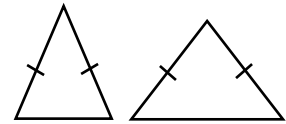Name: _____   Date: _____

Student Exploration: Constructing Congruent Segments and Angles

Vocabulary: congruent, construction

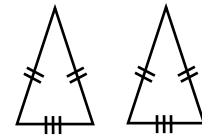**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. The legs of the isosceles triangles to the right are the same length.

   Are these triangles **congruent** (same size and shape)? _____

2. The isosceles triangles to the right have congruent legs and bases.

   A. Are these triangles congruent? _____

   B. When two triangles are congruent, what do you know about their angles? _____

   _____

Gizmo Warm-up
If triangles have three pairs of congruent corresponding sides, then the triangles are congruent. In the *Constructing Congruent Segments and Angles* Gizmo, first you will **construct** congruent segments. Then you will create congruent angles by constructing congruent isosceles triangles.
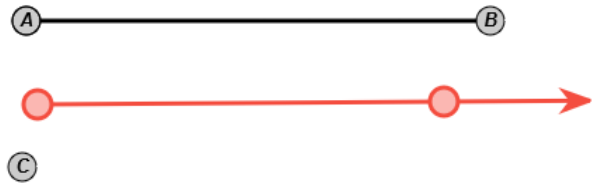
You will use a straightedge and a compass to complete the constructions. To begin, select **Construct a congruent segment** from the dropdown menu to see the Gizmo straightedge.
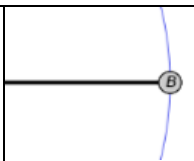
1. Drag the endpoint of the straightedge until it snaps onto point *C*. Then drag the other point on the straightedge around.

   What happens? _____

2. Click **Continue**. The circle that appears is the Gizmo compass. The center of the circle represents the "point" of the compass, and the point on the circle represents the "pencil" that can draw a circle. Place the point of the compass on point *C*. Drag the point on the circle.

   What happens to the radius? _____

Activity A:	Get the Gizmo ready:	
Constructing congruent segments	• Check that **Construct a congruent segment** is selected. • Click **Reset**.	

The Gizmo gives instructions for constructing a segment that is congruent to a given segment. Follow the steps given in the Gizmo. After you complete each step, click **Continue** to go on to the next step.

At any time, if you wish to understand the overall strategy for this construction, click **How?** If you need help understanding the purpose of a particular step, click **Why?** If you want to start over on the construction, click **Reset**.

After you finish the Gizmo construction, click **Reset** and do the construction again. If possible, do the construction on a separate piece of paper using a compass and straightedge. Use the Gizmo as your guide to complete each step of the construction. Answer the following questions as you go along.
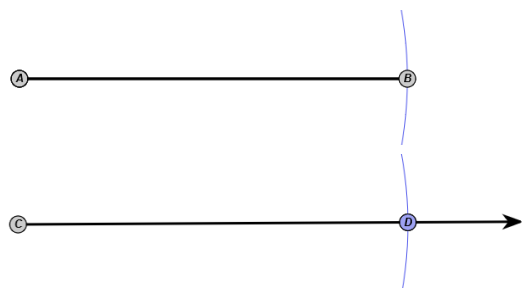
1. In step 2, does it matter if you put the center of the compass on point *A* or point *B*? _____

    Explain. _____

    _____

2. In step 3, why is it important to keep the compass opening the same as it was in step 2?

    _____

    _____

3. What two segments did you construct to be
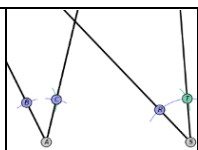
    congruent? _____

    Select **Show ruler** to open the Gizmo rulers. Attach the "donuts" to the endpoints of the segments to check that the segments are congruent.

4. Is it possible to construct a segment that is twice as long as $\overline{AB}$? _____

    Explain. _____

    _____

    _____

Activity B: **Constructing congruent angles**	<u>Get the Gizmo ready</u>: • Turn off the Gizmo rulers. • Select **Construct a congruent angle**.	

Follow the directions given in the Gizmo to construct an angle congruent to a given angle. After you complete each step, click **Continue** to go on.

At any time, if you wish to understand the overall strategy for this construction, click **How?** If you need help understanding the purpose of a particular step, click **Why?** If you want to start over on the construction, click **Reset**.

After you finish the Gizmo construction, click **Reset** and do the construction again. If possible, do the construction on a separate piece of paper using a compass and straightedge. Use the Gizmo as your guide to complete each step of the construction. Answer the following questions as you go along.

1. At the beginning of step 3, points *B* and *C* appear. What is true about

   the lengths of $\overline{AB}$ and $\overline{AC}$? _____

   How do you know? _____

   _____
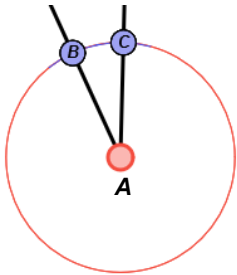
2. In step 5, why is it important to keep the compass opening the same as it was in step 4?

   _____

3. In step 7, how are the lengths of $\overline{AB}$, $\overline{AC}$, $\overline{SR}$, and $\overline{ST}$ related? _____

   Use the Gizmo rulers to check that this is true.
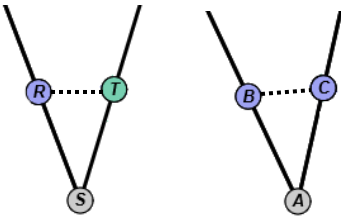
4. Look at the completed construction shown to the right.

   A. How are $\overline{BC}$ and $\overline{RT}$ related? _____

   B. How are ΔABC and ΔSRT related, and how do you know? _____

   _____

   C. How do you know that angle ∠*BAC* is congruent to ∠*RST*? _____

   _____

   Select **Show angle measure tool** to open the Gizmo protractors. Attach the "donuts" to points on each angle to check that the angles are congruent.