Lesson Plan for Inquiry Activity

Lesson Title: Analyzing the Relationship between a Logarithmic Function and Its Inverse

Lesson Summary: This activity will give students the opportunity to investigate the inverse of the logarithmic function and explore several uses of the logarithmic function and its inverse in real world applications.

The student will determine numerous ordered pairs that satisfy a given logarithmic function, reverse the x and y coordinates, and use regression to determine the function that represents the inverse of the given logarithmic function. The student will then use this relationship to solve problems.

Key Words: inverse, families of functions (quadratic, logarithmic, exponential), regression analysis, best fit

Background knowledge: The student will know how to find the inverse of a linear or quadratic function algebraically, graphically, and numerically. The students will be able to recognize the graphs of polynomial and exponential functions. The student will have been introduced to algebraic properties of logarithms. The student should have a general knowledge of graphing, table usage, and regression analysis with a graphing calculator.

OAC Standard(s) Addressed: Patterns, Functions, and Algebra

Benchmarks: 8-10 C, D, E; 11-12 A
Grade Level Indicators: 10.10, 11.3, 11.5, 11.6

Learning Objectives: The student should demonstrate numerically and graphically that the inverse of a logarithmic function is an exponential function. The student should solve logarithmic and exponential equations using inverse operations, and recognize real world applications that can be modeled with these functions.

Materials: Activity handout, worksheet, and graphing calculator

Suggested procedures: The lesson will be introduced with a teaser regarding a method of measuring the volume at which the human eardrum will rupture. Students should be grouped in pairs, but each should enter and record data individually.

Assessment(s): Formative assessment will consist of the questions and extensions in the activity and the class discussion following its completion. Summative assessment questions should include identifying graphs of exponential and logarithmic functions and using a logarithmic scale (like decibels or the pH scale) to convert data.