11. a) blue to white **b)** blue to red to white **c)** red to all **d)** red and white to all

12. a) $\frac{8}{32}$, 25% **b)** 24:8 or 3:1

13. a) 12 games lost **b)** 16:12 or 4:3; The team lost 12 games. If they played 28 games, they won 28 − 12 or 16 games. The ratio 16:12 is equivalent to 4:3. **c)** 15 losses

14. a)

b) 36 adults. Answers may vary. Example: The ratio 3:8 is equivalent to the ratio 36:96. **c)** 60 adults. There are 96 adults in total minus 36 adults who are less than 150 cm tall equals 60 adults who are 150 cm or taller.

15. a) 2:6:5 of Romano to mozzarella to cottage cheese. **b)** 300 g of Romano and 750 g of cottage

16. a) 1:2 **b)** 1:2 **c)** Each length is $\frac{1}{2}$ of what it originally was.

17. a) 16:48 or 1:3 **b)** 12:44 = $\frac{3}{11}$ = $0.\overline{27}$ = $27.\overline{27}$%

18. a) 24 cm **b)** 1.5 m

19. a) $\frac{1608}{1800} = \frac{67}{75}$ **b)** 1.02 **c)** 0.56; Answers may vary. Example: The Churchill River is about twice as long as the Thelon River.

20. 4.5 kg of nitrogen, 6 kg of phosphorus, and 3 kg of potassium, for a total of 13.5 kg

21. a) 24 m × 38.9 m and 348 mm × 565 mm **b)** 10.4 m

22. a) $\frac{1}{4}$ **b)** $\frac{1}{4}$ = 0.25 = 25% **c)** increase the slope; decrease the slope; decrease the slope; increase the slope

Chapter 2

2.1 Two-Term and Three-Term Ratios, pages 51–54

5. a) 2:8 **b)** 21:26 **c)** 16:14:30 **d)** Answers may vary. Example: 13:28.

6. a) 1:4 **b)** 21:26 **c)** 8:7:15 **d)** Answers may vary. Example: 13:28.

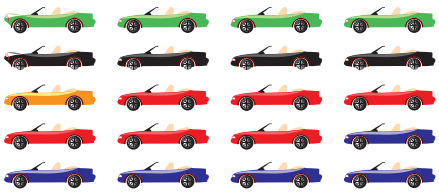
7. a) $\frac{4}{10}$ **b)** $\frac{3}{9}$ **c)** $\frac{3}{15}$ **d)** $\frac{27}{60}$

8. a) 4 **b)** 15 **c)** 6 **d)** 1 **e)** 7 **f)** 5

9. a) Hockey and baseball have equivalent win-loss ratios. Express each ratio in decimal form and compare them.

b) $\frac{9}{15}$, 0.6, 60%

10. a)



b) 9 cars **c)** 1:4:6 **d)** 6:20 = $\frac{3}{10}$ = 30%

2.2 Rates, pages 60–62

4. a) 55 km/h **b)** 64 km/h **c)** 90 daffodils/h

5. a) 4 t/day **b)** 19.3 km/h **c)** 6 bellows/h

6. Gina: $\frac{\$78}{6\text{ h}}$ = \$13/h; Asad: $\frac{\$192.50}{14\text{ h}}$ = \$13.75/h. Asad has the greater hourly rate of pay.

7. a) Pkg 1: \$0.73/100 g; Pkg 2: \$0.62/100 g; Pkg 3: \$0.69/100 g **b)** Pkg 2 is the best buy because the cost per 100 g was the least. This is assuming the quality of mixed nuts is the same in all packages.

8. a) small size: $\frac{\$0.59}{250\text{ mL}}$ = \$0.00236/mL;

medium size: $\frac{\$1.09}{500\text{ mL}}$ = \$0.00218/mL;

large size: $\frac{\$1.99}{1000\text{ mL}}$ = \$0.00199/mL

b) \$0.199/100 mL **c)** The large carton is the best buy because its unit rate is the least.

9. a) Answers may vary. There are four 250 mL small jars in one 1000 mL jar. Since \$2.79 × 4 is greater than \$9.59, four smaller jars would be more expensive for the equivalent amount of honey. This means the bigger jar is the better buy. **b)** small size: $\frac{\$2.79}{250\text{ mL}} = \$0.01116/\text{mL}$; large size: $\frac{\$9.59}{1000\text{ mL}} = \$0.00959/\text{mL}$. Therefore, the large size is the better buy.

10. Trevor: $\frac{84\text{ km}}{3\text{ h}} = 28\text{ km/h}$; Jillian: $\frac{70\text{ km}}{2.5\text{ h}} = 28\text{ km/h}$. They both rode at the same rate; therefore, neither is the fastest cyclist.

11. a) $\frac{\$9.96}{12\text{ bars}} = \$0.83/\text{bar}$ **b)** Answers may vary. Example: The answer to part a) is a rate because it is a comparison of two quantities in different units. A ratio is a comparison of quantities in the same units.

12. Saskatchewan Glacier: $\frac{1500\text{ m}}{75\text{ year}} = 20\text{ m/year}$; Peyto Glacier: $\frac{1320\text{ m}}{70\text{ year}} = 18.86\text{ m/year}$. The Saskatchewan Glacier has the greater annual rate of melting.

13. a) $\frac{60\text{ L}}{840\text{ km}} = 0.0714\text{ L/km}$ **b)** Answers may vary. Example: Multiply the answer by 100. **c)** Joe's vehicle has the lowest fuel consumption.

14. a) 416.4 euros **b)** 332.14 US dollars **c)** 518.72 Australian dollars

15. a) 1000 m race: 73.11 s; 1500 m race: 111.79 s; 3000 m race: 233.34 s **b)** 13.4 m/s **c)** 128.57 m

16. a) Daniel: 1.50 lawns/h; Grace: 1.33 lawns/h **b)** The difference is 0.17 lawn/h

17.

Planet	Radius (km)	Circumference (km)	Length of Day (h)	Rotation Rate (km/h)
Venus	6051	38 000	2808	13.5
Earth	6378	40 054	24	1669.8
Saturn	60 268	378 483	10 233	37

18. a) 0.8823; It represents that one Canadian dollar is equivalent to 0.8823 US dollar. **b)** \$617.61 **c)** 1.1158 **d)** \$627.35 US

19. 16.67 m/s

2.3 Proportional Reasoning, pages 67–69

4. a) 33¢/roll **b)** 2 kg/object

5. a) 47¢/pen **b)** 6 cm/block

6. \$21.00

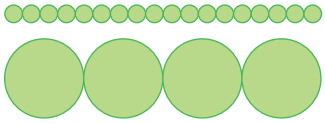
7. $\frac{\$35}{5\text{ h}} = \frac{\$x}{3\text{ h}}$ or $\frac{\$7}{1\text{ h}} = \frac{\$x}{3\text{ h}}$; \$21.00

8. a) 10 **b)** 2 **c)** 9 **d)** 9

9. a) 120 km **b)** 20 cans **c)** 89 beats **d)** \$64.00

10. a) $\frac{10\text{ beans}}{17\text{ g}} = \frac{30\text{ beans}}{51\text{ g}}$ **b)** $\frac{13\text{ boys}}{15\text{ girls}} = \frac{65\text{ boys}}{75\text{ girls}}$ **c)** $\frac{1\text{ cm}}{25\text{ km}} = \frac{6.4\text{ cm}}{160\text{ km}}$

11. Answers may vary. Example:



$\frac{18\text{ small gear turns}}{4\text{ large gear turns}} = \frac{54\text{ turns}}{x\text{ turns}}$; 12 times or turns.

12. a) $\frac{175\text{ mL}}{50\text{ mL}} = \frac{300\text{ mL}}{x\text{ mL}}$ **b)** $\frac{3\text{ home runs}}{17\text{ strikeouts}} = \frac{x\text{ home runs}}{187\text{ strikeouts}}$

13. 25 nickels

14. Answers may vary. Example:

As a unit rate: $\frac{30\text{ cm}}{6\text{ h}} = 5\text{ cm/h}$, so $\frac{45}{5} = 9\text{ h}$.

As a proportion: $\frac{30\text{ cm}}{6\text{ h}} = \frac{45\text{ cm}}{x\text{ h}}$, which results in $x = 9\text{ h}$.

15. Answers may vary. Example: $\frac{1\text{ figure}}{2\text{ squares}} = \frac{7\text{figures}}{x\text{ squares}}$.

16. \$50.00

17. a) \$52.80 **b)** $\frac{\$17.60}{2000\text{ g}} = \frac{\$x}{1600\text{ g}}$; $x = \$14.08$

18. a) \$2.50/ride **b)** \$45.00; Answers may vary. Example: Using unit rate: \$2.50 × 18 = \$45.00. Using a proportion: $\frac{\$2.50}{\text{ride}} = \frac{\$x}{18\text{ rides}}$, where $x = \$45.00$.

19. a) 4, 9 **b)** \$48, 192 km

20. 150 g of rice

21. 17.5 min

22. a) 1.8 m **b)** 48 cm or 0.48 m

23. 0.33 kg

24. a) Answers may vary. Example: The numerators consist of the whole numbers in consecutive order; the denominators consist of the even whole numbers in consecutive order. **b)** Answers may vary. Example: The numerators are multiples of 5 and the denominators are multiples of 6. **c)** Answers may vary. Example: The products are equal. **d)** Answers may vary. Example: The cross-products will be the same. Example: In the equivalent pair $\frac{7}{8} = \frac{14}{16}$, the cross-products are both 112.

25. a) Frog: 96 insects/day; dragonfly: 99 insects/day. The dragon fly eats 3 more insects per day. **b)** 693 insects **c)** 2976 insects

26. a) 1:2 **b)** 1:4

27. 20:35 or 4:7

28. 13.75 mL

Chapter Review, pages 70–71

1. D **2.** B **3.** E **4.** A **5.** G

6. a) 6:6 **b)** 6:12 **c)** $\frac{1}{2} = \frac{3}{6}$ **d)** 50%

7. a) 6:16 **b)** $\frac{3}{8}$ **c)** 8:4

8. a) 1:2:5 **b)** 8 **c)** blue cars to total **d)** silver to (non-silver, non-blue, non-red, and non-yellow) **e)** $\frac{1}{4}$, 25%

9. a) 8 **b)** 10:8

10. a) 24:6 **b)** 48:12 **c)** 4

11. a) 50 steps/min **b)** $0.90/L **c)** 624 km/h **d)** 50 kg/year
12. a) Answers may vary. Example: 4.98 : 13.95
b) Answers may vary. Example: $4.98/3 kg **c)** The unit price in Winnipeg is $1.66/kg. The unit price in Little Grand Rapids is $4.65/kg. The difference in price/kg is $2.99/kg.
13. a) fridge: 5.0¢/h; computer and monitor: 3.6¢/h; television: 1.9¢/h; treadmill: 26.6¢/h **b)** The television has the lowest rate of electricity consumption.
14. a) Shelley travelled farther. **b)** The difference is 2.5 km.
15. a) 16 kg **b)** $10.50 **c)** 18 min
16. a) $7.84 **b)** 5.3 cm
17. a) 8.40 cm **b)** 10.7 g **c)** 33 g
18. a) 5 m **b)** 51 cm