Chapter 7 Planning Chart

Section Suggested Timing	Teacher's Resource Blackline Masters	Assessment Tools	Materials and Technology Tools
Measurement and Design (TR page 219) (15 min)		Diagnostic Assessment (TR page 220)	
7.1 2-D Scale Drawings (TR page 221) (150–225 min)	Master 10 Quarter Inch Grid Paper Master 11 Centimetre Grid Paper Master 12 0.5 Centimetre Grid Paper SP BLM 9 Converting Between Imperial Measures SP BLM 10 Converting Between Metric Measures BLM 7–1 Using *The Geometer's Sketchpad*® to Create a Scale Drawing	Ongoing Assessment (TR page 225)	• map with scale (optional) • calculator • tape measure with metric or Imperial units • ruler with metric units • $\frac{1}{4}$" grid paper • centimetre grid paper • Internet access (optional) • magazines with closet designs (optional) • interactive whiteboard (optional)
Skills Practice 12: The 3–4–5 Method of Checking for a 90° Angle (TR page 226) (10–20 min)	Master 10 Quarter Inch Grid Paper Master 11 Centimetre Grid Paper Master 12 0.5 Centimetre Grid Paper SP BLM 12 The 3–4–5 Method of Checking for a 90° Angle	Ongoing Assessment (TR page 226)	• ruler with metric units
Skills Practice 13: Start Square and You'll Finish Square (TR page 227) (30–40 min)	SP BLM 13 Start Square and You'll Finish Square	Ongoing Assessment (TR page 227)	• calculator • ruler with metric units • tape measure with Imperial units • overhead projector
7.2 Perimeter and Area Applications (TR page 228) (150–225 min)	Master 10 Quarter Inch Grid Paper Master 11 Centimetre Grid Paper Master 12 0.5 Centimetre Grid Paper BLM 6–3 Match the Abbreviation	Ongoing Assessment (TR page 231)	• calculator • ruler • coloured pencils
7.3 Estimating the Cost of a Project (TR page 232) (150–225 min)		Ongoing Assessment (TR page 235)	• calculator • grocery store flyers • Internet access (optional)
Skills Practice 14: Calculating Surface Area (TR page 236) (75–150 min)	SP BLM 14 Calculating Surface Area BLM 7–2 Nets	Ongoing Assessment (TR page 236)	• calculator • boxes or other rectangular prisms, cylinders, triangular prisms (optional)
7.4 3-D Scale Models (TR page 237) (225–300 min)	Master 13 Isometric Dot Paper BLM 7–2 Nets	Ongoing Assessment (TR page 240)	• die (optional) • calculator • ruler or tape measure with metric or Imperial units • modelling clay or cardboard • toy cars, poker chips, golf balls (optional) • glue or tape (optional)
7.5 Capacity and Volume Applications (TR page 241) (150–225 min)	BLM 7–3 Calculating Volume	Ongoing Assessment (TR page 244)	• calculator • 2-cm linking cubes • grocery store flyers (optional) • Internet access (optional)
7.6 Composite Shapes and Figures (TR page 245) (75–150 min)	Master 10 Quarter Inch Grid Paper Master 11 Centimetre Grid Paper Master 12 0.5 Centimetre Grid Paper	Ongoing Assessment (TR page 248)	• calculator • linking cubes • ruler

Section Suggested Timing	Teacher's Resource Blackline Masters	Assessment Tools	Materials and Technology Tools
Chapter 7 Review (TR page 249) (75 min)	Master 2 Chapter Summary Master 11 Centimetre Grid Paper BLM 7–4 Chapter 7 Word Search		• calculator • ruler
Chapter 7 Practice Test (TR page 251) (75 min)	Master 2 Chapter Summary Master 11 Centimetre Grid Paper	BLM 7–5 Chapter 7 Test	• calculator • ruler
Chapter 7 Task (TR page 253) (75–150 min)	Master 10 Quarter Inch Grid Paper Master 11 Centimetre Grid Paper Master 12 0.5 Centimetre Grid Paper BLM 7–6 Chapter 7 Task BLM 7–8 Chapter 7 BLM Answers	BLM 7–7 Chapter 7 Task Rubric	• calculator • access to a computer with spreadsheet software (optional)

CHAPTER 7

Measurement and Design (page 233)

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

Contributing Expectations

A.1 – collect, organize, represent, and make inferences from data using a variety of tools and strategies, and describe related applications
B.2 – interpret, design, and adjust budgets for individuals and families described in case studies

What's the Math?

Students continue their work with metric and Imperial measures. The chapter opener is designed to start students thinking about the importance of correct measurements and calculations.

Throughout the chapter, students will convert units and use proportional reasoning to make estimates and calculations in a variety of settings. Students create two-dimensional scale diagrams and three-dimensional scale models of typical household or work-related settings.

Activity Planning Notes

Consult the list of materials in the Planning Chart prior to introducing the chapter. This chapter requires a number of measuring tools and other materials.

Give students several minutes to examine the cartoon and answer the questions. Encourage them to share their answers. Have students discuss:
- what they think went wrong
- which units of measure they would use for this project.

Speed Bump

- Some students may struggle to think of measurements related to household improvements.

R_x Brainstorm some possible renovation projects with the class.

Diagnostic Assessment

The discussion with the class should give you a sense of students' general understanding of how to apply measurement and design in everyday life. Some things to consider:

- Do students understand the implications of incorrect measuring?
- Are students' comments reasonable?

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 lead many of the activities as a class exercise. If students seem to have a good understanding of the concepts, you may find that they can work at their own pace.

Literacy Link

Provide students with many opportunities to talk and listen as they discuss this cartoon and the related questions. Many will have stories of personal experiences. Encourage them to share these.

Answers (page 233)

1. Once you cut something, you cannot go back and redo it if you have made the item smaller than what is needed. Therefore, it is important to make sure that your measurement is correct before you cut.

2. They will have to buy more carpet. They did not budget for buying the carpet twice.

3. Answers will vary but should include a response that considers the budget of $2000.

7.1 2-D Scale Drawings (page 234)

SUGGESTED TIMING

150–225 min

MATERIALS

- map with scale (optional)
- calculator
- tape measure with metric or Imperial units
- ruler with metric units
- $\frac{1}{4}$" grid paper
- centimetre grid paper
- Internet access (optional)
- magazines with closet designs (optional)
- interactive whiteboard (optional)

BLACKLINE MASTERS

Master 10 Quarter Inch Grid Paper

Master 11 Centimetre Grid Paper

Master 12 0.5 Centimetre Grid Paper

SP BLM 9 Converting Between Imperial Measures

SP BLM 10 Converting Between Metric Measures

BLM 7–1 Using *The Geometer's Sketchpad*® to Create a Scale Drawing

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.2.6 – construct a two-dimensional scale drawing of a familiar setting on grid paper or using design or drawing software

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

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

Cumulative Review

1. State four Imperial units for measuring length.

2. List the four units in question 1 from shortest to longest.

3. What is 10% of $3500?

4. What is 5% of $3500?

Answers to Cumulative Review

1. Answers will vary. Common responses include the inch, foot, yard, and mile.

2. Inch, foot, yard, mile

3. $350

4. $175

What's the Math?

Students measure length using metric and Imperial units. Students then use proportional reasoning to create two-dimensional scale drawings and corresponding scale templates of common items.

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 questions review metric and Imperial measures and proportional reasoning skills learned in Chapter 6. Encourage students to look at their work in Chapter 6 if they struggle with these questions.

Accommodation

- You may wish to review Skills Practice 9: Converting Between Imperial Measures and Skills Practice 10: Converting Between Metric Measures with students who have difficulty answering questions 1 to 4. Alternatively, if they have already completed **SP BLM 9 Converting Between Imperial Measures** and **SP BLM 10 Converting Between Metric Measures**, customize these worksheets by changing the numbers to closely relate them to the ones students are having problems with in the Warm Up.

Questions 1 to 4 are conversion-type questions. Encourage students to explain how they figured out the answer to each question. Look for proportional reasoning and patterning strategies. Make sure that students understand how these strategies work.

Question 5 deals with scale. You may wish to show a copy of a map with a scale to reinforce students' understanding of what a scale is and how it is used in maps and other drawings. Discuss how proportions or patterning can be used to solve question 5.

1 cm = 7 km
2 cm = 14 km
3 cm = 21 km
6 cm = ? km

or

$$\frac{1 \text{ cm}}{7 \text{ km}} = \frac{6 \text{ cm}}{? \text{ km}}$$

Although it may not seem apparent, question 6 is a form of scale question. Discuss how to use patterning or proportional reasoning to solve it.

Answers to Warm Up (page 234)

1. a) $\frac{1}{2}$
b) $\frac{1}{4}$
c) $\frac{3}{4}$

2. a) $\frac{1}{2}$
b) $\frac{1}{4}$
c) $\frac{3}{4}$

3. a) 4
b) 6
c) 9

4. a) 3
b) 18
c) 23

5. The actual distance is 42 km.

6. You need 60 rows.

Activity Planning Notes

Some students may have extensive experience and considerable skill in measuring. These students may not need to complete all questions. Conversely, there may be students with little to no experience with this material. Student success in Chapter 6 may be an indicator of success in Chapter 7. It may be beneficial to pair stronger and weaker students throughout the chapter.

Students should have completed scale drawings in earlier grades, so you may wish to use question 1 as a diagnostic assessment to gauge the timing required for this section. Students will use their drawing from question 1 in section 7.2, so it is important that they complete this question.

Question 2 uses metric units, whereas questions 1 and 3 use Imperial units. Remind students to check the units and scale at the beginning of each question. As a number of similar questions are provided, you may wish to allow students to choose one or two that interest them most.

For question 4, students might want to use an interactive closet design program on the Internet. Alternatively, you may wish to provide some images of different closet designs from magazines.

Questions 5 and 6 can be done in small groups and may take one 75-minute period to complete. Provide access to copies of **Master 10 Quarter Inch Grid Paper, Master 11 Centimetre Grid Paper**, and **Master 12 0.5 Centimetre Grid Paper**. Allow students to use the type they find most useful. Alternatively, pages 286–289 in the student resource have centimetre grid paper.

If you have access to an interactive whiteboard, use it to do question 6 as a class activity.

Conclude the section by having students complete the Check Your Understanding. Encourage students to use this activity for something that interests them. Provide access to copies of **Master 10 Quarter Inch Grid Paper, Master 11 Centimetre Grid Paper**, and **Master 12 0.5 Centimetre Grid Paper**.

Literacy Link

Relate *scale* to proportion so that students understand that the diagrams they are drawing are reductions of the actual items. Compare and contrast this concept to enlargements. Discuss with students when they may have dealt with reductions done to scale (e.g., model trains, planes, and ships) and enlargements done to scale (e.g., model insects). Ask members of the class who are keen modellers to bring some of their scale models for display. Alternatively, you may wish to invite a model buff to discuss and display some scale models.

Accommodations

- Some students may benefit from working in pairs.
- Particularly skilled students may not need to do all questions. Alternatively, encourage them to be classroom leaders.
- Some students may benefit from using rulers or tape measures that have only metric or Imperial units.
- You may wish to have students use **BLM 7–1 Using *The Geometer's Sketchpad*® to Create a Scale Drawing** to complete question 1 and then use the same technology for the other questions in this section. Alternatively, students could use software for some of the questions and do the others by hand.

Technology Link

- For Web sites with interactive closet design programs, go to **www.mcgrawhill.ca/books/workplace12** and follow the links.

Speed Bumps

- Some students may measure items using the wrong units.

R_x Most tape measures state the base unit of measure at the beginning of the tape. Remind students to check it before measuring.

- Some students may continue to struggle with basic numeracy skills when using proportional reasoning.

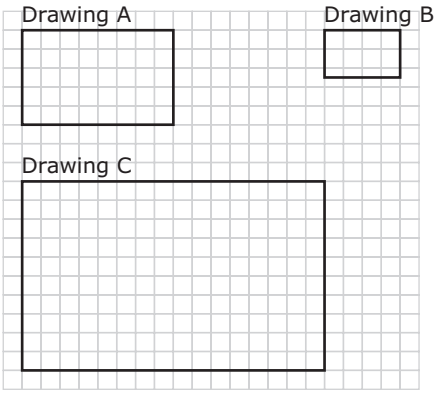
R_x Encourage these students to use a calculator. Alternatively, have them use patterning.

- Some students may need larger grids than are available in the student resource.

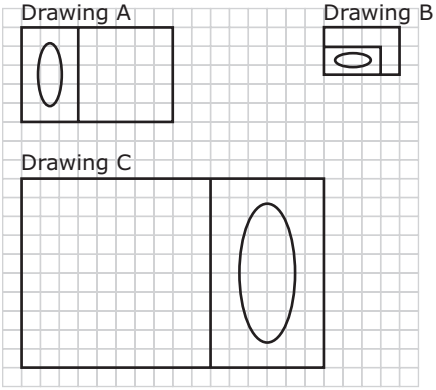
R_x Make copies of **Master 10 Quarter Inch Grid Paper, Master 11 Centimetre Grid Paper**, and **Master 12 0.5 Centimetre Grid Paper** available to these students. You may wish to adjust the scale for some students.

Answers to Activity Questions (pages 235–239)

1. a)–c)



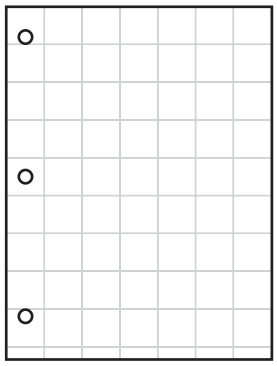
d) The location of the bathtub may vary. Several options are shown below.



e) Answers may vary. A possible response is, "I prefer Drawing C because it is the biggest so it was easiest to draw."

2. a) length = 27 cm, width = 21 cm

b) and **e)**



c) 1 cm

d) 1 cm, 3 cm, 10 cm, 3 cm

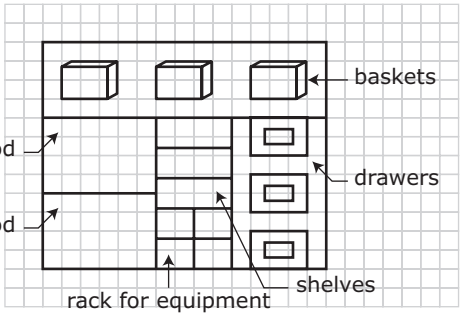
3. a) The rectangle should be 24 squares long and 16 squares high.

b) Print: $6 \times 4 = 24$; Plaque: $2 \times 3 = 6$; Photo: $3.5 \times 2.5 = 8.75$

c) The placement of artwork will vary. Ensure that each piece of art has the dimensions listed in part b).

d) If you know the dimensions of the wall, you can figure out where the art will fit based on the size of the art.

4. Sketches will vary. Ensure that the scale is reasonable and all of the components are included for part b). An example with a scale of 1 square to 20 cm is shown below.



5. Answers will vary.

6. Answers will vary.

Answers to Check Your Understanding (page 239)

1. Answers will vary.

2. Answers will vary. A possible response is planning a renovation or drawing a landscape design.

Challenge!

- Students can create a drawing using *The Geometer's Sketchpad*® or other drawing software.
- Have students develop scale enlargements for some of the diagrams in the section.

Ongoing Assessment

- Check students' ability to take correct measurements, to use correct units, and to think proportionally.

Skills Practice 12: The 3–4–5 Method of Checking for a 90° Angle (page 240)

SUGGESTED TIMING
10–20 min

MATERIALS
- ruler with metric units

BLACKLINE MASTERS
Master 10 Quarter Inch Grid Paper
Master 11 Centimetre Grid Paper
Master 12 0.5 Centimetre Grid Paper
SP BLM 12 The 3–4–5 Method of Checking for a 90° Angle

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.2.1 – construct accurate right angles in practical contexts, and explain connections to the Pythagorean theorem
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 work through a Skills Practice that shows them how to use proportional reasoning to check that a triangle has a 90° angle.

Activity Planning Notes

Accommodation
- Students who need additional reinforcement of these skills could use **SP BLM 12 The 3–4–5 Method of Checking for a 90° Angle.**

Use this Skills Practice as an assessment of students' understanding of proportional reasoning. Review how a 3–4–5 triangle relates to the Pythagorean relationship. You may wish to have students draw an actual version of the triangle in the voice balloon on page 240 to see this for themselves. Consider using **Master 10 Quarter Inch Grid Paper, Master 11 Centimetre Grid Paper**, or **Master 12 0.5 Centimetre Grid Paper** for this purpose.

Also brainstorm a list of ratios that are equivalent to 3 : 4 : 5.

Ongoing Assessment
- Check students' ability to use proportional reasoning to check if a triangle has a 90° angle.

If students question why they need to know this skill, talk about how carpenters use these measurements to check that walls, fences, and doors that they are building have square corners. This discussion will lead to Skills Practice 13: Start Square and You'll Finish Square.

Answers to Skills Practice 12 (page 240)

1. a) The lengths of the sides are 3 cm, 4 cm, and 5 cm, so the triangle has a 90° angle.

b) The lengths of the sides are 3 cm, 4 cm, and 4.7 cm. $3^2 + 4^2 \neq 4.7^2$, so the triangle does not have a 90° angle.

c) The lengths of the sides are 6 cm, 8 cm, and 10 cm. $6^2 + 8^2 = 10^2$, so the triangle has a 90° angle.

Skills Practice 13: Start Square and You'll Finish Square (page 241)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
30–40 min	• calculator • ruler with metric units • tape measure with Imperial units • overhead projector	SP BLM 13 Start Square and You'll Finish Square

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.2.1 – construct accurate right angles in practical contexts, and explain connections to the Pythagorean theorem
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

What's the Math?

Students work through a Skills Practice that shows them how to construct a triangle to check if a room is square. This skill is used by many tradespeople, including carpenters, carpenters' helpers, and people who do odd jobs. It's a quick way of checking that the corners of buildings, doors, and fencelines are square.

Activity Planning Notes

You may wish to photocopy this Skills Practice onto an overhead transparency and work through questions 1 to 3 as a class. Before beginning, discuss the introduction to ensure students understand why it is important to start in the middle of the room and move outward when laying floor tile. Stress that students must measure accurately and draw straight lines.

Similarly, a demonstration of question 6 may be beneficial. Students could then measure the other corners in the room or corners in other rooms.

Literacy Link

Discuss the meaning of *square* in this context. As a class, come up with a list of situations where you would need to check if something is square.

Accommodations

- As an alternative to having students measure corners in the classroom, you could bring in some 5' and 7' two by fours and ask students to construct a square corner. Ask them to prove that the corner is square.
- Students who need additional reinforcement of these skills could use **SP BLM 13 Start Square and You'll Finish Square.**

Ongoing Assessment

- Check students' ability to use a 3–4–5 triangle to check if a corner is square.

Answers to Skills Practice 13 (pages 241–242)

1.–4. Ensure students measure carefully so that their lines in #1 and #2 meet at the centre.

5. It is important to start laying tiles at the centre of the room using a 90° angle because this ensures that your tiles will be square to the walls.

6. c) 5 ft
e) Answers will vary depending on the room. Students should be able to explain that the room is square if the distance between the two marks is 5 ft.

7.2 Perimeter and Area Applications (page 243)

SUGGESTED TIMING
150–225 min

MATERIALS
- calculator
- ruler
- coloured pencils

BLACKLINE MASTERS
Master 10 Quarter Inch Grid Paper
Master 11 Centimetre Grid Paper
Master 12 0.5 Centimetre Grid Paper
BLM 6–3 Match the Abbreviation

Specific Expectations

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.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications
C.2.6 – construct a two-dimensional scale drawing of a familiar setting on grid paper or using design or drawing software
C.3.5 – solve problems involving proportional reasoning in everyday life

Cumulative Review

1. Estimate the annual rent paid by someone paying $795 per month.

2. State two equivalent fractions for $\frac{1}{2}$.

3. A drawer has 10 white socks and 10 black socks. What is the probability of selecting a black sock?

4. When your income equals your expenses, you have a _____ budget.

Answers to Cumulative Review

1. $9600 (12 × $800)

2. Answers will vary.

3. Any answer equivalent to $\frac{1}{2}$ is correct.

4. balanced

What's the Math?

Students review measurement concepts in familiar contexts. They solve everyday problems dealing with the perimeter and area of familiar two-dimensional shapes. Proportional reasoning is emphasized. Composite two-dimensional shapes are introduced in the section in order to enhance practical problem solving.

Warm Up Notes

This Warm Up reviews information about area and perimeter that students need to know in order to complete this section.

Questions 1 and 2 ask students to define perimeter and area. You may wish to encourage students to use a visual or comparison to help with those definitions. For example, perimeter is the frame around a picture. Area is the picture itself.

In questions 3 and 4, students differentiate between linear and square units. You may wish to use a diagram or model to reinforce the difference between a linear foot and a square foot and a linear metre and a square metre.

In questions 5 and 6, make sure that students know what an exponent asks them to do. So, $3^2 = 3 \times 3$.

In questions 7 and 8, ensure that students know what hash marks entail. Also discuss why there are single hash marks on the 6-foot sides in question 7 and double hash marks on the 3-foot sides.

Wherever appropriate, look for and have students consider multiple representations or multiple strategies for working through questions. For example, in question 9a), acceptable strategies are 6 + 3 + 6 + 3 or 6 + 6 + 3 + 3 or (6 + 3) × 2.

Note that both the perimeter and the area of the rectangle in question 9 are 18. Stress that this is merely a coincidence. The numbers have completely different meanings because they are the measures of different quantities; 18 ft and 18 ft^2 are different measurements. This should be clear when students complete question 10.

Answers to Warm Up (page 243)

1. Perimeter is the distance around the outer edge of a shape.

2. Area is the number of square units needed to cover a shape.

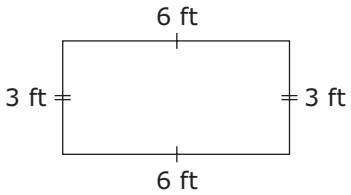
3. a) feet
b) ft

4. a) metres squared or square metres
b) m^2

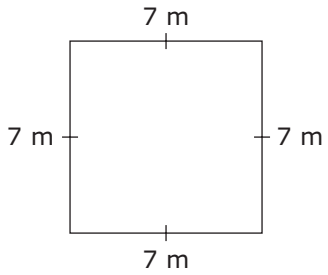
5. 25

6. 25

7.



8.



9. a) 18 ft **b)** 18 ft^2

10. a) 28 m **b)** 49 m^2

Accommodations

- Some students may benefit from working in pairs.
- Particularly skilled students may not need to do all questions.
- Some students may find it easier to use a piece of **Master 10 Quarter Inch Grid Paper, Master 11 Centimetre Grid Paper**, or **Master 12 0.5 Centimetre Grid Paper** to complete the Check Your Understanding.

Speed Bump

- This section requires students to do several different calculations and use many steps to solve problems.

$\mathbf{R_x}$ Provide as much reinforcement as is necessary. Break individual tasks into a number of related subtasks. Refer to the lettering of the sequence of steps for each of the multi-step questions.

Activity Planning Notes

Question 1 uses the bathroom design from section 7.1, question 1. Reading the question aloud may benefit some students. Some students will be able to complete all of the parts of question 1 without assistance. Take up question 1 prior to starting question 2.

You may wish to do question 2a) and b) as a class lesson. Similarly, the first triangle of part c) may need to be done as an example. Ensure that students include the units in their answers. Take up question 2 prior to assigning question 3. Make sure that students correctly calculate the area of the triangle in question 2d).

Since questions 3 to 5 involve circles, you may wish to assign these questions on a separate day. Although students learned these concepts in earlier grades, some students may need reminders. Use the diagrams in question 3 to help students realize that the area of a circle is slightly less than the area of a square formed around the circle.

Review the use of pi to calculate the area of a circle, then have students complete questions 4 and 5.

Conclude the section by having students complete the Check Your Understanding. This may take some students a full period to complete. It may be assigned for homework or you can use it as an assessment of students' progress.

- Allow students to use their own scale to complete part a).
- Make sure that they use the same scale for the circular flower beds.
- You may need to discuss with some students how to calculate the area of the grass once they know the total area of the flower beds.

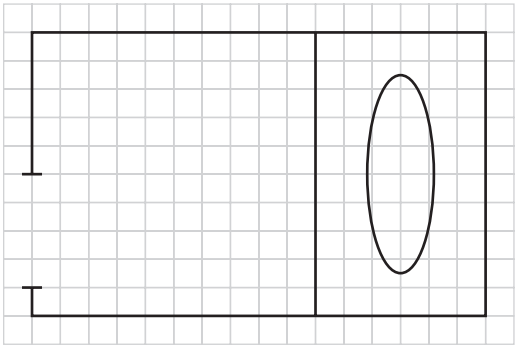
Literacy Link

Units of area, like units of length, are often abbreviated when written. Ensure that students are able to read abbreviations as well as the full names. If students have not already completed **BLM 6–3 Match the Abbreviation**, you may wish to have them do it now.

Ensure that students use the correct terminology in the correct context; for example, they should state the answer to an area problem in square units.

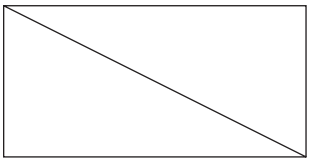
Answers to Activity Questions (pages 244–248)

1. a)–c) The locations of the tub and door may vary. Ensure that the tub is 10 squares by 6 squares. Ensure that the door is 4 squares.



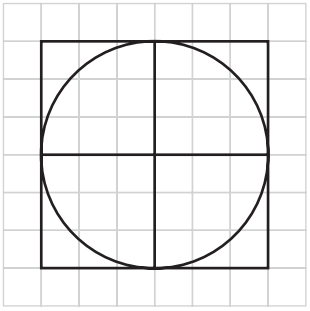
d) Answers will vary depending on the diagram. 13 ft of baseboard is required for the diagram above.
e) 2
f) $29.98
g) $33.88
h) 25 ft^2
i) 100 tiles
j) 9 boxes
k) $161.91
l) $182.96

2. a)



b) The area of each triangle is half the area of the rectangle.
c) 3.6 m^2, 20 ft^2
d) 168 ft^2

3. a) and **b)** radius;



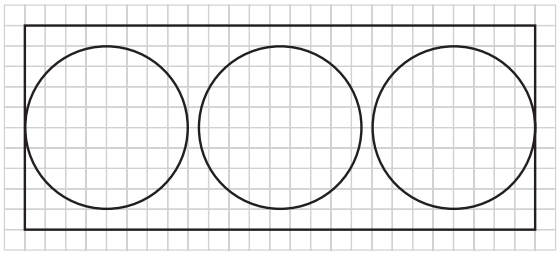
c) 9 m^2
d) 9
e) 36 m^2
f) 30 m^2

4. 3.14 × 3 × 3 = 28.26 m^2; 28 m^2

5. a) 6
b) Scale: 1 square = 1 ft; diagrams will vary.
c) 120 ft^2
d) 113 ft^2

Answers to Check Your Understanding (page 249)

1. a) and **b)** Answers will vary. An example is scale: 1 square = 3 ft



c) 452.16 ft^2
d) 1356.48 ft^2
e) 893.52 ft^2

Challenge!

Have students plan a landscaping design for an area around the school, a community building, or their home. They can use paper and pencil, appropriate software, or a Web-based design program.

Ongoing Assessment

- Assess students' ability to make accurate sketches, to use scale, to use correct units, and to think proportionally.

Technology Link

- For Web sites with interactive landscape design programs, go to **www.mcgrawhill.ca/books/workplace12** and follow the links.

7.3 Estimating the Cost of a Project (page 250)

SUGGESTED TIMING
150–225 min

MATERIALS
- calculator
- grocery store flyers
- Internet access (optional)

Specific Expectations

A.1.2 – explain the distinction between the terms population and sample, describe the characteristics of a good sample, and explain why sampling is necessary
A.1.3 – collect categorical data from primary sources, through experimentation involving observation or measurement, or from secondary sources, and organize and store the data using a variety of tools
B.2.2 – categorize personal non-discretionary expenses as fixed or variable
B.2.6 – make adjustments to a budget to accommodate changes in circumstances, with technology
C.1.3 – estimate quantities, and describe the strategies used
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.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications
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.3.4 – 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. Approximately how many litres are in 1 US gallon?
2. Which is heavier, a pound or a kilogram?
3. What is the approximate Celsius equivalent to 80 °F?
4. What is 50% of 600?

Answers to Cumulative Review

1. 4
2. a kilogram
3. Approximately 25 °C–27 °C
4. 300

What's the Math?

Students estimate and calculate quantities in a variety of situations. Budgeting, sample versus population, and tax calculations are revisited. Students work through and solve multi-step problems typical in workplace and everyday life.

Warm Up Notes

This exercise will provide you with a sense of how comfortable students are working with percent and, by extension, the estimation of tax.

Once students have completed questions 1 to 4, discuss which method of rounding is more appropriate in this situation. (Answers will vary; however, it is useful for students to notice that the actual calculation is $78.16. The rounding in question 2 was closer. It is also a little higher, which is useful when rounding money amounts since you don't want to run out of money.)

Questions 5 to 8 review how to estimate tax. Once students have completed these questions, ask for the estimated cost of the items rounded as in question 1, including tax ($89.70), and the estimated cost of the items rounded as in question 2, including tax ($92).

Again, discuss which method of rounding is more useful in the situation.

Answers to Warm Up (page 250)

1. a) $19
b) $11
c) $48

2. a) $20
b) $10
c) $50

3. $78

4. $80

5. $7.80

6. $8

7. $3.90

8. $4

Activity Planning Notes

Do question 1 as a class activity to review rounding, perimeter, area, proportional reasoning, and tax calculations.

Read question 2 aloud. Some students will need no further assistance; others will need one-on-one help if they are struggling with multi-step problem solving.

Question 3 is a mini-project that uses concepts explored earlier in the course. It may be beneficial to have students work in pairs or in small groups to complete this question. Before they start, you may wish to discuss how this question relates to the work on budgets they did earlier in the year. Ask:

- Which costs in a breakfast program might be considered to be fixed? (e.g., cost of appliances and non-food supplies needed to run the program)
- Which costs are variable? (e.g., food costs)
- How does surveying a class in your school provide a sample of what the entire school might say?
- Why would people survey one class rather than question the entire school?

Students will probably need at least one full 75-minute session with access to the Internet.

Accommodations

- Some students may benefit from working in pairs or in small groups.
- Not all students need to do all questions.
- In question 4, some students may miss the final bullet at the top of page 254. Have them read the bullet and discuss how the fact that the material is twice the width of the window will affect their answer. What strategies can they use to deal with this?
- Some students may have difficulty showing the estimate in question 4 in square yards. Discuss the different strategies for doing this.

Speed Bump

- Some students may continue to round down when estimating cost.

$\mathbf{R_x}$ Discuss the consequences of not having enough money.

In question 4, the dimensions are provided in feet and inches. Have students *estimate* the area of the drapes in square yards. Example:
6' 10" ≈ 7'
$7 \times 10 = 70 \times 2 = 140$ ft^2
1 square yard = 9 square feet
$140 \div 9 = 15.5$ yd^2
This rounds to about 16 yd^2.

Have students discuss whether their estimate is higher or lower than the actual—and whether it is better to estimate high or low.

Have students use their adjusted estimates to answer part c). Check that they have estimated the after-tax cost correctly.

Students can use their size estimate from question 4b) to answer question 5.

Conclude the section by having students complete the Check Your Understanding. The discussion you have about question 4 will help students answer the second question in the Check Your Understanding.

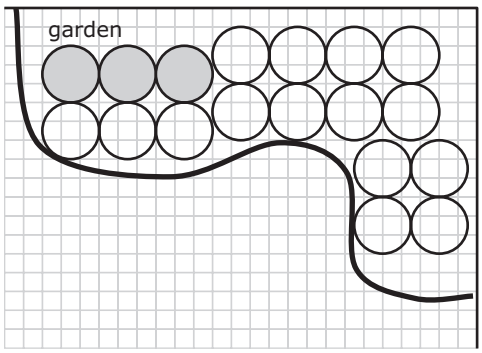
Literacy Link

Have students refer to the Glossary to review the terms *sample* and *population*. Ask how these terms may apply in question 3.

Answers to Activity Questions (pages 250–255)

1. Estimates may vary. Examples: **a)** $280
b) $42
c) 168"
d) 440 in.^{2}

2. Answers will vary. An example is provided.
a)



b) 15
c) $750
d) $110
e) $860
f) $813.43

3. a) and **b)** Answers will vary. An example is provided.

Item	Estimated Cost	Actual Cost
Fridge	$100	$125
Toaster	$20	$15
Frying pans	$50	$75
Pots	$50	$50
Cooking utensils	$20	$25

c) bread, butter or margarine, jam, honey, different types of juice, milk, cereal, eggs
d)–f) Answers will vary depending on the population of the school.
g) The cost of food will increase.
h) The cost of non-food supplies will not increase because they are all one-time purchases. When the items break, they will need to be replaced.

4. a) about 16 yd^2

b) Answers will vary. Example: My estimate is higher because I rounded the width of the drapes to 7 ft, and then rounded the number of square yards up.

c)

Cost Per Square Yard	Estimated Cost	Estimated After-Tax Cost
Clean It Right $4.99	$80.00	$90.00
Hotel Cleaning $5.23	$80.00	$90.00
Drapes for Us $6.50	$96.00	$110.00
Window Coverings Inc. $7.18	$112.00	$125.00

5. a) $48.00

b) $144.00

Answers to Check Your Understanding (page 255)

1. You want to make sure you're getting a reasonable price. Also, you want to make sure the project is within your budget.

2. a) The cost of the project might go over your budget. It also might take longer to complete.

b) You might buy too much and be unable to return it. However, if you can return it, your project might cost less than you thought it would.

Challenge!

Students can set up a spreadsheet for the Breakfast Club project on page 252. They can compile one-time costs, ongoing costs, and a grocery list.

Ongoing Assessment

- Check students' estimates and calculations to make sure they are appropriate. Make sure the strategies offered make sense. Are other considerations taken in each of the situations? For example, do students consider the value of rounding money values upward rather than downward?

Skills Practice 14: Calculating Surface Area (page 256)

SUGGESTED TIMING
75–150 min

MATERIALS
- calculator
- boxes or other rectangular prisms, cylinders, triangular prisms (optional)

BLACKLINE MASTERS
SP BLM 14 Calculating Surface Area
BLM 7–2 Nets

Specific Expectation

C.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications

Accommodations
- Use models of the various prisms, as well as **BLM 7–2 Nets**, to help students visualize the shapes involved in the surface area of rectangular prisms, triangular prisms, and cylinders.
- Some students may benefit from using a computer program, Tabs+, to explore 3-D figures and their corresponding 2-D nets.
- Students who need additional reinforcement of these skills could use **SP BLM 14 Calculating Surface Area**.

Ongoing Assessment
- Check students' ability to calculate the surface area of a rectangular prism, triangular prism, and cylinder.

What's the Math?

Students practise calculating the surface area of rectangular prisms, triangular prisms, and cylinders.

Activity Planning Notes

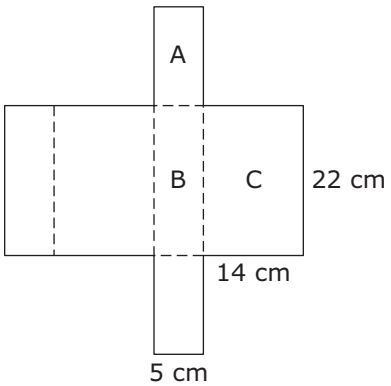
This Skills Practice addresses skills necessary for section 7.4. You may wish to have students do the section 7.4 Warm Up and discuss the section on Nets on page 259 of the student resource before starting the Skills Practice.

Rather than doing all of the Skills Practice at once, consider the following strategy:
- Do the example of the rectangular prism as a teacher-led activity. Then, assign questions 1 and 2. Next, do questions 1 to 3 in section 7.4.
- Similarly, the triangular prisms and cylinders should be done first in the Skills Practice as a teacher-led lesson and then explored and worked on by the students in section 7.4.

Ensure that students have a set of complete, correct answers to the Skills Practice. They can use these pages as a reference for further problem solving.

Answers to Skills Practice 14 (pages 256–258)

1. a)



b)

2-D Shape	Area	Number of Matching Faces	Total Area
A. Top/Bottom	70 cm^2	2	140 cm^2
B. Left/Right	110 cm^2	2	220 cm^2
C. Front/Back	308 cm^2	2	616 cm^2
		Total Surface Area	976 cm^2

2. a) 696 $in.^2$
b) 784 cm^2

3. 378 cm^2

4. a) 292.6 yd^2
b) 8046.25 mm^2

7.4 3-D Scale Models (page 259)

SUGGESTED TIMING
225–300 min

MATERIALS
- die (optional)
- calculator
- ruler or tape measure with metric or Imperial units
- modelling clay or cardboard
- toy cars, poker chips, golf balls (optional)
- glue or tape (optional)

BLACKLINE MASTERS
Master 13 Isometric Dot Paper
BLM 7–2 Nets

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.1.3 – estimate quantities, and describe the strategies used
C.2.5 – solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications
C.2.7 – construct, with reasonable accuracy, a three-dimensional scale model of an object or environment of personal interest
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
C.3.6 – solve problems involving proportional reasoning in work-related situations

Cumulative Review

1. Calculate the weekly gross income of someone who works 30 hours at $10.50/h.

2. What is the perimeter of a picture frame that measures 18 cm by 30 cm?

3. How many centimetres are in 1 kilometre?

4. A road map has a scale of 1 : 700 000. Explain what the scale means.

Answers to Cumulative Review

1. $315

2. 96 cm

3. 100 000

4. Example: A distance on the ground is 700 000 times the distance on the map.

What's the Math?

Students reinforce earlier concepts as they work with three-dimensional objects of various shapes and sizes. Students work with metric and Imperial units. Students build 3-D scale models.

Precise language will be important in this section. Students will use one-dimensional measure (length) to determine two-dimensional measure (area) for a three-dimensional figure. Cubic measure will follow in the next section.

Warm Up Notes

It would be useful to have a large standard die or a large cube to use as a model for the Warm Up. For questions 1 and 2, consider tying the highest number on a die to the number of sides on a cube. That understanding will help students progress naturally from the area of one side in question 3 to the surface area in question 4.

Accommodation

- Some students may find it easier to complete question 6 on **Master 13 Isometric Dot Paper**.

You may wish to provide the first page of **BLM 7–2 Nets** to students as they work on question 5. Ask them to orient the Blackline Master so they see that this is the same net as the one in the student resource.

Answers to Warm Up (page 259)

1. 6

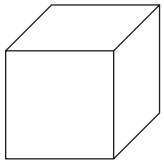
2. Example: There are 6 faces on a cube so 6 is the highest number *or* a die has the numbers 1 to 6 on it.

3. 2.25 cm^2

4. 13.5 cm^2

5. A cube

6.



Activity Planning Notes

Accommodations

- Read instructions aloud to the class, if necessary.
- Break down each subsection into small chunks. Assign one or two questions at a time, or one part of a question at a time. Stop and take up material in small chunks to ensure students grasp concepts before moving on.
- Provide students with toy cars, poker chips, and golf balls as models to work from.

This section provides hands-on opportunities to build three-dimensional figures and containers. This section should be done in conjunction with Skills Practice 14.

Approach one figure type at a time. Throughout the section it will benefit many students to have access to toy cars, poker chips, and golf balls. You may also wish to provide students with **BLM 7–2 Nets** so that they can cut out and create various prisms.

It may help to do this section as three mini-sections:
- rectangular prisms (questions 1–3),
- triangular prisms (question 4), and
- cylinders (questions 5–6).

This will take between four and six classes.

Some students may benefit from working in pairs or in small groups. It may be helpful for groups of students to work on one project at a time.

If students do each of the models in the section, consider using the Check Your Understanding as a separate mini-project or as an extension exercise.

Literacy Link

As students work with one-dimensional (length) and two-dimensional (area) measure, model the correct use of terminology for each measure. Have students develop and post the correct ways to write these units. In the next section, they can add cubic measure to their notes.

In addition, have students differentiate between a two-dimensional area (flat surface) and a three-dimensional object (prism). You may wish to have them draw and post a picture of each type of three-dimensional object from this section, accompanied by a net showing the relevant shapes and how to calculate the area of each shape.

Speed Bump

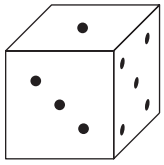
- Some students will struggle with the calculations for the surface area of a cylinder.

R_x Make sure that models and nets of cylinders are available. Have students break a cylinder into its two-dimensional shapes, a rectangle and a circle, and review how to calculate the area of each of these shapes. Differentiate the assignments. Not all students need to do all of the activities in this section. Some students will benefit from working in small groups. One team member might construct an appropriate cylinder while others calculate its surface area.

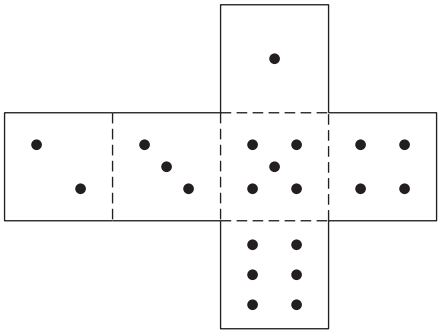
Answers to Activity Questions (pages 260–263)

1. Answers will vary. An example is provided.

a)



b) and **c)**



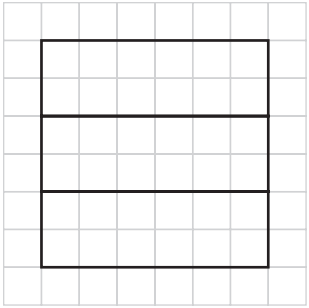
d) They add to 7.

2. a) It means that the scale is 1 unit on the toy car equals 70 units in real life.
b) 4.55 m
c) 1.82 m
d) 1.68 m
e) Models will vary but they should be large enough to fit the dimensions of the car.

3. Answers will vary.

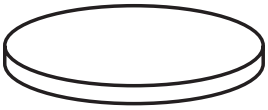
4. a) length = 6 in., width = 6 in.

b)



c) 18. Two rows of candies with 6 in each row will fit on the bottom. One more row of 6 will fit on top.

5. a)

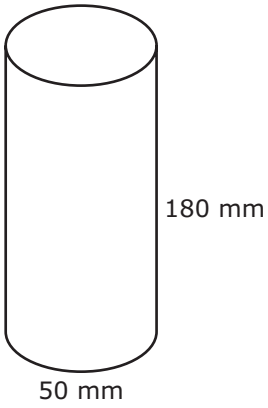


c) 20-chip tube: $SA = 71$ cm^2; 50-chip tube: $SA = 155$ cm^2; 100-chip tube: $SA = 297$ cm^2
d) 22.5 cm

6. Answers will vary. An example is provided.

a) cylinder

b)



c)

2-D Shape	Area	Number Needed	Total Area
Circle/Top/Bottom	1962.5 mm^2	2	3925 mm^2
Rectangle/Side	28 260 mm^2	1	28 260 mm^2
		Total Surface Area	32 185 mm^2

d) Answers will vary.

Answers to Check Your Understanding (page 263)

1. Answers will vary.

Ongoing Assessment

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

Technology Link

- For Web sites about the *Titanic*, go to **www.mcgrawhill.ca/books/workplace12** and follow the links.

Challenge!

- Use the Check Your Understanding as an extension exercise for this section.
- Have students research online to determine the measurements of the *Titanic*. Then, have them
  - search online for diecast models or other models of the ship,
  - identify four different scales for the available models, and
  - determine what the dimensions of each model would be, based on the scale and the actual dimensions.

7.5 Capacity and Volume Applications (page 264)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
150–225 min	• calculator • 2-cm linking cubes • grocery store flyers (optional) • Internet access (optional)	BLM 7–3 Calculating Volume

Specific Expectations

C.2.3 – estimate the areas and volumes of irregular shapes and figures, using a variety of strategies
C.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications
C.2.5 – solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications
C.2.7 – construct, with reasonable accuracy, a three-dimensional scale model of an object or environment of personal interest
C.2.8 – investigate, plan, design, and prepare a budget for a household improvement, using appropriate technologies
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.3.2 – 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.3.5 – solve problems involving proportional reasoning in everyday life

Cumulative Review

1. Estimate the perimeter of your classroom.

2. Frank drives 393 km for business and is reimbursed 55¢/km. How much is he reimbursed?

3. What is the unit cost of a 12-pack of paper towels that costs $7.99?

4. Calculate the monthly cost of an annual renter's insurance bill of $268.

Answers to Cumulative Review

1. Answers will vary.

2. $216.15

3. 67¢/roll

4. $22.33

What's the Math?

Students continue to work with proportional reasoning skills. Students make conversions between metric and Imperial measures. Then, they apply these conversions to solve problems involving volume and capacity that are related to everyday life and the workplace.

Accommodation

- Students who have problems with questions 3–5 may need to review Skills Practice 9: Converting Between Imperial Measures, Skills Practice 10: Converting Between Metric Measures, and Skills Practice 11: Using Ratio and Proportion to Convert Measurements. Alternatively, you may wish to customize the related Skills Practice BLMs to provide additional reinforcement of these skills.

Warm Up Notes

All of the Warm Up questions review previously learned concepts except question 2, which is a set-up for the introduction of cubic units.

Students should be able to do these questions quickly. Stress the use of mental mathematics, thinking strategies, and patterning. For example, in question 1a), some students will multiply in order, that is, $2 \times 3 = 6$, $6 \times 5 = 30$. It may be easier for them to do $2 \times 5 = 10$, $10 \times 3 = 30$. Remind them that order does not matter when multiplying. Have them multiply the numerals in question 1b) to see this for themselves.

Questions 3–5 are conversion questions. You may need to remind students that there are 8 ounces in a cup to get them to remember that 1 ounce must be less than 250 mL.

Answers to Warm Up (page 264)

1. a) 30
b) 160

2. a) $10 \times 10 \times 10$
b) 1000

3. a) 1000
b) 0.5

4. a) 4
b) 32

5. 1 oz, 250 mL, 16 ounces, 500 mL, 1 quart, 2 L, 1 gallon

Accommodations

- Read instructions aloud to the class, if necessary.
- Break down each subsection into small chunks. Assign one or two questions at a time, or one part of a question at a time. Stop and take up material in small chunks to ensure students grasp concepts before moving on.
- Differentiate the assignments. Not all students need to do all of the activities in this section. Some students will benefit from working in pairs or in small groups.
- Some students will benefit from making a model of a room for question 4.
- Let students build the brick in question 6a) using 2-cm cubes.
- Once students have completed question 7, have groups of students build a cubic metre and a cubic yard.

Activity Planning Notes

Use questions 1 and 2 as an informal review of the material in Chapter 6. Some students may need to review section 6.2 before doing these questions.

Use question 3b) as an opportunity to create an easily remembered reference for area conversion.

Question 4 is a practical application of the math learned in the previous section. Encourage students to do this question independently.

In question 5, students will need to use proportional thinking. Depending on the multiplier they choose, they may have varying answers. Allow them to solve the question however they choose.

Sometimes, people talk about cubic feet, cubic yards, or cubic metres; few students have a concept of what these mean. Question 6 gives students an opportunity to visualize a cubic foot. Question 7 gives students an opportunity to construct 1 cubic foot.

As with other sections in this chapter, completing every question may take too long. It may be beneficial to let students choose which parts of this section they wish to do.

Conclude the section by having students complete the Check Your Understanding.

Literacy Link

As in section 7.4, make sure that students are precise in their use of terms for linear, square, and cubic measurements.

Use a drink container with thick sides to demonstrate the difference between volume and capacity. Have students describe this difference in their own words.

Speed Bump

- Some students may struggle with solving multi-step problems and the need to use a solution from one part as a carryover to the next part of the problem.

R_x Monitor students' progress as they move through each question. Reinforce the links between the parts of each question.

Accommodations

- Students may forget how to calculate volume when they know the area of the base and the height of a prism. Before assigning question 8g)–k), provide students with **BLM 7–3 Calculating Volume** to review this skill.

Answers to Activity Questions (pages 264–269)

1. A. 250 mL B. 500 mL C. 2 L D. 1.33 L

2. A. 8 ounces B. 0.5 quart C. 2.1 quarts D. 1.4 quarts

3. a) 3.78 L is 1 gallon.
b) litre, 10, 100

4. a) 372 ft^2
b) 2 cans
c) 688 ft^2
d) 4 cans
e) Answers will vary depending on brand of paint. An example is provided.

Area Painted	Brand of Paint	Price Per 3.78-L Can	Number of Cans	Cost of Paint
Ceiling	Benjamin Moore	$30.09	2	$60.18
Walls	Benjamin Moore	$34.79	4	$139.16
			Subtotal	$199.34
			Tax	$25.91
			Total	$225.25

5. a)

Ingredient	Amount
Cheddar cheese	5 cups
Sour cream	2.5 cups
Cream cheese	7.5 oz.
Refried beans	40 oz.
Salsa	$1\frac{1}{4}$ cups
Cumin	$1\frac{1}{4}$ tsp.

b) Answers will vary. Possible responses include multiplying by 5 because $6 \times 5 = 30$ and it's an easy number to multiply by.

c)

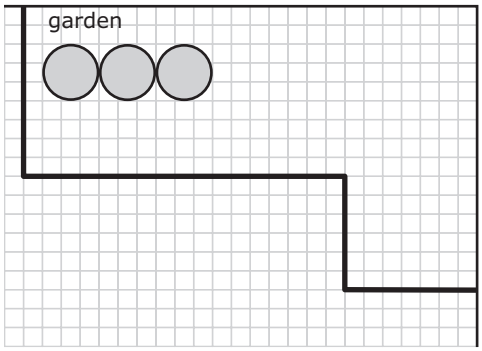
Ingredient	Imperial Measure (from part a)	Exact Metric Conversion	Appropriately Rounded Metric Measure
Cheddar cheese	5 cups	1.18 L	1.25 L
Sour cream	2.5 cups	591 mL	625 mL
Cream cheese	7.5 oz.	212.62 g	200 g
Refried beans	40 oz.	1.13 L	1 L
Salsa	$1\frac{1}{4}$ cups	295.7 mL	300 mL
Cumin	$1\frac{1}{4}$ tsp.	6.16 mL	5 mL

d) She should buy the 1-L tub.
e) She should buy the 350-mL jar. The 350-mL jar is cheaper per mL than the 700 mL jar.
f) Answers will vary depending on prices in the flyer.

6. a) 4
b) 4
c) 32
d) 1728; There are 12 inches in 1 ft, so there are $12 \times 12 \times 12$ cubic inches in 1 cubic ft.
$12 \times 12 \times 12 = 1728$.

7. a) Models will vary.
b) 27
c) There are 3 ft in 1 yd, so there are $3 \times 3 \times 3$ cubic ft in 1 cubic yard.

8. a) Sketches will vary.
b) 1 square foot
c)–d) Estimates and strategies will vary.



Estimate of area of garden:
9 ft by 24 ft = 216 sq ft. + 7 ft by 6 ft
= 42 sq ft.
Total = 258 sq ft.

e) Estimates will vary. A possible response is 206 ft^2.
f) 5 rolls
g) Multiply the area by 4 inches.
h) $\frac{1}{3}$
i) 75 ft^3
j) 3 yd^3
k) Answers will vary depending on the cost of mulch. A possible response is that a 3-cubic-foot bag of mulch is $7.99.
So, $7.99 × 25 bags = $199.75, and
$199.75 × 1.13 = $225.72.

Answers to Check Your Understanding (page 269)

1. a) 5
b) 6
c) 3

2. The capacity is the amount of water the pool holds. The volume is the amount of space the pool takes up, including the 4-inch-thick concrete walls.

Ongoing Assessment

- Check students' ability 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.

Challenge!

Students can landscape an area of the school grounds in conjunction with (or in place of) question 8.

7.6 Composite Shapes and Figures (page 270)

SUGGESTED TIMING
75–150 min

MATERIALS
- calculator
- linking cubes
- ruler

BLACKLINE MASTERS
Master 10 Quarter Inch Grid Paper
Master 11 Centimetre Grid Paper
Master 12 0.5 Centimetre Grid Paper

Specific Expectations

C.2.2 – apply the concept of perimeter in familiar contexts
C.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications
C.2.5 – solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications
C.2.6 – construct a two-dimensional scale drawing of a familiar setting on grid paper or using design or drawing software
C.2.7 – construct, with reasonable accuracy, a three-dimensional scale model of an object or environment of personal interest
C.2.8 – investigate, plan, design, and prepare a budget for a household improvement, using appropriate technologies
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
C.3.6 – solve problems involving proportional reasoning in work-related situations

Cumulative Review

1. What is the surface area of a die with side length equal to 1 inch?

2. What is the volume of that die?

3. How many of these dice would fit into a 6" × 6" × 2" box?

4. What is the highest number you could get by rolling all of the dice?

Answers to Cumulative Review

1. 6 sq in.

2. 1 cu in.

3. 72

4. 432

What's the Math?

Students continue to work with proportional reasoning skills and are reintroduced to composite shapes. Students solve area and volume problems related to composite shapes.

Warm Up Notes

Some students may still need a ruler to complete question 1.

Question 2 reviews material discussed in the previous section.

For questions 3 and 4, encourage students to visualize the area as made up of linear measures. So, for question 3, 1 square yard is 3 feet by 3 feet, or 9 square feet. In question 4, a square metre is 1 metre by 1 metre; a square yard is 1 yard by 1 yard. The question can be recast to ask: Which is longer, a yard or a metre?

In question 5, ask students which rounding they find most useful when estimating tax. Discuss the answers, which will vary. For example, rounding to the closest $100 makes the tax easier to calculate, but is not as precise as rounding to the nearest $10. Rounding to the nearest $1 will not help many students estimate the tax for this item.

For question 6, have students estimate and then calculate the tax. Discuss the strategies used.

Answers to Warm Up (page 270)

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

2. 1 gallon

3. 9

4. 1 m^2

5. a) $88
b) $90
c) $100

6. $11.44

Speed Bump

- Some students may struggle with multi-step problem solving and the need to use a solution from one part as a carryover to the next part of the problem.

R$_x$ Monitor students' progress as they move through each question. Reinforce the links between the parts of each question.

Accommodations

- Have students work in pairs.
- Take students to the gym to see the basketball key.

Activity Planning Notes

Students have learned about dividing a composite area into regular shapes in earlier grades. Discuss the three ways of answering question 1:

- vertical line (the shape is a square 12 ft by 12 ft and a rectangle 12 ft by 18 ft),
- horizontal line (the shape is a large rectangle 12 ft by 24 ft, and a small rectangle 12 ft by 6 ft), or
- subtracting the notch from the 24 ft by 18 ft rectangle.

Students may be able to do questions 2 to 4 unassisted. After assigning questions 1 to 4, take them up as a class. Discuss the strategies students used.

You may need to explain question 5 to students who are unfamiliar with basketball courts. Discuss as a class how to calculate the fraction of a circle shown in the diagram.

Have students construct a model of the steps in question 6. Most students should select a scale of 1 cube to 6", however, other scales are acceptable.

Ensure that students understand the difference between questions 7 and 8 prior to answering them (area versus volume).

Conclude the section by having students complete the Check Your Understanding. You may wish to provide **Master 10 Quarter Inch Grid Paper**, **Master 11 Centimetre Grid Paper**, or **Master 12 0.5 Centimetre Grid Paper** so that students can do rough copies of their design.

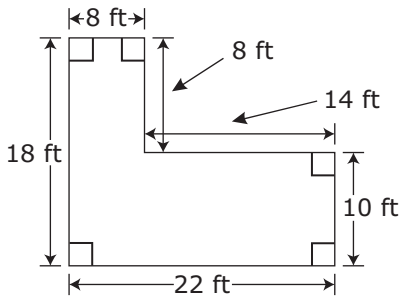
Literacy Link

Define and discuss the difference between a composite shape and an irregular shape. Identify a composite shape and an irregular shape in the classroom or from earlier in the chapter.

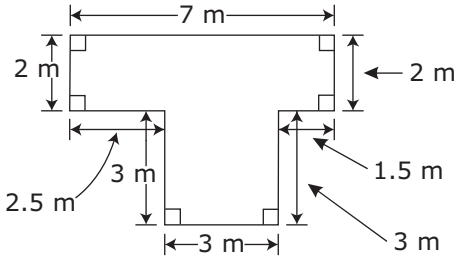
Answers to Activity Questions (pages 270–273)

1. She can divide the space into 2 rectangles, find the areas of both, and add them together.

2. a)



b)



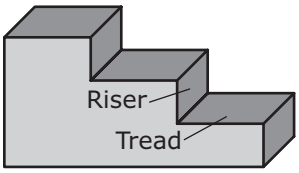
3. Answers will vary. Ensure the shapes are divided into squares or rectangles.

4. a) 284 ft^2
b) 23 m^2

5. a) $A = \pi r^2$
b) 30.33 m^2
c) 12.13 L of paint, or 3.2 gallons

6. a) Models will vary. Ensure they are to scale.
b) 6 in.
c) 4
d) 8

7. a)



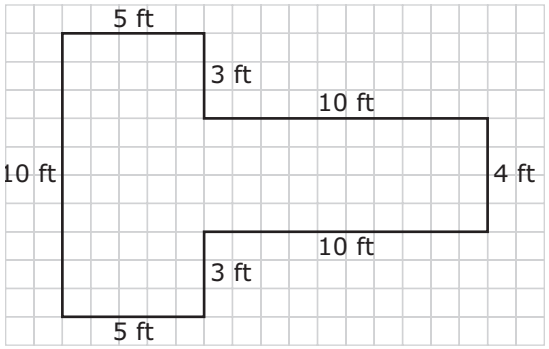
b) 1944 in.^{2} or 13.5 ft^2
c) 1.5 yd^2
d) \$133.50
e) \$150.86

8. a) 9 ft^3
b) 1 yd^3

Answers to Check Your Understanding (page 273)

1. Answers will vary. An example is provided.

a)



b) 50 ft
c) 90 ft^2
d) 6 inches
e) 1.7 yd^3

Ongoing Assessment

- Check students' ability to participate in discussions, to explain their reasoning, and to make correct calculations in the Warm Up and in other questions.
- Use the Check Your Understanding as a formative assessment of the skills from this chapter.
- Provide additional work if needed prior to moving to the chapter review.

Challenge!

- Students can build a 3-D scale model of their sandbox design from the Check Your Understanding.
- Students can design a farmyard by constructing nets for different buildings. Have them place the nets on a grid and give reasons for their placements. Then, ask them to add fencing, roads, and paddocks.

Chapter 7 Review (page 274)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
75 min	• calculator • ruler	Master 2 Chapter Summary Master 11 Centimetre Grid Paper BLM 7–4 Chapter 7 Word Search

Using the Chapter Review

Encourage students to read through the review before they attempt any of the review questions. Students should be able to work through the review at their own pace. You may wish to suggest that students follow the strategy outlined below when completing the chapter review.

1. First, complete any questions that you can do unassisted.

2. Next, do 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 and 2, and then take them up. Then, assign questions 3, 4, and 5. This process will eliminate the problem of students rushing through and completing many questions incorrectly.

Re-teach concepts and/or procedures as necessary.

To provide additional reinforcement of the glossary words for this chapter, have students complete **BLM 7–4 Chapter 7 Word Search**.

Accommodations

- Some students may find it easier to use **Master 11 Centimetre Grid Paper** than the smaller grid in the student resource.
- Students may benefit from making a chapter summary page that summarizes some of the key ideas/skills from the chapter. **Master 2 Chapter Summary** provides an outline for this work.
- Encourage students to highlight key words and key bits of information contained in each question.
- When students have difficulty with a particular review question, use the Review Guide to identify the section they need to review.
- You may wish to provide students with additional reinforcement of the questions in this section before moving on to the Practice Test.
- Some students can skip the Practice Test and move directly to the Chapter Task.

Study Guide

Question	Section(s)
1	Nets (pages 260–261, #2)
2	Using Scale Drawings (page 237, #3)
3	Skills Practice 14 (page 257, #3) Calculating Circular Area (page 248, #4)
4	How Much Will It Cost? (page 251, #2)
5	Using Scale Drawings (page 235, #1) Determine the Area of a Composite Shape (page 271, #4) Composite Figures (page 272, #7 and #8)

Summative Assessment

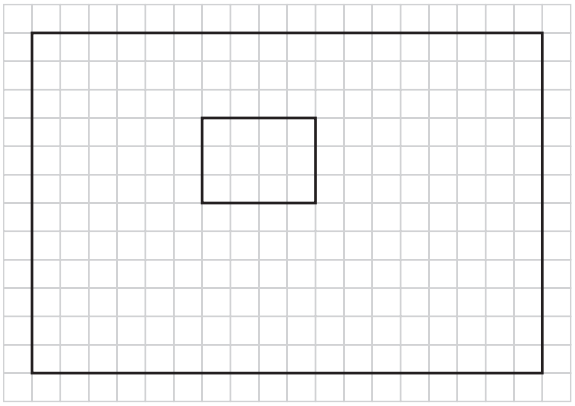
- Have students complete the Chapter 7 Practice Test. Some students may be ready to move directly to **BLM 7–5 Chapter 7 Test**.

Answers to Chapter 7 Review (pages 274–276)

1. a) It means 1 unit on the model equals 72 units on the actual jet. Each measurement of the jet is 72 times the size of the model.

b) The jet is 1080" long (90 ft).

2. a) and **c)** Answers will vary. An example with a scale of 1 square = 0.2 m is provided.



b) 2 cans

3. a)

2-D Shape	Area	Number Needed	Total Area
Front triangle	15 ft^2	2	30 ft^2
Sides and bottom	48 ft^2	3	144 ft^2
		Total Surface Area	174 ft^2

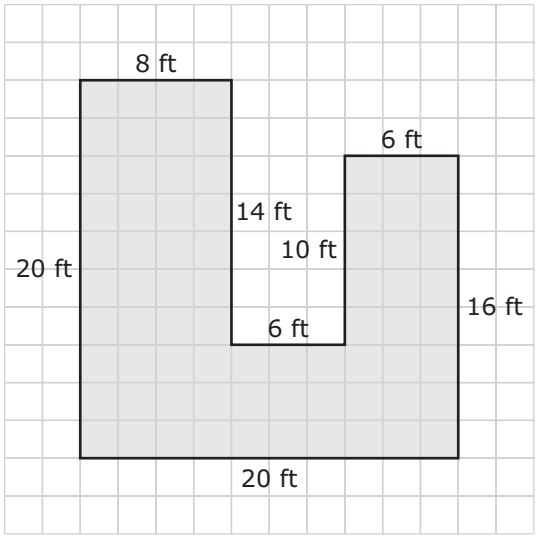
b) 78.5 ft^2

c) 31.4 ft

4. a) 32 boards

b) $115.35

5. a)



b) Answers will vary. Ensure the shape is divided into rectangles or squares.

c) 292 ft^2

d) 73 ft^3

e) $99.80

Chapter 7 Practice Test (page 277)

SUGGESTED TIMING
75 min

MATERIALS
- calculator
- ruler

BLACKLINE MASTERS
Master 2 Chapter Summary
Master 11 Centimetre Grid Paper
BLM 7–5 Chapter 7 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)
1	Nets (pages 260–261, #2)
2	Using Scale Drawings (page 237, #3) Applying Scale Diagrams (pages 244–245, #1)
3	Applying Scale Diagrams (page 246, #2) Calculating Circular Area (page 248, #4)
4	Using Scale Drawings (page 235, #1) Determine the Area of a Composite Shape (page 271, #4) Composite Figures (page 272, #7 and #8)
5	Applying Scale Diagrams (page 246, #2) Estimating the Cost of a Project (page 251, #2) Determine the Area of a Composite Shape (page 271, #4) Composite Figures (page 272, #7 and #8)

Accommodations

- Some students may find it easier to use **Master 11 Centimetre Grid Paper** than the smaller grid in the student resource.
- 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. Use **Master 2 Chapter Summary**.
- Encourage students to highlight key words and key bits of information contained in each question.
- When students have difficulty with a particular 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 the Chapter Task.

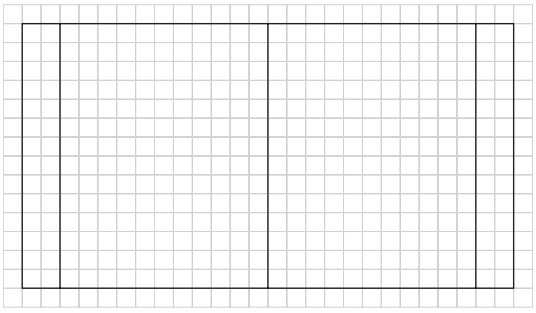
Summative Assessment

- Have students complete **BLM 7–5 Chapter 7 Test**. Alternatively, students could be assessed using the Chapter Task.

Answers to Chapter 7 Practice Test (pages 277–279)

1. a) 1 unit on the drawing equals 48 units in real life. Each dimension in real life is 48 times the length of the corresponding dimension on the diagram.
b) 24 ft

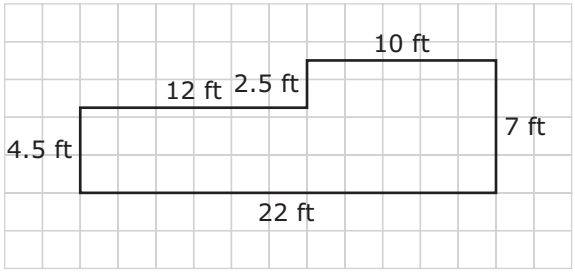
2. a)



b) 8450 yd^2
c) 10 cans (not including the end zones)

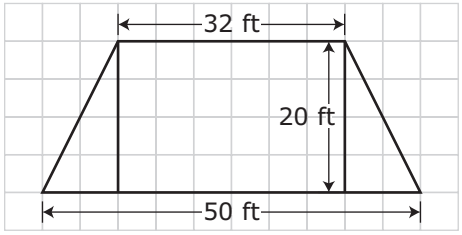
3. a) 3.14 cm^2
b) 30 $miles^2$

4. a)



b) 248 ft^3
c) 9.2 yd^3
d) 116 marigolds

5. a)



b) 820 ft^2
c) 26 bundles
d) $467.74
e) $528.55

Task: Home Renovations (page 280)

SUGGESTED TIMING
75–150 min

MATERIALS
- calculator
- access to a computer with spreadsheet software (optional)

BLACKLINE MASTERS
Master 10 Quarter Inch Grid Paper
Master 11 Centimetre Grid Paper
Master 12 0.5 Centimetre Grid Paper
BLM 7–6 Chapter 7 Task
BLM 7–7 Chapter 7 Task Rubric
BLM 7–8 Chapter 7 BLM Answers

Specific Expectations

A.1.8 – gather, interpret, and describe information about applications of data management in the workplace and in everyday life
B.2.3 – read and interpret prepared individual or family budgets, identify and describe the key components of a budget, and describe how budgets can reflect personal values
B.2.6 – make adjustments to a budget to accommodate changes in circumstances, with technology
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.1.3 – estimate quantities, and describe the strategies used
C.2.2 – apply the concept of perimeter in familiar contexts
C.2.3 – estimate the areas and volumes of irregular shapes and figures, using a variety of strategies
C.2.4 – solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications
C.2.5 – solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications
C.2.6 – construct a two-dimensional scale drawing of a familiar setting on grid paper or using design or drawing software
C.2.8 – investigate, plan, design, and prepare a budget for a household improvement, using appropriate technologies
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.3.2 – identify situations in which it is useful to make comparisons using unit rates, and solve problems that involve comparisons of unit rates
C.3.4 – 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 7–6 Chapter 7 Task**.

You may wish to make an overhead of page 280 to help in a class discussion of the Task. Read the situation aloud and discuss #1 and #2. This page should be used to elicit discussion and to ensure students understand the full Task that they will receive on **BLM 7–6 Chapter 7 Task**. Students can make the final submission as an electronic file.

Accommodations

- Make **Master 10 Quarter Inch Grid Paper**, **Master 11 Centimetre Grid Paper**, and **Master 12 0.5 Centimetre Grid Paper** available. Students who wish to do scale diagrams of their planned renovation may benefit from using one or more of these sizes.

Accommodations

- Some students may need to refer to their workbook and/or chapter notes.
- Encourage students to highlight key words and key bits of information contained in each question.

Summative Assessment

Use **BLM 7–7 Chapter 7 Task Rubric** to assist you in assessing students' work on this task. This Task could be used as a final summative assignment for the course.

Hand out **BLM 7–6 Chapter 7 Task**. Take some time to read and discuss the full Task with students. Encourage students to provide reasoning and to show their calculations for their answers. Remind them to refer back to notes or earlier sections for help if they forget how to do something.

Answers to Task (page 280)

1. Answers will vary but they should be realistic in terms of the budget of $2000 and the skill required to complete the renovation. Example: redecorating my bedroom.

2. Answers will vary. Example:
- paint the walls
- buy an area rug
- install a new ceiling light fixture
- hang new curtains