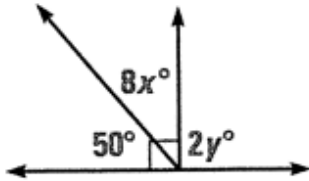# Triangles

Name:_____

Classifying Triangles & Triangle Sum

Date:

Warm Up: Use what you remember to solve for both missing variables

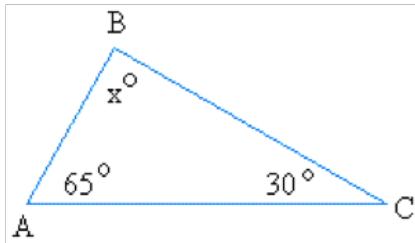$8x°$

$50°$ $2y°$

$x =$ _____

$y =$ _____
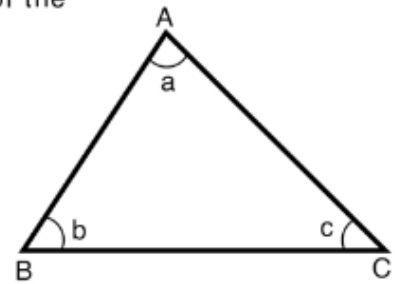
Triangle Sum Theorem

MATH
MONKS

States that the sum of the
3 interior angles of a
triangle add
up to 180°

If ∠a, ∠b, & ∠c are
the 3 angles of
ΔABC, then

∠a + ∠b + ∠c = 180°

Triangle Angle Sum Theorem
the sum of interior angles of a triangle is 180°.

Find the value of x.

B

$x°$

$65°$ $30°$

A C

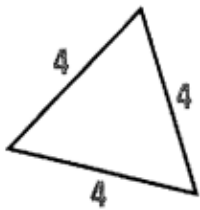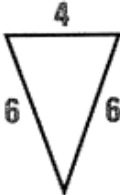| Classifying Triangles by Side Lengths		
Equilateral: ALL sides are equal in length Picture:	**Isosceles:** TWO sides are equal in length Picture:	**Scalene:** NONE of the sides are equal Picture:

Examples: Classify each triangle by its sides.

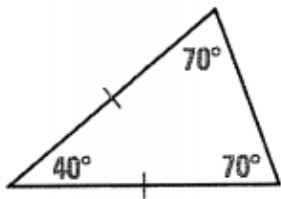a. _____   b. _____   c. _____

Classifying Triangles by Angles

Acute:	Right:	Obtuse:	Equiangular:
Triangle with angles all LESS than 90 degrees	**Triangle with ONE angle that is 90 degrees**	**Triangle with ONE angle that is over 90 degrees**	**Triangle with THREE equal angles** **MUST BE 60 degrees**
Picture:	Picture:	Picture:	Picture:

Examples: Classify each triangle by its sides and angles.

a.

70°
40°   70°

By Sides: _____

By Angles: _____

b.

3   5
4
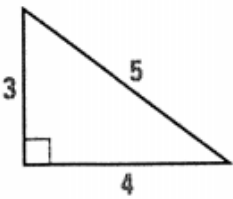
By Sides: _____

By Angles: _____

c.

40°   9
6.4
95°   45°
5.8
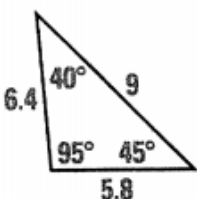
By Sides: _____
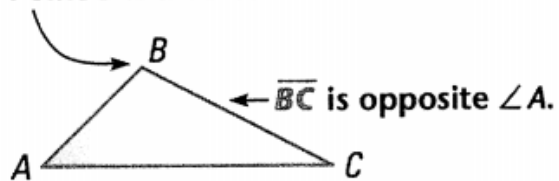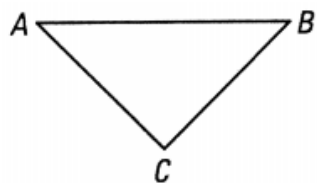
By Angles: _____

A _____**VERTEX**_____ of a triangle is a point that joints two sides of the triangle.

A side across from an angle is the _____**OPPOSITE**_____ side.

Point B is a vertex.

B

← $\overline{BC}$ is opposite ∠A.

A   C

Examples: Name the side that is opposite each angle below.

A   B

C

a. ∠A

Side: _____

b. ∠B

Side: _____

c. ∠C

Side: _____

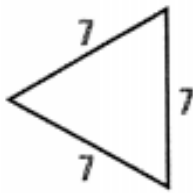**On Your Own:**

Problems 1 – 3, use the diagram below.

P

Q   R
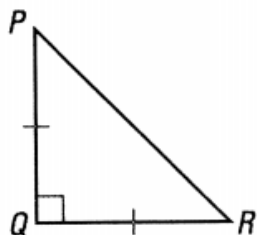
1. Name the side *opposite* ∠P.

2. Name the side *opposite* ∠Q.

3. Classify the triangle by its sides.

4. Classify the triangle by its angles.
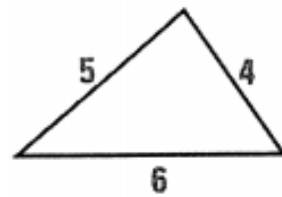
Problems 5 – 7: Classify each triangle by its sides.

5. _____
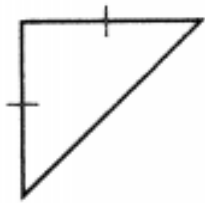
6. _____

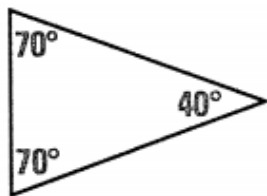7. _____
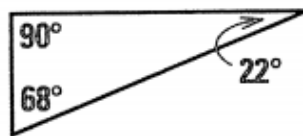
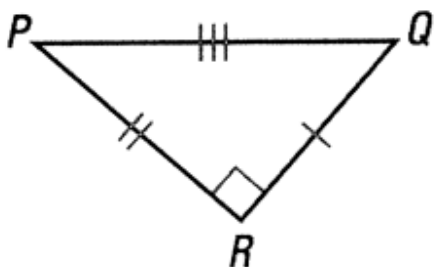Problems 8 – 10: Classify each triangle by its angles.

8. _____

9. _____

10. _____

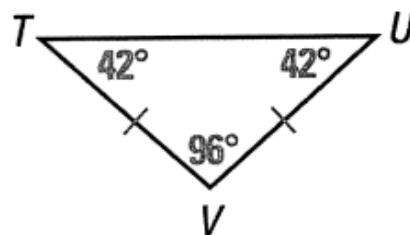Problems 11 – 14: Classify each triangle by its sides and angles.

11. By sides: _____

By angles: _____

12. By sides: _____
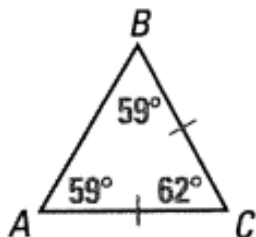
By angles: _____

13.

14. By sides: _____

By angles: _____
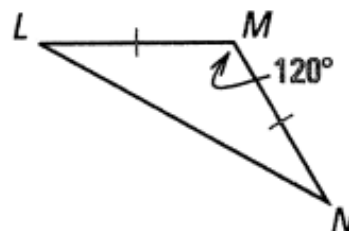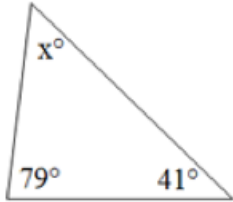
15. By sides: _____

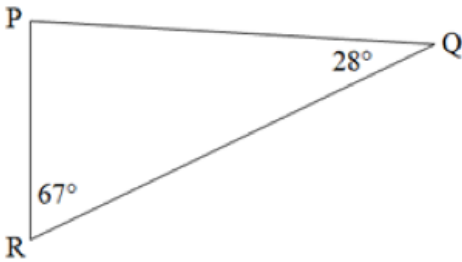By angles: _____

5

Triangles Day 2: Solving for x

Date:

Warm-Up:

a. Determine the unknown angle in the triangle pictured below:

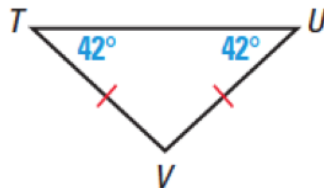After finding the missing angle, classify the triangles as acute, right, or obtuse.

b. Determine the measure of $\angle P$ in the triangle pictured below.

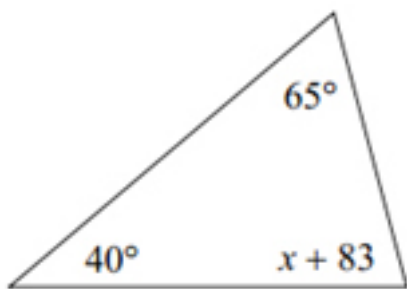After finding the missing angle, classify the triangles as acute, right, or obtuse.

c. Classify each triangle by its angles and sides.

_____ & _____

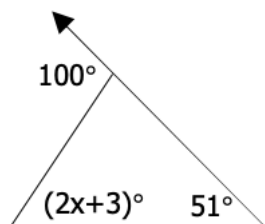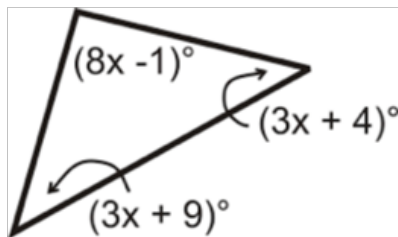**Using Properties of Triangles to Solve for x**

Example 1:

65°

40° $x + 83$

Example 2:

100°
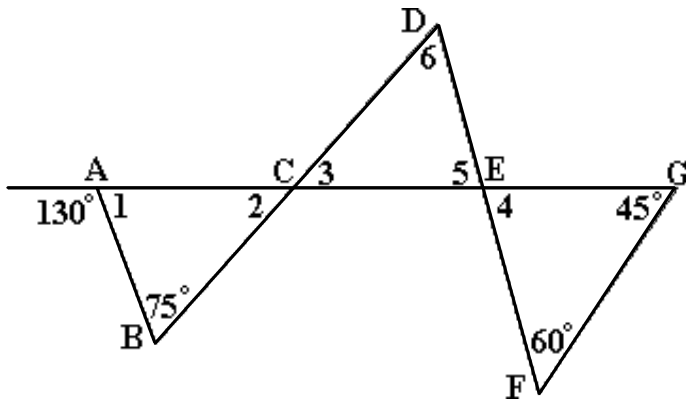
(2x+3)°   51°

Example 3:

(8x -1)°

(3x + 4)°

(3x + 9)°
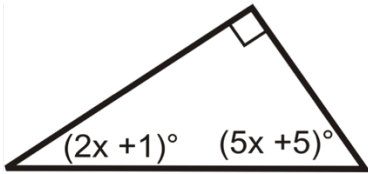
On your own:

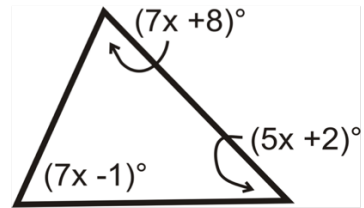1. Find the measure of each numbered angle. (Hint: Use vertical angles, and linear pairs)
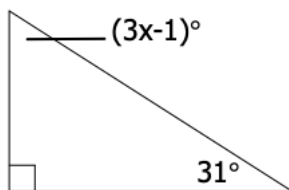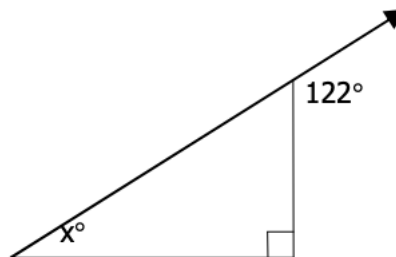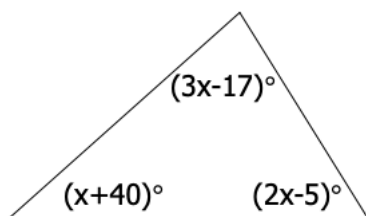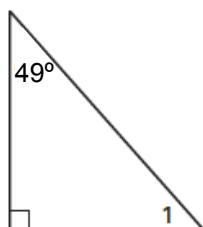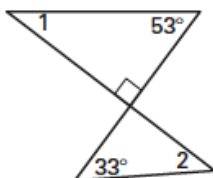

2. Find the value of x.

a.

b.

c.

d.

e.

3. Find all of the missing angle measurements
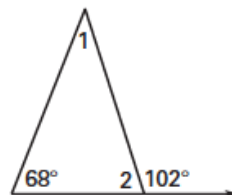
a.
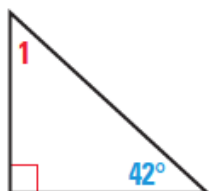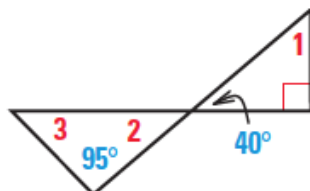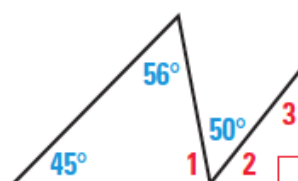

b.

c.

a.

b.
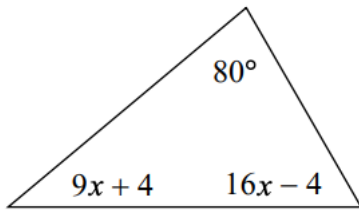

c.

Isosceles and Equilateral Triangles

Date:

Warm Up: Solve for the missing variable and angle measurements

80°

$9x + 4$ $16x - 4$

$x = $ _____

$m < A = $ _____

$m < B = $ _____

Triangle Sum Theorem   MATH MONKS

States that the sum of the
3 interior angles of a
triangle add
up to 180°

If ∠a, ∠b, & ∠c are
the 3 angles of
ΔABC, then
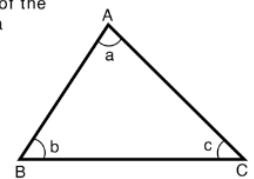
∠a + ∠b + ∠c = 180°

Class Notes:

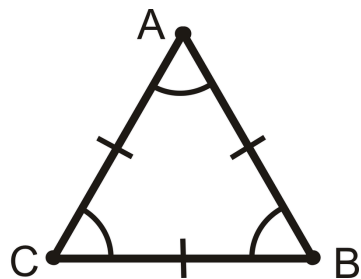| Isosceles Triangles |
|---|
| Characteristics:

 E
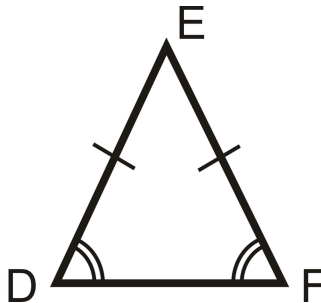
 D   F |
| If two _____ of a triangle are congruent, then the _____ those sides are _____ .

 If two _____ of a triangle are congruent, then the _____ those angles are _____ . |

Equilateral Triangles

Characteristics:

Example:

a. Find the value of *x*.
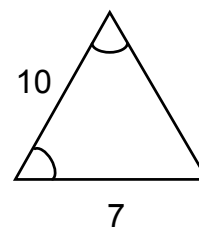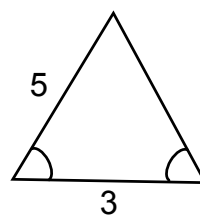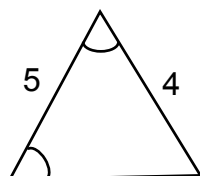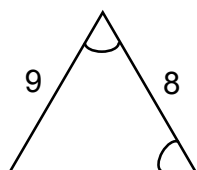

b. Find the value of *y*.
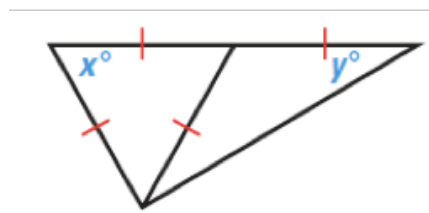
Find the length of the missing side of each triangle.

9   8

5   4

5

3

10

7

On Your Own:

Using Algebra: Solve for *x* and *y*.
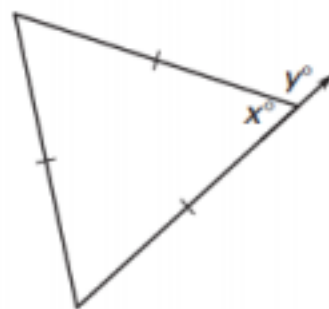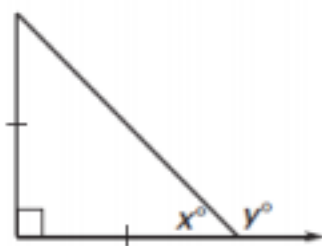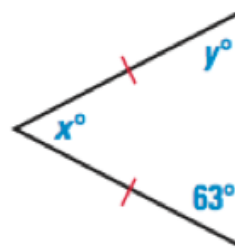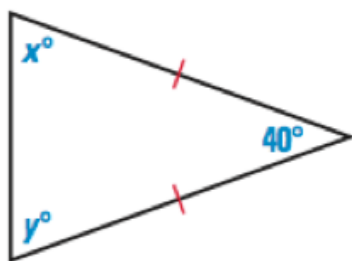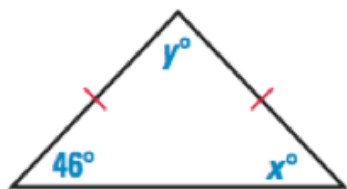
Find the value of *x*.
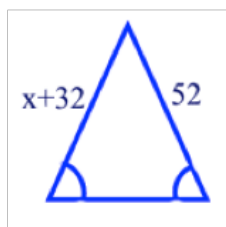
Find the measure of ∠*x*
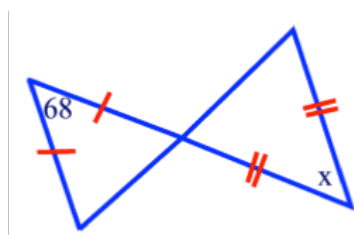
Multiple Choice:

1. In $\triangle PQR$ shown below, $\overline{PR} \cong \overline{PQ}$ and $m\angle P = 50°$
    What is $m\angle Q$?
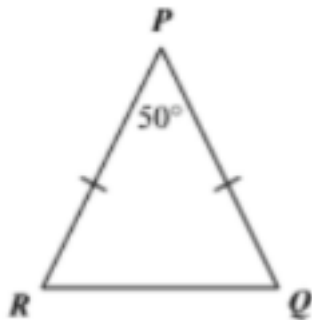
    A. 25°   B. 50°   C. 65°   D. 80°

2. The diagram below shows $\triangle GFJ$. Point H lies on $\overline{GJ}$.
    Based on the angle measures in the diagram, what is $m\angle FGH$?
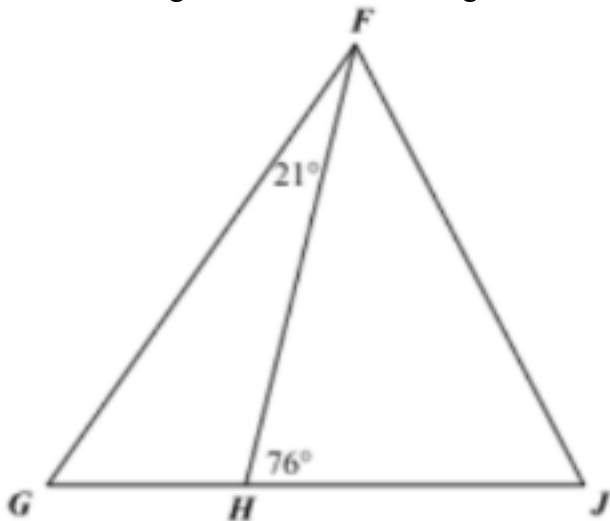
    A. 21°   B. 42°   C. 55°   D. 76°

3. What is the value of x?
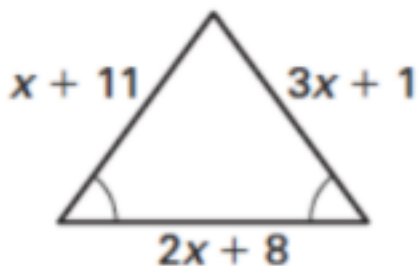
    A. 3   B. 5   C. 7   D. 11

4. What is the value of x?
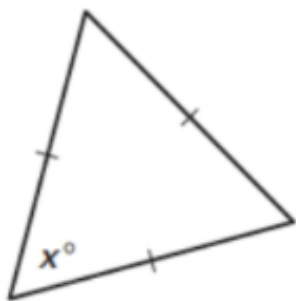
A. 30   B. 60   C. 90   D. 100

Questions 5 & 6: Use the diagram provided below.
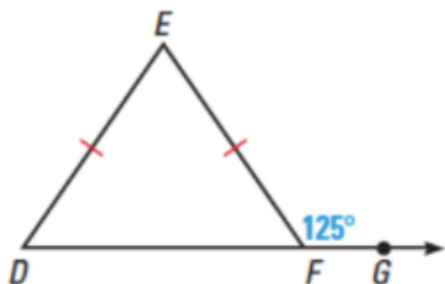
5. What is the measure of $\angle EFD$?

A. 55°   B. 65°   C. 125°   D. 180°

6. What is the measure of $\angle DEF$?

A. 50°   B. 70°   C. 125°   D. 180°

Isosceles & Equilateral Triangles Day 2

Date:

Warm-Up:

1. Find the measure of each missing angle in the triangles.

a.

b. $64°$

c. $64°$

d. $58°$
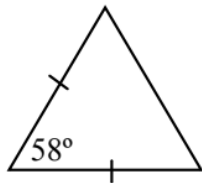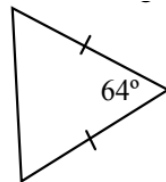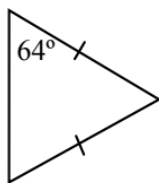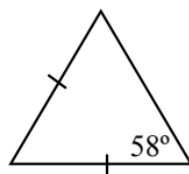
Class Examples:

Find the value x.

1. $(x + 13)$ ft   24 ft
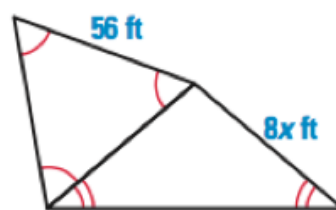
2. $2x$ in.   12 in.

3. 56 ft $8x$ ft

4. Find the measure of each numbered angle.

$m\angle 1 =$ _____

$m\angle 2 =$ _____

$m\angle 3 =$ _____

$m\angle 4 =$ _____

$m\angle 5 =$ _____

$m\angle 6 =$ _____

$m\angle 7 =$ _____

$m\angle 8 =$ _____

$m\angle 9 =$ _____
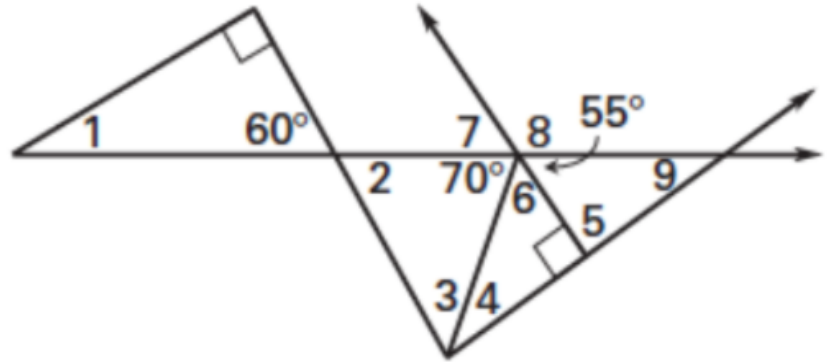
6. Given $m\angle DEF = 90°$
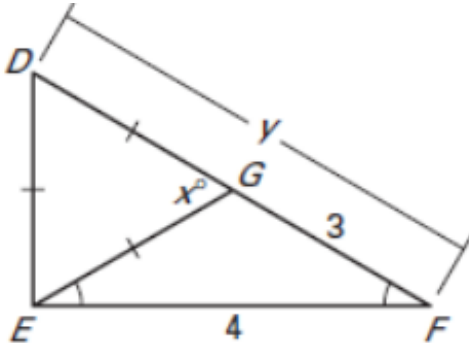
Find the value of x: _____

Find the $m\angle GEF$: _____

Find the length of EG: _____

Find the length of DG: _____

Find the value of y: _____

On Your Own:

1. Find the measure of ∠y

48

y
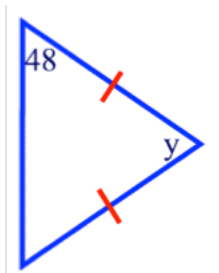
2. Find the measure of ∠1

50

1
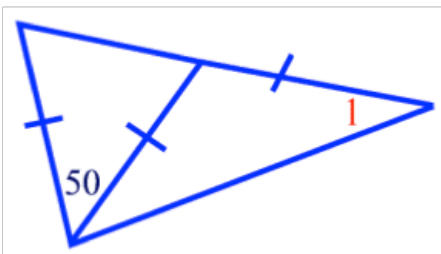
Find the values of x and y.

3.

$x°$

75°

$y°$

$x°$

4.

$y°$

$x°$

140°

4.

40°

$y°$

$x°$

5.

$x°$

$y°$
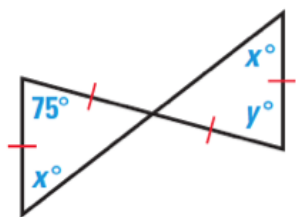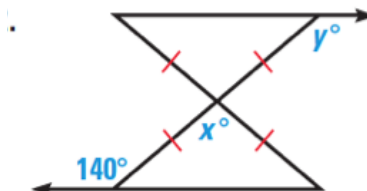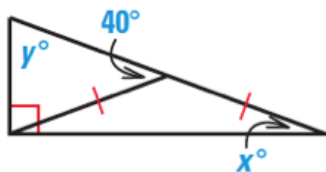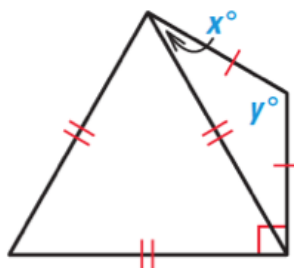
For each of the following problems find the values the missing variables.

12. x = _____
    y = _____

$(3x - 11)°$ $(2x + 11)°$

$2y°$

13. x = _____
    y = _____

$3x°$ $(y + 7)°$

14. x = _____

$(9x - 11)$ ft

$(5x + 16)$ ft

15. x = _____

$(7x - 13)$ in. $(x + 29)$ in.

$(3x + 5)$ in.
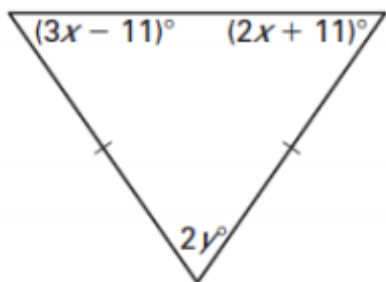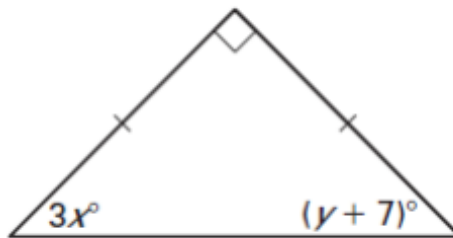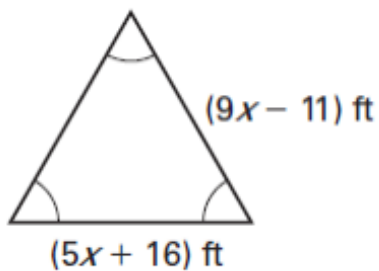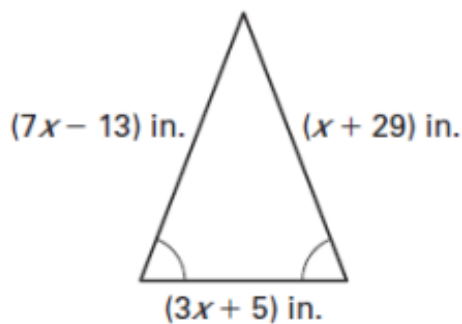
Triangle Inequalities

Date:

Warm Up: Solve for x using the properties of triangles and isosceles triangles.
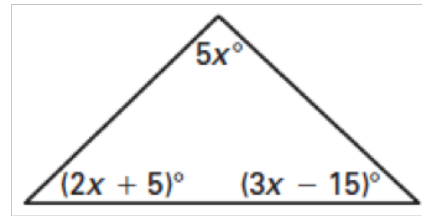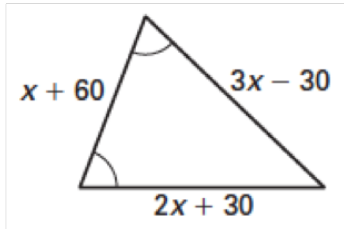
Try to make a triangle with each set of sides listed below. Each side should be perfectly flat and not bed at all. Record the length of each side and whether or not a triangle can be formed using these side lengths.

Side Lengths (inches): Yellow: 2   Green:3   Pink:4
Blue: 5   Orange: 6   Purple: 7

Sides	Length of SHORTEST side	Length of MIDDLE side	Length of LONGEST side	Can these three side lengths form a triangle?
Green, yellow, Orange				
Pink, Orange, Purple				
Orange, orange, purple				
Blue, Yellow, Purple				

Triangle Inequality Theorem

If x is the longest side, then:

If y is the longest side, then:

If z is the longest side, then:

1. Determine whether or not the three side lengths can form a triangle.

    a. 7, 4, 5   b. 8, 4, 3   c. 11, 12, 23   d. 8, 8, 8

Given the lengths of two sides of a triangle:
the third side must be _____ than the difference between the given sides, and
the third side must be _____ than the sum of the given sides.

2.   Complete each inequality to describe the length of the third side of a triangle, given the length of two of its sides.

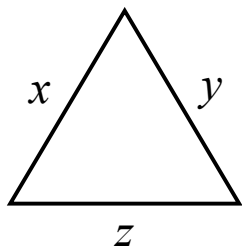   a.   5 mm., 9 mm., x mm.   _____ < x < _____

    b.   12 in., 11 in., y in.   _____ < y < _____

    c.   15 cm., 15 cm., n cm.   _____ < n < _____

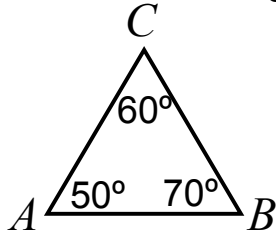   d.   1 m., 2 m., z m.   _____ < z < _____

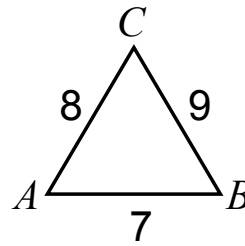| **Relationship Between the Length of a Side and the Measure of an Interior Angle in a Triangle** |
| --- |
| The longest side of a triangle is _____ . |
| The shortest side of a triangle is _____ . |

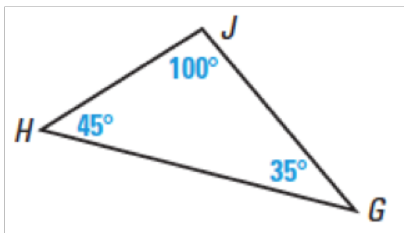**Examples:** (Diagrams not drawn to scale)
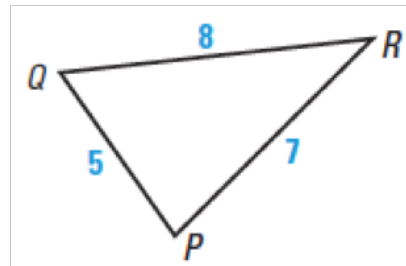
1. Which side is the longest?

2. Which angle has the smallest measure?

3. List the sides from least to greatest

4. List the angle from least to greatest

On Your Own:

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

1) 7, 5, 4

2) 3, 6, 2

3) 5, 2, 4

4) 8, 2, 8

5) 9, 6, 5

6) 5, 8, 4

Two sides of a triangle have the following measures. Find the range of the possible measures for the third side. Express this as a compound inequality. The first two problems will help you write then inequality, then you are on your own!

7) 9, 5

         _____ < x < _____

8) 5, 8

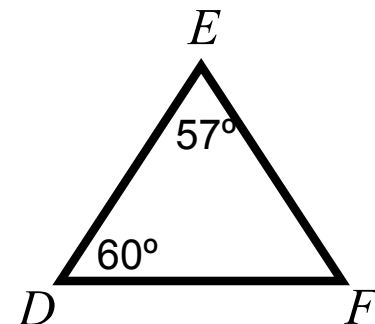   _____ < x < _____

9) 6, 10

10) 6, 15

11) 11, 8

12) 14, 11

5. Name the smallest and largest angles of $\triangle DEF$

        Smallest Angle: _____

        Largest Angle: _____
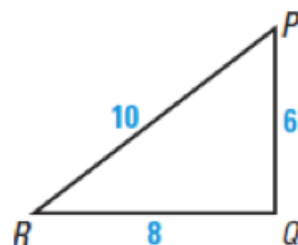
6. Name the shortest and longest sides of $\triangle DEF$

        Shortest Side: _____

        Longest Side: _____

7. Name the smallest and largest angles of each triangle below.

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8. List the sides in order from shortest to longest for each of the triangles below.
Hint: You may need to find missing angles before you can do this!

B
80°
60°   40°
A   C

35°   120°
G
H   J