Writing Ratios

A ratio compares 2 items with the same unit.  
The order of the words in a sentence shows the order of the numbers in the ratio.  
You can write ratios 3 different ways.

\[ \text{●} \quad \text{●} \quad \text{●} \quad \text{○} \quad \text{○} \quad \text{○} \quad \text{○} \quad \text{○} \quad \text{○} \]

The ratio of the black balls to the total number of balls is:

- Words: three to nine, or 3 to 9
- Ratio notation: 3 : 9
- Fraction: \( \frac{3}{9} \)

1. Use the diagram above. Write each ratio 3 different ways.

   a) black balls to white balls  
      _________________  \hspace{1cm} \text{← Words →} \hspace{1cm} _________________
   
      ___________ : ___________  \hspace{1cm} \text{← Ratio Notation →} \hspace{1cm} _________________
   
   b) white balls to total number of balls
      \[ \text{← Fraction →} \]

Equivalent Fractions

\( \frac{1}{4} \) and \( \frac{3}{12} \) are equivalent fractions.

To make equivalent fractions, multiply or divide both the numerator and the denominator by the same number.

\[
\begin{align*}
\frac{1}{4} \times 3 &= \frac{3}{12} \\
\frac{3}{12} \div 3 &= \frac{1}{4}
\end{align*}
\]

\[ \frac{3}{3} = 1, \quad \frac{8}{8} = 1. \]

Multiplying a number by 1 does not change its value.
2. Fill in the blanks and the box to make an equivalent fraction.

\[
\begin{align*}
\frac{5}{8} & = \frac{24}{\text{___}} \\
\times 3 & \\
\frac{1}{3} & = \frac{5}{\text{___}} \\
\end{align*}
\]

\begin{align*}
\text{Comparing Quantities} \\
\text{A fraction can show part of a whole.} \\
\text{Half of the rectangle is shaded.} \\
\text{You can use a multiplier to compare quantities.} \\
\text{Line B is 4 times as long as Line A.} \\
\text{The multiplier of Line A is 4.} \\
\text{So, the ratio of the length of Line B to the length of Line A is 4 to 1 or } \frac{4}{1}.
\end{align*}

3. What is the multiplier from Figure 1 to Figure 2?

\begin{align*}
a) & \quad \frac{5 \text{ g}}{50 \text{ g}} \\
& \quad \text{The multiplier is } \underline{10}. \\
& \quad \text{The ratio of Figure 2 to Figure 1 is } 10 : \underline{1}. \\

b) & \quad \frac{12 \text{ mm}}{36 \text{ mm}} \\
& \quad \text{The multiplier is } \underline{3}. \\
& \quad \text{The ratio of Figure 2 to Figure 1 is } \underline{3} : \underline{1}.
\end{align*}
MULTICULTURAL FESTIVAL

Folklorama® is a 14-day multicultural festival in Winnipeg. At this festival, 40 pavilions represent different cultural groups or countries.

Imagine you are volunteering at Folklorama®.

a) Which pavilion would you choose? __________________________

b) During the festival, 500 000 people visit the 40 pavilions. Estimate the number of people who will visit your pavilion: __________

Should you multiply or divide?

Use your answer from part b).

Choose a pavilion that shows your family’s background or a country that you want to learn more about.

c) The ingredients for a meal at your pavilion cost $12.00. If the meal serves 30 people, calculate the cost for 1 person.

Sentence: __________________________

d) Not everyone who visits your pavilion eats there. Estimate the number of people who will eat at your pavilion: __________________________

e) How much will it cost to feed these people?

Total cost = number of people × cost per person

= ______________ × ______________

= ______________

f) Write the ratio of the number of people who will eat at your pavilion to the total number of people who will visit your pavilion:

Words: ______________ Fraction: ____________ Ratio notation: ____________
2.1 Warm Up

1. Write each ratio 3 different ways.
   a) black tiles to white tiles
   b) white tiles to all tiles

2. Write each fraction in lowest terms.
   a) \(\frac{10}{12} = \frac{5}{6}\)
   b) \(\frac{9}{27} = \frac{1}{3}\)

3. Write each fraction as a decimal.
   \(\frac{1}{2} = 0.5\)
   a) \(\frac{4}{5} = \frac{4}{5} \div 5 = 0.8\)
   b) \(\frac{3}{4} = \frac{3}{4} \div 4 = 0.75\)
   c) \(\frac{10}{16} = \frac{5}{8}\)
   d) \(\frac{6}{12} = 0.5\)

4. Write each decimal as a percent.
   \(0.66 = 0.66 \times 100 = 66\%\)
   a) \(0.89 = \\_\_\_\_\_\_\_\%\)
   b) \(0.9 = \\_\_\_\_\_\_\_\)
   c) \(0.48 = \\_\_\_\_\_\_\)
   d) \(0.5 = \\_\_\_\_\_\_\_\)
2.1 Two-Term and Three-Term Ratios

Working Example 1: Represent Ratios

represent
• to show using a sign or a symbol

2-term ratio
• compares 2 quantities with the same units
• write as \( a : b \) or \( a \) to \( b \)

example: \( \bigcirc \) black: white is 6:4

A bag holds 20 marbles.

a) What is the 2-term ratio of black marbles to white marbles?

Solution

Method 1: Represent a Ratio Using a Drawing

\[ \square \square \square \square \square : \square \square \square \text{ or } \square \square \square \square \text{ compared to } \square \square \square \square \]

There are ____________ black marbles and ____________ white marbles.

part-to-part ratio
• compares each part of a group to the other parts of the same group

example: \( \bigcirc \) 2:3 compares white tiles to black tiles

Method 2: Represent a Ratio Using Symbols or Words

The ratio of black marbles to white marbles is 10:4 or 10 _______ 4.

\( \textit{(symbols)} \) \( \textit{(words)} \)
part-to-whole ratio
- compares 1 part of a group to the whole group
- example: 2 : 6 compares white tiles to the group of tiles

b) Compare the number of white marbles to the total number of marbles. Write the part-to-whole ratio as a fraction in lowest terms.

Solution
There are _________ white marbles out of a total of _________ marbles.

Write a part-to-whole ratio as a fraction: \( \frac{\text{white}}{\text{total}} = \frac{4}{20} \)

Write the fraction in lowest terms.

\[
\begin{align*}
\frac{4}{20} & \quad \text{ Divide the numerator and the denominator by the same number.} \\
\div 4 & \\
\frac{1}{5} & \\
\end{align*}
\]

c) What marbles show the ratio 6 : 10?

Solution
There are _________ grey marbles and _________ black marbles.

grey : black is ___________ : ___________

3-term ratio
- compares 3 quantities with the same units
- write as \(a : b : c\) or \(a \text{ to } b \text{ to } c\)
- example: black : white : grey is 10 : 4 : 6

d) Write the 3-term ratio comparing the white, grey, and black marbles.

Solution
white : grey : black = __________ : __________ : __________

\[= 2 : __________ : 5\]
Use the design to answer the questions.

<table>
<thead>
<tr>
<th>Grey</th>
<th>Black</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

a) Write the ratio of grey tiles to total tiles 3 different ways.

There are ______ grey tiles.
There are ______ tiles in total.

Words: ______________________
Ratio notation: ______________________

Fraction: ______________________

b) What does the ratio 4 : 6 represent?

There are 4 ______ tiles and 6 ______ tiles.

c) What is the ratio of grey to black to white tiles?

grey : black : white = ______ : ______ : ______

d) What is the ratio of grey to white to total tiles?

grey : white : total = ______ : ______ : ______
Working Example 2: Apply Ratios

This is Tamara’s recipe for fruit drink:
• 3 cans of frozen orange juice
• 2 cans of frozen raspberry juice
• 1 can of frozen lime juice
For each can of juice, add 3 cans of water.

a) Complete the chart.

Solution

<table>
<thead>
<tr>
<th></th>
<th>Orange</th>
<th>Raspberry</th>
<th>Lime</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cans of Juice</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Number of Cans of Water</td>
<td>3 × 3 = 9</td>
<td>3 × _____ = _____</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Number of Cans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Write the ratio of orange juice to lime juice 2 different ways.

Solution

There are 3 cans of orange juice and _______ can of lime juice.

The ratio of orange to lime juice is 3 : _______ or 3 to _______.

c) Write the ratio of lime to orange to raspberry juice.

Solution

There are 1 can of lime juice, _______ cans of orange juice, and _______ cans of raspberry juice.

The ratio is 1 : _______ : _______.

d) What is the ratio of water to juice?

Solution

There are 18 cans of water and 6 cans of juice.

The ratio is 18 : 6 or _______ : _______.

e) How many cans of fruit drink does the recipe make?

Solution

18 cans of water + 6 cans of juice = _______ cans of fruit drink
f) What is the ratio of cans of juice to total cans of fruit drink? Write the ratio as a fraction, a decimal, and a percent.

Solution

\[
\text{juice} \div \text{fruit drink} = \frac{6}{24} = \frac{1}{4} \\
\text{divided by } 6
\]

\[
\frac{1}{4} = 0.25 \quad \text{or} \quad \frac{1}{4} = 25\%
\]

The ratio of cans of juice to fruit drink is \(\frac{1}{4}\), 0.25, or 25\%.

Recipe for trail mix:
- 3 cups mini pretzels
- 2 cups roasted soy chips
- 1 cup raisins
- 1 cup sunflower seeds

a) Write the ratio of mini pretzels to raisins 2 different ways.

The ratio is \(\text{mini pretzels} : \text{raisins}\) or \(\text{mini pretzels} \text{ to } \text{raisins}\).

b) For one batch of trail mix, what is the ratio of soy chips and sunflower seeds to total mix? Write your answer as a fraction, a decimal, and a percent. Round your answer to 2 decimal places.

\[
\frac{\text{soy chips} + \text{sunflower seeds}}{\text{total cups of trail mix}} = \frac{2}{6} \\
= \frac{1}{3}
\]

\[
= 0.333 \quad \text{or} \quad \frac{1}{3} \quad \text{or} \quad 33\frac{1}{3}\%
\]

The ratio is \(\frac{1}{3}\), 0.33, or 33\%.
1. Janine wants to write the ratio of oranges (O) to apples (A).

Circle the correct answer. 3 : 4 or 4 : 3

Give 1 reason for your answer. ______________________________________

2. The fraction \( \frac{2}{5} \) means 2 parts out of a total of 5 parts.

Draw a diagram to show this fraction as a part-to-whole ratio.

3. Write each ratio in ratio notation. Then, write the ratio in lowest terms.
   a) $3$ compared to $9$
   b) Your age compared to a 28-year-old person.

\[
\frac{3}{9} : \frac{1}{2} + 3 = \frac{3}{9} : \frac{1}{2} = \frac{1}{3} : \frac{1}{2}
\]

4. Write each ratio in fraction form.
   a) There are 12 red beads and 3 blue beads in a bag.
      Compare red beads to total beads.

\[
\frac{\text{red beads}}{\text{total beads}} = \frac{12}{15}
\]

   b) A team won 3 games and lost 6 games. What is the ratio of games won to total games played?

\[
\frac{\text{games won}}{\text{total games played}} = \frac{3}{3 + 6}
\]
5. Find the missing number to make an equivalent fraction.

\[
\begin{align*}
\text{a)} & \quad \frac{1}{2} = \frac{8}{x} \\
\text{b)} & \quad \frac{4}{3} = \frac{x}{3}
\end{align*}
\]

6. Tyler counted 20 cars in a parking lot.
   Six were red, 4 were green, and 1 was yellow.
   a) Draw a diagram to show the colours of the cars.
   b) How many cars were red, yellow, or green? ____________
   c) How many cars were not red, yellow, or green? ____________
   d) What is the ratio of yellow to green to red cars? ____________
   e) What is the ratio of red to total cars?
      Write the ratio as a fraction, a decimal, and a percent.
      \[
      \frac{\text{red cars}}{\text{total cars}} = \frac{\underline{\underline{\text{ }}}}{\underline{\underline{\text{ }}}}
      \]
      Write fraction in lowest terms.
      \[
      \frac{\underline{\underline{\text{ }}}}{\underline{\underline{\text{ }}}}
      \]
      Write as a decimal.
      \[
      \underline{\underline{\text{ }}} \%
      \]
      The ratio of red cars to total cars is ____________, ____________, or ____________.
7. A class of 32 students has 24 girls.
   a) How many boys are in the class? ____________
   b) What is the ratio of boys to total students? Write the ratio as a fraction and a percent.
   c) What is the ratio of girls to boys? Write the ratio in ratio notation.

8. The ratio of the width to the length of the Canadian flag is 1:2.
   a) The flag on the cover of an atlas is 12 cm wide. How long is the flag?
      \[
      \frac{\text{width}}{\text{length}} = \frac{12}{2} = 6 \text{ cm}
      \]
      Sentence: ______________________________________
   b) A Canadian flag outside a school is 4 m long. How wide is the flag?
      \[
      \frac{\text{width}}{\text{length}}
      \]
      Sentence: ______________________________________
9. Diana is making 3-cheese lasagna.
   She needs 100 g of Romano cheese, 300 g of mozzarella cheese,
   and 250 g of cottage cheese.

   a) Write the masses of the cheeses in ascending order (smallest to largest).

   , ,

   b) Write the ratio to compare the masses of the cheeses from smallest to largest.

   : : 

   c) Write the ratio from part b) in lowest terms.

   Divide each term by the same number.

   d) How much Romano cheese does Diana need to make a lasagna that has 900 g of mozzarella?

   Sentence: 

   e) How much cottage cheese does she need to make a lasagna that has 900 g of mozzarella?

   Sentence: 

   Use equivalent fractions.

   Use equivalent ratios.
Make an invitation for your international meal.
Draw a logo for the front of your invitation.

Your logo must show these ratios:
- 4:3
- 2:3:4

a) Look at these examples of ratios.

6 cm

8 cm

What is the length to width ratio?

What is the white to dots to grey ratio?

b) How will you show the ratio 4:3 on your logo?

c) How will you show the ratio 2:3:4 on your logo?

How many parts will there be in total? 2 + 3 + 4 =

d) Draw your logo on Grid 1 or Grid 2.
   - Use the whole grid.
   - Use shapes with straight lines.
   - Decorate and colour your logo.
   - Label the 2 ratios.
2.2 Warm Up

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
<th>Decimal Point</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
</table>

1. Round to the nearest 10. Use the place value chart to help you.
   a) \(18.5 \approx \) __________
   b) \(51.6 \approx \) __________

2. Round to the nearest 100. Use the place value chart to help you.
   a) \(489 \approx \) __________
   b) \(625 \approx \) __________

3. Change dollars ($) to cents (¢).
   Example: \(0.00839 = 0.00839 \times 100 = 0.839¢\)
   a) \(0.00908 = 0.00908 \times 100 = \) __________¢
   b) \(0.00504 = \) __________ \times __________
      \(= \) __________¢

4. Write each fraction with a denominator of 1.
   a) \(\frac{18}{3} = \) \(\frac{\_}{1} \)
      \(\div 3\)
   b) \(\frac{15}{5} = \) \(\frac{\_}{1} \)
      \(\div \_\)

5. Write each fraction with a denominator of 100.
   a) \(\frac{2.19}{300} = \) \(\frac{\_}{100} \)
      \(\div 3\)
   b) \(\frac{4.20}{400} = \) \(\frac{\_}{100} \)
2.2 Rates

rate
• compares 2 quantities measured in different units
• example: $1.69 per 100 g or $1.69/100 g of food

Working Example 1: Determine Unit Rates

unit rate
• a rate in which the second term is 1
• example: 30 km/h means 30 km travelled in 1 h

Jesse and Brent send text messages to each other.
Jesse can text 187 words in 5 min.
Brent can text 444 words in 10 min.
Estimate and calculate Jesse’s and Brent’s texting speeds.

Solution

Speed of texting = \( \frac{\text{number of words}}{\text{time}} \)

To estimate, round the numbers.

<table>
<thead>
<tr>
<th></th>
<th>Jesse</th>
<th>Brent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate Speed</td>
<td>( \frac{200 \text{ words}}{5 \text{ min}} = _ _ _ \text{ words/min} )</td>
<td>( \frac{400 \text{ words}}{10 \text{ min}} = _ _ _ \text{ words/min} )</td>
</tr>
<tr>
<td>Calculate Speed</td>
<td>( \frac{187 \text{ words}}{5 \text{ min}} )</td>
<td>( \frac{444 \text{ words}}{10 \text{ min}} )</td>
</tr>
<tr>
<td></td>
<td>( 187 \div 5 = _ _ _ )</td>
<td>( 444 \div 10 = _ _ _ )</td>
</tr>
<tr>
<td></td>
<td>( = 37.4 \text{ words/min} )</td>
<td>( = _ _ _ _ _ _ \text{ words/min} )</td>
</tr>
</tbody>
</table>

Jesse can text \_ \_ \_ \_ \_ \_ words/min and Brent can text \_ \_ \_ \_ \_ \_ words/min.
The estimates and answers are close to each other, so the answer is reasonable.

Show You Know

Find the unit rates.

a) Brandon runs 150 m in 25 s.

\( \frac{150 \text{ m}}{25 \text{ s}} = \_ \_ \_ \_ \_ \_ \text{ m/s} \)

Brandon runs \_ \_ \_ \_ \_ \_ m/s.

b) Kira earns $88 for working 8 h.

\( \frac{88 \text{ $}}{8 \text{ h}} = \_ \_ \_ \_ \_ \_ \text{ $/h} \)
Working Example 2: Compare Prices Using Unit Rates

Which container of orange juice is the best buy?

Solution

Calculate the unit price of each container of orange juice.

<table>
<thead>
<tr>
<th>Container Size</th>
<th>Calculations for Unit Price</th>
<th>Change to Cents (¢)</th>
<th>Unit Price (¢)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mL</td>
<td>$1.25 \div 250 = 0.005\text{/mL}</td>
<td>$0.005 \times 100 = 0.5</td>
<td>0.5¢/mL</td>
</tr>
<tr>
<td>500 mL</td>
<td>$2.30 \div 500 = 0.0046\text{/mL}</td>
<td>$0.0046 \times 100 = 0.46</td>
<td>0.46¢/mL</td>
</tr>
<tr>
<td>1 L = 1000 mL</td>
<td>$4.50 \div 1000 = \text{_____/mL}</td>
<td>\text{____}</td>
<td>\text{____}</td>
</tr>
</tbody>
</table>

Compare the prices.
The smallest unit price is the best buy.

So, the best buy is the __________ container with a unit price of $__________.
Which container of salsa is the best buy?

Complete the table. Show your work.

<table>
<thead>
<tr>
<th>Container Size</th>
<th>Calculations for Unit Price</th>
<th>Change to Cents (¢)</th>
<th>Unit Price (¢)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mL</td>
<td>( \frac{$3.44}{400 \text{ mL}} = $\text{________}/\text{mL} )</td>
<td>$\text{_______} \times 100$</td>
<td>$\text{_______} \text{¢/mL}$</td>
</tr>
<tr>
<td>700 mL</td>
<td>( \frac{$6.65}{700 \text{ mL}} = $\text{________}/\text{mL} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7 L</td>
<td>( 1.7 \times 1000 = \text{________ mL} )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The best buy is ________________________.

Communicate the Ideas

1. a) Give an example of a ratio using words and numbers from the table.

<table>
<thead>
<tr>
<th>Bear</th>
<th>Birth Mass (kg)</th>
<th>Mass After 60 Days (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>0.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Polar</td>
<td>0.7</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Ratio: ________________________

b) The black bear gained 6.2 kg in 60 days.

Explain how to calculate the unit rate for 1 day.

\[ \text{Mass gained} = 6.5 - 0.3 = 6.2 \text{ kg} \]
2. a) Give 2 examples of rates that are used in everyday life.

__________________________________________________________________________
__________________________________________________________________________

b) Write the units for each of your rates in part a).

__________________________________________________________________________
__________________________________________________________________________

3. Find the unit rate.

a) An orca swims 110 km in 2 h.

\[
\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{\text{km}}{\text{h}}
\]

\[
= \frac{\underline{110}}{\underline{2}} \text{ km/h}
\]

b) A Canada goose flies 800 km in 12.5 h.

c) Cathy plants 60 daffodils in 30 min.

d) A blue whale eats 8 tonnes of food in 2 days.

e) A blue whale swims 193 km in 10 h.

f) A bull moose roars 15 times in 2.5 h.
4. **a)** Gina earns $78.00 for working 6 h. Find her hourly rate of pay.  
**b)** Asad makes $192.50 for working 14 h. Find his hourly rate of pay.

c) Who has a greater hourly rate of pay?

5. The table shows the prices of different-sized packages of nuts.

<table>
<thead>
<tr>
<th>Nut Package</th>
<th>Mass</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300 g</td>
<td>$2.19</td>
</tr>
<tr>
<td>2</td>
<td>500 g</td>
<td>$3.09</td>
</tr>
<tr>
<td>3</td>
<td>700 g</td>
<td>$4.83</td>
</tr>
</tbody>
</table>

**a)** What is the unit price per 100 g for each package?

<table>
<thead>
<tr>
<th>Package 1:</th>
<th>Package 2:</th>
<th>Package 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit price = ( \frac{\text{price}}{\text{mass}} ) + 3 ( \frac{3}{3} )</td>
<td>Unit price = ( \frac{\text{price}}{\text{mass}} ) + 3 ( \frac{5}{3} )</td>
<td>Unit price = ( \frac{\text{price}}{\text{mass}} )</td>
</tr>
<tr>
<td>$2.19 \div 300 \text{ g} = \frac{2.19}{300} \div 100 \text{ g} \quad \text{The unit price is } $\frac{2.19}{300} \div 100 \text{ g.}$</td>
<td>$3.09 \div 500 \text{ g} = \frac{3.09}{500} \div 100 \text{ g} \quad \text{The unit price is } $\frac{3.09}{500} \div 100 \text{ g.}$</td>
<td></td>
</tr>
</tbody>
</table>

**b)** Which package is the best buy? _________________  
Give 1 reason for your answer.

__________________________________________
6. Mala is shopping for honey. Her favourite brand is available in 2 sizes.
   
a) Estimate which is the better buy.

   **Small jar:**
   - $2.49 is about $2.
   - 250 mL is about 300 mL.
   - Unit price = \( \frac{price}{volume} \) = \( \frac{2.00}{300 \text{ mL}} \) = \$__________/mL

   **Large jar:**
   - $9.59 is about ________.
   - Volume is 1000 mL.
   - Unit price =

   b) Calculate to find the better buy. Round your answers to 2 decimal places.

   **Small jar:**
   - Unit price = \( \frac{price}{volume} \) = \( \frac{2.49}{250 \text{ mL}} \) = \$__________/mL
   - Change dollars ($) to cents (¢).
   - \$_________ \times 100 = \___________¢
   - The unit price is ________________.

   **Large jar:**
   - Unit price =

   Circle the better buy. SMALL JAR or LARGE JAR.

Apply

7. Trevor rode his bike 84 km in 3 h.
   Jillian rode 56 km in 2 h.
   Who is the faster cyclist?

   Trevor: \( \frac{\text{distance}}{\text{time}} \)
   Jillian: \( \frac{\text{distance}}{\text{time}} \)

   Sentence: ________________________________________________.

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   a) Find the price per bar.

   b) Is your answer in part a) a rate or a ratio? ____________________________
      Give 1 reason for your answer.

9. The table shows the fuel consumption of 2 cars.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Distance (km)</th>
<th>Fuel Used (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe</td>
<td>400</td>
<td>28</td>
</tr>
<tr>
<td>Sarah</td>
<td>840</td>
<td>60</td>
</tr>
</tbody>
</table>

Find the fuel consumption in litres per kilometre (L/km) for each car.
Round your answer to 4 decimal places.

\[
\text{Fuel consumption} = \frac{\text{fuel used (L)}}{\text{distance (km)}}
\]

Joe’s car: ____________________________
Sarah’s car: ____________________________

Sentence: The fuel consumption for Joe’s car is _______ L/km.

b) Whose car has the lower fuel consumption?
Kheer is a traditional rice pudding made in India and Pakistan.

The recipe for kheer serves 4 people. Fill in the table to calculate the amount of each ingredient you need to serve 10 people.

1 recipe serves 4 people. \( \frac{10}{4} = 2.5 \)

So, you need to multiply by 2.5.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Amount to Serve 10</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>125 mL rice</td>
<td>( \times 2.5 )</td>
<td>The amount of rice needed to serve 10 people is 312.5 mL.</td>
</tr>
<tr>
<td></td>
<td>( \frac{125\text{mL}}{4\text{ people}} = \frac{312.5\text{mL}}{10\text{ people}} \times 2.5 )</td>
<td></td>
</tr>
<tr>
<td>1 L milk</td>
<td>( \times 2.5 )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \frac{1\text{L}}{4\text{ people}} = \frac{\text{L}}{10\text{ people}} \times 2.5 )</td>
<td></td>
</tr>
<tr>
<td>50 mL raisins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 mL sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 mL cardamom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 mL almonds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.3 Warm Up

1. Round to the nearest cent (¢).

Example: 34.7¢ = 35¢
125.3¢ = 125¢

34.7 means 34 and 7 tenths cents.
Round up 5 tenths or more to the next cent.
Don't round if it is less than 5 tenths.

a) 84.3¢ = ________¢
b) 39.9¢ = ________¢
c) 173.1¢ = ________¢
d) 75.5¢ = ________¢

2. Change cents (¢) to dollars ($).

Example: 35¢ = 35 ÷ 100 = $0.35
158¢ = 158¢ ÷ 100 = $1.58

100¢ = $1.00

a) 58¢ = ________
b) 185¢ = ________

3. Find the missing number to make an equivalent fraction.

\[
\begin{align*}
\frac{1}{4} & \times \_ = \frac{8}{1} \\
\frac{3}{5} & \times \_ = \frac{9}{1} \\
\frac{9}{4} & \times \_ = \frac{3}{1} \\
100 & \times \_ = \frac{3}{10}
\end{align*}
\]
2.3 Proportional Reasoning

**proportion**
- an equation that shows 2 ratios or 2 rates are equal

\[
\frac{2}{3} \times 3 = \frac{6}{9} \quad \text{or} \quad \frac{2 \text{ km}}{3 \text{ h}} \times 3 = \frac{6 \text{ km}}{9 \text{ h}}
\]

**Working Example 1: Solve a Rate Problem Using Proportional Reasoning**

Electricity costs 11.58¢ per 2 kWh. How much does 30 kWh cost? Round your answer to the nearest cent.

**Solution**

*Method 1: Use a Unit Rate*

Find the unit rate.

\[
\frac{11.58\text{¢}}{2 \text{ kWh}} = \frac{11.58\text{¢}}{1 \text{ kWh}} \div 2
\]

Electricity costs ____________¢ per kWh or ____________¢/kWh.

Find the cost of 30 kWh.

\[
30 \times 5.79\text{¢} = \text{ 173.7¢}
\]

So, 30 kWh costs about 174¢ or $__________.

*Method 2: Use a Proportion*

\[
\frac{11.58\text{¢}}{2 \text{ kWh}} = \frac{30 \times 5.79\text{¢}}{30 \text{ kWh}} \times 15
\]

11.58¢ is about 12¢.

\[
12 \times 15 = (10 \times 15) + (2 \times 15) = 150 + 30 = 180
\]

The answer will be about 180¢ or $1.80.

So, 30 kWh costs about 174¢ or $__________.
a) There are 72 players on 8 baseball teams. Use 2 methods to find the number of players on 2 teams.

Method 1: Use a Unit Rate

\[
\frac{72 \text{ players}}{8 \text{ teams}} = \frac{\text{players}}{1 \text{ team}}
\]

\[ \div \\
\]

Number of players on 1 team = __________

Number of players on 2 teams = 2 \times __________

\[ = \]

Method 2: Use a Proportion

\[
\frac{72 \text{ players}}{8 \text{ teams}} = \frac{\text{players}}{2 \text{ teams}}
\]

\[ \div \\
\]

Sentence: ________________________________________________________________

b) Which method do you like best? ________________________

Give 1 reason for your answer.

______________________________________________________________

______________________________________________________________

______________________________________________________________
Working Example 2: Solve a Ratio Problem Using Proportional Reasoning

A biologist catches and tags 24 trout, and then releases them back into the pond. Two weeks later, he catches 30 trout and finds that 5 of them are tagged. Estimate how many trout are in the pond.

Solution

Method 1: Use a Proportion in Lowest Terms

\[ \frac{\text{fish recought with tags}}{\text{total fish recought}} = \frac{\text{fish tagged and released}}{\text{total fish in pond (t)}} \]

\[ \frac{5}{30} = \frac{24}{t} \]

Set up a proportion using equal ratios.

\[ \frac{1}{6} = \frac{24}{t} \]

Reduce \( \frac{5}{30} \) to \( \frac{1}{6} \).

\[ \times 24 \]

\[ \frac{1}{6} = \frac{24}{t} \]

Make equivalent ratios.

\[ \times 24 \]

\[ \frac{t}{6} = 24 \]

Divide to find what number multiplied by 5 gives 24.

\[ \frac{24}{t} = 4.8 \]

\[ t = 30 \times 4.8 \]

\[ t = \underline{144} \]

I estimate there are ________ trout in the pond.

Method 2: Use the Original Proportion

\[ \frac{5}{30} = \frac{24}{t} \]

\[ \times 4.8 \]

Divide to find what number multiplied by 5 gives 24.

\[ \frac{24}{5} = 4.8 \]

\[ \times 4.8 \]

\[ t = 30 \times 4.8 \]

\[ t = \underline{144} \]

I estimate there are ________ trout in the pond.

Show You Know

Three erasers cost 75¢.
How much will a dozen erasers cost?

1 dozen erasers = __________ erasers

\[ \underline{\square} = \underline{c} \]

Sentence: ____________________________
2.3 Proportional Reasoning

Communicate the Ideas

1. Give an example of a ratio, a rate, and a proportion.

<table>
<thead>
<tr>
<th>Example</th>
<th>Ratio</th>
<th>Rate</th>
<th>Proportion</th>
</tr>
</thead>
</table>

2. Explain how to use a proportion to solve this problem:
Three balls cost $1.29. What is the cost of 12 balls?

Cost of 3 balls = $1.29
Cost of 12 balls = ?

Check Your Understanding

Practise

3. Find the missing value.

a) \[
\frac{2}{3} \times \_ = \frac{15}{\_}
\]

b) \[
\frac{5}{\_} \div \_ = \frac{14}{35}
\]

c) \[
\frac{30}{45} \times \_ = \frac{6}{\_}
\]

d) \[
\frac{3}{\_} \div \_ = \frac{12}{36}
\]
4. Find the unit rate.

   a) Three dinner rolls cost 99¢.

   \[
   \frac{99\text{¢}}{3\text{ rolls}} = \frac{\text{¢}}{1\text{ roll}}
   \]

   \[
   \div 3
   \]

   \[
   \frac{99}{3} = \frac{\text{¢}}{1}
   \]

   \[
   \div 3
   \]

   The unit rate is ________ ¢/roll.

   b) Seven boxes have a mass of 14 kg.

   The unit rate is ____________________.

   c) Two pens cost 84¢.

   ____________________.

   d) Four stacking blocks are 24 cm high.

5. Find the missing value to make each rate equivalent. Include the units.

   \[
   \times \frac{\text{cans}}{\text{kg}}
   \]

   a) \[
   \frac{60\text{ km}}{3\text{ h}} = \frac{\text{km}}{6\text{ h}}
   \]

   \[
   \times \frac{\text{cans}}{\text{kg}}
   \]

   b) \[
   \frac{\$3}{4\text{ cans}} = \frac{\$15}{\text{cans}}
   \]

6. Delia was paid $35 for 5 h of babysitting.

   a) How much will she earn for 1 h?

   Use a unit rate to find the answer.

   b) How much will she earn for 3 h?
7. Meredith was paid $54 for 6 h of housecleaning. How much will she earn for 2 h? Use a proportion to find the answer.

\[
\frac{\text{pay for housecleaning for 6 h}}{\text{6 h}} = \frac{\text{pay for housecleaning for 2 h (p)}}{\text{2 h}}
\]

\[p = \frac{\frac{54}{6}}{\frac{2}{2}}\]

Sentence: ____________________________________________________________________

8. Set up a proportion for each situation.

a) If 10 beans have a mass of 17 g, then 30 beans have a mass of 51 g.

\[
\frac{17 \text{ g}}{\text{beans}} = \frac{\text{g}}{\text{beans}}
\]

b) There are 15 boys for every 13 girls in each classroom in a school. If there are 75 boys in the school, then there are 65 girls.

\[
\frac{\text{boys}}{\text{girls}} = \frac{75}{65}
\]

c) On a map, 1 cm represents 25 km. Kendra wants to ride her bike 160 km. The distance is 6.4 cm on the map.
9. Set up a proportion for each situation. Use a variable.
Do not find the answer.

a) A recipe for salad dressing uses 150 mL of oil and 50 mL of vinegar.
   How much vinegar do you need to mix with 300 mL of oil?

\[
\frac{\text{mL oil}}{\text{mL vinegar}} = \frac{300}{v}
\]

\(v\) represents the amount of vinegar.

b) A baseball player’s ratio of home runs to strikeouts is 3 : 17.
   How many home runs does she hit if she strikes out 51 times?

\[
\frac{\text{home runs}}{\text{strikeouts}} = \frac{h}{51}
\]

\(h\) represents the number of strikeouts.

10. Look at the pattern. Set up a proportion to find the number of small squares in Figure 7.

\[
\frac{\text{Figure 1}}{\text{Figure 2}} = \frac{\text{Figure 3}}{\text{Figure 4}}
\]
11. A gardener charges $25 to mow a lawn that measures 600 m². How much should he charge for a lawn that measures 1200 m²? 

\[
\frac{\text{cost}}{\text{area}} = \frac{\text{cost}}{\text{area}}
\]

Sentence: \______________________________ \______________________________

12. It costs $7.50 for 3 rides at an amusement park.

a) What is the unit rate per ride? 

b) At this rate, what would it cost for 18 rides?

\______________________________ \______________________________

\______________________________ \______________________________

13. At a different amusement park, it costs $10 for 4 rides. What is the cost for 12 rides?

Sentence: \______________________________

14. Fresh pickerel is advertised in a local market. How much will 6 kg of pickerel cost?

Sentence: \______________________________
**MATH LINK**

a) It costs $7.60 to make Greek salad for 12 people. What is the unit price? Round your answer to the nearest cent.

Sentence: ___________________ ________________ ___________________ ________________

b) On a separate sheet of paper, create a table to help you find the amount of each ingredient needed to serve 10 people. Use proportions to help you. Show your work.

**Example:**
A recipe calls for 270 mL couscous for 5 people. How much couscous will you need for 10 people?

<table>
<thead>
<tr>
<th>Recipe Couscous</th>
<th>Serves 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingredients</td>
<td>Amount Given in Recipe</td>
</tr>
<tr>
<td>Couscous</td>
<td>270 mL</td>
</tr>
</tbody>
</table>
Chapter Review

Key Words
For #1 to #5, write the number that matches the description.

1. proportion $2.75 per tin
2. ratio \( \frac{3}{5} \)
3. 3-term ratio \( \frac{7}{50} = \frac{14}{100} \)
4. unit price 4:3:2
5. unit rate 27 km/h

2.1 Two-Term and Three-Term Ratios, pages 58–67

6. Use the square tile pattern to answer each question.
   
   a) The ratio of white squares to total squares is \( \frac{18}{12} \). Write 2 equivalent ratios for this ratio.

   \[
   \frac{6}{12} = \frac{18}{12}, \quad \frac{18}{12} \times \frac{2}{2}
   \]

   \[
   \frac{6}{12} \div \frac{2}{2}
   \]

   18: \( \frac{18}{12} \) \( \frac{18}{12} \times \frac{2}{2} \)

   \[
   \frac{18}{12} \div \frac{2}{2}, \quad \frac{18}{12} \times \frac{2}{2}
   \]

   b) Find the percent of squares that are white.

   \[
   \frac{\text{white}}{\text{total}} = \frac{1}{2}
   \]

   Change the fraction to a decimal.

   \[
   = \frac{1}{2} = 0.5
   \]

   To change a decimal to a percent, multiply by 100.

   \[
   = \frac{1}{2} \times 100 = 50\%
   \]
7. Stephanie counted 20 vehicles in a parking lot. Five were silver, 4 were blue, 2 were red, and 1 was yellow.

a) What is the ratio of yellow to red to silver vehicles?

________________________

b) What is the total number of silver, blue, red, and yellow vehicles?

Sentence: ________________________________________________________________

c) How many vehicles are not silver, blue, red, or yellow?

Sentence: ________________________________________________________________

d) Look at the number of each colour of vehicle. What does the ratio 4 to 20 show?

__________________________________________________________

e) Write the ratio of silver to total vehicles as a fraction, a decimal, and a percent.

\[
\frac{\text{silver}}{\text{total}} = \frac{4}{20} \quad \leftarrow \text{fraction}
\]

\[
= \frac{1}{5} \quad \leftarrow \text{decimal}
\]

\[
= 0.2 \quad \leftarrow \text{percent}
\]

f) Write the ratio of silver to total vehicles from part e) in lowest terms.
2.2 Rates, pages 69–76

8. Find the unit rates.

a) Stephen runs up 300 steps in 6 min.

\[
\frac{300 \text{ steps}}{6 \text{ min}} = \frac{\text{steps}}{1 \text{ min}} \div 6 = \frac{300}{6} = \frac{\text{steps}}{1} \div 6
\]

The unit rate is _______ steps/min. The unit rate is _______.

b) $3.60 is the price of 4 L of milk.

\[
\text{Unit price} = \frac{\text{cost}}{\text{number of hours}}
\]

\[
\frac{\text{cost}}{\text{number of hours}} = \frac{\text{dollar}}{120} = \frac{4.26}{120} = ?
\]

To change $ to ¢, multiply by 100.

\[
\text{answer} \times 100 = \text{___________¢}
\]

The unit price is _________¢/h.

9. The table compares the monthly cost of electricity for a computer and a television.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Time On (h)</th>
<th>Monthly Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer and monitor</td>
<td>120</td>
<td>4.26</td>
</tr>
<tr>
<td>Television</td>
<td>180</td>
<td>3.46</td>
</tr>
</tbody>
</table>

What is the hourly unit cost for each piece of equipment? Round each answer to the nearest tenth of a cent.

**Computer:**

\[
\text{Unit price} = \frac{\text{cost}}{\text{number of hours}}
\]

\[
\frac{\text{cost}}{\text{number of hours}} = \frac{4.26}{120} = \frac{\text{¢}}{1} = ?
\]

To change $ to ¢, multiply by 100.

\[
\text{answer} \times 100 = \text{___________¢}
\]

The unit price is _________¢/h.

**Television:**

\[
\text{Unit price} = \frac{\text{cost}}{\text{number of hours}}
\]

\[
\frac{\text{cost}}{\text{number of hours}} = ?
\]

To change $ to ¢, multiply by 100.

\[
\text{answer} \times 100 = \text{___________¢}
\]

The unit price is _________¢/h.
10. Groceries often cost more in Northern communities. Use the data in the table to answer the questions.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost in Winnipeg</th>
<th>Cost in Little Grand Rapids</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 kg bananas</td>
<td>$4.98</td>
<td>$13.95</td>
</tr>
</tbody>
</table>

a) Write the ratio of the cost of bananas in Winnipeg to the cost in Little Grand Rapids.

b) Write the rate for the cost of 3 kg of bananas in Winnipeg.

c) What is the unit price for bananas in Winnipeg?

d) What is the unit price for bananas in Little Grand Rapids?

e) What is the difference in unit price for bananas for the 2 communities?

Sentence: __________________________________________________________________
2.3 Proportional Reasoning, pages 78–86

11. Find the missing value to make equivalent rates. Write the unit.

\[ \frac{40 \text{ kg}}{1 \text{ month}} = \frac{10 \text{ kg}}{2 \text{ months}} \]

\[ \frac{84 \text{ $}}{8 \text{ h}} = \frac{70 \text{ $}}{10 \text{ h}} \]

12. Use a proportion to solve each question. Use a variable for the unknown quantity.

a) Three bars of soap cost $2.94. What is the cost of 9 bars of soap?

\[ \frac{\text{cost of soap}}{3 \text{ soap}} = \frac{\text{cost of soap (c)}}{9 \text{ soap}} \]

\[ \frac{2.94}{3} = \frac{c}{9} \]

\[ c = \text{___________} \]

b) On a map, 1 cm represents 200 km. How many centimetres represent 800 km?

\[ \frac{1 \text{ cm}}{200 \text{ km}} = \frac{x \text{ cm}}{800 \text{ km}} \]

\[ x = \text{___________} \]
13. Compare the heights of objects to their shadows.

   a) A 20-m building casts a 12-m shadow. 
      What is the height of a tree with a shadow that is 3 m long?

      \[
      \frac{\text{building height}}{\text{shadow height}} = \frac{\text{tree height}}{\text{shadow height}}
      \]

      Sentence: ____________________________________________________________________

   b) A building with a height of 25 m has a shadow 8 m long.
      What is the height of a pole with a shadow 4 m long?

      Draw a diagram:
For #1 to #4, circle the best answer.

1. The ratio of Jared’s stamps to Paulo’s stamps is 4 : 7. Jared has 36 stamps. How many stamps does Paulo have?
   - A 21
   - B 63
   - C 84
   - D 99

2. A robot can make 27 toy cars in 9 min. Which is the unit rate?
   - A 27 cars/9 min
   - B 3 cars
   - C 3 cars per min
   - D $\frac{1}{3}$ car/min

3. In the school choir, the ratio of girls to boys is 17 : 8. What percent of the choir are boys?
   - A 17%
   - B 25%
   - C 32%
   - D 47%

4. Look at the figure. What is the ratio of 2-digit numbers in the black hexagon compared to the total number of 2-digit numbers? Write your answer in lowest terms.
   - A 3 : 8
   - B 8 : 3
   - C 6 : 16
   - D 16 : 6

Complete the sentences in #5 and #6.

5. There are 30 g of sugar in 200 mL of pop.
   There is 300 g of sugar in _____________ L of pop.

\[
\frac{\text{g sugar}}{\text{mL pop}} = \frac{\text{g sugar}}{\text{pop}}
\]

Change your answer to litres.
6. Canadians buy 5 loaves of brown bread for every 2 loaves of white bread. A bakery makes 200 loaves of brown bread.

The bakery should make _____________ loaves of white bread.

Short Answer

7. Randi makes 9 scarves from 4 m of fabric. How many scarves can she make from 28 m of fabric?

Proportion:

Solve:

Sentence: _______________________

8. The circle graph shows the favourite pets for a class of 32 grade 8 students.

a) How many students chose a pet other than a dog, cat, or rabbit?

Sentence: ____________________________________________

b) Write a ratio to show the number of students who chose a cat compared to the number who chose a rabbit. _______________________

c) Write an equivalent ratio for your answer in part b).
9. Kyra is shopping for ketchup. Her favourite brand is available in 2 sizes.

   a) Estimate which is the better buy. Show your work.

   \[ \text{Small bottle:} \quad \text{Large bottle:} \]

   \[ \text{Cost} \quad \text{Cost} \]

   \[ \text{Unit price} = \frac{\text{Cost}}{\text{# of mL}} \]

   Sentence: __________________________________________________________________

   b) Calculate to find the better buy. Show your work.

   \[ \text{Small bottle:} \quad \text{Large bottle:} \]

   \[ \text{Unit price} = \frac{\text{Cost}}{\text{# of mL}} \]

   Sentence: __________________________________________________________________

10. Karen earns $420 for working 35 h at a factory. Liam makes $40 for working 4 h at a store.

   a) What is Karen’s hourly rate of pay? 
   b) What is Liam’s hourly rate of pay?

   c) Who has the greatest rate of hourly pay? ________________

   d) How much does Liam earn in an 8-h shift?

   Sentence: __________________________________________________________________
WRAP IT UP!

Plan an international meal that will serve 10 people. Include 1 dish from each of the following categories:
- soup, salad, or appetizer
- main course
- dessert

Create your meal plan.

a) Complete your invitation to the meal on the grid on page 68. Make sure your logo design has an area of 36 cm² and shows each ratio:
   - 4 : 3
   - 2 : 3 : 4

b) On a separate sheet of paper, write your recipe for a main course or a dessert. Include information on how to make the recipe.

c) Write the following information for the main course or the dessert on a separate sheet of paper:
   - the name and category of your recipe
   - the number of people your recipe serves
   - the list of ingredients
   - the amount of each ingredient
   - the amount of each ingredient needed to serve 10 people

d) For the recipe in part b), research the cost of each ingredient by visiting a grocery store, looking at grocery store flyers, or talking with someone who shops for groceries. Fill in the chart.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Amount needed to serve 10 people</th>
<th>Cost for 10 people</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Web Link
To discover some international food recipes go to www.mathlinks8.ca and follow the links.
## Key Word Builder

Match each example in column A with the correct term in column B.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{\times 3}{3 \text{ plants}} = \frac{$85}{15 \text{ plants}} \times 3$</td>
<td><strong>part-to-part ratio:</strong> compares different parts of a group to each other within the same group</td>
</tr>
<tr>
<td>12 km/h</td>
<td><strong>part-to-whole ratio:</strong> compares 1 part of a group to the whole group</td>
</tr>
<tr>
<td>33¢/1</td>
<td><strong>proportion:</strong> 2 ratios or 2 rates that are equal</td>
</tr>
<tr>
<td>3 red balloons to 4 blue balloons</td>
<td><strong>rate:</strong> compares 2 quantities measured in different units</td>
</tr>
<tr>
<td>3 red balloons to a total of 16 balloons</td>
<td><strong>3-term ratio:</strong> compares 3 quantities with the same units</td>
</tr>
<tr>
<td>2:3</td>
<td><strong>2-term ratio:</strong> compares 2 quantities with the same units</td>
</tr>
<tr>
<td>3:4:6</td>
<td><strong>unit price:</strong> price for 1 article</td>
</tr>
<tr>
<td>45 km in 3 h</td>
<td><strong>unit rate:</strong> a rate in which the second term is 1</td>
</tr>
</tbody>
</table>

In the E below, shade the squares to show the ratio of black squares to white squares as 2:3.

```
\[ \begin{array}{cccc}
\square & \square & \square & \square \\
\square & \square & \square & \square \\
\square & \square & \square & \square \\
\end{array} \]
```
Math Games

Rolling Ratios

Play Rolling Ratios with a partner.

Rules:
• Each player rolls 1 die to decide who will play first. If there is a tie, roll again.
• Each partner takes a turn rolling the dice in each round.
• Write the values rolled on the Recording Chart.
• Write the ratio of the smaller value to the sum of the rolled values in fraction form.
• Write the fraction as a decimal. Round to the nearest hundredth (2 decimal places).
• Add the decimals from your turns.
• The first player to reach a total of 2.5 or higher wins the game.
  - If both players reach 2.5 in the same round, the player with the higher total wins.
  - If the totals are tied, keep playing until 1 player wins.

Example:

<table>
<thead>
<tr>
<th>Rolled Values</th>
<th>Ratio (fraction form)</th>
<th>Decimal (to the nearest hundredth)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 and 4</td>
<td>smaller value/sum of values = ( \frac{2}{6} )</td>
<td>( 2 \div 6 = 0.3333\ldots \approx 0.33 )</td>
<td>0.33</td>
</tr>
<tr>
<td>1 and 3</td>
<td>( \frac{1}{1+3} = \frac{1}{4} )</td>
<td>( 1 \div 4 = 0.25 )</td>
<td>0.33 + 0.25 = 0.58</td>
</tr>
<tr>
<td>3 and 3</td>
<td>( \frac{3}{3+3} = \frac{3}{6} )</td>
<td>( 3 \div 6 = 0.5 )</td>
<td>0.58 + 0.5 = 1.08</td>
</tr>
</tbody>
</table>
Challenge in Real Life

Life of a Bush Pilot

Doug is a bush pilot. He flies medical supplies and medical workers to the Northwest Territories. You be the flight planner.

Calculate the distances and times for Doug’s next trip using the map of Northwest Territories BLM.

1. Use a ruler to measure the distances to the nearest tenth of a centimetre.

   **Example:** Hay River to Tuktoyaktuk = 7.6 cm

   a) Tuktoyaktuk to Paulatuk = _______ cm      b) Paulatuk to Hay River = _______ cm

2. Use a proportion to calculate the actual flying distances.

   a) Hay River to Tuktoyaktuk

      \[
      \frac{1 \text{ cm on map}}{180 \text{ km}} = \frac{7.6 \text{ cm}}{x \text{ km}}
      \]

      \[
      x \times 7.6
      \]

      The distance from Hay River to Tuktoyaktuk is ____________ km.

   b) Tuktoyaktuk to Paulatuk

   c) Paulatuk to Hay River
3. Doug needs to fly emergency materials from Yellowknife to Inuvik.

   a) Measure the distance in centimetres between the 2 communities: __________ cm

   b) Calculate the actual distance between the communities.

      \[
      \frac{1 \text{ cm}}{180 \text{ km}} = \frac{\text{ cm}}{\text{ km}}
      \]

      Sentence: __________________________________________________________________

   c) Doug needs to get to Inuvik in 4.5 h.
      What will Doug’s average speed in km/h need to be?

      \[
      \frac{\text{actual distance}}{4.5 \text{ h}} = \frac{\text{ km}}{1 \text{ h}} \quad \text{Use your answer from part b) for the actual distance.}
      \]

      Sentence: __________________________________________________________________
Answers

Get Ready, pages 54–55
1. a) three to six, or 3 to 6; 3 : 6 b) six to nine, or 6 to 9; 6 : 9
2. a) 3: 15 b) 5: 15
3. a) 10; 10 : 1 or 10 1 b) 3; 3 : 1; 3 1

Math Link
a) Answers may vary. Example: Mexico, because I have always wanted to travel to Mexico.
b) Answers may vary. Example: 12 500.
c) Answers may vary. Example: $0.40, it will cost 40 cents per person.
d) Answers may vary. Example: 3125
e) Answers may vary. Example: $1250

f) Answers may vary. Example: one to four, or 1 to 4; 1 : 4; 1 4

2.1 Warm Up, page 57
1. a) five to seven, or 5 to 7; 5 : 7 b) seven to twelve, or 7 to 12; 7 : 12; 7 12
2. a) 5 6 b) 1 3
3. a) 0.8 b) 0.75 c) 0.625 d) 0.5
4. a) 89 b) 90% c) 48% d) 50%

2.1 Two-Term and Three-Term Ratios, pages 58–67
Working Example 1: Show You Know
a) 4 to 21; 4 : 21 b) grey, black c) 4 : 6; 11 d) 4 : 11; 21

Working Example 2: Show You Know
a) 3 : 1; 3 to 1 b) 3 7; 0.43; 43%

Communicate the Ideas
1. 4 : 3; Janine wants to know the number of oranges to apples, so she has to put the number of oranges first.
2. Answers may vary. Example:

Practise
3. a) 3 : 9; 1 : 3 b) Answers may vary. Example: 13 : 28
4. a) 12 15 b) 3 9
5. a) 4 b) 1
6. a) Red: w w w w w w w w w w
Green: w w w w w w w w w w
Yellow: w w w w w w
Other: w w w w w w w w w w
b) 11 c) 9 d) 1 : 4 : 6 e) 3 10; 0.3, 30%

Apply
7. They both rode 28 km/h.
8. a) $0.83 b) Rate; it compares different units
9. a) Joe’s car: 0.070 L/km; Sarah’s car: 0.0714 L/km
   b) Joes’ car

Math Link
a) 8 : 6 or 4 : 3; 2 : 3 : 4 b) Answers may vary. Example: I will draw a rectangle that is 8 cm by 6 cm.
c) Answers may vary. Example: I will draw a rectangle that is divided into 9 squares with 2 red squares, 3 blue squares, and 4 green squares.
d) Answers will vary.

2.2 Warm Up, page 68
1. a) 20 b) 50
2. a) 500 b) 600
3. a) 0.908 b) 0.504
4. a) 6 1 b) 3 1
5. a) 0.73 100 b) 1.05 100

2.2 Rates, pages 69–76
Working Example 1: Show You Know
a) 6 m/s b) $11/h

Working Example 2: Show You Know
400 mL = 0.86; 700 mL = 0.95¢/mL; 1.7 L = 1.01¢/mL
The best buy is the 400-mL bottle.

Communicate the Ideas
1. a) Answers may vary. Example: The birth mass of black bears to polar bears is 0.3 : 0.7. b) Answers may vary. Example: Divide the mass gained (6.2 kg) by 60.
2. a) Answers may vary. Example: speed limit, temperature b) Answers may vary. Example: km, h, °C

Practise
3. a) 55 km/h b) 64 km/h c) 2 daffodils/min d) 4 t/d e) 19.3 km/h f) 6 roars/h
4. a) $13/h b) $13.75/h c) Asad
5. a) Package: $0.73/100 g; Package 2: $0.62/100 g; Package 3: $0.69/100 g b) Package 2 is the best buy because the cost per 100 g is the least.
6. a) small jar: $0.0067/mL; large jar: $0.01/mL b) small size: $0.996¢; large size: $0.956¢; LARGE JAR

Apply
7. They both rode 28 km/h.
8. a) $0.83 b) Rate; it compares different units
9. a) Joe’s car: 0.070 L/km; Sarah’s car: 0.0714 L/km
   b) Joes’ car

Math Link
125 mL rice × 2.5 = 312.5 mL; 1 L milk × 2.5 = 2.5 L;
50 mL raisins × 2.5 = 125 mL; 250 mL sugar × 2.5 = 625 mL;
5 mL cardamom × 2.5 = 12.5 mL; 1 L milk × 2.5 = 2.5 L

2.3 Warm Up, page 77
1. a) 84¢ b) 40¢ c) 173¢ d) 76¢
2. a) $0.58 b) $1.85
3. a) 2 b) 15 c) 12 d) 30

2.3 Proportional Reasoning, pages 78–86
Working Example 1: Show You Know
a) 18 players

b) Answers may vary. Example: I like Method 2 better because it involves fewer steps.
Working Example 2: Show You Know

$3.00

Communicate the Ideas

1. Answers may vary. Example: Ratio: 20 cm : 25 cm; Rate: 20 m/5 s; Proportion: \( \frac{2}{5} = \frac{6}{15} \)

2. Answers may vary. Example: Use \( \frac{1.29}{3} \). Then, multiply the numerator and denominator by 4 to find the cost.

Practise

3. a) 10 b) 2 c) 9 d) 9
4. a) 33¢/roll b) 2 kg/box c) 42¢/pen d) 6 cm/block
5. a) 120 km b) 20 cans
6. a) $7/hour b) $21
7. $18
8. a) \( \frac{17}{10} \) beans = \( \frac{51}{30} \) beans b) 15 boys = 75 boys c) 1 cm = 6.4 cm d) 6 cm
9. a) \( \frac{150}{50} \) beans = \( \frac{300}{r} \) beans b) \( \frac{3}{17} \) = \( \frac{h}{51} \)

Apply

10. 2 squares = \( x \) squares
   Figure 1 = \( x \) squares

11. $50
12. a) $2.50/ride b) $45
13. $30
14. $52.80

Math Link

a) 63¢/person b) Answers will vary.

Chapter Review, pages 87–92

1. \( \frac{7}{50} = \frac{14}{100} \)
2. \( \frac{3}{5} \)
3. 4 : 3 : 2
4. $2.75 per tin
5. 27 km/h

6. a) 6 : 12; 18 : 36; \( \frac{3}{6} \) b) 50%
7. a) 1 : 2 : 5 b) 12 silver, blue, red, and yellow vehicles c) 8 d) the ratio of blue cars to total cars e) \( \frac{5}{20} \), 0.25, 25% f) \( \frac{1}{4} \)
8. a) 50 steps/min b) $0.90/L
9. a) computer: 3.6¢/h; television: 1.9¢/h
10. a) $4.98 : $13.95 b) $4.98/3 kg c) $1.66/kg d) $4.65/kg e) $2.99/kg
11. a) 10 kg b) $840
12. a) $8.82 b) 4 cm
13. a) 5 m b) 12.5 m

Practice Test, pages 93–95

5. 2 L
6. 80
7. 63
8. a) 4 b) 16 : 4 c) Answers may vary. Example: 8 : 2
9. a) Answers may vary. Example: small size: 40¢/100 mL; large size: 38¢/100 mL
   b) small size: 0.418¢/mL; large size: 0.439¢/mL; The small size is the better buy.
10. a) $12/h b) $10/h c) Karen d) $80

Wrap It Up!, page 96

Answers will vary.

Key Word Builder, page 97

1. proportion 2. unit rate 3. unit price 4. part-to-part ratio 5. part-to-whole ratio 6. two-term ratio 7. three-term ratio 8. rate

Challenge in Real Life, pages 99–100

1. a) 2 cm b) 6.4 cm
2. a) 1368 km b) 360 km c) 1152 km
3. a) 6.9 cm b) 1242 km c) 276 km/h