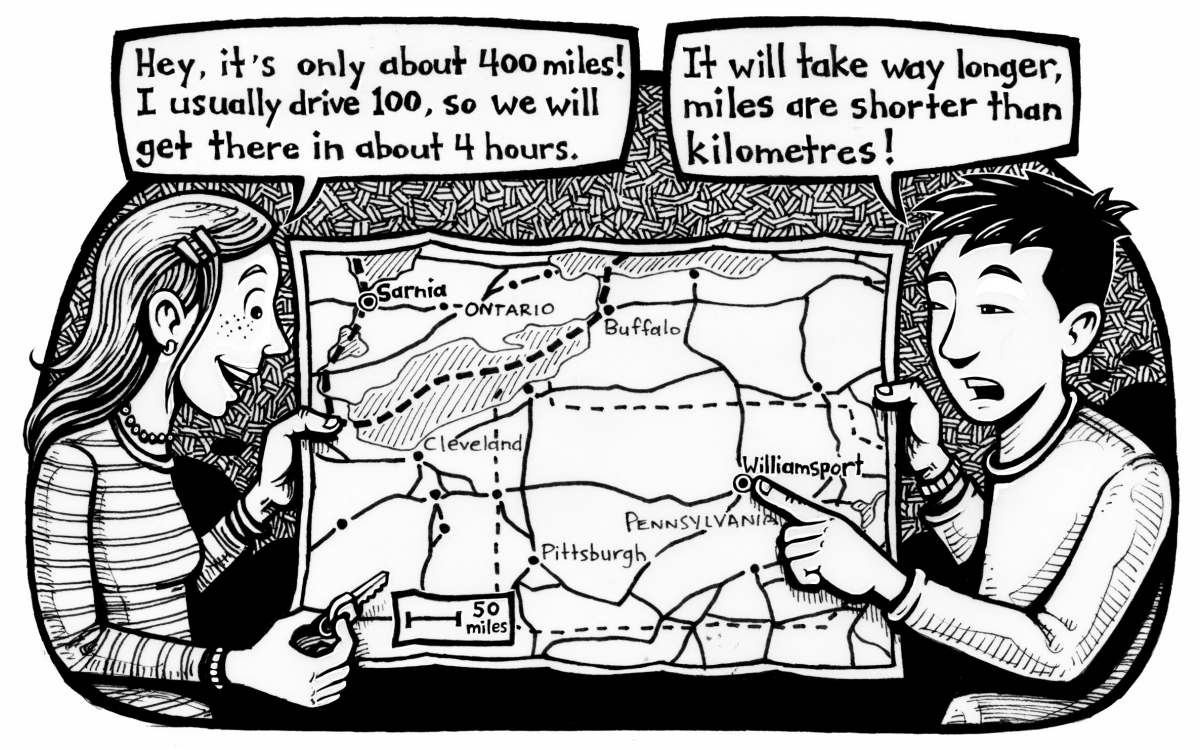
Date _____

6 Measuring and Estimating



1. What error is the girl making?

2. What error is the boy making?

3. How long do you think the drive will take? Explain your answer.

Chapter 6

Date _____

6.1 Length

Focus: metric measure, Imperial measure, measurement references

Warm Up

1. Solve *without* a calculator.

a) 14 × 1 = _____

b) 14 × 10 = _____

c) 14 × 100 = _____

2. Solve *without* a calculator.

a) 0.7 × 10 = _____

b) 0.7 × 100 = _____

c) 0.7 × 1000 = _____

3. Describe the pattern when multiplying by 10, 100, and 1000.

_____

_____

4. Count by 12s.

_____, _____, _____, _____, _____

_____, _____, _____, _____, _____

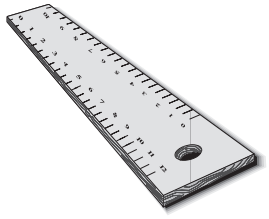
5. Write 2 pairs of numbers that multiply to 12.

_____ × _____

_____ × _____

Metric Length

1. Measure each line in the chart. Record the length in centimetres and in millimetres. The first one is done for you.



a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

g) _____

h) _____

Length in Centimetres	Length in Millimetres
4.3 cm	43 mm

Chapter 6

Date _____

2. Draw lines of the following lengths. Do not use a ruler. Instead, estimate each of the lengths.

Length	Estimation
a) 1 cm	
b) 5 cm	
c) 10 mm	
d) 5 mm	
e) 15 mm	

f) Measure each line in the chart. Label the actual measurement. See how close you were.

- Estimating the length of an item or distance is difficult without something to help you.
- Using a set of **personal references** can help you estimate certain lengths.
- A personal reference for 1 m might be the distance from the end of your nose to the tip of your longest finger when your arm is out-stretched. A personal reference for 1 cm might be the width of your cell phone's key.

Go to pages 187–188 to write a definition for **personal references** in your own words.

3. Collect 4 personal references that will help you estimate the common lengths in the chart. Describe your personal references in the chart.

Metric Length	Personal Metric Reference
1 cm	
10 cm	
1 m	
2 m	

4. Go to #13 on page 194 and complete the column titled Metric Length.

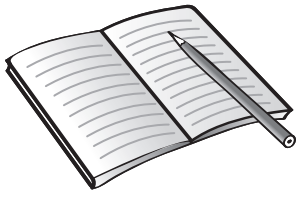
Date _____

5. a) Complete the "Units" column by stating the metric unit that you would use to measure each item.

Item	Unit	Estimate	Metric Measurement
length of classroom			
height of a light switch			
thickness of a loonie			
diameter of a penny			
width of classroom door			

b) Complete the "Estimate" column by estimating the metric measure of each item. Use the personal references you have gathered.

c) Complete the "Measurement" column by measuring each item using a ruler or measuring tape.



6. a) Which personal reference could you use to estimate the length of this page? _____

b) Explain how you could use this personal reference to make the estimate.

_____

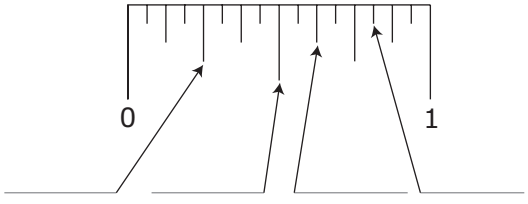
_____

Imperial Length

7. a) What is half of a half? _____

b) What is half of your answer for part a)? _____

8. This diagram of an inch is divided into 16 equal parts. Identify each fraction shown with an arrow.



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 978-0-07-090894-9

Date _____

9. Measure each line. Record the length in inches or fractions of an inch.

a) _____

b) _____

c) _____

d) _____

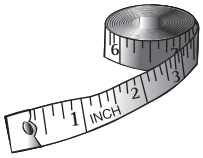
e) ___

f) _____

g) _____

h) _____

Length in Inches



10. Draw lines of the following lengths. Do not use a ruler. Instead, estimate each of the lengths.

There are two short forms for inch: in. and ".

Length	Estimation
a) 1 inch	
b) 2 in.	
c) 3"	
d) $\frac{1}{2}$ inch	
e) $1\frac{1}{2}$ in.	

f) Measure each line in the chart. Label the actual measurement. See how close you were.

Chapter 6

Date _____

11. a) How many inches are in 1 foot? _____

b) How many inches are in $\frac{1}{2}$ foot? _____

c) How many inches are in 2 feet? _____

d) How many inches are in 3 feet? _____

In the Imperial system:
- 12 inches is referred to as 1 _____
- 3 feet is referred to as 1 _____

- As with metric measurement, it's easier to estimate Imperial lengths using references.
- Good references use parts of the body or common things around you.
- The Imperial system was developed around personal references.

12. Collect 4 personal references that will help you estimate the following Imperial lengths.

Imperial Lengths	Personal Imperial Reference
1 inch	
1 foot	
2 feet	
3 feet	

13. What lengths could you use these body parts to estimate?

Personal Reference	Metric Length	Imperial Length
Your outstretched hand		
The length of your foot		
The length of your arm		
Your height		

Date _____

14. a) Complete the "Units" column with the Imperial unit that you would use to measure each item.

Item	Unit	Estimate	Imperial Measurement
Length of classroom			
Height of a light switch			
Thickness of a loonie			
Diameter of a penny			
Width of classroom door			

b) Complete the "Estimate" column by estimating the Imperial measure of each item. Use the personal references you have gathered.

c) Complete the "Imperial Measurement" column by measuring each item using a ruler or measuring tape.

15. a) Which personal references would you use to estimate the height of the classroom in Imperial measurement?

_____

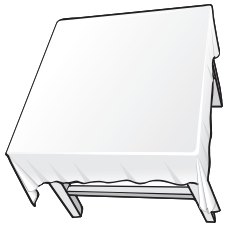
b) Explain how you would use that personal reference.

_____

_____

☑ Check Your Understanding

1. You are planning a special party and want to buy a tablecloth for a large table you have borrowed.



a) Explain which personal references you would use and how you would use them to measure the size of the cloth you need. _____

_____

_____

_____

b) Would you use metric or Imperial personal references? Explain your choice. _____

_____

Chapter 6

Date _____

6.2 Capacity

Focus: metric measure, Imperial measure, measurement references

Warm Up

1. Solve *without* a calculator.

a) 1500 ÷ 1 = _____

b) 1500 ÷ 100 = _____

c) 1500 ÷ 1000 = _____

2. Solve *without* a calculator.

a) 355 ÷ 1 = _____

b) 591 ÷ 100 = _____

c) 473 ÷ 1000 = _____

3. Describe the pattern for dividing the same number by 10, 100, and then 1000. _____

_____

4. Solve *without* a calculator.

a) 1.9 × 1000 = _____

b) 0.355 × 1000 = _____

c) 1500 ÷ 1000 = _____

5. List these Imperial units from smallest to largest:
foot, inch, mile, yard

_____, _____,

_____, _____

6. **a)** There are _____ mL in 1 litre.

b) There are _____ mL in $\frac{1}{2}$ litre.

7. Circle the better buy.

250 mL for $1.99

or

2 L for $9.99

What Do You Already Know?

1. **a)** By what unit is gasoline sold in Canada? _____

b) By what unit is gasoline sold in the United States? _____

c) Which unit for selling gasoline is bigger? _____

d) What is the capacity of a small plastic bottle of water? _____

e) How much does a tablespoon hold? _____

Chapter 6

Date _____

Metric Capacities

- The **capacity** of a container is the greatest amount that it can hold.
- You can estimate a capacity using a personal reference, just like you can estimate a length.

Go to pages 187–188 to write a definition for **capacity** in your own words.

2. Collect measurement references for the following metric capacities.

millilitre = mL
litre = L

Common Capacities	Reference
10 mL	
500 mL	
1 L	
2 L	

3. The chart in #2 provides some personal references. Use these references to estimate the following capacities. The last 4 rows are for containers of your choice.

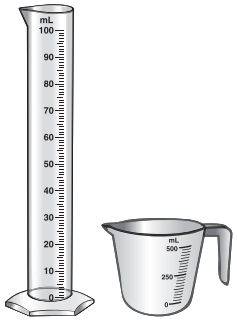
20 L

Container	Approximate Metric Capacity
A typical coffee cup	
A small red plastic gasoline container	
A baby food jar	
A kitchen sink	

Date _____

4. Circle the most appropriate capacity.

Container	Most Appropriate Capacity			
a) A car's gas tank	500 mL	5 L	50 L	500 L
b) A small bottle of shampoo	30 mL	300 mL	3 L	30 L
c) A large drink from a fast food restaurant	0.5 mL	50 mL	1 L	2.5 L
d) A blue plastic bottle in a water dispenser	200 mL	2000 mL	20 L	2000 L



5. Look at the units on several graduated cylinders and metric measuring cups.

a) What units are used on the graduated cylinders? _____

b) What units are used on the measuring cups? _____

c) Are there any units on these items that you do not recognize? If so, list them.

_____

_____

6. Use a metric measuring cup or a graduated cylinder to measure out the following capacities. What personal reference could you use for each amount?

1 cc stands for 1 cubic centimetre. This is equivalent to 1 mL.

Capacity	Personal Reference
a) 10 mL	
b) 40 mL	
c) 75 mL	
d) 90 mL	
e) 150 mL	

Chapter 6

Date _____

US Imperial Capacities

- There are two type of Imperial capacities: US and British.
- Both use the same names for units: ounce, pint, quart, and gallon.
- Some of the units represent different sizes. For example, the US fluid ounce is slightly larger than the British fluid ounce.
- In this book, all references to Imperial capacities will refer to US Imperial units because the United States shares a border with Canada and is a major trading partner.

7. One US pint is equal to 16 fluid ounces. Convert each US measurement to the unit given.

a) 1 US quart
= 2 pints
= _____ fluid ounces

b) 1 US gallon
= 4 quarts
= _____ pints
= _____ fluid ounces

8. a) Use measuring cups with Imperial measure to measure out the following capacities. What personal reference could you use for each amount?

The abbreviation for pint is "pt". The short form for fluid ounce is "fl oz".

Common Imperial Capacities	Approximate Metric Equivalent	Personal Reference
1 fluid ounce	30 mL	
8 fl oz	250 mL	
1 quart	1 litre	
1 gallon	4 litres	

The abbreviation for quart is "qt". The short form for gallon is "gal".

b) Approximate metric equivalents are included in the chart. How might these help you remember Imperial capacities?

_____

_____

Chapter 6

9. The chart in #8 provides some personal references. Use these references to estimate the following Imperial capacities. The last 2 rows are for containers of your choice.

Container	Approximate Imperial Capacity
A typical coffee cup	
A small red plastic gasoline container	
A baby food jar	
A kitchen sink	
_____	
_____	

10. Circle the most appropriate capacity.

Container		Most Appropriate Capacity			
a)	A car's gas tank	1 qt	1 gal	5 gal	15 gal
b)	A small bottle of shampoo	1 fl oz	8 fl oz	16 fl oz	2 qt
c)	A large drink from a fast food restaurant	6 fl oz	16 fl oz	16 qt	16 gal
d)	A blue plastic bottle in a water dispenser	1 qt	5 qt	1 gal	5 gal

11. a) A coffee shop sells coffee in four sizes of cups. Use the information in the chart to determine the cost per fluid ounce for each size of cup. Round your answers to the nearest cent per fluid ounce.

Size	Capacity	Cost Before Tax	Unit Cost (¢/fl oz)
Medium	10 fl oz	$1.28	
Large	14 fl oz	$1.45	
Extra large	20 fl oz	$1.59	

b) Based on your answer for part a), which cup of coffee is the better buy? _____

c) Why would you choose a size other than the one that is the better buy? Explain your answer.

☑ Check Your Understanding

1. While watching an American television station, Jordan hears an ad for a grocery store. The store sells a gallon of milk for $2.99. Without considering currency exchange, what is the milk's approximate price per litre?

2. a) List 4 containers in your classroom.

Container	Estimate of Metric Capacity	Estimate of Imperial Capacity

b) Use your personal references to estimate the metric capacity of each container.

c) Use your personal references to estimate the Imperial capacity of each container.

3. a) Select one of your items from #2. Measure the actual metric and Imperial capacity of the container.

b) Are you better at estimating metric or Imperial capacity? _____

Date _____

6.3 Estimating Large Numbers

Focus: estimating large numbers, developing strategies

Warm Up

1. Round the following numbers to the nearest 10.

a) 49 _____ **b)** 52 _____

c) 17 _____ **d)** 35 _____

2. Add the rounded answers from #1.

3. Add the numbers from #1.

4. Calculate the difference between your answers for #2 and #3.

_____

5. Estimate how much a person will earn in 8 hours, if they make $11.90 per hour.

6. Round the amounts to the nearest dollar.

a) $1.10 _____

b) 99¢ _____

c) $8.88 _____

d) $97.25 _____

7. Add the rounded answers from #6.

8. a) How else could you round the numbers in #6?

_____

b) Recalculate the total using new values.

Make an Educated Guess

- How can you determine the number of fans at a basketball game, or the number of students at a dance?
- In many cases, the ability to estimate is more useful than the ability to calculate an exact answer. It's close enough to know that there were *about* 2000 fans at the game.
- Estimation also works well with time. For example, a flight scheduled to depart at 10:37 and arrive at 12:46 means that you'll be in the air for a bit more than 2 hours. Rarely is it important to calculate the length of the flight as 2 hours and 9 minutes.

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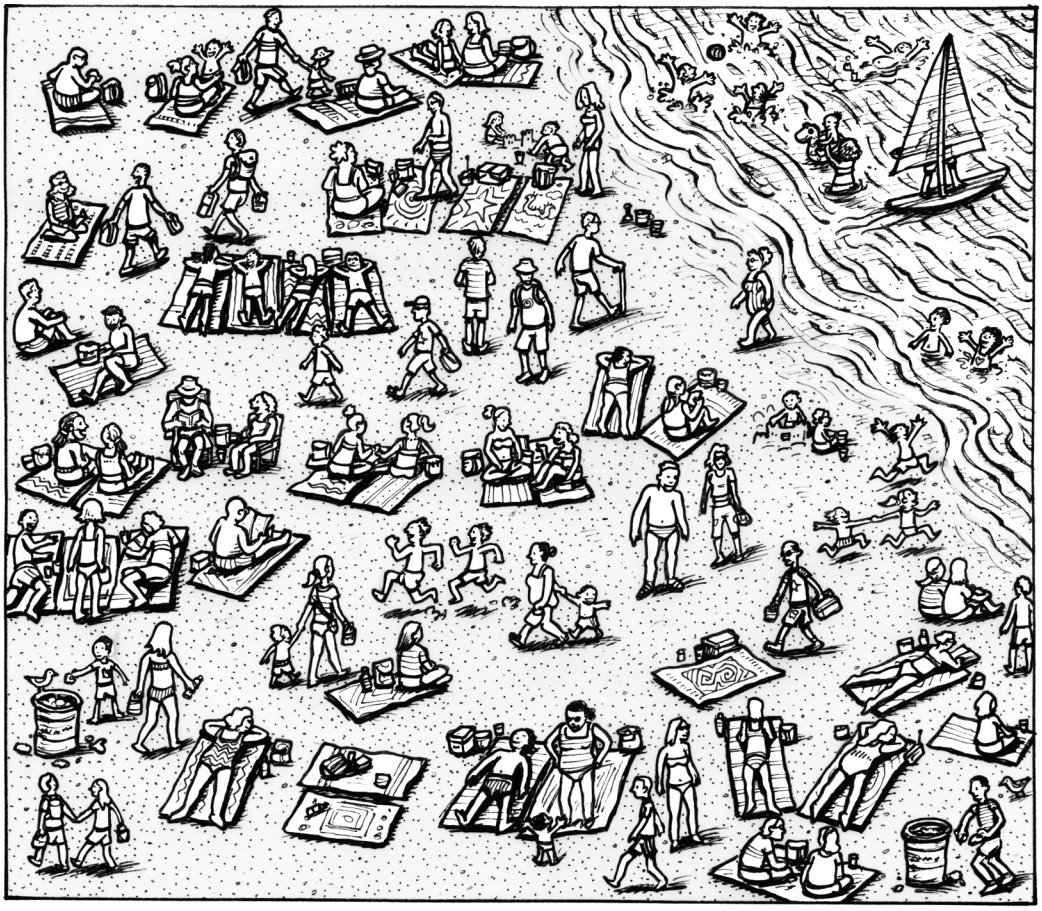

1. a) Estimate the number of people in this picture. _____

b) Describe the strategy you used to answer part a).

c) Compare strategies with 2 of your classmates. What strategy did they use?

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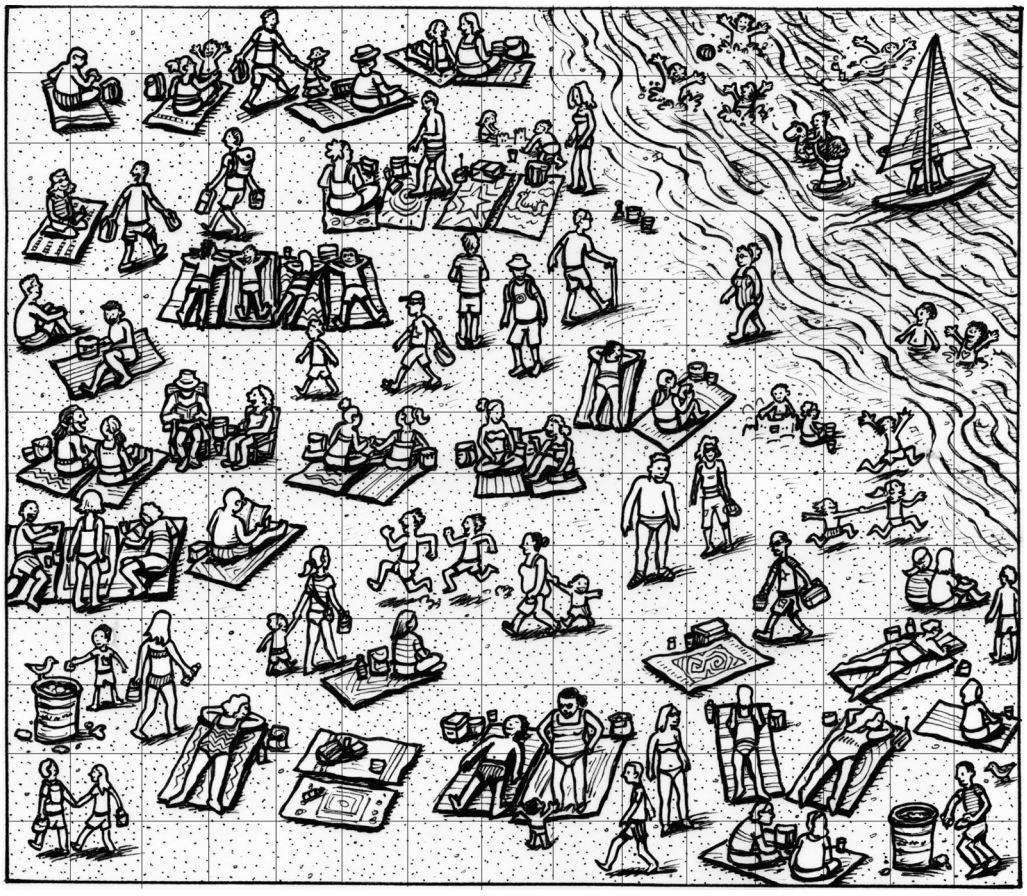


Animal populations are often estimated using this strategy.

2. a) Pick a square in the picture. How many people are in the square? _____

b) How many squares are in the picture? _____

c) Assume that each square has about the same number of people in it. About how many people are in the picture? _____

d) State 1 advantage of using this method of estimating the number of people in the picture.

_____

_____

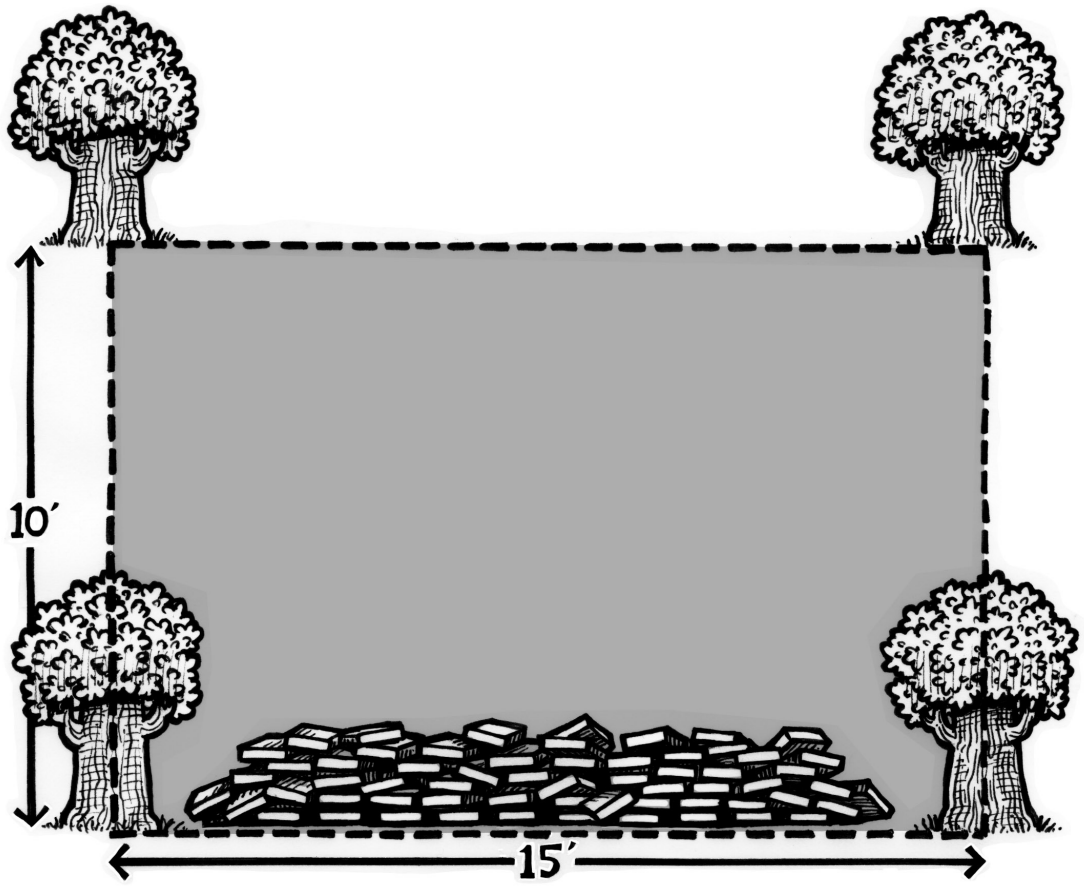
e) State 1 disadvantage of using this method of estimating the number of people in the picture.

_____

_____

Date _____

3. Mei wants to build a rectangular patio in her backyard. The patio will be built in the centre of 4 trees, which form a rectangle. Mei is using square patio stones that measure 12″ by 12″.



a) Draw a sketch of the patio Mei wants to build.

b) Calculate how many patio stones Mei would need to cover the patio.

c) Estimate how many patio stones there are in the picture. _____

d) Describe a strategy you could use to estimate the number of patio stones in the pile.

_____

_____

Chapter 6

Date _____

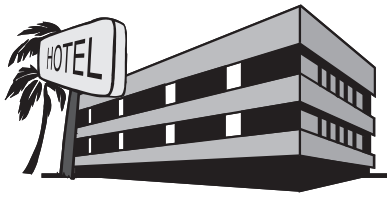
- When going grocery shopping, it is important to have a budget.
- When you shop, it is difficult to add the actual prices unless you have a calculator with you.
- Rounding the prices of items can help you estimate the total cost of your groceries as you shop.

4. a) Create a grocery list for a couple in their twenties with an infant. The couple has a weekly budget of $150. Use store flyers to help you select items. Complete the chart.

Item	Actual Cost	Rounded Cost
	Estimated Total Cost	

b) What different strategies did you and your friends use for estimating the amount of this bill? Which ones worked best?

5. A website says that the driving distance between Gloucester (a suburb of Ottawa) and Orlando, Florida is 1439 miles. Driving time is approximately 24 hours. Estimate the following items.



a) How many times would you need to stop for fuel? _____

How long would each stop last? _____

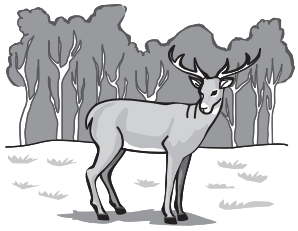
b) What other stops would you need to make?

Estimate the total time needed for these stops. _____

c) So, the total time for the trip would not be 24 hours. It would be closer to _____ hours.

How many nights would you sleep over? _____

d) If you leave Gloucester at 6:00 A.M. on a Saturday morning, what day and approximately what time would you arrive in Orlando?



☑ Check Your Understanding

1. One square kilometre of a provincial park contains 12 deer. The park has an area of about 85 square kilometres. Describe how you could estimate the deer population of the park.

Date _____

Skills Practice 9: Converting Between Imperial Measures

There are 12 inches in 1 foot.
You can use proportional reasoning to help you convert feet to inches.

$$\frac{12 \text{ in.}}{1 \text{ ft}} = \frac{\_\_\_\_ \text{ in.}}{6 \text{ ft}}$$

$$\frac{12 \text{ in.}}{1 \text{ ft}} \overset{\times 6}{=} \frac{\_\_\_\_ \text{ in.}}{6 \text{ ft}}$$

You can also count by 12s.

1 ft = 12 in.
2 ft = 24 in.
3 ft = 36 in.
4 ft = 48 in.
5 ft = 60 in.
6 ft = 72 in.

1. Solve.

a) 4 ft = _____ in. **b)** 3 ft = _____ in.

c) 5' = _____" **d)** 1' = _____"

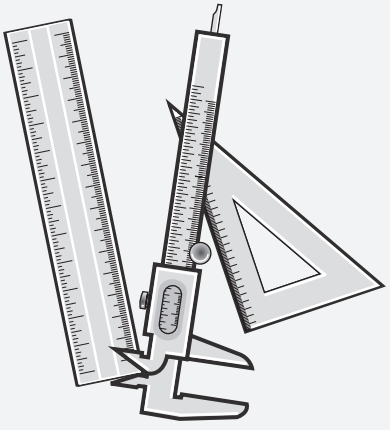
Convert 6 ft 3 in. to inches.
1 ft = 12 in., so 6 ft = 72 in.
6 ft 3 in. = 72 in. + 3 in.
= 75 in.

2. Convert each measurement to inches.

a) 1 ft 7 in. = _____ inches

b) 4 ft 11 in. = _____ inches

c) 10' 6" = _____ inches



Chapter 6

Date _____

Convert 32 in. to feet and inches.

32 = 24 + 8

= 2 ft 8 in.

There are 24 inches in 2 feet.
There are 36 inches in 3 feet.
So 32 inches is 2 foot something.

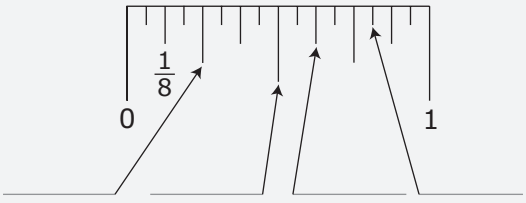
3. Convert each measure to feet and inches.

a) 27 in. = _____ ft _____ in.

b) 70 in. = _____ ft _____ in.

Convert fractions of an inch to lowest terms.

Most tape measures and rulers divide each inch into sixteenths. Label the fractions shown.



4. Small measurements can be measured as a fraction of an inch. Write these fractions in lowest terms.

a) $\frac{4}{16}$" = _____ **b)** $\frac{10}{16}$" = _____ **c)** $\frac{14}{16}$" = _____

Chapter 6

Date _____

Skills Practice 10: Converting Between Metric Measures

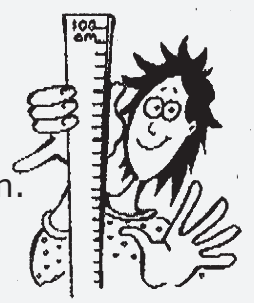
1. a) Arrange the following metric units from shortest to longest.

kilometre *centimetre* *metre* *millimetre*

_____

b) Write the common abbreviation for each unit.

_____ _____ _____ _____



2. Fill in the blanks.

a) There are 10 _____ in 1 cm.

b) 1 m equals 100 _____.

c) 1 km equals _____ m.

3. Fill in the blanks using the abbreviations for the metric units.

a) 2 m = 200 _____ **b)** 3000 _____ = 3 km

c) 400 cm = 4 _____ **d)** 4 _____ = 40 mm

e) 10 cm = 100 _____ **f)** 1.5 _____ = 1500 m

g) 260 mm = 26 _____ **h)** 260 mm = 0.26 _____

You can use proportional reasoning to help you convert centimetres to metres.

$$\frac{400\text{ cm}}{?\text{ m}} = \frac{100\text{ cm}}{1\text{ m}}$$

$$\frac{400\text{ cm}}{?\text{ m}} \overset{\div 4}{=} \frac{100\text{ cm}}{1\text{ m}}$$

$4 \div 4 = 1$

100 cm = 1 m

400 cm = 4 m

4. Convert each measure to the units shown.

a) 500 cm = _____ m **b)** 500 m = _____ km

c) 9 cm = _____ mm **d)** 9 m = _____ cm

e) 1.5 m = _____ cm **f)** 1.5 km = _____ m

5. Circle the larger measure.

a) 450 m or 45 km

b) 1 m or 120 cm

c) 300 cm or 0.5 km

d) 70 mm or 0.7 cm

Chapter 6

Date _____

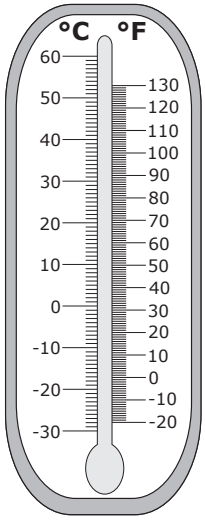
6.4 Converting Units

Focus: metric measure, Imperial measure, proportional reasoning

Warm Up

1. How many cents are in 1 dollar? _____	**2.** How many minutes are in 1 hour? _____
3. How many years are in 1 decade? _____	**4.** What is **a)** half of 12? _____ **b)** $\frac{1}{4}$ of 12? _____
5. State 3 metric units for measuring length. _____	**6.** State 3 Imperial units for measuring length. _____
7. How many nickels are in $2? _____	**8.** How many months are in $2\frac{1}{2}$ years? _____

What Units Do You Usually Use?



- Sometimes it is necessary to convert a measurement to a different unit.
- For example, you may measure the length of a room in inches but a store sells trim by the foot. You may need to mix litres and millilitres to get the right mix of gas and oil for your grass trimmer.

1. Fill in the blanks to complete the statement, "I tend to measure…" The first one is done for you.

a) the outside temperature in degrees Celsius

b) the oven temperature in degrees _____

c) my weight in _____

d) my height in _____

e) driving distances in _____

f) lengths in my home in _____

g) liquids in the kitchen in _____

h) weights in the kitchen in _____

Chapter 6

Date _____

Converting Between Metric Units

2. Write the metric units from shortest to longest.

centimetre kilometre metre millimetre

_____

3. Often, if you know how to convert between 2 units, you are able to use what you know to convert between multiples of those units.

a) 1 m = _____ cm 2 m = _____ cm

b) 1 cm = _____ mm 3.5 cm = _____ mm

c) 1 km = _____ m 0.5 km = _____ m

d) Show or explain how you can use proportions to make these conversions.

_____

_____

_____

For a review of how to convert from 1 metric unit to another, see **Skills Practice 10: Converting Between Metric Measures** on page 210.

4. Measure the following 3 items. State the measurement in 2 different metric units. Add 2 more items of your choice to the bottom of the chart.

Item	Length in Metric Units
a) the length of this book	_____ _____ or _____ _____
b) the height of the classroom door	_____ _____ or _____ _____
c) the thickness of a loonie	_____ _____ or _____ _____
d) _____	_____ _____ or _____ _____
e) _____	_____ _____ or _____ _____

Chapter 6

Date _____

5. Write the metric units from lightest to heaviest.

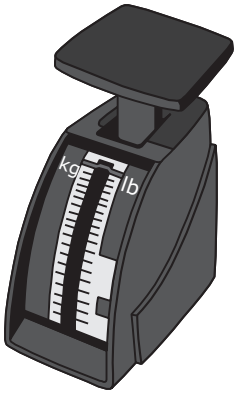
milligram kilogram gram

_____

6. Fill in each box.

a) 1 kg = _____ g 2 kg = _____ g

b) 1 g = _____ mg 500 g = _____ mg



You would usually talk about "weighing" something. Mathematicians and scientists refer to "measuring its mass."

7. Weigh the following 2 items. State the weight in 2 different metric units. Add 2 more items of your choice to the bottom of the chart.

Item	Weight in Metric Units
a) this book	_____ _____ or _____ _____
b) a loonie	_____ _____ or _____ _____
c) _____	_____ _____ or _____ _____
d) _____	_____ _____ or _____ _____

8. a) Which unit do you think is better to use when weighing this book? Explain your answer.

_____

_____

b) Show how you can use proportions to convert grams to kilograms.

Chapter 6

Date _____

Converting Between Imperial Measures

9. Write the Imperial units from shortest to longest.

foot inch mile yard

_____

10. Fill in the blanks. Use a tape measure or yard stick for reference.

a) 1 ft = _____ in. 2 ft = _____ in.

b) 1 yd = _____ ft 10 yd = _____ ft

For a review of how to convert from one Imperial unit to another, see **Skills Practice 9: Converting Between Imperial Measures** on page 208.

- Imperial lengths are often stated as a combination of feet and inches. Sometimes just inches are used.
- Twenty-two inches might be shown as 22" or 1' 10". People rarely refer to it as 1.833 ft.

11. Convert the units as indicated.

a) 18 inches = _____ ft _____ in.

b) 27 inches = _____ ft _____ in.

c) 48 inches = _____ ft _____ in.

d) 5 ft 4 in. = _____ in.

e) 6 ft = _____ in.

12. Measure the following 3 items. State the measurement in 2 different Imperial units. Add 2 more items of your choice to the bottom of the chart.

Item	Length in Imperial Units
a) my height	5 ft 11 in. or _____ in.
b) the height of the classroom door	_____ _____ or _____ _____
c) the thickness of a loonie	_____ _____ or _____ _____
d) _____	_____ _____ or _____ _____
e) _____	_____ _____ or _____ _____

Date _____

13. List the following Imperial weights from lightest to heaviest.

pound ton ounce

_____

- There are 16 ounces in 1 pound.
- There are 2000 pounds in 1 ton.
- The abbreviation for ounce or ounces is "oz".
- The abbreviation for pound or pounds is "lb".
- The abbreviation for ton is "T".

14. Fill in the blanks.

a) $\frac{1}{2}$ lb= _____ oz

b) $\frac{1}{4}$ lb = _____ oz

c) $\frac{3}{4}$ lb = _____ oz

d) 20 oz = _____ lb

e) 4000 lb = _____ T

☑ Check Your Understanding

1. The perimeter of your living room is 500 inches. You need to put baseboard around the perimeter of the room. Baseboard is sold by the foot. How many feet do you need to buy?

2. Mohammed has entered a 1500-metre race. How many kilometres will he run?

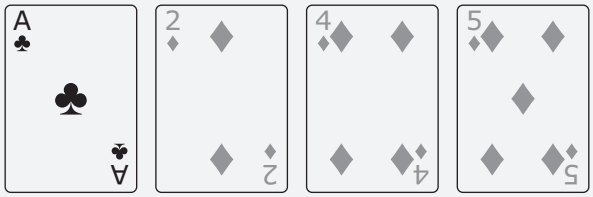
3. You are on holiday in the United States and buy a roast that weighs 2 $\frac{1}{2}$ pounds. How many ounces is that?

4. Kevin jokingly says that he is 5 ft 19 in. How tall is he?

Date _____

Skills Practice 11: Using Ratio and Proportion to Convert Measurements

Equivalent Ratios



1. Jose is playing cards. He has 1 club and 3 diamonds. The ratio of clubs to diamonds is 1 to 3. This is commonly written 1:3.

a) Jose draws 4 more cards. One of the new cards is a club. To keep the ratio of clubs to diamonds the same, how many of the new cards must be diamonds?

$$\frac{1 \text{ club}}{3 \text{ diamonds}} = \frac{2 \text{ clubs}}{? \text{ diamonds}}$$

$$\frac{1 \text{ club} \overset{\times 2}{\longrightarrow}}{3 \text{ diamonds}} = \frac{2 \text{ clubs}}{? \text{ diamonds}} \overset{\times 2}{\longrightarrow}$$

b) Write 2 equivalent ratios for the cards Jose has in his hand.

3 clubs: _____ diamonds

4 clubs: _____ diamonds

$1 CDN = $0.62 US
100¢ CDN = 62¢ US

Currency

Go to pages 187–188 to write the definition for **exchange rate**.

- The **exchange rate** between Canadian and American money varies from day to day.
- The exchange rate refers to the value of $1 CDN when you buy money from another country.

2. On November 7, 2007, the exchange rate hit a record high. $1 CDN was equal to about $1.10 US.

a) Sandi wrote a proportion to help her calculate how many US dollars she could have gotten for $2 CDN on that day.

$$\frac{1 \text{ CDN}}{1.10 \text{ US}} = \frac{2 \text{ CDN}}{? \text{ US}}$$

Explain or show how Sandi could use her proportion to calculate how many US dollars she could have bought.

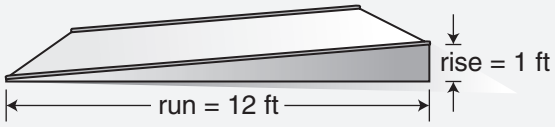
Chapter 6

b) On that day, how many US dollars could Sandi have bought for $100 CDN?

c) On that day, how many US dollars could Sandi have bought for $200 CDN?

d) Sandi's friend from New York came to visit. She had $150 US. How many Canadian dollars could she have bought on that day?

Construction



The ratio of the height to the horizontal length of a wheelchair ramp should not be greater than 1:12. The height is also called the "rise." The horizontal length is also called the "run."

4. Complete the chart for the rise or run of a wheelchair ramp with a 1 : 12 ratio.

$\frac{1}{12} = \frac{?}{24}$

Rise	Run
	24 feet
6 inches	
	6 metres
15 centimetres	
	15 feet
9.5 centimetres	

Date _____

6.5 Converting Between Systems

Focus: unit conversion, proportional reasoning

Warm Up

1. a) How many feet are in 1 yard? _____

b) How many square feet are in 1 square yard?

_____

2. Gas is sold in litres in Canada. What unit is used in the United States?

_____

3. What is your personal reference for 1 yard?

_____

4. What is your personal reference for 1 metre?

_____

5. Find a ruler in your classroom. How long is it?

_____ cm _____ in.

6. A plane is scheduled to leave Pearson International Airport at 17:35. What time is that?

_____

Metric and Imperial Measurement

- The metric system is Canada's official measurement system. However, many people still use Imperial units for certain measurements.
- For example, lumber and wood trim are sold by the foot.
- In Canada, we buy gasoline by the litre. When we travel to the United States, we buy gasoline by the gallon.

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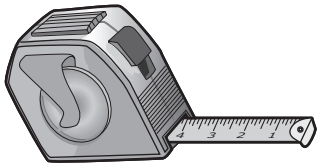
Date _____

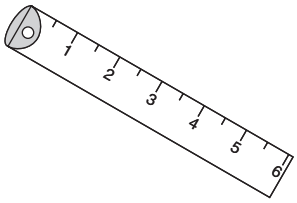
Converting Length

1. Use a tape measure and create a set of approximate metric conversions for each Imperial length.



Imperial Length	Approximate Metric Conversion
1 in.	
6 in.	
1 ft	
3 ft	
6 ft	

2. Use a tape measure and create a set of approximate Imperial conversions for each metric length.



Metric Measure	Approximate Imperial Equivalent
1 mm	
1 cm	
10 cm	
50 cm	
3 m	

3. Work with a partner and measure each other's height.

My height: _____ cm or _____ ft _____ in.

My partner's height: _____ cm or _____ ft _____ in.

4. The bases in baseball are 90 feet apart. Approximately how many metres is this?

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Date _____

Go to page 291 for **Conversions Tables** that will help you convert from one measurement system to another.

Travelling in the United States

5. **a)** 1 mi = _____ km **b)** 1 km = _____ mi

6. Most 400-series highways in Ontario have a speed limit of 100 km/h. What is the speed limit in miles per hour?

_____ mph

Go to **www.mcgrawhill.ca/books/workplace12** and follow the links to unit conversions.

7. The speed limit on parts of Interstate 79 in Pennsylvania is 70 mph. What is the speed limit in kilometres per hour?

_____ km/h

8. An American travel website says the driving distance from Toronto to Orlando, Florida, is just under 1300 mi

a) Convert this distance to km

b) How many hours would it take you to drive from Toronto to Orlando, if your average speed was 100 km/h?

c) Is this a realistic estimate? Explain why or why not.

_____

_____

_____

9. While you're in the United States, you hear that London, Ontario got 10 to 12 in. of snow.

a) Approximately how many centimetres is that?

b) What personal reference would you use for that height?

_____

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Date _____

Go to **www.mcgrawhill.ca/books/workplace12** and follow the links to road trip planners. Select a city in the United States that you would like to visit. You will start your trip from your hometown.

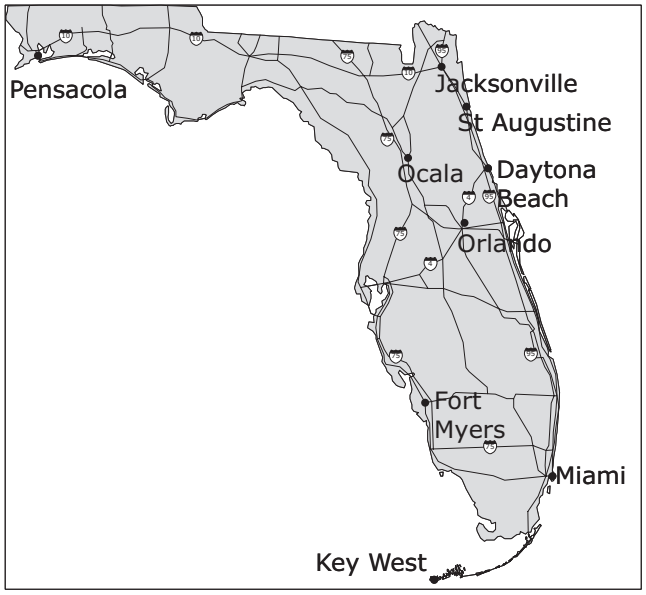
10. a) 1 gal = _____ L **b)** 1 mi = _____ km

11. a) Pick an American city you would like to visit.

_____

b) How far is your destination from your hometown?

_____ km _____ mi



12. Assume that your car has a 50-L gas tank.

a) You will need to fill up along your route. Find a city along your route where you could stop to fill your gas tank. _____

b) Research the price of gasoline in the city from part a). What is the price per gallon? _____

13. a) How much will it cost in American funds to fill the gas tank using the price in #12b)?

b) What is the current exchange rate between the US and the Canadian dollar?

$1 US = $ _____ CDN

c) Calculate the cost, in Canadian dollars, of filling the car.

Chapter 6

Date _____

Weight Conversions

14. a) Use a scale or balance and create a set of approximate conversions for each weight.

Metric Weight	Imperial Weight
1 kg	_____ lb
_____ g	1 lb
_____ g	1 oz

Go to **www.mcgrawhill.ca/books/workplace12** for links to exact conversions.

b) Check the following conversions from page 213, #6, for metric and page 215, below #13, for Imperial.

1 kg = _____ g 1 lb = _____ oz

15. You need 5 lb of fish for a favourite recipe. The supermarket sells fish by the kilogram. How many kilograms of fish should you buy?

16. A backyard hammock made in Sweden is rated to carry up to 160 kg. How many pounds can the hammock safely hold?

17. A nurse says that a newborn baby weighs 3978 g.

a) How much does the baby weigh in kilograms?

b) What is its weight in pounds?

Date _____

Temperature Conversions

The abbreviation for degrees Celsius is °C. The short form for degrees Fahrenheit is °F.

- In North America, both the Celsius and Fahrenheit systems are used.

  Temperature in Celsius = $\frac{5}{9}$ × (Temperature in °F − 32)

  Temperature in Fahrenheit = ($\frac{9}{5}$ × Temperature in °C) + 32

18. Claire decides to take a winter vacation in Florida. She flies from Toronto to New Orleans.

a) When Claire leaves Toronto, the news reports that the temperature is −10 °C. She text messages her friend in New Orleans, who asks for the temperature in °F. Convert the temperature for Claire.

b) When Claire arrives in New Orleans, the pilot announces that the temperature is 85 °F. Convert this to °C.

19. Omar is making lasagna using a recipe from the Internet. The recipe says to bake the dish for $1\frac{1}{2}$ hours at 175 °C. Omar's oven shows temperatures in Fahrenheit. At what temperature, in degrees Fahrenheit, should the lasagna be baked?

☑ Check Your Understanding

1. Even though Canada officially uses the metric system, what Imperial measurements do you use? Give 3 examples.

_____

_____

_____

_____

Chapter 6

Date _____

6.6 Measurement Systems at Work and at Home

Focus: proportional reasoning, basic calculations, decision making

Warm Up

1. Convert the metric measurements.

a) 1 L = _____ mL

b) 2 L = _____ mL

2. Solve.

a) $\frac{1}{2} + \frac{1}{4} =$ _____

b) $\frac{1}{4} + \frac{1}{8} =$ _____

3. **a)** 1 m = _____ mm

b) 2 m = _____ mm

4. **a)** 1 kg = _____ g

b) 14 kg = _____ g

5. How many 4-hour periods are in 1 day?

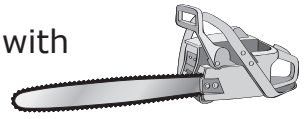
6. **a)** What is the ratio of male to female students in your class right now?

_____:_____

b) State 2 equivalent ratios to your answer to part a).

Measure Up!

At work and in everyday life, you might work with measurements several times each day.



1. A brand of chainsaw requires a gasoline to oil ratio of 40:1.

a) Explain the meaning of a 40:1 ratio.

_____

_____

b) How much gasoline would you add to 10 mL of oil? _____

c) How much gasoline would you add to 20 mL of oil? _____

Chapter 6

d) Your gas can holds 5 L. You plan on adding the oil at home, then driving to a gas station to add the gasoline. How much gasoline and how much oil will you need?

e) What could happen if the mixture of gasoline and oil is incorrect?

_____

_____

Cooking for a Crowd

2. Jared works for a catering service. He is preparing breakfast for 100 people. To make 10 pancakes, Jared needs to mix 1 cup of water with 2 cups of pancake mix.

a) How much water and mix will Jared need for 20 pancakes?

water _____ mix _____

b) How much water and mix will he need for 30 pancakes?

water _____ mix _____

c) Use a proportion to calculate how much water and pancake mix Jared will need to make 200 pancakes.

d) What are some possible consequences of getting the mixture wrong?

_____

_____

Date _____

Watching Your Health

3. Most nutritionists recommend that you drink plenty of water. One authority suggests calculating your daily water requirement in this way:

$$\underset{\text{your weight in pounds}}{\_\_\_\_\_} \div 2 = \underset{\text{daily ounces of water}}{\_\_\_\_\_}$$

a) How much do you weigh? _____ lb

b) Determine your daily water requirement in ounces.

c) Convert your answer from part b) to millilitres.

d) If you followed the recommendation above, how much water would you drink in 1 week? _____

e) Monitor your water consumption for 1 week.

S	M	T	W	T	F	S

f) What was your total water consumption for the week? _____

g) What percent of the recommended amount did you drink?

h) Research the health benefits of drinking water.

i) Sheryl has a 3-year-old daughter who weighs 34 lbs. How many millilitres of water should her daughter drink each day?

Date _____

Handling Medication

4. Brandon is taking care of his siblings, Crystal and Evan. Crystal is 3 years old and weighs 42 lb. Evan is 16 months old and weighs 22 lb. Below is a dosage chart for children's acetaminophen.

Weight (lb)	Age (years)	Single Oral Dose
Under 24	Under 2	As directed by a doctor
24–35	2–3	1 teaspoon = 5 mL
36–47	4–5	$1\frac{1}{2}$ teaspoons = 7.5 mL
48–59	6, 7, 8	2 teaspoons = 10 mL
60–71	9–10	$2\frac{1}{2}$ teaspoons = 12.5 mL
72–95	11	3 teaspoons = 15 mL

A single dose may be repeated every 4 hours, as needed. It is hazardous to exceed 5 doses of acetaminophen per day.

a) Brandon gave Crystal 1 kitchen tablespoonful, which looked like about $1\frac{1}{2}$ teaspoonsful. He gave Evan 1 kitchen teaspoonful. What would you have done?

b) What are some possible consequences of improper administration of medicine?

c) Brandon gave each child the medicine at 6 A.M. At what other times of the day could he administer the medicine?

☑ Check Your Understanding

1. Explain why measuring accurately is important.

Chapter 6

Date _____

Chapter 6 Review

1. Measure each line. Write the length in centimetres and in millimetres.

a) _____

b) _____

c) _____

d) _____

e) ____

Length in Centimetres	Length in Millimetres

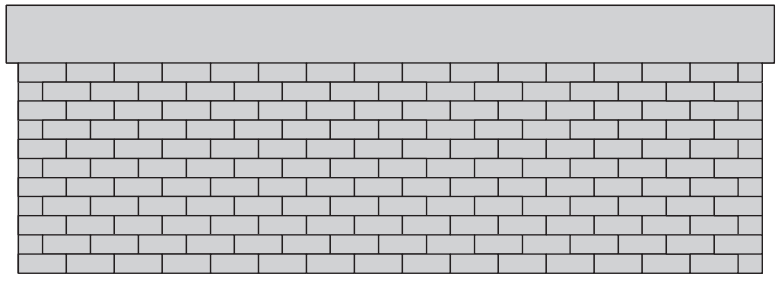
2. Convert the length of each line in #1 to inches. Do not use a ruler.

a)	b)	c)	d)	e)

3. Measure the length of each line in #1 to the nearest fraction of an inch.

a)	b)	c)	d)	e)

4. a) Estimate the number of bricks in this wall. _____



b) Explain how you determined your estimate.

_____

_____

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Date _____

5. Fill in the blanks.

a) 1 L = _____ mL **b)** 1 pt = _____ fl oz

c) 1 qt = _____ pt **d)** 1 gal = _____ qt

6. Use >, <, or = to make the following statements true.

> means "greater than"
< means "less than"

a) l litre _____ 1 gallon **b)** 1 mL _____ 1 oz

c) 1 L _____ 1 qt **d)** 500 millilitre _____ 1 pint

7. Fill in each blank with a number that gives an approximation for the unit conversion.

a) One metre is approximately _____ feet.

b) One gallon is approximately _____ litre(s).

c) One inch is approximately _____ centimetre(s).

d) One foot is approximately _____ centimetre(s).

e) One litre is approximately _____ ounce(s).

8. A pickup truck has a 70-litre gas tank.

a) What is the capacity of the gas tank, in gallons?

b) A gas station in Niagara Falls, New York, sells gasoline for $2.67 US per gallon. Calculate the cost to fill the truck's gas tank.

c) Use the exchange rate you researched on page 221. What is the cost of filling the tank, in Canadian dollars?

d) A gas station in Niagara Falls, Ontario, sells gasoline for 98¢ per litre. Which gas station sells gas for the better price?

Date _____

Chapter 6 Practice Test

1. Measure each line to the nearest fraction of an inch.

a) _____

b) _____

c) _____

d) _____

e) _____

Length in Inches

2. Convert the length of each line in #1 to centimetres. Do not use a ruler.

a)	b)	c)	d)	e)

3. Remeasure each line in #1. Show each length to the nearest 0.1 cm.

a)	b)	c)	d)	e)

4. Use the symbols >, <, or = to make the following statements true.

> means "greater than"
> < means "less than"

a) 1 gal _____ 1 qt

b) 1 qt _____ 1 L

c) 15 mL _____ 1 fl oz

d) 500 mL _____ 1 qt

5. Fill in the blanks.

a) 2 litres = _____ millilitres

b) 1 pt = _____ oz

c) 1 qt = _____ pt

d) 1 gallon = _____ quarts

Chapter 6

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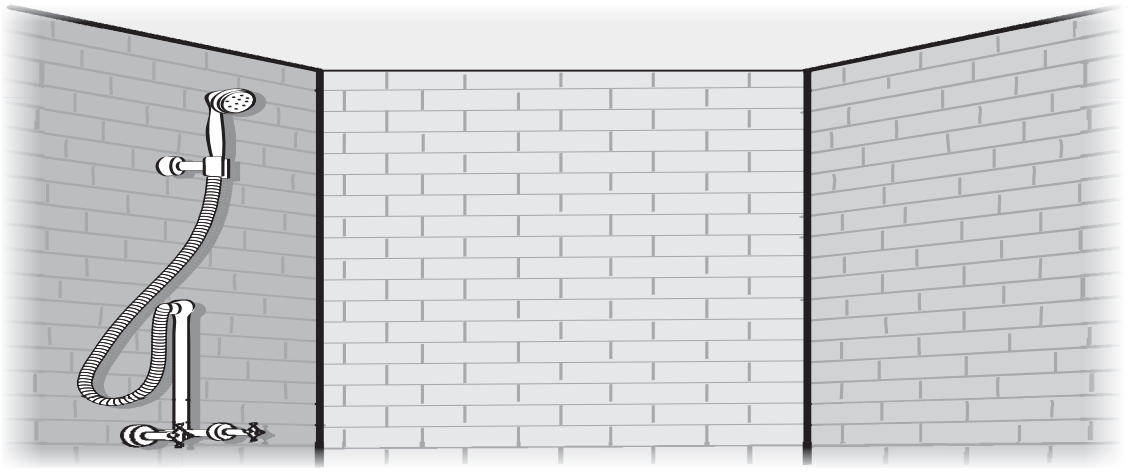
Date _____

6. a) Estimate the number of tiles in this shower stall.



b) Explain how you made your estimate.

_____

_____

_____

7. Fill in each blank with a number that gives an approximation for the unit conversion.

a) One yard is approximately _____ metre(s).

b) One gallon is approximately _____ litre(s).

c) One foot is approximately _____ centimetre(s).

d) One metre is approximately _____ feet.

e) One litre is approximately _____ quart(s).

8. a) A motorcycle has a 20-L gas tank. How many gallons is this?

b) A gas station in Port Huron, Michigan, sells gas for $2.94 per gallon. Calculate the cost to fill the motorcycle's gas tank in US dollars.

c) Use the exchange rate you researched on page 221. What is the cost of filling the tank, in Canadian dollars?

d) A gas station in Sarnia, Ontario, sells gas for 96¢/L. Which city has lower priced gasoline?

Date _____

Task: Plan A Shopping Trip

- A Canadian who stays in the United States for a 48-hour period is allowed to bring $400 CDN worth of goods back into Canada.
- This amount includes any taxes paid on the items in the United States.
- You are going to plan a 2-day shopping trip to the United States.
- Before leaving, you will identify the price in Canada of what you want to buy.
- Then you will check the price in the United States.
- You will calculate where you can get the better buy.

Go to **www.mcgrawhill.ca/books/workplace12** and follow the links to Canadian and American retailers. What is the price of each item in Canada? in the United States?

1. Go to **www.mcgrawhill.ca/books/workplace12** and follow the links to road trip planners. Select a city in the United States that you would like to visit. _____

2. a) List 5 items you would like to buy while on your trip.

_____

b) Research the cost of these items from Canadian stores near where you currently live. Note any important information about each item, such as the model number and the capacity of any container.

c) Select 1 or more retailers in the United States. What is the price of each item in US dollars?

Chapter 6