Learning Math, Doing Math: Deductive Thinking and Construction Tasks with The Geometer's Sketchpad

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A deductive thinking can be considered as the concatenation of ideas, each one determined by the previous one. In mathematics, deduction is the way in which we validate a conjecture, using general facts to justify less general or particular facts.

All individuals possess this way of constructing thoughts and jumping into conclusions, but we need to practice it in order to develop it deeper and get conclusion more educated, and so the decision we make will be the best ones at that moment.

In construction tasks with The Geometer's Sketchpad it is possible to explore the construction itself, make conjectures and try to validate them. When we try to explain why a construction works or why a conjecture is valid, we put ourselves in a theoretical context and make use of deduction as the means of getting the right answers.

When students work on a mathematical problem, they are used to think in the final result, not in the process they followed to get that final result. Most of the time, is in these processes were students find the justification of a conjecture and a review of the knowledge they already have.

In Learning Math, Doing Math, I propose, among many things, the fostering of a deductive thinking mainly –but not exclusively- with the development of construction tasks in Euclidian Geometry. An important part of the construction tasks is to ask students to explain how they did it and what suppositions they made and why. Now, the drag function of Sketchpad is of great help in exploring constructions in search of the right construction and validation of conjectures.

In this workshop, aimed at high school teachers and people interested in deductive thinking, we will go through the next activities to illustrate what I said in the previous paragraphs. They are a good way to introduce on the software and the teaching model activities. It is not mandatory that attendees have Sketchpad experience.

Activity 1

Construct a square using three different ways of doing it. In each case, explain why your construction is a square.

Actvity 2

Which kind of quadrilateral is the one that its diagonals meet each other at their midpoints? Explain your answer.

Construct the quadrilateral with Sketchpad. Write down step by step how the construction was made.