4.3   Applications of Systems of Linear Equations in Two Variables

**Recall General Guidelines and Hints for Solving Word Problems:**
- **read** the problem twice
- recognize the type of the problem and draw appropriate tables or diagrams to **organize your data** in a useful way; list relevant formulas;
- **assign variables** for the unknown quantities, use meaningful letters;
- **write equations** by following a relevant formula(s) or a common sense pattern;
- **solve** the system of equations;
- **check** if the solution is reasonable;
- **give the formal answer**.

Commonly used tables, patterns, and formulas:

Geometry Problems
Example 1:   A rectangular soccer field has perimeter 360 yd. Its length is 20 yd less than twice its width. What are the dimensions of the field?

Solution: Let L = the **length**, and W = the **width** of the rectangle.

W ▭
       L
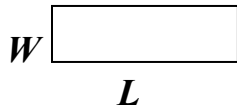
Answer: The length is .... and the with is ....

Total Value Problems
Example 2:   Three baseball tickets and two football tickets cost $229.90. Two baseball tickets and one football ticket cost $128.27. What are the ticket prices for the two sports?

Solution: Let b be the price of a baseball ticket, and
                     f be the price of a football ticket.

value of baseball tickets + value of football tickets = total value

Answer: A baseball ticket costs ...., and a football ticket costs ....

Investment Problems

Example 3: An executive near retirement made two investments totalling $18,000. In one year, these investments yielded $950 in simple interest. Part of the money was invested at 4% and the rest at 6%. How much was invested at each rate?

Solution: Let x = the money invested at 4%, and
y = the money invested at 6%.

$18,000

x at 4% y at 6%

interest ($I = Prt$):

Answer: He invested .... at 4% and .... at 6%.

Mixture (Solution) Problems

Example 4: How many litres of a 15% acid solution and a 25% acid solution should be mixed to get 30 L of an 18% acid solution?

Solution: Let x = the volume of 15% solution, and
y = the volume of 25% solution

	% ·	volume =	content
15% solution			
25% solution			
mixture			

Answer: .... L of 15% solution and .... L of 25% solution should be mixed.

Motion Problems

Example 5:   A train travels 600 mi in the same time that a truck travels 520 mi. Find the rate of each vehicle if the train's average rate is 8 mph faster than that of the truck.

Solution: Let v = average rate of the truck.
                Then $(v + 8)$ = average rate of the train.

Rate ·	Time =	Distance

Answer: The rate of the truck is .... and the rate of the train is ....