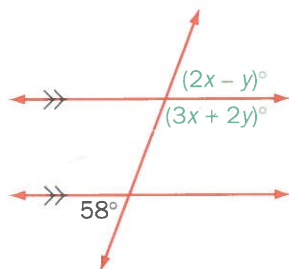


## Applications and Problem Solving

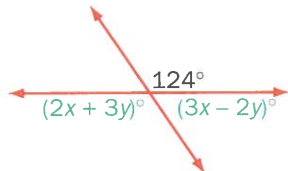
- 4. Numbers** The sum of two numbers is 255. When the smaller is subtracted from the larger, the result is 39. Find the numbers.
- 5. Earning interest** Isabel invested \$8000, part at 9% per annum and the remainder at 4% per annum. After one year, the total interest from these investments was \$420. How much did she invest at each rate?
- 6. Driving** Kareem took 5 h to drive 470 km from Sudbury to Brantford. For part of the trip, he drove at 100 km/h. For the rest of the trip, he drove at 90 km/h. How far did he drive at each speed?
- 7. Patrol boat** It took a patrol boat 5 h to travel 60 km up a river against the current, and 3 h for the return trip with the current. Find the speed of the boat in still water and the speed of the current.
- 8. Investments** Hakim invested \$15 000. He put part of it in a term deposit that paid 4% per annum, and the remainder in a treasury bill that paid 5% per annum. After one year, the total interest was \$690. How much did Hakim invest at each rate?

### B

- 9. Measurement** Find the values of  $x$  and  $y$ .



- 10. Vinegar solutions** White vinegar is a solution of acetic acid in water. There are two strengths of white vinegar—a 5% solution and a 10% solution. How many millilitres of each solution must be mixed to make 50 mL of a 9% vinegar solution?
- 11. Acid solutions** What volume, in millilitres, of a 60% hydrochloric acid solution must be added to 100 mL of a 30% hydrochloric acid solution to make a 36% hydrochloric acid solution?
- 12. Measurement** Use the diagram to find the values of  $x$  and  $y$ .



**13. Flying speed** A plane took 4 h to fly 2200 km from Saskatoon to Toronto with a tail wind. The return trip, with a head wind, took 5 h. Find the speed of the plane in still air and the wind speed.

**14. Pool table** The perimeter of a pool table is about 7.8 m. Four times the length equals nine times the width. What are the dimensions of the table, in metres?

**15. Fitness** Playing tennis burns energy at a rate of about 25 kJ/min. Cycling burns energy at about 35 kJ/min. Hans exercised by playing tennis and then cycling. He exercised for 50 min altogether and used a total of 1450 kJ of energy. For how long did he play tennis?

**16. Measurement** The rectangle has an area of  $m$  square units and a perimeter of  $2m$  units. What is the value of  $x$ ?



**17. Driving distance** Erica drove from Sarnia at 80 km/h. Aisha left Sarnia one hour later and drove along the same road at 100 km/h. How far from Sarnia did Aisha overtake Erica?

**C**

**18.** For two numbers whose sum is  $q$  and whose difference is  $r$ , write an expression for each number in terms of  $q$  and  $r$ .

**19. Road trips** From his home in Point Alexander, Dan drove to Belleville at an average speed of 75 km/h. From her home in Chalk River, Ashley drove through Point Alexander to Belleville at an average speed of 85 km/h. The distance from Chalk River to Point Alexander is 18 km. If Dan and Ashley left home at the same time,

**a)** after what length of time did Ashley overtake Dan?

**b)** how far were they from Point Alexander when Ashley overtook Dan?

**20. Three variables** When three numbers are added in pairs, the sums of the pairs are 22, 39, and 45. What are the three numbers?

**21. Communication** Can the following equations describe the relationship between the side lengths in a triangle? Explain.

$$a + b + c = 13$$

$$b = 2a$$

$$a = c - 5$$

**22. Communication** Write a word problem that can be solved using a system of linear equations and that has the solution  $(7, 5)$ . Have a classmate check that your problem gives the correct solution.

- c)  $c = 2d$ ,  $c - d = 17$  d)  $b + f = 331$ ,  $10b + 15f = 3915$   
 e)  $x + y = 180$ ,  $x + 4 = 3y$

### Section 1.7 pp. 43–45

- Practice 1.** a) \$140 b) \$15 c) \$210 d)  $0.04x$   
 2. a) 30 kg b) 200 L c)  $0.3x$  litres d)  $0.09m$  kilograms  
 3. a) 240 km b)  $40x$  kilometres c) 12 h d)  $\frac{y}{90}$  hours

- Applications and Problem Solving 4.** 147, 108  
 5. \$2000 at 6%, \$6000 at 4% 6. 200 km at 100 km/h, 270 km at 90 km/h 7. 16 km/h, 4 km/h 8. \$6000 at 4%, \$9000 at 5% 9.  $x = 34$ ,  $y = 10$  10. 10 mL of the 5% solution, 40 mL of the 10% solution 11. 25 mL  
 12.  $x = 32$ ,  $y = 20$  13. 495 km/h, 55 km/h 14. 2.7 m by 1.2 m 15. 30 min 16. 2.5 17. 400 km

18.  $x = \frac{q+r}{2}$ ,  $y = \frac{q-r}{2}$  19. a) 1.8 h b) 135 km  
 20. 8, 14, 31 21. No, since  $a + b < c$ . 22. Answers may vary. 23. a) 24 m by 2 m b) not possible c) 24 m by 2 m d) not possible

### Career Connection p. 46

1. 100 g of 18-karat gold, 50 g of 9-karat gold

### Modelling Math p. 46

- a) Cost:  $C = 2n + 2000$ ; Revenue:  $C = 10n$  b) 250 c) 2250

### Rich Problem pp. 48–49

- 1 **Graphing and Interpreting Data** 2. a) 95% b) 5%  
 3. 4 million years ago  
 2 **Communication** 3. a) (14, 50) b) Fourteen million years ago, the populations were equal.  
 4. No, the graphs only show percents, not absolute numbers. 5. a) 5; -5

- Technology Extension** 1.  $y = 5x - 20$ ;  $y = -5x + 120$   
 2. (14, 50)

### Review of Key Concepts pp. 50–53

1. a) (4, -1) b) (-4, 3) c) (3, 2) d) no solution  
 e) (1, -3) f) infinitely many solutions g) (-2, 1)  
 h)  $(\frac{1}{2}, 5)$  2. a) (1.9, -2.2) b) (0.1, 0.7)  
 3. a) infinitely many solutions b) no solution c) one solution d) no solution 4. Sahara Desert: 9 million square kilometres; Australian Desert: 4 million square kilometres 5. a)  $d$  represents the total cost or revenue;  $p$  represents the number of paddles.  
 b) (62.5, 1125) c) greater than 62 6. a) (2, 2)  
 b) (1, -1) c) (4, -2) d) infinitely many solutions  
 e) (1, 3) f) no solution g) (-1, 5) h)  $(1, \frac{1}{3})$  7. a) (3, -2)  
 b) (1, 1) 8. Mount Pleasant: 16, Centreville: 15

9. a) (-1, 2) b) (-2, 1) c) (3, 2) d) (1, 0) e) no solution  
 f) infinitely many solutions g) (-2, -3) h) (4, 1)  
 10. Methods may vary. a) substitution: (-4, -5)

- b) elimination: (1, 1) c) substitution:  $(2, \frac{1}{2})$

- d) elimination: (-1, 2) 11. (-2, -3) 12. a) (3, 4)  
 b) (0.6, -0.5) 13. one night: \$150, one meal: \$15  
 14. 36 cars and 9 vans 15. \$5000 Canada Savings Bond, \$10 000 Provincial Government Bond  
 16. 75 kg of 24% nitrogen, 25 kg of 12% nitrogen  
 17. 40 km/h; 280 km/h 18. 210 km

### Chapter Test pp. 54–55

1. a) (4, 3) b) (-2, -3) c) (-1, 0) d) (1, -2)  
 2. a) (-0.7, 3.7) b) (2.4, 1.1) 3. a) The lines intersect at exactly one point. b) The lines are parallel and distinct. c) The lines are coincident.  
 4. a) (2, 2) b)  $(-3, \frac{1}{2})$  5. a) (-1, -1) b) (2, 1)  
 6. a) (3, 2) b) (2, -2) c) infinitely many solutions  
 d) no solution e) (-6, 4) f)  $(\frac{2}{3}, \frac{1}{3})$  g)  $(-\frac{4}{7}, -\frac{2}{7})$  h) (4, 1)  
 i) (5, 6) j) (3, -3) 7. Mackenzie River: 4241 km, Yukon River: 3185 km 8. 240 g of 30% fruit, 360 g of 15% fruit 9. term deposit: \$4000, municipal bond: \$9000 10. 50 km/h, 550 km/h

### Problem Solving p. 57

- Applications and Problem Solving** 1. a) 8 h 29 min  
 b) 179 km/h 2. Jupiter, Saturn 3. a) Newfoundland  
 b) Prince Edward Island 4. (information taken from the web site of the Canadian Museum of Nature: <http://www.nature.ca/english/eladback.htm>)  
 a) extinct: a species that no longer exists; extirpated: a species no longer existing in the wild, but existing elsewhere; endangered: a species facing imminent extirpation or extinction; threatened: a species likely to become endangered if limiting factors are not reversed; vulnerable: a species of special concern because of characteristics that make it particularly sensitive to human activities or natural events b) all living things, including plants and animals  
 10. Alberta 11. Answers may vary.

### Problem Solving p. 60

1. 298 2. 50 3. 92 units 4. infinitely many; they pass through the centre of the rectangle 5. 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40

### Problem Solving p. 61

1.  $253 \times 14$  2. a)  $20 \text{ cm}^2$  b)  $5 \text{ cm}^2$  3. 05:00 Wednesday  
 4.  $321 \text{ cm}^2$  5. 16 6. 12 7. a) 94 b) 50 8. 31, 49