For 1100 m to 1500 m:	
In 2002	In 2006
1:55.59 s = 60 s + 55.59 s 1:55.59 s = 115.59 s $R = \dfrac{1500\text{ m} - 1100\text{ m}}{115.59\text{ s} - 84.09\text{ s}}$ $R = \dfrac{400\text{ m}}{31.5\text{ s}}$ R = 12.698… m/s	1:55.27 s = 60 s + 55.27 s 1:55.27 s = 115.27 s $R = \dfrac{1500\text{ m} - 1100\text{ m}}{115.27\text{ s} - 83.50\text{ s}}$ $R = \dfrac{400\text{ m}}{31.77\text{ s}}$ R = 12.590… m/s
Difference = 12.698… m/s – 12.590…m/s Difference = 0.107… m/s The difference in speed is about 0.108 m/s.	

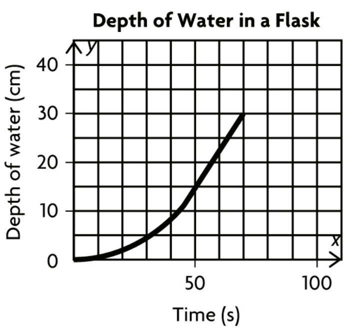
The greatest difference in speed was between 700 m to 1100 m by 0.113 m/s.

16. e.g.,

a) An estimate is sufficient when you only need to know which rate is better, such as which car uses less fuel per kilometre. A precise answer is needed if you want to know how much fuel you will save for a particular trip.

b) A graphing strategy is a good approach for comparing rates because you can visually compare the slopes. For example, a steeper slope for one lap of a car race on a graph of distance versus time means a faster speed. A numerical strategy is better if you want to know exactly how much faster one lap was compared to another.

17. Here is the diagram.



18. a) Number of computers = $\dfrac{\text{brain rate}}{\text{computer rate}}$

Number of computers = $\dfrac{100\,000\,000\ \cancel{\text{MIPS}}}{7000\ \cancel{\text{MIPS}}}$

Number of computers = 14 285.714…

The processing power of the human brain is equivalent to about 14 300 computers.

b) e.g., My computer has a processing power of 27 079 MIPS.

Number of computers = $\dfrac{100\,000\,000\ \cancel{\text{MIPS}}}{27\,079\ \cancel{\text{MIPS}}}$

Number of computers = 3692.898…

About 3693 of these computers have the processing power equivalent to the human brain.

History Connection, page 461

A. e.g., Convert Ivy's time, 10:33.40, to seconds:

$$(10\ \cancel{\text{min}})\left(\frac{60\text{ s}}{1\ \cancel{\text{min}}}\right) + 33.40\text{ s} = 633.40\text{ s}$$

Therefore Ivy's rate, in metres per second, is

$\dfrac{1500\text{ m}}{633.40\text{ s}}$ or 2.368… m/s.

For the mile race, convert the distance from miles to metres: 1 mi = 1609 m

Convert the record time, 11:03.11 for 1 mi, to seconds:

$$(11\ \cancel{\text{min}})\left(\frac{60\text{ s}}{1\ \cancel{\text{min}}}\right) + 3.11\text{ s} = 663.11\text{ s}$$

So the record rate for the mile race is

$\dfrac{1609\text{ m}}{633.11\text{ s}}$ or 2.426… m/s.

2.368… m/s < 2.426… m/s

Ivy's rate for 1500 m is less than the rate for the mile. If Ivy ran at her world record rate, she would not break the record for the mile race.

Lesson 8.2: Solving Problems That Involve Rates, page 466

1. a) Price per litre = $\dfrac{\$163}{50\text{ L}}$

Price per litre = \$3.26/L

Number of litres = $\dfrac{\$30}{\$3.26\text{/L}}$

Number of litres = 9.202… L

You can buy 9 L of oil.

b) 3 min 25 s = 3 min + $\dfrac{25\ \cancel{\text{s}}}{60\ \cancel{\text{s}}\text{/min}}$

3 min 25 s = 3 min + 0.416… min

3 min 25 s = 3.416… min

Rate = $\dfrac{\text{time}}{\text{volume}}$

Rate = $\dfrac{3.416...\text{ min}}{75\text{ L}}$

Rate = 0.045… min/L

Time taken for 55 L = (rate)(volume)

Time taken for 55 L = $\left(\dfrac{0.045...\text{ min}}{1\ \cancel{\text{L}}}\right)(55\ \cancel{\text{L}})$

Time taken for 55 L = 2.505… min

It will take 3 min to fill a 55 L tank.

c) Rate = $\dfrac{\text{cost}}{\text{mass}}$

Rate = $\dfrac{\$68}{8\text{ kg}}$

Rate = \$8.50/kg
Cost of 1.5 kg = (rate)(mass)

Cost of 1.5 kg = $\left(\dfrac{\$8.50}{1\ \cancel{\text{kg}}}\right)(1.5\ \cancel{\text{kg}})$

Cost of 1.5 kg = \$12.75
It will cost \$12.75 to buy 1.5 kg of beef.

d) Rate = $\dfrac{25\text{ mL}}{80\text{ kg}}$

Rate = 0.3125 mL/kg
Dosage = (rate)(mass)

Dosage = $\left(\dfrac{0.3125\text{ mL}}{1\ \cancel{\text{kg}}}\right)(95\ \cancel{\text{kg}})$

Dosage = 29.6875 mL
The person would need about 30 mL.

2. a) Rate = $\dfrac{\text{cost}}{\text{number of cans}}$

For Super Saver:

Rate = $\dfrac{\$5.99}{24\text{ cans}}$

Rate = \$0.249…/can

For Gord the Grocer:

Number of cans = $(3\ \cancel{\text{cases}})\left(\dfrac{12\text{ cans}}{1\ \cancel{\text{case}}}\right)$

Number of cans = 36

Rate = $\dfrac{\$9.99}{36\text{ cans}}$

Rate = \$0.2775/can
SuperSaver has the lower price per can.
b) e.g., You should also consider the size of container and the amount that must be bought.

3. Rate = $\dfrac{\text{number of turns}}{\text{length}}$

For the 24 mm thread screw:

Rate = $\dfrac{32\text{ turns}}{24\text{ mm}}$

Rate = 1.333…turns/mm
For the 42 mm thread screw:

$$1.333...\text{ turns/mm} = \frac{\text{number of turns}}{42\text{ mm}}$$

$$42\text{ mm}(1.333...\text{ turn/mm}) = 42\text{ mm}\left(\frac{\text{number of turns}}{42\text{ mm}}\right)$$

$$42\ \cancel{\text{mm}}(1.333...\text{ turn/}\cancel{\text{mm}}) = \text{number of turns}$$

$$56\text{ turns} = \text{number of turns}$$

A 42 mm screw with have 56 turns.

4. Rate = $\dfrac{\text{number of wins}}{\text{number of games played}}$

For 20 games played:

Rate = $\dfrac{12\text{ wins}}{20\text{ games}}$

Rate = 0.60 wins/game
For 30 games played:

$$0.60\text{ wins/game} = \frac{\text{number of wins}}{30\text{ games}}$$

$$30\text{ games}(0.60\text{ wins/game}) = 30\text{ games}\left(\frac{\text{number of wins}}{30\text{ games}}\right)$$

$$30\ \cancel{\text{games}}(0.60\text{ wins/}\cancel{\text{game}}) = \text{number of wins}$$

$$18\text{ wins} = \text{number of wins}$$

In 30 games, there should be 18 wins.

5. 8 months = $(8\ \cancel{\text{months}})\left(\dfrac{1\text{ year}}{12\ \cancel{\text{months}}}\right)$

8 months = 0.666… year

$$\text{Interest paid} = (\text{principal})(\text{interest rate})(\text{time})$$

$$\frac{\text{Interest paid}}{(\text{principal})(\text{time})} = \text{interest rate}$$

$$\frac{\$40}{(\$1000)(0.666...\text{ year})} = \text{interest rate}$$

$$0.06/\text{year} = \text{interest rate}$$

The annual interest rate is 6%.
6. e.g.,
a) cost for meat in a grocery store;
Factors: overhead cost for running the store, supply and demand for meat
b) amount of medicine per body mass;
Factors: the severity of illness of patient
c) cost for cold cuts at the deli counter;
Factors: overhead cost for running the store, supply and demand for the cold cuts
d) change in temperature as altitude changes when climbing a mountain;
Factors: inclement weather included
e) density of a substance;
Factors: the unit of volume used for measurement; the physical state of the substance
f) cost of flooring at a hardware store;
Factors: overhead cost for running the store, supply and demand

7. Rate = $\dfrac{\text{amount of data}}{\text{time}}$

For 12 MB of data:

Rate = $\dfrac{12\text{ MB}}{2\text{ s}}$

Rate = 6 MB/s
For 1.5 GB of data:

1.5 GB = $(1.5\ \cancel{\text{GB}})\left(\dfrac{1024\text{ MB}}{1\ \cancel{\text{GB}}}\right)$

1.5 GB = 1536 MB

$$\text{Time} = \frac{\text{amount of data}}{\text{rate}}$$

$$\text{Time} = \frac{1536\ \cancel{\text{MB}}}{6\ \cancel{\text{MB}}/\text{s}}$$

Time = 256 s

It will take 256 s or 4 min 16 s to transfer 1.5 GB of data.

8. $2.68 \text{ kg} = (2.68\ \cancel{\text{kg}})\left(\frac{2.2 \text{ lb}}{1\ \cancel{\text{kg}}}\right)$

2.68 kg = 5.896 lb

For 2 lb of meat:

$$\text{Rate} = \frac{15 \text{ min}}{2 \text{ lb}}$$

Rate = 7.5 min/lb

For 2.68 kg of meat:

Time = (mass in pounds)(rate)

$$\text{Time} = (5.896\ \cancel{\text{lb}})\left(\frac{7.5 \text{ min}}{1\ \cancel{\text{lb}}}\right)$$

Time = 44.22 min

The roast should be defrosted for 44 min.

9. 1 cc = 1 mL

0.5 cc = 0.5 mL

$$\text{Number of vaccinations} = \frac{\text{total volume}}{\text{one dosage}}$$

$$\text{Number of vaccinations} = \frac{10 \text{ mL}}{0.5 \text{ mL}}$$

Number of vaccinations = 20

The nurse can vaccinate 20 adults.

10. Strategy 1: She works 50 h every 3 weeks; therefore, she works about 50 h in 3 weeks or 16.667 h in 1 week. Since there are 52 weeks in a year, she works about (16.667 h/week)(52 weeks/year) or 867 h in a year.

Strategy 2: Set up equivalent ratios and solve for *x*, the number of hours.

$$\frac{50 \text{ h}}{3 \text{ weeks}} = \frac{x}{52 \text{ weeks}}$$

$$52 \text{ weeks}\left(\frac{50 \text{ h}}{3 \text{ weeks}}\right) = 52 \text{ weeks}\left(\frac{x}{52 \text{ weeks}}\right)$$

$$52\ \cancel{\text{weeks}}\left(\frac{50 \text{ h}}{3\ \cancel{\text{weeks}}}\right) = x$$

$$\frac{2600 \text{ h}}{3} = x$$

$$866.666... \text{ h} = x$$

Tonya must work about 867 h in one year.

11. a) $36 \text{ h } 12 \text{ min} = 36 \text{ h} + (12\ \cancel{\text{min}})\left(\frac{1 \text{ h}}{60\ \cancel{\text{min}}}\right)$

36 h 12 min = 36 h + 0.2 h

36 h 12 min = 36.2 h

$$\text{Rate} = \frac{\text{distance}}{\text{time}}$$

$$\text{Rate} = \frac{2359 \text{ km}}{36.2 \text{ h}}$$

Rate = 65.167… km/h

Their average speed was 65.2 km/h.

b) $\text{Rate of fuel use} = \frac{\text{volume of gas}}{\text{distance}}$

$$\text{Rate of fuel use} = \frac{231.2 \text{ L}}{2359 \text{ km}}$$

Rate of fuel use = 0.098… L/km

For 100 km:

Rate = (rate of fuel use)(100)

Rate = (0.098…L/km)(100)

Rate = 9.8 L/100 km

The average rate of fuel consumption is 9.8 L/100 km.

c) $\text{Unit cost} = \frac{\text{total cost}}{\text{volume of gas}}$

$$\text{Unit cost} = \frac{\$252.05}{231.2 \text{ L}}$$

Unit cost = $1.09/L

It cost $1.09/L for gas.

12. $1250 \text{ kg} = (1250\ \cancel{\text{kg}})\left(\frac{2.2 \text{ lb}}{1\ \cancel{\text{kg}}}\right)$

1250 kg = 2750 lb

Cost = (vehicle rate)(weight) + (furniture rate)(weight)

$$\text{Cost} = \left(\frac{\$0.2015}{1\ \cancel{\text{lb}}}\right)(2750\ \cancel{\text{lb}}) + \left(\frac{\$0.2734}{1\ \cancel{\text{lb}}}\right)(550\ \cancel{\text{lb}})$$

Cost = $704.495

It will cost Manpret $704.50 to ship her things.

13. a) $\$38.95 \text{ U.S.} = (\cancel{\$}38.95\ \cancel{\text{U.S.}})\left(\frac{\$1.05 \text{ Cdn}}{\cancel{\$1 \text{ U.S.}}}\right)$

$38.95 U.S. = $40.8975

One bag of food costs $40.8975 Cdn.

Total cost = (number of bags)(price per bag)

$$\text{Total cost} = (20\ \cancel{\text{bags}})\left(\frac{\$40.8975}{1\ \cancel{\text{bag}}}\right)$$

Total cost = $817.95

It will cost $817.95 Cdn to buy 20 bags of food.

b) $4\text{kg} = (4\ \cancel{\text{kg}})\left(\frac{2.2 \text{ lbs}}{1\ \cancel{\text{kg}}}\right)$

4kg = 8.8 lbs

In one week, one dog eats 8.8 lb of food.

Twelve dogs eat 12(8.8 lb/week) or 105.6 lbs per week.

(20 bag)(40 lb/bags) = 800 lb

Emma has 800 lbs of dog food.

$$2 \text{ months} = (2\ \cancel{\text{months}})\left(\frac{4 \text{ weeks}}{1\ \cancel{\text{month}}}\right)$$

2 months = 8 weeks

Total food eaten = (total weeks)(twelve dogs eating)

$$\text{Total food eaten} = (8\ \cancel{\text{weeks}})\left(\frac{105.6 \text{ lb}}{1\ \cancel{\text{week}}}\right)$$

Total food eaten = 844.8 lb

Emma will not have enough food for two months since 800 lb < 844.8 lb.

c) e.g., What is the food's shelf-life? How much space will be needed to store the food? What are the shipping charges? Is there a discount for buying in bulk?

14. e.g.,

a) First, I determined the number of metres 20 km represents.

$$20 \text{ km} = (20 \cancel{\text{km}})\left(\frac{1000 \text{ m}}{1 \cancel{\text{km}}}\right)$$

20 km = 20 000 m

So 1.3 cm represents 20 000 m.

The shape of the park is almost a rectangle.

I used a ruler and made these estimates:

For the rectangle:

Length = 5.6 cm, Width = 3.0 cm

I set up a proportion for each dimension to determine how many kilometres each dimension represented.

For the length, x:

$$\frac{1.3 \text{ cm}}{20 \text{ km}} = \frac{5.6 \text{ cm}}{x}$$

$$\frac{20 \text{ km}}{1.3 \text{ cm}} = \frac{x}{5.6 \text{ cm}}$$

$$5.6 \cancel{\text{cm}}\left(\frac{20 \text{ km}}{1.3 \cancel{\text{cm}}}\right) = \cancel{5.6 \text{ cm}}\left(\frac{x}{\cancel{5.6 \text{ cm}}}\right)$$

$$86.153... \text{ km} = x$$

1000 m = 1 km, so 86.153… km = 86 153.846… m

x = 55 384.615…m

For the width, y:

$$\frac{1.3 \text{ cm}}{20 \text{ km}} = \frac{3.0 \text{ cm}}{y}$$

$$\frac{20 \text{ km}}{1.3 \text{ cm}} = \frac{y}{3.0 \text{ cm}}$$

$$3.0 \cancel{\text{cm}}\left(\frac{20 \text{ km}}{1.3 \cancel{\text{cm}}}\right) = \cancel{3.0 \text{ cm}}\left(\frac{y}{\cancel{3.0 \text{ cm}}}\right)$$

$$46.153... \text{ km} = y$$

1000 m = 1 km, so 46.153… km = 46 153.846… m

y = 46 153.846… m

Then I determined the area of the rectangle in square metres.

Area = xy

Area = (86 153.846… m)(46 153.846… m)

Area = 3 976 331 360.9… m^2

Area in hectares

$$= (3\,976\,331\,360.9... \cancel{\text{m}^2})\left(\frac{1 \text{ ha}}{10\,000 \cancel{\text{m}^2}}\right)$$

Area in hectares = 397 633.136… ha

The area of the park is about 400 000 ha.

Note: The actual area of the Prince Albert National Park is about 387 400 ha.

b) Expenditure = (area of park)(unit cost)

$$\text{Expenditure} = (400\,000 \cancel{\text{ha}})\left(\frac{\$48}{1 \cancel{\text{ha}}}\right)$$

Expenditure = $19 200 000

The annual cost is $19.2 million.

15. Determine the number of litres per case and the cost per litre at both stores.

Store A: 24 bottles, with 500 mL in each, for $4.99

$$24 \cancel{\text{bottles}}\left(\frac{500 \text{ mL}}{1 \cancel{\text{bottle}}}\right) = 12\,000 \text{ mL or } 12 \text{ L}$$

$$\frac{\$4.99}{12 \text{ L}} = \$0.415.../\text{L}$$

Distance for round trip to store A = (2)(12 km) or 24 km

Store B: 24 bottles, with 330 mL in each, for $3.49

$$24 \cancel{\text{bottles}}\left(\frac{330 \text{ mL}}{1 \cancel{\text{bottle}}}\right) = 7920 \text{ mL or } 7.92 \text{ L}$$

$$\frac{\$3.49}{7.92 \text{ L}} = \$0.440.../\text{L}$$

Distance for round trip to store B = (2)(20 km) or 40 km

Difference in cost per litre = $0.440… – $0.415… or $0.024…

Difference in distance = 40 km – 24 km or 16 km

Difference in cost of travelling at $0.14/km

$$= 16 \cancel{\text{km}}\left(\frac{\$0.14}{1 \cancel{\text{km}}}\right) \text{ or } \$2.24$$

Paula should buy the water bottles at store A. The cost per litre of water at store A is a little more than 2¢ less than the cost at store B. The travel cost of a trip to store A is $2.24 less than to store B.

16. For 2000 ft to 37 000 ft:

Distance = 3700 ft – 2000 ft

Distance = 3500 ft

$$\text{Time 1} = \frac{\text{distance}}{\text{rate}}$$

$$\text{Time 1} = \frac{3500 \text{ ft}}{700 \text{ ft/min}}$$

$$\text{Time 1} = (3500 \cancel{\text{ft}})\left(\frac{1 \text{ min}}{700 \cancel{\text{ft}}}\right)$$

Time 1 = 5 min

Time 2 = 40 min

For 37 000 ft to 5500 ft:

Distance = 37 000 ft – 5500 ft

Distance = 31 500 ft

$$\text{Time 3} = \frac{31\,500 \text{ ft}}{3500 \text{ ft/min}}$$

$$\text{Time 3} = (31\,500 \cancel{\text{ft}})\left(\frac{1 \text{ min}}{3500 \cancel{\text{ft}}}\right)$$

Time 3 = 9 min

Time of arrival = initial time + time 1 + time 2 + time 3

Time of arrival = 6:30 a.m. + 5 min + 40 min + 9 min

Time of arrival = 6:35 a.m. + 40 min + 9 min

Time of arrival = 7:15 a.m. + 9 min

Time of arrival = 7:24 a.m.

The jet should land at 7:24 a.m.

17. For 3:30 a.m. to 5:45 p.m.:
Temperature change = 11.8 °C – (–5.3 °C)
Temperature change = 17.1 °C
Time change = 14 h 15 min

Time change = $(14\ \cancel{h})\left(\dfrac{60\text{ min}}{1\ \cancel{h}}\right) + 15\text{ min}$

Time change = 855 min

Rate = $\dfrac{\text{temperature change}}{\text{time change}}$

Rate = $\dfrac{17.1\ °\text{C}}{855\text{ min}}$

Rate = 0.02 °C/min
For 3 a.m. to 7 a.m.:
Time change = 4h

Time change = $(4\ \cancel{h})\left(\dfrac{60\text{ min}}{1\ \cancel{h}}\right)$

Time change = 240 min
Temperature change = (rate)(time change)

Temperature change = $(240\ \cancel{\text{min}})\left(\dfrac{0.02\ °\text{C}}{1\ \cancel{\text{min}}}\right)$

Temperature change = 4.8 °C
Temperature at 7 a.m. = temperature at 3 a.m. + temperature change
Temperature at 7 a.m. = –7 °C + 4.8 °C
Temperature at 7 a.m. = –2.2 °C
The temperature at 7 a.m. will be –2.2 °C.

18. a) Determine the area to be painted:
Area of room = 2(3.2 m)(2.4 m) + 2(2.7 m)(2.4 m)
Area of room = 15.36 m^2 + 12.96 m^2
Area of room = 28.32 m^2
For the door:

80 cm = $(80\ \cancel{\text{cm}})\left(\dfrac{1\text{ m}}{100\ \cancel{\text{cm}}}\right)$

80 cm = 0.8 m

205 cm = $(205\ \cancel{\text{cm}})\left(\dfrac{1\text{ m}}{100\ \cancel{\text{cm}}}\right)$

205 cm = 2.05 m
Area of door = (0.8 m)(2.05 m)
Area of door = 1.64 m^2
For the window:
100 cm = 1 m

130 cm = $(130\ \cancel{\text{cm}})\left(\dfrac{1\text{ m}}{100\ \cancel{\text{cm}}}\right)$

130 cm = 1.3 m
Area of window = (1 m)(1.3 m)
Area of window = 1.3 m^2
Area to be painted = area of room – area of door – area of window
Area to be painted = 28.32 m^2 – 1.64 m^2 – 1.3 m^2
Area to be painted = 25.38 m^2

Volume of paint needed = $\dfrac{\text{area to be painted}}{\text{coverage per litre}}$

Volume of paint needed = $\dfrac{25.38\text{ m}^2}{10\text{ m}^2/\text{L}}$

Volume of paint needed = $(25.38\ \cancel{\text{m}^2})\left(\dfrac{1\text{ L}}{10\ \cancel{\text{m}^2}}\right)$

Volume of paint needed = 2.538 L

Number of Bren's cans = $\dfrac{2.538\ \cancel{\text{L}}}{0.870\ \cancel{\text{L}}/\text{can}}$

Number of Bren's cans = 2.917…cans
You will need 3 cans of Bren's paint.
Cost of Bren's paint = (3 cans)($7.99)
Cost of Bren's paint = $23.97
You will need one can of Home Suppliers paint, which costs $27.99. Therefore, it is cheaper to buy paint at Bren's Interior Design.
b) e.g., The distance to the store or whether a second coat will be needed.

19. Length, L = 2 m
Total time, t = 1 h or 3600 s

$T = 2\pi\sqrt{\dfrac{L}{9.8}}$

$T = 2\pi\sqrt{\dfrac{2}{9.8}}$

$T = 2\pi\sqrt{0.204...}$

$T = 2\pi(0.451…)$
T = 2.838…
One period takes 2.838… s.
1 h = 3600 s

Number of periods = $\dfrac{t}{T}$

Number of periods = $\dfrac{3600\ \cancel{s}}{2.838...\ \cancel{s}}$

Number of periods = 1268.296…
In one hour, the pendulum should swing about 1268 times.

20. Let v represent the volume of the pool.
Let t represent the time to fill the pool.
Let r present the rate of filling.

$r = \dfrac{v}{t}$ or $t = rv$

2 days = 48 h 3 days = 72 h 4 days = 96 h

$r_{2\text{ days}} = \dfrac{v}{48}$ $r_{3\text{ days}} = \dfrac{v}{72}$ $r_{4\text{ days}} = \dfrac{v}{96}$

$r_{6\text{ hours}} = \dfrac{v}{6}$

Since v is constant, in each ratio, let v = 1.
Let the full volume of the pool be 1 unit. Then

$t\left(\dfrac{v}{48}+\dfrac{v}{72}+\dfrac{v}{96}+\dfrac{v}{6}\right) = 1$

$t\left(\dfrac{1}{48}+\dfrac{1}{72}+\dfrac{1}{96}+\dfrac{1}{6}\right) = 1$

t = 4.721… h
It will take 4.7 h to fill the pool.

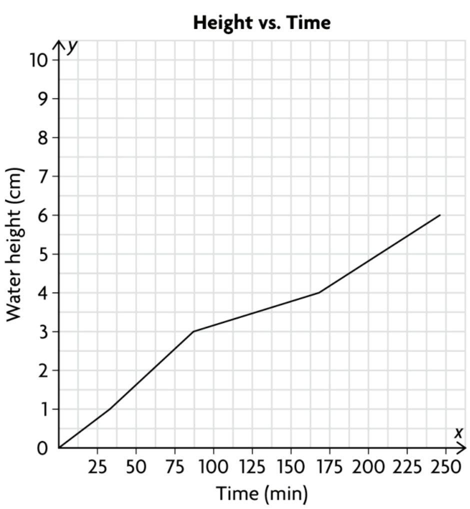
Applying Problem-Solving Strategies, page 470

A. No, all three rectangular prisms will be filled at exactly the same time. Since they are all connected and have the same height, after the water level reaches 4 cm, the water level in all three prisms will rise at the same rate simultaneously.

B.

Height Mark (cm)	Volume Filled (cm^3)	Time (min)
1	(11)(3)(1) = 33	$33\ \cancel{cm}^3\left(\frac{1\ \text{min}}{1\ \cancel{cm}^3}\right) = 33$
2	33 + (3)(3)(1) + (6)(3)(1) = 60	60
3	60 + (3)(3)(1) + (6)(3)(1) = 87	87
4	87 + (3)(3)(1) + (12)(3)(1) + (4)(3)(3) = 168	168
5	168 + (3)(3)(1) + (6)(3)(1) + (4)(3)(1) = 207	207
6	207 + (3)(3)(1) + (6)(3)(1) + (4)(3)(1) = 246	246

C.



D. The water level rose the slowest between the heights of 3 cm and 4 cm. I know this because the slope of the line segment that joins these heights on my graph is less steep than all the other slopes, meaning the slope of that segment has the least value of all the slopes.
E. I determined the volume of each section of the container that corresponded to heights of 1 cm to 6 cm. I knew that each minute, 1 cm^3 was being filled, so I could determine how long it would take to fill each section.
F. No. The container and the rate at which the water is dripping have not changed.
G. Yes. For example, if the red hole in the prism on the right is used, the water level will not be able to reach the 1 cm mark until after the prism on the right is filled to the 3 cm mark and water can pour through the container to the middle and left prisms.

Mid-Chapter Review, page 473

1. Carol's rate = 65 words/min

Jed's rate = $\frac{290\ \text{words}}{5\ \text{min}}$

Jed's rate = 58 words/min
Carol is faster by 7 words/min.
2. Stan's rate = 95¢/L

Harry's rate = $\frac{\$73.88}{75\ \text{L}}$

Harry's rate = 98.506…¢/L
Stan paid less per litre of fuel.
3. a) Rate 1 = 4 Cal/min
Rate 2 = 300 Cal/h

$$300\ \text{Cal/h} = \left(\frac{300\ \text{Cal}}{1\ \cancel{h}}\right)\left(\frac{1\ \cancel{h}}{60\ \text{min}}\right)$$

300 Cal/h = 5 Cal/min
The rate of 4 Cal/min is lower than 300 Cal/h.
b) Usage 1 = 30 L/day
Usage 2 = 245 L/week

$$245\ \text{L/week} = \left(\frac{245\ \text{L}}{\cancel{1\ \text{week}}}\right)\left(\frac{\cancel{1\ \text{week}}}{7\ \text{days}}\right)$$

245 L/week = 35 L/day
The rate of 30 L/day is lower than 245 L/week.
c) Cost 1 = $8.40/kg

$$\$8.40/\text{kg} = \left(\frac{\$8.40}{\cancel{1\ \text{kg}}}\right)\left(\frac{\cancel{1\ \text{kg}}}{2.2\ \text{lb}}\right)$$

$8.40/kg = $3.818…/lb
Cost 2 = $3.99/lb
The cost of $8.40/kg is lower than $3.99/lb.

d) Speed 1 = $\frac{2\ \text{mi}}{5\ \text{min}}$

Speed 1 = 0.4 mi/min

Speed 2 = $\frac{5\ \text{km}}{20\ \text{min}}$

Speed 2 = 0.25 km/min

$$0.25\ \text{km/min} = \left(\frac{0.25\ \cancel{km}}{1\ \text{min}}\right)\left(\frac{0.6\ \text{mi}}{1\ \cancel{km}}\right)$$

0.25 km/min = 0.15 mi/min
A speed of 5 km in 20 min is lower than a speed of 2 mi in 5 min.