Chapter 6 Planning Chart

Section Suggested Timing	Teacher's Resource Blackline Masters	Assessment Tools	Materials and Technology Tools
6.0 Opener (TR page 178) (15 min)		Diagnostic Assessment (TR page 179)	
6.1 Length (TR page 180) (120–150 min)		Ongoing Assessment (TR page 184)	• ruler with metric units (m, cm, and mm) • ruler with Imperial units (feet and inches, divided in $\frac{1}{16}$s of an inch) • straightedge with no units
6.2 Capacity (TR page 185) (150–225 min)		Ongoing Assessment (TR page 188)	• graduated cylinder with metric units • metric and Imperial measuring cups • examples of items with metric and Imperial capacities (water bottles, food containers, etc.) • calculator
6.3 Estimating Large Numbers (TR page 189) (75–110 min)	Master 10 Quarter Inch Grid Paper	Ongoing Assessment (TR page 191)	• calculator • grocery store flyers • grid paper (optional)
Skills Practice 9: Converting Between Imperial Measures (TR page 192) (10–20 min)	SP BLM 9 Converting Between Imperial Measures	Ongoing Assessment (TR page 193)	• calculator • ruler or tape measure with Imperial units (optional)
Skills Practice 10: Converting Between Metric Measures (TR page 194) (10–20 min)	SP BLM 10 Converting Between Metric Measures	Ongoing Assessment (TR page 195)	• calculator • ruler or tape measure with metric units (optional)
6.4 Converting Units (TR page 196) (75 min)	SP BLM 9 Converting Between Imperial Measures SP BLM 10 Converting Between Metric Measures	Ongoing Assessment (TR page 199)	• calculator • rulers or tape measures with metric and Imperial units • balance or scale with metric units (g)
Skills Practice 11: Using Ratio and Proportion to Convert Measurements (TR page 200) (20–40 min)	SP BLM 11 Using Ratio and Proportion to Convert Measurements	Ongoing Assessment (TR page 201)	• calculator • playing cards (optional)
6.5 Converting Between Systems (TR page 202) (150–225 min)	SP BLM 11 Using Ratio and Proportion to Convert Measurements BLM 6–1 Temperature Conversions	Ongoing Assessment (TR page 206)	• ruler with metric units (m, cm, and mm) • ruler with Imperial units (feet and inches, divided in $\frac{1}{16}$s of an inch) • scale or balance with metric units (g) • computer access • calculator • thermometer (optional)
6.6 Measurement Systems at Work and at Home (TR page 207) (75 min)		Ongoing Assessment (TR page 210)	• calculator
Chapter 6 Review (TR page 211) (75 min)	Master 2 Chapter Summary BLM 6–2 Chapter 6 Word Puzzle BLM 6–3 Match the Abbreviation		• calculator • ruler with metric and Imperial units
Chapter 6 Practice Test (TR page 213) (75 min)	Master 2 Chapter Summary	BLM 6–4 Chapter 6 Test	• calculator • ruler with metric and Imperial units
Chapter 6 Task (TR page 215) (75–150 min)	BLM 6–5 Chapter 6 Task BLM 6–7 Chapter 6 BLM Answers	BLM 6–6 Chapter 6 Task Rubric	• calculator • Internet access • spreadsheet software (optional)

Measuring and Estimating (page 189)

> **SUGGESTED TIMING**
> 15 min

Overall Expectations

C.1 – determine and estimate measurements using the metric and imperial systems, and convert measures within and between systems

C.2 – apply measurement concepts and skills to solve problems in measurement and design, to construct scale drawings and scale models, and to budget for a household improvement

C.3 – identify and describe situations that involve proportional relationships and the possible consequences of errors in proportional reasoning, and solve problems involving proportional reasoning, arising in applications from work and everyday life

What's the Math?

Students work with metric and Imperial (US) measures. Students convert units between or within measurement systems, as the need arises. Throughout the chapter, students use proportional reasoning to make estimates and calculations in a variety of settings.

A thorough working knowledge of the skills in this chapter is essential for success in Chapter 7.

Activity Planning Notes

Browse the list of materials prior to introducing this chapter. This is a very hands-on chapter and will require a number of measuring tools.

Give students several minutes to examine the cartoon and answer the questions. Encourage them to share their answers and to discuss openly. Some students may struggle with identifying the difference between the units for distance used in the cartoon, or may assume that the measurements are equivalent. Have students discuss:
- the difference between miles and kilometres
- which units of measurement are used in various countries

Once students have calculated an answer to question 3, get them to think about what they might do on the way to Williamsport that would take additional time. For example, they will need to go through customs. They may need to stop for gas, a washroom break, and food. If they added these things to their travel time, how long might the journey take?

Accommodations
- Williamsport is popular with outdoors enthusiasts. If you have avid hunters or anglers in the class, you might have them research why the area around Williamsport is so popular.
- When discussing question 3, it may help for students to know that 50 mi is approximately the same distance as 80 km.

Diagnostic Assessment

Some students, perhaps those who travel or live close to the Canada–US border, may have a thorough understanding of measurement in general, and driving distance in particular. Some things to consider:
- What does the discussion indicate about individual students' level of comfort with the subject matter?
- Can students state the units implied as the girl says, "I usually drive 100"?
- Are their comments reasonable?
- Do they offer anecdotes about their family or friends?

Use your assessment of students' awareness of these concepts to help you gauge the pace of the lessons that follow and the amount of assistance students will need. If students seem to have little experience, you may wish to walk them through many of the activities as a class.

Literacy Link

Provide students with many opportunities to talk and listen as they discuss this cartoon and the related questions. Are they familiar with the place names on the map? If not, you may wish to get out a road atlas or a map of Ontario and one of the northern United States and discuss how to get from your school's community to Williamsport. Ask:
- What route might we take?
- Where should we cross the border?
- What states of the United States will we drive through?
- What points of interest are along the way?

Answers (page 189)

1. She is forgetting that her speedometer is in kilometres. She drives 100 km/h, not 100 mph.

2. Miles are *longer* than kilometres.

3. Answers will vary. Example: 1 mi is about 1.6 km. So 400 mi is about 640 km. If she drives 100 km/h without stopping for a break, it will take about 6.5 h.

6.1 Length (page 190)

SUGGESTED TIMING	MATERIALS
120–150 min	• ruler with metric units (m, cm, and mm) • ruler with Imperial units (feet and inches, divided in $\frac{1}{16}$ s of an inch) • straightedge with no units

Specific Expectations

C.1.1 – measure, using a variety of tools, the lengths of common objects and the capacities of common containers, using the metric system and the imperial system

C.1.2 – estimate lengths, distances, and capacities in metric units and in imperial units by applying personal referents

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts

Cumulative Review

1. What date is 2 weeks after April 24?

2. How many zeroes are needed to write 1 million?

3. Explain the difference between the variables P/Y and PMT in a TVM solver.

4. What is 10% of $50 000?

Answers to Cumulative Review

1. May 8

2. 6

3. P/Y represents the number of payments made per year and PMT represents the amount of each payment.

4. $5000

What's the Math?

Students review measuring and estimating length using metric and Imperial units. Students collect personal references to assist with estimating common lengths. Students begin to convert units within the same measurement system.

Warm Up Notes

The main purpose of the Warm Up is to provide structure to the classroom environment and to provide students with an opportunity to work with basic mathematics skills. The Warm Up at the beginning of each lesson reviews specific skills that students will need during that lesson or that students may need to remember from the current chapter. On average, plan for 5–10 minutes to complete the questions and 10–15 minutes to take up and discuss answers.

This exercise will also provide you with some sense of how comfortable students are working with mathematics and may provide an opportunity for diagnostic and ongoing assessment of basic skills.

Students have done questions similar to questions 1 to 3. Discuss how the location of the decimal point changes depending on the power of 10 by which you are multiplying a number. If students do not understand the word *power*, discuss its meaning.

Wherever appropriate, look for and have students consider multiple representations and/or multiple strategies for working through questions. For example, in question 4, multiples of 12 can be obtained by repeatedly adding 10 plus 2 to the previous number. So, 24 + 10 + 2 = 36, which is the next multiple of 12.

In question 5, stress that, for example, 2 × 6 and 6 × 2 yield the same result. Sketching a 2 × 6 rectangle can illustrate this point simply. Ask students to list all the pairs of numbers that multiply to make 12.

Answers to Warm Up (page 190)

1. a) 14
  b) 140
  c) 1400

2. a) 7
  b) 70
  c) 700

3. The decimal moves one place to the right for each 0.

4. 12, 24, 36, 48, 60, 72, 84, 96, 108, 120

5. Answers will vary. Examples: 12 × 1, 2 × 6

Activity Planning Notes

As this is the opening section of the chapter, consider discussing the theme of the chapter. Some students may have extensive experience and considerable skill with this material. These students may not need to complete all questions. Conversely, there may be students with little to no experience with this material.

It may be beneficial to pair stronger and weaker students throughout the chapter.

Students may have collected personal references in earlier math courses. Some students—for example, those who did a similar exercise in grade 9—may have grown significantly in the past three years. Personal references collected then may be of no use to them in this grade.

For question 1, expect students' measurements to be accurate within 1 mm.

Once students measure the lines they drew in question 2a), have them consider how they might adjust their metric estimates in future. Question 10 is the same exercise, except in Imperial measure.

Ensure that students complete question 4. If students correctly complete the chart in question 13 on page 194, they will have a collection of personal referents that will provide a connection between metric and Imperial lengths. For example, they may notice that their foot is 10 in. or 25.5 cm. This will provide them with a handy conversion tool for converting between metric and Imperial measurements, which they do in Section 6.5.

Opportunities for using proportional thinking by developing parallel referents for metric and Imperial measures are embedded throughout the chapter. For example, students measure the same items in question 5 on page 192 as they do in question 14 on page 195.

When working with Imperial measures, expect students to be accurate to the nearest sixteenth of an inch.

When working on question 11, have students complete the marginal note: 12 inches is referred to as 1 foot, 3 feet is referred to as 1 yard.

It may be beneficial to do the metric activities and the Imperial activities on separate days, then to discuss what students noticed about comparative lengths in the classroom. For example, what is the height of a light switch in metric? in Imperial? What is the comparative measurement for the diameter of a penny?

Conclude the section with Check Your Understanding. Note student preferences.

Literacy Link

Units of measure, when written, are often abbreviated. Common abbreviations for inches are in. and ". Common abbreviations for feet are ft and '.

Answers to Activity Questions (pages 190–195)

1. Answers are in italics.

Length in Centimetres	Length in Millimetres
4.3 cm	43 mm
3.2 cm	*32 mm*
5.9 cm	*59 mm*
5.8 cm	*58 mm*
1.1 cm	*11 mm*
4.4 cm	*44 mm*
2.5 cm	*25 mm*
4.9 cm	*49 mm*

2. Estimates will vary. Check that students demonstrate an understanding of converting between centimetres and millimetres; the 1-cm line should be the same length as the 10-mm line.
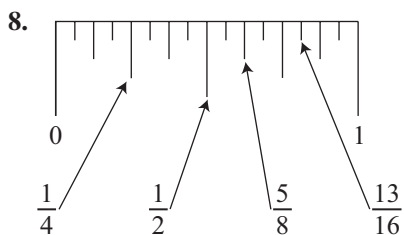
3. Answers will vary.

4. Answers will vary.

5. Answers are in italics. Estimates will vary.

Item	Unit	Estimate	Metric Measurement
length of classroom	*metres*	*Answers will vary.*	*Answers will vary.*
height of a light switch	*metres*	*1.5 m*	*1.1 m*
thickness of a loonie	*millimetres*	*2 mm*	*2 mm*
diameter of a penny	*centimetres*	*1.5 cm*	*1.9 cm*
width of classroom door	*metres*	*1 m*	*0.8 m*

6. Answers will vary.

7. a) one quarter
b) one eighth

8.

9. a) $2\frac{1}{8}$

b) $\frac{15}{16}$

c) $2\frac{3}{16}$

d) 3

e) $\frac{5}{16}$

f) $1\frac{3}{8}$

g) $\frac{1}{2}$

h) $2\frac{1}{2}$

10. Answers will vary. Check that lines are proportionate.

11. a) 12
b) 6
c) 24
d) 36

12. Answers will vary.

13. Answers will vary.

14. Estimates will vary.

Item	Unit	Estimate	Imperial Measurement
length of classroom	*feet*	*Answers will vary.*	*Answers will vary.*
height of a light switch	*feet*	*4 ft*	*3 ft 8 in.*
thickness of a loonie	*inches*	*$\frac{1}{16}$ in.*	*$\frac{1}{16}$ in.*
diameter of a penny	*inches*	*$\frac{1}{2}$ in.*	*$\frac{3}{4}$ in.*
width of classroom door	*feet*	*3 ft*	*2 ft 8 in.*

15. Answers will vary.

Answers to Margin Items (page 194)

1 foot, 1 yard

Answers to Check Your Understanding (page 195)

1. Answers will vary. Examples are provided.
a) I could use my arm span to measure the length and width of the table.
b) I would choose Imperial, because fabric is often measured in Imperial units.

Challenge!

Students can create a scatter plot of the data in question 13. Then, have students create a line of best fit, the slope of which is the conversion factor between centimetres and inches.

6.2 Capacity (page 196)

SUGGESTED TIMING	MATERIALS
150–225 min	• graduated cylinder with metric units • metric and Imperial measuring cups • examples of items with metric and Imperial capacities (water bottles, food containers, etc.) • calculator

Specific Expectations

C.1.2 – estimate lengths, distances, and capacities in metric units and in imperial units by applying personal referents
C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts

What's the Math?

Students review measuring and estimating capacity using metric and Imperial units. Students collect references to assist with estimating common capacities. Students continue converting units within the same measurement system.

Cumulative Review

1. How many inches are in 2 feet?

2. What is another way of saying $\frac{4}{16}"$?

3. Name 2 common variable expenses that a homeowner may have.

4. What is the probability of tossing a coin and having it show "heads"?

Answers to Cumulative Review

1. 24

2. $\frac{1}{4}"$

3. Answers will vary. Possible responses include utilities and telephone bills.

4. $\frac{1}{2}$

Warm Up Notes

Students have done questions similar to questions 1 to 3. Discuss how the location of the decimal point changes depending on the power of 10 by which you are dividing. If students do not understand the word *power*, discuss its meaning.

When discussing the answer to question 3, ask students to consider how the answer needs to change when handling questions such as #4a) and #4b). Question 4c) is the same as question 1b). If students get a different answer, you may wish to discuss the reason for this.

You may wish to have an Imperial ruler and yardstick handy to help students answer question 5, and a graduated litre for answering question 6.

Wherever appropriate, look for and have students consider multiple representations and/or multiple strategies for working through questions. For example, in question 7, an acceptable strategy is "250 mL for $2 is $8/L, which is more expensive than 2 L for $10, which is $5/L."

Answers to Warm Up (page 196)

1. a) 1500
   b) 15
   c) 1.5

2. a) 355
   b) 5.91
   c) 0.473

3. The decimal moves 1 place to the left for each 0.

4. a) 1900
   b) 355
   c) 1.5

5. inch, foot, yard, mile

6. a) 1000
   b) 500

7. 2 L for $9.99

Activity Planning Notes

Read through the section and collect the required measuring devices and containers. Some students may have extensive experience and considerable skill with this material. These students may not need to complete all questions. Conversely, there may be students with little to no experience with this material. You may find that students who are strong in Section 6.1 may not be strong in this section, and vice versa. It may be beneficial to pair stronger and weaker students throughout the chapter.

Many of the actual measurements in this section are completed in both systems. While upon first glance the activities may look repetitive, students who complete them will develop a set of comparative referents that will assist them with understanding conversions between the metric and Imperial systems. For example, they may find that a common drinking cup is approximately 8 oz or about 250 mL.

Opportunities for this kind of proportional thinking are embedded throughout the chapter. The table below shows the comparative questions and how they might be used.

Metric Capacity	Imperial Capacity	Discussion
page 197 #3	page 200 #9	How can what you have learned about the capacity of a typical coffee cup assist you in comparing metric and Imperial capacities?
page 198 #4	page 200 #10	How can what you have learned about the capacity of a car's gas tank, small bottle of shampoo, large drink, and water dispenser assist you in comparing metric and Imperial capacities?

Question 1 can be used to kick off discussion and to assess prior knowledge. Take up questions 2 and 3 before moving on. Ensure that students' references and approximations are appropriate. Redo the activity if necessary.

Question 4 can be used to assess students' ability to reason. Encourage discussion and explanation of thinking when taking up question 4. Have students explain why the wrong answers are wrong. Encourage the use of the references for different capacities in their explanations.

Read the bullets leading into the subsection on Imperial capacities and ensure student understanding.

Work through the second half of the section as you did the first half.

Question 11 has students use Imperial capacity measures to consider unit price and decide on a better buy. In real life, the item that is the cheapest per unit may not be the better buy if someone does not use the largest size. Have students discuss how much coffee they would actually drink and therefore which is the better buy for question 11a). Answers will vary from student to student, depending on how much they drink.

Conclude the section with Check Your Understanding. Note which system students feel better estimating.

Literacy Link

Units of capacity, like units of length, are often written in an abbreviated form. Ensure that students are able to read abbreviations as well as the full names. Note that ounce does not have a Z, yet is abbreviated "oz".

Answers to Activity Questions (pages 196–201)

1. a) the litre
   b) the gallon
   c) the gallon
   d) 250 mL or 500 mL, depending on the size of bottle students are considering
   e) about 15 mL

2. Answers will vary.

3. Answers are in italics. Estimates will vary. Possible responses include:

Container	Approximate Metric Capacity
A typical coffee cup	*250 mL*
A small red plastic gasoline container	*5 L*
A baby food jar	*100 mL*
A kitchen sink	*15 L*

4. a) 50 L
   b) 300 mL
   c) 1 L
   d) 20 L

5. a) millilitres
   b) millilitres
   c) Answers will vary. There may be no answer. Some metric containers refer to cubic centimetres (cc).

6. Answers will vary.

7. a) 32 fluid ounces
   b) 8 pints, 128 fluid ounces

8. a) Answers will vary.
   b) Answers will vary. Example: Approximate metric equivalents will help me remember Imperial capacities because I use metric measurements more often, and because the metric system uses a pattern between units that is easier to remember than Imperial.

9. Answers are in italics. Estimates will vary. Possible responses include:

Container	Approximate Imperial Capacity
A typical coffee cup	*8 fl oz*
A small red plastic gasoline container	*1 gal*
A baby food jar	*3 fl oz*
A kitchen sink	*4 gal*

10. a) 15 gal
   b) 8 fl oz
   c) 16 fl oz
   d) 5 gal

11. a) Medium: 12.8 ¢/fl oz; Large: 10.4 ¢/fl oz; Extra large: 8 ¢/fl oz
   b) Extra large
   c) I would choose a smaller size if I did not want that much coffee.

Answers to Check Your Understanding (page 201)

1. $0.75/L

2. Answers will vary.

3. Answers will vary.

Ongoing Assessment

• The entire section can be used to check students' ability to make correct estimates or measurements of capacity, to use correct units, and to think proportionally as they compare metric and Imperial capacities.

Challenge!

Try This!

Similar to the previous section, students can create a scatter plot of the data in Check Your Understanding question 2. This can help students determine a conversion ratio for each unit.

6.3 Estimating Large Numbers (page 202)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
75–110 min	• calculator • grocery store flyers • grid paper (optional)	Master 10 Quarter Inch Grid Paper

Specific Expectation

C.1.3 – estimate quantities, and describe the strategies used

Cumulative Review

1. How many inches are in $2\frac{1}{2}$ feet?

2. What is 10% of 300?

3. What is 30% of 300?

4. What is 80% of 300?

Answers to Cumulative Review

1. 30

2. 30

3. 90

4. 240

What's the Math?

Students estimate quantities in a variety of settings. Students develop strategies for estimation and discuss those strategies with others.

Warm Up Notes

When discussing answers with students, stress the mathematical processes at work. These are often more important than obtaining the right answer. Wherever appropriate, look for and have students consider multiple representations and/or multiple strategies for working through questions.

> **Accommodations**
> • Some students may benefit from working in pairs.

Questions 1, 5, 6, and 8 involve rounding. Encourage students to consider different ways of rounding these numbers to make their estimates more concise. For example, when they round the numbers in question 1 to the closest 5, they can still add them mentally and get an answer that is closer to the numbers when added.
$50 + 50 + 15 + 35 = 100 + 50 = 150$

Question 8 asks them to round the numbers from question 6 in a different way. Encourage students to round the amounts so that the numbers can be added without a calculator. It's precise enough to round #6a) and b) to the closest dollar and #6c) and d) to the closest $10. This is what many people would do while shopping.
$\$1 + \$1 + \$10 + \$100 = \$112$

You might also start asking students whether their estimate is higher or lower than the actual. When estimating cost, many people like to round the numbers a little higher. All of these questions are related to making educated guesses, which is what the section is about.

Activity Planning Notes

In this section, estimating will be more important than knowing or calculating an exact answer.

Have students work in pairs or in small groups for question 1. When discussing question 2, refer back to the earlier concepts of sample and population.

In question 3, students can use the diagram in the student resource for rough work and create a scale diagram on grid paper. You may wish to hand out **Master 10 Quarter Inch Grid Paper** for this purpose. The activity in this question can be used as an eventual lead-in to Chapter 7. Students may benefit from discussing the estimation strategy in #3c) and d) with other students.

It may be beneficial to discuss other strategies for the decision making needed for question 4. For example, ask:
• Where is the nearest grocery store?
• Is there more than one grocery store in the same general area?
• Does the couple own a car?

Discuss how the answers to questions such as these may affect what choices shoppers make about where they purchase items. For example, people without a car may use just one grocery store, especially if they need a taxi to get home.

Question 5 furthers the discussion started in the chapter opener. When travelling long distances, travellers need to consider more than the amount of time needed to drive from one place to another. Encourage students to share any experiences they may have had with travelling. What stops did they make? How long did each last? The answers to these questions will depend on the needs of the people travelling.

Accommodations

• Some students may benefit from working in pairs.
• Some students may benefit from using **Master 10 Quarter Inch Grid Paper** to draw a scale diagram of the scenario in question 3. Have them consider the scale for their diagram.

Speed Bump

• Students may experience difficulties that they have already handled earlier in the course.

R_x Discuss with students how they handled the difficulty earlier. Have them try the same strategy. Does it work? If not, discuss other strategies they might try.

• When doing question 2 on page 204, students may choose a square with nobody in it.

R_x Have students consider whether this is wise, given the fact that there are people on the beach. Ask what square is more representative of the number of people on the beach. It may be wisest to pick a square with a fraction of a person in it.

Conclude the section with Check Your Understanding. Note how students do their estimates. Discuss different strategies.

Literacy Link

Have students look in their glossary to review the terms *sample* and *population*. Ask how these terms may apply in this section.

Answers to Activity Questions (pages 203–207)

1. Answers will vary.

2. a) Answers will vary. Most squares have half of 1 person.
   b) 195
   c) 98
   d) It is easy to estimate the number of people.
   e) It is not very accurate since people can take up more than 1 square.

3. a)
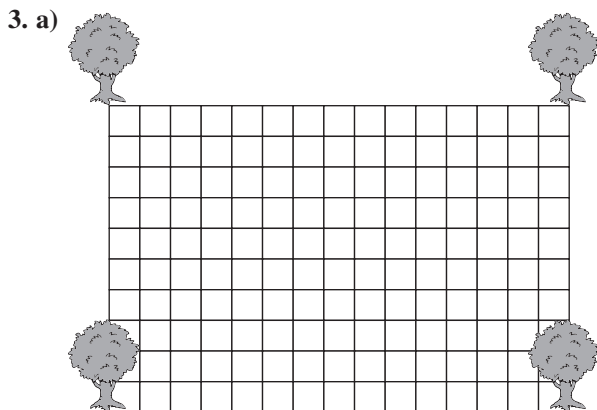
b) 150
c) Estimates will vary.
d) Answers will vary. Possible responses include dividing the pile into sections, counting the number of stones in one section, and then multiplying by the number of sections.

4. a) Answers will vary. Ensure students are rounding accurately.
   b) Answers will vary. Students could add the rounded costs together, or they could add five of the costs and then use a proportion to find the estimated total cost.

5. Answers will vary. Possible responses include:
   a) 5; 10 min
   b) food and bathroom breaks; 2 h
   c) 27; 2
   d) 10 A.M. Monday

Answer to Check Your Understanding (page 207)

1. I would multiply the number of deer in 1 square kilometre by the number of square kilometres in the park. So, there are about 1020 deer in the park.

Challenge! Try This!

Students can use drawing or design software to create a drawing of the patio in question 3.

Ongoing Assessment

- Are estimates and/or calculations appropriate?
- Do the strategies offered make sense?
- What do students consider in each of the situations?

Skills Practice 9: Converting Between Imperial Measures (page 208)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
10–20 min	• calculator • ruler or tape measure with Imperial units (optional)	SP BLM 9 Converting Between Imperial Measures

Specific Expectations

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts
C.3.1 – identify and describe applications of ratio and rate, and recognize and represent equivalent ratios and equivalent rates using a variety of tools

What's the Math?

Students use unit conversions or proportional reasoning to convert between various units of Imperial measure.

Activity Planning Notes

Use this Skills Practice with students who are struggling with unit conversion, basic arithmetic skills, or proportional reasoning. Encourage students to answer question 1 using both counting and proportional reasoning. For example,
1 ft = 12 in.
2 ft = 24 in.
3 ft = 36 in.
4 ft = 48 in.

Accommodations

- Take time to show students how they can use the equivalent fractions to answer the questions involved.
- Use **SP BLM 9 Converting Between Imperial Measures** to provide additional reinforcement for students who need it.

You may wish to demonstrate different ways to set up a proportion to solve the conversions in question 1. Have students play with the different proportions and use the style that means the most to them. Some will find it easier to show the number of feet on one side of the proportion and the number of inches on the other. For example:

$$\frac{1 \text{ ft}}{4 \text{ ft}} = \frac{12 \text{ in.}}{? \text{ in.}}$$

Discuss how this proportion works. If there are 12 inches in 1 ft, then there are 4×12 inches in 4 ft. To make this pair of fractions equivalent, you need to multiply the denominator by the same number as the numerator.

Other students may prefer to use a proportion similar to what is in the student resource.

$$\frac{12 \text{ in.}}{1 \text{ ft}} = \frac{? \text{ in.}}{4 \text{ ft}}$$

If there are 12 inches in 1 ft, then there are 48 inches (12 inches $\times$ 4) in 4 ft. To make this pair of fractions equivalent, you need to multiply the numerator by the same number as the denominator.

Create supplemental questions if needed. Some students may benefit from using a tape measure or ruler to complete the questions.

Answers to Skills Practice 9 (pages 208–209)

1. a) 48
   b) 36
   c) 60
   d) 12

2. a) 19
   b) 59
   c) 126

3. a) 2 ft 3 in.
   b) 5 ft 10 in.

Labels for ruler diagram between #3 and #4: $\frac{1}{4}, \frac{1}{2}, \frac{5}{8}, \frac{13}{16}$

4. a) $\frac{1}{4}$"

   b) $\frac{5}{8}$"

   c) $\frac{7}{8}$"

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
10–20 min	• calculator • ruler or tape measure with metric units (optional)	SP BLM 10 Converting Between Metric Measures

Specific Expectations

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts

C.3.1 – identify and describe applications of ratio and rate, and recognize and represent equivalent ratios and equivalent rates using a variety of tools

What's the Math?

Students use unit conversions or proportional reasoning to convert between various units of metric measure.

Activity Planning Notes

This Skills Practice provides another good opportunity for students who are struggling with unit conversion, basic arithmetic skills, or proportional reasoning.

Accommodations

• Use **SP BLM 10 Converting Between Metric Measures** to provide additional reinforcement for students who need it.

Have students start by reviewing the comparative size of each metric unit. You may wish to post a reminder in the classroom.
millimetre → centimetre → metre → kilometre
10 mm = 1 cm
1000 mm or 100 cm = 1 m
1000 m = 1 km

Have students use logic and counting to do the conversions in question 3.
For example:
1 m = 100 cm
2 m = 200 cm

Students can use either counting or proportional reasoning to convert the units in question 4. For example:
100 cm = 1 m
200 cm = 2 m
300 cm = 3 m
400 cm = 4 m
500 cm = 5 m

$$\frac{100\ cm}{500\ cm} = \frac{1\ m}{?\ m} \quad \text{or} \quad \frac{500\ cm}{?\ m} = \frac{100\ cm}{1\ m}$$

Encourage students to share their strategies for doing these types of conversions.

Question 5 is a disguised conversion question. Again, encourage students to share their strategies.

Create supplemental questions if needed. Some students may benefit from using a tape measure or metre stick to complete the questions.

Literacy Link

To help students remember the connection between linear metric measures and their values, you may wish to review the meaning of each word.
- The base linear unit of the metric system is the metre. Everything is based on the metre.
- The millimetre and centimetre are fractions of the metre.
  – "Milli" refers to a thousand. There are 1000 mm in 1 m.
  – "Centi" refers to a hundred. There are 100 cm in 1 m.
  – "Kilo" also refers to a thousand. There are 1000 m in 1 km.

Answers to Skills Practice 10 (page 210)

1. a) millimetre, centimetre, metre, kilometre
  b) mm, cm, m, km

2. a) millimetres
  b) centimetres
  c) 1000

3. a) cm
  b) m
  c) m
  d) cm
  e) mm
  f) km
  g) cm
  h) m

4. a) 5
  b) 0.5
  c) 90
  d) 900
  e) 150
  f) 1500

5. a) 45 km
  b) 120 cm
  c) 0.5 km
  d) 70 mm

6.4 Converting Units (page 211)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
75 min	• calculator • rulers or tape measures with metric and Imperial units • balance or scale with metric units (g)	SP BLM 9 Converting Between Imperial Measures SP BLM 10 Converting Between Metric Measures

Specific Expectations

C.1.1 – measure, using a variety of tools, the lengths of common objects and the capacities of common containers, using the metric system and the imperial system

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts

C.2.2 – apply the concept of perimeter in familiar contexts

C.3.1 – identify and describe applications of ratio and rate, and recognize and represent equivalent ratios and equivalent rates, using a variety of tools

C.3.3 – identify and describe real-world applications of proportional reasoning, distinguish between a situation involving a proportional relationship and a situation involving a non-proportional relationship in a personal and/or workplace context, and explain their reasoning

C.3.5 – solve problems involving proportional reasoning in everyday life

Cumulative Review

1. Calculate the gross income for someone who works 20 hours at $12.50/h.

2. Calculate the net income for the person in question 1 if the take-home pay is about 90% of gross income.

3. A circular spinner for a board game has 5 sectors of equal size. Each sector is a different colour. What is the probability, as a percent, of the spinner landing on a certain colour?

4. All Canadian mortgages have interest calculated _____.

Answers to Cumulative Review

1. $250

2. $225

3. 20%

4. semi-annually

What's the Math?

Students reinforce numeracy and proportional reasoning skills by converting units in various situations. Students measure the length or the weight of common objects. Students work with metric and Imperial units.

Warm Up Notes

All of these types of questions have been seen by students on many occasions, some dating back to elementary school. Have students do a self-assessment. There are 13 answers (question 4 has two parts; the answers to questions 5 and 7 each require a three-word list). Have students reflect on whether their skills are improving.

When discussing the answers to questions 4, 7, and 8, ask how patterning can help students calculate these answers. Example:
half of 12 = 6
one quarter is half of a half
one quarter of 12 = 3

Suggest that students use abbreviations to write their answers to questions 5 and 6. Ask them to use the full word when reporting the answer.

Answers to Warm Up (page 211)

1. 100

2. 60

3. 10

4. a) 6
   b) 3

5. Answers will vary. Possible responses include three of: millimetres, centimetres, metres, kilometres.

6. Answers will vary. Possible responses include three of: inches, feet, yards, miles.

7. 40

8. 30

Activity Planning Notes

This section provides some hands-on opportunities to measure the length or the weight of common items. Mathematically, there is nothing new in this section. Reinforce numeracy and reasoning skills. This section could be used as an assessment of previously learned numeracy skills.

Answers to question 1 may vary from student to student. Encourage students to share their experiences. What measurement systems do they use for each of these measurements? Why? Are there times when they feel more comfortable using metric? using Imperial?

Students who have already done Skills Practice 10: Converting Between Metric Measures should have no difficulty with questions 2 to 4.

Some students may need a review of the terms for mass. The base unit for weight in the metric system is the gram. Use students' knowledge of the linear measurement terms to help them understand the terms for weight.
• Just as there are 1000 mm in 1 m, there are 1000 mg in 1 g.
• There are 1000 g in 1 kg.

• Some students struggle with proportional reasoning.

R_x Ask students to consider if the number that they are working toward should be smaller or larger than the original number. Ask them to explain their reasoning.

Accommodations

• Students having difficulty with questions 10 to 12 may benefit from completing Skills Practice 9: Converting Between Imperial Measures, if they have not already done so. If they have completed the Skills Practice and are still experiencing difficulty, you may wish to work through **SP BLM 9 Converting Between Imperial Measures** with them before having them complete these questions.

Encourage students to use patterning or proportional reasoning to answer questions 6 and 7.

Students who have already done Skills Practice 9: Converting Between Imperial Measures should have no difficulty with questions 9 to 12. Encourage them to use patterning and proportional reasoning to answer these questions. Ask students to share the strategies that work for them.

The information in questions 13 and 14 may be new for some students. Post the information in the bullets before question 14. You may wish to work through parts a) and b) with students, then have them try parts c) to e) on their own.

Conclude the section with Check Your Understanding. After discussing the answer to question 4, have students make jokes about their own height. How can they make their height seem greater? lesser?

Literacy Link

Continue to reinforce the use of abbreviations and full terms. You may wish to have students develop a game to provide additional practice in this area.

Discuss the speech balloon with question 7 on page 213. Although students will likely use "weigh" in common parlance, it is important for them to realize what "measuring mass" means, especially if they are taking science.

Explain the difference between a ton and a tonne.
• One ton is an Imperial measure equal to 2000 lb.
• One tonne is a metric measure equal to 1000 kg.

Answers to Activity Questions (pages 211–215)

1. Answers will vary. Ensure students are using the right type of unit for each.

2. millimetre, centimetre, metre, kilometre

3. a) 100; 200
b) 10; 35
c) 1000; 500
d) Answers will vary. Example:
$\dfrac{1 \text{ m}}{100 \text{ cm}} = \dfrac{2 \text{ m}}{? \text{ m}}$. So, $\dfrac{1 \text{ m}}{100 \text{ cm}} = \dfrac{2 \text{ m}}{200 \text{ m}}$.

4. Answers are in italics.

Item	Length in Metric Units
a) the length of this book	*27.5 cm or 275 mm*
b) the height of the classroom door	*2 m or 200 cm*
c) the thickness of a loonie	*2 mm or 0.2 cm*
d) *the diameter of a penny*	*1.9 cm or 19 mm*
e) *the width of this book*	*21.3 cm or 213 mm*

5. milligram, gram, kilogram

6. a) 1000; 2000
b) 1000; 500 000

7. Answers are in italics.

Item	Weight in Metric Units
a) this book	*689 g or 0.689 kg*
b) a loonie	*7 g or 7000 mg*
c) *a penny*	*2.3 g or 2300 mg*
d) *a pencil*	*10 g or 10 000 mg*

8. a) Answers will vary. An example is provided. I think using grams is better because it gives a whole number, not a fraction.

b) $\dfrac{1 \text{ kg}}{1000 \text{ g}} = \dfrac{2 \text{ kg}}{? \text{ g}}$. So, $\dfrac{1 \text{ kg}}{1000 \text{ g}} = \dfrac{2 \text{ kg}}{2000 \text{ g}}$.

9. inch, foot, yard, mile

10. a) 12; 24
b) 3; 30

11. a) 1 ft 6 in.
b) 2 ft 3 in.
c) 4 ft
d) 64 in.
e) 72 in.

12. Answers are in italics.

Item	Length in Imperial Units
a) my height	*71 in.*
b) the height of the classroom door	*6 ft 8 in.* or *80 in.*
c) the thickness of a loonie	*0.0625 in.* or $\frac{1}{16}''$
d) *the height of a light switch*	*3 ft 8 in.* or *44 in.*
e) *the width of the classroom door*	*2 ft 8 in.* or *32 in.*

13. ounce, pound, ton

14. a) 8
b) 4
c) 12
d) 1.25
e) 2

Answers to Check Your Understanding (page 215)

1. about 42 ft

2. 1.5 km

3. 40 oz

4. 6 ft 7 in.

Challenge!

Try This!

Have students repeat question 7, but this time weigh the items in ounces. They can then create a conversion chart between grams and ounces.

Ongoing Assessment

- Any part of this section can be used as an opportunity to assess students' ability to make the calculations necessary for the situation.

Skills Practice 11: Using Ratio and Proportion to Convert Measurements

(page 216)

Specific Expectations

C.3.1 – identify and describe applications of ratio and rate, and recognize and represent equivalent ratios and equivalent rates, using a variety of tools

C.3.3 – identify and describe real-world applications of proportional reasoning, distinguish between a situation involving a proportional relationship and a situation involving a non-proportional relationship in a personal and/or workplace context, and explain their reasoning

C.3.5 – solve problems involving proportional reasoning in everyday life

What's the Math?

Students use ratio and proportion to convert measurements. This Skills Practice extends the work that students did with proportional reasoning in Skills Practice 9: Converting Between Imperial Measures and Skills Practice 10: Converting Between Metric Measures.

Activity Planning Notes

Use this Skills Practice with students who are struggling with basic arithmetic skills or proportional reasoning.

You may wish to use playing cards to show a concrete example of what is done in question 1. On one side, put one club above three diamonds. On the other side, put two clubs. Ask: How many diamonds do I need to have on this side to make the two sides equivalent? Work through a couple more concrete examples before returning to the symbolic.

Currency exchange is another example in which people use proportional reasoning and patterning. Ask students to describe the experiences they have had with exchange. Discuss how the proportion in question 2 works. Ask students to solve the same question using patterning.

$1 CDN = $1.10 US
$2 CDN = $2.20 US
$3 CDN = $3.30 US
$100 CDN = $100 US + $10 US
= $110 US

Question 3 on page 217 can also be answered using either proportions or patterning. Consider having students work in pairs. Have them answer the question using proportions, then using patterning. Which method do students prefer? Why?

Accommodations

- Some students may benefit from using a deck of cards and/or a tape measure.
- Consider using **SP BLM 11 Using Ratio and Proportion to Convert Measurements** with students who need additional reinforcement in this skill.

Do students have other strategies for solving questions like these? If so, ask them to share those strategies.

Answers to Skills Practice 11 (pages 216–217)

1. b) 9; 12

2. a) $1.10 US × 2 = $2.20 US
   b) $110 US
   c) $220 US
   d) $136.36 CDN

3. Answers are in italics.

Rise	Run
2 feet	24 feet
6 inches	*72 inches*
0.5 metres	6 metres
15 centimetres	*180 centimetres*
1.25 feet	15 feet
9.5 centimetres	*114 centimetres*

6.5 Converting Between Systems (page 218)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
150–225 min	• ruler with metric units (m, cm, and mm) • ruler with Imperial units (feet and inches, divided in $\frac{1}{16}$s of an inch) • scale or balance with metric units (g) • computer access • calculator • thermometer (optional)	SP BLM 11 Using Ratio and Proportion to Convert Measurements BLM 6–1 Temperature Conversions

Specific Expectations

C.1.1 – measure, using a variety of tools, the lengths of common objects and the capacities of common containers, using the metric system and the imperial system

C.1.5 – convert measures between systems, as required within applications that arise from familiar contexts

C.3.2 – identify situations in which it is useful to make comparisons using unit rates, and solve problems that involve comparisons of unit rates

C.3.3 – identify and describe real-world applications of proportional reasoning, distinguish between a situation involving a proportional relationship and a situation involving a non-proportional relationship in a personal and/or workplace context, and explain their reasoning

C.3.4 – identify and describe the possible consequences of errors in proportional reasoning

C.3.5 – solve problems involving proportional reasoning in everyday life

Cumulative Review

1. What document do employees complete to determine their tax code?

2. Joshua drives 120 km for business and is reimbursed at 62¢/km. How much is the reimbursement?

3. State two possible variable expenses associated with renting an apartment.

4. Calculate the total annual cost of home insurance if the monthly premium is $33.50.

Answers to Cumulative Review

1. TD1

2. $74.40

3. Answers will vary. Examples: utilities and groceries.

4. $402

What's the Math?

Students work with a number of skills, including
• using measuring tapes to get approximate conversions between metric and Imperial measures
• converting typical linear and capacity measurements used during driving trips to the United States

- working with exchange rates
- making conversions with various masses, and
- converting temperatures.

Earlier in this chapter, students have worked with each of these skills except the temperature conversions. You may need to spend additional time on this work and provide additional examples.

Warm Up Notes

Students will likely be able to complete these questions fairly quickly. You may wish to take up the questions as a class once they are completed. Have students explain their reasoning.

Question 1b) is the only type of question not seen previously. It can be used as a set-up for Chapter 7.

Answers to Warm Up (page 218)

1. a) 3
 b) 9

2. the gallon

3. Answers will vary.

4. Answers will vary.

5. Answers will vary. Many rulers are 30.5 cm (12 in.).

6. 5:35 P.M.

Activity Planning Notes

Arrange for the use of a computer lab to complete questions 10 to 13. Availability of the lab may dictate the sequence in which this section is completed.

If computer access is not available, questions 10 to 13 can be done without it; however, using a computer lab will teach students skills that they will use on personal trips. If this is not possible, you will need
- a number of maps of Ontario and the northern United States that provide information about distances between various locations,
- the current prices of gasoline at Canadian and American gas stations, and
- the current exchange rate.

Questions 1 and 2 have, in part, been done implicitly earlier in the chapter. In this section, students will use a tape measure to create a set of approximate conversions. Emphasize the proportional thinking that has already been done throughout the course and how this exercise is yet another example.

Relate questions 3 and 4 to questions 1 and 2 using proportional reasoning.

Use questions 5 to 9 to review skills that students will need in order to answer questions 10 to 13, which can be used as a mini task. You may wish to have

students remember that 50 mi = 80 km. If they can remember this, they will always have a conversion tool. They can use this information and patterning or proportional reasoning to do all mile/kilometre conversions.

Kilometres to Miles	Miles to Kilometres
80 km = 50 mi 10 km = 6.25 mi 100 km = 62.5 mi	50 mi = 80 km 10 mi = 16 km 70 mi = 112 km 1300 mi = 2080 km

Displaying a map of Pennsylvania or the eastern United States may help with students' understanding as they work on question 7.

The map on page 221 will help students to locate Orlando, Florida. Many of them may have visited various Florida locations. Their memories of these trips could make an interesting classroom discussion. If they drove to Florida, they may have interesting information to help the class answer question 8c).

Some students may find it helpful to use a ruler to confirm their answer to question 9.

Questions 10 to 13 can be handled in a number of ways. They could be used as an individual assignment or mini task. It may be beneficial for some students to work in pairs. If possible, have students download a map showing the route from their hometown to their destination.

Students who are not sure how to work with exchange rates may need to complete Skills Practice 11: Using Ratio and Proportion to Convert Measurements, before attempting question 13.

Questions 14 to 17 all involve weight and should be treated as a group. Discuss how many homeowners and workers may need to convert from metric weight to Imperial weight. You may wish to make a list of occasions when this might occur (i.e., cooking, shopping, buying items on the Internet, etc.). You may wish to discuss the answer to question 14 before having students try questions 15 to 17 on their own.

It may be necessary to work through the section on temperature conversion as a class. Explain that in question 18, a "ballpark" estimate may suffice; whereas in question 19, a greater degree of accuracy is required. In question 19, students need to do the calculation and then compare their answer to the degrees scale on the oven dial. What setting on the dial is closest to the answer they received?

Conclude the section with the Check Your Understanding. This may make another interesting class discussion, as students will have different experiences with the various measurement systems.

Accommodations

- If students have already completed Skills Practice 11: Using Ratio and Proportion to Convert Measurements, and are not sure how to do question 13, you may wish to work through **SP BLM 11 Using Ratio and Proportion to Convert Measurements** for additional reinforcement.
- **BLM 6–1 Temperature Conversions** provides additional reinforcement of this skill for students who have difficulty with questions 18 and 19.

Speed Bump

- Temperature conversion is a more complicated unit conversion than the others in this section.

R_x Work through examples as a class. Have a thermometer handy.

Literacy Link

Continue to reinforce the difference between the system of measurement used in Canada and the one used in the United States. Emphasize the importance of learning both, as students will likely travel back and forth between Canada and the United States many times during their adult life. In addition, they may purchase items from the United States or make materials for that market. As a result, it is important to know the names of the measurement units used in the Imperial system: inch, foot, yard, mile, quart, gallon, ounce, pound, and degrees Fahrenheit. It is also important to have an idea of what these might represent.

Answers to Activity Questions (pages 219–223)

1. Answers are in italics.

Imperial Length	Approximate Metric Conversion
1 in.	*2.5 cm*
6 in.	*15 cm*
1 ft	*30 cm*
3 ft	*1 m*
6 ft	*2 m*

2. Answers are in italics.

Metric Measure	Approximate Imperial Equivalent
1 mm	$\frac{1}{16}$ *in.*
1 cm	*0.39 in.*
10 cm	*4 in.*
50 cm	*20 in.*
3 m	*10 ft*

3. Answers will vary.

4. About 30 m

5. Answers will vary depending on the degree of accuracy required.
   a) 1.609 or 1.6
   b) 0.621 or 0.6

6. 62.1

7. 112

8. a) 2091.7 km
   b) About 21 h
   c) No, because you would have to stop for gas, to sleep, to eat, etc.

9. a) 25 to 30 cm
   b) Answers will vary.

10. a) 3.79
   b) 1.609 or 1.6

11.–13. Answers will vary.

14. a) Answers are in italics.

Metric Weight	Imperial Weight
1 kg	*2.2 lb*
450 g	1 lb
30 g	1 oz

   b) 1000; 16

15. Approximately 2.5 kg

16. Approximately 350 lb

17. a) 3.978 kg
   b) Approximately 8.75 lb

18. a) 14 °F
   b) 29 °C

19. The direct conversion is 347 °F. A typical oven can be set to the nearest 25 degrees, so the oven should be set to 350 °F.

Answer to Check Your Understanding (page 223)

1. Answers will vary. Students may say pounds, cups, tablespoons, teaspoons, miles, inches, feet, or yards.

Challenge!

Students who took applied level mathematics in earlier courses can explain or demonstrate how many of the conversions in this course are examples of direct variation, while the Fahrenheit to Celsius temperature conversion is an example of partial variation.

6.6 Measurement Systems at Work and at Home (page 224)

Specific Expectations

C.1.1 – measure, using a variety of tools, the lengths of common objects and the capacities of common containers, using the metric system and the imperial system

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts

C.1.5 – convert measures between systems, as required within applications that arise from familiar contexts

C.3.2 – identify situations in which it is useful to make comparisons using unit rates, and solve problems that involve comparisons of unit rates

C.3.3 – identify and describe real-world applications of proportional reasoning, distinguish between a situation involving a proportional relationship and a situation involving a non-proportional relationship in a personal and/or workplace context, and explain their reasoning

C.3.4 – identify and describe the possible consequences of errors in proportional reasoning

C.3.5 – solve problems involving proportional reasoning in everyday life

C.3.6 – solve problems involving proportional reasoning in work-related situations

Cumulative Review

1. How many face cards are in a deck of cards?

2. What is the probability of cutting a face card from a deck of cards?

3. State two fractions that are equivalent to your answer in #2.

4. Express the answer to #2 to the nearest percent.

Answers to Cumulative Review

1. 12

2. $\frac{12}{52}$

3. Answers will vary. Examples: $\frac{3}{13}$ and $\frac{6}{26}$.

4. 23%

What's the Math?

Students continue to work with proportional reasoning skills. Students make a number of conversions between various metric and Imperial measures. Students apply these conversions to solve workplace and everyday life problems.

Warm Up Notes

When discussing answers with students, stress the use of mental mathematics, thinking strategies, and patterning as opposed to having students simply getting the answers using a calculator.

For questions 1, 3, and 4, stress proportional reasoning. When you discuss the answers, ask students how they would solve these questions using patterning. What other strategies might they use?

Students may be able to relate money concepts to answering question 2a). Have them do it this way, then using equivalent fractions. How does their thinking change?

You may wish to relate question 5 to the question about medication asked on page 227.

You may wish to relate question 6 to the equivalent fractions students developed in question 2. How are equivalent fractions and equivalent ratios the same? (They represent the same amount.) How are they different? (They are written differently.)

On average, expect students to take 5 to 10 minutes to complete the Warm Up questions. You will likely need 10 to 15 minutes to take up and discuss the answers.

Answers to Warm Up (page 224)

1. a) 1000 mL
   b) 2000 mL

2. a) $\frac{3}{4}$
   b) $\frac{3}{8}$

3. a) 1000
   b) 2000

4. a) 1000
   b) 14 000

5. 6

6. Answers will vary.

Activity Planning Notes

This final section is designed to give students an opportunity to continue their work on proportional reasoning and unit conversion in a variety of settings. Emphasize the consequences of making errors in calculations or reasoning. As each of the four questions contains a number of parts, it may be necessary to work through the set-up to each question so that students understand the context of the problems.

Conclude the section with the Check Your Understanding. Have students consider the scenarios in the section and generalize about the importance of measuring carefully.

Literacy Link

Discuss the difference between *ratio* and *rate*.

Have students brainstorm the jobs and careers that might need to worry about the consequences discussed in this section.

Question	Related Jobs or Careers
1	gas station attendant, odd jobs person, forest technician, landscaper, mechanic
2	homemaker, cook, caterer, chef, events planner
3	parent, baby sitter, child care worker, day care worker, medical technician, nurse's aide, nutritionist, dietitian, teacher, doctor
4	parent, baby sitter, child care worker, day care worker, medical technician, nurse's aide, teacher, doctor

Answers to Activity Questions (pages 224–227)

1. a) You need to put 40 parts of gasoline to every 1 part of oil in the chainsaw.
 b) 400 mL
 c) 800 mL
 d) 120 mL oil and 4800 mL (4.8 L) of gas
 e) You could damage the chainsaw.
2. a) water: 2 cups; mix: 4 cups
 b) water: 3 cups; mix: 6 cups
 c) water: 20 cups; mix: 40 cups
 d) Answers will vary. Possible responses include: the batter will be too thick or too runny and the pancakes will not cook properly.

3. a)–h) Answers will vary.
 i) about 500 mL

4. a) Answers will vary. Ensure students consider the weight of each child and the exactness of the capacity of a kitchen teaspoon in their answers.
 b) Answers will vary. Possible responses include side effects and overdosing.
 c) 10 A.M., 2 P.M., 6 P.M., 10 P.M., and 2 A.M.

Answer to Check Your Understanding (page 227)

1. Answers will vary. Expect students to recognize the importance of measuring carefully to avoid various negative consequences.

- Check students' ability to participate in discussions, to explain their reasoning, and to make correct calculations in the Warm Up and in other questions.
- Continue to look for comfort level with the material and the process. Adjust your presentation accordingly.
- Provide additional practice, if needed, prior to moving to the chapter review.

Challenge! *Try This!*

Students can record their water consumption for a week and compile the class's data using a spreadsheet. They can calculate average consumption and total consumption, then look for patterns.

Chapter 6 Review (page 228)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
75 min	• calculator • ruler with metric and Imperial units	Master 2 Chapter Summary BLM 6–2 Chapter 6 Word Puzzle BLM 6–3 Match the Abbreviation

Using the Chapter Review

Insist that, before any of the review questions are attempted, students read through the review. Highlighting key words should, by now, be a commonly used strategy. You may wish to suggest that students follow the strategy outlined below in order to complete the review:

1. Look for and complete any questions that you can do unassisted.

2. Next, complete the questions that you understand but may need to refer back to notes or similar questions earlier in the chapter to complete.

3. Ask a classmate for help.

4. Ask the teacher for help.

Some students may need to do the review in chunks. For example, have students do questions 1 to 3, and then take up those questions. Question 4 stands alone. Questions 5 to 7 can be chunked. Question 8 stands alone. This process will avoid the problem of students rushing through and completing many questions incorrectly.

Re-teach concepts and/or procedures as necessary. Use **BLM 6–2 Chapter 6 Word Puzzle** as a means of reviewing the key terms.

Accommodations

- You may wish to use **BLM 6–3 Match the Abbreviation** with students who need additional reinforcement of the names or abbreviations for various metric and Imperial units.
- Students may benefit from making a chapter summary page that summarizes some of the key ideas/ skills from the chapter. **Master 2 Chapter Summary** can help provide structure for this process.
- When students have difficulty on a particular review question, use the Review Guide to identify the section they need to review. You may wish to provide them with additional reinforcement of the questions in this section before moving on to the Practice Test or the Chapter Task.

Review Guide

Question	Section(s)	Refer To
1	6.1	Metric Length (page 190, #1)
2	6.5 SP 11	Converting Between Systems (page 219, #1–#2) Skills Practice 11 (pages 216–217)
3	6.1	Imperial Length (pages 192–193, #7–#9)
4	6.3	Estimating Large Numbers (pages 202–205)
5	6.2 6.4	Capacity (pages 196–201) Converting Units (pages 212–215)
6	6.2 6.5	Capacity (pages 196–201) Converting Between Systems (pages 218–222)
7	6.5	Converting Between Systems (pages 218–222)
8	SP 11 6.5	Skills Practice 11 (pages 216–217) Converting Between Systems (pages 218–222)

Answers to Chapter 6 Review (pages 228–229)

1. Answers are in italics.

Length in Centimetres	Length in Millimetres
5.4 cm	*54 mm*
2.4 cm	*24 mm*
5.6 cm	*56 mm*
7.0 cm	*70 mm*
0.7 cm	*7 mm*

2. a) 2.13 in.
   b) 0.94 in.
   c) 2.20 in.
   d) 2.76 in.
   e) 0.28 in.

3. a) $2\frac{1}{8}$ in.
   b) $\frac{7}{8}$ in.
   c) $2\frac{3}{16}$ in.
   d) $2\frac{3}{4}$ in.
   e) $\frac{5}{16}$ in.

4. a) Estimates will vary.
   b) Answers will vary. Possible responses include counting the number of bricks in one row and multiplying by the number of rows.

5. a) 1000
   b) 16
   c) 2
   d) 4

6. a) <
   b) <
   c) >
   d) >

7. a) 3
   b) 4
   c) 2.5
   d) 30
   e) 30

8. a) 18.5 gal
   b) $49.40
   c) Answers will vary depending on exchange rate.
   d) The gas station in New York

Chapter 6 Practice Test (page 230)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
75 min	• calculator • ruler with metric and Imperial units	Master 2 Chapter Summary BLM 6–4 Chapter 6 Test

Using the Practice Test

As in the chapter review, encourage students to read through the practice test before they attempt any of the questions. Students should be able to work through the test at their own pace. You may wish to suggest that students follow the same strategy as for the chapter review. Remind them that a test is a time to show what they know. That's why it's important to do the questions they feel confident of first.

Re-teach concepts and/or procedures as necessary.

Study Guide

Question	Section(s)	Refer To
1	6.1	Imperial Length (pages 192–193, #7–#9)
2	6.5 SP 11	Converting Between Systems (page 219, #1–#2) Skills Practice 11 (pages 216–217)
3	6.1	Metric Length (page 190, #1)
4	6.2 6.4	Capacity (pages 196–201) Converting Units (pages 212–215)
5	6.2 6.5	Capacity (pages 196–201) Converting Between Systems (pages 218–222)
6	6.3	Estimating Large Numbers (pages 202–205)
7	6.5	Converting Between Systems (pages 218–222)
8	SP 11 6.5	Skills Practice 11 (pages 216–217) Converting Between Systems (pages 218–222)

Accommodations

- If they have not already done so, students may benefit from making a chapter summary page that summarizes some of the key ideas/skills from the chapter. **Master 2 Chapter Summary** can help provide structure for this process.
- Encourage students to highlight key words and key information contained in each question.
- When students have difficulty on a particular review question, use the Study Guide to identify the section they need to review. You may wish to provide them with additional reinforcement of the questions in this section before moving on to a test or the Chapter Task.

Summative Assessment

- Have students complete **BLM 6–4 Chapter 6 Test** and/or **BLM 6–5 Chapter 6 Task** to assess individual performance.

Answers to Chapter 6 Practice Test (pages 230–231)

1.

Length in Inches
3 in.
$1\frac{3}{4}$ in.
$\frac{1}{2}$ in.
$3\frac{1}{16}$ in.
$\frac{3}{16}$ in.

2. **a)** 7.62 cm
   b) 4.44 cm
   c) 1.27 cm
   d) 8.89 cm
   e) 0.48 cm

3. **a)** 7.6 cm
   b) 4.5 cm
   c) 1.3 cm
   d) 8.9 cm
   e) 0.5 cm

4. **a)** >
   b) <
   c) <
   d) <

5. **a)** 2000
   b) 16
   c) 2
   d) 4

6. **a)** Estimates will vary.
   b) Answers will vary. A possible response is counting the number of tiles in one row and multiplying by the number of rows.

7. **a)** 1
   b) 4
   c) 30
   d) 3
   e) 1

8. **a)** 5.3 gal
   b) $15.58
   c) Answers will vary depending on the exchange rate.
   d) The gas station in Port Huron has the lower priced gas.

Task: Plan A Shopping Trip (page 232)

<table>
<tr><td>

SUGGESTED TIMING

75–150 min

</td><td>

MATERIALS

- calculator
- Internet access
- spreadsheet software (optional)

</td><td>

BLACKLINE MASTERS

BLM 6–5 Chapter 6 Task

BLM 6–6 Chapter 6 Task Rubric

BLM 6–7 Chapter 6 BLM
Answers

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Specific Expectations

C.1.4 – convert measures within systems, as required within applications that arise from familiar contexts
C.1.5 – convert measures between systems, as required within applications that arise from familiar contexts
C.3.1 – identify and describe applications of ratio and rate, and recognize and represent equivalent ratios and
      equivalent rates using a variety of tools
C.3.4 – identify and describe the possible consequences of errors in proportional reasoning
C.3.5 – solve problems involving proportional reasoning in everyday life

Activity Planning Notes

The Task page in the student resource provides opening content for a longer
Task that is scaffolded on **BLM 6–5 Chapter 6 Task** in the Teacher's Resource.
Internet access is required for this Task.

Display page 232 of the student resource and read the situation aloud. Discuss all
questions. This page should be used to elicit discussion and to ensure students
understand the task that they will receive. It may be beneficial to work through
the opening page with imaginary data to use as an example in order to ensure
that students understand how to get started.

Hand out the Task. Read the entire Task aloud and check for student
understanding of the scenario. Encourage students to provide reasoning and to
show their calculations for their answers. Remind them to refer back to earlier
sections for help if they forget how to do some calculations or steps.

Accommodations

- Consider providing road maps or an atlas and catalogues from the United States to students who do not have access to the Internet. Alternatively, you may wish to download specific web pages and provide them to students.
- Some students may have difficulty deciding what city to visit. Narrow the choice by either choosing a state for them or limiting their choice to one of five cities you suggest.

Summative Assessment

- Use **BLM 6–6 Chapter 6 Task Rubric** to assist you in assessing students' work on this task.

> **Answers to Task: Plan A Shopping Trip (page 232)**
>
> Answers will vary.