Percent Increase or Decrease and Discount

Objective 1

Solve a Percent Increase Problem

A **percent increase** refers to an amount that is a portion of a given total quantity. For example, if you receive a percent raise on your salary, the amount of the raise is a portion of your total salary. As in the previous sections, we can use the following structured format to calculate the amount of increase on any total quantity.

$$(\text{Portion}) = (\ \%\ ) \cdot (\text{Total})$$

$$\begin{pmatrix}\text{Amount of}\\ \text{Increase}\end{pmatrix} = \begin{pmatrix}\%\\ \text{Increase}\end{pmatrix} \cdot \begin{pmatrix}\text{Total}\\ \text{Quantity}\end{pmatrix}$$

Example 1: An employee earning $60,000 a year receives a 15% raise. What is the amount of the raise? What is the new salary?

Example 2: The annual tuition at a college is presently $4,500. Next year the tuition will increase by 18%. What is the amount of the tuition increase? What will the annual tuition be next year?

Example 3: If an employee making $8.20 per hour receives a raise of $1.23 per hour, what is the percent increase?

Objective 2 **Solve a Percent Decrease Problem**

A **percent decrease** refers to an amount that is again a portion of a given total quantity. As with percent increase problems, we can again use a structured format to solve these types of problems.

$$(\text{Portion}) = (\ \%\ ) \cdot (\text{Total})$$

$$\left(\begin{array}{c}\text{Amount of}\\ \text{Decrease}\end{array}\right) = \left(\begin{array}{c}\%\\ \text{Decrease}\end{array}\right) \cdot \left(\begin{array}{c}\text{Total}\\ \text{Quantity}\end{array}\right)$$

Example 4: A large university currently has 40,000 students. Next year, it is expected that the university will see a 3.2% decrease in its current student population. How many students are expected to attend the university next year?

Example 5: One year ago, Duyen bought a 16GB USB drive for $48. Today she bought the same USB drive for $12. What is the percent decrease in the price of the USB drive?

$$\left(\begin{array}{c}\text{Amount of}\\ \text{Decrease}\end{array}\right) = \left(\begin{array}{c}\%\\ \text{Decrease}\end{array}\right) \cdot \left(\begin{array}{c}\text{Total}\\ \text{Quantity}\end{array}\right)$$

Objective 3

Solve a Discount Problem

When department stores have clearance sales, they regularly discount the purchase price of much of their merchandise to attract potential shoppers. Stores will often place signs throughout the store stating things like "15% Off" or in some cases "50% Off". These signs indicate that there is a percent decrease in the purchase price of the item. The new discounted price is referred to as the **sale price.**

When we buy things from a store and there is a percent decrease in the purchase price, we refer to this as a **discount**. The **amount of the discount** is always a portion of the purchase price and can be calculated using the following structured format.

$$(\text{Portion}) = (\ \%\ ) \cdot (\text{Total})$$

$$\left(\begin{array}{c}\text{Amount of}\\ \text{Discount}\end{array}\right) = \left(\begin{array}{c}\%\\ \text{Discount}\end{array}\right) \cdot \left(\begin{array}{c}\text{Purchase}\\ \text{Price}\end{array}\right)$$

Example 6: During a clearance sale, a pair of shoes that usually sells for $39.00 is marked "15% Off". What is the discount amount and what is the sale price?

Example 7: The regular price of a pair of designer jeans costs $80. If the jeans are marked on sale for "15% Off", what is the total cost of the jeans if the sales tax rate is 8%?