Chapter 1

Unit Pricing and Currency Exchange

GOALS

Both in the workplace and in your daily life, you will need to make decisions about what to buy and how to pay the best price for what you need. In this chapter, you will use some familiar mathematics concepts—including fractions, percent, rate, and ratio—in a new context. You will apply these mathematical ideas to

- learn how to determine which purchase is the best buy, considering quality and quantity as well as unit price;
- investigate sales promotions and compare their effects; and
- convert Canadian dollars into a foreign currency and foreign currencies into Canadian dollars.

KEY TERMS

- buying rate
- exchange rate
- markup
- promotion
- proportion
- rate
- ratio
- selling rate
- unit price
- unit rate

START TO PLAN

PROJECT OVERVIEW

Have you ever planned a party? In this chapter, your project will be to plan a wind-up party for the end of the school year for a team, club, or committee at your school.

You will plan the party for 15 guests plus yourself. It will be held on a Saturday evening between 6:00 pm and 11:00 pm.

Each guest will contribute $15.00, and your club, team, or committee will contribute $10.00 per member as well. The total budget for the party will therefore be $400.00. This amount must cover all the expenses of the party.

Students from a North Vancouver high school golf team are practising at a driving range.

GET STARTED

To begin your project, start planning your party. First, make a list of all the things you will need to consider and buy. Keep these questions in mind:

- Where will the party be held?
- What decorations will you choose?
- What activities or entertainment will you plan for the guests?
- What kind of music will you choose?
- What food and drinks will you need?
- Where will you purchase supplies?

FINAL PRESENTATION CHECKLIST

You will make a final presentation to your fellow team, club, or committee members when you have completed this project. Your presentation will include these items:

- a description of the party, its location, and any decorations you plan to use;
- a sample invitation;
- a list of activities and entertainment for the guests;
- a table or spreadsheet itemizing the expenses, suppliers, and the total cost and unit cost of each item; and
- a calculation of the cost per guest and the total cost of the party.

1.1 Proportional Reasoning

MATH *ON THE JOB*

Sandra Tuccaro is an Inuvialuit nurse originally from Hay River, Northwest Territories. She now works in the Home Care department of Yellowknife Health and Social Services Authority. She has a diploma in nursing and her job encompasses many tasks. As a home care nurse, Sandra provides short- and long-term care to people in their homes. She helps patients with nursing and rehabilitation needs and assists with their nutrition and daily living.

Sandra has to administer 300 mg of a drug that comes in a vial that has 120 mg of the drug dissolved in 2 mL of fluid. How many mL of fluid will she need to give her patient? How can Sandra use proportional reasoning to solve this problem?

Sandra is shown here in her Yellowknife office.

PRACTISE YOUR PRIOR SKILLS

RATIO

ratio: a comparison between two numbers with the same units

proportion: a fractional statement of equality between two ratios or rates

In this chapter, you will learn to apply your knowledge of **ratios** in new areas.

Remember that a ratio compares two numbers that are measured in the same units. A ratio can be written in several ways. For example, the ratio 20 to 50 can be written as 20:50 or as $\frac{20}{50}$. The notation $\frac{20}{50}$ is often the most useful notation because your knowledge of fractions can be used in calculations.

When working with ratios, simplify them first. For example, the ratio 20:50 can be simplified by dividing each term by 10. To solve calculations using this ratio, you can use 2:5 instead of 20:50.

The two ratios 20:50 and 2:5 are equivalent statements and the fractional equation $\frac{20}{50} = \frac{2}{5}$ is referred to as a **proportion**.

Ratios are often expressed in real-life situations as proportions. For example, you may need to mix a certain shade of paint. The proportion needed is 3 parts blue to 1 part green, or 3:1. You can use this ratio to mix the amount of paint you need in the correct proportions. Mixing 3 parts and 1 part means there are 4 parts in all.

In a ratio, since the units are the same, they essentially cancel each other out. In your calculations, you can omit the units but remember to include them in your solution.

DISCUSS THE IDEAS

ADAPTING A RECIPE

You have invited five friends over to your house and decide to serve them homemade fudge brownies. You found a great recipe that makes 20 large brownies, but you only need 12, two per person. How would you change the recipe to make only 12 brownies and have them taste exactly the same as they do when made from the original recipe?

Example 1

Engines that require you to mix oil with fuel to provide lubrication are called 2-stroke engines. A faller at a logging site needs to refill a chainsaw's fuel can. The ratio of gasoline to oil that is needed is 40 parts of gasoline to 1 part of oil. The chainsaw's fuel can holds 8 litres of gasoline. How much oil should be added to the gasoline to obtain the correct ratio?

SOLUTION METHOD 1

The ratio of litres of gasoline to oil can be written as $\frac{40}{1}$.

Let x represent the amount of oil needed.

The problem can be expressed as a proportion.

$$\frac{40}{1} = \frac{8}{x}$$

The proportion forms an equation involving fractions. To solve this equation, one strategy is to simplify the equation by eliminating the denominators. This can be done by multiplying both sides of the equation by the common denominator.

$$\frac{40}{1}(x) = \frac{8}{x}(x)$$

Multiply both sides of the equation by the common denominator.

The common denominator for $\frac{40}{1}$ and $\frac{8}{x}$ is x.

$$\frac{40(x)}{1} = \frac{8(x)}{x}$$

This logger is using a chainsaw at a logging site in BC.

$40x = 8$ — The ratio $\frac{8(x)}{x}$ can be simplified to 8 since $\frac{x}{x} = 1$.

$\frac{40x}{40} = \frac{8}{40}$ — To isolate the variable, divide by its coefficient. Since the coefficient of x is 40, divide both sides of the equation by 40.

$x = \frac{8}{40}$ — The ratio $\frac{40x}{40}$ equals x since $\frac{40}{40} = 1$.

The answer can be simplified to $\frac{1}{5}$ by dividing both the numerator and the denominator by 8.

The answer could be expressed as a decimal by dividing 8 by 40 to obtain 0.2.

The faller needs to add 0.2 litres of oil to the fuel can.

SOLUTION METHOD 2

$$\frac{40}{1} = \frac{8}{x}$$

The faller reasons that the numerator, 40, has been divided by 5 to equal 8. To keep the fractions equivalent, he must also divide the denominator, 1, by 5 to equal x.

The faller needs to add $\frac{1}{5}$ of a litre of oil to the fuel can.

Example 2

Jean-Luc, a builder, has found that he can arrange the work cubicles of his employees best if the ratio between the length and the width of a room is 3:2. If a room is 6 m long, how wide should the room be?

SOLUTION

The ratio of length to width in metres is $\frac{3}{2}$.

Let w represent the width of the room.

The two ratios can be expressed as the following proportion.

$\frac{3}{2} = \frac{6}{w}$

This proportion forms an equation involving fractions. To solve this equation, one strategy is to simplify the equation by eliminating the denominators. This can be done by multiplying both sides of the equation by the common denominator.

$2w\left(\frac{3}{2}\right) = \left(\frac{6}{w}\right)2w$

Multiply both sides of the equation by the common denominator. The common denominator for $\frac{3}{2}$ and $\frac{6}{w}$ is $2w$.

$\frac{6w}{2} = \frac{12w}{w}$

Simplify both sides of the equation.

$3w = 12$

$\frac{3w}{3} = \frac{12}{3}$

To isolate the variable, divide by its coefficient. Since the coefficient of w is 3, divide both sides of the equation by 3.

$w = 4$

The width of the room should be 4 metres.

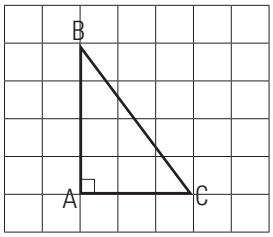
ALTERNATIVE SOLUTION

The builder might also reason that since the numerator, 6, is twice 3, that w will be twice 2, or 4 metres.

ACTIVITY 1.1
VISUALIZE A PROPORTION

A right triangle is created by joining the ends of two line segments drawn at 90° to each other, as shown below.

1. Copy the triangle below onto a sheet of 0.5 cm graph paper.



2. For each item, draw the new figure and determine whether the new figure is proportional to the original figure or whether it is distorted.

   a) Double the length of line segments AB and AC.

   b) Add three squares on the graph to the length of each of these segments.

   c) Subtract 2 squares from the length of each of these segments.

   d) Divide the length of each of these segments by 2.

3. What conclusions can you draw from your results?

ACTIVITY 1.2
FRUIT DRINK TASTE TESTER

You are part of a taste tester team for a healthy lifestyle company. Your team is developing some new drinks to put on the market. The company has produced orange concentrate that is packaged in 1-cup portions. Buyers will mix the concentrate with water, and the best proportions of concentrate to water need to be identified.

The company is considering two different recipes. It is your team's job to compare the recipes and produce a taste tester report.

Recipe #1

3 cups of concentrate
7 cups of water

Recipe #2

2 cups of concentrate
5 cups of water

Complete a table like the one below for the company. A batch is one recipe.

MIXING THE CONCENTRATES

	Recipe #1		Recipe #2	
Batches	*Orange concentrate (cups)*	*Water (cups)*	*Orange concentrate (cups)*	*Water (cups)*
1				
2				
3				
5				
10				

1. Using the patterns in the table above, how many cups of orange concentrate would be needed to make 100 batches of the orange drink following Recipe #1?

2. Using the raw data in the table, can you tell which of the two recipes has a stronger taste of orange? Explain mathematically how you know.

3. Suppose you had only 1 cup of concentrate. How many cups of water would you need to make Recipe #2? Set up a proportion and solve this question.

4. You only want to make 8 cups of Recipe #1. How many cups of concentrate and how many cups of water will you need? Explain your solution.

5. You have been given a recipe for a completely new fruit drink. The recipe has 3 ingredients as listed below:

Fruit Drink Recipe
2 cups pineapple juice
3 cups cranberry juice
5 cups lemon juice

You need to make 4 cups of juice for the taste test. How much of each ingredient will you need? Explain your solution.

HINT

In question 5, add up all the cups used in the recipe. Then each kind of juice can be expressed as a fraction of the total recipe.

PRACTISE YOUR PRIOR SKILLS

RATE

This carpenter is taking a measurement.

A **rate** is similar to a ratio, but it compares two numbers with different units. Here are some examples of rates:

- the number of words you can type per minute
- the number of hamburgers a concession stand sells each day
- the price of lumber per linear foot
- the price of stone per kilogram

rate: a comparison between two numbers with different units

A rate can be expressed using the same notation as a ratio. Because the units are different in the two terms, they must be used. For example, if you see salmon for sale at $1.89 for 100 grams, you can write the rate in these ways:

$1.89:100 g

$1.89/100 g

$$\frac{\$1.89}{100\text{ g}}$$

A proportion is an equivalent statement between two ratios. You can also think of a proportion as an equivalent statement between two rates.

DISCUSS THE IDEAS

CINDY KLASSEN, SPEED SKATER

Cindy Klassen

At the 2006 Olympic Winter Games in Torino, Cindy Klassen of Winnipeg became the first Canadian athlete to win five medals at a single Winter Olympics. She won gold in the 1500 m speed skating event, silver in the 1000 m, silver in the Team Pursuit, bronze in the 5000 m, and bronze in the 3000 m. Combined with her bronze medal at the 2002 Winter Games, Cindy became the first Canadian to win six Olympic medals.

Cindy finished the 1500 m race in 1:55.27 (115.27 seconds). How would you calculate Cindy's average speed?

Example 1

If salmon costs $1.89 for 100 g, how much will it cost to buy 250 g of salmon?

SOLUTION

Let c represent the cost of 250 g of salmon.

The problem can be expressed as a proportion.

$$\frac{1.89}{100} = \frac{c}{250}$$

The proportion forms an equation involving fractions. To solve this equation, one strategy is to simplify the equation by eliminating the denominators. This can be done by multiplying both sides of the equation by the common denominator.

$\frac{1.89}{100}(25\,000) = \frac{c}{250}(25\,000)$ Multiply both sides of the equation by the common denominator. A common denominator for 100 and 250 is 25 000.

$\frac{(1.89)(25\,000)}{100} = \frac{25\,000c}{250}$ Simplify both sides of the equation.

$472.5 = 100c$ The coefficient of the variable is 100 because 25 000 divided by 250 equals 100.

$\frac{472.5}{100} = \frac{100c}{100}$ To isolate the variable, divide by its coefficient. Since the coefficient of c is 100, divide both sides of the equation by 100.

$4.725 = c$ Since c represents a value in dollars, it must be rounded off to 2 decimal places.

It will cost \$4.73 to buy 250 g of salmon.

ALTERNATIVE SOLUTION 1

Since 250 g is 2.5 times 100 g, the cost of 250 g of salmon would be 2.5 times the cost of 100 grams of salmon.

$(1.89)(2.5) = 4.725$ Round the answer to 2 decimal places since it is the cost in dollars.

It will cost \$4.73 to buy 250 g of salmon.

ALTERNATIVE SOLUTION 2

Cost of 250 g of salmon.

100 g	+	100 g	+	50 g	=	250 g
						
\$1.89	+	\$1.89	+	$\frac{\$1.89}{2}$	=	\$4.73

It will cost \$4.73 for 250 g of salmon.

HINTS

1. Make sure you are comparing the same unit or units when you set up a proportion.
2. To find a common denominator, you can multiply the given denominators. In the example, 25 000 is obtained by multiplying 100 and 250.
   - Are there other common denominators that could have been used?
   - How would the choice of 500 as a common denominator affect your calculations?
   - The lowest common denominator is the smallest number that all given denominators will divide into evenly.

HINT

To simplify an equation containing fractions, multiply both sides of the equation by a common denominator. This will create an equivalent equation that will not contain fractions.

Example 2

A local plumbing store sells 100 copper-plated pipe straps for $4.97. You have estimated that you require 75 straps. How much will you pay for 75 straps?

SOLUTION

$$\frac{4.97}{100} = \frac{x}{75}$$

Let x represent the cost of 75 straps and create a proportion. The proportion forms an equation involving fractions. To solve this equation, one strategy is to simplify the equation by eliminating the denominators. This can be done by multiplying both sides of the equation by the common denominator.

$$\frac{4.97}{100}(7500) = \frac{x}{75}(7500)$$

Multiply both sides of the equation by a common denominator. One common denominator for 100 and 75 is 7500.

$$\frac{(4.97)(7500)}{100} = \frac{7500x}{75}$$

$$372.75 = 100x$$

The coefficient of the variable is 100 because 7500 divided by 75 equals 100.

$$\frac{372.75}{100} = \frac{100x}{100}$$

To isolate the variable, divide by its coefficient. Since the coefficient of x is 100, divide both sides of the equation by 100.

$$3.7275 = x$$

Since x represents a value in dollars, it must be rounded to 2 decimal places.

It will cost $3.73 to buy 75 pipe straps.

ALTERNATIVE SOLUTION

Since 75 is $\frac{3}{4}$ of 100, you can find the cost of 75 straps by multiplying the cost of 100 straps by $\frac{3}{4}$.

$$(4.97)\left(\frac{3}{4}\right) = 3.73$$

It will cost $3.73 to buy 75 pipe straps.

Mental Math and Estimation

The pipe straps in the example above each cost $0.0497. About how much will 50 pipe straps cost?

PRACTISE YOUR NEW SKILLS

1. A computer repair technician fixes 8 printers for every 2 computers she repairs. What is the simplest form of this ratio? What are two ways you can write this ratio?

2. If a secretary types 55 words per minute, how long will it take her or him to type a 2000-word director's report?

3. An apprentice mechanic rotates the 4 tires on a pick-up truck in 15 minutes. How long would it take him to rotate the tires on 5 trucks? How long does rotating 2 tires take?

4. An Edmonton car salesperson sells 4 cars on Thursday, 6 on Friday, and an equal number each on Saturday and Sunday, for a total of 36 cars sold over the four days. How many cars were sold each day on Saturday and Sunday? What proportion of the total sales took place on Saturday?

This vehicle is a hybrid that is powered by either gasoline or electricity.

5. The ratio between Siu's height and the height of her brother Tai is 5:6. If Tai is 145 cm tall, how tall is Siu, to the nearest centimetre?

6. If the Sound Source music store makes a profit of $2550.00 on the sale of 200 DVDs, how much profit would the store make on the sale of 50? On the sale of 900?

7. If a 5-kg jar of olives costs a restaurant $15.00 through a wholesaler, how many kilograms would it get for $75.00? How much would it cost the restaurant to buy 20 kilograms?

8. A carpenter wants to mix a shade of stain for a set of kitchen cabinets he is building. The ratio for the shade he wants is 3 parts of Spanish oak to 4 parts of red mahogany. If he needs 12 litres in all, how many litres of each stain does he need?

The high speed Japanese Bullet Trains run on a network that joins the major cities on the island of Honshu.

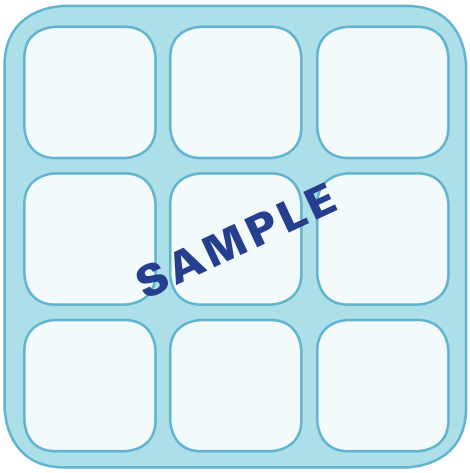
Extend your thinking

9. Keiko says that the Japanese Bullet Train (Shinkansen) takes about 6 minutes to travel 30 km. Yuki says that at this rate, he could travel around the world at the equator in less than 8 days. Keiko disagrees; she thinks it will take longer. Who is correct? Justify your response. The circumference of the earth at the equator is approximately 40 074 km.

PUZZLE IT OUT

MAGIC PROPORTIONS

In this puzzle, the object is to fill a 3 × 3 square with the nine numbers from 0 through 8 (using each of them exactly once) in such a way that the numbers in the first, second, and third rows will add up to three numbers in the proportion 1:2:3. Simultaneously, the same proportion has to be achieved for the first, second, and third columns.



One possible solution is shown here.

1	0	5
2	4	6
3	8	7

Can you find other solutions? What strategy did you use?

1.2 Unit Price

Linda sells her produce at a seasonal farm stand and at farmers' markets.

MATH *ON THE JOB*

Linda Fogarty is self-employed as an organic farmer and greenhouse grower. She completed a horticulture technology diploma at Kwantlen Polytechnic University in Langley, BC.

Linda operates The Green Room, a 3.5-hectare farm in Upper Gibsons, BC. She grows tomatoes, peppers, cucumbers, carrots, and many other crops throughout the year. She uses math on the job in many ways: to calculate plant density, to determine production statistics, to calculate sales revenue and expenses, and to handle sales transactions.

Linda wants to buy a species of heritage tomato seedlings from a wholesaler. Company A sells 20 plants for $45.95. Company B sells 24 plants for $48.50. What is the unit price at each wholesaler? What is the unit price difference between the two companies? What factors apart from price might Linda want to consider?

EXPLORE THE MATH

Products are packaged and sold in various sizes, such as a 1-litre, 2-litre, or 4-litre jug of milk. How do you determine the least expensive choice? Different brands may package their products in different sizes of packages. Brand A may sell a 250 g package of meat, while Brand B may sell a 375 g package. Which is the better buy? Finding the **unit price** will allow you to compare prices, and help you determine the best buy.

unit price: the cost of one unit; a rate expressed as a fraction in which the denominator is 1

unit rate: the rate or cost for one item or unit

Consumer goods, such as pens or rolls of toilet paper, are often bundled together and sold in bulk. To compare the price when the quantity in the package is not the same, it is often useful to look at the unit cost of one item. If you have a business, you may buy items in a bulk purchase that you later want to charge to your customers one item at a time. To do this, you also need to calculate the cost of one item.

A unit price is the cost of one unit. It is sometimes referred to as a **unit rate**. To calculate a unit price, you can use a proportion where the second rate has a denominator of 1. For example, if you buy a package of 4 rolls of Eco-Friendly toilet paper for $2.68, you can calculate the cost of 1 roll by using this proportion:

$$\frac{\$2.68}{4 \text{ rolls}} = \frac{x}{1 \text{ roll}}$$

HINT

To determine the product or brand that is the best value, or the size of purchase that is the best value, shoppers often compare the unit cost of different brands of the same product or different sizes of the same product.

The 1 in the denominator of the second rate is obtained by dividing the denominator of the first rate by 4. Therefore, to find x, you will also divide the numerator by 4.

$2.68 ÷ 4 = $0.67

One roll of toilet paper costs $0.67 or 67¢. Thus, cost per unit or unit price can be determined by dividing the price of a product by the number of units contained in a purchase.

Comparing unit prices can save you money at home and in the workplace. Unit price is not the only factor to consider, however. You may prefer the quality of one product over another. You may also find that there are more items in a large package than you can use. In this case, it may be a better choice to spend more on a per unit basis, and buy only what you need.

Example 1

Rosa buys supplies for the hamlet office in Arviat, Nunavut where she works as a clerk. She wants to buy pens. The supplier sells a box of 12 pens for $6.25. Calculate the unit price of 1 pen.

SOLUTION

In this case, the unit is 1 pen. The cost for 12 pens is $6.25. What is the cost of 1 pen?

$6.25 ÷ 12 pens = $0.52/pen, rounded to the nearest cent

Note that $0.52 can also be written as 52¢.

Example 2

It can save you money to pick your own fruit.

Claire picks fresh strawberries at a U-pick farm in Portage la Prairie, Manitoba. If she fills a pint basket (0.5506 litres), it will cost her $1.50. If she fills a 4-litre ice cream pail, it will cost $9.00. Which size of container will give her a better buy?

SOLUTION

Make sure you compare the same units. The pint basket can also be measured as 0.5506 litres.

Find the price per litre if Claire uses the pint basket by dividing the price by the volume.

$1.50 ÷ 0.5506 L = $2.724/L or $2.72, rounded to the nearest cent.

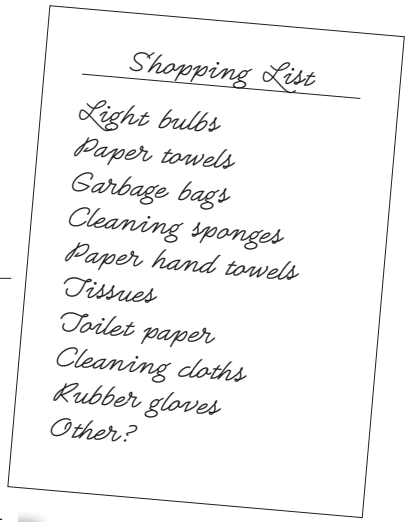
Then find the price per litre if she uses the ice cream pail.

$9.00 ÷ 4 L = $2.25/L

Since the unit price if Claire fills the ice cream pail is lower, it is a better buy. However, Claire will also need to consider whether she can use 4 litres of strawberries.

ACTIVITY 1.3
WHICH PRICE IS RIGHT?

You and a partner own a janitorial service. Your janitorial service buys cleaning products for the office buildings that you clean. Before making your purchases, you research prices from local stores or online stores to calculate and compare the unit price of each item. You could record your research on tables similar to the following samples.



Part A

You may need to compare the unit price charged by different companies for the same size of package. For each item shown in the table, calculate the cost per unit and record it in your notebook.

COMPARING DIFFERENT BRANDS—SAME SIZE

Item	*Items per pkg.*	*Brand A*	*Unit price*	*Brand B*	*Unit price*
Light bulbs	4	$2.29		$2.99	
Paper towels	6	$6.49		$9.29	
Garbage bags	20	$8.79		$7.48	
Sponges	5	$7.95		$7.69	

Part B

Sometimes you may need to compare the unit cost of different sizes of packages. For each item shown in the table, compare the cost per unit of two different package sizes. Record in your notebook which size has the lower cost per unit.

COMPARING DIFFERENT SIZES—SAME BRAND

Item	*Smaller size*	*Price*	*Unit price*	*Larger size*	*Price*	*Unit price*
Light bulbs	3	$2.49		6	$4.49	
Paper towels	3	$3.69		6	$6.49	
Garbage bags	20	$8.79		30	$9.99	
Sponges	5	$7.95		8	$11.99	

Discuss the following questions with your partner.

1. For each item, which brand and which size of package is the best buy for your janitorial business? Why?
2. Why might a package of 20 garbage bags have a lower cost per unit than a package of 30 in the same brand? Which is the better buy?
3. Why might a person choose to buy the product that does not have the lowest unit price?

BUILD YOUR SKILLS

This horticulture technician mows the lawn prior to fertilizing it.

1. Vikram purchases 12 sinks for his plumbing business at a wholesale price of $1053.00. He wants to sell each sink to a different customer. What is the unit price of one sink?
2. A horticulture technician buys lawn fertilizer for several customers. She finds the following prices: 7 kg for $19.99; 14 kg for $35.95; 21 kg for $50.99. Which package has the lowest unit cost?
3. A locksmith in Winkler, Manitoba is buying locks for a new apartment building. One supplier sells locks at $120.00 for four. Another supplier sells six for $192.00. Which supplier has the lower cost for one lock? What other factors might you consider when selecting a lock?

4. Joel is a salesperson in a department store that sells T-shirts individually and in packages of two or three. One T-shirt sells for $9.98, a package of two sells for $15.49, and a package of three sells for $22.99.

   a) Find the unit price when T-shirts are sold in a package of two. How much is the unit price in a package of three?

   b) Suppose a customer wants to buy seven T-shirts. Which combination of packages will be the least expensive?

5. The meat department at a large supermarket sells boneless steaks at the following prices: $7.50 for 500 g; $12.50 for 1 kg; and $19.50 for 1.5 kg. Which of these packages has the lowest unit price? If a customer needs 2.5 kg, which combination of packages should he or she buy to get the best price but not have leftover meat?

6. A different store sells boneless steaks for the following prices: $4.25 for 250 g; $7.95 for 500 g; and $29.50 for 2 kg. Which of these packages has the lowest unit price? How do these prices compare to those in question 5?

Extend your thinking

7. A uranium mining company in northern Saskatchewan is buying industrial first-aid kits in bulk. First-aid kits are available in three sizes. A small kit costs $42.50 and contains enough supplies to meet the needs of 1–9 workers. A medium-sized kit costs $58.25 and will serve 10–40 workers. A large kit costs $70.50 and will serve 41–75 workers. Jason, the buyer, needs to buy kits for 250 workers. Which combination of kits will be the least expensive? What will the total cost be before taxes?

1.3 Setting a Price

MATH *ON THE JOB*

Maurice is a cost estimator for a construction company in Gravelbourg, Saskatchewan. He develops the cost information that the company manager needs to make bids for contracts. First he gathers information about the site and the project; then he prepares a cost summary for the entire project. He includes the costs associated with labour, equipment, architectural plans, materials, and subcontractors as well as the overhead, taxes, insurance, and a markup, as well as any other costs that may affect the project. He presents the final cost in various ways, for example, the cost per square foot or the cost per labour hour.

Maurice is estimating the cost of stuccoing a home. After calculating that the exterior walls are 3600 square feet, he determines the cost of the wire, paper, concrete, and labour. His total cost for the job is $30 600.00. What is the cost per square foot for stuccoing?

Estimating the costs of construction requires research into the prices of many materials.

EXPLORE THE MATH

markup: the difference between the amount a dealer sells a product for and the amount he or she paid for it

percent: percent means "out of 100"; a percentage is a ratio in which the denominator is 100

The price at which goods and services are sold has an impact on you whether you are a consumer or working in a business.

Prices rise and fall due to consumer demand and supply. If demand rises, suppliers are able to charge more. If demand falls, or if there is a large supply of a product, prices may fall.

Prices also rise and fall according to the cost of the materials and labour that go into the creation of a product or service. An additional amount, called **markup**, is added to these costs so that a profit can be made. For example, when the owner of a retail store buys items to re-sell, he or she buys them at a wholesale price. This price is then marked up and the item is sold at a higher retail price. The markup is usually a **percent** of the wholesale price.

When setting the prices for goods and services, companies consider psychological factors that have an impact on buyers as well as the cost of their products. Have you ever wondered why something costs $39.95 instead of $40.00? If you sell something in your store for $39.95 rather than $40.00, the difference in price, though small, can have a big impact on sales because the item seems less expensive. If you are a butcher, you may advertise a price of $2.39/100 g of meat, because that seems less expensive to consumers than $23.90/kg, even though these prices are equivalent.

Remember that in many cases taxes are added to arrive at the total price. Taxes are calculated as a percentage of the price paid. All Canadians pay the federal Goods and Services Tax (GST), which was 5% at the time of publication (2010). Most of the provinces also charge Provincial Sales Tax (PST), shown in the table below. The northern territories do not charge a Territorial Sales Tax. Copy this table into your notebook to use when solving problems that include taxes. What are the rates today?

FIGURE 1.1
Provincial Sales Tax Rates

	PST
Alberta	0%
British Columbia	7%
Manitoba	7%
Saskatchewan	5%

DISCUSS THE IDEAS

CONCERT PROMOTER

This francophone concert is an annual event.

Imagine that you are a concert promoter. You are responsible for promoting concerts for up-and-coming bands and selling tickets to these concerts. For your next concert, you have set a ticket price based on the amount it will cost you to put on the concert, plus a 30% profit.

Consider the following situations.

1. If ticket sales are high and you realize you are going to sell out quickly, what could you do?
2. If ticket sales are low and you realize you will not be able to sell them all, what could you do?
3. Under what circumstances might you consider selling tickets for a price that would not cover the cost of the concert?

HINTS

1. To change a number written as a percent to a fraction, write the number over 100.
2. To change a fraction to a decimal, divide the denominator into the numerator.
3. Since a percentage is a fraction over 100, you can convert it to a decimal by dividing the percentage by 100.

Example 1

Arlene purchases fabric at a wholesale price for her custom sewing business in Dawson City, YT. She pays $46.00/m. She charges a markup of 20% on the fabric. What will Arlene charge her clients per metre?

SOLUTION

When working with percents, it is often simplest to use them in their decimal form. To calculate a 20% markup, convert 20% to 0.2 and multiply.

$46.00/m × 0.2 = $9.20

Add the markup amount to the price.

$46.00/m + $9.20 = $55.20/m

The price Arlene will charge her clients will be $55.20/m.

ALTERNATIVE SOLUTION

You could also find the marked-up price by multiplying $46.00/m by 1.20. You may notice that the new price, $55.20/m, includes both 100% of the original price and the 20% markup, or 120%. To calculate the price, convert the percentage to a decimal, 1.20, and multiply to find the marked-up price.

Example 2

A furniture store in Saskatoon is selling a bedroom suite. The list price for the suite is $1599.00. What will the total cost be, including GST and PST?

SOLUTION

To arrive at the total cost, consider both GST and PST, and use percents to calculate them.

PST in Saskatchewan is 5%.

$1599.00 × 0.05 = $79.95

GST is also 5%.

$1599.00 × 0.05 = $79.95

Find the total cost.

$1599.00 + $79.95 + $79.95 = $1758.90

ALTERNATIVE SOLUTION

Another way to calculate the total cost is to add the two taxes together to get 10% and add this to 100% of the price before taxes. Convert this percentage to a decimal and multiply to find the total cost including taxes.

$1599.00 × 1.10 = $1758.90

Although there are several ways to calculate the final price, a store needs to keep track of the PST and GST amounts.

DISCUSS THE IDEAS

SEASONS AND HOLIDAYS

The demand for many goods and services varies with the seasons and, as a result, so does the price of these goods and services. Consider summer and winter in different parts of the country. Can you name some goods or services that have higher prices in summer or winter?

In many cultures, flowers are a common gift for special occasions.

Demand for many items also increases around holidays, which may cause an increase in the price. In small groups, discuss the following questions.

1. Consider the price of roses. What time of year are roses most expensive? Why?
2. Consider the price of a litre of gasoline. What time of year is gasoline most expensive? Why?
3. Name two or three other goods or services that have a higher price at certain times. Why do their prices fluctuate?
4. Name two or three products that command higher prices because they are rare or unique.
5. Find two examples where prices are advertised in a way that makes an item seem less expensive. Share your examples with your classmates.

Mental Math and Estimation

If you set the price of a bike helmet at $49.95 and sell 25, how much less income will your store generate than if you sold the same number at $54.95?

BUILD YOUR SKILLS

This dragline is located in the Alberta oil sands.

1. Max owns a clothing store. He buys an order of shirts for $22.75 per shirt. In order to make a profit, he wants to mark them up 60%. What will the list price of the shirts be for customers?

2. An outfitter in Fort McMurray, Alberta sells full-brim aluminum hard hats for $49.95 and steel-toed work boots for $129.95. If you purchase a hard hat and two pairs of boots, what will your total cost be, including tax? How much GST will you pay on these three items?

3. If the outfitter in question 2 opens a store in Axe Lake, Saskatchewan where exploration for oil is taking place, it may sell hard hats and work boots for 10% more than it charges in Fort McMurray. What would you pay for a hard hat and a pair of steel-toed boots in Saskatchewan, taking into account that PST of 5% applies?

4. Roberta works for a retail hardware store in Dauphin, Manitoba. She buys 3 sinks for $89.95 each, 2 bathtubs at $639.95 each, and 2 faucets for $74.95 each. She sells one sink, one bathtub, and 2 faucets to a customer at a 25% markup. How much does she charge her customer?

5. Parminder runs an organic blueberry farm in the Fraser Valley, BC. She sells her crop in three ways: direct to customers who come to the farm, at $3.50 a quart; at the local farmers' market at $3.99 a quart; and wholesale to organic food stores for $2.00 a quart.

   a) If she sells 50 quarts at $3.50, 175 quarts at $3.99, and 250 quarts at $2.00, what is her total income?

   b) Compare her income from 100 quarts sold directly at the farm to 100 quarts sold to a wholesaler. What is the difference in income? Why would she sell to a wholesaler?

6. When Julie completed the baker apprenticeship program and started her own cake business, her first order was to provide cakes for 100 people at a business luncheon. After calculating the cost of all her supplies and ingredients, her time, and the cost of gas for delivering the cakes, she found that her price of $2.50 per portion did not cover her costs.

   a) If she increased her price by 15%, what would the new unit price be?

   b) How much more would she make on 100 servings at the higher price?

   c) If she thought customers would reject a 15% price increase, how might she lower her costs?

7. At the end of the summer season, Marie has a lot of unsold $29.99 tank tops left in her Grande Prairie shop. She decides to put the remaining tank tops on sale. What might the sale price be? How will this sale affect her total profits? What reasons might Marie have for doing this?

This woman is an apprentice in a baking program.

Extend your thinking

8. You plan to sell imported cheese in your butcher shop and need to set a price. If the wholesale price you pay for a 10 kg wheel of medium Dutch Gouda is $175.00, what is the price for 250 grams if you sell it at cost?

   a) What factors will you consider in setting the retail price?

   b) If you decide on a markup of 40%, what would 250 g of cheese cost?

   c) If you found that your supply of Gouda exceeded the demand for it, you might decide to offer a 15% discount off the regular price. What would a customer now pay for 250 g?

   d) At the discounted price (15% off), would you still be making a profit? Explain your thinking.

1.4 On Sale!

MATH *ON THE JOB*

Daniel is the owner of a company in Brandon, Manitoba, that installs ceramic tile, marble, slate, terrazzo, and granite for exterior and interior walls, floors, and other surfaces. Early spring is a slow time for this type of business, so Daniel's company is offering discounts on materials left in stock from last year. To get the most from this **promotion**, Daniel needs to calculate what percentage discount to offer on each type of material, taking into account what his costs were and how much stock remains. He may also offer a variety of discounts based on quantities bought.

The company has in stock 12″ × 12″ slate in sandstone colour that sold for $6.99 per square foot last year. If Daniel offers it at a 15% discount, what will the sale price be for 50 square feet of slate, before taxes?

This floor in an apartment building foyer is made of ceramic tiles.

promotion: an activity that increases awareness of a product or attracts customers

EXPLORE THE MATH

When you go shopping, you often see that something is on sale for a discounted price. Frequently, the discount is expressed as a percent. For example, a clothing store may be selling certain items at 20% or 50% off. This may be because the clothes are out of season, out of fashion, or the store buyer may have ordered more than he or she could sell.

Businesses may use other sales promotions to attract buyers. Coupons usually give you a certain amount off the retail price, 25¢ or $1.00 for example. Companies often use coupon offers to attract consumers so they will try out a new product. More and more, businesses use points systems or customer cards to encourage customer loyalty by offering lower prices or prizes. Do you participate in any rewards programs?

As a consumer, remember to consider the amount of taxes as well as the listed price when making a decision to buy.

Example 1

Jonas needs to buy a new winter jacket. He has waited for a sale, and a jacket that originally cost $249.95 is now discounted 20%. How much will the jacket cost if Jonas lives in Nunavut, where there is no PST?

SOLUTION

Note that GST (and PST, if applicable) is charged on the sale price, not the initial price. Thus, you must first find the discounted price.

Find the amount of the discount.

$249.95 × 0.20 = $49.99

Find the sale price by subtracting the discount from the list price.

$249.95 – $49.99 = $199.96

Another way you could calculate this discount is to reason that if there is a 20% discount, then Jonas will have to pay 80% of the original price.

$249.95 × 0.80 = $199.96

However, the store needs to know the dollar value of the discount.

Determine the GST on $199.96.

$199.96 × 0.05 = $10.00, rounded to the nearest cent

Add the GST to the discounted price to find the total.

$199.96 + $10.00 = $209.96

Jonas will pay $209.96 for the jacket.

Example 2

A fisher sells fresh salmon, live crabs, and prawns at the dock in Steveston, BC directly to customers on Saturdays and Sundays. As the weekend winds down, he needs to sell off his stock, otherwise it will spoil. He has a sale! He offers 20% off all his prices.

Salmon is regularly $18.50/kg and prawns are $34.50/kg. At a 20% discount, what is the price of a salmon that weighs 3 kg? How much would 500 g of prawns cost?

SOLUTION

Calculate the discount per kg of salmon.

$18.50 × 0.20 = $3.70 discount

Then calculate the price per kg at the discounted price.

$18.50 – $3.70 = $14.80

The discounted price is $14.80/kg.

Consumers can buy fish directly from the fishing boats in Steveston, BC.

Next, calculate the price for 3 kg of salmon.

$14.80 × 3 = $44.40

To calculate the price of prawns, use another way to calculate a discounted price.

100% – 20% = 80%

Then calculate the discounted price per kg.

$34.50 × 0.80 = $27.60

Convert 500 g to kg.

500 g = 0.5 kg

Find the cost of 0.5 kg.

$27.60 × 0.5 = $13.80

At a 20% discount, a 3 kg salmon would cost $44.40 and 500 g of prawns would cost $13.80.

Mental Math and Estimation

You are shopping at a sale and see a $995.00 barbeque marked down 20%. Approximately what price do you estimate the sale price is before taxes?

ACTIVITY 1.4
TAKING ADVANTAGE OF SALES PROMOTIONS

Setting up your first apartment will require you to research the best prices on furnishings.

You have just moved into your first apartment and you are planning a housewarming party. You need to buy a stereo to play music, a couch and two chairs for your guests to sit on, and some drinks for your guests. You decide to see what stores have promotions on these products.

1. Using your local newspaper, flyers, or the internet, find promotional sales advertisements for each of the items you need.

2. Record the store's name, the product, the promotional pitch or slogan, the regular price, and the sale price or percent discount in a table such as the following sample.

ASSESSING PROMOTIONS

Item	*Store name*	*Product*	*Promotional pitch*	*Regular price*	*Sale price*	*Percent discount*
Stereo						
Couch						

3. Did the company advertise the promotion as a percent decrease or as a full-value discount? Calculate either the percent decrease in price or the full value discount for each item, whichever is *not* given.

4. Were any of the promotions misleading? If so, explain.

5. Compare the information you found with a partner's information. Who found the better deal?

BUILD YOUR SKILLS

1. A supermarket regularly charges $5.89 for a package of Pizza Pockets. During a sale, the supermarket offers this promotion: "Buy one at the regular price, get a second one for half price."

   a) If Marylyn buys two packages, what will she pay?

   b) Approximately what percent does Marylyn save during this sale? Explain your reasoning.

2. Ross works at a sports store in St. Albert, Alberta where the price of a best-selling tennis racquet is $49.95. His friend Al works at a competitor's store where the regular price of a similar tennis racquet is $55.95, but it is on sale at 15% off. Al says his store offers the best price.

   a) Calculate the total price of the tennis racquet at each store, including GST.

   b) Is Al right? Explain why or why not.

3. A hairstylist at Top Cuts is preparing a discount offer. The regular cost of highlighting is $55.00. To attract more customers early in the day, he offers 15% off for appointments before 10:00 am. Mid-afternoon is also a slow time on Wednesdays and Thursdays, so he offers $5.00 off coupons for appointments made during those times.

   a) Which appointment time will get you the lowest price?

   b) Which promotion do you think will appeal to more people, coupons or percent off? Explain your thinking.

This apprentice hairstylist is learning to cut and style hair at a community college.

4. A roofer in Mission, BC buys metal roofing at a builder's discount of 20% off the retail price of $27.50 per square metre. If the roof of your house is 74 square metres and the roofer passes on 50% of the discount he receives to you, how much will you pay for the materials? If his usual hourly rate for labour is $36.00 and he gives you a 5% discount, how much will you save in labour costs if the job takes 16 hours? Omit the taxes in your calculations.

5. Pole mount industrial fans are on sale at two wholesalers in Cochrane, Alberta. An electrician needs 20 fans for installation in an office building. The sale price at the first store is 5% off the regular price of $157.00. The price at the second store is $165.00 each, but $149.00 for 10 or more. GST applies.

   a) Calculate the total cost of 20 fans at each store.

   b) Which wholesaler offers a better buy?

6. A storewide sale in Yellowknife advertises the following sales items:

   A shirt that was $31.99 is marked down to $19.99.

   Shorts that were $24.95 are marked down to $16.95.

   A jacket that was priced at $49.99 is marked down to $24.99.

   a) Calculate what percentage of markdown each item has been given.

   b) If a customer bought all 3 items, how much would he or she save in total? On which item would the customer save the most?

Extend your thinking

House painting is a job that high school and college students may do over the summer months.

7. An exterior house painter in Swift Current, Saskatchewan is offering a sales promotion. If you sign a contract to have your house painted and get a neighbour or friend to sign a contract at the same time, you each get a discount of 5% on the labour rate of $26.00/hr. Both GST and PST apply.

   a) If your house takes 55 hours to paint, how much would you pay at the regular price and how much would you pay with the discount? How much did you save?

   b) If the second person's house takes 60 hours to paint, how much more would that person save than you would save?

RESEARCH YOUR IDEAS

Earlier, you started making plans for a party. It is time now to put your plans on paper and calculate your costs.

- Write a description of your party and explain why it would be enjoyable for you and your friends.
- Explain how you will find out about and handle any allergies or other restrictions the guests may have.
- Design a sample invitation that will be sent to the guests. Include all the needed details, such as the time, date, location, and any other important information.

These members of a drama club are rehearsing for their school play.

- Make a chart like the sample below or use a spreadsheet to list all of the items you will need to purchase. Include all unit costs, the number of items needed, GST and PST (if applicable), and totals. Add columns/rows as needed for your particular party.
- Once you have worked out a total cost for your party, make sure that it falls within your budget. If it does not fall within the budget amount, you may need to revise your original plans and recalculate your costs. If this happens, keep a record of both plans and include a summary explaining your reasons for changing your original plan.

PARTY SUPPLIES

Purchases	*Name of store (if online, include the URL)*	*Unit cost*	*Number of items needed*	*Taxes (GST and PST)*	*Total cost*
Invitations					
Activities					
Decorations					
Snacks					
Drinks					
				Total cost	$
				Cost/guest	$

SAMPLE

CANADIAN CURRENCY

This copper shield was a symbol of wealth within the Haida Nation.

Haida symbols adorn the Canadian 2004 $20.00 bill. Today, this $20.00 bill can be exchanged for something, such as groceries or a haircut. Traditionally, the Haida and other aboriginal groups also had currency exchange systems—between and within groups and with European traders.

In British Columbia, archaeological evidence indicates that there was extensive trade in obsidian (volcanic glass that could be made into sharp blades or arrowheads) as early as 9500 years ago. Researchers have also found evidence that 4000–3500 years ago, coastal peoples had exchange systems more complex than simple bartering or sharing. Researchers have inferred from archaeological evidence that there was a social ranking system for members of the coastal First Nations (some members and nations were more "wealthy" in goods) and that exchange and distribution of elaborate wood, antler, and soapstone carvings and other ornamental goods occurred at potlatch ceremonies. Beads made from shells were also exchanged and were indicators of wealth.

When the Europeans arrived, the Haida traded fur pelts for clothing, tools, and ornamental goods such as glass beads, abalone shells, and metals that were used to make items like iron bracelets and copper shields. These shields were a symbol of wealth and were exchanged at potlatch ceremonies. High-ranking chiefs could own many shields.

In eastern Canada, among the Iroquois and Huron peoples, wampum came to be used as a kind of money. Wampum is a European word derived from the Algonquin word *wampumpeague*. Wampum were often small beads made from white or purple shells, but other media such as porcupine quills and coarse animal hair were also used to create wampum.

Traditionally, wampum had complex uses. It was a system of record-keeping and was used to record important historical events such as peace treaties and trade agreements made between aboriginal peoples. It was also used for personal decoration. After Europeans arrived, wampum came to be used as a currency in the fur trade between aboriginal peoples and Europeans. In New England, for example, wampum was considered legal tender with a value of eight white beads or four purple beads to a penny.

1. Do you know of other items that were traditionally used by aboriginal peoples for trading or exchange?
2. Have you ever traded either a good, like a CD you no longer wanted, or a service, like mowing the lawn, with another person for something you wanted without exchanging money? How did you determine the value of your good or service?
3. Why do you think $5.00 is worth $5.00? What gives money its value?

Currency Exchange Rates

1.5

Potatoes are just one of the many agricultural products that Canada exports to other countries.

MATH *ON THE JOB*

Naomi Coates works for a potato grower in Sherwood Park, Alberta that sells a number of varieties of seed potatoes to the United States and table potatoes to Mexico. The prices are negotiated based on the Potato Growers of Alberta price list. Naomi negotiates for multi-year contracts in foreign currencies with buyers who want large shipments of potatoes. She must also ask for and compare quotes from shipping companies in the currency of the destination country.

Naomi has to pay the monthly shipping invoice to a firm in Idaho. She has 30 days in which to make the payment. As the exchange rate changes every day, how much she pays (in Canadian dollars, which are converted to US dollars) will depend on the day she converts the money to US dollars. What strategies can Naomi use to ensure she gets the best rate?

EXPLORE THE MATH

People travel to different countries on business and for pleasure. Goods and services are also bought and sold between countries. Since different countries use different systems of **currency**, international trade requires an organized system for exchanging money.

Currency is exchanged by banks, currency exchange companies, and businesses such as travel agencies. Not all currencies are available at every exchange. If the currency you need is not requested very often, you may have to order it in advance. It may take some time to obtain a currency, so it is best to plan ahead. Since banks and other exchange agents charge a fee for this service, it can be a good idea to shop around for the best price.

If a Canadian company wants to buy goods made in Japan, it must exchange Canadian dollars for yen to complete the purchase. The **exchange rate** between the two currencies is used to calculate how many dollars the company must convert to yen.

The exchange rate fluctuates from day to day, and from one currency exchange to another. Exchanges set a **selling rate** and a **buying rate** for currency exchange, and these rates are different from each other. If you plan to travel to Italy and need to obtain euros from your bank, you will pay the selling rate (the bank is selling the euros to you). If you have euros left

buying rate: the rate at which a currency exchange buys money from customers

currency: the system of money a country uses

exchange rate: the price of one country's currency in terms of another nation's currency

selling rate: the rate at which a currency exchange sells money to its customers

HINT

When working with foreign currency, it is often useful to begin with an estimate.

over when you return to Canada, you will receive the buying rate when you convert them back into Canadian dollars (the bank is buying them from you). You pay more for the foreign currency than the banking institution will pay you in return.

When travelling in a foreign country, it is often helpful to estimate what something costs in your own currency. Estimating can help you compare prices.

Mental Math and Estimation

If the exchange rate for the euro is $1.644814 CAD and your hotel in Paris costs €95.00, about how much is your hotel in Canadian dollars?

ACTIVITY 1.5
WHAT'S YOUR RIDE? SURVEY

This Peugeot 308 SW costs about €220 000.00 in France.

The current issue of *What's Your Ride?* magazine includes a feature article about the international automotive scene. Vehicles from five countries are profiled. The chart below lists the vehicles, their country of origin, and their list prices in the local currency. Your task is to research the price of each vehicle in Canadian dollars at today's exchange rate.

T

1. Use the internet to research information for currency conversion. Try using the Bank of Canada website (www.bank-banque-canada.ca) and select "currency converter." Then create a chart like the sample below to record the exchange rate and the price in Canadian dollars for each vehicle.

COMPARING CARS

Name of country	*Make and model of vehicle*	*Name of currency*	*Exchange rate*	*Foreign amount*	*Canadian amount*
France	Fiat 500	euro		€10 900.00	
India	Maruti Gypsy King	rupee		Rs 537 921.07	
England	Mini Cooper S	pound		£16 245.00	
United States	Dodge Ram 3500	US dollar		US$30 420.00	
Japan	Daihatsu Move Latte L	yen		¥1 073 380.00	

SAMPLE

2. If you have high-speed access to the internet, research each vehicle in the chart and decide which one you would most like to purchase. If you don't have internet access, choose any vehicle from the list to purchase.

3. You will need to purchase a money order to send to the seller (for now, ignore international shipping charges, import taxes, and duty).

   a) Using the foreign exchange calculator on the Royal Bank website (www.rbcroyalbank.com), find the selling exchange rate and work out the total amount of the money order you will need to purchase your vehicle.

   b) You may notice that the exchange rate does not match the rate you found on the Bank of Canada website (www.bank-banque-canada.ca). Why is this?

4. On your way home from the bank, you see the same vehicle for sale at a local automotive dealer. When you consider the international shipping costs, import taxes, and duty you will have to pay, you realize that you should buy the vehicle locally. You decide to exchange your money order back into Canadian dollars.

   a) At your bank's website, you find a different exchange rate than when you purchased the money order. Why?

   b) Using the foreign exchange converter on the Royal Bank website (www.rbcroyalbank.com), find the buying exchange rate and the total Canadian value of your money order. What is the difference between the buying and selling rate of the currency you converted?

Example 1

On a specific date, the selling rate for the Danish krone compared to the Canadian dollar is 0.221778. How many kroner will you receive for $500.00 CAD?

HINT

The unit of Danish currency is the krone, which is the Danish word for crown. The plural of krone is kroner.

SOLUTION

One Danish krone is worth $0.221778 CAD. This exchange rate can be written in the form of a fraction where the numerator represents Danish kroner and the denominator represents Canadian dollars.

$$\frac{1.00}{0.221778}$$

Let x represent the number of kroner you will receive for $500.00 CAD.

HINT

Since an exchange rate tells you the price of one nation's money in terms of another, you can use proportions to determine the value of the amount exchanged.

$$\frac{1.00}{0.221778} = \frac{x}{500.00}$$

The proportion forms a fractional equation. To simplify the equation, multiply both sides of the equation by the common denominator.

$$\frac{1.00}{0.221778}(110.889) = \frac{x}{500.00}(110.889)$$

The common denominator is (0.221778)(500.00) which equals 110.889.

$$\frac{110.889}{0.221778} = \frac{110.889x}{500.00}$$

Simplify both sides of the equation.

$$500.00 = 0.221778x$$

To isolate the variable, divide by its coefficient. Since the coefficient of x is 0.221778, divide both sides of the equation by 0.221778.

$$\frac{500.00}{0.221778} = \frac{0.221778x}{0.221778}$$

Simplify both sides of the equation.

$$2254.506759 = x$$

The value must be rounded since it represents the number of kroner received.

You will receive 2255.00 kroner for 500.00 Canadian dollars.

ALTERNATIVE SOLUTION

The exchange rate given states that 1.00 krone equals $0.221778 CAD.

1.00 krone = $0.221778 CAD

$$\frac{1.00}{0.221778} \text{ kroner} = \frac{\$0.221778 \text{ CAD}}{\$0.221778 \text{ CAD}}$$

Dividing both sides of the equation by 0.221778 will give the number of kroner that would equal $1.00 CAD.

4.50901 kroner = $1.00 CAD

Since $1.00 CAD is worth 4.50901 kroner, $500.00 CAD is worth (500.00)(4.50901) or 2255.00 kroner.

You will receive 2255.00 kroner for 500.00 Canadian dollars.

FIGURE 1.2

Exchange Rates Compared to the Canadian Dollar

Bank buying rate	*Country*	*Currency units*	*Bank selling rate*
0.950964	Australia	dollar	1.006964
1.580814	Austria	euro	1.644814
1.580814	Belgium	euro	1.644814
0.534900	Brazil	real	0.697000
0.127100	China	yuan	0.162600
0.210778	Denmark	krone	0.221778
1.996146	England	pound	2.060146
0.159300	Egypt	pound	0.217300
1.580814	European Community	euro	1.644814
1.580814	Finland	euro	1.644814
1.580814	France	euro	1.644814
1.580814	Germany	euro	1.644814
1.580814	Greece	euro	1.644814
0.128451	Hong Kong	dollar	0.133451
1.580814	Italy	euro	1.644814
0.009295	Japan	yen	0.009855
0.012510	Kenya	shilling	0.017300
0.083443	Mexico	peso	0.108443
1.580814	Netherlands	euro	1.644814
0.748264	New Zealand	dollar	0.798264
1.996146	N. Ireland	pound	2.060146
0.194863	Norway	krone	0.205863
0.012360	Pakistan	rupee	0.019360
1.580814	Portugal	euro	1.644814
1.580814	Republic of Ireland	euro	1.644814
1.996146	Scotland	pound	2.060146
0.737280	Singapore	dollar	0.762280
1.580814	Spain	euro	1.644814
0.165558	Sweden	krona	0.175558
0.982007	Switzerland	franc	1.017007
0.026550	Thailand	baht	0.035120
1.004350	United States	dollar	1.038650

Example 2

On the same day as example 1 occurs, the buying rate for kroner was 0.210778. If, after purchasing your kroner, you decided not to go to Denmark and sold the kroner back to the bank, how much would you lose?

SOLUTION

You now have 2255.00 kroner. The rate is 1 krone: $0.210778 CAD.

Let y represent the number of Canadian dollars you will receive in return.

$y = 2255.00 \times 0.210778$

$y = 475.30$

You would receive $475.30 CAD from the bank.

$500.00 – $475.30 = $24.70

Therefore, you would lose $24.70 in this transaction.

ACTIVITY 1.6
CALCULATE FOREIGN EXCHANGE

You need to upgrade some equipment. In this activity, you will investigate and compare Canadian and foreign prices for the same item.

1. Choose two items you'd like to upgrade. Items could be game systems, cameras, sports equipment, or other items of your choice.

T 2. Use the internet to research the cost of these items in a foreign currency. Calculate what each item would cost in Canadian dollars. Record this information in your notebook or on a spreadsheet.

Manufacturers of snowboards exist in several countries, including Canada.

3. Find a Canadian supplier and record the prices, including taxes.

4. Which is a better buy, buying these items locally or from a foreign supplier?

5. What factors apart from price might you consider when deciding which supplier to choose?

BUILD YOUR SKILLS

Use the table on p. 45 to answer the following questions.

Switzerland still uses francs rather than euros.

1. What would the cost be, in Canadian dollars, to buy the following currencies from a bank?

   a) euro

   b) Hong Kong dollar

   c) Pakistan rupee

2. If you had the following foreign currencies, what rate would you use when a bank is buying the currency from you?

   a) Japanese yen

   b) Australian dollar

   c) United States dollar

3. Calculate the amount of money you would receive in Canadian dollars if you sold the following currencies to a bank.

   a) 4500.00 pesos

   b) 25 000.00 Hong Kong dollars

   c) 2200.00 euros

   d) 8545.00 Scottish pounds

4. Megan is attending a three-day trade fair in Germany. Her travel allowance is $1200.00 CAD. How much money will she have in the local currency for her expenses in Germany?

5. Opal is planning a trip to Europe. She wishes to buy $650.00 Canadian dollars' worth of each of the following currencies. How much of each currency will she have?

   a) euro

   b) Swiss francs

   c) Swedish kronor

   d) If Opal cancels her trip to Sweden and changes the kronor back into Canadian dollars, how much will she receive? Why does she receive a lower amount back in Canadian dollars than she initially paid?

6. Chris is planning a golfing trip. He plans to golf at five highly rated international golf courses. He estimates how much money he will need in each of the different currencies. For each of the countries that he will visit, calculate how much he will need in Canadian dollars (CAD). What is the total amount of Canadian money he needs?

GOLF VACATION

Country	*Golf course*	*Estimated funds needed*	*Estimated funds needed in $CAD*
United States	Pebble Beach	US$5000.00	
Scotland	St. Andrew's	£8500.00	
China	Spring City Golf & Lake Resort	¥26 600.00	
Singapore	SAFRA Resort & Country Club	S$15 000.00	
Austria	Leopoldsdorf	€4000.00	

Extend your thinking

T

7. Your company produces a line of herbal vinegars. In Canada, you sell each bottle of vinegar for $8.95 before taxes. Your company is planning to expand and sell its products in the United States and Australia.

   a) What would the equivalent price be for the bottle of vinegar in US and Australian dollars? Use www.rbcroyalbank.com or a similar site to calculate your conversion.

   b) The costs of shipping and exporting are $1.00/bottle to the United States and $2.00/bottle to Australia. How much will the retail price be in the US and Australia if you incorporate shipping costs and set the price so that the income per bottle is equal to the Canadian income of $8.95 per bottle before taxes?

MAKE A PRESENTATION

These students are planning a wind-up party for their debating club.

You are now ready to present your party plan to your fellow team, club, or committee members to get their approval. Use all the information you have gathered to complete this project.

Presentations are often made using posters and handouts accompanied by oral explanations. Presentation software could also be used. Prepare your presentation with these items:

- a poster showing your location and decorations. Be creative—include some pictures! List any activities that you have planned and the entertainment;
- the sample invitation; and
- the detailed itemized list, chart, or spreadsheet of all supplies and final costs.

Be prepared to explain to your friends why your party plans will make the wind-up party the best one ever!

- Finally, reflect on how well you completed your project.

REFLECT ON YOUR LEARNING

UNIT PRICING AND CURRENCY EXCHANGE

Now that you have finished this chapter, you should be able to

- ❒ apply your prior knowledge of ratios and rates in new contexts;
- ❒ appreciate how proportional reasoning is used in several jobs;
- ❒ calculate unit price and use your knowledge to determine the best buy;
- ❒ understand some of the factors that influence how prices are set;
- ❒ predict the impact of promotions on prices;
- ❒ consider other factors, such as quality and your needs, when making purchasing decisions, at home or in the workplace;
- ❒ comprehend how foreign currencies are bought and sold.

In addition, you have completed a project that applied your new skills in a practical context.

PRACTISE YOUR NEW SKILLS

1. Use mental math to solve these problems.

   a) If the posted speed limit is 80 km/h, how far will you travel in half an hour? In two-and-a-half hours?

   b) If the exchange rate for 1 euro is $1.59 CAD, how many Canadian dollars could you buy with 10 euros?

2. If the ratio of loaves of white bread sold compared to loaves of whole wheat bread sold is 3:1 and a bakery sells 100 loaves of whole wheat bread in a day, how many loaves of white bread would it sell in a day?

3. Calculate the unit rate for each of the following. Include correct units in all your answers.

   a) 30 metres in 4 seconds

   b) $2.80 for a dozen eggs

4. The standard sizes for photographs are 4″ × 6″, 5″ × 7″, and 8″ × 10″. Can you use a photocopier to enlarge a 4″ × 6″ photo to one of the other standard sizes? Explain. If you reduce an 8″ × 10″ photograph, what sizes could you make?

At St. Norbert Farmers' Market, vendors offer a variety of products such as produce, baking, and crafts.

5. At the St. Norbert Farmers' Market in Winnipeg, a 5 lb bag of potatoes sells for $1.89 and a 20 lb bag sells for $5.99.

   a) Find the unit price for each size. Which is a better deal?

   b) Name two things other than price that you should consider when buying potatoes.

   c) You meet a vendor at the farmers' market who is from Altona. He tells you that he can sell you a 75 lb bag of potatoes for $15.00. Do you buy them? Why or why not?

6. During a Boxing Day promotion in Edmonton, Alberta, Krazy Krazy Televisions advertises a 42″ flat-screen television for $300.00 off and they will "pay the GST" while Too Good To Be True Electronics is discounting the same television by 30%. If the original price of the television at both stores was $1299.99, which store offers a better deal?

7. A recipe for calls for $2\frac{1}{2}$ cups of flour to $\frac{1}{2}$ cup of sugar.

   a) How many cups of flour would you use with 1 cup of sugar?

   b) This recipe makes 12 scones but you only want 8. How much flour and sugar do you use?

8. Glynis wishes to purchase 500.00 euros for her business trip to Austria. The rate of exchange is 1.00 euro equals $1.59 CAD.

   a) How much will it cost her in Canadian dollars to purchase the euros?

   b) Her financial institution charges a 0.5% handling fee on the currency exchange. The handling fee is charged on the Canadian amount. What is her final cost?

9. Karisha travelled to Milan for a weekend to purchase fabric for her children's clothing business. She bought 15 metres of hand-painted designer cotton for €28.92/m and 40 metres of reversible fleece for €9.95/m. How much did her fabric cost in Canadian dollars if $1.00 CAD equals 0.6478 euros?

10. Natalia earns $28.50 caring for a child for 3 hours.

    a) Using mental math, calculate how much she would earn in one hour.

T b) Copy the following table or use a spreadsheet to make a table showing the number of hours versus dollars earned.

CALCULATING EARNINGS

Hours	*Dollars earned*
0	
1	
2	
3	
4	
5	

T c) Use a spreadsheet tool or pen and paper to graph what Natalia earns. Graph up to 15 hours worked.

   d) Using your graph, estimate how much Natalia would earn for 3.5 hours of work. For 12.5 hours?

This childcare worker at the St. Mary's Indian Reserve in Cranbrook, BC wants to calculate her earnings.