SCARSDALE HIGH SCHOOL
Mathematics Department

TRI-STATES VISIT
May 19th and 20th, 2010

The Scarsdale High School Mathematics Department is a strong proponent of critical and creative thinking. As the department struggled to come up with a suitable definition, we realized that what we did every day in class exemplified higher order thinking skills and problem solving. George Polya, noted mathematics professor at Stanford University, believed that the main point in math teaching was to develop the tactics of problem solving. He identified two types of reasoning – demonstrative and plausible. Demonstrative reasoning is illustrated by the mathematical proof – it doesn't yield new knowledge about the world, it is not controversial. Plausible, on the other hand, supports our conjectures through inductive, circumstantial, documentary, and statistical evidence. In order for a student to produce a proof or show how he arrived at a solution, he must first have an idea about a topic and eventually guess a possible theorem or concept supporting that idea. The result of mathematicians' creative work is demonstrative reasoning.

Our high school has structured its math courses and designed its curriculum to support these principles. Students, throughout their four years at SHS, have the opportunity on all grade and all ability levels to foster their creative and critical thinking through collaboration and independent work. Formulas and theorems are not handed to students with the expectation that they will merely practice executing them with multiple examples. But rather, students are encouraged to explore relationships and patterns that emerge and continually reevaluate their theories as they investigate various ideas central to the development of a solid, comprehensive mathematics foundation. Without the proper knowledge and understanding of concepts, students cannot use thinking skills correctly and effectively. Sir Ken Robinson, creativity expert and author of the book, The Element, states, "It's a process, not a single event, and genuine creative processes involve critical thinking as well as imaginative insights and fresh ideas." The very nature of mathematics is to explore, investigate, analyze, strategize, evaluate, interpret, derive, reflect, and validate. The Department has also taken its direction from the National Council of Teachers of Mathematics. Its 2009 publication, Focus on High School Mathematics, Reasoning and Sense Making, also upholds that reason and sense making in a mathematics program:

- Will prepare students for citizenship, the workplace, and further study,
- Should be a part of the mathematics classroom every day,
- Are integral to the experience of all students across the high school mathematics curriculum, and
- Must be evident in the mathematical experience of all students