VISUALIZING MATH
BRUCE BAGULEY AND LOUIS SCHULTZ

Teachers Manual

Introduction

We often hear students say that they cannot do math because they can't "see" it. They learn to get answers without really understanding the underlying mathematical concepts. As the mathematics they are expected to do goes to a higher level, they often do not have the understanding of the basics that apply to these more complex applications. Our purpose in this first program is to present the basic concepts in a manner that will allow students to visualize or "see" the basic concepts as they apply to mathematical applications.

In addition to students, this program provides the elementary teacher, parent of an elementary student, or someone working with a student who lacks a sound understanding of basic concepts a template for working with that student toward understanding and application. The understanding of each basic operation is built around "seeing" the concept in it's simplest form and applying this insight to the solution of real world applications.

To accommodate the various learning styles of students, all concepts are presented using visual, auditory, and tactile means. Problems are presented as word problems with balls and a tray used to model all numerical operations. All answers are given as a visual representation, a complete sentence, and in the appropriate symbolic format.

Every concept is covered in three sections. The student progresses from introduction to demonstration of conceptual understanding.

Section 1: This section is composed of a movie that guides the student through three problem-solving exercises. In problem one, the narrator shows the student how to model the problem as the students follow along using their balls and trays. The second problem is started by the narrator and then left for the student to finish. The narrator then shows the students how he finished the problem. The third problem is given to the student to solve without any help from the narrator. When the students are finished the narrator shows how he solved the problem.

Section 2: This section is an interactive section and uses the last problem of section 1. This time the students get to select the numerical values that will be used in the problem. As they finish each new problem, the teacher can advance to the correct solution. The answer to the new problem will be given as a complete sentence, If the numbers used do not make sense for the problem, the written answer will indicate this.

Section 3: This section is used to evaluate the students understanding of the concept covered. It consists of five word problems for the students to solve. When the students are finished, the teacher can advance to the solutions.

The format used was designed to allow teachers, parents, or individual learners, flexibility in how they used the program. A teacher, parent or user maintains complete control of the process whether using it to plan for class activities or providing additional help for an individual student.