Chapter 10

10.1 Modelling and Solving One-Step Equations: $ax = b$, $\frac{x}{a} = b$, pages 376–379

5. a) $3t = -6$ **b)** $-\frac{w}{2} = -4$ **c)** $2x = -4$ **d)** $-\frac{c}{4} = 2$

6. a) $-2 = \frac{m}{3}$ **b)** $-2n = -10$ **c)** $-4f = -12$ **d)** $\frac{p}{4} = -9$

7. a) $j = -8$ **b)** $n = -5$ **c)** $k = -18$ **d)** $x = 44$

8. a) $r = -4$ **b)** $p = 4$ **c)** $t = -60$ **d)** $d = -20$

9. a) $k = -4$ **b)** $t = -12$

10. a) $b = -5$ **b)** $x = 9$

11. a) -3 **b)** -4 **c)** -9 **d)** 4

12. a) 5 **b)** -4 **c)** 4 **d)** -21

13. a) $s = -3$ **b)** $j = 13$ **c)** $j = -26$ **d)** $t = 4$

14. a) $f = -7$ **b)** $q = -9$ **c)** $h = 21$ **d)** $k = -5$

15. a) -6 **b)** 3 **c)** -21 **d)** 17

16. a) 11 **b)** -12 **c)** 4 **d)** -3

17. a) $t = -36$ **b)** $h = -120$ **c)** $s = -105$ **d)** $x = 567$

18. a) $y = -20$ **b)** $k = 48$ **c)** $b = -10$ **d)** $r = 180$

19. a) Yes. **b)** Yes. **c)** Yes. **d)** No.

20. a) No. **b)** No. **c)** No. **d)** Yes.

21. a) $\frac{m}{4} = -4$ **b)** $m = -16$ °C

22. a) $13n = 312$; n is the number of litres. **b)** 24 L

23. a) $5p = 85$; p is the height of the pygmy owl in centimetres. **b)** 17 cm

24. a) $8m = 144$ **b)** $m = 18$ cm

25. Let x be the percent of right-handed boys.

$$\frac{1}{7}x = 11$$

$$x = 77$$

Therefore, 77% of boys are right-handed.

26. a) \$18 000 **b)** \$72 000

27. $\frac{12h}{2} = 30$; $h = 5$ cm

28. 9 min

29. a) 2994 m in fresh water; 3000 m in salt water
b) Sandra

10.2 Modelling and Solving Two-Step Equations: $ax + b = c$, pages 385–387

3. a) $x = 1$ **b)** $g = 2$

4. a) $h = 2$ **b)** $z = 6$

5. a) $x = 3$ **b)** $t = -7$

6. a) $d = 3$ **b)** $z = 4$

7. a) Add 2 to both sides of the equation.
b) Subtract 3 from both sides of the equation.
c) Add 10 to both sides of the equation.
d) Add 1 to both sides of the equation.

8. a) Divide both sides of the equation by 4.
b) Divide both sides of the equation by -3.
c) Divide both sides of the equation by 2.
d) Divide both sides of the equation by -9.

9. a) $r = 2$ **b)** $m = 1$ **c)** $g = 4$ **d)** $f = 12.75$
10. a) $k = -7$ **b)** $n = -2$ **c)** $x = -3$ **d)** $n = 0.5$
11. a) No. **b)** No. **c)** Yes. **d)** No.
12. a) $3s$ represents triple his current savings. By subtracting 30 from $3s$, Matt will have the amount he needs: \$750. **b)** savings: \$260 **c)** Answers may vary. Example: Algebra tiles could be used to determine Matt's savings.
13. 3 extras
14. a) $4s + 2 = 14$
b) Percent of students who choose skiing: 3%
15. $2m - 50 = 299$; Jennifer has \$174.50 in her account now.
16. $2w - 3 = 9$; width of the classroom: 6 m
17. a) The value of 6 represents the number of metres that the eagle drops every second. **b)** 11.8 s
18. 108 m^2
19. 3 m
20. There are three possible values for m: 667, 668, and 669.
21. 3.7 km/h

10.3 Modelling and Solving Two-Step Equations: $\frac{x}{a} + b = c$, pages 392–393

4. a) $x = 21$ **b)** $b = -18$
5. a) $z = 15$ **b)** $d = -35$
6. a) $g = -16$ **b)** $n = -50$
7. a) $f = 25$ **b)** $n = 24$
8. a) Subtract 12 from both sides of the equation.
b) Add 2 to both sides of the equation.
c) Subtract 6 from both sides of the equation.
d) Subtract 11 from both sides of the equation.
9. a) Multiply both sides of the equation by -5.
b) Multiply both sides of the equation by 13.
c) Multiply both sides of the equation by 12.
d) Multiply both sides of the equation by 3.
10. a) $m = 48$ **b)** $c = 32$ **c)** $b = -56$ **d)** $n = 154$
11. a) $j = -32$ **b)** $r = 0$ **c)** $x = -120$ **d)** $n = 195$
12. a) No. **b)** Yes. **c)** No. **d)** Yes.
13. a) Brian's age: 8 years old **b)** Answers may vary. Example: Natasha is not getting enough sleep according to the formula. She needs 8.75 h of sleep.
14. $\frac{a}{2} - 2 = 5$; Cost of an adult ticket: \$14
15. a) -25 °C **b)** 9000 m
16. $\frac{m}{2} - 1 = 6$; 14% of students prefer math.
17. a) 3100 Calories **b)** 2831 is greater than the recommended amount of Calories, which is 2700.
c) $x = 7$

10.4 Modelling and Solving Two-Step Equations: $a(x + b) = c$, pages 398–399

4. a) $x = 6$ **b)** $s = 5$
5. a) $x = 4$ **b)** $x = -7$
6. a) $t = 6$ **b)** $j = 0$
7. a) $p = 1$ **b)** $n = 2$
8. a) $r = -9$ **b)** $m = 6$ **c)** $g = -26$ **d)** $f = -7$
9. a) $k = -10$ **b)** $n = 8$ **c)** $x = 3$ **d)** $w = -11$
10. a) No. **b)** No. **c)** Yes. **d)** No.
11. a) $3(s + 7) = 183$
b) Length of each side of old fence: 54 cm
12. a) 17 750 kJ **b)** -30 °C
13. a) $4(x + 4) = 96$ **b)** Maximum dimensions of the square picture: 20 cm by 20 cm
14. Rental time: 4 h
15. Parking time: 3 h
16. a) Andrew's current speed: 12 km/h **b)** 9 km/h
c) Answers may vary. Example: Andrew would not be able to get to his grandfather's apartment in two hours if he was riding his bicycle through a city with several traffic lights and several steep hills. It would also depend on the types of roads and the terrain that he would have to bicycle over, and on his athletic ability.

Chapter Review, pages 400–401

1. variable
2. equation
3. opposite operations
4. numerical coefficient
5. distributive property
6. constant
7. linear equation
8. a) $x = -3$ **b)** $n = -8$ **c)** $d = 2$ **d)** $x = -15$
9. a) $x = 2$ **b)** $r = -3$ **c)** $z = -4$ **d)** $t = -3$
10. a) $p = -15$ **b)** $n = -33$ **c)** $x = 36$ **d)** $a = 14$
11. Answers may vary. Example: Two equations which would result in an answer of five are $-3p = -15$ and $20 = 4x$.
12. a) $3c + 2 = 5$; $c = 1$ **b)** $-4x + 7 = -1$; $x = 2$
13. a) Yes. **b)** Yes. **c)** Yes. **d)** No.
14. a) $t = -4$ **b)** $j = -25$ **c)** $p = 4$ **d)** $n = 11.25$
15. a) $4d - 3 = 25$ **b)** Zoë has seven DVDs.
16. a) $v = -50$ **b)** $j = -4$
17. a) Subtract 13 from both sides of the equation. Then multiply both sides of the equation by -3. **b)** Add 7 to both sides of the equation. Then multiply both sides of the equation by 15. **c)** Subtract 2 from both sides of the equation. Then multiply both sides of the equation by -22. **d)** Add 16 to both sides of the equation. Then multiply both sides of the equation by -4.
18. a) $v = 12$ **b)** $d = 15$ **c)** $x = -42$ **d)** $n = 36$
19. $\frac{b}{5} - 1120 = 23\,761$; British Columbia had 124 405 soccer players in 2006.
20. a) $r = -2$ **b)** $w = -5$
21. a) $q = 9$ **b)** $g = -11$ **c)** $k = -14$ **d)** $x = 1$
22. $4(x + 6) = 372$; Without the border, the quilt is 87 cm by 87 cm.
23. The sides of the original octagon were 9 cm long.