### The Sum of All Angles

**Sketch Filename:** sum_angles.gsp  
**Movie Filename:** sum_angles.mov  
**Math Concept(s):** Properties of 2D Shapes  
**Suggested Grades:**  
- 7  
- 8  
- 9 Applied  
**Sketchpad Level:** Intermediate - measure/ construct/ tabulate/ calculate

### Learning Goals:
- Investigate the sum of the interior angles of a triangle
- Apply the results to problems involving the interior angles of triangles

### “Sketchy” Description:
This multiple page sketch includes:
- Five ways to visualize the sum of the interior angles
- Measuring and tabulating angle sum data to prove a point
- Making his/her own manipulative
- View sample problem solutions
- Solving problems of diagrams not to scale (ie: by calculation rather than measurement)

### Lesson Plan Suggestions
- Description of how the sketch might be used in each of the three lesson parts - Minds On, Action!, Consolidate.
- Includes student groupings, instructional strategies, and connections to manipulatives or other technologies.

**Minds On** - Students cut or receive two paper triangles. The vertices of one are ripped off and fitted together to observe the straight angle that this created; the vertices of the other are folded together to observe the straight angle that this created;

**Action!** - Review interface (ie: use of buttons, calculator, menu bar)  
- Have the students work in pairs to complete the sketch  
- Students should be encouraged to compare their paper models to their sketch demonstrations

**Consolidate** - Students will complete a worksheet based on a blackline master

### Extensions:
- Once students have reviewed isosceles triangles, right triangles and other special triangles they then complete a blackline master with more complex problems.
- This sketch contains links to websites for some of these contexts.

### Questions or activities for students/parents to explore together:
1. Explore conjectures about the sums of interior angles of other shapes eg: quadrilaterals, pentagons,
2. Can you formulate a rule for the interior angle sum of an “n-gon”?
3. Is it possible for a triangle to contain two right angles, or a right angle and an obtuse angle? Without using a diagram, use your knowledge of the sum of interior angles to support your answer