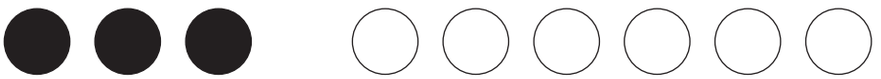
Get Ready

Name: _____ Date: _____

Writing Ratios

A **ratio** is a comparison of quantities that have the same units. The order of the words in a sentence indicates the order of the numbers in the ratio. Ratios can be written in several ways.



The ratio of black balls to the total number of balls can be expressed using

- *Words*: three compared to nine or 3 to 9
- *Ratio Notation*: 3 : 9
- *Fractions*: $\frac{3}{9}$

1. For the diagram shown above, write each ratio. Express each answer three different ways.

a) black balls to white balls

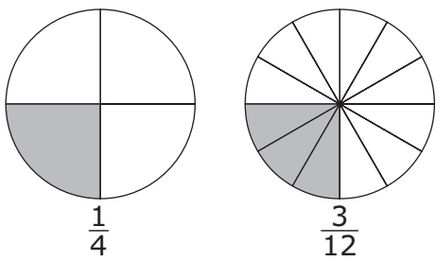
b) white balls to total balls

2. For the diagram shown above, what does each of the following ratios represent?

a) 6 : 3

b) 3 : 9

Equivalent Fractions



$\frac{1}{4}$ $\frac{3}{12}$

The fractions $\frac{1}{4}$ and $\frac{3}{12}$ are **equivalent fractions.** They are different names for the same fraction.

Literacy Link

$\frac{1}{4}$ ← numerator, denominator

Two fractions are equivalent if you can multiply or divide the numerator and denominator of one fraction by the same number to get the second fraction.

$\frac{1}{4} = \frac{3}{12}$ ($\times 3$ above, $\times 3$ below)

$\frac{3}{12} = \frac{1}{4}$ ($\div 3$ above, $\div 3$ below)

Name: _____ **Date:** _____

3. Are the following fractions equivalent? Show how you know.

a) $\frac{2}{3}$ and $\frac{6}{9}$ **b)** $\frac{1}{5}$ and $\frac{4}{20}$

4. List two equivalent fractions for each of the following.

a) $\frac{1}{4}$ **b)** $\frac{4}{12}$

5. Identify the missing value to make an equivalent fraction. Show how you calculated each value.

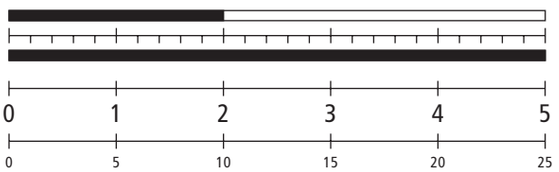
a) $\frac{5}{8} = \frac{\square}{24}$

b) $\frac{1}{3} = \frac{5}{\square}$

Comparing Quantities

A fraction can represent part of a whole. One half of the rectangle is shaded.

The top line is $\frac{2}{5}$, $\frac{10}{25}$, or $\frac{20}{50}$ of the bottom line.

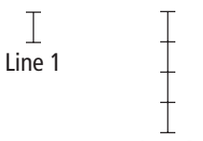


Think of the number line labelled as $\frac{2}{5}$.

Think of the number line labelled as $\frac{10}{25}$.

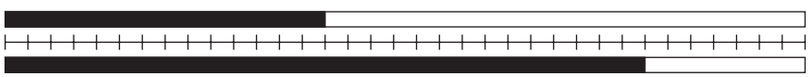
How could you label a number line to represent $\frac{20}{50}$?

You can use a **multiplier** to compare two quantities. In the diagram, Line 2 is 4 times as long as Line 1.



The multiplier of Line 2 compared to Line 1 is 4, or the ratio $\frac{4}{1}$.

6. Give three equivalent fractions that compare the top line to the bottom line.



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

a)

Figure 1 Figure 2

b)

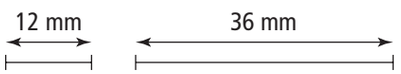


Figure 1 Figure 2

Name: _____ **Date:** _____

2.1 Two-Term and Three-Term Ratios

***MathLinks 8*, pages 46–54**

Key Ideas Review

1. Decide whether each of the following statements is true or false. Circle the word *True* or *False*. If the statement is false, rewrite it to make it true.

a) **True/False** A part-to-part ratio compares different parts of several groups.

b) **True/False** A part-to-whole ratio compares one part of a group to the whole group.

c) **True/False** A part-to-part ratio can be written as a fraction, decimal, or percent. For example, the ratio of flowers to leaves is $\frac{\square}{12}$ or $\frac{\square}{3}$, _____, or _____%.

d) **True/False** A three-term ratio compares three quantities measured in the same units.

e) **True/False** A two-term ratio compares two quantities measured in the same scale.

Practise and Apply

2. Write each ratio using ratio notation. Then, write the ratios in lowest terms.

a) Three red tiles compared to nine black tiles.

b) In a hotel, 23 rooms have a double bed and 9 have a queen-size bed. What is the ratio of double beds to queen-size beds to total beds?

Name: _____ **Date:** _____

c) A bike rack contains 5 road bikes and 15 mountain bikes.

d) Over two weeks, eight days were cloudy and six were sunny.

e) The arena schedule lists 10 hockey games, 8 skating classes, and 2 family times. Compare hockey games to total time slots.

f) The room has 16 chairs and 4 tables. Compare chairs to pieces of furniture.

3. Fill in the missing number to make each fraction equivalent.

a) $\frac{1}{3} = \frac{\square}{6}$ **b)** $\frac{\square}{3} = \frac{10}{15}$

c) $\frac{5}{6} = \frac{\square}{12}$ **d)** $\frac{40}{50} = \frac{80}{\square}$

4. There are 9 black tiles to 3 white tiles.

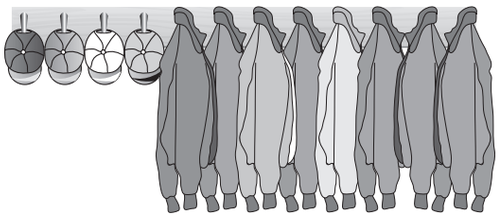
a) Draw the ratio.

b) Write the part-to-part ratio that corresponds with the drawing.

c) Write two part-to-whole ratios that correspond with the drawing.

d) Write the ratios in part c) as equivalent fractions in lowest terms.

5. What part(s) of this diagram could be represented by each of the following ratios?



a) 1 to 2

b) 8 : 12 : 4

c) 3 : 2

d) $\frac{12}{24}$

6. In a class of 28 students, 20 took band and the rest took choir. Use ratio notation to answer the following.

a) What is the ratio of choir members to total students in the class?

b) What is the ratio of band members to choir members?

7. A mixed cereal contains 150 g of rice, 300 g of wheat, and 400 g of oats. Write the ratio in decimal form to compare the types of grains in the cereal. Show your thinking and round the decimals to the nearest hundredth.

Name: _____ **Date:** _____

2.2 Rates

***MathLinks 8*, pages 55–62**

Key Ideas Review

1. Unscramble the letters to form a word in each blank to complete the statement.

a) A rate is a comparison of two quantities measured in _____ units.
TFDIFEERN

b) A rate can be expressed as a _____, but cannot be expressed as a _____.
OFNARTCI
REPTCNE

c) A unit rate is a rate in which the second term is _____.
NOE

d) To compare the cost of similar items a unit _____ is useful.
EPCIR

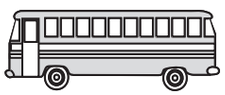
Practise and Apply

2. Determine the unit rate. Show your thinking.

a) Riding 50 km in 3 h. Round your answer to the nearest hundredth.

b) Typing 660 words in 10 minutes.

c) Moving 216 students in 4 buses.



d) Carrying 138 apples in 6 bags.

e) Raising $315 in 35 h.

f) Driving 220 km in $2\frac{1}{2}$ h.

3. Calculate the unit rate for each situation. Show your thinking. Then, circle the greater rate for each pair.

a) $210 for 30 h or $198 for 20 h

b) 574 km in 7 h or 420 km in 5 h

c) 64 h of sunlight in 16 days or 69 h sunlight in 23 days

4. The Mitchells' car used half a tank of gas when travelling from Edmonton to Calgary, a trip of about 300 km. If the fuel tank's capacity is 54 L, what was the car's fuel consumption rate in L/100 km?

Name: _____ **Date:** _____

5. You are shopping for yogurt.

a) What is the unit price for each container of yogurt?

b) What is the unit price per 100 g for each container of yogurt?

c) Which container is the best buy? Explain your thinking.

6. Jeremy earned $1365 after working for half of a year. He expects to continue working for the same number of hours each month, at the same pay rate.

a) How much will he earn in total after working for a year? Show two different ways of arriving at the answer.

b) If he works 10 hours a week, what is his hourly rate of pay? Show your thinking.

7. This table lists the approximate area and population of five countries.

Country	Population	Land Area (km^2)	Density
Canada	31 006 000	9 220 000	
Ecuador	12 562 000	278 000	
France	58 978 000	546 000	
Nether-lands	15 808 000	34 000	
United States	272 640 000	9 159 000	

a) Calculate the population density (population/km^2) for each country listed. Show your thinking below, then record the values in the table rounded to the nearest hundredth.

b) List the countries in order from greatest density to least density.

c) Is population density a rate? **Yes** **No** Explain.

Name: _____ **Date:** _____

2.3 Proportional Reasoning

***MathLinks 8*, pages 63–69**

Key Ideas Review

Choose from the following terms to complete #1 and #2.

equal	proportion	ratios	unit rate

1. A proportion is a relationship that says that two _____ or rates are _____.

2. Identify the method shown in each example, then solve for the missing value.

a) Using a _____.

$$\frac{\$6}{4 \text{ advocadoes}} \overset{\times 2.5}{=} \frac{\$\square}{10 \text{ advocadoes}}$$

$\times 2.5$

Missing value is $\$6 \times 2.5 = \$$_____

b) Using a _____.

$$\frac{\$6}{4 \text{ advocados}} = \frac{\$1.50}{1 \text{ advocado}}$$

$10 \times \$1.50 = \$$_____

Practise and Apply

3. Determine the unit rate. Show your thinking.

a) Riding a bicycle 50 km in 2 h.

b) A pack of 10 pencils for $2.49.

c) Running 400 m in 80 s.

d) Ground beef costs $5.99 for 3 kg.

4. Fill in the missing value. Show your thinking.

a) $\frac{1}{4} = \frac{\square}{12}$ **b)** $\frac{12}{16} = \frac{\square}{4}$

c) $\frac{10}{\square} = \frac{2}{5}$ **d)** $\frac{\square}{21} = \frac{4}{7}$

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

a) $\frac{16 \text{ roses}}{2 \text{ bouquets}} = \frac{\square \text{ roses}}{1 \text{ bouquet}}$

b) $\frac{190 \text{ km}}{2 \text{ h}} = \frac{\square \text{ km}}{8 \text{ h}}$

Name: _____ **Date:** _____

6. Set up a proportion for each situation.

a) A plant that is 40 cm tall has a planter that is 20 cm wide. If it grows to a height of 50 cm, it will need a planter 25 cm wide.

b) If there are 60 mL of sugar in 600 mL of pop, then 1 L of pop contains 100 mL of sugar.

c) A car needs 9.4 L of gasoline to go 100 km. It will need 56.4 L to go 600 km.

7. There are 42 players on 7 volleyball teams. How many players are on 4 teams? Show your thinking.

8. Trevor is a high school quarterback. On average, out of each 16 attempts, he completes 5 out of 8 passes and throws 1 pass that is intercepted. Set up a proportion to answer each question, and then write a sentence answer.

a) If Trevor passes 40 times, how many completions would he be expected to make?

b) In last week's game, he attempted 32 passes. How many were likely intercepted?

9. Fill in the missing value in each equivalent fraction. Show your thinking.

a) $\frac{\square}{20} = \frac{4}{5} = \frac{\square}{30}$

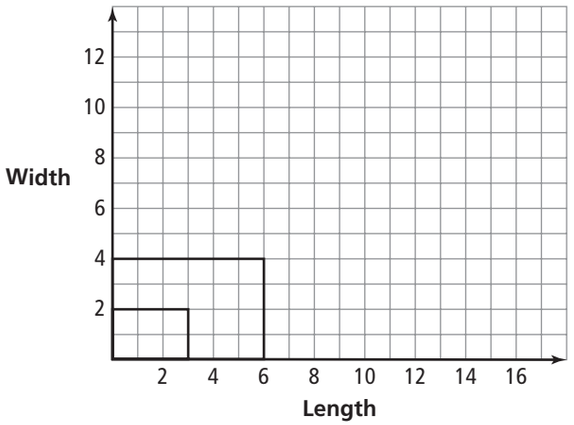
b) $\frac{\$4.14}{3\text{ kg}} = \frac{\square}{1\text{ kg}} = \frac{\square}{7\text{ kg}}$

10. Car A used 40.5 L of gasoline to travel 450 km. Car B used 18.7 L to travel 220 km. Circle the car with better fuel mileage. Justify your answer by calculating each car's L/100 km rate. Show your work.

11. On a map of Alberta, Edson is 2 cm from Spruce Grove. A proportion on the map shows that 3 cm on the map equals 225 km on the ground. Write the correct distance on the highway sign. Show your thinking.

Name: _____ **Date:** _____

Link It Together



1. a) Write a ratio for the two rectangles on the graph.

b) On the graph, draw the next three rectangles that continue the pattern.

c) Complete the table. Show your thinking.

Rectangle	Length	Width	Area (square units)	Area Difference (square units)
P	3	2	6	—
Q	6	4	24	18
R	9		54	30
S				
T				

d) Write the width to the length ratio of these rectangles as a fraction in lowest terms.

d) Predict the area of rectangle U. Show your thinking.

Name: _____ **Date:** _____

Vocabulary Link

Draw a line from the example in column A to the correct term in column B, and then find each term in the word search. Note that the words in the word search do not have any hyphens.

A	B
1. $\frac{3 \text{ plants}}{0.5 \text{ m}^2} \overset{\times 170}{=} \frac{\square}{85 \text{ m}^2}$ (multiply by 170)	**a)** part-to-part ratio
2. 12 km/h	**b)** part-to-whole ratio
3. 33¢/1	**c)** proportion
4. three red balloons in a drawer to four blue balloons in a drawer	**d)** rate
5. 3 red balloons in a drawer to 16 balloons in a drawer	**e)** three-term ratio
6. 2 : 3	**f)** two-term ratio
7. 3 : 4 : 6	**g)** unit price
8. 45 km in 3 h	**h)** unit rate

E	I	D	M	Z	B	Z	I	C	D	X	G	L	F	K	F	S	J	B	F
C	Y	K	T	Y	L	G	J	R	P	Z	B	E	X	J	J	D	B	Y	T
W	V	J	H	Z	G	U	I	C	A	M	F	D	H	W	O	Y	V	D	J
V	L	X	R	N	X	J	W	A	R	F	S	C	U	F	X	C	C	S	T
P	A	U	E	B	X	T	G	R	T	I	L	P	Y	T	P	Z	H	G	K
F	F	X	E	V	N	R	I	S	T	X	G	T	O	U	R	D	P	C	G
D	P	X	T	S	O	X	U	J	O	E	X	I	Q	J	O	Q	W	T	Q
T	U	U	E	X	V	L	H	M	P	Q	T	C	C	I	P	E	I	G	B
S	N	N	R	O	X	T	E	K	A	A	J	M	X	Q	O	N	W	B	U
I	I	I	M	Z	A	R	Q	E	R	K	C	T	B	G	R	E	M	M	L
I	T	T	R	F	L	I	M	M	T	W	F	F	Z	U	T	S	M	H	K
U	R	P	A	E	V	Y	R	A	R	L	H	D	E	V	I	N	J	J	P
G	A	R	T	S	L	E	K	P	A	K	T	R	X	C	O	M	A	P	J
G	T	I	I	F	T	F	T	M	T	L	B	Z	A	L	N	L	V	I	M
X	E	C	O	O	E	A	M	S	I	O	X	H	R	T	D	K	F	M	W
F	Y	E	W	N	N	J	L	C	O	M	P	Q	O	G	E	C	T	D	A
B	D	T	P	A	R	T	T	O	W	H	O	L	E	R	A	T	I	O	S
L	B	X	J	Z	I	Y	I	W	A	O	O	J	N	O	Z	M	L	H	O