

# GSP Lesson Plan

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Grade level(s)/Subject taught: 10<sup>th</sup> Grade Geometry

Objectives:

The students will investigate the sum of the interior angles of various triangles and conjecture and prove the following theorem:

- The sum of the interior angles in a triangle is  $180^\circ$ .

The extension activities include conjecturing and proving the following theorems:

- The sum of the interior angles in a quadrilateral is  $360^\circ$ .
- The sum of the measures of the interior angles in a convex n-gon is  $180^\circ(n-2)$ .

1. Write the Mathematical Concept or “key idea” that modeling will be used to teach: (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships)

- Students will be asked to predict, conjecture, generalize and prove the aforementioned theorems.
- Students draw triangles and explore the classification of each using the measures of interior angles and lengths of sides. In the extension activities, the students further explore and generalize a formula for the sum of the interior angles of convex polygons.

Materials: Computer Lab, worksheet, pen/pencil.

"...a rich **one-page, single-spaced**, description or a *vision* of your best thinking..."

During this lesson the students will be introduced to the classification of triangles as well as discovering quadrilaterals, and other polygons. As the students enter the room they will begin working on a quick warm-up beginning to introduce them to triangles, quads, and polygons. When the students are finished with their warm-up we will go over the problems together. Before they are asked to go on the computer, we will discuss some of the characteristics of triangles, as well as quadrilaterals and other polygons. At this time the students and I will explore the sum of the interior angles in a triangle is  $180^\circ$ . We will do several examples with each other and time will be given for the students to explore things on their own. Following this, if time permits, we will begin to look at the sum of the interior angles in a quadrilateral is  $360^\circ$ , and the sum of the measures of the interior angles in a convex n-gon is  $180^\circ(n-2)$ .

When I feel the students, have a good understanding of each the theorems, we will begin our activity in the computer lab using GSP to model the proof of each of these theorems. They will be given a worksheet that walks them through how to prove each theorem. I will do the first one with them, which would be the sum of the angles equaling 180 degrees. After we have gone through this together, and talked about what we found, if time permits they will be asked to try the same thing for a quadrilateral, as well as any side number polygon they wish to prove. At this time I will walk around and help the students and talk to them about what they found.

My hope is that the students walk away from this lesson with a strong understanding of the three theorems, and why they work. They will then using this understanding to further their knowledge of other geometric shapes.

## Exploring Characteristics of Triangles

CATEGORY	4	3	2	1
<b>Mathematical Concepts</b>	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
<b>Use of Manipulatives</b>	Student always listens and follows directions and only uses manipulatives as instructed.	Student typically listens and follows directions and uses manipulatives as instructed most of the time.	Student sometimes listens and follows directions and uses manipulatives appropriately when reminded.	Student rarely listens and often "plays" with the manipulatives instead of using them as instructed.
<b>Mathematical Reasoning</b>	Uses complex and refined mathematical reasoning.	Uses effective mathematical reasoning	Some evidence of mathematical reasoning.	Little evidence of mathematical reasoning.