

## 3.5

## Exercise Set

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Solve.

- The sum of three numbers is 57. The second is 3 more than the first. The third is 6 more than the first. Find the numbers.
- The sum of three numbers is 5. The first number minus the second plus the third is 1. The first minus the third is 3 more than the second. Find the numbers.
- The sum of three numbers is 26. Twice the first minus the second is 2 less than the third. The third is the second minus three times the first. Find the numbers.
- The sum of three numbers is 105. The third is 11 less than ten times the second. Twice the first is 7 more than three times the second. Find the numbers.
- Geometry.** In triangle  $ABC$ , the measure of angle  $B$  is three times that of angle  $A$ . The measure of angle  $C$  is  $20^\circ$  more than that of angle  $A$ . Find the angle measures.
- Geometry.** In triangle  $ABC$ , the measure of angle  $B$  is twice the measure of angle  $A$ . The measure of angle  $C$  is  $80^\circ$  more than that of angle  $A$ . Find the angle measures.
- Scholastic Aptitude Test.** Many high-school students take the Scholastic Aptitude Test (SAT). Beginning in March 2005, students taking the SAT received three scores: a critical reading score, a mathematics score, and a writing score. The average total score of 2009 high-school seniors who took the SAT was 1509. The average mathematics score exceeded the reading score by 14 points and the average writing score was 8 points less than the reading score. What was the average score for each category?  
Source: College Entrance Examination Board
- Advertising.** In 2008, U.S. companies spent a total of \$118.2 billion on newspaper, television, and magazine ads. The total amount spent on television ads was \$10.8 billion more than the amount spent on newspaper and magazine ads together. The amount spent on magazine ads was \$3.5 billion more than the amount spent on newspaper ads. How much was spent on each form of advertising?  
Source: TNS Media Intelligence
- Nutrition.** Most nutritionists now agree that a healthy adult diet should include 25–35 g of fiber each day. A breakfast of 2 bran muffins, 1 banana, and a 1-cup serving of Wheaties® contains 9 g of fiber; a breakfast of 1 bran muffin, 2 bananas, and a 1-cup serving of Wheaties® contains 10.5 g of fiber; and a breakfast of 2 bran muffins and a 1-cup serving of Wheaties® contains 6 g of fiber. How much fiber is in each of these foods?  
Sources: usda.gov; IntelliHealth.com



- Nutrition.** Refer to Exercise 9. A breakfast consisting of 2 pancakes and a 1-cup serving of strawberries contains 4.5 g of fiber, whereas a breakfast of 2 pancakes and a 1-cup serving of Cheerios® contains 4 g of fiber. When a meal consists of 1 pancake, a 1-cup serving of Cheerios®, and a 1-cup serving of strawberries, it contains 7 g of fiber. How much fiber is in each of these foods?  
Source: IntelliHealth.com

- Automobile Pricing.** The basic model of a 2010 Honda Civic Hybrid with a car cover cost \$24,030. When equipped with satellite radio and a car cover, the vehicle's price rose to \$24,340. The price of the basic model with satellite radio was \$24,110. Find the basic price, the price of satellite radio, and the price of a car cover.
- Telemarketing.** Sven, Laurie, and Isaiah can process 740 telephone orders per day. Sven and Laurie together can process 470 orders, while Laurie and Isaiah together can process 520 orders per day. How many orders can each person process alone?
- Coffee Prices.** Reba works at a Starbucks® coffee shop where a 12-oz cup of coffee costs \$1.65, a 16-oz cup costs \$1.85, and a 20-oz cup costs \$1.95. During one busy period, Reba served 55 cups of coffee, emptying six 144-oz "brewers" while collecting a total of \$99.65. How many cups of each size did Reba fill?

14. **Restaurant Management.** Chick-fil-A® recently sold small lemonades for \$1.29, medium lemonades for \$1.49, and large lemonades for \$1.85. During a lunch-time rush, Chris sold 40 lemonades for a total of \$59.40. The number of small drinks and large drinks, combined, was 10 fewer than the number of medium drinks. How many drinks of each size were sold?
15. **Small-Business Loans.** Chelsea took out three loans for a total of \$120,000 to start an organic orchard. Her bank loan was at an interest rate of 8%, the small-business loan was at an interest rate of 5%, and the mortgage on her house was at an interest rate of 4%. The total simple interest due on the loans in one year was \$5750. The annual simple interest on the mortgage was \$1600 more than the interest on the bank loan. How much did she borrow from each source?
16. **Investments.** A business class divided an imaginary investment of \$80,000 among three mutual funds. The first fund grew by 10%, the second by 6%, and the third by 15%. Total earnings were \$8850. The earnings from the first fund were \$750 more than the earnings from the third. How much was invested in each fund?
17. **Gold Alloys.** Gold used to make jewelry is often a blend of gold, silver, and copper. The relative amounts of the metals determine the color of the alloy. Red gold is 75% gold, 5% silver, and 20% copper. Yellow gold is 75% gold, 12.5% silver, and 12.5% copper. White gold is 37.5% gold and 62.5% silver. If 100 g of red gold costs \$2265.40, 100 g of yellow gold costs \$2287.75, and 100 g of white gold costs \$1312.50, how much do gold, silver, and copper cost?

Source: World Gold Council



18. **Blending Teas.** Verity has recently created three custom tea blends. A 5-oz package of Southern Sandalwood sells for \$13.15 and contains 2 oz of Keemun tea, 2 oz of Assam tea, and 1 oz of a berry blend. A 4-oz package of Golden Sunshine sells for \$12.50 and contains 3 oz of Assam tea and 1 oz of the

berry blend. A 6-oz package of Mountain Morning sells for \$12.50 and contains 2 oz of the berry blend, 3 oz of Keemun tea, and 1 oz of Assam tea. What is the price per ounce of Keemun tea, Assam tea, and the berry blend?

19. **Nutrition.** A dietician in a hospital prepares meals under the guidance of a physician. Suppose that for a particular patient a physician prescribes a meal to have 800 calories, 55 g of protein, and 220 mg of vitamin C. The dietician prepares a meal of roast beef, baked potatoes, and broccoli according to the data in the table below.

Serving Size	Calories	Protein (in grams)	Vitamin C (in milligrams)
Roast Beef, 3 oz	300	20	0
Baked Potato, 1	100	5	20
Broccoli, 156 g	50	5	100

How many servings of each food are needed in order to satisfy the doctor's orders?

20. **Nutrition.** Repeat Exercise 19 but replace the broccoli with asparagus, for which a 180-g serving contains 50 calories, 5 g of protein, and 44 mg of vitamin C. Which meal would you prefer eating?
21. **Concert Tickets.** Students in a Listening Responses class bought 40 tickets for a piano concert. The number of tickets purchased for seats either in the first mezzanine or on the main floor was the same as the number purchased for seats in the second mezzanine. First mezzanine seats cost \$52, main floor seats cost \$38, and second mezzanine seats cost \$28. The total cost of the tickets was \$1432. How many of each type of ticket were purchased?



22. **World Population Growth.** The world population is projected to be 9.4 billion in 2050. At that time, there is expected to be approximately 3.5 billion more people in Asia than in Africa. The population for the rest of the world will be approximately 0.3 billion less than two-fifths the population of Asia. Find the projected populations of Asia, Africa, and the rest of the world in 2050.

Source: U.S. Census Bureau

23. **Basketball Scoring.** The New York Knicks recently scored a total of 92 points on a combination of 2-point field goals, 3-point field goals, and 1-point foul shots. Altogether, the Knicks made 50 baskets and 19 more 2-pointers than foul shots. How many shots of each kind were made?

24. **History.** Find the year in which the first U.S. transcontinental railroad was completed. The following are some facts about the number. The sum of the digits in the year is 24. The ones digit is 1 more than the hundreds digit. Both the tens and the ones digits are multiples of 3.

TW 25. Problems like Exercises 13 and 14 could be classified as total-value problems. How do these problems differ from the total-value problems of Section 3.3?

TW 26. Write a problem for a classmate to solve. Design the problem so that it translates to a system of three equations in three variables.

### SKILL REVIEW

To prepare for Section 3.6, review simplifying expressions (Section 1.3).

Simplify. [1.3]

27.  $-2(2x - 3y)$

28.  $-(x - 6y)$

29.  $-6(x - 2y) + (6x - 5y)$

30.  $3(2a + 4b) + (5a - 12b)$

31.  $-(2a - b - 6c)$

32.  $-10(5a + 3b - c)$

33.  $-2(3x - y + z) + 3(-2x + y - 2z)$

34.  $(8x - 10y + 7z) + 5(3x + 2y - 4z)$

### SYNTHESIS

TW 35. Consider Exercise 23. Suppose there were no foul shots made. Would there still be a solution? Why or why not?

TW 36. Consider Exercise 13. Suppose Reba collected \$50. Could the problem still be solved? Why or why not?

37. **Health Insurance.** In 2010, United Health One insurance for a 45-year-old and his or her spouse cost \$135 per month. That rate increased to \$154 per month if a child were included and \$173 per month if two children were included. The rate dropped to \$102 per month for just the applicant and one child. Find the separate costs for insuring the applicant, the spouse, the first child, and the second child.  
Source: United Health One Insurance Company® through www.ehealth.com

38. Find a three-digit positive integer such that the sum of all three digits is 14, the tens digit is 2 more than the ones digit, and if the digits are reversed, the number is unchanged.

39. **Ages.** Tammy's age is the sum of the ages of Carmen and Dennis. Carmen's age is 2 more than the sum of the ages of Dennis and Mark. Dennis's age is four times Mark's age. The sum of all four ages is 42. How old is Tammy?

40. **Ticket Revenue.** A magic show's audience of 100 people consists of adults, students, and children. The ticket prices are \$10 for adults, \$3 for students, and 50¢ for children. The total amount of money taken in is \$100. How many adults, students, and children are in attendance? Does there seem to be some information missing? Do some more careful reasoning.

41. **Sharing Raffle Tickets.** Hal gives Tom as many raffle tickets as Tom first had and Gary as many as Gary first had. In like manner, Tom then gives Hal and Gary as many tickets as each then has. Similarly, Gary gives Hal and Tom as many tickets as each then has. If each finally has 40 tickets, with how many tickets does Tom begin?

42. Find the sum of the angle measures at the tips of the star in this figure.



### Try Exercise Answers: Section 3.5

1. 16, 19, 22    5.  $32^\circ, 96^\circ, 52^\circ$     9. Bran muffin: 1.5 g; banana: 3 g; 1 cup of Wheaties: 3 g