4.3 APPLICATIONS OF SYSTEMS OF LINEAR EQUATIONS

OBJECTIVES:

- Solve geometry problems by using two variables.
- Solve money problems by using two variables.
- Solve mixture problems by using two variables.
- Solve distance-rate-time problems by using two variables.

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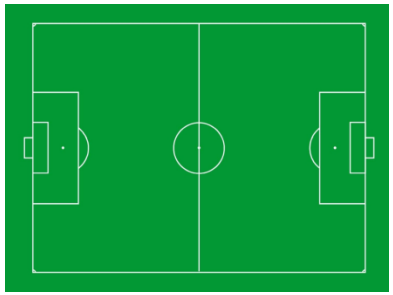
Steps to Solving an Applied Problem

Many applied problems involve more than one unknown quantity. Although some problems with two unknowns can be solved by using just one variable, it is often easier to use two variables and a system of equations.

- **READ** the problem carefully until you understand what is given and what is to be found.
- **ASSIGN VARIABLES** to represent the unknown values, using diagrams or tables as needed. *Write down* what each variable represents.
- **WRITE A SYSTEM OF EQUATIONS** that relates the unknowns.
- **SOLVE** the system of equations.
- **STATE THE ANSWER** to the problem. Does it seem reasonable?
- **CHECK** the answer in the words of the *original* problem.

Solving a Geometry Problem

- A rectangular soccer field has perimeter 360 yards. Its length is 20 yards more than its width. What are the dimensions.



W

L

L = length of field

W = width of field

Because the perimeter is 360 yards, we find one equation by using the perimeter formula.

Because the length is 20 yards more than the width we have

$$2L + 2W = 360$$

$$L = W + 20$$

Solving a Money Problem

- For the 2009 Major League Baseball and National Football League seasons, based on average ticket prices, three baseball tickets and two football tickets would have cost $229.90, while two baseball tickets and one football ticket would have cost $128.27. What were the average tickets prices for the tickets for the two sports?

$$3b + 2f = 229.90$$
$$2b + f = 128.27$$

Solving a Mixture Problem

- A grocer has some $4-per-pound coffee and some $8-per-pound coffee that she will mix to make 50 pounds of $5.60-per-pound coffee. How many pounds of each should be used?

Pounds of Solution	Price per Pound	Total Price

$$x + y = 50$$
$$4x + 8y = 280$$

Solving a Distance-Rate-Time Problem

- A train travels 600 miles in the same time that a truck travels 520 miles. Find the speed of each vehicle if the train's average speed is 8 mph faster than the truck's.

Use a table to organize the information.

	R	T	D

$$600y = 520x$$
$$x = y + 8$$

Solving an Interest Problem

- An investor will invest a total of $15,000 in two accounts, one paying 4% annual simple interest and the other 3%. If he wants to earn $550 annual interest, how much should he invest at each rate?

Use a table to organize the information.

P	R	T	I

$$x + y = 15000$$
$$0.04x + 0.03y = 550$$