Math at Work 10: Chapter 1

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Consumerism and Travel

Max is in charge of buying supplies for a party at work. He is shopping for drinks. He needs to decide which pop to buy. A 2-L pop bottle costs $1.79. A case of eighteen 355-mL cans costs $5.99.

1. What does Max need to think about before making his choice?

2. If there is a type of pop on sale, should he buy that one? Explain.

3. How can Max be sure his choice is the least expensive for the amount of pop he needs?

Key Words

unit price
exchange rate
proportion
SI (Système international d'unités)
imperial system
ounce
pound
fluid ounce
gallon
Celsius
Fahrenheit
cup
quart

Career Link

Wade is the dairy manager at a grocery store. He must decide how much of each product to keep in stock. Dairy products have an expiry date. It is important that Wade orders the right amounts. Too much stock may result in products going bad before they can be sold.
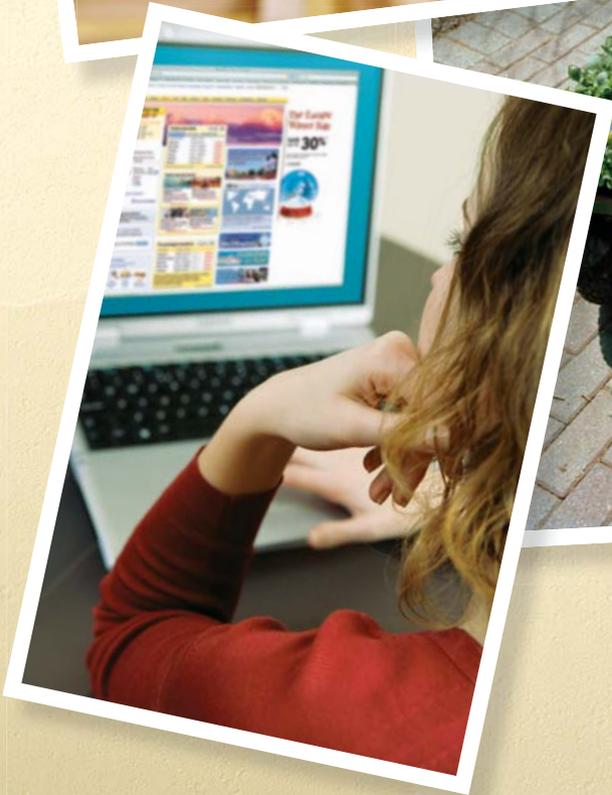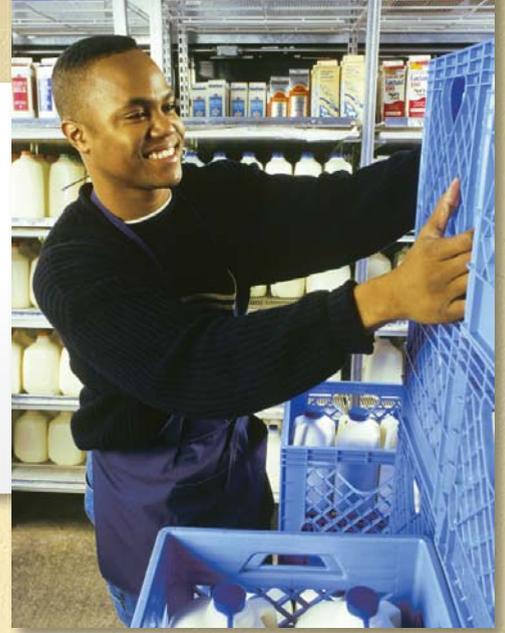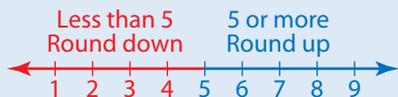
Get Ready

Round

The names of the place values are shown.

1	2	3	4	.	5	6	7
thousands	hundreds	tens	ones		tenths	hundredths	thousandths

If the value following the place value that you are rounding to is 5 or more, round up. If the value is less than 5, round down.

Less than 5
Round down
5 or more
Round up

1 2 3 4 5 6 7 8 9

So, 1.75 m rounded to the nearest tenth is 1.8 m.

1. Round each decimal number to the place value indicated.

a) 12.76 (tenths)

b) 384 (hundreds)

c) 0.099 (hundredths)

d) 8.473 (ones)

e) 16 (tens)

f) 100.4 (ones)

g) 299.015 (hundredths)

h) 1.01 (tenths)

2. Round each measurement to the place value indicated.

a) 0.084 cm (tenths)

b) 1.265 ft (hundredths)

c) 613 km (tens)

d) 89.98 yd (tenths)

e) 55.5 in. (tens)

f) 10.86 mm (ones)

g) 0.101 m (hundredths)

h) 1499 mi (thousands)

3. Round each amount of money to the nearest cent.

a) $0.678   **b)** $35.992

c) $7.004   **d)** $44.335

e) $1.854   **f)** $0.109

g) $9.999   **h)** $0.001

Compare Numbers

4. Write each pair of numbers with $>$, $<$, or $=$ between them.

a) 0.02, 0.0195

b) 0.3, 0.30

c) 1.142, 1.15

d) 25.80, 25.09

e) 0.007, 0.0070

f) 6.98, 6.9

g) 11.01, 11.10

h) 0.25, 0.249

Compare the digits that are in the same place value. Both numbers have a zero in the tenths place value, so compare the numbers in the hundredths place value.

Proportions

5. Solve for x in each proportion.

a) $\dfrac{7}{10} = \dfrac{x}{100}$

b) $\dfrac{3}{8} = \dfrac{27}{x}$

c) $\dfrac{x}{25} = \dfrac{4}{100}$

d) $\dfrac{18}{x} = \dfrac{36}{40}$

e) $\dfrac{4}{0.5} = \dfrac{40}{x}$

f) $\dfrac{x}{6} = \dfrac{0.2}{12}$

g) $\dfrac{0.9}{1.5} = \dfrac{x}{15}$

h) $\dfrac{1.7}{25.0} = \dfrac{6.8}{x}$

Convert SI Units

6. Convert each amount to the SI unit indicated.

a) 1000 mL (litres)

b) 1 kg (grams)

c) 2.6 L (millilitres)

d) 5890 g (kilograms)

e) 765 mL (litres)

f) 0.7437 kg (grams)

g) 0.002 L (millilitres)

h) 38 g (kilograms)

Percent

Tech Link

Follow the steps to calculate 90% of 209.
Press [C] **209** [×] **90** [2nd] [%] [=]
You may need to use different keystrokes on your calculator. Experiment or check with a classmate.

7. Estimate and calculate the following percents.

a) 90% of 209

b) 20% of 835

c) 3% of 38

d) 42% of 9000

e) 12.5% of 399

f) 151% of 22

Tech Link

Follow these steps to calculate 28 out of 200 as a percent.
Press [C] **28** [÷] **200** [2nd] [%] [=]

8. Calculate each value as a percent. Where necessary, round to the nearest percent.

a) 28 out of 200

b) 31 out of 50

c) 23 out of 26

d) 327 out of 1569

e) 24.5 out of 65

f) 4.4 out of 192.6

Unit Pricing

Focus On . . .

- calculating unit price
- comparing unit prices of two or more items
- determining the best buy
- analysing sales techniques
- determining percent changes in prices

Joseph and Debra are shopping for milk. They want to purchase the size that would give them the best unit price.

unit price

- the price for one unit of an item
- examples include
  $2.25/litre
  $5.90/metre
  50¢/apple

Materials

- calculator

Explore Unit Pricing

4 litres $5.25

1 litre $1.89

500 mL $1.05

250 mL $0.75

1. Find out the price for four different sizes of milk containers. Copy the table shown into your notebook. Record each size in column 1 and each price in column 2.

Container Size	Price	Number of Containers or Parts of Container to Make 1 L	Price for 1 L

2. For each size, determine how many containers or parts of a container are needed to make 1 L. Use your findings to fill in column 3 of the table.

3. For each size, what is the price for 1 L? Use your findings to fill in column 4 of the table.

> The price for 1 L is the unit price for each container size.

4. List the unit price of the four containers from most expensive to least expensive. Which size has the lowest unit price?

5. **Reflect** Some products are available in a variety of brands.

FARM FRESH
1 litre
$2.30

HEALTHY OPTION
1 litre
$1.99

PURE
1 litre
$2.09

OUR CHOICE
1 litre
$1.79

a) Does brand affect the quality of a product? Explain.

b) How might a choice of brands influence what you consider to be the best buy?

6. The best buy may be of a size that cannot be all used up by the expiry date. How would this affect what you consider to be the best buy?

7. Extend Your Understanding

a) Identify an item that you buy regularly that comes in a variety of sizes and brands.

b) List all the factors that influence your decision to buy this item.

c) Do you think you are getting the best buy? Explain.

On the Job 1

Determine the Unit Price and the Best Buy

Edward builds furniture. He needs to buy brass nails. The nails he needs are sold in packages of 20 nails for $4.99, 175 nails for $24.95, and 800 nails for $82.99.

800 NAILS $82.99

175 NAILS $24.95

20 NAILS $4.99

a) Estimate which package has the lowest unit price.

b) Calculate which package has the lowest unit price.

c) What other factors, besides price, might Edward consider before making his purchase?

Solution

a) Small package:
20 nails for $4.99
Round $4.99 to $5.00. How many 20s are in 500¢?
$20 \times 5 = 100$
$20 \times 25 = 500$
Each nail costs about 25¢.

> I did not round very much. This estimate is close to the actual calculation.

Medium package:
175 nails for $24.95
That is about 200 nails for $25.00. How many 200s are in 2500¢?
$200 \times 10 = 2000$
2000¢ is $20.
That is 10¢ per nail.
There are $5.00 or 500¢ left.
That is a little more than 2¢ per nail.
Each nail costs about 12¢.

> I rounded the number of nails up. This estimate is a bit less than the actual calculation.

Large package:
800 nails for $82.99
That is 800 nails for about $80.00.
How many 800s are in 8000¢?
$800 \times 10 = 8000$
Each nail costs about 10¢.

> I rounded the cost down. This estimate is a bit less than the actual calculation.

The large package with 800 nails has the lowest unit price.

b) Determine the unit price for each package.

Small package:
20 nails cost $4.99.

Price per nail = 4.99 ÷ 20
            = 0.249…

> `C` **4.99** `÷` **20** `=`
> 0.2495

The unit price per nail is $0.25.

> Round to the nearest cent.

Medium package:
175 nails cost $24.95.

Price per nail = 24.95 ÷ 175
            = 0.142…

> `C` **24.95** `÷` **175** `=`
> 0.142571429

The unit price per nail is $0.14.

Large package:
800 nails cost $82.99.

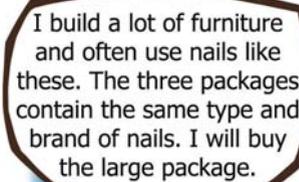Price per nail = 82.99 ÷ 800
            = 0.103…

> `C` **82.99** `÷` **800** `=`
> 0.1037375

The unit price per nail is $0.10.

The nails in the large package have the lowest unit price.

c) Edward might ask himself the following questions:
- Can I use 800 nails?
- Is there a difference in quality between the packages?
- Do I prefer one brand of nail over the other?

> I build a lot of furniture and often use nails like these. The three packages contain the same type and brand of nails. I will buy the large package.

Your Turn

Tasha owns a fair-trade shop called World Fair. She sells coffee in a 350-g package for $12.39. The Never Bean Better coffee shop down the street sells coffee in a 950-g package for $30.99.

a) Estimate which type of coffee has the lower unit price.

b) Calculate which type of coffee has the lower unit price.

c) What might influence a consumer to buy one type of coffee over the other?

Try It

1. Estimate the unit price of each product.

   a) $17.90 for 10 pens

   b) $7.25 for 4 L milk

   c) 24 cans of root beer for $9.99

   d) $4.29 for 750 g yogurt

2. Calculate the unit price of each product in #1.

3. What is the price per 100 g for the following items from a bulk food store?

	Product	Total Price	Amount
a)	Dried apricots	$6.75	500 g
b)	Green tea bags	$7.26	275 g
c)	Almonds	$5.85	325 g

Apply It

4. A case of 24 sports drinks costs $40.99. A 6-pack costs $12.39. What is the most economical size if you need to buy 100 drinks for a bikeathon? Show your work.

5. You need to buy potting soil for some plants.

LUSH GROW (8.8 L) $4.29

GREEN LEAF (17 L) $6.49

   a) Which potting soil has the lower unit price? Show your work.

   b) Which of the following factors might be considerations when making this purchase? Explain.
   - quality
   - expiry date
   - budget
   - amount needed
   - brand name

6. The table shows the price of different sizes of bags of dog food.

Brand	Size	Price
Dog O'Meal	3.6 kg	$11.57
The Gourmet Dog	13.62 kg	$33.19
Tasty Choice	22.7 kg	$49.89

a) What is the unit price for each brand?

b) What should a dog owner consider when buying dog food?

c) Which brand seems like the best buy?

7. The cost of groceries in outports is generally higher than in larger communities.

Item	Cost in St. John's	Cost in Outport
2 kg bananas	$3.32	$8.60
Milk (4 L)	$6.28	$9.80
Can of mushroom soup (284 mL)	$1.68	$2.90

a) What is the unit price for each item at each location?

b) What is the difference in unit prices for each item?

c) What are some reasons for the unit price being higher in an outport?

8. To make some extra cash, Maggie shovels snow for people in her neighbourhood. She uses ice melter for their paths and sidewalks. A store down the street sells 4.5 kg for $9.99. A store across town sells 5 kg for $10.99.

a) Which brand has a lower unit price? Show your work.

b) Which brand would you buy if you were Maggie? Why?

On the Job 2

Compare Unit Prices

Margo owns Margo's Veggie Mart. She sells potatoes for 30¢ per 100 g. The Friendly Grocer sells potatoes for $2.50 per kg.

a) Which store offers the cheaper unit price?

b) Why do you think Margo lists the price of potatoes per 100 g instead of per kg?

c) Margo puts her potatoes on sale for 27¢ per 100 g. Calculate the decrease in price.

d) Margo puts up a sign advertising the percent decrease in price. What is the percent decrease?

Solution

a) *Method 1: Determine the Price Per kg*

The Friendly Grocer:
The price per kg is $2.50.

Margo's Veggie Mart:
100 g costs 30¢.
1 kg = 1000 g
There are ten 100-g units in 1000 g.
1000 g costs 30¢ × 10 = 300¢, or $3.00.
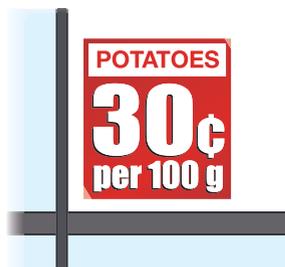The price per kg is $3.00.

The Friendly Grocer offers the lower price.

Method 2: Determine the Price Per 100 g

The Friendly Grocer:
Potatoes are $2.50 per kg.
1 kg = 1000 g
1000 g divided by 10 is 100 g.
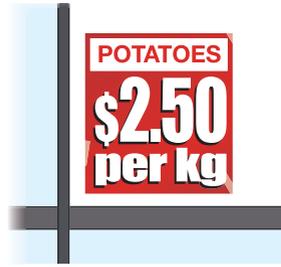100 g costs $2.50 ÷ 10 = $0.25.
$0.25 is 25¢.
The price per 100 g is 25¢.

Margo's Veggie Mart:
The price per 100 g is 30¢.

The Friendly Grocer offers the lower price.

Which method do you prefer?

b) Margo's price:

POTATOES
30¢
per 100 g

The Friendly Grocer's price:

POTATOES
$2.50
per kg

Margo's price appears to be lower.

c) The original price is 30¢ per 100 g.
The new price is 27¢ per 100 g.
The decrease is 3¢ per 100 g.

d) *Method 1: Work With a Fraction*

The original price is 30¢.
The decrease in price is 3¢.
3¢ is $\frac{1}{10}$ of 30¢.
$\frac{1}{10}$ is 10%.
The percent decrease is 10%.

Method 2: Work With a Decimal Number

The original price is 30¢.
The decrease in price is 3¢.
$3 \div 30 = 0.10$
0.10 is 10%.
The percent decrease is 10%.

Method 3: Use a Calculator

The original price is 30¢.

The decrease in price is 3¢.

| C | 3 | ÷ | 30 | 2nd | % | = |

10

The percent decrease is 10%.

Your Turn

The Butcher Block sells beef tenderloin for $28.90 per kg. The Meat Mart sells beef tenderloin for $3.25 per 100 g.

a) Which store offers the lower unit price?

b) The Butcher Block changes its price for beef tenderloin to $34.00 per kg. Calculate the increase in price.

c) What is the percent increase in price? Round your answer to the nearest percent.

d) The Butcher Block changes the sign on its beef tenderloin as shown. Give one reason for the change.

Check Your Understanding

Try It

1. For each item, identify whether you would use 100 g or 1 kg to determine the unit price.

 a) pasta at $2.99 for 900 g

 b) 525 g cashews for $9.90

 c) $3.50 for 1.2 kg oats

 d) $4.99 for a 2.5-kg bag of apples

2. Determine the unit price for each item in #1.

3. What is the original unit price and the new unit price of each item?

 a) A 2-kg bag of oranges for $6.99 goes on sale for $5.99.

 b) The price of a box of 12 tea lights goes up from $1.99 to $2.49.

 c) 900 mL of shampoo is reduced from $11.00 to $8.99.

4. a) What is the increase or decrease in price for each item in #3?

 b) What is the percent increase or decrease in price for each item in #3? Round your answers to the nearest percent.

Apply It

5. Determine the unit price using either 1 mL or 100 mL. Explain your choice.

 a) 900 mL salad dressing for $6.24

 **b)** 2 L milk for $3.89

 c) 180 mL toothpaste for $4.12

6. Predict which size of each item has the lower unit price. Calculate to check your predictions.

a) 8 muffins for $4.29 or 12 for $6.99

b) 1 L olive oil for $6.89 or 250 mL for $2.05

c) $1.99 for 5 dinner rolls or $2.99 for 8 dinner rolls

d) $10.49 for a 950-g lasagna or $11.99 for a 1.1-kg lasagna

7. Margaret is opening a housecleaning business. An average cleaning takes 4 hours. She will charge $70 for a 4-hour cleaning.

a) What is her rate per hour?

b) She is going to post advertisements. Do you think the ad should show the rate per hour or the rate per cleaning? Why?
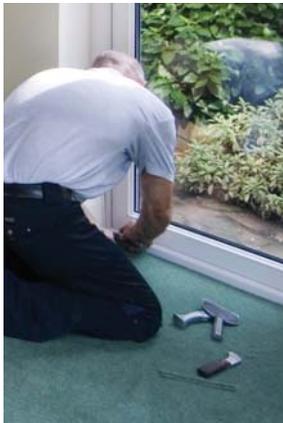
8. Derrick paid $672 before tax for 16 m^2 of carpeting for his living room. Later, he decides to put 12 m^2 of the same carpeting in his dining room. The price of the carpeting has increased by $1.20 per square metre.

a) What is the original unit price of the carpeting?

b) What is the new unit price of the carpeting?

c) What is the percent increase in price?

d) How much will it cost before tax to carpet the dining room?

e) Find out the tax on the sale of goods where you live. What would be the total price, with tax, to carpet the dining room?

9. On a grocery store shelf, you see the price per unit for two types of granola bars.

(558-g BOX)	TOTAL PRICE	(210-g BOX)	TOTAL PRICE
GOOD GRAIN GRANOLA BARS	$4.19	QT GRANOLA BARS	$2.80
UNIT PRICE $ 0.75 PER 100 g	16 BARS	UNIT PRICE $ 0.35 PER BAR	8 BARS

a) Based on the unit price shown on the price tag, which granola bar has a lower unit price?

b) Based on the unit price using the same units, which granola bar has a lower unit price?

c) Why do you think one unit price is given per bar and the other unit price is given per 100 g?

FRESH
ATLANTIC SALMON
$1.56/100 g

Work With It

1. Eva sells fish at the market.

   a) A customer buys 700 g of fish for $6.23. What is the unit price of the fish?

   b) Atlantic salmon costs $15.60/kg. Eva got in a large shipment of Atlantic salmon that she needs to sell. She decides to put up a sign showing the price per 100 g, as shown. Why do you think she did that?

2. Diane needs to supply fruit drinks for the 24 children in the kindergarten class at Bay View Elementary School. Each child will be given 200 mL of juice. She finds two options for purchasing the juice.

   - $14.59 for twenty-four 200-mL boxes of juice
   - 3-L jugs of juice at $7.25/jug, plus paper cups priced at 20 cups for $1.29

   a) What is the price per 100 mL for each option? Do not include the price of cups.

   b) What would be the total cost for the first option?

   c) What would be the total cost for the second option? Include the price of cups.

   d) What else should Diane consider when choosing the best option?

3. Walter owns a deli. The regular price for roast turkey is $2.79/100 g. The roast turkey is getting close to its expiry date. Walter decides to put it on sale but cannot decide which sign to put up.

   a) Which sign would you recommend? Why?

   b) What is the percent decrease in price?

ROAST TURKEY
$0.50 / 100 g
off the regular price!

ROAST TURKEY
$5.00 / kg
off the regular price!

4. Ron makes stained-glass windows. From one supplier, he bought 900 g coloured glass for $3.96. From another supplier, he bought 1.5 kg coloured glass for $7.35.

a) Which supplier has the lower unit price for glass?

b) The second supplier reduces the price of glass per 100 g by $0.04. What is the percent decrease in price?

c) Which supplier has the lower unit price now?

Discuss It

5. A store sells packages of printer paper in three sizes. Which package would you buy? Explain your reasons.

RECYCLED PAPER	QUALITY PAPER	ECONOMY PAPER
200 Sheets	400 Sheets	500 Sheets
$4.50	$8.89	$9.99

6. List all the considerations you make when buying a product that comes in more than one size of container.

7. Suppose your family buys a 350-g package of toasted oats cereal every week for a year.

a) How much would your family save in a year by buying the less expensive brand?
- Brand A: $4.59 for 350 g
- Brand B: $3.99 for 350 g

b) Why might determining unit prices be beneficial to consumers?

Currency Exchange

Focus On . . .

- converting between Canadian currency and foreign currencies
- estimating the cost of items from another country in Canadian currency

exchange rate

- a rate that specifies how much one currency is worth in terms of the other
- also known as the foreign-exchange rate

Materials

- Internet access or newspapers with foreign exchange rates
- calculator

proportion

- an equation that says two rates or ratios are equal
- an example is $\frac{1}{4} = \frac{4}{16}$

*Whether you travel to a country outside Canada or go shopping online, it is important to know the currency **exchange rate**. That way, when you pay for a hotel or buy electronic equipment online, you can figure out the cost in Canadian dollars.*

Explore Exchange Rates

Exchange rates change every day. Before exchanging money, many people research the current exchange rates.

1. Andrea's family is travelling to Ellicottville, New York, for a ski trip. The day they exchange their money, C$1 = US$0.921434. This means that 1 Canadian dollar equals 0.921434 U.S. dollars. Write each conversion as a **proportion**. Then, solve.

   a) Andrea's sister has C$100 to spend. How much will she get in American currency?

   b) Andrea has C$250 to spend. How much is this in American currency?

   c) Andrea's parents exchange C$1200. How much do they get in American currency?

2. At the end of their trip, the family converts the money they have left back to Canadian dollars. At that time, they learn that US$1 = C$1.1283. Write each conversion as a proportion. Then, solve.

a) Andrea's sister has US$5 left. What is this worth in Canadian currency?

b) Andrea has US$25 left. What is this worth in Canadian currency?

c) Andrea's parents spent all of their U.S. cash. They charged US$500 on their credit card. What will their credit card company charge them in Canadian currency?

3. Reflect

a) What strategy would you use to convert from one currency to another currency? Explain how it works.

b) Compare your strategy with that of a partner.

4. Extend Your Understanding Exchange rates change regularly. When Andrea went online, she saw the exchange rates below.

Today's Exchange Rates	
CANADIAN 🍁	**USD** 🇺🇸
1	0.901559
1.10919	1

a) What was C$1 worth in American dollars that day?

b) What was US$1 worth in Canadian dollars that day?

5. a) Go online to get today's exchange rates.

b) Calculate the value of C$500 in U.S. currency.

c) Use an online converter to check your answer.

On the Job 1

Convert Between Canadian Currency and Foreign Currency

After a hurricane, Yolanda volunteers to go to the Dominican Republic to help rebuild homes. Yolanda has budgeted C$675 for expenses.

a) On the day Yolanda exchanges her money, C$1 is worth RD$37.25572. Estimate how much she will receive in Dominican currency.

b) Calculate how much she will receive in Dominican currency.

c) When she returns home, Yolanda has RD$2198 left. On that day, Dominican Republic pesos are worth C$0.02684. How much will she receive in Canadian currency?

Solution

a) She is exchanging C$675.
This is about C$700.
She receives RD$37.25572 per C$1.
This is about RD$40 pesos per C$1.

Use a pattern.
C$1 ≈ RD$40
C$2 ≈ RD$80
C$10 ≈ RD$400
C$700 ≈ C$700 × RD$40
　　 ≈ RD$28 000

She will receive about RD$28 000.

> The pattern is to multiply by 40.

> I always rounded up. This estimate is a little high.

b) Use a proportion.

$$\frac{C\$1}{RD\$37.25572} = \frac{C\$675}{x}$$

$$\xrightarrow{\times\,675}$$

$$\frac{C\$1}{RD\$37.25572} = \frac{C\$675}{x}$$

$$\xrightarrow{\times\,675}$$

$$x = RD\$37.25572 \times C\$675$$
$$x = RD\$25\ 147.611$$

C	37.25572	×	675	=

25147.611

Yolanda will receive RD$25 147.61 for C$675.

Round to the nearest cent.

c) Use a proportion.

$$\frac{RD\$1}{C\$0.02684} = \frac{RD\$2198}{x}$$

$$\xrightarrow{\times\,2198}$$

$$\frac{RD\$1}{C\$0.02684} = \frac{RD\$2198}{x}$$

$$\xrightarrow{\times\,2198}$$

$$x = C\$0.02684 \times RD\$2198$$
$$x = C\$58.994\ldots$$

C	0.02684	×	2198	=

58.99432

Yolanda will receive $C58.99.

Round to the nearest cent.

Your Turn

Ryan will be spending his summer holidays with relatives in Edinburgh, Scotland. He has saved C$550 to spend while he is in Scotland. He finds the following information online.

C$1 = £0.634597
£1 = C$1.5758

a) What is the value of C$550 in pounds?

b) Ryan has a 10-pound note and a 50-pound note left at the end of the trip. The exchange rate has not changed. What is the value of each of these notes in Canadian dollars?

Edinburgh, Scotland

Try It

1. Exchange rates change a lot.

   a) On January 17, 2002, C$1 was worth US$0.6213. On that day, how many American dollars would you get for C$400?

   b) On November 2, 2007, C$1 was worth US$1.0722. On that day, how many American dollars would you get for C$400?

2. a) You have US$300 on a day when US$1 is worth approximately C$1.10. How many Canadian dollars will you get for your American money?

   b) You have US$300 on a day when US$1 is worth approximately C$0.90. How many Canadian dollars will you get for your American money?

3. a) One day, C$1 was worth approximately £0.634. On that day, how many British pounds would you get for C$250?

   b) On another day, C$1 was worth £0.613. On that day, how many British pounds would you get for C$250?

4. a) You have £600 on a day when £1 is worth approximately C$1.58. How many Canadian dollars will you get for your British pounds?

   b) You have £600 on a day when £1 is worth approximately C$1.67. How many Canadian dollars will you get for your British pounds?

5. a) One day, C$1 was worth approximately RD$37.3. On that day, how many Dominican Republic pesos would you get for C$150?

   b) On another day, C$1 was worth RD$38.1. On that day, how many Dominican Republic pesos would you get for C$150?

6. a) You have RD$5000 on a day when RD$1 is worth approximately C$0.0268. How many Canadian dollars will you get for your Dominican Republic pesos?

b) You have RD$5000 on a day when RD$1 is worth approximately C$0.0277. How many Canadian dollars will you get for your Dominican Republic pesos?

Apply It

7. The exchange rate on a certain day for converting from Japanese yen to Canadian dollars is 0.012134. Which proportion could you use to convert ¥5670 to Canadian dollars? Explain your reasoning.

A $\dfrac{¥1}{¥5670} = \dfrac{\$x}{\$0.012134}$

B $\dfrac{¥1}{\$0.012134} = \dfrac{¥5670}{\$x}$

C $\dfrac{¥1}{\$0.012134} = \dfrac{\$x}{¥5670}$

8. Name three countries you would like to visit. If you had $500 Canadian to spend, how much would it be worth today in each country you chose? Research exchange rates online.

9. Carol is going to Las Vegas for three nights. The hotel costs US$174 per night. She plans to attend two shows: a circus show for US$125 and a comedy show for US$45. She has C$750 to spend on the hotel and shows. Assume that US$1 equals about C$1.07. How much will Carol have left in Canadian dollars?

10. A Japanese tourist arrives in P.E.I. with ¥15 000 in spending money for souvenirs. The table shows the exchange rate at that time.

Canadian Dollar	Japanese Yen
1	0.012134
82.413	1

a) How much is ¥15 000 in Canadian dollars?

b) During a visit to Green Gables, the tourist purchases an Anne doll for C$30. How much is that in Japanese yen?

On the Job 2

Solve Problems Involving Currency Exchange

Patrick refurbishes motorcycles. He found a part he needs while surfing the Internet. The part is priced in British pounds at £30. The shipping cost is £4.20. In a town near Patrick, the same part costs C$84.75, tax included. When Patrick checked the exchange rate, he found the following information.

Canadian Dollar		
	C$1	in C$
British pound	0.634597	1.5758

a) Which source has the better price for the part? By how much?

b) Where would you recommend that Patrick buy the part? Why?

Solution

a) Total cost of part online $= 30 + 4.20$
$$= 34.20$$
The part online costs £34.20.

Method 1: Use a Pattern
The table says a British pound in C$ is 1.5758.
£1 = C$1.5758
£10 = C$15.758
£34.20 = £34.20 × C$1.5758
$\qquad = $ C$53.892…
The part online costs $53.89.

> C 34.2 × 1.5758 =
> 53.89236

> You can also estimate.
> Total cost ≈ £34
> £1 ≈ C$1.50
> £34 = £34 × C$1.50
> $\qquad$ = (£34 × C$1) +
> $\qquad\qquad$ (£34 × C$0.5)
> $\qquad$ = C$51
>
> The part online costs about C$51.

Method 2: Use a Proportion
Determine £34.20 in Canadian dollars.

$$\frac{1}{C\$1.5758} \xrightarrow{\times 34.2} = \frac{£34.20}{x} \xleftarrow{\times 34.2}$$

$\qquad x = $ C$1.5758 × £34.20
$\qquad x = $ C$53.892…
The part online costs C$53.89.
The part in the nearby town costs C$84.75.
84.75 − 53.89 = 30.86
Patrick can save C$30.86 by buying the part online.

b) Develop a +/− chart.

Advantages of Shopping Online	Disadvantages of Shopping Online
• price is lower • easy to comparison shop • convenient: available 24/7, no travelling, no standing in lines • can get items not sold locally • greater choice	• security: thieves may get access to payment information • can see the part online only • warranties and guarantees may not be honoured • shipping costs • have to wait for the order to be shipped • may have to pay duty for items from another country • do not know the dealers • not supporting your local economy

I suggest that Patrick buy the part online. He can save $30.86 by doing that. That's about 36%.

I suggest that Patrick buy the part locally. That way, he will not have to wait for the part to be delivered. He also will not have to worry about paying duty.
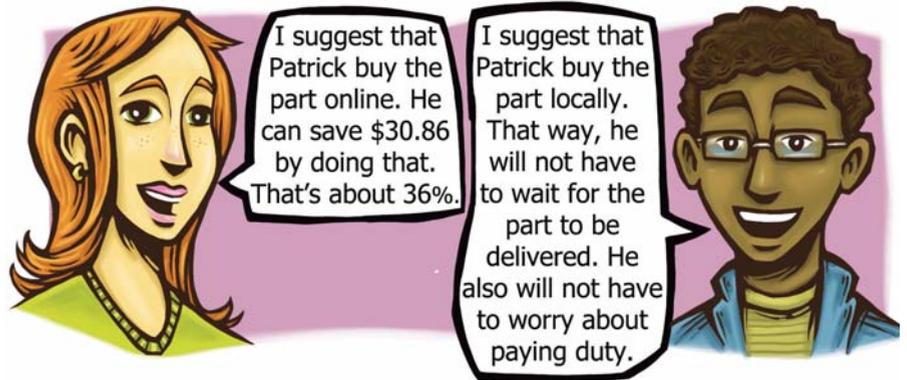
Your Turn

Marcel needs a new ATV winch for a quad vehicle. He can purchase one at a local supply shop for $160.00. He searched online and found one for US$129.97. The charge for shipping and handling is US$6.50. When Marcel checked the exchange rate, he found the following information.

Canadian Dollar		
	C$1	**in C$**
American dollar	0.994046	1.00599

a) Estimate, then calculate, the cost in Canadian dollars of the part online.

b) Where should Marcel buy the winch to pay the lower price? Show your thinking.

c) List two advantages and two disadvantages of buying the winch online.

d) What would you recommend to Marcel? Why?

Try It

Use the exchange rates from the following table. Note that exchange rates change every day. These rates are just examples.

Canadian Dollar		
	C$1	**in C$**
U.S. dollar (US$)	0.991051	1.00903
British pound (£)	0.616697	1.62154
Euro (€)	0.727323	1.37490
Japanese yen (¥)	82.413	0.012134
Jamaican dollar (J$)	83.6623	0.011953

1. Convert C$435 to the following currencies.

    a) U.S. dollars   **b)** euros

    c) British pounds   **d)** Japanese yen

2. Convert each of the following amounts to Canadian dollars.

    a) US$255   **b)** J$95

    c) ¥25 000   **d)** £4300

3. Which amount has the greatest value in Canadian dollars?
    US$15   €11   £10

4. Which amount has the least value in Canadian dollars?
    J$54 631   ¥54 133   US$649

5. Which amount is greater?

    a) ¥3132 or C$36?   **b)** US$487 or C$489?

    c) J$1491 or C$18?   **d)** €1854 or C$1346?

Apply It

6. While on a holiday in Montego Bay, Jamaica, Marilyn shops for souvenirs for friends. She has budgeted C$120 for souvenirs.

    a) How much does she have in Jamaican dollars to spend on souvenirs?

    b) In one shop, she finds a T-shirt for J$668. At a shop a few streets away, she finds the same T-shirt for J$680. How much does each T-shirt cost in Canadian dollars?

    c) Should she go back to the first shop to buy the T-shirt? Explain.

7. Su Mei is looking at online classified ads. She finds a used cell phone for US$99 plus US$30 for shipping. The same cell phone costs C$199 new at a local store.

a) What is the total cost of the used cell phone in Canadian dollars?

b) Do you think Su Mei should buy the cell phone online? Why?

8. While shopping online, Wayne found the following prices for a snowmobile helmet.
- US$279 plus a charge for shipping and handling of 7% of the price of the item
- ¥20 000 plus ¥2500 shipping and handling fee

He has seen the helmet at a local store for C$300.

a) Which total price is the lowest?

b) Where would you suggest that Wayne buy the helmet? Why?

Work With It

1. Jonas is travelling to Boston, Massachusetts, for a week to visit his grandparents. He has budgeted C$20 a day for spending money.

a) Before he leaves, Jonas exchanges enough spending money for his one-week trip. How much is it in U.S. dollars?

b) His grandparents paid for the plane trip. It cost US$819. How much is that in Canadian dollars?

2. While in Manchester, England, Chelsea bought a sweater for £28. When she returned, she saw the same sweater for C$38. Which sweater cost more? By how much in Canadian dollars?

3. a) Write and solve a proportion to convert ¥3560 to Canadian dollars.

b) Find a classmate who wrote a different proportion from yours. Did you get the same answer? If yes, how is that possible? If no, check to see if the proportions were written and solved correctly.

Discuss It

4. Stewart went on a trip to Mexico for ten days. When he returned, he received his credit card statement. How could Stewart be charged two different amounts in Canadian dollars for the same amount in Mexican pesos?

⬢ **FIRST BANK**   **Monthly Statement**

Date	Summery / Location	Withdraw	Total
02 / 02 / 2011	La Habichuela	$750.00 Mexican pesos	$76.14 Canadian
02 / 04 / 2011	Plaza Caracol	$750.00 Mexican pesos	$73.90 Canadian

5. Sonya found a dress online for US$139. She found a similar dress in a store where she lives for C$230. Give Sonya advice on which dress to buy. Include pros and cons of shopping online versus shopping in her local store.

6. Discuss with a group some reasons why it is useful to be able to estimate the exchange rate when you buy something on holiday. Write down the main reasons discussed by your group.

BEACH TOWEL
RD$335
República Dominicana

Focus On . . .

- converting between imperial units and SI units of mass, capacity, and temperature
- converting between imperial units of mass and capacity

Tina's aunt and uncle live in Maine in the United States. They are going to Shoal Harbour to visit Tina and do some fishing. Tina's uncle wants to know how many litres of gas it will take to fill his car with 10 gallons of gas. Tina's aunt wants to know what 1.5 kg of fish is in pounds. How can Tina answer these questions?

SI (Système international d'unités)

- a system of measurement in which units are based on powers of 10
- also called the metric system of measurement

imperial system

- the system of measurement based on British units

Explore Imperial Units and SI Units

The official measurement system of Canada is **SI (Système international d'unités)**. The official measurement system of the United States is the **imperial system**.

To help Tina answer the question her aunt asked, you can use an equal-arm balance with various masses, including some for **ounces** and **pounds**. You can use measuring cups with measurements for **fluid ounces** to help her answer her uncle's question about **gallons**.

ounce
- imperial unit of measure for mass
- short form is oz
- 16 oz = 1 lb

pound
- imperial unit of measure for mass
- short form is lb
- 1 lb = 16 oz

fluid ounce
- imperial unit of measure for capacity
- short form is fl oz
- 128 fl oz = 1 gal

gallon
- imperial unit of measure for capacity
- short form is gal
- 1 gal = 128 fl oz

Part 1: Explore Mass

1. Copy the table below into your notebook.

Imperial Mass	Approximate SI Equivalent
1 oz	
1 lb	
5 lb	

2. a) Place a 1-oz mass on one side of the balance.

   b) Place SI masses on the other side of the scale until the masses balance.

   c) In your table, record the total mass in SI units that is approximately equivalent to 1 oz.

3. Repeat step 2 for each imperial mass in the table.

4. Copy the table below into your notebook.

SI Mass	Approximate Imperial Equivalent
50 g	
100 g	
1 kg	

5. a) Place a 50-g mass on one side of the balance.

   b) Place imperial masses on the other side of the scale until the masses balance.

   c) In your table, record the total mass in imperial units that is approximately equivalent to 50 g.

6. Repeat step 5 for each SI mass in the table.

Part 2: Explore Capacity

7. Copy the table below into your notebook.

Imperial Capacity	Approximate SI Equivalent
1 cup (8 fl oz)	
1 pint (16 fl oz)	
1 quart (32 fl oz)	

8. Fill the measuring cup to 1 cup. Read the water level in millilitres. Record this value in your table.

9. Repeat step 8 for each imperial capacity in the table.

10. Copy the table below into your notebook.

SI Capacity	Approximate Imperial Equivalent
100 mL	
500 mL	
1000 mL (1 L)	

11. Fill the measuring cup to the 100-mL line. Read the level in fluid ounces. Record this value in your table.

12. Repeat step 11 for each SI capacity in the table.

13. Reflect

   a) Consider your table from step 1. How can you convert ounces to grams? pounds to kilograms?

   b) Consider your table from step 4. How can you convert grams to ounces? kilograms to pounds?

   c) Consider your table from step 7. How can you convert fluid ounces to millilitres?

   d) Consider your table from step 10. How can you convert millilitres to fluid ounces?

14. Extend Your Understanding

   a) One American gallon is 128 fl oz. What is the equivalent of 1 gal, to the nearest hundredth of a litre?

   b) Tina's uncle wants to know how many litres of gas it will take to fill his car with 10 gal of gas. Determine what Tina's answer should be, to the nearest tenth of a litre.

   c) Tina's aunt wants to know how many pounds 1.5 kg of fish is. Determine what Tina's answer should be, to the nearest tenth of a pound.

Web Link

To convert between SI units and imperial units, go to www.mhrmathatwork10.ca, and follow the links.

On the Job 1

Convert Temperatures

Tina's aunt and uncle are from Maine in the United States. They are planning to visit Shoal Harbour in August.

a) They read that the average high temperature in August in Shoal Harbour is 22 degrees **Celsius**. What is the equivalent in Fahrenheit?

b) Tina's aunt tells her that the average temperature in January in Maine is about 22 degrees **Fahrenheit**. What is the equivalent in Celsius?

Celsius

- a scale for measuring temperature in which the freezing point of water is 0 °C and the boiling point is 100 °C
- short form is C

Fahrenheit

- a scale for measuring temperature in which the freezing point of water is 32 °F and the boiling point is 212 °F
- short form is F

Cape Elizabeth, Maine

Solution

a) Convert °C to °F.

$$\text{Temperature in °F} = \left(\frac{9}{5} \times \text{temperature in °C}\right) + 32$$

$$= \left(\frac{9}{5} \times 22\right) + 32$$

$$= 71.6$$

71.6 °F is equivalent to 22 °C.

[C] 9 [÷] 5 [×] 22 [+] 32 [=]
71.6

You can also estimate.
$\frac{9}{5}$ is close to 2. Round the other numbers to the closest 10.
$2 \times 20 + 30 = 70$
The equivalent is about 70 °F.

b) Convert °F to °C.

Temperature in °C $= \dfrac{5}{9}$(temperature in °F $- 32$)

$$= \dfrac{5}{9}(22 - 32)$$

$$= -5.555\ldots$$

C 5 ÷ 9 × ( ) 22 −
32) =
-5.555555556
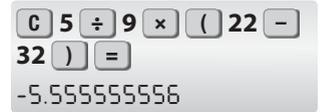
22 °F is equivalent to about -5.5 °C.

> You can also estimate.
>
> $\dfrac{5}{9}$ is close to 0.5. Round the other numbers to the closest 10.
>
> $0.5\,(20 - 30) = -5$
>
> The equivalent is about -5 °C.

Your Turn

Conrad and Todd are involved in an exchange program. Conrad will travel from his home in St. John's to stay in Jacksonville, Florida, for one week in March. Todd will travel from Jacksonville, Florida, to stay in St. John's for one week in April.

St. John's, NL

Jacksonville, Florida

a) The average temperature in Jacksonville in March is 61.1 °F. What is the temperature in Celsius?

b) The average temperature in St. John's in April is 1.6 °C. What is the temperature in Fahrenheit?

Puzzler

1. Perform the following operations on degrees Celsius. Do you get a reasonable estimate for degrees Fahrenheit?
   • Take the Celsius temperature and multiply by 2.
   • Add 30 to the result.

2. Perform the inverse operations on degrees Fahrenheit. Do you get a reasonable estimate for degrees Celsius?

Try It

1. Estimate, then calculate, the following temperatures in Fahrenheit.

  a) 28 °C   **b)** 15 °C

  c) 0 °C   **d)** −12 °C

2. Estimate, then calculate, the following temperatures in Celsius.

  a) 75 °F   **b)** 54 °F

  c) 32 °F   **d)** 0 °F

3. In each pair, which temperature is warmer?

  a) 88 °F, 30 °C   **b)** 20 °C, 67 °F

  c) 49 °F, 8 °C   **d)** −4 °C, 25 °F

4. In each pair, which temperature is colder?

  a) −1 °C, 32 °F   **b)** −1 °F, −19 °C

  c) 46 °F, 9 °C   **d)** 25 °C, 78 °F

Apply It

5. Gordon lives in St. John's. He is planning a trip to Lake Placid, New York, in January.
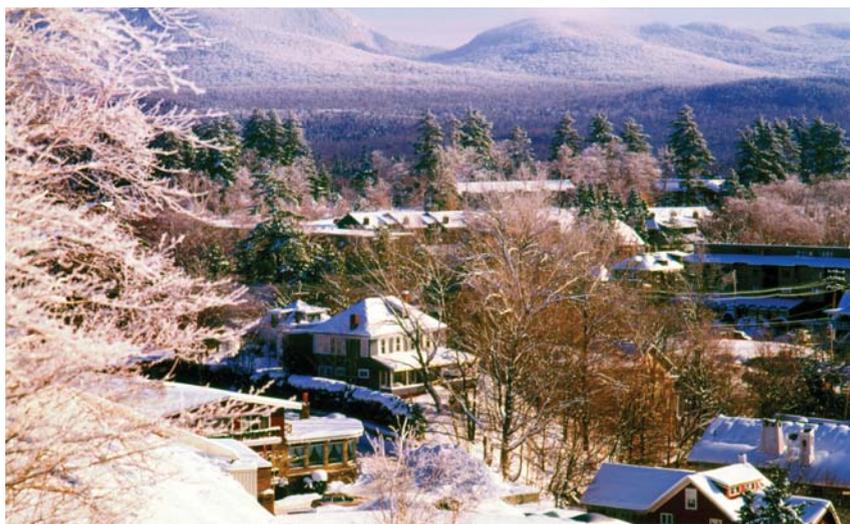
Lake Placid, New York

  a) He finds out that the average high temperature in January in Lake Placid is 16 °F. What is the equivalent in Celsius?

  b) Gordon knows that the approximate average temperature in August in St. John's is 16 °C. He wonders what that is in Fahrenheit. What is it?

6. Every day for a week, Julie recorded the daily high temperature in Cancun, Mexico.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
90 °F	95 °F	89 °F	97 °F	92 °F	95° F	85 °F

a) What was the average high temperature in Fahrenheit that week?

b) What was the average high temperature in Celsius that week?

Cancun, Mexico

7. Ted's friend, Nolan, is coming from Washington, D.C., to Mount Pearl for a visit in March. Nolan wants to know what clothes to pack. Ted tells him that the average high temperature in Mount Pearl in March is about 3 °C and the average low temperature is −4 °C.

a) What are the average high and average low temperatures in Fahrenheit?

b) On the day Nolan is leaving for Mount Pearl, Ted tells his friend that it has been unusually cold. The low temperature that day is −11 °C. What is the temperature in Fahrenheit?

c) Nolan tells Ted that the temperature that day in Washington, D.C., is 56 °F. What is the temperature in Celsius?

8. a) Choose a destination in the United States that you would like to visit.

b) Choose the month in which you would like to visit.

c) Research the average temperature of your destination for the month you chose.

d) Show this temperature in both Celsius and Fahrenheit.

Convert Pounds and Kilograms

Tina's uncle caught a 7.7-kg Atlantic salmon one day while on holiday in Shoal Harbour.

a) He wants bragging rights back in Maine. How many pounds is the fish? Show your answer to the nearest pound.

b) The biggest Atlantic salmon he caught in Maine was a 15-lb fish. What was its mass in kilograms? Show your answer to the nearest tenth of a kilogram.

c) Which fish has a greater mass? By how many pounds? By how many kilograms?

Solution

a) 1 kg ≈ 2.2 lb

Method 1: Use a Pattern

1 kg ≈ 2.2 lb
2 kg ≈ 4.4 kg
7.7 kg ≈ 7.7 kg × 2.2 lb
    ≈ 16.94 lb

The pattern is to multiply by 2.2.

$\boxed{C}$ **7.7** $\boxed{\times}$ **2.2** $\boxed{=}$
16.94

The 7.7-kg salmon has a mass of approximately 17 lb.

You can also estimate. Round 2.2 lb to 2 lb. Round 7.7 kg to 8 kg. 8 kg × 2 lb = 16 lb

Method 2: Use a Proportion

$$\frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{7.7 \text{ kg}}{x \text{ lb}}$$

$$\overset{\times\, 7.7}{\frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{7.7 \text{ kg}}{x \text{ lb}}}$$
$$\underset{\times\, 7.7}{}$$

$$x = 2.2 \text{ lb} \times 7.7 \text{ kg}$$
$$x = 16.94 \text{ lb}$$

The 7.7-kg salmon has a mass of approximately 17 lb.

b) 1 lb ≈ 0.454 kg

Method 1: Use a Pattern

1 lb ≈ 0.454 kg

2 lb ≈ 0.908 kg

15 lb ≈ 15 lb × 0.454 kg

     ≈ 6.81 kg

The 15-lb salmon has a
mass of approximately 6.8 kg.

> The pattern is to
> multiply by 0.454.

> C | 15 | × | 0.454 | =
> 6.81

> You can also estimate.
> Round 0.454 kg to 0.5 kg,
> which is half a kilogram.
> 15 lb ÷ 2 = 7.5 lb
> This estimate is high
> because I rounded up.

Method 2: Use a Proportion

$$\frac{1 \text{ lb}}{0.454 \text{ kg}} = \frac{15 \text{ lb}}{x \text{ kg}}$$

$$\frac{1 \text{ lb}}{0.454 \text{ kg}} \overset{\times\, 15}{\underset{\times\, 15}{=}} \frac{15 \text{ lb}}{x \text{ kg}}$$

$$x = 0.454 \text{ kg} \times 15 \text{ lb}$$
$$x = 6.81 \text{ kg}$$

The 15-lb salmon has a mass of approximately 6.8 kg.

c) 7.7 kg − 6.8 kg = 0.9 kg

The salmon caught in Shoal Harbour has a mass of 0.9 kg more.

16.9 lb − 15 lb = 1.9 lb

The salmon caught in Shoal Harbour had a mass of about 2 lb more.

Your Turn

a) Ferdinand finds an online recipe for seafood chowder. It calls for $\frac{1}{2}$ lb lobster meat, $1\frac{1}{4}$ lb fish fillets, and $\frac{3}{4}$ lb clams. How many kilograms of lobster, fish fillets, and clams does he need to buy? Give your answers to the nearest tenth of a kilogram.

b) Ferdinand finds another recipe. The recipe for lobster stew calls for 0.5 kg lobster. How many pounds is that?

Check Your Understanding

Try It

1. Estimate and then convert the following amounts to the nearest tenth of a kilogram.

a) 3 lb

b) 35 lb

c) 937 lb

d) 122 lb

2. Estimate and then convert the following amounts to the nearest pound.

a) 3 kg

b) 28 kg

c) 0.5 kg

d) 196.7 kg

3. Estimate and then convert the following amounts to the nearest tenth of a gram.

> $1 \, oz \approx 28.35 \, g$

a) 35 oz

b) 21 oz

c) 14 oz

d) $\frac{1}{4}$ oz

4. Estimate and then convert the following amounts to the nearest ounce.

a) 99 g

b) 314 g

c) 359.3 g

d) 120 g

Apply It

5. Tara is going to visit Juliet in Rochester, New York. Juliet asks Tara to bring 10 pounds lobster. Tara asks Juliet how much this amount is in kilograms. What is Juliet's answer, to the nearest tenth of a kilogram?

6. Mark is flying on a Canadian airline from Chicago to St. John's. He finds out that the maximum baggage allowed on the flight is 23 kg. What is this amount in pounds?

7. Katarina has just moved from Cincinnati to Edmonton, Alberta. She is at the grocery store and wants to buy 8 oz salami at the deli, but the salami is sold in grams. How many grams should she ask for?

8. Luc asks his uncle in Louisiana for his recipe for jambalaya. The recipe calls for 6 ounces Andouille sausage.

a) How many grams of sausage does he need to buy?

b) Another day, Luc makes 4 times the recipe. How many pounds of sausage is that, to the nearest half pound?

O'Hare International Airport, Chicago

On the Job 3

Convert Gallons and Litres

Tina's aunt and uncle from Maine are taking a scenic drive outside Shoal Harbour. They stop to fill the car with gas.

a) Their gas tank has a capacity of 19 gal. What is the capacity in litres? Give your answer to the nearest tenth of a litre.

b) The tank is not totally empty, so they fill it with only 42 L. How many gallons is that? Give your answer to the nearest gallon.

Solution

a) *Method 1: Use a Pattern*

$1 \text{ gal} \approx 3.785 \text{ L}$

$2 \text{ gal} \approx 7.57 \text{ L}$

$19 \text{ gal} \approx 19 \text{ gal} \times 3.785 \text{ L}$

$\qquad \approx 71.915 \text{ L}$

> The pattern is to multiply by 3.785.

C 19 × 3.785 =

71.915

It takes about 71.9 L to fill their gas tank.

> You can also estimate.
> Round 19 gal to 20 gal.
> Round 3.785 L to 3.5 L.
> 20 gal × 3.5 L = (20 gal × 3 L) + (20 gal × 0.5 L)
> $\qquad\qquad\qquad$ = 60 L + 10 L
> $\qquad\qquad\qquad$ = 70 L

Method 2: Use a Proportion

$$\frac{1 \text{ gal}}{3.785 \text{ L}} = \frac{19 \text{ gal}}{x}$$

(× 19)

$x = 3.785 \text{ L} \times 19 \text{ gal}$

$x = 71.915 \text{ L}$

It takes about 71.9 L to fill their gas tank.

b) *Method 1: Use a Pattern*

1 L ≈ 0.2642 gal

2 L ≈ 0.5284 gal

42 L ≈ 42 L × 0.2642 gal

   ≈ 11.096… gal

This is about 11 gal.

C 42 × 0.2642 =

11.0964

> You can also estimate.
>
> Round 0.2642 gal to 0.25 gal.
>
> That is $\frac{1}{4}$.
>
> Round 42 L to 40 L.
>
> $\frac{1}{4}$ of 40 L = 40 L ÷ 4
>
>   = 10 gal

Method 2: Use a Proportion

$$\frac{1 \text{ L}}{0.2642 \text{ gal}} = \frac{42 \text{ L}}{x}$$

× 42

× 42

   $x = 0.2642 \text{ gal} \times 42 \text{ L}$

   $x = 11.0964 \text{ gal}$

This is approximately 11 gal.

Your Turn

Adam is from Corner Brook. He is away on business in North Carolina. He rents an SUV at the airport. At home, he drives a compact car.

a) The gas tank of the SUV has a capacity of 31 gal. What is the capacity in litres? Express your answer to the nearest tenth of a litre.

b) The gas tank of Adam's compact car at home has a capacity of 54 L. What is the capacity in gallons? Express your answer to the nearest gallon.

Try It

1. Estimate and then convert each amount to the nearest gallon.

   a) 20 litres   **b)** 5000 litres

   c) 348.6 litres   **d)** 3 litres

2. Estimate and then convert each amount to the nearest tenth of a litre.

   a) 20 gallons   **b)** 491 gallons

   c) 87 gallons   **d)** $\frac{1}{2}$ gallon

3. Estimate and then convert each amount to the nearest fluid ounce.

   > 1 mL ≈ 0.0338 fl oz

   a) 400 millilitres   **b)** 75 millilitres

   c) 999.5 millilitres   **d)** 20 millilitres

4. Estimate and then convert each amount to the nearest tenth of a millilitre.

   > 1 fl oz ≈ 29.574 mL

   a) 50 fluid ounces   **b)** 32 fluid ounces

   c) 18.2 fluid ounces   **d)** $\frac{1}{5}$ fluid ounce

Apply It

5. Convert the capacity measurements to the unit indicated. Give your answer to the nearest tenth.

   a) The gas tank holds 22 gal. (litres)

   b) The recipe called for 1.5 L milk. (fluid ounces)

   c) The propane tank has 14.2 L gas left. (gallons)

   d) The perfume bottle holds 3 oz. (millilitres)

6. After a trip to New York, Calvin checked his gas receipts. He purchased the following amounts: 12 gal, 10 gal, 14 gal, and 8 gal. What was the total amount to the nearest tenth of a litre?

7. While on holiday, three friends visit an amusement park. They want to go on a ride together. Each car on the ride allows a maximum of 200 kg. The masses of the three friends are 114 lb, 130 lb, and 154 lb. Is it possible for all three of them to go in one car? Explain.

On the Job 4

Convert Between Imperial Units of Mass and Capacity

Anne is the cook in a cafeteria. To make chocolate squares, she needs to order the following ingredients from her food supplier.

10 cups milk   24 oz butter $1\frac{1}{4}$ lb chocolate

a) The supplier needs to know how many quarts of milk Anne needs. What will she say?

b) The supplier needs to know how many pounds of butter Anne needs. What will she say?

c) The supplier needs to know how many ounces of chocolate Anne needs. What will she say?

Solution

a) There are 4 **cups** in 1 **quart**. Convert 10 cups to quarts.

4 cups = 1 quart

Method 1: Use a Pattern

4 cups = 1 quart
8 cups = 2 quarts
10 cups = 10 ÷ 4

> The pattern is to divide by 4.

$$= 2.5$$

10 cups milk is equal to $2\frac{1}{2}$ quarts milk.

4 cups	1 quart
3 cups	3 cups
2 cups	2 cups
1 cups	1 cups

Method 2: Use a Proportion

$$\frac{4 \text{ cups}}{10 \text{ cups}} \overset{\div 4}{\underset{\div 4}{=}} \frac{1 \text{ quart}}{x \text{ quarts}}$$

$$x = 10 \div 4$$
$$x = 2.5$$

10 cups milk is equal to $2\frac{1}{2}$ quarts milk.
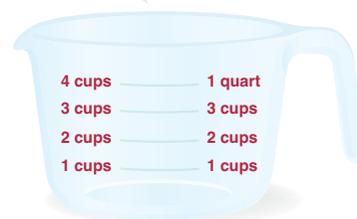
b) There are 16 oz in 1 lb. Convert 24 oz to pounds.

16 oz = 1 lb

Method 1: Use a Pattern

16 oz = 1 lb
32 oz = 2 lb

> The pattern is to divide by 16.

24 oz = 24 ÷ 16
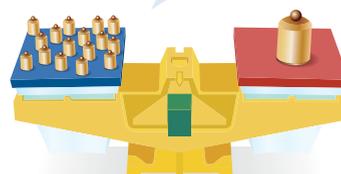
$$= 1.5$$

24 oz butter is equal to $1\frac{1}{2}$ lb butter.

Method 2: Use a Proportion

$$\overset{\div 16}{\frac{16 \text{ oz}}{24 \text{ oz}} = \frac{1 \text{ lb}}{x \text{ lb}}}$$

$$x = 24 \div 16$$
$$x = 1.5$$

24 oz butter is equal to $1\frac{1}{2}$ lb butter.

c) There are 16 ounces in 1 lb.

Convert $1\frac{1}{4}$ lb to ounces.

Method 1: Use a Pattern

1 lb = 16 oz

$\frac{1}{2}$ lb = 8 oz

$\frac{1}{4}$ lb = 4 oz

$1\frac{1}{4}$ lb = 16 oz + 4 oz
        = 20 oz

> The pattern is to multiply by 16.

$1\frac{1}{4}$ lb chocolate is equal to 20 oz chocolate.

Method 2: Use a Proportion

$$1\frac{1}{4} \text{ lb} = 1.25 \text{ lb}$$

$$\overset{\div 16}{\frac{1 \text{ lb}}{1.25 \text{ lb}} = \frac{16 \text{ oz}}{x \text{ oz}}}$$

$$x = 1.25 \times 16$$
$$x = 20$$

$1\frac{1}{4}$ lb chocolate is equal to 20 oz chocolate.

Your Turn

Anne is going to make carrot raisin muffins. She needs to order the following ingredients from her food supplier.

$1\frac{1}{2}$ lb raisins   64 oz carrots   6 cups milk

a) How many ounces of raisins does she need?

b) How many pounds of carrots does she need?

c) How many quarts of milk does she need?

Try It

1. Convert the following Imperial measurements to the unit indicated.

   a) 7 cups milk (quarts)

   b) $3\frac{1}{2}$ lb grass seed (ounces)

   c) 28 oz potatoes (pounds)

   d) $\frac{1}{4}$ lb nails (ounces)

   e) $2\frac{1}{2}$ cups blueberries (quarts)

   f) 14 oz drywall compound (pounds)

2. There are 8 fl oz in 1 cup. Convert each of the following amounts to cups.

   a) 16 fl oz yogurt

   b) 36 fl oz tomato sauce

   c) 14 fl oz vinegar

   d) 2 fl oz lemon juice

3. Write each pair of amounts with $>$, $<$, or $=$ between them.

   a) 2 lb aquarium rocks
      18 oz aquarium rocks

   b) 12 cups strawberries
      3 quarts strawberries

   c) 5 fl oz mayonnaise
      $\frac{3}{4}$ cup mayonnaise

   d) 12 oz beads
      $1\frac{3}{4}$ lb beads

   e) 5 fl oz fish stock
      $\frac{5}{8}$ cup fish stock

   **f)** $1\frac{1}{8}$ quarts milk
      $4\frac{1}{4}$ cups milk

Apply It

4. State whether an appropriate unit is used for each measurement. If not, explain why. Then, convert it to a more appropriate unit.

   a) Chloe's suitcase has a mass of 320 oz.

   b) Donald needs to buy $\frac{1}{16}$ quarts milk for the recipe.

   c) Gillian needs to buy 60 fl oz flour to make 3 loaves of bread.

   d) Clay needs to buy $2\frac{1}{2}$ lb beef to make stew.

   e) Laura bought a 672-oz bag of fertilizer.

   f) There are $3\frac{3}{4}$ cups oats in the muffin recipe.

5. A stir-fry recipe calls for 8 oz shrimp. You plan to triple the recipe. How many pounds of shrimp do you need to buy?

6. A spaghetti sauce recipe calls for 1 lb ground beef. Fergus is going to use $\frac{3}{4}$ lb ground beef and $\frac{1}{4}$ lb Italian sausage instead. How many ounces of each type of meat does he need to buy?

7. Jana made 12 waffles. The recipe included $\frac{3}{4}$ cup canola oil. If she eats four waffles, how many fluid ounces of canola oil does she consume?
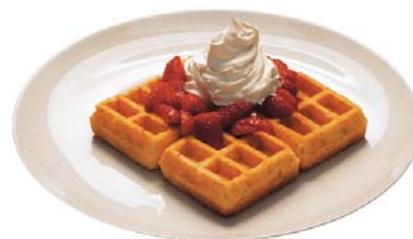
8. Greg bought a punch bowl that has a capacity of 12 quarts. How many 32-fl oz bottles of juice would it take to fill the punch bowl?

Work With It

1. Convert each measurement to the nearest tenth of a unit.

a) $\frac{3}{4}$ gal oil (litres)

b) 4 fl oz cold medication (millilitres)

c) $\frac{1}{3}$ cup soy sauce (fluid ounces)

d) 27 kg bricks (pounds)

e) 4 oz butter (grams)

f) $4\frac{1}{4}$ lb fish (ounces)

g) $-9\,°C$ (Fahrenheit)

h) 79 °F (Celsius)

2. Convert the following recipe for nachos to the SI system. Give your answers to the nearest tenth of a unit.

> 1 tablespoon (tbsp) $\approx \frac{1}{2}$ fl oz
>
> 1 cup (c) ≈ 8 fl oz

Ingredient	Imperial Measurement	SI Measurement
Tortilla chips	8 oz	? g
Cheddar cheese, grated	1 c	? mL
Monterey Jack cheese, grated	1 c	? mL
Onions, thinly sliced	3	?
Olives, finely chopped	3 tbsp	? mL
Salsa	$\frac{3}{4}$ c	? mL
Sour cream	$\frac{3}{4}$ c	? mL

3. Austin lives in Detroit, Michigan. He visited Dalhousie, New Brunswick, in March. He recorded the high and low temperatures in Dalhousie over the five days before his trip.

Day	High (°C)	Low (°C)
Monday	−5.6	−12.5
Tuesday	−6.0	−15.3
Wednesday	−4.8	−10.9
Thursday	−3.0	−9.0
Friday	−1.5	−10.8

a) What was the average high temperature in °F?

b) What was the average low temperature in °F?

4. The price of Gas in Albany, New York, was $3.89/gal. The price of gas in St. John's was $0.99/L.

   a) What was the unit price per litre in Albany?

   b) What was the unit price per gallon in St. John's?

   c) Which location had the lower unit price? Explain.

5. Laura is a chef. She prefers a certain type of hot sauce that can be purchased only in the United States. She asks her friend, Kendra, in New York to send her three 296-mL bottles of the hot sauce. Kendra finds 6-fl oz bottles.

   a) Is this equivalent to the size of bottle that Laura asked for? Explain.

   b) How many bottles should Kendra send so that Laura gets enough?

6. At home in Peggy's Cove, Otto can buy a 100-g bar of dark chocolate for $1.39. While shopping in Halifax, Otto saw imported dark chocolate available in a 14 oz size for $4.50.

   a) How many grams is the 14-oz bar?

   b) Which chocolate has the lower unit price? Explain.

   c) If Otto buys four chocolate bars in Halifax, how many pounds of chocolate will he have? How many kilograms will he have? Give your answers to the nearest tenth of a unit.

Discuss It

7. Copy the table in your notebook. Fill in the unit from each system that you think is better when measuring the items in the table. Explain each choice.

Item	Imperial Unit	SI Unit
Mass of a car		
Capacity of a swimming pool		
Mass of a bag of apples		
Amount of cough syrup		

8. List some advantages of the SI system of measurement compared to the imperial system.

Skill Check

What You Need to Know

Section	After this section, I know how to . . .
1.1	■ calculate and compare unit prices ■ determine the best buy ■ analyse sales techniques ■ determine percent changes in prices
1.2	■ convert between Canadian currency and foreign currencies ■ estimate the cost of items from another country in Canadian currency
1.3	■ convert between imperial units and SI units of mass, capacity, and temperature ■ convert between imperial units of mass and capacity

If you are unsure about any of these questions, review the appropriate section or sections of this chapter.

1.1 **Unit Pricing, pages 6–17**

1. Sophie is shopping for coffee beans. She finds three sizes at the local grocery store, as shown.

a) What is the price per 100 g for each brand of coffee?

b) Which has the lowest unit price?

c) What else should Sophie consider before she makes her purchase?

PERFECT ROAST
350 g
$10.49

MORNING GLORY
500 g
$12.90

BEST BREW
1 kg
$23.99

2. A grocery store sells 284-mL cans of beef stew for $1.98.

a) What is the unit price of the beef stew?

b) The beef stew goes on sale for $1.68. What is the new unit price?

c) What is the percent decrease?

Currency Exchange, pages 18–28

Use the exchange rates in the following table for #3 and #4.

Canadian Dollar		
	C\$1	**in C\$**
U.S. dollar (US\$)	0.991051	1.00903
euro (€)	0.727323	1.37490

3. On November 7, 2007, the exchange rate from Canadian to U.S. currency hit a record high. C\$1 was equal to US\$1.10.

a) How much was C\$250 worth in U.S. dollars?

b) What did it cost in C\$ for a purchase of US\$75?

4. While shopping online, you find the following prices for a pair of ski goggles: US\$79 and €53. You can purchase similar ski goggles at a local store for C\$85.

a) What is the price in Canadian dollars for each of the ski goggles?

b) Determine the total price, including tax, for the ski goggles at your local store.

c) What else should you consider when buying ski goggles?

Measurement Comparisons, pages 29–47

5. Which is the larger amount?

a) 2 qt milk, 7 cups milk

b) 13 oz modelling clay, $1\frac{1}{4}$ lb modelling clay

c) $\frac{1}{3}$ cup beef broth, 2 fl oz beef broth

6. You will be travelling by car from Albany, New York, to Edmundston, New Brunswick. Gas costs \$2.75/gal that day in Albany. What will you pay for 1 L gas in Albany?

7. Carla arrives in Phoenix, Arizona, in July. That day, the temperature is 107 °F. What is this temperature in Celsius?

Phoenix, Arizona

Use the exchange rates in the following chart.

Canadian Dollar		
	C$1	**in C$**
U.S. dollar	0.991051	1.00903
euro	0.727323	1.37490

For #1 to #3, select the best answer.

1. Which of the following has the lowest unit price?

   A 250 mL for $1.58   **B** 500 mL for $2.98

   C 750 mL for $4.35   **D** 1 L for $6.40

2. The standard oil barrel of 42 gallons is used in the United States as a measure of crude oil and other petroleum products. What is the closest equivalent in litres?

   A 10.4 L   **B** 42 L   **C** 159 L   **D** 168 L

3. You have C$50. What is the closest equivalent in euros?

   A €36.30   **B** €36.40   **C** €$68.70   **D** €68.80

4. a) The freezing point of water is 0 °C. What is it in °F?

   b) The boiling point of water is 212 °F. What is it in °C?

5. Write each pair of amounts with > or < between them.

   a) 18 fl oz cream, 2 cups cream

   b) 28 oz rice, 2 lb rice

   c) 2 qt olive oil, 10 cups olive oil

   d) $\frac{1}{4}$ cup corn syrup, 1 fl oz corn syrup

   e) 1 lb butter, four 8-oz packages of butter

6. Henry sees that 950 g of ground beef is on sale at The Grocery Stop for $8.98. At The Cost Club, 3.4 kg is selling for $33.00.

   a) Which package of ground beef has the lower unit price?

   b) The Cost Club reduces the price of their ground beef to $29.70. What is the percent decrease?

   c) Which size has the lower unit price now?

   d) What else should Henry consider when buying the beef?

7. Bruce is going to install a hot tub that he bought from a U.S. manufacturer.

a) If the capacity is 500 gallons, what is the capacity in litres?

b) The floor under a hot tub must be strong enough to support it. A 500-gallon hot tub is at least 4000 lbs. What is it in kilograms?

c) The maximum recommended temperature for a hot tub is 104 °F. What is this maximum in Celsius?

8. Tina's uncle and aunt are visiting Newfoundland from Maine. They decide to go for a drive to see some sights.

a) During their drive, they stop for gas. They pay C$48 for 45 L of gas. How many gallons of gas is this?

b) What was the cost of gas per litre in Newfoundland that day?

c) The last time they got gas in Maine, it cost US$60 to fill their 19-gallon tank. How many litres of gas is this?

d) What was the cost of gas per litre in Maine in U.S. dollars? in Canadian dollars?

9. Marta is shopping at the duty-free shop in La Guardia Airport, New York. She is buying perfume and chocolates. Show the unit price of each item in Canadian dollars using an SI unit of measurement.

a)

PERFUME
8 fl oz
US$85

b)

Chocolate
1 LB

CHOCOLATE
1 lb
US$36

Chapter Project

Plan a Party

Project

Max is in charge of buying food and drinks for a party at work. Help him plan what to serve and the costs of these items. There will be 30 people at the party. Max has a budget of $250.

1. Decide on the food and drinks that you plan to serve. The supplies for the party must include one recipe with imperial measures and one with SI measures. Two sample recipes are shown. You will find your own recipes.

2. Calculate how much of each food item and drink you will need. Show the amounts you need in both measurement systems.

3. Visit a grocery store to determine prices for the SI measurements.
   a) Show the cost of each item.
   b) Show the unit cost of each item.
   c) Show the total cost of all of the items.

4. Use the imperial units to check the prices online. Can you save money by buying some of the items in the United States? Show your thinking, including currency conversions.

Fruit Punch

125 mL	sugar
125 mL	water
500 mL	apple juice
250 mL	orange juice
75 mL	lemon juice
1 L	orange sherbet

Caramel Snack Mix

8 cups	popped popcorn
4 cups	cereal squares
2 cups	pretzel twists
1 cup	pecan halves
1 cup	brown sugar
½ cup	butter
¼ cup	corn syrup
1 teaspoon	vanilla
½ teaspoon	baking soda

GAMES AND PUZZLES

With a partner or in a small group, solve the following puzzles.

Water Puzzle

You need exactly 3 L of water, but you have only two containers. One container holds 2 L. The other holds 7000 mL. You can fill either or both of the two containers as many times as you need to get exactly 3 L of water. Note that you have only the containers to help you measure. How do you do it?

Canoe Puzzle

Help the family cross the river in a canoe.

- The father weighs 80 kg, the mother 55 kg, the daughter 40 kg, the son 40 kg, and the dog 10 kg.
- The canoe holds no more than 180 lb.
- The family wants to get across the river in the fewest number of trips possible.
- Count one way as one trip. Remember that someone always has to come back with the canoe.

What is the fewest number of trips they can make to get everyone across the river? **Note:** None of them can swim across.