



## Challenges and Strategies

A major challenge for students is applying algebraic skills to setting up and solving a variety of real-world problems. While most students learn to manipulate variables symbolically, they need assistance assigning variables and using them to write equations to answer problem situations. The Craine, McGowan, Ruben text begins by using examples students readily understand to assign variables, write expressions and evaluate them.

In Chapter 2 functions are introduced to students informally, although the important properties of functions are discussed. Students are encouraged to represent functions verbally, symbolically, numerically, and graphically. With the aid of the TI-83 students can see how the assignment of a variable and writing of a formula are beneficial for using the power of a graphing calculator to analyze tables and graphs to better understand problem situations. Formal steps to problem solving are introduced in the third chapter and used repeatedly throughout the text.

The formal definition of function is left until Chapter 8, but the concept reappears frequently in the intervening chapters; the word function appears more than 70 times. By the time students see the definition, the concept of function is old hat, and they will be able to manipulate functions in a manner more appropriate to an Intermediate Algebra course.

Application problems are used to help students relate different types of functions. A variety of applications including cost; distance; rate; time; perimeter, geometric patterns; membership plans; and temperature are used to help students recognize linear situations. Quadratic problems are clearly distinguished from linear problems by comparing their slope in a detailed application problem involving a pizza.

Applications in direct variation are used to produce power functions involving linear, quadratic, and radical equations. Exponential functions are derived from growth and decay situations from the sciences and investment. The inverse function, logarithm, is related by graph and reviewed with applications involving earthquakes, pH, and sound. Rational functions are compared to linear equations by comparing total cost to average cost.

## Examples and Exercises

In Example 1 on page 56 a pattern of squares built from toothpicks is used to introduce variables to write a formula for discussing equivalent expressions.

In Example 4 on page 60 students expand upon their knowledge of perimeter from Section 1.4 to assign variables and write algebraic statements from word statements. In Exercise 11 on page 64, students use a diagram to assist in assigning a variable, writing an expression and evaluating the expression for a specific value. In Exercise 16 on page 73 students practice converting word statements to algebraic statements.

In Example 6 on page 79 students use the four representations of a function to convert Celsius temperatures to Fahrenheit. In Exercise 13 on page 82 students are asked to represent the given function in four ways. In setting the window parameters for this exercise students informally learn about the domain and range of a function.

In Example 3 on page 90 students set up and solve an equation. The solution is checked graphically using the TRACE feature of the TI-83. In Exercise 8 on page 94, with the aid of a table, students find expressions and write an equation. The equation is solved and the solution interpreted in the context of the problem situation.

In Section 3.3 we formally introduce steps for problem solving. In Example 4 on page 109 we use a distance, rate, time problem to arrive at an equation involving distribution. Exercise 11 on page 111 requires students to apply problem-solving skills to answer a question.

In Section 4.2 application problems are used to distinguish between writing equations from: 1) the slope and y-intercept (Example 1, page 136); 2) the slope and a point (Example 4, page 141); and 3) two points (Example 5, page 142).

Example 6 on page 182 employs sampling, a useful tool for statistics, to study proportions.

In Example 2 on page 259 students distinguish between the properties of linear and quadratic functions. In Exercise 11 on page 265 students compare the steps to solving a linear and quadratic equation.

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