Name: _____   Date: _____

Student Exploration: Classifying Triangles

Vocabulary: acute, equilateral, isosceles, obtuse, right, scalene

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. **Right** angles are angles that measure 90°. Which sign to the right has right

   angles at its vertices? _____

2. **Acute** angles are angles that measure more than 0° and less than 90°.
   Obtuse angles are angles that measure more than 90° and less than 180°.

   A. How does an acute angle look different from a right angle? _____

   _____

   B. Which sign has acute angles at its vertices? _____

   C. Which sign has obtuse angles at its vertices? _____

Gizmo Warm-up
In the *Classifying Triangles* Gizmo, you can create and manipulate triangles. You can also
measure sides and angles of your triangles to classify them and explore their properties.

1. Under **Condition**, select **No conditions**. Drag the vertices to
   create a triangle with one obtuse angle. Select **Show angle
   measure tool** to open a Gizmo protractor. To measure an angle,
   attach the protractor's "donuts" to 3 points as shown to the right.
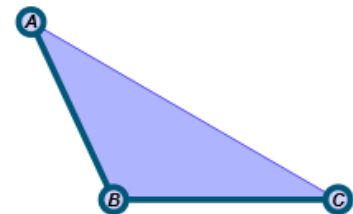
   A. What is the measure of the obtuse angle? _____

   B. Measure the other two angles. What kind of angles are they? _____

2. Look at the **Angle-based classifications** list. The green check marks show you which
   names apply to the current triangle shown in the Gizmo.

   A. Based on its angles, what kind of triangle is this? _____

   B. Drag the vertices to see more triangles like this. What defines an obtuse triangle?

   _____

Activity A: **Classifying triangles by angles and sides**	Get the Gizmo ready: • Turn on the Gizmo protractors. • Be sure **No conditions** is selected.	

1. In the Gizmo, drag *A* until all three angles appear to be acute.

    A. Use the Gizmo protractor to measure the angles. Record their measures below.

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

    B. Look under **Angle-based classifications**. What kind of triangle is this? _____

    C. Drag the vertices to view more triangles like this. What defines an acute triangle?

    _____

2. A right triangle is another triangle that is classified by its angles.

    A. In the Gizmo, create several right triangles. Sketch one of the right triangles in the space to the right.

    B. What do you think defines a right triangle? _____

    C. Can a right triangle have more than one right angle? _____   Why or why not?

    _____

3. With **No conditions** selected, drag *A* until there is a green check mark next to **Isosceles**.

    A. Use the Gizmo rulers to measure the three sides. What is true about the sides in this

    isosceles triangle? _____

    Drag the vertices to create a variety of isosceles triangles to see if this is always true.

    B. Under **Condition**, select **Two sides congruent**. Drag the vertices to make several of these triangles. What are all the classifications that apply to these triangles?

    _____

    C. Under **Condition**, select **Two congruent angles**. Drag the vertices to see several more triangles. What are all the classifications that apply to this type of triangle?

    _____

(Activity A continued on next page)

Activity A (continued from previous page)

4. Select **No conditions.** Then drag *A* until there is a green check mark next to **Equilateral**.

    A. Use the Gizmo rulers to measure the three sides. What is true about the sides in this

    equilateral triangle? _____

    Drag the vertices to experiment with a variety of equilateral triangles to check if this is always true.

    B. Under **Condition**, select **Three sides congruent**. Drag the vertices to create a variety of triangles. List all the classifications that apply to these triangles.

    _____

    C. Under **Condition**, select **Three congruent angles**. Drag the vertices to look at more triangles. What are all the classifications that apply to this type of triangle?

    _____

5. Select **No conditions**. Drag the vertices of the triangle around. Watch the **side-based classifications** as you do.

    A. If a triangle is not isosceles or equilateral, what does it have to be? _____

    B. Experiment with the triangle, using the Gizmo rulers to measure the sides. What do

    you think defines a **scalene** triangle? _____
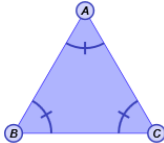
    _____

6. Create several of each type of triangle in the Gizmo. Then sketch two different examples of each type of triangle in the space below.

    A. right scalene   B. obtuse isosceles   C. acute equilateral

Activity B: Multiple-condition triangles	Get the Gizmo ready: • Be sure **No conditions** is selected.	

1. Triangles can be classified by their side and angle measures (listed below). In the Gizmo, try to create a triangle for each pair of classifications in the table (for example, "acute scalene"). If you can, sketch an example. If not, write "not possible" and explain why not.

	Scalene	**Isosceles**	**Equilateral**
Acute			
Right			
Obtuse			

2. Look at the table above. One of the triangles can be classified in three different ways.

 A. What three triangle classifications can all be true at the same time?

 _____   _____   _____

 B. How is it possible for all three of these classifications to be true at the same time?

 _____

 _____