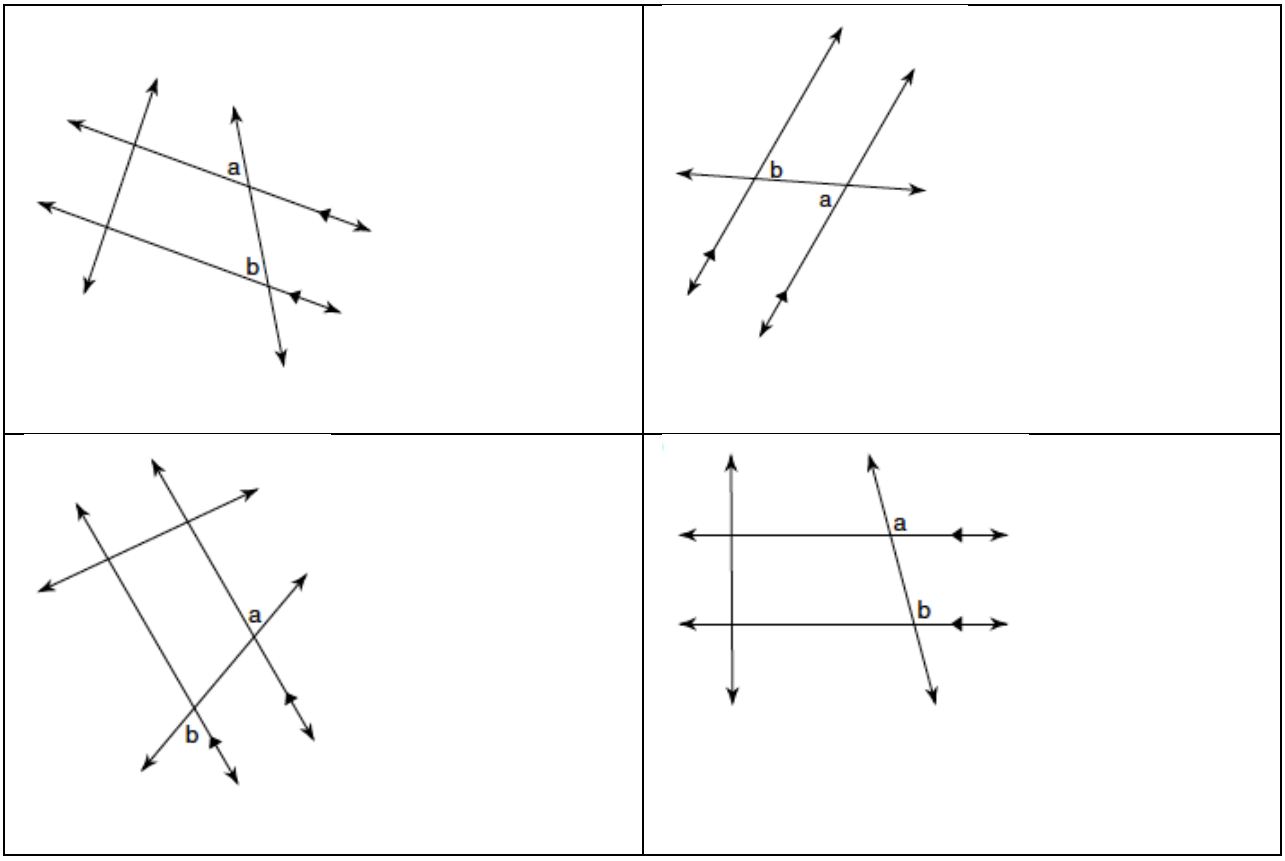
18. 

19. 

20. 

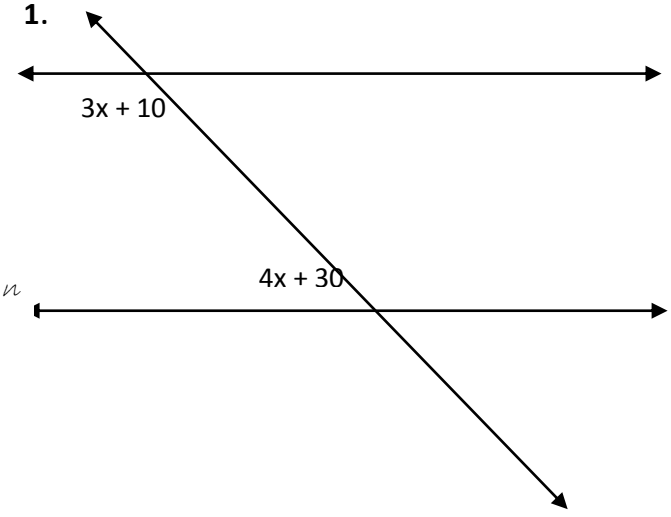
Parallel Lines

Name the relationship as alternate interior, corresponding, or alternate exterior.

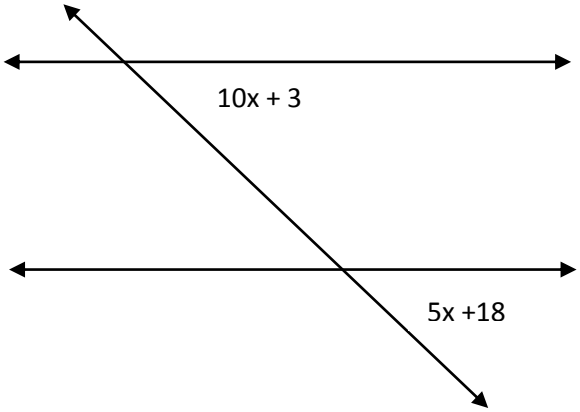


Find the missing measures on all the angles below.

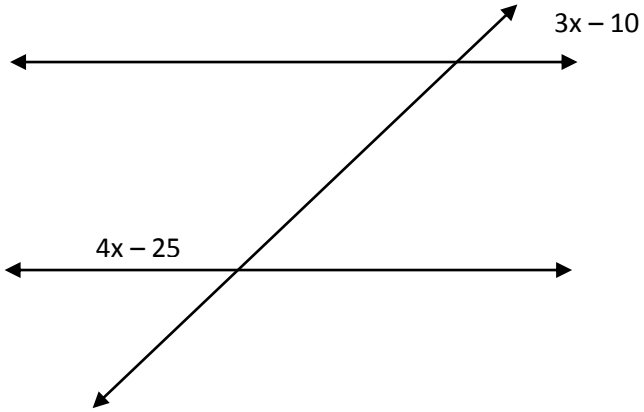
1.



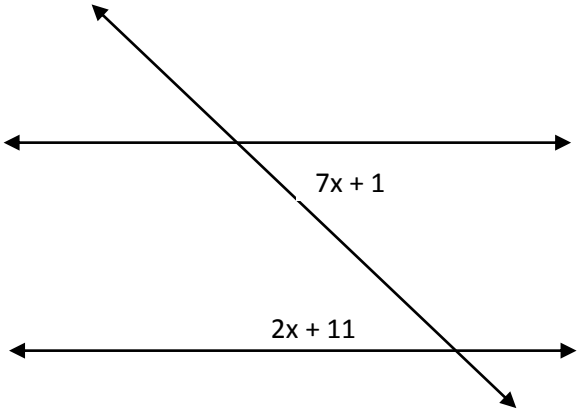
2.



3.



4.



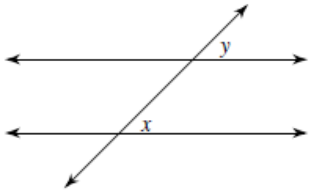
Kuta Software - Infinite Geometry Name_____

Parallel Lines and Transversals

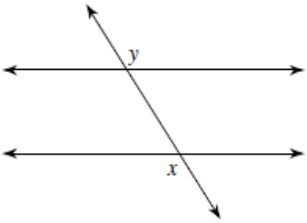
Date_____ Period____

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

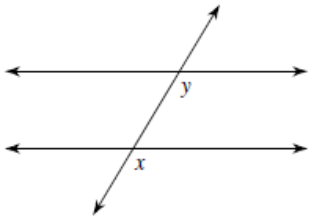
1)



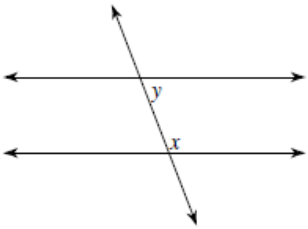
2)



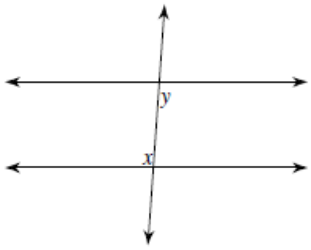
3)



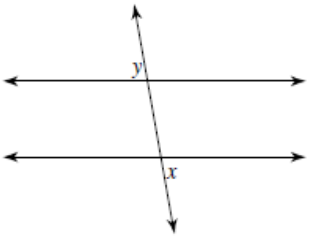
4)



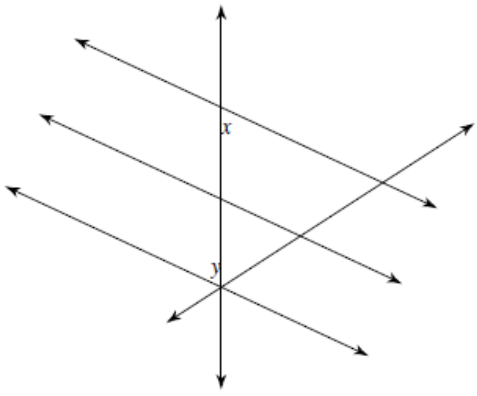
5)



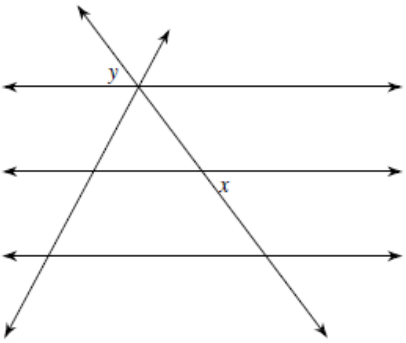
6)



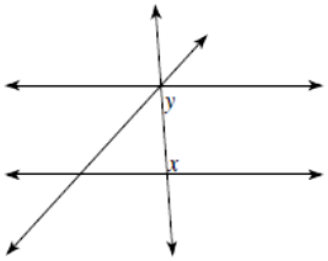
7)



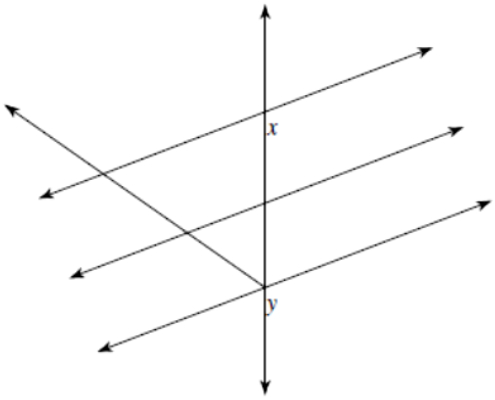
8)



9)

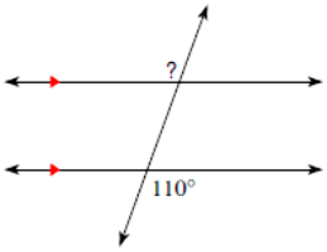


10)

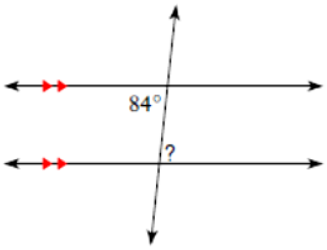


Find the measure of each angle indicated.

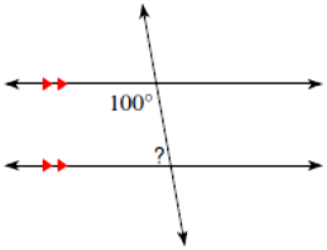
11)



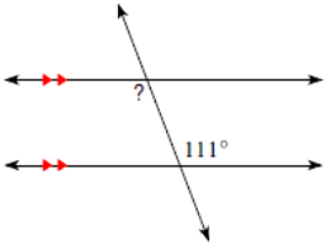
12)



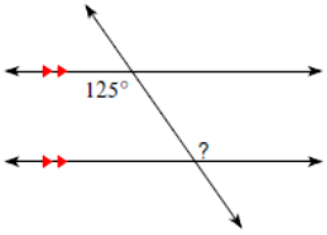
13)



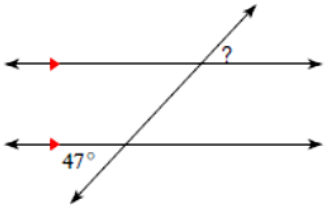
14)



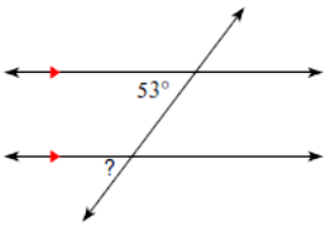
15)



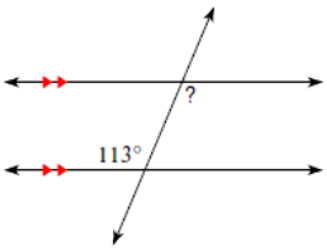
16)



17)

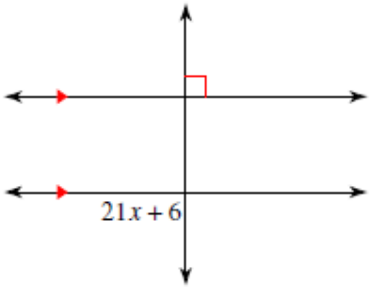


18)

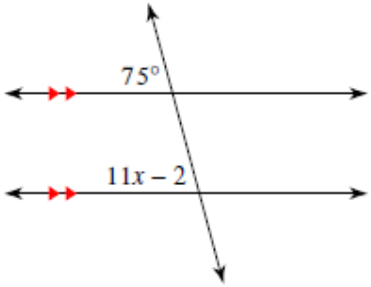


Solve for x.

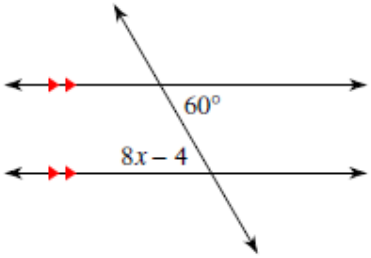
19)



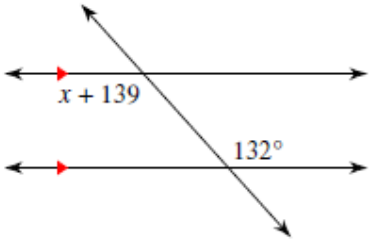
20)



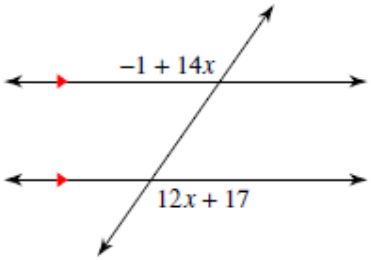
21)



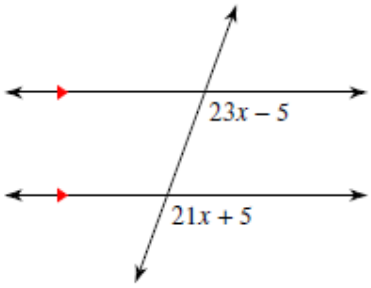
22)



23)

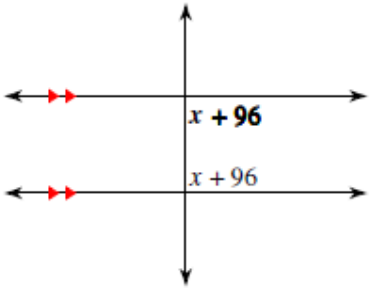


24)

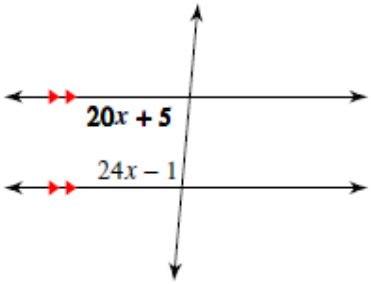


Find the measure of the angle indicated in bold.

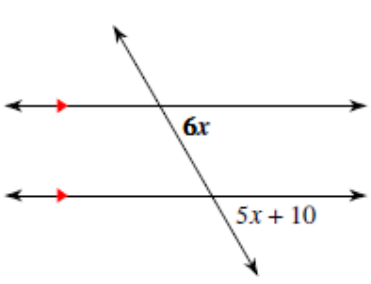
25)



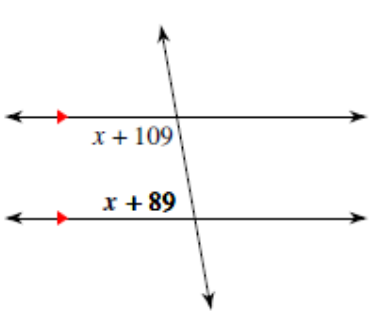
26)



27)



28)



Classifying Triangles by Sides:

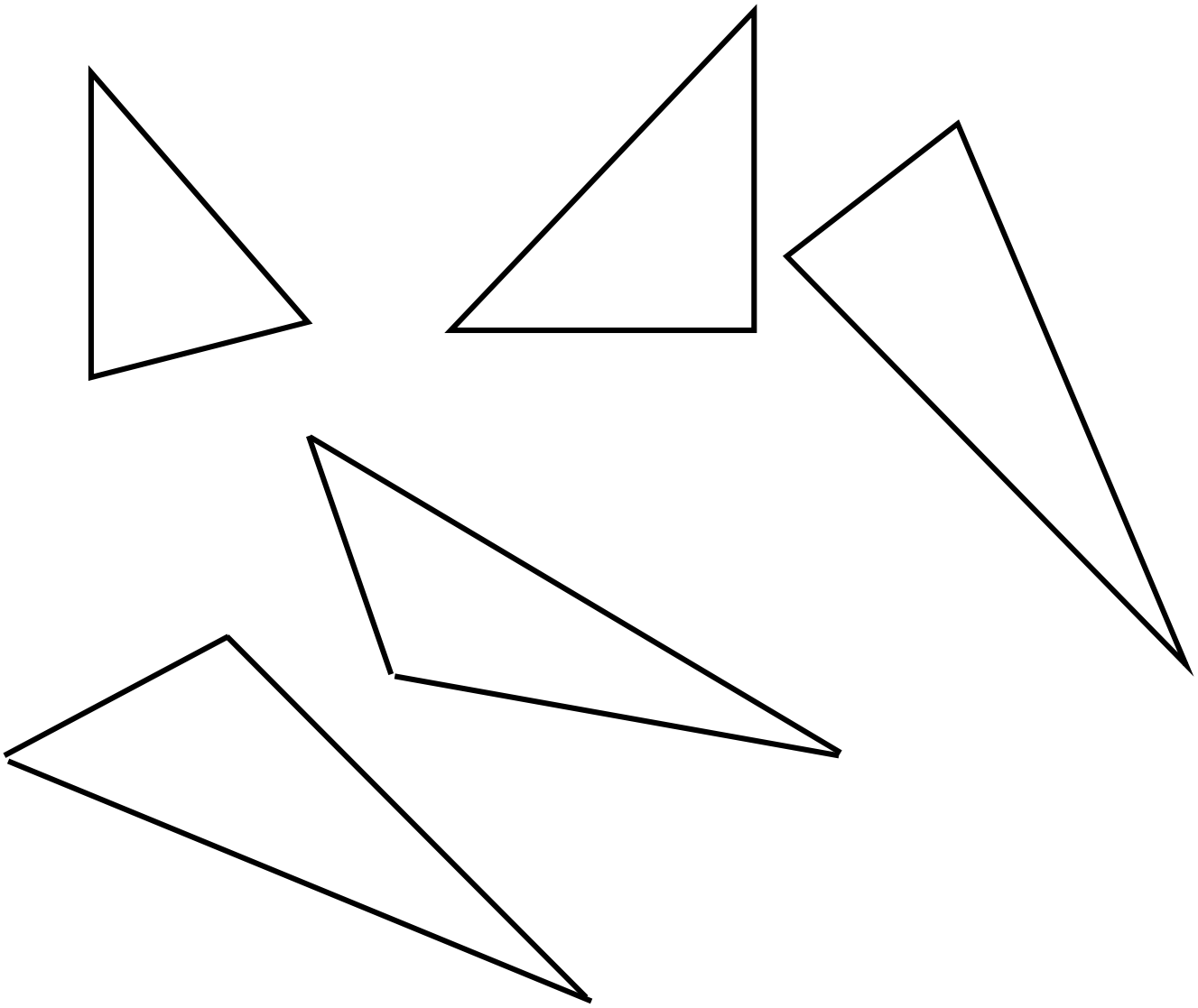
Name each type and draw a picture of each.

Classifying Triangles by Angles:

Name each type and draw a picture of each.

Using a ruler, measure each side of each triangle (in cm to nearest tenth).

What do you notice about the relationship between the two shorter sides and the longest side?



Can you draw a triangle with sides of 2, 3, and 7? EXPLAIN:

Can you draw a triangle with sides of 5, 5, and 12? EXPLAIN:

Can you draw a triangle with sides of 5, 3, and 7? EXPLAIN:

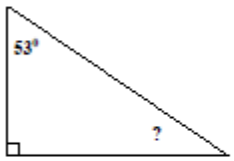
After your investigation, complete the following statement:

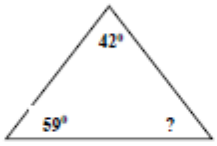
In any triangle, the sum of the two _____ sides will be _____ than the length of the longest side.

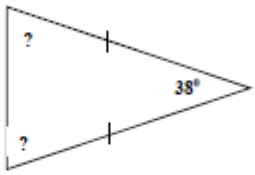
Fill in the missing information for each triangle named.

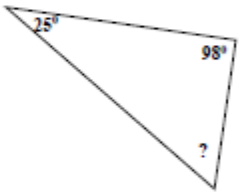
TRIANGLE	Length of Side 1	Length of Side 2	Length of Side 3	Sum of all Sides	Name of Triangle by Sides
Triangle MAD	12 mm		12 mm	42 mm	
Triangle ZEN		15 mm			Equilateral Δ
Triangle POD	5 mm	9 mm		28 mm	
Triangle CAT				60 mm	Equilateral Δ
Triangle CRY		8 mm	13 mm	29 mm	Isosceles Δ

Identify the missing measurement for each triangle below and then classify the triangle by its angles. DO NOT USE A PROTRACTOR. (Triangles shown are not to scale.)









Missing Measure:_____
Name:_____

Missing Measure:_____
Name:_____

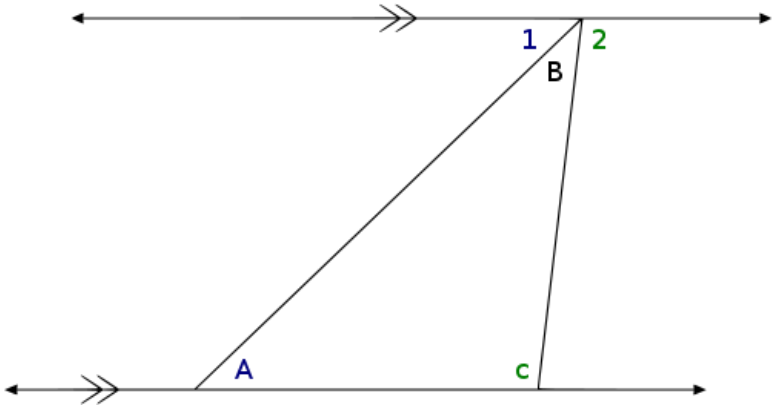
Missing Measure:_____
Name:_____

Missing Measure:_____
Name:_____

Making Connections - Parallel Lines and the Triangle Sum Theorem

How can I show that the sum of the interior angles of a triangle is equal to 180° using what I know about the relationships between the angles of parallel lines cut by a transversal?

Use the following figure to answer the questions that follow.



1. Knowing that angle 1, angle B and angle 2 form a straight line, what is their sum?

2. What kind of angles are angle C and angle 2? What is their relationship?

3. What kind of angles are angle A and angle 1? What is their relationship?

4. Based on your answers to questions 1 – 3, how do you know that the sum of the angle A, angle B, and angle C is 180°?

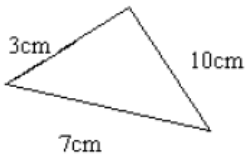
TRIANGLE SUM THEOREM:

The sum of all 3 angles of a triangle ALWAYS EQUALS 180°.

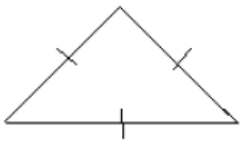
Triangle Homework

For #1-4, name the triangle

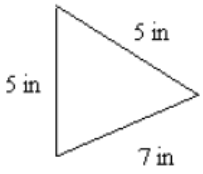
1) _____



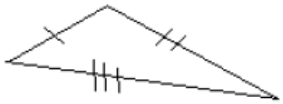
2) _____



3) _____



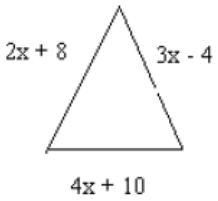
4) _____



For numbers 5-8, find the missing side length.

5) The perimeter of an equilateral triangle is 45cm. What is the length of each side?

6) If the perimeter of the triangle below is 36in find the value of x and the length of each side.



7) Two sides of an isosceles triangle are 4 less than twice the value of the third side. If the perimeter of the triangle is 42cm, what is the value of x? What are the lengths of the 3 sides?

8) The perimeter of an equilateral triangle is 108in. Find the length of each side.

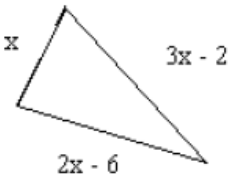
An isosceles triangle has the same perimeter, what can be the lengths of the sides?

For numbers 9-12, state whether the sides can form a triangle

9) 2cm, 6cm, 4cm	10) 9cm, 11cm, 4cm
11) 15cm, 7cm, 9cm	12) 60cm, 60cm, 20cm

Find the value of x and the measurement of each side:

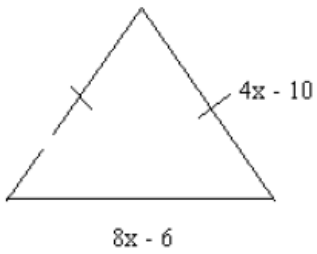
1) x = _____
Side 1=_____
Side 2 =_____
Side 3=_____



Perimeter = 40

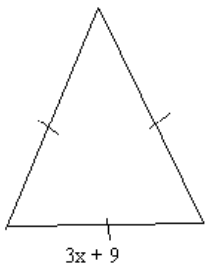
2) x = _____
Side 1=_____
Side 2 =_____
Side 3=_____

Perimeter = 22 cm



3) x = _____
Side 1=_____
Side 2 =_____
Side 3=_____

Perimeter = 71m



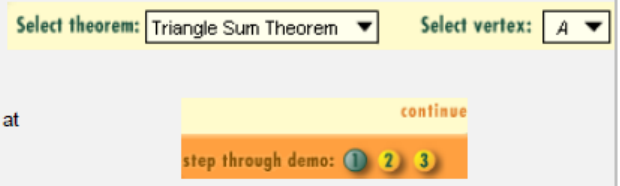
Mathematics 1435 SAS® Curriculum Pathways®

Triangles: Interior and Exterior Angles: *In-class Worksheet (Middle School)*

NAME:_____ **CLASS:**_____ **DATE:**_____

A. Directions for problems 1 – 3

1) Click **Demo.**
2) Select **Triangle Sum Theorem** from the drop-down menu.
3) Select one of the three vertices from the drop-down menu that will appear.
4) Step through the demo by clicking the navigation buttons at the bottom of the window.
5) Complete problems 1 – 3 on this worksheet.



1. Complete the **Triangle Sum Theorem**.
The sum of the measures of the angles _____

_____

2. How is the Triangle Sum Theorem illustrated in the demo? _____

_____

_____

3. **Review:** Triangles are classified by sides (scalene, isosceles, equilateral) and by angles (acute, right, obtuse). *This information is not stated in the demo.*

Draw an example of each of the following triangles:

Isosceles right triangle	Scalene obtuse triangle	Acute equilateral triangle

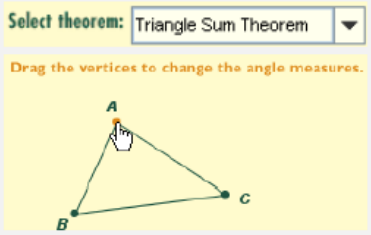
Triangles: Interior and Exterior Angles: *In-class Worksheet (Middle School)*

B. Directions for problems 4 – 9

1) Click **Practice**.

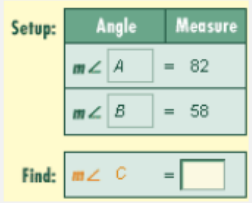
2) In the **Create Triangle** panel, set up each problem *on the computer* to match the setup for each problem *on this worksheet*.

- Select **Triangle Sum Theorem** from the drop-down menu.
- Click three points to create a triangle similar to the one shown for each problem below.
- If needed, drag the vertices to adjust the shape of the triangle.



3) In the **Measurements** panel *on the computer*, select the first two angles for each problem in **Setup**.

Note: The angles to select in **Setup** will vary for each problem.



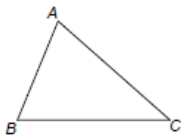
4) Find the measure of the third angle in the triangle.

5) Click the **Check Answers** button to check your work. Correct as necessary.

6) For each new problem, click **Clear** to clear the triangle and all measurements. (The **Clear** button is located at the bottom of the **Create Triangle** panel)

7) Complete problems 4 – 9 and record your answers on this worksheet.

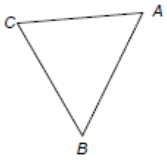
4. Acute triangle



Angle		Measure
$m\angle A$	=	
$m\angle B$	=	
$m\angle C$	=	

$m\angle A + m\angle B + m\angle C =$ _____

5. Acute triangle

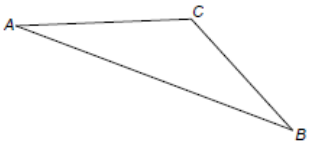


Angle		Measure
$m\angle A$	=	
$m\angle C$	=	
$m\angle B$	=	

$m\angle A + m\angle B + m\angle C =$ _____

Triangles: Interior and Exterior Angles: *In-class Worksheet (Middle School)*

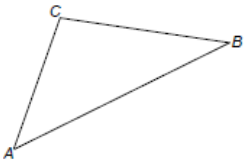
6. Obtuse triangle



Angle	Measure
$m\angle B$ =	
$m\angle C$ =	
$m\angle A$ =	

$m\angle A + m\angle B + m\angle C =$ _____

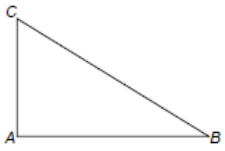
7. Obtuse triangle



Angle	Measure
$m\angle A$ =	
$m\angle B$ =	
$m\angle C$ =	

$m\angle A + m\angle B + m\angle C =$ _____

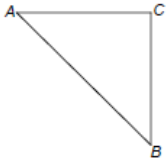
8. Right triangle



Angle	Measure
$m\angle A$ =	
$m\angle C$ =	
$m\angle B$ =	

$m\angle A + m\angle B + m\angle C =$ _____

9. Right triangle



Angle	Measure
$m\angle B$ =	
$m\angle C$ =	
$m\angle A$ =	

$m\angle A + m\angle B + m\angle C =$ _____

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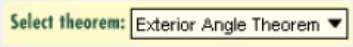
Triangles: Interior and Exterior Angles: *In-class Worksheet (Middle School)*

Extension

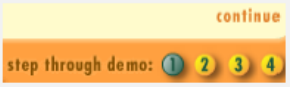
C. Directions for problems 10 – 15

1) Click **Demo.**

2) Select **Exterior Angle Theorem** from the drop-down menu.



3) Step through the demo using the navigation buttons at the bottom of the window.

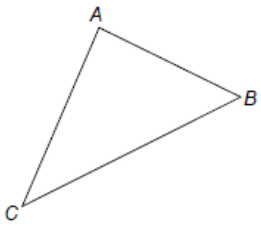


4) Complete problems 10 – 15 on this worksheet.

10. Define an exterior angle._____

_____

11. Draw an exterior angle at $\angle A$.



12. In the above triangle, $\angle A$, $\angle B$, and $\angle C$ are called interior angles. Describe an interior angle._____

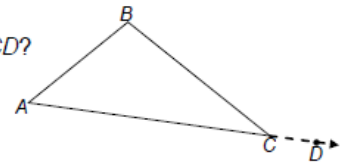
_____

13. Describe a remote interior angle._____

_____

14. Name the two remote interior angles of $\angle BCD$?

_____ and _____



15. **Exterior Angle Theorem:** The measure of an exterior angle of a triangle _____

_____

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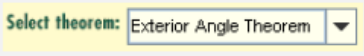
Triangles: Interior and Exterior Angles: *In-class Worksheet (Middle School)*

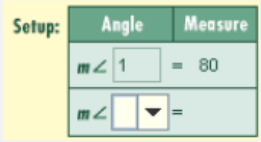
D. Directions for problems 16 – 21

1) Click **Practice**.
2) Select **Exterior Angle Theorem** from the drop-down menu.



3) In the **Create Triangle** panel, set up each problem *on the computer* to match the setup for each problem *on this worksheet*. For each problem
   - Click three points to create a triangle.
   - Select a vertex and an exterior point from the drop-down menus.

   - In the **Measurements** panel, select the first given angle to set up the worksheet problem.



   - Adjust the triangle until the given angle measure matches the problem.
   - In the **Measurements** panel, select the second angle given on the worksheet.
4) Find the measure of the third angle.

5) Click the **Check Answers** button ☑ to check your work. Correct as necessary.
6) ***Important:*** For each new problem, click **Clear** (located at the bottom of the **Create Triangle** panel) to clear the triangle and all measurements.

7) Complete problems 16 – 21 and record your answers on this worksheet.

16.

Angle		Measure
$m\angle 1$	=	80
$m\angle 2$	=	
$m\angle 4$	=	

17.

Angle		Measure
$m\angle 4$	=	140
$m\angle 1$	=	
$m\angle 2$	=	

18.

Angle		Measure
$m\angle 2$	=	125
$m\angle 4$	=	
$m\angle 1$	=	

19.

Angle		Measure
$m\angle 1$	=	105
$m\angle 2$	=	
$m\angle 4$	=	

20.

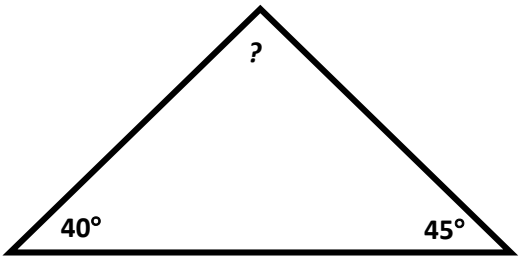
Angle		Measure
$m\angle 1$	=	90
$m\angle 4$	=	
$m\angle 2$	=	

21.

Angle		Measure
$m\angle 4$	=	90
$m\angle 2$	=	
$m\angle 1$	=	

Find each missing angle measure.

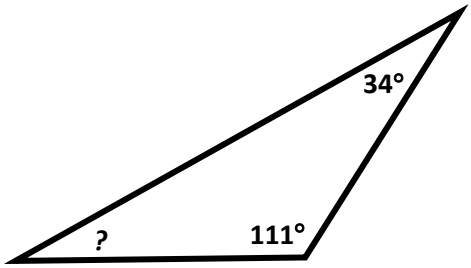
1.



2. In a triangle the measure of two of the angles is 35° and 65°. Find the measure of the third angle.

3. In triangle *DEF* the measure of angle *D* is 33° and the measure of angle *E* is 97°. Find the measure of angle *F*.

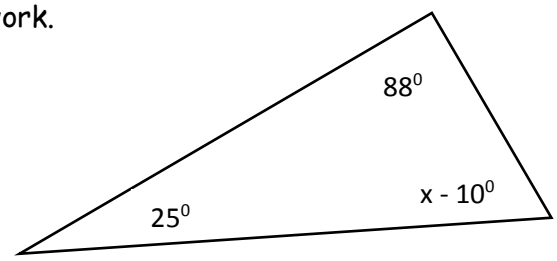
4.



5. Triangle *ABC* is a right triangle. The measure of angle *A* is *37°*. Find the measures of angle *B* and *C*.

6. Four isosceles triangles cap the Smith Tower in Seattle. If one of the base angles measures 65°, what are the measures of the other two angles?

7. Find the missing angle measure without using a protractor. Triangle is not drawn to scale. Set up an equation and show your work.



8. Draw a triangle and give it the following measures then list the measure of all three angles. $m\angle 1 = 102^0$, $m\angle 2 = x + 2$, and $m\angle 3 = x + 20$.

$m\angle 1$ = _____

$m\angle 2$ = _____

$m\angle 3$ = _____

9. Can you draw a right triangle that is also an isosceles triangle? Explain.

10. Can a triangle have more than one obtuse angle? Explain.

Tell if the following combinations are lengths that could create a triangle.

11. 3, 5, 9 12. 8, 8, 8 13. 7, 8, 2

How did you determine the answers to #11-13?

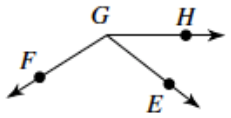
14. In congruent triangles, what is true about corresponding sides?

_____

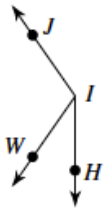
15. In congruent triangles, what is true about corresponding angles?

Find the Missing Angle Practice

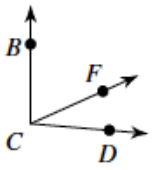
$m\angle HGF = 16x + 4$, $m\angle EGF = 110°$, and $m\angle HGE = 3x + 11$. Find x.



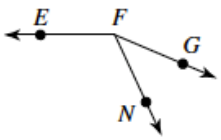
Find $m\angle HIW$ if $m\angle WIJ = 10x$, $m\angle HIJ = 145°$, and $m\angle HIW = 2x + 13$.



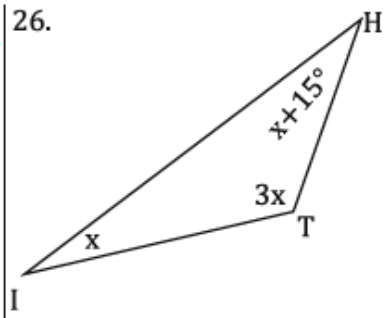
$m\angle FCD = x + 41$, $m\angle BCF = x + 78$, and $m\angle BCD = 95°$. Find x.

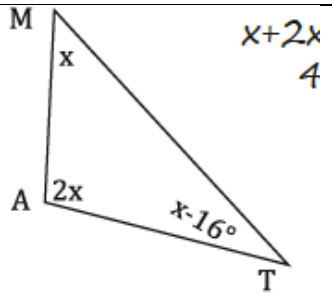


$m\angle GFN = 4x + 10$, $m\angle NFE = 14x + 3$, and $m\angle GFE = 157°$. Find $m\angle NFE$.

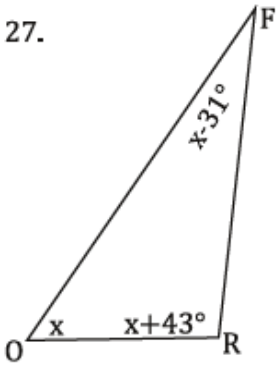


26.

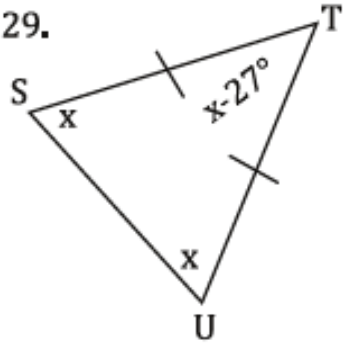




27.

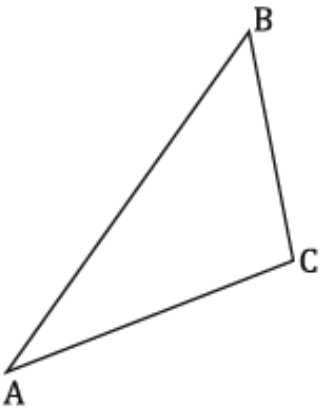


29.

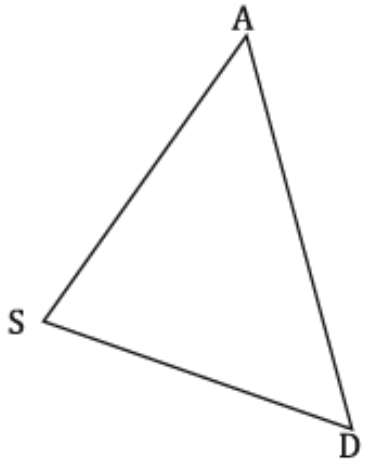


Mark the diagram with the given information. Then, find the measure of the indicated angle.

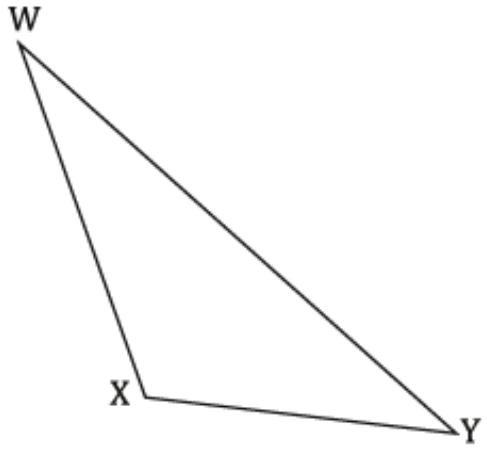
31. $m\angle A=X$, $m\angle B=2X$. $m\angle C=2X+30°$. Find $m\angle B$.



32. $m\angle S=2x$, $m\angle A=X-23$. $m\angle D=X-17°$.
Find $m\angle S$.

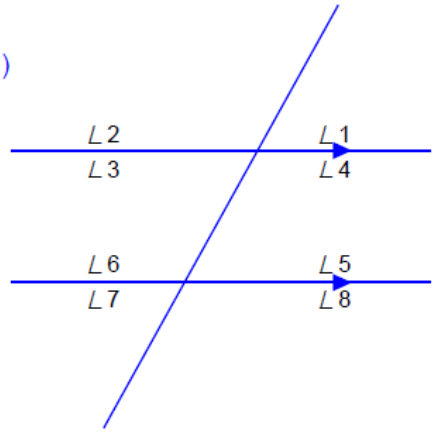


35. $m\angle W=x-22°$, $m\angle X=3x+19°$, $m\angle Y=x-17°$. Find $m\angle X$.



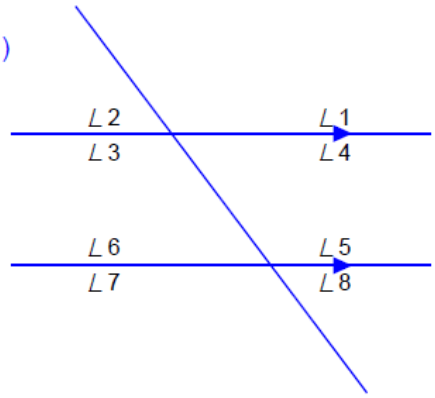
Find all of the missing angles.

1)



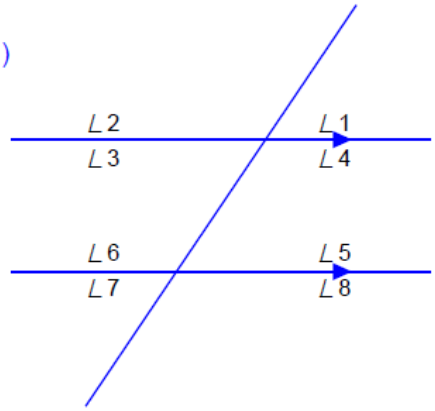
∠1 = _____
∠2 = _____
∠3 = 61°
∠4 = _____
∠5 = _____
∠6 = _____
∠7 = _____
∠8 = _____

2)



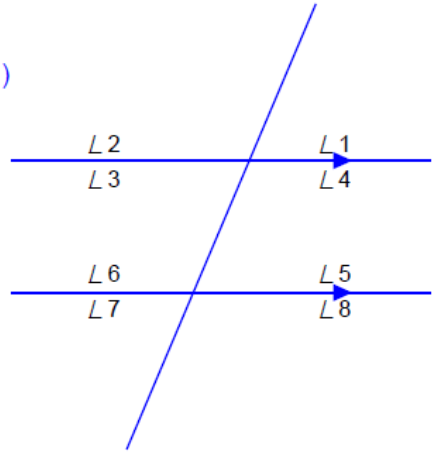
∠1 = _____
∠2 = _____
∠3 = _____
∠4 = _____
∠5 = _____
∠6 = _____
∠7 = _____
∠8 = 53°

3)



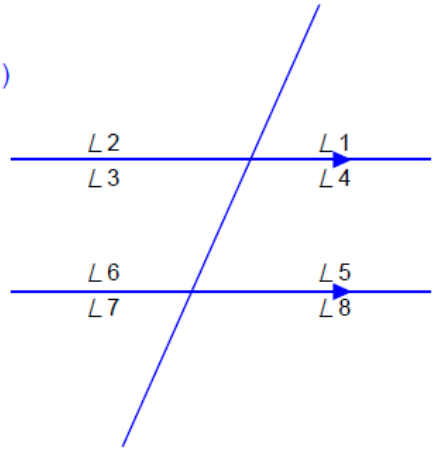
∠1 = 56°
∠2 = _____
∠3 = _____
∠4 = _____
∠5 = _____
∠6 = _____
∠7 = _____
∠8 = _____

4)



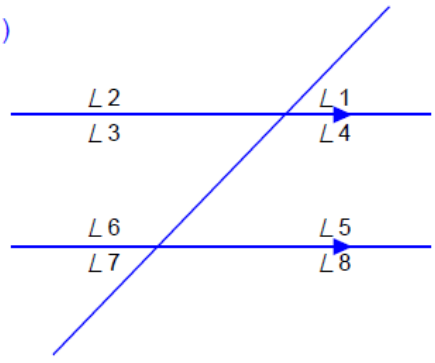
∠1 = _____
∠2 = _____
∠3 = _____
∠4 = _____
∠5 = _____
∠6 = 113°
∠7 = _____
∠8 = _____

5)



∠1 = _____
∠2 = _____
∠3 = _____
∠4 = _____
∠5 = 66°
∠6 = _____
∠7 = _____
∠8 = _____

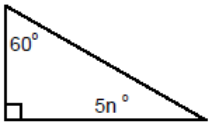
6)



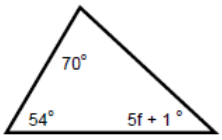
∠1 = _____
∠2 = _____
∠3 = _____
∠4 = _____
∠5 = _____
∠6 = _____
∠7 = 46°
∠8 = _____

Triangle Angle Sum

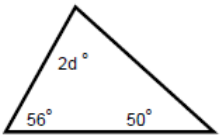
Solve for the given variable.

1) 

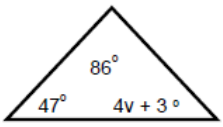
n = ____

2) 

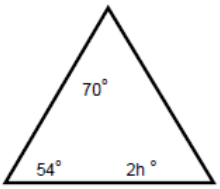
f = ____

3) 

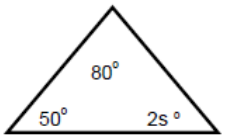
d = ____

4) 

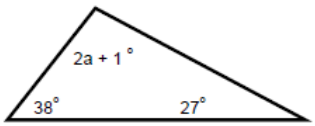
v = ____

5) 

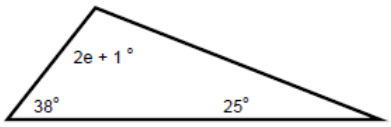
h = ____

6) 

s = ____

7) 

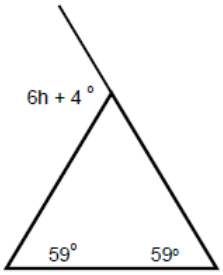
a = ____

8) 

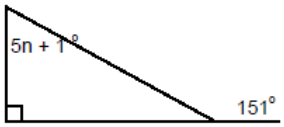
e = ____

Exterior Angle Theorem

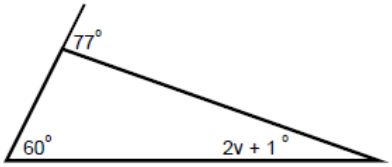
Solve for the given variable.

1) 

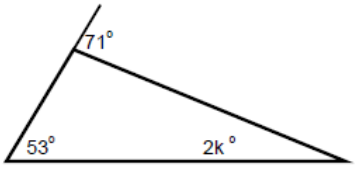
h = ____

2) 

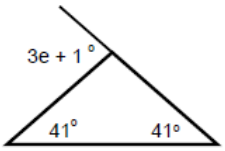
n = ____

3) 

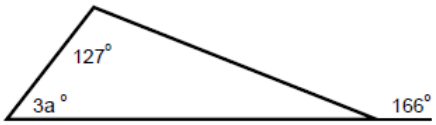
v = ____

4) 

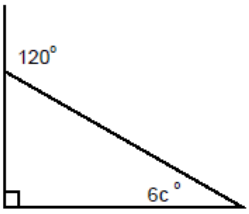
k = ____

5) 

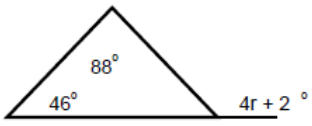
e = ____

6) 

a = ____

7) 

c = ____

8) 

r = ____

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STUDY GUIDE

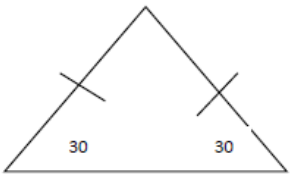
Unit 10 Review for Assessment

Define the following words:

- supplementary angles
- complementary angles
- vertical angles
- adjacent angles
- acute triangle
- obtuse triangle
- right triangle
- isosceles triangle
- scalene triangle
- equilateral triangle
- parallel lines
- transversal
- congruent angles
- corresponding angles
- alternate interior angles
- alternate exterior angles
- triangle sum theorem
- exterior angle theorem

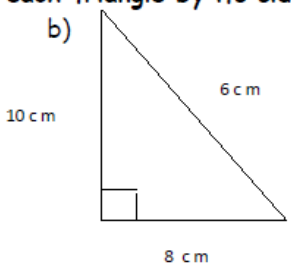
Name each triangle by its sides and lengths

a)



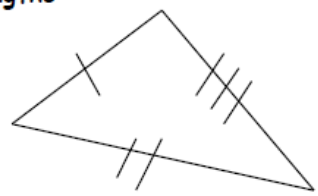
_____

b)



_____

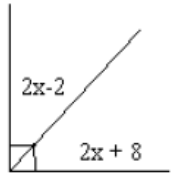
c)



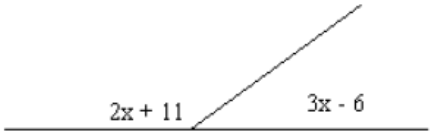
_____

For # 1-10, find the measure of the missing angle

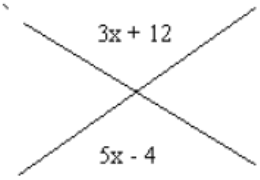
1)



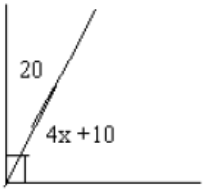
2)



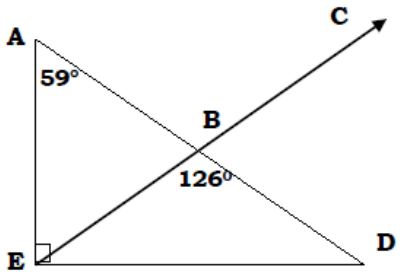
3)



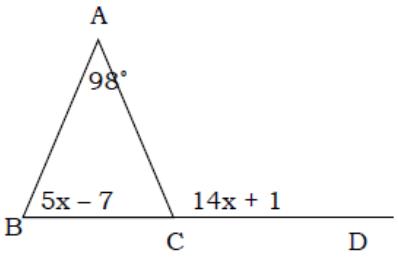
4)



5) Use the diagram to find the missing angle measures B and D.

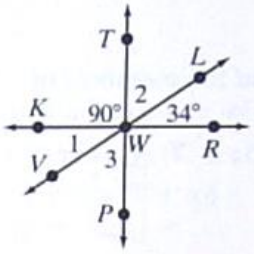


6)



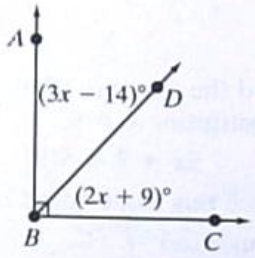
Practice 9-2 Angle Relationships and Parallel Lines

Find the measure of each angle in the figure at the right.



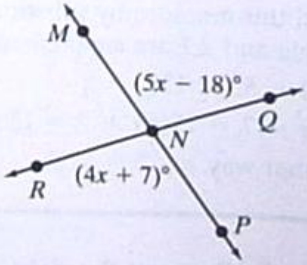
1. $m\angle 1$
2. $m\angle 2$
3. $m\angle 3$
4. $m\angle VWR$

Use the figure at the right for Exercises 5-8.



5. Write an equation. _____
6. Find the value of x. _____
7. Find $m\angle ABD$. _____
8. Find $m\angle DBC$. _____

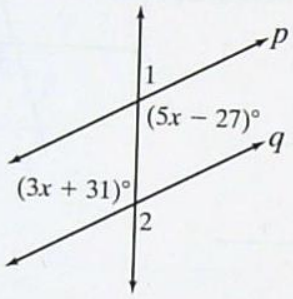
Use the figure at the right for Exercises 9-12.



9. Write an equation. _____
10. Find the value of x. _____
11. Find $m\angle MNQ$. _____
12. Find $m\angle MNR$. _____

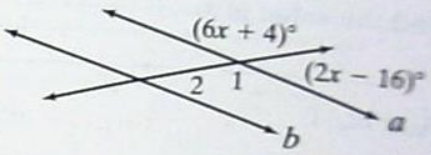
In each figure, find the measures of $\angle 1$ and $\angle 2$.

13. Given $p \parallel q$.



$m\angle 1 =$ $m\angle 2 =$

14. Given $a \parallel b$.



$m\angle 1 =$ $m\angle 2 =$

15. Find a pair of complementary angles such that the difference of their measures is 12°.

_____