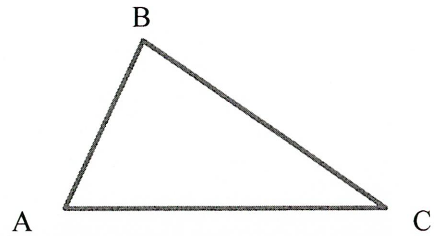
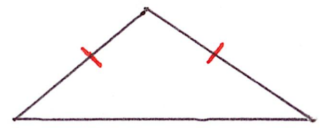
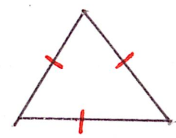
Chapter 4.1: Apply Triangle Sum Properties

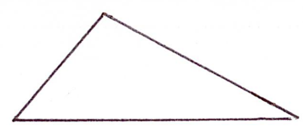
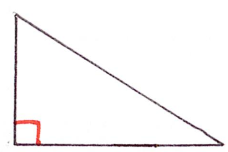
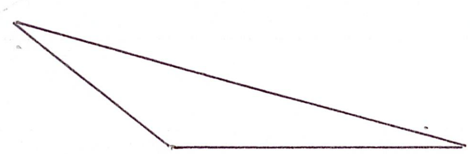
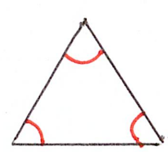
A **triangle** is polygon with three sides.
A triangle with vertices *A*, *B*, and *C* is called "triangle *ABC*" or $\triangle ABC$



Classifying Triangles by Sides:

Term	Definition	Example
Scalene Triangle	Triangle with no congruent sides	
Isosceles Triangle	Triangle with two congruent sides	
Equilateral Triangle	Triangle with three congruent sides	

Classifying Triangles by Angles:

Term	Definition	Example
Acute Triangle	Triangle with three acute angles.	
Right Triangle	Triangle with one right angle (two acute angles)	
Obtuse Triangle	Triangle with one obtuse angle (two acute angles)	
Equiangular Triangle	Triangle with three congruent angles (acute)	

Distance Formula: $D = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

Change graph

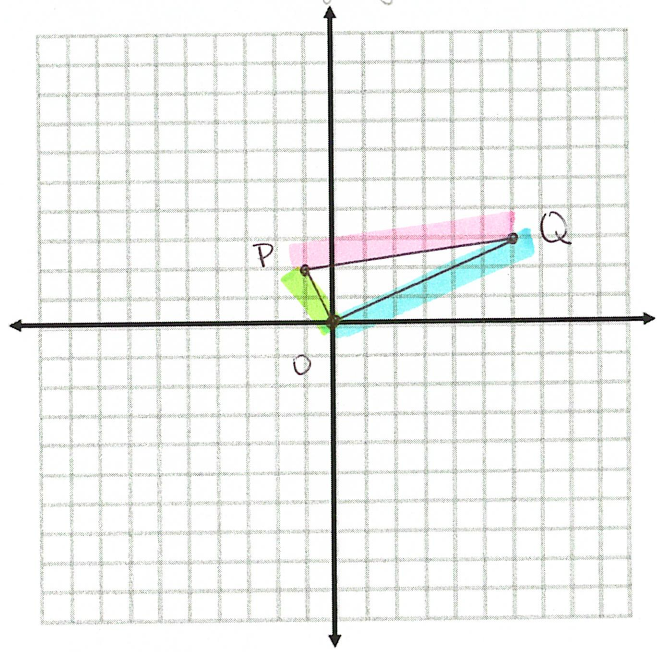
Example #1: Classify $\triangle PQO$ by its sides.
Vertices P(-1, 2); Q(6,3); O(0, 0)

$x_1\ y_1 \quad x_2\ y_2 \quad x_1\ y_1$

$PQ = \sqrt{(6-(-1))^2 + (3-2)^2}$

$PQ = \sqrt{49+1}$

$PQ = \sqrt{50} \approx 7.1$ units



$OQ = \sqrt{(6-0)^2 + (3-0)^2}$

$OQ = \sqrt{36+9}$

$OQ = \sqrt{45} \approx 6.7$ units

★ No sides are ≅ … $\boxed{\text{Scalene triangle}}$

Determine if the triangle is a right triangle. → 90°… ⊥ lines (need to look @ slope)
↳ opposite signs and reciprocal (flipped fraction)

Slope of PO $= \frac{-2}{1} = -2$

Slope of OQ $= \frac{3}{6} = \frac{1}{2}$

★ Right Triangle
because -2 and $\frac{1}{2}$ are opposite reciprocal
Slope → ⊥ → 90° angle

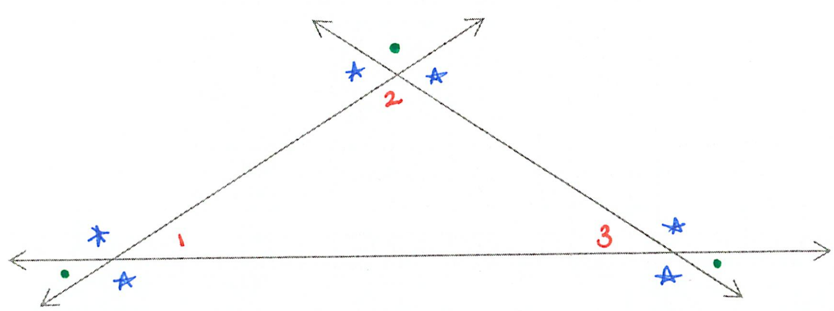
Angles: When the sides of a polygon are extended, other angles are formed. The original angles are the

(∠1, ∠2, ∠3)
interior angles. The angles that form linear pairs with the interior angles are the

exterior angles.

$\underbrace{\text{interior} + \text{exterior} = 180°}_{\text{Supplementary}}$

Vertical Angles of the interior angles (≅)

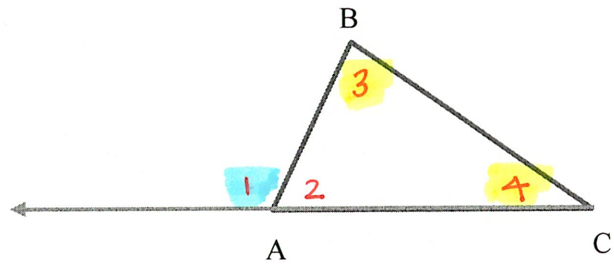


Triangle Sum Theorem (Theorem 4.1):

The sum of the measures of the interior angles of a triangle is <u>180°</u>.

Exterior Angles Theorem (Theorem 4.2):

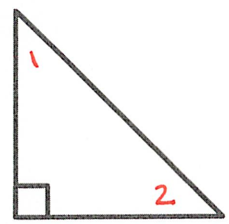
The measure of an exterior angles of a triangle is equal to the <u>Sum</u> of the measures of the two <u>nonadjacent</u> interior angles.



$m\angle 1 = m\angle 3 + m\angle 4$

Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are <u>Complementary</u>.



$m\angle 1 + m\angle 2 = 90°$

Example #2: The front face of a wheelchair ramp form a right triangle. The measure of one acute angles in the triangle is eight times the measure of the other. Find the measure of each acute angle.

$8x + x = 90$

$9x = 90$

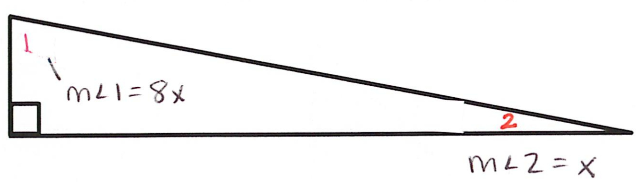
$\frac{9x}{9} = \frac{90}{9}$

$x = 10°$

$m\angle 1 = 8(10)$

$\boxed{m\angle 1 = 80°}$

$\boxed{m\angle 2 = 10°}$



Example #3: Find $m\angle 1$

$3x + 16 = 52 + 2x$

$-2x \qquad -2x$

$x + 16 = 52$

$-16 \qquad -16$

$x = 36°$

$m\angle 1 = 180 - (3(36) + 16)$

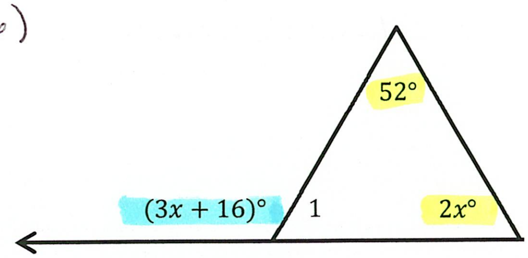
$m\angle 1 = 180 - 124$

$\boxed{m\angle 1 = 56°}$

or

$m\angle 1 = 180 - 52 - 2(36)$

$\boxed{m\angle 1 = 56°}$



Example #4: Find the measure of each interior angles of $\triangle ABC$, where $m\angle A = x°$, $m\angle B = 2x°$ and $m\angle C = 3x°$.

$m\angle A + m\angle B + m\angle C = 180°$

$x + 2x + 3x = 180$

$\frac{6x}{6} = \frac{180}{6}$

$x = 30°$

$\boxed{m\angle A = 30° \quad m\angle B = 60° \quad m\angle C = 90°}$

Chapter 4.2: Apply Congruence and Triangles

Two geometric figures are **congruent** if they have exactly the Same Size and shape.

In two Congruent figures, all the parts of one figure are congruent to the Corresponding parts of the other figure.

→ Includes Angles, side Lengths, etc

Corresponding Angles: $\angle A \cong \angle E$ $\angle B \cong \angle F$ $\angle C \cong \angle G$

Corresponding Sides: $\overline{AB} \cong \overline{EF}$ $\overline{BC} \cong \overline{FG}$ $\overline{CA} \cong \overline{GE}$

→ A statement saying figures are $\cong$

Congruent Statements: When you write a congruence statement for two polygons, always list the corresponding vertices in the same order.

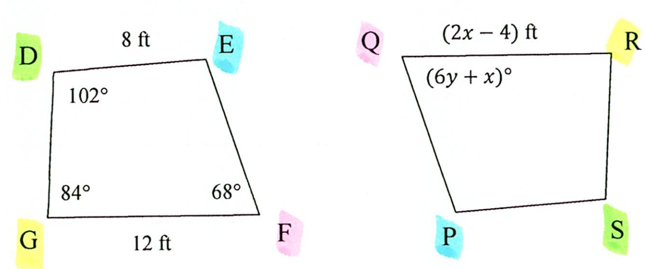
Example Statement: $\triangle ABC \cong \triangle EFG$ OR $\triangle CAB \cong GEF$

NOT a Congruent Statement: $\triangle ABC \cong \triangle GFE$

Example #1: In the diagram $DEFG \cong SPQR$

a.) Find the value of x

b.) Find the value of y



$\angle Q \cong \angle F$

$6y + x = 68$

$6y + 8 = 68$
$-8 \quad -8$

$\frac{6y}{6} = \frac{60}{6}$

$y = 10$

$\overline{GF} \cong \overline{RQ}$

$12 = 2x - 4$
$+4 \quad +4$

$\frac{16}{2} = \frac{2x}{2}$

$x = 8$