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Level 2 Lesson Plan July 30, 2003

The purpose of this lesson will be to reinforce the concept of using appropriate mathematical functions to model a realistic situation. This lesson is appropriate at any level of high school mathematics. My intention is to use it at the ninth grade level at a point in the year after students have thoroughly studied linear relationships and have become accustomed to the idea of modeling real-life situations using mathematics. The students will have already fit linear functions to data collected in class. The class period for this lesson will be held in a computer lab where Stella is available for pairs of students to build simple models. The lesson will also be used as an opportunity to reinforce a number of previously-learned mathematical concepts.

The lesson will begin with having students recall ideas about modeling from the just-finished unit on linear functions. Students may respond that data collection is the first part of experimental modeling. Students may respond that actual data doesn't always fit the theoretical model. There are many other possible student responses. This brief discussion will serve as a connection between modeling based on linear functions and modeling in general.

Once the stage has been set and students are in a modeling frame-of-mind, I will describe to them a realistic situation that I will model. (I am using a chemistry reaction model. Although the students will most likely not have had this level of chemistry yet, the process is simple enough for students to understand and realistic enough to be of some interest.) After describing the basics of the science that will be modeled, I will build a simple model in Stella to represent a hydrogen and iodine mixture undergoing a reaction to produce hydrogen iodide. A projector or large monitor will be used to allow all students to see the model being built. I will then run the model and produce a graph and table that can be used to analyze the reaction. One interesting thing is that the graph of this reaction may appear to be linear over of small interval. Students could be asked, when shown the graph over this interval, whether or not they think the nature of the

relationship is linear. The graph could then be shown over a larger interval, revealing the actual nature of the reaction. I may spend a minute or two asking one or two questions that can be answered using the graph, such as how could you determine when the reaction is 90% complete? This would be the end of the demonstration part of the lesson. (10-15 minutes)

At this point, I will have students work in pairs building a model of their choice. A list of several simple models with descriptions will be supplied along with directions on how to use Stella. Students will then spend 25-30 minutes building and analyzing their own mathematical models of real-life situations. They will be required to print their model, graphs, tables and equations and to hand in hard copies.

There are a number of aspects of the NYS Math A curriculum addressed by this lesson. The main focus of the lesson is to demonstrate how a real-world situation can be modeled and analyzed using appropriate mathematical relationships, a concept that is integral to NYS Math A Key Idea 4 (Modeling & Multiple Representation) and Key Idea 7 (Patterns & Functions).