Key Concepts

Lesson 18

Percent of Change

Objective Teach students to compute the percent of change of a certain quantity.

Note to the Teacher *When a certain quantity changes, it is often important to know by what percent it changed. For example, the statement "there was annual inflation of 5% in housing prices," means that the cost of housing went up 5% during the year. In this lesson, students will learn how to find the percent of change. Start with the following example.*

Finding Percent of Change

Example 1 **Find the percent of change from 160 to 180.**

Solution There are two ways to solve this problem.

Method 1

First, find the amount of change. Then compare the amount of change to the original amount. The amount of change is 180 − 160 or 20. That is, the quantity increased by 20. Now, compare the amount of change to the original amount. Let x represent the percent of change. The following equation results.

$$20 = x\% \times 160$$

$$20 = \frac{x}{100} \times 160 \quad \textit{Rewrite } x\% \textit{ as } \frac{x}{100}.$$

$$\frac{20}{160} = \frac{x}{100} \quad \textit{Divide each side by 160.}$$

$$2000 = 160x \quad \textit{Find the cross products.}$$

$$12.5 = x$$

So, the percent change from 160 to 180 is 12.5%.

Method 2

To find the percent of change from 160 to 180 essentially means to find *What percent is 180 of 160?* Let y represent this percent. The following equation results.

$$\frac{180}{160} = \frac{y}{100}$$

$18{,}000 = 160y$ *Write the cross products.*

$112.5 = y$

This means that 180 is 112.5% of 160. Since 100% of a number is equal to that number, the percent of increase is 112.5% − 100% or 12.5%.

A shortcut to Method 2 is to divide the new amount by the original amount, subtract 1, and then express the decimal as a percent.

$$\frac{180}{160} = 1.125 \Rightarrow 1.125 - 1 = 0.125 \Rightarrow 0.125 = 12.5\%$$

Here's another example.

Example 2 **The price of a hamburger at Mike's Diner is $2.50. Last Sunday, they had a special and charged only $2.00 for a hamburger. What percent of savings does this represent?**

Solution **Method 1**

Step 1:
Subtract: $2.50 − $2.00 = $0.50. Notice that the cost has *decreased.*

Step 2:
Use an equation to find what percent the difference is of the original amount. That is, *$0.50 is what percent of $2.50?*

$0.5 = x\% \times 2.5$

$0.5 = \frac{x}{100} \times 2.5$ *Rewrite x% as* $\frac{x}{100}$.

$\frac{0.5}{2.5} = \frac{x}{100}$ *Divide each side by 2.5.*

$50 = 2.5x$ *Find the cross products.*

$20 = x$

So, there was a 20% decrease in the price.

Method 2

Step 1:
Divide the new amount by the original amount.

$$2.00 \div 2.50 = 0.80$$

Step 2:
Subtract 1 from the result and write the decimal as a percent.

$$0.8 - 1 = -0.20 \text{ or } -20\%$$

The percent is negative. So, there was a 20% decrease in the price.

Do one final example on the board to make sure students understand the procedure.

Example 3 **When Susan brought her dog home from the pet store, it weighed 35 pounds. One year later, the dog weighed 45 pounds. Find the percent of weight gained.**

Solution **<u>Method 1</u>**

Step 1:
Subtract: $45 - 35 = 10$.

Step 2:
Use an equation to find what percent the difference is of the original amount. That is, *10 is what percent of 35?*

$$10 = x\% \times 35$$

$$10 = \frac{x}{100} \times 35 \quad \textit{Rewrite } x\% \textit{ as } \frac{x}{100}.$$

$$\frac{10}{35} = \frac{x}{100} \quad \textit{Divide each side by 35.}$$

$$1000 = 35x \quad \textit{Find the cross products.}$$

$$28.6 \approx x$$

Notice that we used a calculator to approximate the answer. We conclude that the dog had a weight gain of about 28.6%.

<u>Method 2</u>

Step 1:
Divide the new amount by the original amount.

$$45 \div 35 \approx 1.286$$

Step 2:
Subtract 1 from the result and write the decimal as a percent.

$$1.286 - 1 = 0.286 \text{ or } 28.6\%$$

So the weight gain was about 28.6%.