Section 4.3 Systems of Linear Equations and Problem Solving

# Objective 1: Solving Problems Modeled by Systems of Two Equations

Applied problems sometimes involve two or more unknown quantities. Sometimes we are able to use a single equation involving one variable to solve problems. However, it is often easier to use two variables and create a system of two equations.

**Five Step Strategy for Solving Applied Problems Using Systems of Equations**

**Step 1:** Read the problem. If possible, create diagrams, charts, or tables.

**Step 2:** Choose variables that describe each unknown quantity that is to be found.

**Step 3**: Write a system of equations using the given information and the variables.

**Step 4**: Solve the system of equations using the method of elimination or

 substitution.

**Step 5**: Use the solution to answer the problem. Check to make sure the answers make

 sense.

Find how many quarts of $5\%$ butterfat milk and $2\%$ butterfat milk should be mixed to yield $90$ quarts of $4\%$ butterfat milk.

# Objective 2: Solving Problems with Cost and Revenue Functions

Businesses often use cost and revenue functions to predict sales and determine prices. The value at which the revenue equals the cost is called the **break-even point**. When revenue is less than cost, the company is losing money, and when revenue is greater than cost, the company is making money.

A manufacturing company recently purchased $\$3000$ worth of new equipment to offer new personalized stationery to its customers. The cost of producing a package of personalized stationery is $\$3.00$, and it is sold for $\$5.50$. Find the number of packages that must be sold for the company to break even.

**Objective 3: Solving Problems Modeled by Systems of Three Equations**

We will use the same strategy outlined in objective 1 to solve problems involving three unknown quantities.

The perimeter of a quadrilateral (four-sided polygon) is $29$ inches. The longest side is four times as long as the shortest side. The other two sides are equally long and are $4$ inches longer than the shortest side. Find the length of all four sides.