

# §4.1 Apply Triangle Sum Properties



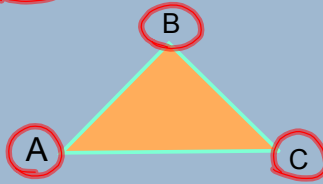
- Before** You classified angles and found their measures.
- Now** You will classify triangles and find measures of their angles.
- Why?** So you can place actors on stage, as in Ex. 40, Pg 213.

G.CO.10 Prove theorems about triangles.

Triangle: A polygon with three sides.

Label the triangle.

\*  $\triangle ABC$

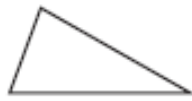


## KEY CONCEPT

For Your Notebook

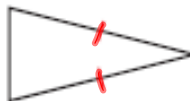
### Classifying Triangles by Sides

Scalene Triangle



No congruent sides

Isosceles Triangle



At least 2 congruent sides

Equilateral Triangle



3 congruent sides

### Classifying Triangles by Angles

Acute Triangle



3 acute angles

Right Triangle



1 right angle

Obtuse Triangle



1 obtuse angle

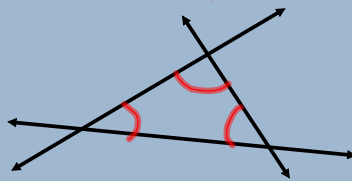
Equiangular Triangle



3 congruent angles

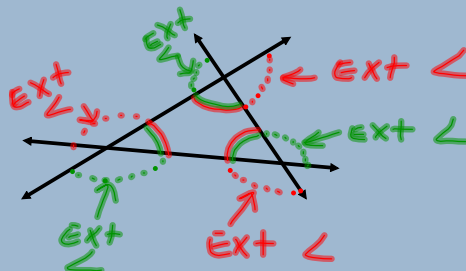
Angles:

Interior angles - The original angles.



When the sides of a polygon are extended, other angles are formed.

\* Exterior angles - The angles that form linear pairs with the interior angles.



## Classify a triangle in a coordinate plane.

Classify  $\triangle PQR$  by its sides. Then determine if the triangle is a right triangle.

\*Recall:

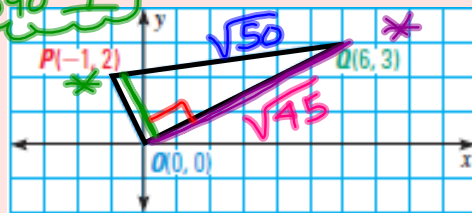
$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$m_{\overline{PQ}} = \frac{2 - 0}{-1 - 0}$$

$$m_{\overline{QR}} = \frac{3 - 0}{6 - 0}$$

$$m = \frac{2}{-1} = -2$$

$$m = \frac{3}{6} = \frac{1}{2}$$



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

$$= \sqrt{49 + 1}$$

$$= \sqrt{50}$$

$$d_{\overline{QR}} = \sqrt{(\cancel{6} - \cancel{0})^2 + (\cancel{3} - \cancel{0})^2}$$

$$= \sqrt{36 + 9}$$

$$= \sqrt{45}$$

Classification: Right Scalene  $\triangle$

Make a conjecture about the sum of the measures of the angles of a triangle.



**Conjecture:** The sum of the measures of the angles of a triangle is  $180^\circ$ .



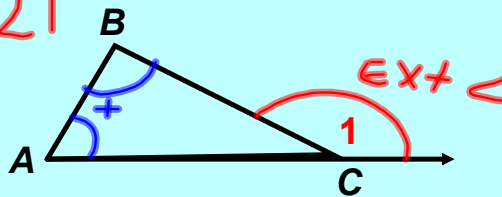
## The Triangle Sum Theorem

The sum of the measures of the angles of a triangle is  $180^\circ$ .

### EXTERIOR ANGLES THEOREM

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.

$$m\angle A + m\angle B = m\angle 1$$

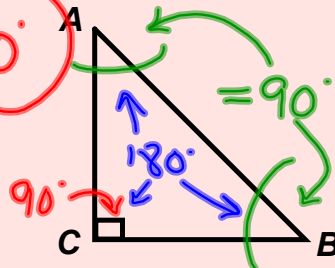


**Corollary to a Theorem** - Is a statement that can be PROVEN EASILY using the theorem.

### COROLLARY to the TRIANGLE SUM THEOREM

The acute angles of a right triangle are complementary.

$$m\angle A + m\angle B = 90^\circ$$



## Find an angle measure

1a Find  $m\angle 1$ .

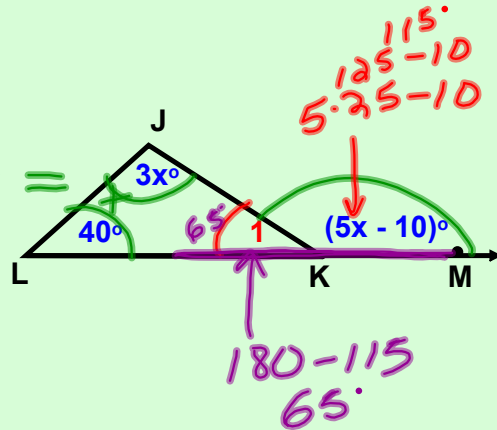
$$5x - 10 = 3x + 40$$

$$2x - 10 = 40$$

$$2x = 50$$

$$x = 25$$

$$5x - 10 =$$



b. Find the measure of each interior angle.

$$m\angle J = 3(25) = 75^\circ$$

$$40 + 75 + 65 = 180 \checkmark$$

2. Find the acute angles of the triangle.

$$2x + x - 6 = 90$$

$$3x - 6 = 90$$

$$3x = 96$$

$$x = 32$$

