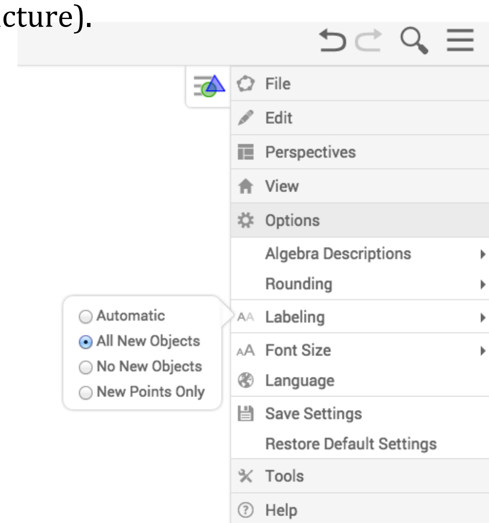
One Special Type of Triangle…

1) Go to www.geogebra.org. Select "Start Creating". Then select the "Geometry" perspective.

2) Right click in the blank screen. Uncheck "Show Axes". (This will cause the axes to disappear.)

3) Next, go to the menu. (3 horizontal bars in the upper right hand corner.) Go to "Labeling". Select "All New Objects." (See picture).



4) Construct a circle anywhere on the screen. The center of the circle should be labeled A.

5) Go to the Point Tool. Select "Point On Object". Plot and label 2 points (label them C and D) that lie on the circle.

6) Go to the "Segment" tool. Construct segments $\overline{AC}$, $\overline{AD}$, and $\overline{CD}$.

7) Right click on the circle. Uncheck "Show Object" to Hide the circle. Right click on point B and perform the same action for this object as well.

8) Notice that points A, C, and D serve as the vertices of a newly formed triangle. Go to the "Move" (arrow) tool and drag these points around. **WITHOUT using GeoGebra to measure any of its side lengths, how would you classify this triangle by its sides?** Clearly explain how and why you would classify the triangle this way. (Again, be sure not to use any measuring tools yet.)

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9) Now use GeoGebra to measure and display the lengths of segments $\overline{AC}$ and $\overline{AD}$ only. (Don't bother measuring the 3rd side now.) Is your classification you made in (8) on the previous page correct?

10) Notice how angle C is located opposite $\overline{AD}$. In addition, notice how angle D is located opposite $\overline{AC}$. Use GeoGebra to find and display the measures of these 2 angles. (Once you do so, be sure to change the measure setting of each angle to remain between 0 and 180 degrees.)

11) Now, move points C and D around. What do you notice about the measures of angles C and D?

12) Use your observations to complete the following theorem. This theorem is called the **ISOSCELES TRIANGLE THEOREM.**

If two ________________________ of a triangle are __________________________, then

the ____________________ located opposite those ____________________ are

______________________________.

13) In your diagram, angles C and D are called *base angles*, seeing that $\overline{CD}$ is the *base* of this isosceles triangle. The 3rd angle, angle A, is called the *vertex angle* of this isosceles triangle.

Let's explore this isosceles triangle a bit more. *Use the ANGLE BISECTOR tool to construct the angle bisector of your triangle's vertex angle*.

14) Go to the "Intersect" tool and plot and label a point E at the intersection of this angle bisector and $\overline{CD}$. Now measure and display the measures of angles *CAE* and *EAD* to verify that they are indeed congruent. (Under "object properties" for each angle, be sure to make each a "0 – 180 degree" angle.

15) Now find and display the measures of angle *CEA* and *DEA*. (Make each a "0 – 180" angle). Also, find and display the lengths *DE* and *EC*.

16) Now drag the vertices of this triangle around again. List 2 new observations (other than the fact that angles *CAE* and *DEA* are congruent) you see.

17) Complete the following theorem:

The ______________ ____________________ of the _________________ angle of an

isosceles triangle is also the ______________________ ______________________ of the base.