**Activity 2.3.2a Angles in Isosceles Triangles**

In the following activity, triangles will be constructed with compass and straight edge by drawing a circle. At this point, it is known that isosceles triangles are triangles with *at least* two congruent sides.

The two congruent sides of an isosceles triangle are called *legs.* The third side is called the *base.*

Using this vocabulary, label the triangles below.

 a) b) \_\_\_\_\_\_

 \_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_\_\_

 \_\_\_\_\_\_\_

 \_\_\_\_\_\_\_

You will be asked to use inductive reasoning (*reasoning that allows you to reach a conclusion based on a pattern of specific examples)* to form a conjecture about the angles in isosceles triangles. To start, follow the instructions below to form isosceles triangles using a circle.

1. Points *A* and *B* lie on the circumference of Circle *C*.

 A Connect point *C* (the center) to point *A*. $\overbar{CA}$ is called a

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Circle *C*.

 B Connect point *C* to point *B*. $\overbar{CB}$ is called a \_\_\_\_\_\_\_\_\_\_\_

 of Circle *C*.

 C Now connect point *A* and *B* to form chord $\overbar{AB}$. Because $\overbar{CA}$ and $\overbar{CB }$are both radii of Circle *C*, we know that $\overbar{CA}$ *\_\_\_\_*$\overbar{CB}$.

 If $ ABC$ has two congruent sides then it is called an

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. Draw two points on the circle *O* and label them *N* and *P*. Form triangle $∆NOP$ by drawing the radii and a chord.

 O

3. Now draw two circles with radii 2 inches and 1 inch respectively below with a compass and straightedge. Remember to mark the center of each circle.

Follow the same procedure of drawing two points on the circumference of each circle and form triangles by drawing the two radii and a chord.

Circle Q with radius of 2 inches. Circle E with radius of 1 inch.

\*\*Now cut out the 4 triangles created in #1, 2, and 3 and finish answering the questions on the following page.

4. Now fold all four triangles you created on their axis of symmetry.

What do you notice about the sides and the angles that overlap?

 *Line of symmetry*

5. The overlapping sides are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. The overlapping angles are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. Now form a conjecture (a generalization using inductive reasoning).

If two sides of a triangle are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then the angles opposite these sides

are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. What transformation was used in this activity?

**Vocabulary related to Isosceles triangles**

Legs: the two congruent sides

Base: the third side of and isosceles triangle that is not necessarily congruent to the other sides

Base angles: the angles opposite from the legs and adjacent to the base

Vertex angle: the angle opposite from the base in an isosceles triangle

9. Now label the isosceles triangle below with the above vocabulary.