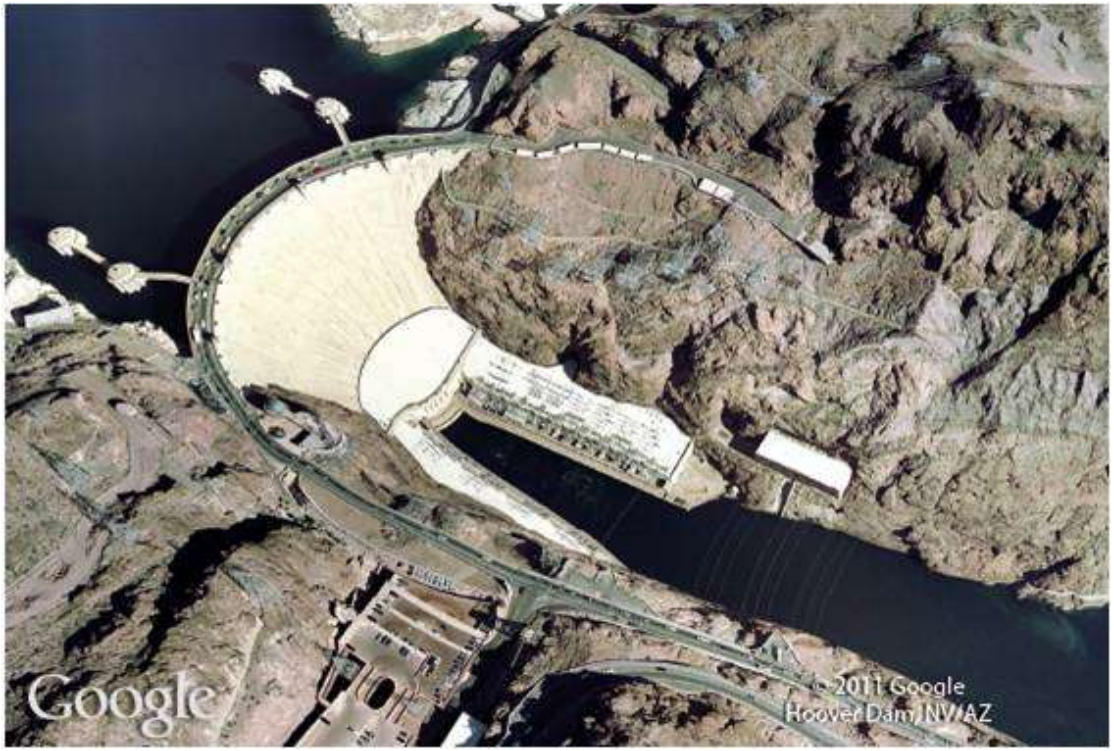
Percent

7



SECTION 7.6

Interest

Objectives

A Solve application problems involving annual interest.

B Solve application problems involving simple interest.

C Solve compound interest problems.

A Interest

Interest

Anyone who has borrowed money from a bank or other lending institution, or who has invested money in a savings account, is aware of *interest*.

Interest is the amount of money paid for the use of money.

If we put $500 in a savings account that pays 6% annually, the interest will be 6% of $500, or 0.06(500) = $30.

The amount we invest ($500) is called the *principal*, the percent (6%) is the *interest rate*, and the money earned ($30) is the *interest*.

Example 1

A man invests $2,000 in a savings plan that pays 7% per year. How much money will be in the account at the end of 1 year?

Solution:

We first find the interest by taking 7% of the principal, $2,000.

$$\text{Interest} = 0.07(\$2{,}000)$$

$$= \$140$$

The interest earned in 1 year is $140.

Example 1 – *Solution*

cont'd

The total amount of money in the account at the end of a year is the original amount plus the $140 interest.

$2,000	Original investment (principal)
+ 140	Interest (7% of $2,000)
$2,140	Amount after 1 year

The amount in the account after 1 year is $2,140.

B Simple Interest

Simple Interest

There are many situations in which interest on a loan is figured on other than a yearly basis.

Many short-term loans are for only 30 or 60 days.

In these cases we can use a formula to calculate the interest that has accumulated.

This type of interest is called *simple interest*.

Simple Interest

The formula is

$$I = P \cdot R \cdot T$$

where

I = Interest

P = Principal

R = Interest rate (this is the percent)

T = Time (in years, 1 year = 360 days)

Simple Interest

We could have used this formula to find the interest in Example 1.

In Example 1, T is 1.

When the length of time is in days rather than years, it is common practice to use 360 days for 1 year, and we write T as a fraction.

Example 4

A student takes out an emergency loan for tuition, books, and supplies. The loan is for $600 at an interest rate of 4%. How much interest does the student pay if the loan is paid back in 60 days?

Solution:

The principal P is $600, the rate R is 4% = 0.04, and the time T is $\frac{60}{360}$.

Notice that T must be given in years, and
60 days = $\frac{60}{360}$ year.

Example 4 – *Solution*

cont'd

Applying the formula, we have

$$I = P \cdot R \cdot T$$

$$I = 600 \times 0.04 \times \frac{60}{360}$$

$$I = 600 \cdot 0.04 \cdot \frac{1}{6} \qquad \frac{60}{360} = \frac{1}{6}$$

$$I = 4 \qquad \text{Multiply.}$$

The interest is $4.

C Compound Interest

Compound Interest

A second common kind of interest is *compound interest*.

Compound interest includes interest paid on interest.

We can use what we know about simple interest to help us solve problems involving compound interest.

Example 6

A homemaker puts $3,000 into a savings account that pays 7% compounded annually. How much money is in the account at the end of 2 years?

Solution:

Because the account pays 7% annually, the simple interest at the end of 1 year is 7% of $3,000.

$$\text{Interest after 1 year} = 0.07(\$3{,}000)$$

$$= \$210$$

Example 6 – *Solution*

cont'd

Because the interest is paid annually, at the end of 1 year the total amount of money in the account is

$3,000	Original amount
+ 210	Interest for 1 year
$3,210	Total in account after 1 year

The interest paid for the second year is 7% of this new total, or

$$\text{Interest paid the second year} = 0.07(\$3{,}210)$$

$$= \$224.70$$

Example 6 – *Solution*

cont'd

At the end of 2 years, the total in the account is

$3,210.00	Amount at the beginning of year 2
+ 224.70	Interest paid for year 2
$3,434.70	Account after 2 years

At the end of 2 years, the account totals $3,434.70.

The total interest earned during this 2-year period is $210 (first year) + $224.70 (second year) = $434.70.

Compound Interest

You may have heard of savings and loan companies that offer interest rates that are compounded quarterly.

If the interest rate is, say, 6% and it is compounded quarterly, then after every 90 days ($\frac{1}{4}$ of a year) the interest is added to the account.

If it is compounded semiannually, then the interest is added to the account every 6 months.

Most accounts have interest rates that are compounded daily, which means the simple interest is computed daily and added to the account.