<table>
<thead>
<tr>
<th>Concept</th>
<th>BEFORE</th>
<th>DURING (What I can do)</th>
<th>AFTER (Proof that I can do this)</th>
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<tbody>
<tr>
<td>I can use linear units to convert area and volume units within the SI system.</td>
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<tr>
<td>I can use mental math to judge the reasonableness of a solution to a problem.</td>
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### 2.2

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<td>I can sketch 2-D (including nets) and 3-D diagrams.</td>
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<td>I can calculate the surface area of right cylinders and right prisms.</td>
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<td>I can calculate the surface area of spheres.</td>
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<tr>
<td>I can determine the unknown dimension of a 3-D object when the surface area is given.</td>
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<tr>
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<tr>
<td>Concept</td>
<td>BEFORE</td>
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</tr>
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<td>----------------------------------</td>
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<tr>
<td>I can calculate the volume of right prisms and right cylinders.</td>
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<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
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<tr>
<td>I can explain the relationship between the volume of a right cone and the volume of a right cylinder with the same radius and height.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
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<tr>
<td>I can calculate the volume of right cones.</td>
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<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
</tr>
<tr>
<td>I can explain the relationship between the volume of a right pyramid and the volume of a right prism with the same base and height.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
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<tr>
<td>I can calculate the volume of right pyramids.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
</tr>
<tr>
<td>I can calculate the volume of spheres.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
</tr>
<tr>
<td>I can determine the unknown dimension of a 3-D object when the volume is given.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
</tr>
<tr>
<td>I can determine the volume of composite 3-D objects.</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
<td>□ No, not yet □ Some □ Yes</td>
</tr>
</tbody>
</table>
Chapter 2 Prerequisite Skills

Show all your work.

1. Calculate the surface area and volume of each rectangular prism. Express the answer in centimetres and inches. Round your answer to the nearest tenth.
   a) 
   ![Rectangular Prism a)](image1)
   b) 
   ![Rectangular Prism b)](image2)
   c) 
   ![Rectangular Prism c)](image3)

2. Calculate the surface area and volume of each cylinder. Express the answer in centimetres and inches. Round your answer to the nearest tenth.
   a) 
   ![Cylinder a)](image4)
   b) 
   ![Cylinder b)](image5)
   c) 
   ![Cylinder c)](image6)
   d) 
   ![Cylinder d)](image7)
   e) 
   ![Cylinder e)](image8)
3. Use a sketch to help determine the surface area and volume of each 3-D object. Express your answer to the nearest tenth.
   a) a cube with side length 14.3 cm
   b) a rectangular prism measuring 3 in. by $6 \frac{3}{4}$ in. by $4 \frac{1}{2}$ in.
   c) a rectangular prism measuring 0.85 m by 34.25 cm by 642 mm
   d) a cylinder with height 62.8 cm and radius 11.3 cm
   e) a cylinder with diameter 15 in. and height 3 ft
   f) a cylinder with circumference 452 mm and height 1.65 m

4. Determine the square root of each number to the nearest hundredth.
   a) 81
   b) 30
   c) 12
   d) 65.98
   e) 1589.04

5. a) A cube has a volume of 8 m$^3$. Determine its side length.
   b) What real object could this cube represent?

6. a) A cube has a volume of 125 cm$^3$. Determine its side length.
   b) What real object could this cube represent?
Chapter 2 Warm-Up

Section 2.1 Warm-Up

1. Ed wants to put siding on a storage building. He measures the outside walls and records wall lengths 0.0238 km and 0.0179 km.
   a) Explain why kilometres is not an appropriate measurement unit for Ed’s purpose.
   b) Rewrite the measurements using appropriate metric units.

2. Jaspreet wants to build a flower box with the following dimensions. First, she needs to convert all measurements to the same units.
   a) What imperial units do you recommend? Explain why.
   b) Convert all the measurements to the same units. Explain how you did each conversion.

3. Teresa wants to install a countertop on an island in her kitchen. The dimensions of the island are 180.3 cm by 101.6 cm. Explain how she could estimate the cost if granite costs $75 per square foot.

4. Explain why area is always expressed in square units.

5. Define volume in your own words.
Section 2.2 Warm-Up

1. Convert the following to the indicated equivalents. Justify each answer.
   a) an area that is 3 m by 3 m to cm²
   b) an area that is 1 ft by 1 ft to in.²

2. A drum has a circumference of 47 in. What is the surface area of the top of the drum, to the nearest whole number?

3. a) A farmer has 36 m of fencing, all in 1 m sections. If he does not cut any of the sections, what are the dimensions of all the different rectangular sheep pens he can make?
   b) Which dimensions will give the biggest area?

4. Explain how to find the area of the shaded portion of the circle.

5. Draw the net for each 3-D object. Label all the dimensions.

Section 2.3 Warm-Up

1. Explain why volume is measured in cubic units.

2. Convert 1 m³ to cm³. Justify your answer.

3. Calculate the height of the triangle to the nearest tenth. Explain your answer.

4. Use the formula $SA = \frac{1}{2} h(a + b)$ to determine the height of a trapezoid with area 21.9 cm² and parallel side lengths 4.5 cm and 2.8 cm. **Hint:** Draw a diagram.

5. What strategy would you use to find the volume of this composite 3-D object if the dimensions were given?
Chapter 2 Foldable

Linear Conversions

<table>
<thead>
<tr>
<th>Imperial Unit</th>
<th>SI Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in.</td>
<td>2.54 cm</td>
</tr>
<tr>
<td>1 ft</td>
<td>30.48 cm</td>
</tr>
<tr>
<td>1 ft</td>
<td>0.305 m</td>
</tr>
<tr>
<td>1 yd</td>
<td>0.914 m</td>
</tr>
<tr>
<td>1 mi</td>
<td>1.609 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SI Unit</th>
<th>Imperial Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm</td>
<td>0.394 in.</td>
</tr>
<tr>
<td>1 m</td>
<td>1.094 yd</td>
</tr>
</tbody>
</table>

If I know the dimensions of an area in one unit, I can convert the area to another unit by

Surface Area Formulas

\[
A = s^2 \\
A = lw \\
A = \pi r^2 \\
SA_{prism} = 2lw + 2lh + 2wh \\
SA_{cylinder} = 2\pi r^2 + 2\pi rh \\
SA_{cone} = \pi r^2 + \pi rs \\
s^2 = r^2 + h^2 \\
SA_{pyramid} = lw + ls + ws \\
SA_{sphere} = 4\pi r^2
\]

Volume Conversions

<table>
<thead>
<tr>
<th>SI Unit</th>
<th>Imperial Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm³</td>
<td>1 mL</td>
</tr>
<tr>
<td>1000 cm³</td>
<td>1 L</td>
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</tbody>
</table>

If I know the dimensions of a volume in one unit, I can convert the volume to another unit by

Volume Formulas

\[
V = Bh \\
V_{prism} = lwh \\
V_{cylinder} = \pi r^2 h \\
V_{cone} = \frac{1}{3} \pi r^2 h \\
V_{pyramid} = \frac{1}{3} lwh \\
V_{sphere} = \frac{4}{3} \pi r^3
\]
Surface Area:

lateral area:

slant height:
Volume:

- Cube: \( l \times w \times h \)
- Cylinder: \( \pi r^2 h \)
- Cone: \( \frac{1}{3} \pi r^2 h \)
- Pyramid: \( \frac{1}{3} B h \)
- Sphere: \( \frac{4}{3} \pi r^3 \)
Chapter 2 Unit 1 Project

Section 2.1

1. By the 1880s, wax cylinders were used to record music. In the 1930s, RCA produced the LP. Compact discs were introduced in 1982.

   a) Calculate the outside surface area of a wax cylinder used to record music. Standard cylinders were about 4 in. long with a diameter of $2\frac{1}{4}$ in.

   b) One cylinder could play about two minutes of music or sound. Calculate the rate of the area needed to record the music to the number of minutes of music.

   c) LP records were pressed on a 30 cm diameter flexible plastic disc. Calculate the circular area of both sides of an LP.

   d) Each LP could hold about 45 min of music using both sides. Calculate the rate of the area needed to record the music to the number of minutes of music.

   e) Choose one size of vinyl record. Calculate the area of a record jacket needed for this vinyl record.

   f) Design an album cover for your favourite recording artist that you could use for the record jacket in part e).

   g) List possible advantages and disadvantages of vinyl records compared to wax cylinders for recorded music.

   h) Vinyl records have recently made a comeback and sales are on the increase. Suggest some possible reasons for this increase in popularity.

   i) Brainstorm other advancements in music storage since the early wax cylinders. How has technology changed the storage of music?

Section 2.2

2. Compact discs are sometimes packaged in cylindrical stacks of 100. Each CD has a thickness of 1.2 mm and a diameter of 12 cm.

   a) The outside radius of the storage case is 0.7 cm more than that of the CD. The height of the case is 4.2 mm more than that of the stack of 100 CDs. What is the surface area of the storage case, excluding the base?

   b) If a rectangular CD jewel case holding a single CD is 0.5 cm wider than the CD, 2.5 cm longer than the CD, and 8 times the thickness of the CD, what is the surface area of the jewel case?
Section 2.3

3. A cell phone is basically a sophisticated two-way radio. It is a form of wireless communication. The basic concept of cellular phones began in 1947. In 1979, the first commercial cellular telephone system began operation in Tokyo. The first cell phones were much larger than present-day cell phones. A typical cell phone now has a volume between 4 in.$^3$ and 6 in.$^3$. Using the information shown in the photo, estimate the volume of the first commercial portable cell phone released in 1984 by Motorola.

4. The MP3 player, a digital audio player, was first created in 1997. One of the original types of MP3 players has a capacity of 4.8 GB and was advertised to be able to hold 1200 songs. Now, MP3s come in all shapes and sizes. An MP3 player with a memory of 80 GB has a storage capacity of 20 000 average-length songs. A vinyl LP record is 0.11 in. thick and on average can hold 12 songs.

If the dimensions of the MP3 player are 4.14 cm wide, 9.15 cm high, and 0.85 cm thick, and the record has a radius of 6 in., how many songs per cubic centimetre are there on each storage medium?

5. Work individually or in a small group. Choose a 3-D object related to your Unit 1 project.

a) Estimate its volume in both SI and imperial units. Are your estimates reasonable? Explain.

b) Calculate the volume. Are the units in your answer appropriate for the object?

c) In which measurement system was your estimate more accurate? Why do you think this happened?
Section 2.1 Extra Practice

For help with unit conversions, refer to the conversion charts in your Foldable™.

1. Convert the SI measurements to the indicated equivalents.
   a) an area 250 cm by 296 cm to square metres
   b) an area 50 mm by 46 mm to square centimetres
   c) an area 4 km by 4 km to square metres
   d) a volume 900 cm by 1000 cm by 200 cm to cubic metres

2. Convert the imperial measurements to the indicated equivalents. Express your answers to the nearest tenth of a square or cubic unit.
   a) an area 13.5 in by 10 in. to square feet
   b) an area 3.5 ft by 0.2 ft to square inches
   c) an area 4 ft by 9 ft to square yards
   d) a volume 28.6 in. by 10 in. by 10 in. to cubic feet

3. Convert the measurements to the indicated equivalents. Express your answers to the nearest tenth of a square or cubic unit.
   a) an area 3 in. by 4 in. to square centimetres
   b) an area 3 m by 1 m to square yards
   c) a volume 1.75 km by 2 km by 1 km to cubic miles
   d) a volume 2.5 ft by 2 ft by 1 ft to cubic metres

4. For each 3-D object, calculate the volume in cubic centimetres.
   a) a prism with sides measuring 7.5 cm, 3 cm, and 2 cm
   b) a cube with sides measuring 3 in.

5. Marielle is helping her mother sew a tablecloth. The table has a length of 75 in. and a width of 45 in. An overhang of 6 in. is needed on each side of the table.
   a) Sketch and label a diagram to represent the tablecloth.
   b) What are the dimensions of the tablecloth in inches?
   c) Marielle and her mother go shopping to order fabric for the tablecloth. The fabric is sold in square metres. Determine the amount of fabric needed in square metres, to the nearest tenth of a square metre.

6. The sandpits for a new long jump and a triple jump will each have dimensions 1.5 m by 5 m and be 0.5 m deep. The local landscaping store sells sand by the cubic yard. Calculate the volume of sand required for the pits, to the nearest tenth of a cubic yard.

7. The revolving circular platform in a microwave has a diameter of 34 cm.
   a) What is the area of the top of the platform in square centimetres?
   b) Is the area larger or smaller than one square foot? By how much?

8. A tile installer is laying files in a bathroom. If the area of the rectangular floor to be tiled is 2688 in.² and the floor length is 5′4″, how wide is the floor?
Investigate Surface Area of Three-Dimensional Objects

1. Group Definition of Surface Area

2. Group Strategy for Determining Surface Area

3. Determine Surface Area

4. Alternative Method for Determining Surface Area
Section 2.2 Extra Practice

1. Sketch a net for each 3-D object.
   a) ![3D Object A](image1)
   b) ![3D Object B](image2)
   c) ![3D Object C](image3)

2. Calculate the surface area of each object in #1.

3. Sketch a net for each cone. Then, determine the surface area of each cone. Round the answer to the nearest tenth of a square unit.
   a) ![Cone A](image4)
   b) ![Cone B](image5)

4. Sketch a net for each cylinder. Then, calculate the surface area of each cylinder. Round the answer to the nearest tenth of a square unit.
   a) ![Cylinder A](image6)
   b) ![Cylinder B](image7)

5. Determine the surface area of each right pyramid. Round the answer to the nearest tenth of a square unit.
   a) ![Pyramid A](image8)
   b) ![Pyramid B](image9)
6. Determine the surface area of each 3-D object. Round the answer to the nearest tenth of a square unit.

a)

b)

c)

7. The surface area is given for each 3-D object. To the nearest tenth of a square unit, determine the missing dimension.

a) $SA = 5025 \text{ mm}^2$

8. A dome-shaped tent has a diameter of 9 ft. How much material is needed to make the tent, to the nearest tenth of a square foot? **Hint:** A dome is half a sphere.

9. Jake and his father installed a wall light beside the front door of their home. The wall light consists of a wooden box with a round plastic cover for the light to shine through. Once the wall light is in place, Jake decides to paint the wooden part to contrast with the front of the house. What area will Jake need to paint? Give your answer to the closest tenth of a square inch.
Section 2.3 Extra Practice

1. Determine the volume of each 3-D object. Round each answer to the nearest tenth of a cubic unit.

   a) 
   
   b) 
   
   c) 
   
   d) 
   
   e) 
   
   f) 

2. A microwave oven has a capacity of 1 ft³. The interior of the microwave is 14 in. wide and 14 in. deep. What is the height of the interior of the microwave?

3. Determine the volume of the globe.

4. A beach ball holds 804 in.³ of air. Determine the diameter of the beach ball.

5. Draw and label a diagram of each shape, then calculate the missing dimension.
   a) A cylinder has a volume of 3 m³ and a radius of 0.8 m. What is the height of the cylinder?
   b) A cylinder has a volume of 553 cm³ and a height of 11 cm. What is its radius?
   c) A cone has a height of 3 ft and a volume of 1.77 ft³. Determine its radius.
   d) A cone has a radius of 23 cm and a volume of 6647.6 cm³. What is the height of the cone?

6. Calculate the volume, in cubic feet, of a sphere with a diameter of 1’3”.
7. Frank made a model of a house in construction class. The block of wood for the base measures 3 in. by 2 in. and is 2 in. tall. He used a triangular prism for the roof that hangs over the base half an inch on all sides and is $1\frac{1}{2}$ in. in height. Calculate the total volume of wood used for the model.

8. A perfume bottle shaped like a pyramid is 5" tall.  
   a) The top is a sphere with a volume of 0.524 in.³. What is the diameter of the sphere?  
   b) Assume that the apex of the pyramid touches the base of the sphere. What is the height of the pyramid?  
   c) If the volume of the pyramid is 6 in.³ and the length of the base is 3 in., determine the width of the rectangular base.  
   d) Using the dimensions you have calculated, determine the volume of the rectangular-shaped box needed to package the bottle of perfume.
Chapter 2 Test

Multiple Choice

For #1 to 6, select the best answer.

1. What are the most appropriate SI and imperial units for expressing the area of a banquet hall floor?
   A m² and ft²
   B m² and yd²
   C km² and ft²
   D km² and mi²

2. What is the minimum amount of wrapping you would need to cover the gift box shown here?

   A 216 cm²
   B 408 cm²
   C 432 cm²
   D 576 cm²

3. A rectangular pyramid has a base 3 cm by 6 cm and a height of 9 cm. What are the dimensions of a rectangular prism with an equivalent volume?
   A 1 cm by 2 cm by 3 cm
   B 2 cm by 4 cm by 6 cm
   C 2 cm by 3 cm by 9 cm
   D 3 cm by 6 cm by 9 cm

4. Calculate the surface area of the pyramid to the nearest square inch.

   A 1500 in.²
   B 1387 in.²
   C 825 in.²
   D 780 in.²

5. Skateboarders use half pipes, which are shaped like half cylinders.

   To the nearest square metre, what is the curved surface area of the half pipe if it is 7 m deep?
   A 33 m²
   B 66 m²
   C 132 m²
   D 160 m²
6. Scientists at NASA have built a robot called Personal Satellite Assistant or PSA to assist astronauts on board a spacecraft. PSA is in the shape of a sphere and has a diameter of 12 in. To make it more efficient, NASA wants to reduce its diameter to 8 in. To the nearest cubic inch, the difference in volume would be

A 996 in.³
B 905 in.³
C 771 in.³
D 637 in.³

Short Answer

7. A cone has a height of 8 m, a slant height of 9.4 m, and a radius of 5 m.
   a) Determine the surface area of the cone, to the nearest tenth of a square metre.
   b) Determine the volume of the cone, to the nearest tenth of a cubic metre.

8. What is the radius of a sphere with surface area of 804.2 cm²?

Extended Response

9. The shaded area represents a 2-yd wide trench dug by a contractor at a building site. If the contractor removed 182 yd³ of soil, how deep is the trench?

10. Two cones have the same height. Cone A has a radius of 4 cm and a volume of 92.15 cm³. Cone B has a radius of 7 cm.
   a) What is the height of the cones?
   b) What is the volume of Cone B?
   c) If the radius of Cone A is increased by 3 cm, what is the volume relationship between the new cone and Cone B?

11. A storage container for radioactive material has the dimensions shown below.

   a) To the nearest cubic centimetre, what is the volume of the inside storage compartment?
   b) The outside of the storage container needs to be sealed with a protective coating. Excluding the bottom, what is the area that needs to be coated, to the nearest square centimetre?
Chapter 2 BLM Answers

BLM 2–2 Chapter 2 Prerequisite Skills

1. **Surface Area** | **Volume**
---|---
a) 3324 cm²; 515.2 in.² | 11 880 cm³; 725.0 in.³
b) 433.5 cm²; 67.2 in.² | 614.1 cm³; 37.5 in.³
c) 484 in.²; 3122.6 cm² | 665.5 in.³; 10 905.6 cm³

2. **Surface Area** | **Volume**
---|---
a) 452.4 in.²; 2918.6 cm² | 703.7 in.³; 11 531.9 cm³
b) 22 776.5 cm²; 3530.4 in.² | 235 619.4 cm³; 14 378.4 in.³
c) 251.6 cm²; 39.0 in.² | 317.8 in.³; 51.6 in.³

3. **Surface Area** | **Volume**
---|---
a) 1226.9 cm² | 2924.2 cm³
b) 128.3 in.² | 91.1 in.³
c) 21 134.2 cm² | 186 902.2 cm³
d) 5261.1 cm² | 25 192.2 cm³
e) 2049.9 in.² | 267 613.4 cm³
f) 7783.2 cm² | 26 825.7 cm³

4. **Area** is the number of square units needed to cover a surface. For example, 47 m² means 47 squares each with side length 1 m and area 1 m².

5. **Volume** is the amount of space that an object occupies.

Section 2.2

1. a) 90 000 cm²; 1 m = 100 cm
   b) 144 in.²; 1 ft = 12 in.

2. 176 in.²

3. a) 
   
   b) 9 m by 9 m gives the largest area.

4. The diameter of the circle is the length of one square multiplied by 7, as the squares and the line segments that connect them are equal in length. Half of the diameter is the radius. Substitute the value of the radius in the formula \( SA = \pi r^2 \) to solve the area of the circle. Then, subtract the area of the squares (or 3 times the area of one square) to find the area of the shaded portion.

5. a) 
   
   b)

BLM 2–3 Chapter 2 Warm-Up

**Section 2.1**

1. a) For Ed’s project, using large units, such as kilometres results in very small numbers. It would be more appropriate to measure in metres and centimetres.
   b) 23.8 m; 17.9 m

2. a) Use inches or feet, as they are smaller units than yards but large enough that most measurements can be expressed as whole numbers.
   b) Students may convert all measurements to inches or feet.

<table>
<thead>
<tr>
<th>Area (m²)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 in</td>
<td>17</td>
<td>32</td>
<td>45</td>
<td>56</td>
<td>65</td>
<td>72</td>
<td>77</td>
<td>80</td>
<td>81</td>
</tr>
</tbody>
</table>

3. Example:
   - Convert 180.3 cm by 101.6 cm to approximately 71 in. by 40 in. or 5.9 ft by 3.3 ft.
   - Estimate the area to be about 6 ft by 3 ft or 18 ft².
   - Estimate the cost to be at least (18)(75) = $1350.
Section 2.3
1. Volume is the number of cubes that fill the space that an object occupies. For example, $4\text{m}^3$ is made up of four $1\text{m}^3$ cubes. Each cube is 1 m in length by 1 m in width by 1 m in depth.
2. $1\text{m} = 100\text{cm}$, $1\ 000\ 000\ \text{cm}^3$
3. Using the Pythagoras relationship, $c^2 = a^2 + b^2$; $8^2 = 4^2 + h^2$; height = 6.9 cm
4. 6 cm
5. Add the sum of the volumes of the square-based pyramid and the three prisms.

BLM 2–6 Section 2.1 Extra Practice
1. a) $7.4\text{m}^2$ b) $23\text{cm}^2$ c) $16\ 000\ 000\ \text{m}^2$ d) $180\ \text{m}^3$
2. a) $0.9\text{ft}^2$ b) $100.8\ \text{in}^2$ c) $4\ \text{yd}^2$ d) $1.7\ \text{ft}^3$
3. a) $77.4\text{cm}^2$ b) $3.6\ \text{yd}^2$ c) $0.8\ \text{cubic mi}$ d) $0.1\ \text{m}^3$
4. a) $45\ \text{cm}^3$ b) $442.5\ \text{cm}^3$
5. a) 

b) $87\ \text{in. by 57 in.}$ c) $3.2\ \text{m}^2$; It will take $3.2\ \text{m}^2$ of fabric to make the tablecloth.
6. $4.9\ \text{yd}^3$; It will take $4.9\ \text{yd}^3$ of sand to fill the sandpits.
7. a) $908\ \text{cm}^2$; The area of the platform top is $908\ \text{cm}^2$.
b) smaller by approximately $21.1\ \text{cm}^2$
8. 42 in. or $3'6"$; The floor measures 42 in. or $3'6"$ in width.

BLM 2–7 Investigate Surface Area of Three-Dimensional Objects
1. 2. Example:
   Quadrant 1: The sum of the surface areas of all faces of a 3-D object.
   Quadrant 2: Find the area of each face, and then add all the areas.
   Quadrant 3: Students use strategies of their choice. They record the strategies and the results.
   Example: The surface area of the cylinder is $374.7\ \text{cm}^2$. The surface area of the cone is $208.6\ \text{mm}^2$. The surface area of the prism is $348\ \text{in.}^2$.
   Quadrant 4: Expect a different strategy from the one shown in Quadrant 3.

BLM 2–8 Section 2.2 Extra Practice
1. a) 

2. a) $184\ \text{cm}^2$ b) $31.4\ \text{in.}^2$ c) $132\ \text{cm}^2$
3. a) $248.8\ \text{cm}^2$
b) 6985.9 cm²

\[ \text{base: } 70 \text{ cm} \]

\[ \text{radius: } r = 23 \text{ cm} \]

4. a) 6.3 m²

\[ \text{diameter: } d = 1 \text{ m} \]

\[ \text{width: } r = 2 \text{ in.} \]

b) 62.8 in²

5. a) 96 cm²  
   b) 3124 in²  
   c) 187.4 in²

6. a) 320 mm²  
   b) 153.9 in²

7. a) 20.0 mm  
   b) 23.0  
   c) 35.0 cm

8. 127.2 ft²

9. front: 64 in.²; sides: 16 in.², light cover: 12.6 in.²; total surface area: 80 – 12.6 = 67.4 in.². He will need to paint an area 67.4 in.².

BLM 2–9 Section 2.3 Extra Practice
1. a) 280 in.³  
   b) 3000 cm³  
   c) 114.5 m³  
   d) 508.9 in.³  
   e) 1026.3 mm³  
   f) 284.8 cm³

2. 8.8 in. The microwave is 8.8 in. tall.
3. 2144.7 cm³. The volume of the globe is 2144.7 cm³.
4. 11.5 in. The beach ball is 11.5 in. in diameter.
5. a) 1.5 m  
   b) 4 cm  
   c) 0.75 ft  
   d) 12.0 cm

6. 1.02 ft³

7. base: 12 in.³; roof: 9 in.³; total volume: 21 in.³. The total volume of wood used is 21 in.³.
8. a) 1 in. The sphere is 1 in. in diameter.  
   b) 4 in. The pyramid is 4 in. in height.  
   c) 1.5 in. The pyramid base is 1.5 in. wide.  
   d) 22.5 in.³ The volume of packaging needed is 22.5 in.³.

BLM 2–10 Chapter 2 Test
1. A  
2. C  
3. C  
4. C  
5. A  
6. D  
7. a) 226.2 m²  
   b) 209.4 m³  
8. 8 cm  
9. 1.625 yd  
10. a) 5.5 cm³  
    b) 282.2 cm³  
    c) approximately 3 times as great  

11. a) 1571 cm³ = 524 cm³  
    b) 2453.6 cm² = 2454 cm²