Algebra

Picturing Percents

Math Concepts

- multiplication
- decimal
- division
- ratio
- place value
- proportion
- whole numbers
- percent
- fractions

Materials

- TI-15 Explorer™
- **Picturing Percents** recording sheets
- pencils

Overview

Students will represent percents on a 10 × 10 grid. They will use the grid and the calculator to generate patterns that lead to methods for calculating percentages.

Introduction

1. Discuss with students the origins of the word *percent* — *per* means "for each" and *cent* means "hundred."

2. Show a 10 × 10 grid (page 69) on the overhead projector, and ask questions such as:
   - How many squares are in each row?
   - How many squares are in each column?
   - How many small squares are in the entire large square (grid)?
   - If the large square (grid) represents 1, what does each small square represent?
   - If the large square (grid) is described as 100%, what percent does each small square represent?

3. Have students practice representing various percentages on the 10 × 10 grid.

   Example:
   For 25%, color 25 small squares in some configuration.

4. Introduce a problem such as: Jorge makes a 12% commission on the newspapers he sells. If he sells $100 worth of papers, how much money in commission does he make?

   Have students model a solution to this problem on the 10 × 10 grid.

   Example:
   If the entire grid represents 100% of the $100 total, one small square represents 1% (1/100) of the total, or $1. Then 12 small squares represents 12% (12/100) of the total, or 12 × $1, or $12 commission.

Picturing Percents *(continued)*

Introduction (continued)

5. Discuss with students the percent problem on the recording sheet. Have them fill in blanks (a) and (b) and model solutions for blank (c) using the 10 × 10 grid. Have them use the table to record their data for the solution to the problem.
6. Have students work in small groups to generate several different problems, record their data, and look for patterns to develop a method for calculating percentages.
7. Have students use their calculators to test methods for calculating percentages.

Collecting and Organizing Data

While students generate data from the solutions to their different problems, ask questions such as:

- What does the 10 × 10 grid represent in general? What does it represent in this particular problem?
- What does each small square represent in general? What does each small square represent in this particular problem?
- How did you go about finding the value of a small square?
- Predict the solution to your problem. How did you make your prediction?
- How can you use the value of a small square to help you find the solution to your problem?
- What patterns do you see in the table information used to find your solutions?

How can the calculator be used to help you determine the value of each small square?

How can the calculator be used to help you determine the solution to the problem?

Picturing Percents *(continued)*

Analyzing Data and Drawing Conclusions

After students have generated data and solutions for several different problems, have them discuss their results as a whole group. Ask questions such as:

- What numbers did you find most interesting in the problems you made up? Why?
- How are your data and solutions like everyone else's? How are they different?
- What relationships do you see among the three columns of the table, if any?
- How did you find the value of a small square? Did you use the same procedure for each problem?
- What generalizations could you make about the relationship of 1% of a number to the whole number (100%)?
- Using the data in your table, what other generalizations could you make about finding percentages?

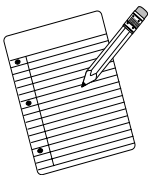
Continuing the Investigation

Have students investigate percentages that are more than 100% and less than 1%. Do the same relationships in the data hold? Do the same procedures hold?

- How does [%] on a calculator work?
- What information do you need to give the calculator in order to use [%]?
- What information does the calculator provide you when you use [%]?
- How do these ideas relate to your pictures of percents?
- Explore the [%] and [▸%] keys. What is the difference between them?

Algebra

Name:



Picturing Percents

Recording Sheet

Collecting and Organizing Data

Using different sets of numbers in blanks (a) and (b) to determine the number in blank (c), fill in the table below and look for patterns.

Problem: Susan planted (a) _____ bulbs. The nursery guarantees that at least (b) _____ % of them will bloom within two weeks. (c) _____ bulbs must bloom for the guarantee to be upheld.

100% 10 x 10 Grid Represents Total Number of Bulbs	1% A Small Square Represents How Many Bulbs?	b Equals What Percent?	The Number of Blooming Bulbs in b%
a =		_____ %	c =
a =		_____ %	c =
a =		_____ %	c =
a =		_____ %	c =

Analyzing Data and Drawing Conclusions

From the patterns in the data above, we think we would find 15% of 360 by:

Picturing Percents

10 x 10 Grid