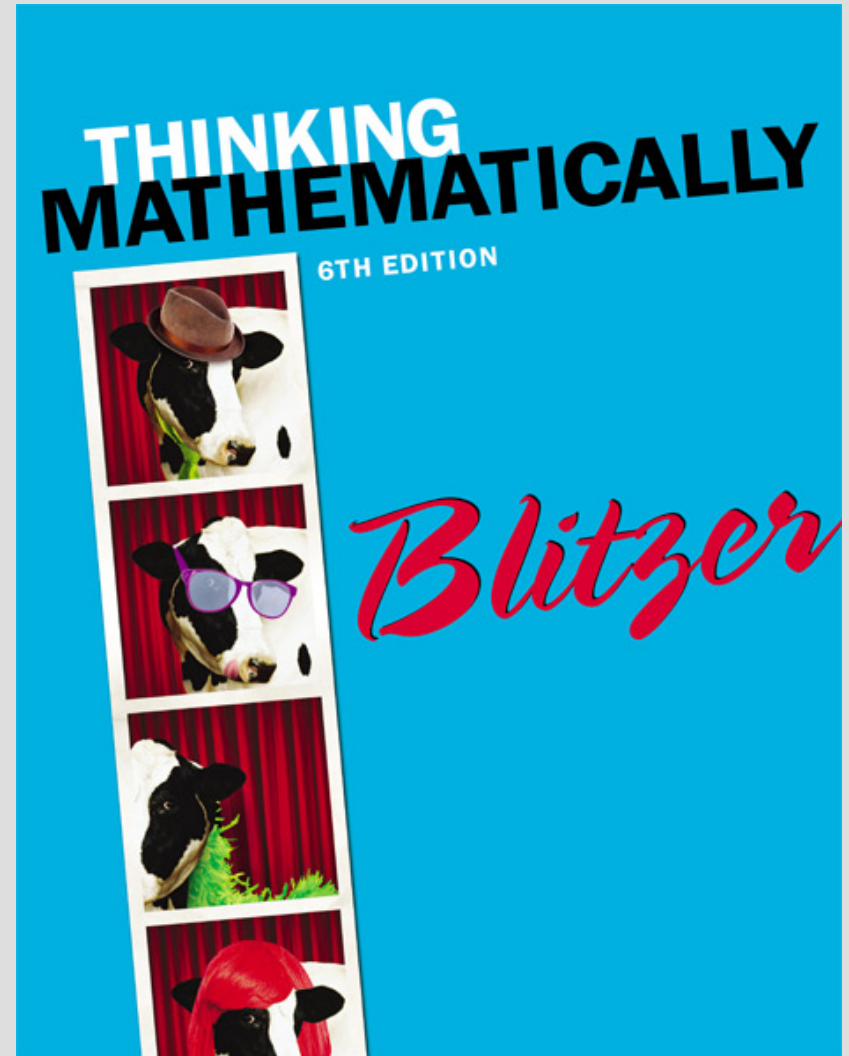


CHAPTER 8

Personal Finance



8.1

Percent, Sales Tax, and Discounts

Objectives

1. Express a fraction as a percent.
2. Express a decimal as a percent.
3. Express a percent as a decimal.
4. Solve applied problems involving sales tax and discounts.
5. Determine percent increase or decrease.
6. Investigate some of the ways percent can be abused.

Basics of Percent

Percents are the result of expressing numbers as a part of 100.

The word *percent* means per hundred.

Expressing a fraction as a percent:

1. Divide the numerator by the denominator.
2. Multiply the quotient by 100. This is done by moving the decimal point in the quotient two places to the right.
3. Add a percent sign.

Example: Expressing a Fraction as a Percent

Express $\frac{5}{8}$ as a percent.

Solution:

Step 1. Divide the numerator by the denominator.

$$5 \div 8 = 0.625$$

Step 2. Multiply the quotient by 100.

$$0.625 \times 100 = 62.5$$

Step 3. Add a percent sign.

$$62.5\%$$

Thus, $\frac{5}{8} = 62.5\%$.

Expressing a Decimal Number as a Percent

To express a decimal as a percent:

1. Move the decimal point two places to the right.
2. Attach a percent sign.

Example: Expressing a Decimal as a Percent

Express 0.47 as a percent.

Solution:

Move decimal point
two places right.

0.47 %

Add a percent sign.

Thus, $0.47 = 47\%$.

Expressing a Percent as a Decimal Number

To express a percent as a decimal number:

1. Move the decimal point two places to the left.
2. Remove the percent sign.

Example: Expressing Percents as Decimals

Express each percent as a decimal:

a. 19%

b. 180%

Solution: Use the two steps.

a.

$$19\% = 19.\% = 0.19\%$$

The decimal point starts at the far right.

The percent sign is removed.

The decimal point is moved two places to the left.

Thus, $19\% = 0.19$.

b. $180\% = 1.80$ or 1.8

Percent, Sales Tax, & Discounts

Many applications involving percent are based on the following formula:

A is P percent of B .

$A = P \cdot B$.

Note that “of” implies multiplication.

We use this formula to determine *sales tax* collected by states, counties, cities on sales items to customers.

$$\text{Sales tax amount} = \text{tax rate} \times \text{item's cost}$$

Example: Percent and Sales Tax

Suppose that the local sales tax rate is 7.5% and you purchase a bicycle for \$894.

- a. How much tax is paid?
- b. What is the bicycle's total cost?

Solution:

- a. Sales tax amount = tax rate \times item's cost

$$7.5\% \times \$894 = 0.075 \times \$894 = \$67.05$$

The tax paid is \$67.05.

- b. Total Cost = \$894.00 + \$67.05 = \$961.05

The bicycle's total cost is \$961.05.

Percent and Sales Price

Businesses reduce prices, or *discount*, to attract customers and to reduce inventory.

The *discount* rate is a percent of the original price.

Discount amount = discount rate \times original price.

Example: Percent and Sales Price

A computer with an original price of \$1460 is on sale at 15% off.

- a. What is the discount amount?
- b. What is the computer's sale price?

Solution:

a. Discount amount = discount rate \times original price
 $= 15\% \times \$1460 = 0.15 \times \$1460 = \$219$

15% of the original price,
or 15% of \$1460

The discount amount is \$219.

Example: Percent and Sales Price continued

- b. A computer's sale price is the original price, \$1460, minus the discount amount, \$219.

$$\text{Sale price} = \$1460 - \$219 = \$1241$$

The computer's sale price is \$1241.

Percent and Change

If a quantity changes, its *percent increase* or its *percent decrease* can be found as follows:

1. Find the fraction for the percent increase or decrease:

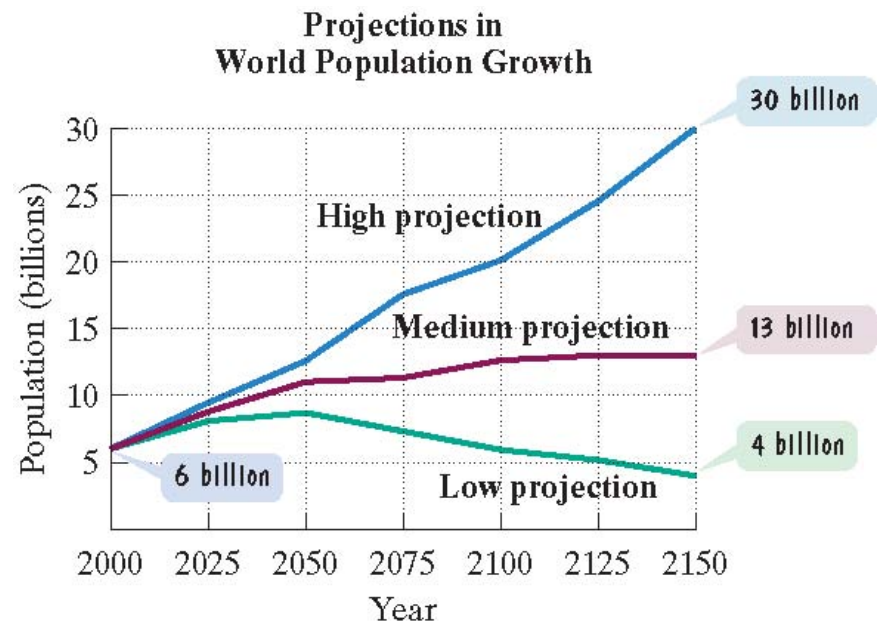
$$\frac{\text{amount of increase}}{\text{original amount}} \quad \text{or} \quad \frac{\text{amount of decrease}}{\text{original amount}}.$$

2. Find the percent increase or decrease by expressing the fraction in step 1 as a percent.

Example: Finding Percent Increase and Decrease

In 2000, world population was approximately 6 billion. The data are from United Nations Family Planning Program and are based on optimistic or pessimistic expectations for successful control of human population growth.

- Find the percent increase in world population from 2000 to 2150 using the high projection data.
- Find the percent decrease in world population from 2000 to 2150 using the low projection data.



Example: Finding Percent Increase and Decrease continued

Solution:

a. Use the data shown on the blue, high-projection, graph.

$$\begin{aligned}\text{Percent increase} &= \frac{\text{amount of increase}}{\text{original amount}} \\ &= \frac{30 - 6}{6} = \frac{24}{6} = 4 = 400\%\end{aligned}$$

The projected percent increase in world population is 400%.

Example: Finding Percent Increase and Decrease continued

- b. Use the data shown on the green, low-projection, graph.

$$\begin{aligned}\text{Percent decrease} &= \frac{\text{amount of decrease}}{\text{original amount}} \\ &= \frac{6-4}{6} = \frac{2}{6} = \frac{1}{3} = 33\frac{1}{3}\%\end{aligned}$$

The projected percent decrease in world population is $33\frac{1}{3}\%$.

Example: Abuses of Percents

John Tesh, while he was still co-anchoring *Entertainment Tonight*, reported that the PBS series *The Civil War* had an audience of 13% versus the usual 4% PBS audience, “an increase of more than 300%.” Did Tesh report the percent increase correctly?

Solution: We begin by finding the actual percent increase.

$$\begin{aligned}\text{Percent increase} &= \frac{\text{amount of increase}}{\text{original amount}} \\ &= \frac{13 - 4}{4} = \frac{9}{4} = 2.25 = 225\%\end{aligned}$$

The percent increase for PBS was 225%. This is not more than 300%, so Tesh did not report the percent increase correctly.