

3 Applications

Write a system of two equations in two unknowns for each problem. Solve each system by the method of your choice. See Examples 7 and 8.

- 65. Two numbers.** The sum of two numbers is 12 and their difference is 2. Find the numbers.
- 66. Two more numbers.** The sum of two numbers is 11 and their difference is 6. Find the numbers.
- 67. Paper size.** The length of a rectangular piece of paper is 2.5 inches greater than the width. The perimeter is 39 inches. Find the length and width.
- 68. Photo size.** The length of a rectangular photo is 2 inches greater than the width. The perimeter is 20 inches. Find the length and width.
- 69. Buy and sell.** Cory buys and sells baseball cards on ebay. He always buys at the same price and then sells the cards for \$2 more than he buys them. One month he broke even after buying 56 cards and selling 49. Find his buying price and selling price.
- 70. Jay Leno's garage.** Jay Leno's collection of cars and motorcycles totals 187. When he checks the air in the tires he has 588 tires to check. How many cars and how many motorcycles does he own? Assume that the cars all have four tires and the motorcycles have two.
- 71. Coffee and doughnuts.** On Monday, Archie paid \$3.40 for three doughnuts and two coffees. On Tuesday he paid \$3.60 for two doughnuts and three coffees. On Wednesday he was tired of paying the tab and went out for coffee by himself. What was his bill for one doughnut and one coffee?

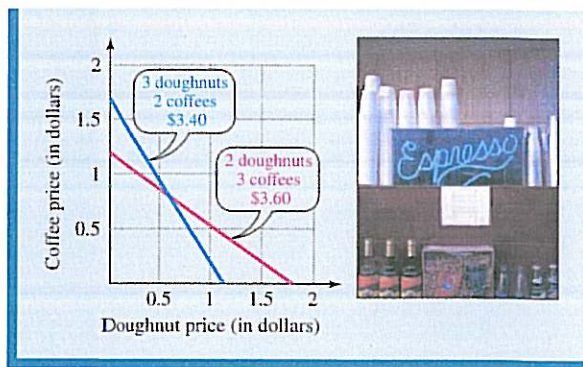


Figure for Exercise 71

- 72. Books and magazines.** At Gwen's garage sale, all books were one price, and all magazines were another price. Harriet bought four books and three magazines for \$1.45, and June bought two books and five magazines for \$1.25. What was the price of a book and what was the price of a magazine?

- 73. Boys and girls.** One-half of the boys and one-third of the girls of Fremont High attended the homecoming game, whereas one-third of the boys and one-half of the girls attended the homecoming dance. If there were 570 students at the game and 580 at the dance, then how many students are there at Fremont High?
- 74. Girls and boys.** There are 385 surfers in Surf City. Two-thirds of the boys are surfers and one-twelfth of the girls are surfers. If there are two girls for every boy, then how many boys and how many girls are there in Surf City?
- 75. Nickels and dimes.** Winborne has 35 coins consisting of dimes and nickels. If the value of his coins is \$3.30, then how many of each type does he have?
- 76. Pennies and nickels.** Wendy has 52 coins consisting of nickels and pennies. If the value of the coins is \$1.20, then how many of each type does she have?
- 77. Blending fudge.** The Chocolate Factory in Vancouver blends its double-dark-chocolate fudge, which is 35% fat, with its peanut butter fudge, which is 25% fat, to obtain double-dark-peanut fudge, which is 29% fat.
- Use the accompanying graph to estimate the number of pounds of each type that must be mixed to obtain 50 pounds of double-dark-peanut fudge.
 - Write a system of equations and solve it algebraically to find the exact amount of each type that should be used to obtain 50 pounds of double-dark-peanut fudge.

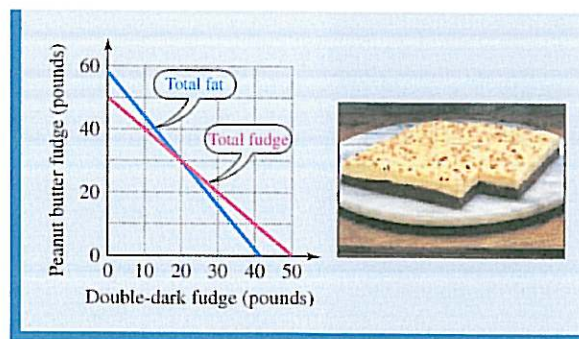


Figure for Exercise 77

- 78. Low-fat yogurt.** Ziggy's Famous Yogurt blends regular yogurt that is 3% fat with its no-fat yogurt to obtain low-fat yogurt that is 1% fat. How many pounds of regular yogurt and how many pounds of no-fat yogurt should be mixed to obtain 60 pounds of low-fat yogurt?

79. **Keystone state.** Judy averaged 42 miles per hour (mph) driving from Allentown to Harrisburg and 51 mph driving from Harrisburg to Pittsburgh. See the accompanying figure. If she drove a total of 288 miles in 6 hours, then how long did it take her to drive from Harrisburg to Pittsburgh?

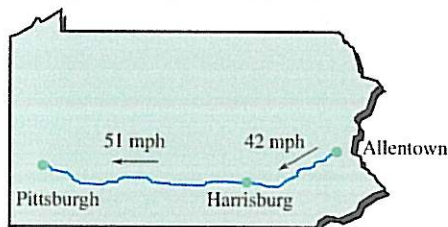


Figure for Exercise 79

80. **Empire state.** Spike averaged 45 mph driving from Rochester to Syracuse and 49 mph driving from Syracuse to Albany. If he drove a total of 237 miles in 5 hours, then how far is it from Syracuse to Albany?
81. **Probability of rain.** The probability of rain tomorrow is four times the probability that it does not rain tomorrow. The probability that it rains plus the probability that it does not rain is 1. What is the probability that it rains tomorrow?
82. **Super Bowl contender.** The probability that San Francisco plays in the next Super Bowl is nine times the probability that they do not play in the next Super Bowl. The probability that San Francisco plays in the next Super Bowl plus the probability that they do not play is 1. What is the probability that San Francisco plays in the next Super Bowl?
83. **Rectangular lot.** The width of a rectangular lot is 75% of its length. If the perimeter is 700 meters, then what are the length and width?
84. **Fence painting.** Darren and Douglas must paint the 792-foot fence that encircles their family home. Because Darren is older, he has agreed to paint 20% more than Douglas. How much of the fence will each boy paint?

Getting More Involved

85. Discussion

Explain how you decide whether it is easier to solve a system by substitution or addition.

86. Exploration

- Write a linear equation in two variables that is satisfied by $(-3, 5)$.
- Write another linear equation in two variables that is satisfied by $(-3, 5)$.
- Are your equations independent or dependent?
- Explain how to select the second equation so that it will be independent of the first.

87. Exploration

- Make up a system of two linear equations in two variables such that both $(-1, 2)$ and $(4, 5)$ are in the solution set.
- Are your equations independent or dependent?
- Is it possible to find an independent system that is satisfied by both ordered pairs? Explain.



7.3 Systems of Linear Equations in Three Variables

In This Section

- 1 Definition
- 2 Solving a System by Elimination
- 3 Dependent and Inconsistent Systems
- 4 Applications

The techniques that you learned in Section 7.2 can be extended to systems of equations in more than two variables. In this section, we use elimination of variables to solve systems of equations in three variables.

1 Definition

The equation $5x - 4y = 7$ is called a linear equation in two variables because its graph is a straight line. The equation $2x + 3y - 4z = 12$ is similar in form, and so it is a linear equation in three variables. An equation in three variables is graphed in a three-dimensional coordinate system. The graph of a linear equation in three variables is a plane, not a line. We will not graph equations in three variables in this text, but we can solve systems without graphing. In general, we make the following definition.