

Robert F. Babler  
Niles High School  
[rfbabler@remc11.k12.mi.us](mailto:rfbabler@remc11.k12.mi.us)

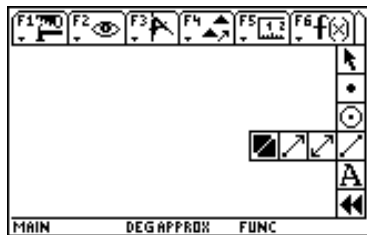
Triangles: triangle inequalities  
**Exterior Angle Theorem**

**NCTM standard:** Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

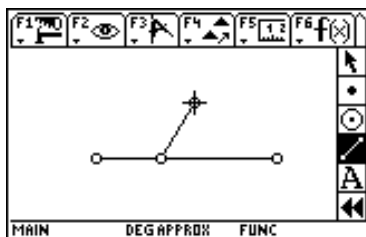
Analyze properties and determine attributes of two- and three-dimensional objects.

Introduction: This application shows the relationship between an exterior angle of a triangle and the two remote interior angles.

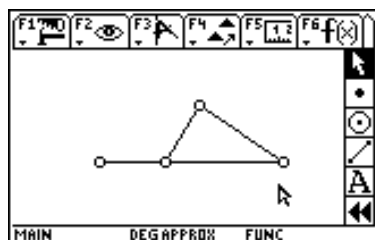
- 1) Turn the calculator on.
- 2) Press **[APPS]**. Press 1:FLASHAPPS:Sketchpad, then press **[ENTER]**.
- 3) Press **[2nd]** **[F3]** to get to the Toolbox. Highlight the Segment tool.



Press **[ENTER]**. Move the cursor to the bottom right, press **[ENTER]**, move the cursor to the bottom left, press **[ENTER]** twice. Move the cursor back to the right a little ways on the segment, press **[ENTER]** twice, then move the cursor up and right.



Press **[ENTER]** twice. Finally, move the cursor back to the original point. Press **[ENTER]**, then **[ESC]** twice.



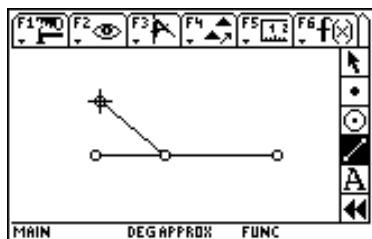
4) The angle formed by the outside of the triangle and the segment extended from the triangle is called an *exterior angle*. Measure it. Highlight the left point of the segment, then the left point of the triangle then the top point of the triangle. Press **[F5]** 5:Angle. Record the value in the table below for Triangle 1. Hide the measure by pressing **[F2]**:1:Hide.

5) The top angle of the triangle will be called remote interior angle 1 (one of the angles of the triangle not adjacent to the exterior angle), while the left angle will be remote interior angle 2. Measure each angle. Press **[ESC]**, then highlight the left point of the triangle, then the top point, then the right point. Press **[F5]** 5:angle. Record the value in the table below. Press **[ESC]** twice, and repeat the steps for the second remote interior angle. This time, the right point of the triangle should be the second one highlighted. Record the value in the table below.

6) What do you notice about the exterior angle compared to either remote interior angle? \_\_\_\_\_

7) Add the two remote angles together and record the sum. What do you notice about the sum of the two remote angles compared with the exterior angle? \_\_\_\_\_

8) Try seeing if this holds for another triangle. Press **[F1]** 5:Select All, then press **[F1]** 3:Delete. Repeat steps 3-5, but try making the triangle obtuse by going back on the segment and then going up and *left*.



Does everything still hold true? \_\_\_\_\_

9) The reason:

What do the interior angles of a triangle add up to be? \_\_\_\_\_

What is the angle measure of a straight line? \_\_\_\_\_

What does the angle next to the exterior angle and the exterior angle form? \_\_\_\_\_

What does the angle next to the exterior angle and the two remote interior angles form? \_\_\_\_\_

\_\_\_\_\_ They are both 180 degrees, and both have the angle next to the exterior angle in common, so take that away from both situations, and you see that the exterior angle is the same as the sum of the two remote interiors.

triangle	exterior angle	remote interior angle 1	remote interior angle 2	remote 1 + remote 2
1				
2				