

Unit 10 - Angles and Triangles

7th Grade Math - Ms. Santora

	Topic
Lesson 1	Types of Angles
Lesson 2	Solve for Unknown Angles
Lesson 3	Vertical Angles
Lesson 4	Solve for Unknown Angles
	Quiz
Lesson 5	Classify Triangles
Lesson 6	Angles in a Triangle
Lesson 7	Draw Triangles
Lesson 8	Unique Triangles
Lesson 9A	Checking for Identical Triangles
Lesson 9B	Checking for Identical Triangles
	Review
	Unit 10 Exam

LESSON 1: TYPES OF ANGLES



This is a _____ angle.

This angle has _____ degrees.

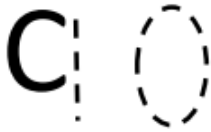


This is a _____ angle.

This angle has _____ degrees.

Complementary angles.....

Two angles whose sum measure 90°



You can change **C** into a 9 to stand for 90°

Supplementary angles.....

Two angles whose sum measure 180°

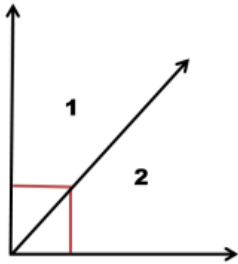


You can change **S** into a 8 to stand for 180°

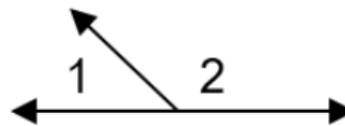
Also known as a
linear pair

**** You can also remember in the alphabet C come before S and 90 comes before 180****

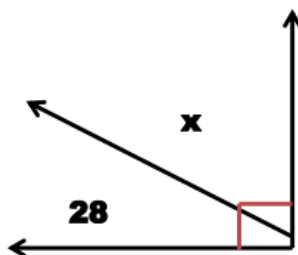
Ex 1: Angles 1 and 2 are complementary angles.
If the angle $m\angle 1$ is 53° the $m\angle 2$ is:



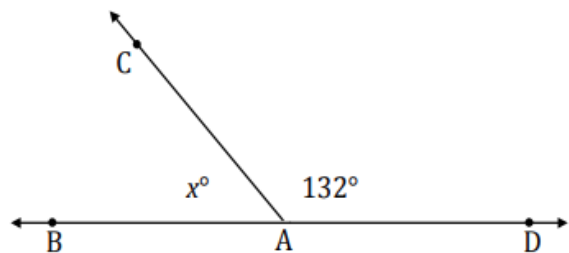
Ex 2: Angles 1 and 2 are supplementary angles. If
angle $m\angle 2$ is 103° the $m\angle 1$ is:



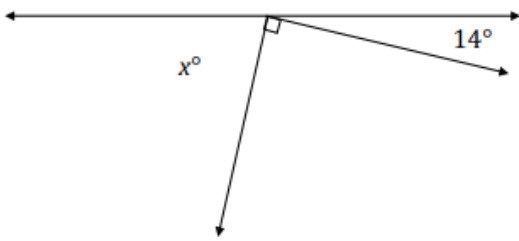
1) Find the value of x .



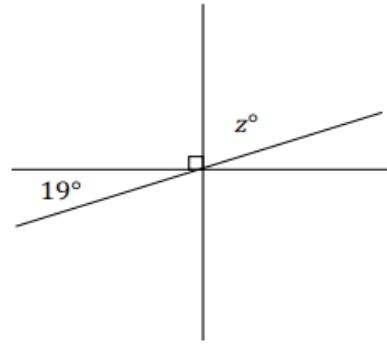
2) Then find the measures of $\angle BAC$.



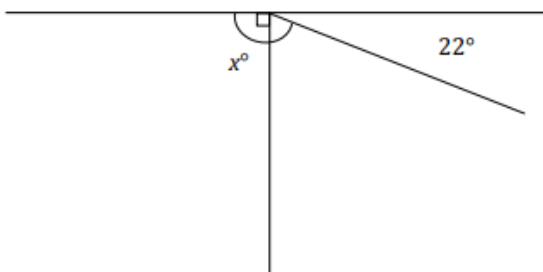
3) Find the value of x .



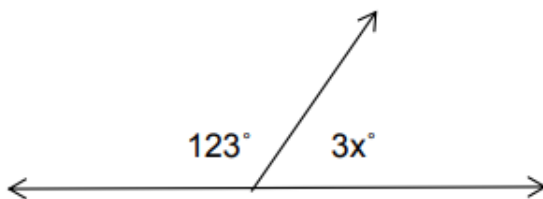
4) Three lines meet at a point. Find the value of z .



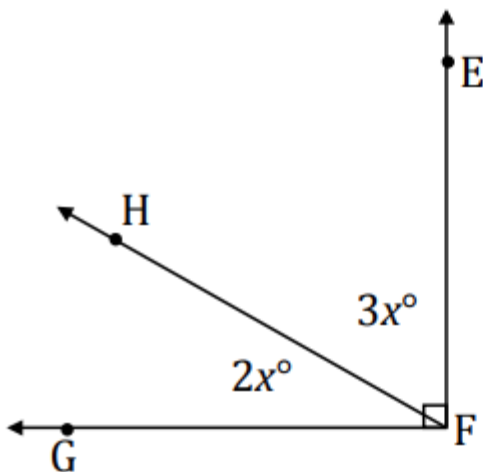
5) Find the value of x .



6) Write an equation for the angle relationship shown in the figure and solve for x . Then find the measure of each angle.



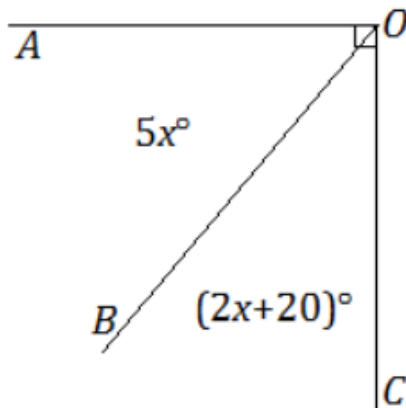
7) Find the value of x . Then find the value of the missing angle.



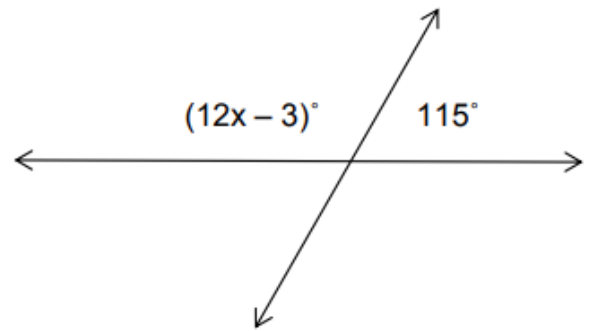
LESSON 2: SOLVE FOR UNKNOWN ANGLES

Directions: Find the value of x . Then find the value of the missing angle.

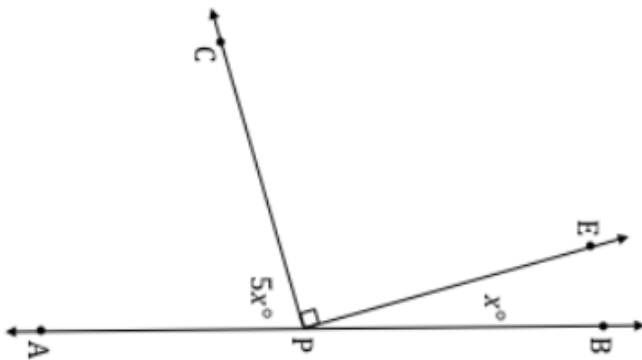
1)



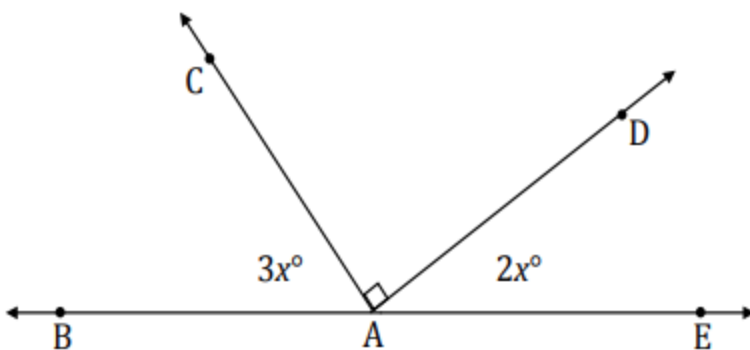
2)



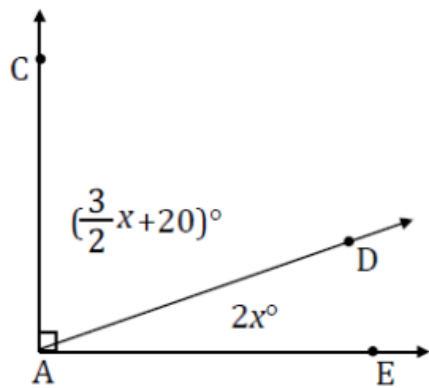
3) Write an equation for the angle relationship shown in the figure and solve for x . Find the measurements of $\angle EPB$ and $\angle CPA$.



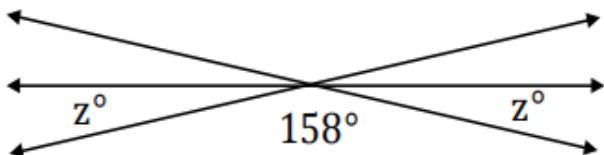
4) Find the measurements of $\angle BAC$ and $\angle DAE$.



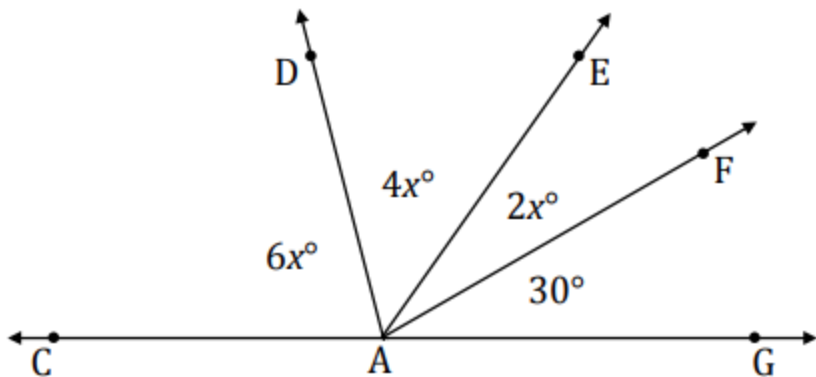
- 5) Find the value of x . Then find the value of the missing angle.



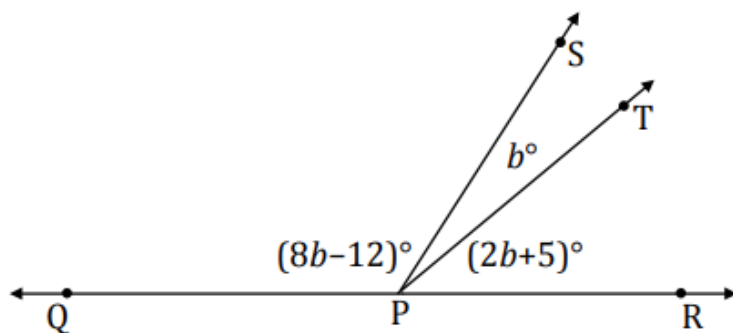
- 6) The following figure shows three lines intersecting at a point. Write an equation for the angle relationship shown in the figure and solve for z .



- 7) Find the measure of $\angle EAF$, $\angle DAE$, and $\angle CAD$.



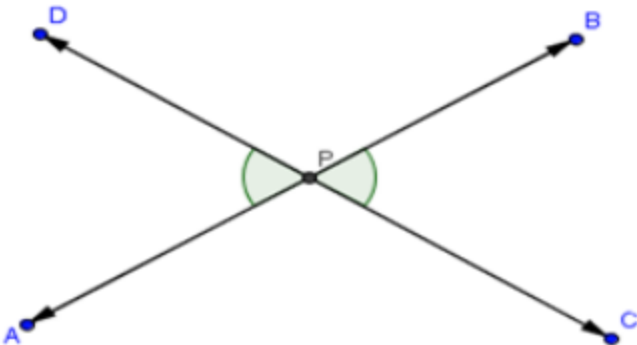
- 8) The measure of $\angle SPT = b^\circ$. The measure of $\angle TPR$ is five more than two times $\angle SPT$. The measure of $\angle QPS$ is twelve less than eight times $\angle SPT$. Find the measures of $\angle SPT$, $\angle TPR$, and $\angle QPS$.



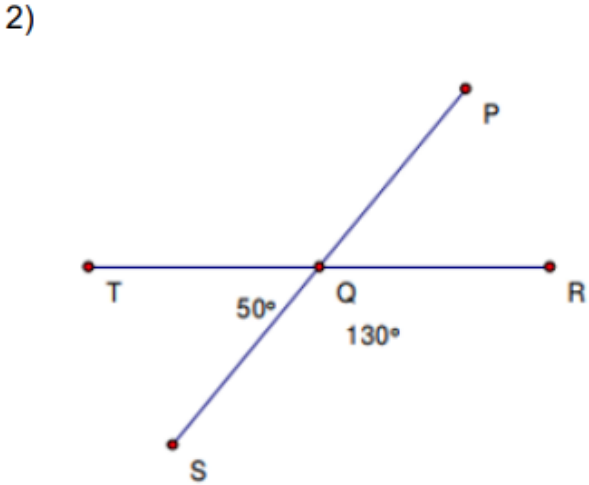
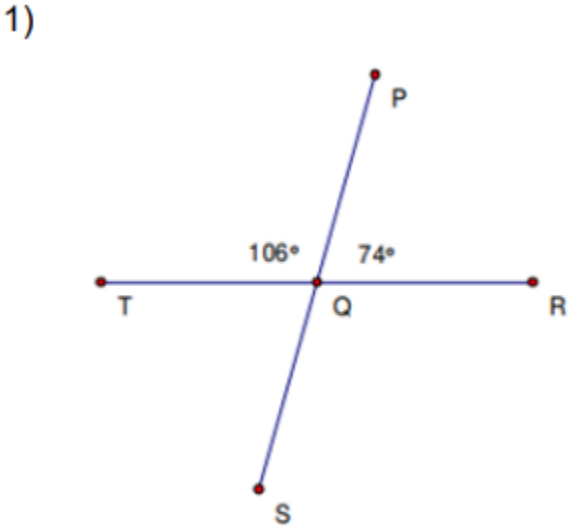
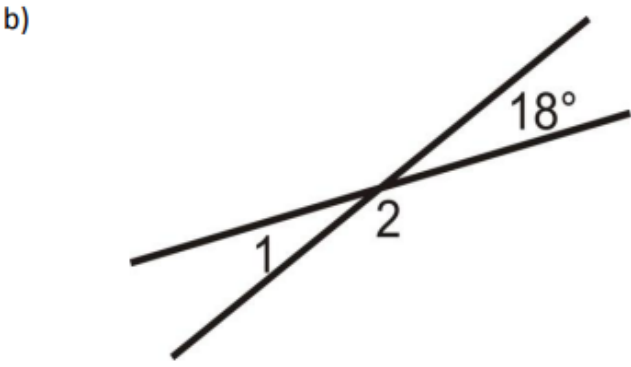
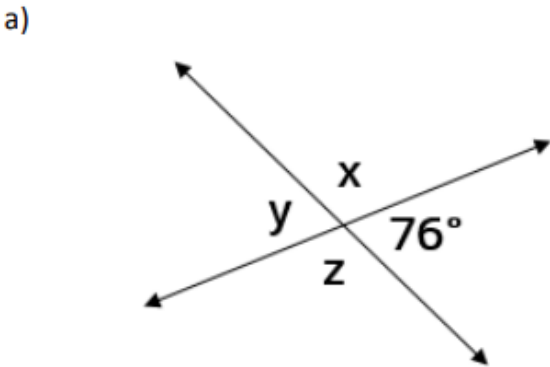
LESSON 3: VERTICAL ANGLES

Vertical Angles: opposite angles formed by the intersection of two lines.

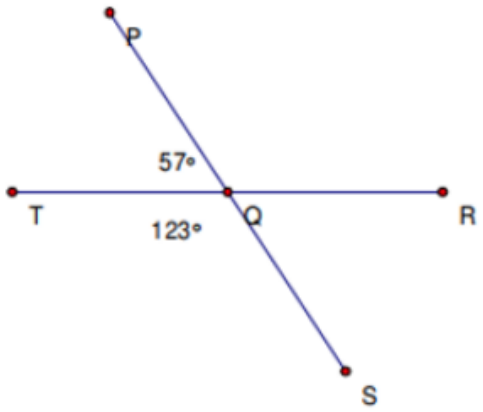
*Vertical angles are _____.



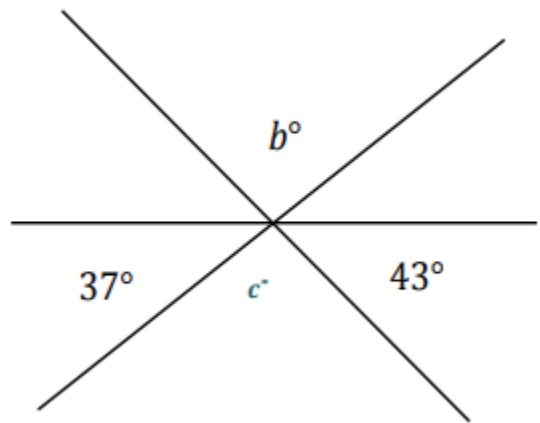
Find all the missing angles:



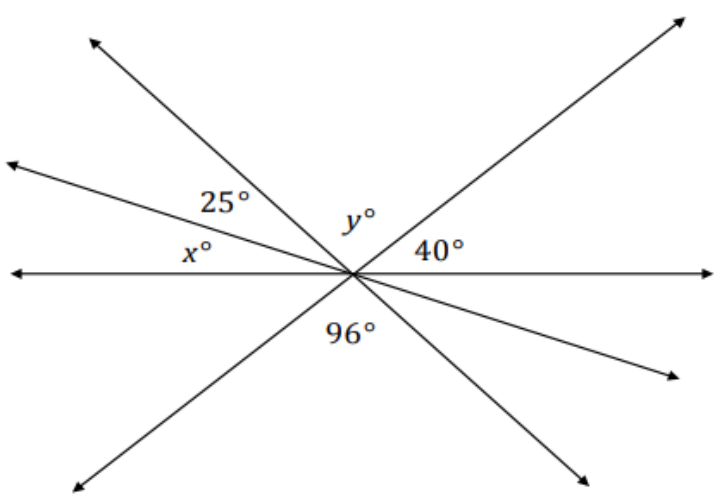
3)



4) Find the all the missing angles.

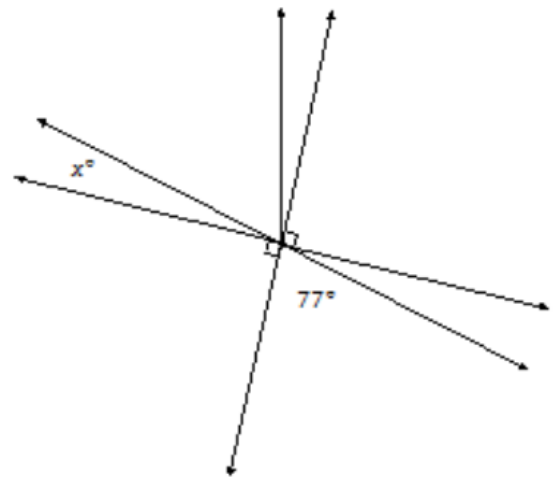
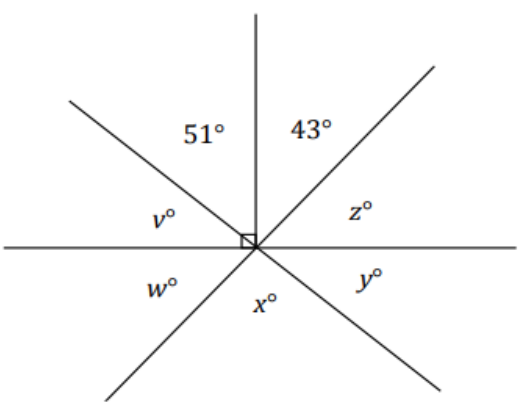


5) The following figure shows four lines intersecting at a point. Write an equation for the angle relationship shown in the figure and solve for x and y .



7) Find the missing value of x .

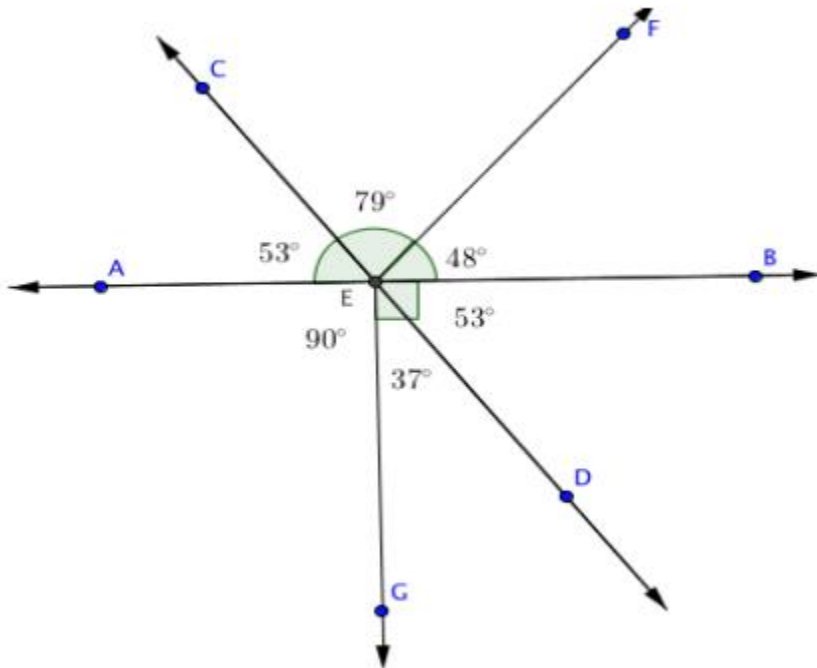
6) Find the measure of each missing value.



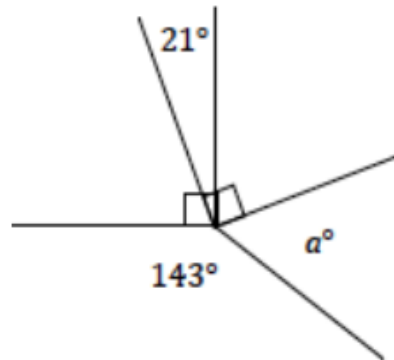
LESSON 4: SOLVE FOR UNKNOWN ANGLES

Angles at a point – The measure of all angles formed by three or more rays with the same vertex is 360°

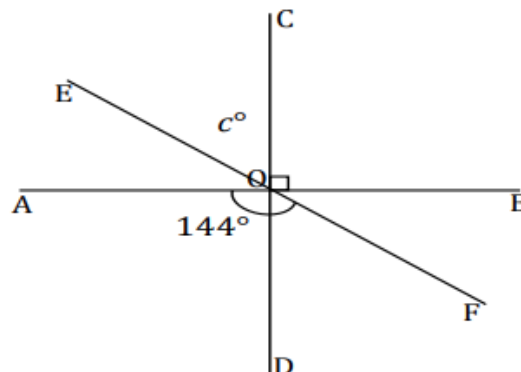
What angle relationships do you see?



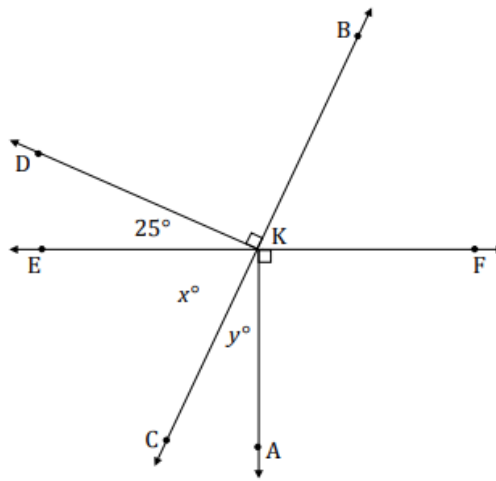
1) Find the missing value of a .



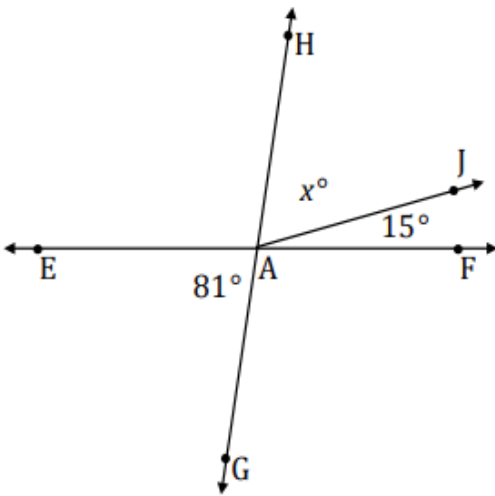
2) Find the missing value of c .



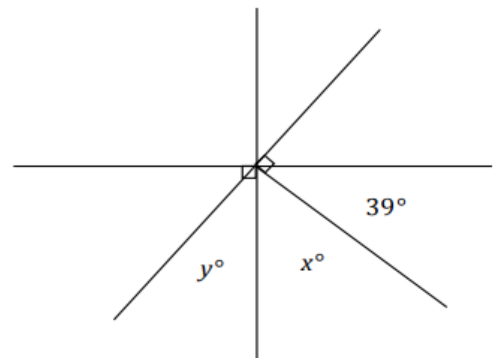
3) Find the measure of each missing value.



4) Find the missing value of x .

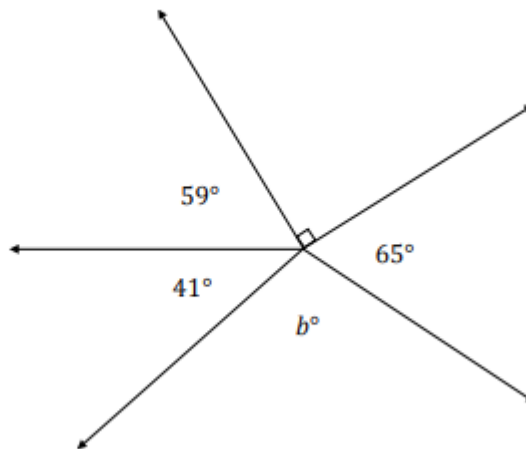


5) Find the missing value of x and y .

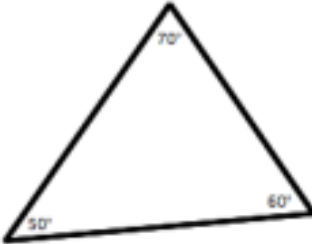

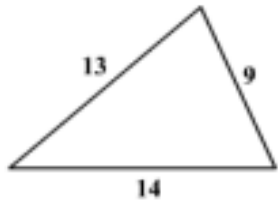



Directions: For each problem find the value of each angle.

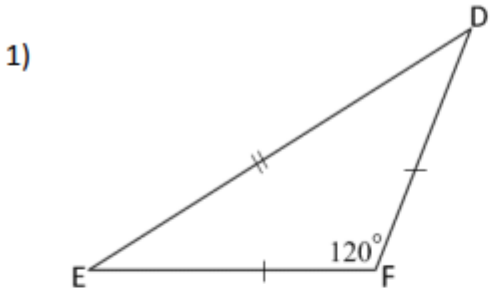
1) Find the missing value of l

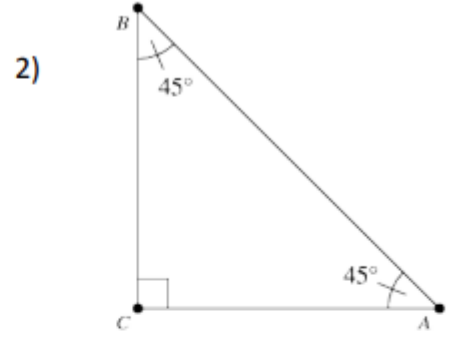


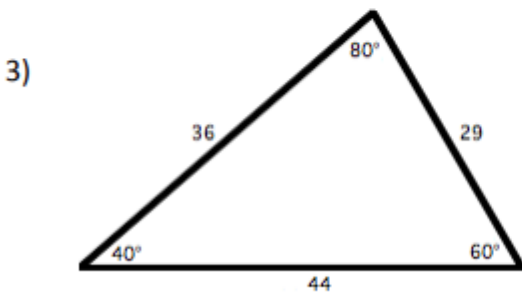
LESSON 5: CLASSIFY TRIANGLES

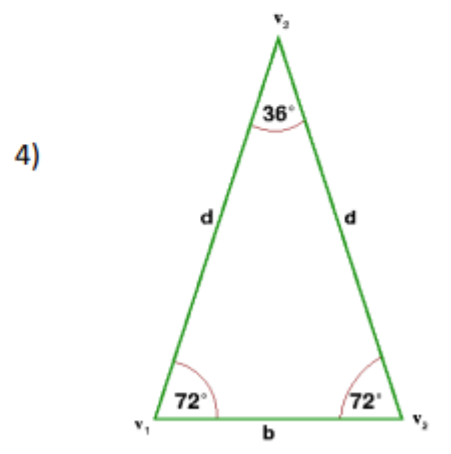
Name	Drawing	Definition
Acute Triangle		A triangle with all three angles less than 90° .
Right Triangle		A triangle with one 90° angle.
		A triangle with one obtuse angle.
Scalene Triangle		A triangle that has NO sides of equal length and NO congruent angles.
Isosceles Triangle		A triangle that has two sides of equal length and two congruent base angles.
		Has 3 congruent sides and 3 congruent angles.

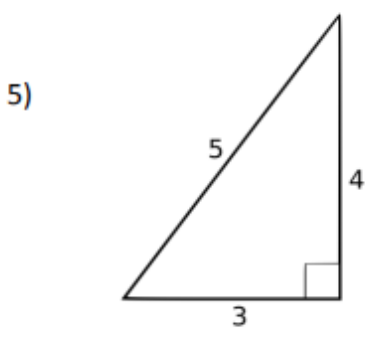
Classify the triangle by both its sides and its angles:

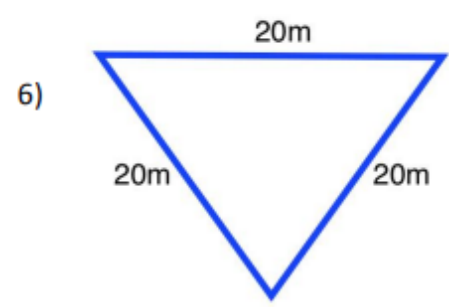








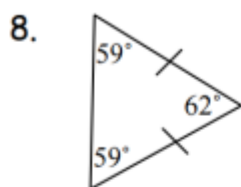




Match each triangle with its description.

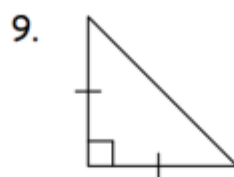
- | | |
|--|-------------------|
| ___ 1. Side lengths: 2cm, 3cm, 4cm | A. Equilateral |
| ___ 2. Side lengths: 3 cm, 2cm, 3cm | B. Scalene |
| ___ 3. Side lengths: 1cm, 4cm, 5cm | C. Obtuse |
| ___ 4. Side lengths: 4cm, 4cm, 4cm | D. Not a triangle |
| ___ 5. Angle measures: 60° , 60° , 60° | E. Equiangular |
| ___ 6. Angle measures: 30° , 60° , 90° | F. Isosceles |
| ___ 7. Angle measures: 20° , 145° , 15° | G. Right |

Classify each triangle by its angles and by its sides.



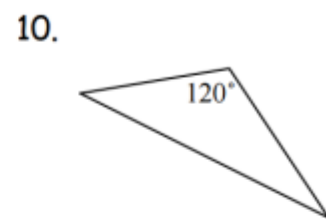
Sides: _____

Angles: _____



Sides: _____

Angles: _____



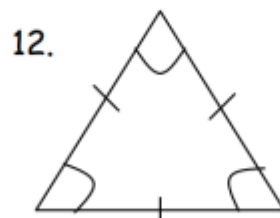
Sides: _____

Angles: _____



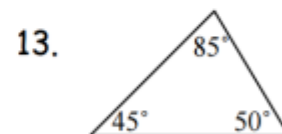
Sides: _____

Angles: _____



Sides: _____

Angles: _____

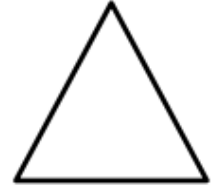


Sides: _____

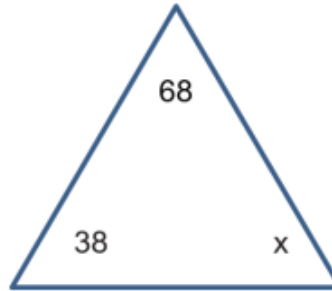
Angles: _____

LESSON 6: ANGLES IN A TRIANGLE

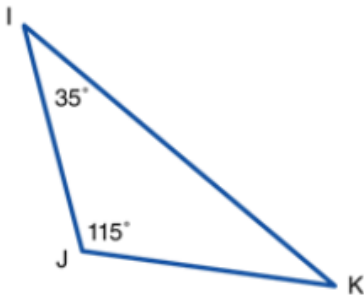
All the angles in a TRIANGLE have a sum of _____



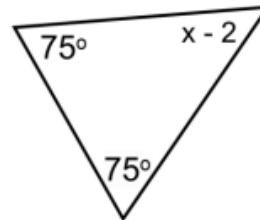
1) Find the missing value of x :



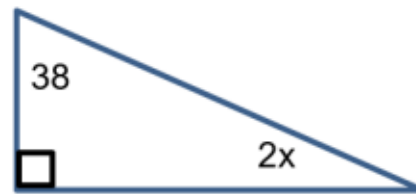
2) Find the $m\angle K$:



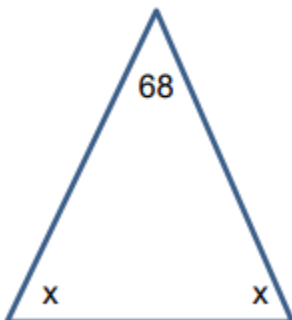
3) Find the value of x and find the missing angle.



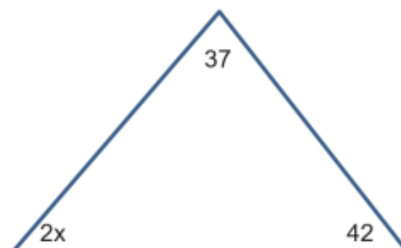
3) Find the value of x and find the missing angle.



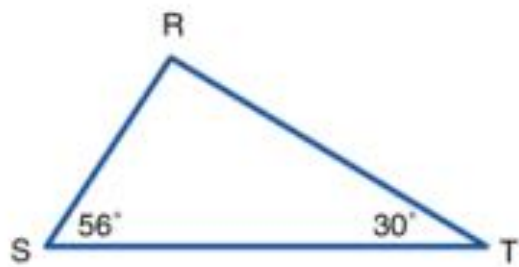
4) Find the value of x and find the missing angle.



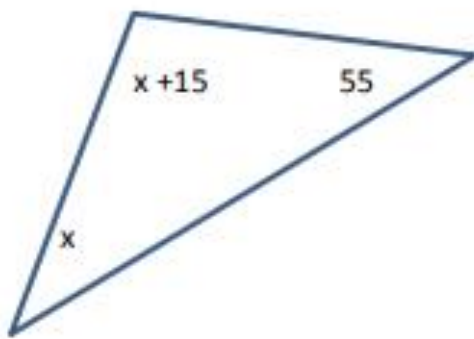
5) Find the value of x and find the missing angle.



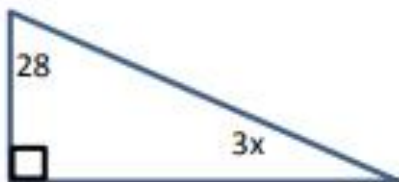
14) Find the missing angle.



15) Find the value of x and find the missing angle.



16) Find the value of x and find the missing angle.



LESSON 7: DRAW TRIANGLES

Open Activity:

James was creating triangles. Is it possible for him to draw a triangle with angle measures of 85° , 35° , and 60° ? Explain why or why not.

Is it possible for him draw a triangle with angles measures of 40° , 30° , and 120° ? Explain why or why not.

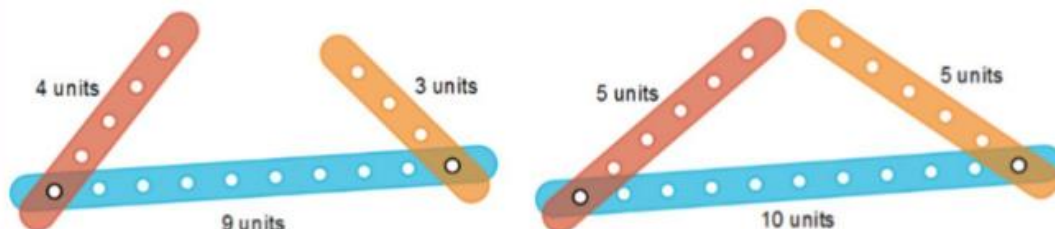
The sum of two angle measurements of a triangle must be less than 180° .

Which of the following sets of angle measurements can be two angles in a triangle?

- a) 30° , 120°
- b) 125° , 55°
- c) 105° , 80°
- d) 90° , 89°
- e) 91° , 89°

Impossible to Make a Triangle Conditions

1. If the sum of the angles in the triangle are less than or more than 180° .
2. If the sum of the two shorter sides is less than or equal to the length of the longest side.



Directions: State if the three numbers can be the measures of the sides of a triangle:

1) 7, 5, 4

2) 3, 6, 2

3) 11, 12, 9

4) 1, 13, 13

5) 3, 10, 8

6) 2, 15, 16

Directions: Two sides of a triangle have the following measures. Find the range of possible measures for the third side:

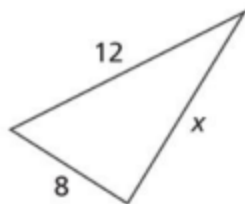
7) 9, 5

8) 6, 10

9) 11, 8

10) 5, 8

Which number could not be a value of x ?



[not drawn to scale]

a) 8

b) 9

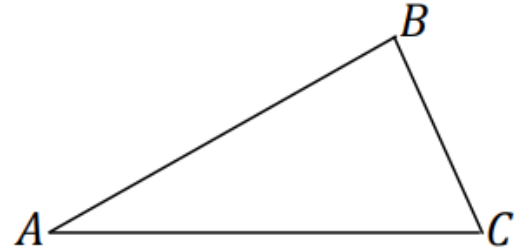
c) 12

d) 21

LESSON 8: UNIQUE TRIANGLES

The following terms are used to identify particular angles or sides:

- between
- adjacent to
- opposite to
- included [side/angle]



Exercises 1–7

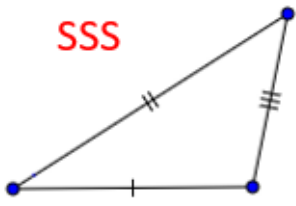
Use the figure $\triangle ABC$ to fill in the following blanks.

1. $\angle A$ is _____ sides \overline{AB} and \overline{AC} .
2. $\angle B$ is _____ side \overline{AB} and to side \overline{BC} .
3. Side \overline{AB} is _____ $\angle C$.
4. Side _____ is the included side of $\angle B$ and $\angle C$.
5. \angle _____ is opposite to side \overline{AC} .
6. Side \overline{AB} is between \angle _____ and \angle _____.
7. What is the included angle of sides \overline{AB} and \overline{BC} ? _____

Conditions for Unique Triangles

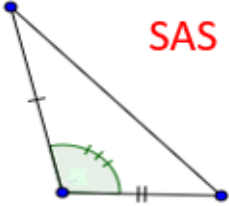
A unique triangle is a triangle that can only be drawn in one way. If a triangle is not unique then more than one triangle can be formed using the same measures.

SSS



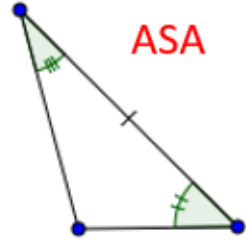
Knowing the length of three sides tells you it's unique

SAS



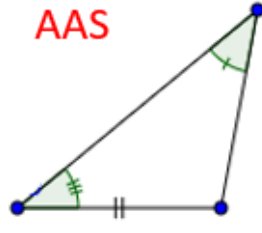
Knowing two sides and their included angle tells you it's unique

ASA

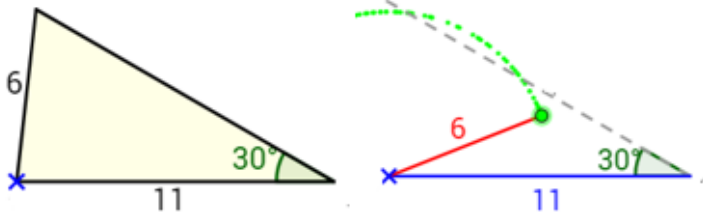


Knowing two angles and their included side tells you it's unique

AAS



Knowing two angles and the length of a non-included side tells you it's unique



SSA (not unique triangle)

Knowing two sides and a non-included angles is not sufficient for a unique triangle.
It may make two different triangles.

- 1) A triangle has a 60° angle, a 60° angle and a side 2 centimeters in length. Select true or false for each statement about this triangle.

Statement	True	False
This triangle must be an equilateral triangle.		
More than one triangle can be made with these measures.		
The triangle must contain an angle measuring 75°		

- 2) A triangle has a 40° angle, a 120° angle and a side 2.5 centimeters in length. Select true or false for each statement about this triangle.

Statement	True	False
This triangle must be an isosceles triangle.		
More than one triangle can be made with these measures.		
The triangle must contain an angle measuring 20°		

Draw a triangle that satisfies each set of conditions. Then classify each triangle.

10. a triangle with one obtuse angle and no congruent sides

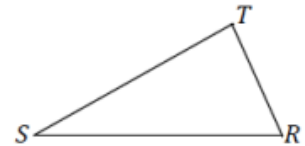
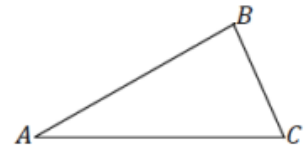
11. a triangle with three acute angles and three congruent sides

12. a triangle with one right angle and two congruent sides

LESSON 9A: CHECKING FOR IDENTICAL TRIANGLES

Example 1: Given the following triangle correspondences, use double arrows to show the correspondence between vertices, angles, and sides.

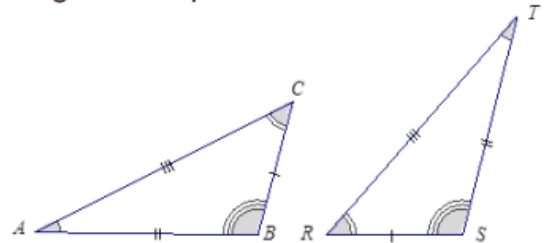
Triangle Correspondence	$\triangle ABC \leftrightarrow \triangle STR$
Correspondence of Vertices	
Correspondence of Angles	
Correspondence of Sides	



Try: Given the following triangle correspondences, use double arrows to show the correspondence between vertices, angles, and sides. (**DRAW TRIANGLE TO HELP**)

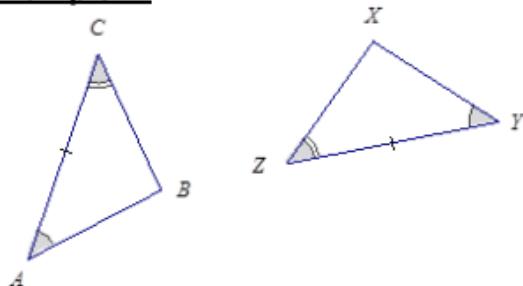
Triangle Correspondence	$\triangle QRP \leftrightarrow \triangle WYX$
Correspondence of Vertices	
Correspondence of Angles	
Correspondence of Sides	

Example 2: Two identical triangles are shown below. Give a triangle correspondence that matches equal sides and equal angles.

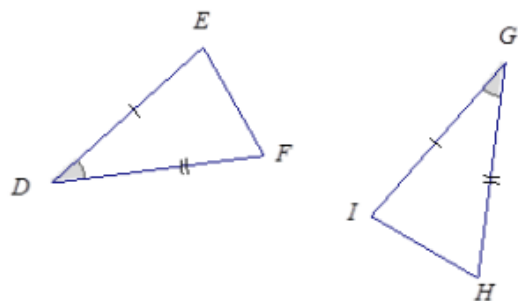


Directions: Determine whether the triangles are identical. If the triangles are identical, give the triangle conditions that explain why, and write a triangle correspondence that matches the sides and angles.

Example 1:



Example 2:



Directions: Three pieces of information are given for $\triangle ABC$ and $\triangle XYZ$. Draw, freehand, the two triangles (do not worry about scale), and mark the given information. If the triangles are identical, give a triangle correspondence that matches equal angles and equal sides. Explain your reasoning.

Example 5:

$$AB = XZ, AC = XY, \angle A = \angle X$$

Example 6:

$$\angle A = \angle Z, \angle B = \angle Y, AB = YZ$$

Example 7:

$$\angle A = \angle Z, \angle B = \angle Y, BC = XY$$

Example 8:

$$\angle A = \angle Z, \angle B = \angle Y, BC = XZ$$

LESSON 9B: CHECKING FOR IDENTICAL TRIANGLES

Open Activity:

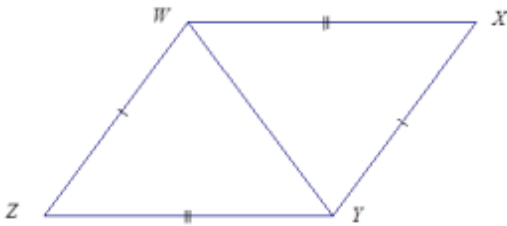
Three pieces of information are given for $\triangle ABC$ and $\triangle YZX$. Draw, freehand, the two triangles (do not worry about scale), and mark the given information. If the triangles are identical, give a triangle correspondence that matches equal angles and equal sides. Explain your reasoning.

$$AB = XZ, \angle A = \angle Z, \angle C = \angle Y$$

Directions: In each of the following, determine whether the triangles are *identical* and justify your reasoning. If the triangles are identical, write a triangle correspondence that matches the sides and angles.

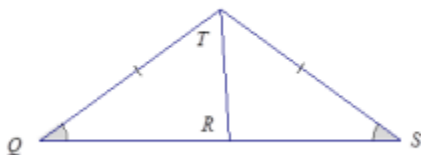
Example 1:

What is the relationship between the two triangles below?



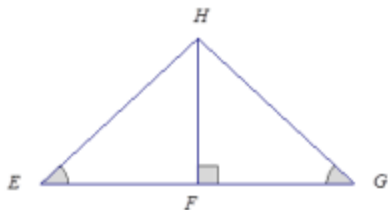
Example 2:

Are the triangles identical? Justify your reasoning.



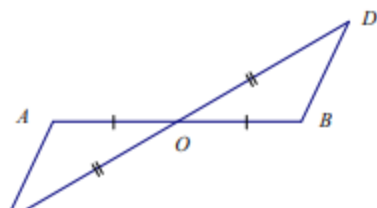
Example 3:

Are the triangles identical? Justify your reasoning.



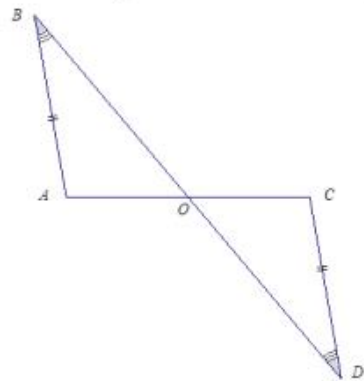
Example 4:

Are the triangles identical? Justify your reasoning.



Example 5:

Are the triangles identical? Justify your reasoning.



Example 6:

Are the triangles identical? Justify your reasoning.

