



- Got It?** 3. a. You row upstream at a speed of 2 mi/h. You travel the same distance downstream at a speed of 5 mi/h. What would be your rowing speed in still water? What is the speed of the current?
- b. **Reasoning** Suppose your rowing speed in still water is 3 mi/h and the speed of the current is 4 mi/h. What happens when you try to row upstream?



Lesson Check

Do you know HOW?

- Newsletters** Printing a newsletter costs \$1.50 per copy plus \$450 in printer's fees. The copies are sold for \$3 each. How many copies of the newsletter must be sold to break even?
- Jewelry** A metal alloy is a metal made by blending 2 or more types of metal. A jeweler has supplies of two metal alloys. One alloy is 30% gold and the other is 10% gold. How much of each alloy should the jeweler combine to create 4 kg of an alloy containing 15% gold?
- Flying** With a tailwind, a bird flew at a ground speed of 3 mi/h. Flying the same path against the same wind, the bird travels at a ground speed of 1.5 mi/h. What is the bird's air speed? What is the wind speed?

Do you UNDERSTAND?



- Vocabulary** What is the relationship between income and expenses before a break-even point is reached? What is the relationship between income and expenses after a break-even point is reached?
- Reasoning** Which method would you use to solve the following system? Explain.

$$3x + 2y = 9$$

$$-2x + 3y = 5$$
- Reasoning** One brand of cranberry-apple drink is 15% cranberry juice. Another brand is 40% cranberry juice. You would like to combine the brands to make a drink that is 25% cranberry juice. Without calculating, which brand of juice will you need more of to make your drink? Explain.



Practice and Problem-Solving Exercises



A Practice

- Business** A bicycle store costs \$2400 per month to operate. The store pays an average of \$60 per bike. The average selling price of each bicycle is \$120. How many bicycles must the store sell each month to break even?
- Theater** Producing a musical costs \$88,000 plus \$5900 per performance. One sold-out performance earns \$7500 in revenue. If every performance sells out, how many performances are needed to break even?
- Investment** You split \$1500 between two savings accounts. Account A pays annual 5% interest and Account B pays 4% annual interest. After one year, you have earned a total of \$69.50 in interest. How much money did you invest in each account? Explain.
- STEM** **Biology** A group of scientists studied the effect of a chemical on various strains of bacteria. Strain A started with 6000 cells and decreased at a constant rate of 2000 cells per hour after the chemical was applied. Strain B started with 2000 cells and decreased at a constant rate of 1000 cells per hour after the chemical was applied. When will the strains have the same number of cells? Explain.

← See Problem 1.

← See Problem 2.

- 11. Airports** A traveler is walking on a moving walkway in an airport. The traveler must walk back on the walkway to get a bag he forgot. The traveler's groundspeed is 2 ft/s against the walkway and 6 ft/s with the walkway. What is the traveler's speed off the walkway? What is the speed of the moving walkway?
- 12. Kayaking** A kayaker paddles upstream from camp to photograph a waterfall and returns. The kayaker's speed while traveling upstream and downstream is shown below. What is the kayaker's speed in still water? What is the speed of the current?



B Apply

- 13. Money** You have a jar of pennies and quarters. You want to choose 15 coins that are worth exactly \$4.35.
- Write and solve a system of equations that models the situation.
 - Is your solution reasonable in terms of the original problem? Explain.

Solve each system. Explain why you chose the method you used.

14. $4x + 5y = 3$
 $3x - 2y = 8$

15. $2x + 7y = -20$
 $y = 3x + 7$

16. $5x + 2y = 17$
 $x - 2y = 8$

- 17. Reasoning** Find A and B so that the system below has the solution $(2, 3)$.

$$Ax - 2By = 6$$

$$3Ax - By = -12$$

- 18. Think About a Plan** A tugboat can pull a boat 24 mi downstream in 2 h. Going upstream, the tugboat can pull the same boat 16 mi in 2 h. What is the speed of the tugboat in still water? What is the speed of the current?
- How can you use the formula $d = rt$ to help you solve the problem?
 - How are the tugboat's speeds when traveling upstream and downstream related to its speed in still water and the speed of the current?

- 19. Open-Ended** Without solving, decide which method you would use to solve each system: *graphing*, *substitution*, or *elimination*. Explain.

19. $y = 3x - 1$
 $y = 4x$

20. $3m - 4n = 1$
 $3m - 2n = -1$

21. $4s - 3t = 8$
 $t = -2s - 1$

- 22. Business** A perfume maker has stocks of two perfumes on hand. Perfume A sells for \$15 per ounce. Perfume B sells for \$35 per ounce. How much of each should be combined to make a 3-oz bottle of perfume that can be sold for \$63?

- STEM 23. Chemistry** In a chemistry lab, you have two vinegars. One is 5% acetic acid, and one is 6.5% acetic acid. You want to make 200 mL of a vinegar with 6% acetic acid. How many milliliters of each vinegar do you need to mix together?