# Chapter 1 Unit Pricing and Currency Exchange

### KEY TERMS

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

### 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 mathematical 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.

## MATH *ON THE JOB*

"In 1997, I moved back to the old family homestead, turning the place into an organic, small plot gardening, herb farm and an informal learning centre. We grow food, flowers, garlic, herbs, and wheatgrass," says Pam Trenholm. Pam is a farmer who operates Brighton Botanicals, located near Hartland, New Brunswick. She attended Hartland High School and later took business courses at Carleton County Vocational School in Woodstock, New Brunswick.

Pam's job includes ordering seeds, selling produce, and planting and caring for crops. Pam needs to fertilize a crop with an organic liquid fertilizer that is mixed with water. Five hundred mL of fertilizer is mixed with 60 L of water. If Pam is using 750 mL of fertilizer, how much water does she need to add? How can Pam use proportional reasoning to solve this problem?

*Pam (right) and her intern check plants to see if they have received enough nutrients.*

Students have used ratios and proportions in previous grades. Activate their prior knowledge by giving students a few minutes to try to solve the question in this scenario themselves. When presenting the solution, you may want to show students that there is more than one method.

**METHOD 1:** Set up a ratio by aligning the same units. Students may have seen this method in science class, where it is called dimensional analysis. Show the students that the same units (mL) should cancel each other out, leaving the desired units (L).

$$\frac{500\text{ mL}}{750\text{ mL}} = \frac{60\text{ L}}{x}$$

To solve for $x$, multiply both sides of the equation by the common denominator, $300x$.

$$750x\left(\frac{500}{750}\right) = \left(\frac{60}{x}\right)750x$$

$$\frac{375\,000x}{750} = \frac{45\,000x}{x}$$

Simplify each side of the equation by dividing by the denominator.

$$500x = 45\,000$$

Divide each side by the coefficient of the variable, 500.

$$\frac{500x}{500} = \frac{45\,000}{500}$$

$$x = 90\text{ L}$$

**METHOD 2:** Find the unit amount of L/mL first by dividing the numerator by the denominator, 500.

$$\frac{60\text{ L}}{500\text{ mL}} = \frac{0.12\text{ L}}{1\text{ mL}}$$

For every mL of fertilizer, 0.12 L of water is added. Multiply to find the amount of water needed for 750 g of liquid fertilizer.

$$0.12 \times 750 = 90$$

The farmer must add 90 L of water to 750 g of fertilizer.

$$\frac{60\ l\ H_2O}{500\ ml\ feit} = \frac{x}{750}$$

$$\frac{(60)(750)}{500} = x$$

$x = 90$ L of $H_2O$

Porportional


Reasoning

Ratio

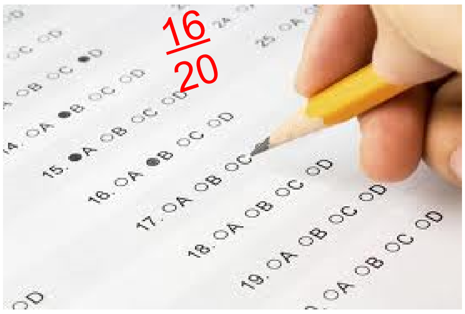
Rate

Proportion

Can you recall what these are??

**Ratio:** a comparison between two numbers with the same units

- can be written 2:5 or 2/5
- fraction is popular for calculations
- fraction form is also called a proportion
- ex: mixing oil 50:1





**Rate:** a comparison between two numbers with different units

- ex: km/h; \$/hr; \$/100 g; words/min
- also known as a rate of change

**Proportion:** a fractional statement of equality between two ratios or rates

$$\frac{3}{6} = \frac{1}{2}$$

Engines requiring a mixture of oil and fuel to provide lubrication are called 2-stroke engines. Lisa lives in McCallum, Newfoundland, and uses her boat for transportation. Her boat motor's tank holds 25 L of fuel. The ratio of gasoline to oil required is 50 parts of gasoline to 1 part of oil. Lisa mixes the fuel and oil in a 30-L jerry can before filling up her boat's tank. How much oil should be added to the gasoline?

$\frac{1}{50} = \frac{x}{25}$

1. Indicate the variable and Set up the ratio:


$x = 0.5$

[redacted]

[redacted]

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2. Use the ratio to fill in the values:

$\frac{\text{gasoline}}{\text{oil}}$

[redacted]


3. Use the ratio to create a proportion:

[redacted]

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3. Use the proportion to solve for the unknown value:

$$\frac{50}{1} = \frac{25}{x}$$

[redacted]

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3. Use the proportion to solve for the unknown value:

$$\frac{50}{1} = \frac{25}{x}$$

$$50x = 25$$

$$\frac{50x}{50} = \frac{25}{50}$$

$$x = 1/2 \text{ or } 0.5$$

Refer back to the ratio:

$\frac{\text{gasoline}}{\text{oil}}$ = [redacted]

[redacted]

Jean-Luc, a builder, works in Kentville, Nova Scotia. He 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...

L : W
3 2

6m : 4m
Long wide

1. State the variable and Set up ratio.
2. Fill in ratio
3. Use ratio to create proportion.
4. Solve for the unknown.

If halibut steaks cost $2.49 for 100 g, how much will it cost to buy 250 g of halibut steaks?

SOLUTION...

$$\frac{\$2.49}{100g} = \frac{x}{250g}$$

$$x = \frac{250(2.49)}{100}$$

$$= \$6.23$$

1. State the variable and Set up ratio or rate.
2. Fill in rate
3. Use rate to create proportion.
4. Solve for the unknown.

| Recipe #1 | |
|---|---|
| 3 cups of concentrate<br>7 cups of water | } 10 c |

| Recipe #2 |
|---|
| 2 cups of concentrate<br>5 cups of water |

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.

...Hint...How many cups does the recipe make in total??

Concentrate

$\frac{3}{10} = \frac{x}{8}$

$x = \frac{3(8)}{10}$

$= 2.4 \text{ c}$

Water

$\frac{7}{10} = \frac{x}{8}$

$x = \frac{7(8)}{10}$

$= 5.6 \text{ c}$

*Sidney Crosby*

DISCUSS THE IDEAS

## SIDNEY CROSBY, HOCKEY PLAYER

At the 2010 Olympic Winter Games in Vancouver, British Columbia, Sidney Crosby of Cole Harbour, Nova Scotia, scored the gold medal–winning goal in men's hockey. Team Canada, which had been playing at a furious pace against the United States, won the game with a score of 3 to 2.

In the 2001–2002 season, when Crosby was playing for the Dartmouth Subways, he scored 95 goals and earned 193 points in 74 games. How would you calculate the average number of points he earned per game?

$$\frac{193}{74} = 2.61$$

Sidney's average points scored is a rate comparing his points scored to games played. Students could discuss how the number of points scored per game can vary significantly with each game, due to scoring streaks or injuries. Thus, an average rate may not always be the best indicator of an athlete's ability.

The solution is as follows.

$$\frac{193 \text{ points}}{74 \text{ games}} \approx 2.6 \text{ points/game}$$


**HOMEWORK**: P. 21 #1 - 9.

1.1 Build Your Skills Detailed Solutions.pdf

Attachments

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