Key Concepts

Lesson 17

Using Percent Equations

Objective Teach students to solve percent problems involving percents.

Note to the Teacher *There are many practical problems that use the concept of percent. In this lesson, students will be shown several ways that percents are used. You may wish to explain to students that there are good reasons for using percents rather than fractions. Here is a rather easy example to begin the lesson.*

Using Percents

Example 1 **Which fraction is greater, $\frac{4}{7}$ or $\frac{6}{11}$?**

Solution First, write each fraction as a percent. Then compare the percentages. Remember that a percent is a ratio that compares a number to 100.

$\frac{4}{7} = \frac{x}{100}$

$4 \cdot 100 = 7 \cdot x$ *Write the cross products.*

$\frac{400}{7} = \frac{7x}{7}$ *Divide each side by 7.*

$57.1 \approx x$

So, $\frac{4}{7}$ is about 57.1%.

Now express $\frac{6}{11}$ as a percent.

$\frac{6}{11} = \frac{x}{100}$

$6 \cdot 100 = 11 \cdot x$ *Write the cross products.*

$\frac{600}{11} = \frac{11x}{11}$ *Divide each side by 11.*

$54.5 \approx x$

So, $\frac{6}{11}$ is about 54.5%. Since 57.1% > 54.5%, it follows that $\frac{4}{7} > \frac{6}{11}$.

Percents are used when dealing with interest rates. Suppose you have a savings account with an annual interest rate of 5%. If you put an initial amount of money, called the **principal**, into this account without making any further deposits or withdrawals, then after one year, the account would earn **interest** equal to 5% of the initial amount deposited. The **rate** is often expressed as a percent.

Definition of Principal, Interest, and Rate	Principal is the amount of money in an account. Interest is the amount of money paid or earned for the use of money. Rate is the percent charged or paid for the use of money.

To determine interest on any account, we can use the formula $I = prt$, where I represents the interest, p is the principal, r is the interest rate, and t is the amount of time that has passed.

Note to the Teacher *The unit of time t must be expressed in the same units as the ones used to express the interest rate. For example, if the interest rate is 5% per year, then the time t in the above equation must be expressed in years.*

Example 2 **Anitra received a $250 certificate of deposit for her graduation. The certificate paid an annual interest rate of 6%. How much interest will the certificate earn after 8 months?**

Solution To determine the interest after 8 months, use the equation $I = prt$.

$I = prt$

$I = 250 \cdot 6\% \cdot \frac{2}{3}$ *Replace p with 250, r with 6%, and t with* $\frac{2}{3}$ *since 8 months is* $\frac{8}{12}$ *or* $\frac{2}{3}$ *of a year.*

$I = 250 \cdot \frac{6}{100} \cdot \frac{2}{3}$ *Rewrite 6% as* $\frac{6}{100}$.

$I = \frac{3000}{300}$ *Simplify.*

$I = 10$

So, after 8 months, the certificate of deposit will earn $10 in interest. Therefore, after 8 months, the value of the certificate will be $250 + $10 or $260.

Percents are also found in problems that deal with shopping.

Example 3 **At store A, a certain shirt sells for $20. During one weekend, the store was having a promotion in which there would be no sales tax on any purchase. Store B sold the same shirt for $24, but they had a 25% off sale. However, at store B, you had to pay a sales tax of 6%. Which store offers a better buy on the shirt?**

Solution We know that at store A, the cost of the shirt is $20. At store B, the shirt normally sells for $24 and is on sale for 25% off. We also know that a sales tax applies to store B where as it does not apply to store A. Let's do some calculations.

Let d represent the discount on the shirt. This discount is 25% of the original price of $24. The following equation results.

$d = 25\% \times 24$

$d = \frac{25}{100} \times 24$ *Rewrite 25% as* $\frac{25}{100}$.

$d = \frac{25 \times 24}{100}$

$d = \frac{600}{100}$ or 6 *Simplify.*

The discount is $6. So, the sale price of the shirt at store B is $24 − $6 or $18. However, the customer has to pay a 6% sales tax. Let t represent the amount of sales tax on the shirt. We can write that t is 6% of $18. In other words,

$t = 6\% \times 18.$

$t = \frac{6}{100} \times 18$ *Rewrite 6% as* $\frac{6}{100}$.

$t = \frac{6 \times 18}{100}$

$t = \frac{108}{100}$ or 1.08 *Simplify.*

The tax on the shirt is $1.08. So, the total cost of the shirt at store B is $18 + $1.08 or $19.08. The cost at store A is $20. Therefore, the customer would get a better deal at store B.