

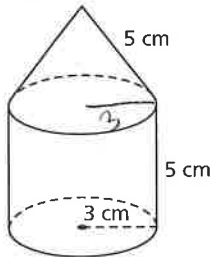
## Discuss the Ideas

- When you determine the surface area of a composite object, how do you identify the faces that comprise the surface area?
- When might you use the Pythagorean Theorem in a calculation of the surface area or volume of a composite object? How do you know your answer is reasonable?

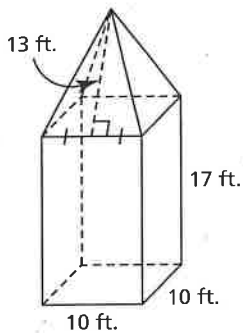
## Exercises

### A

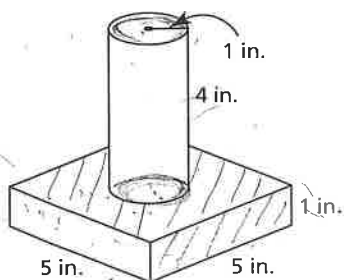
- Determine the surface area of each composite object to the nearest square unit.
  - right cylinder and right cone



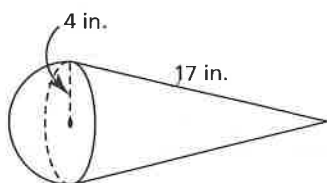
- right square prism and right square pyramid



- right square prism and right cylinder



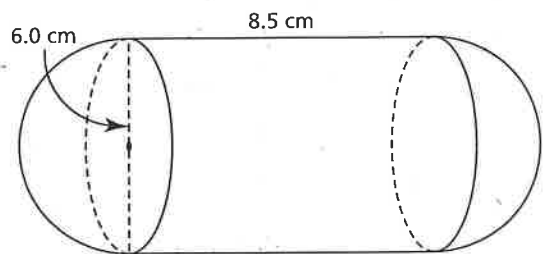
- right cone and hemisphere



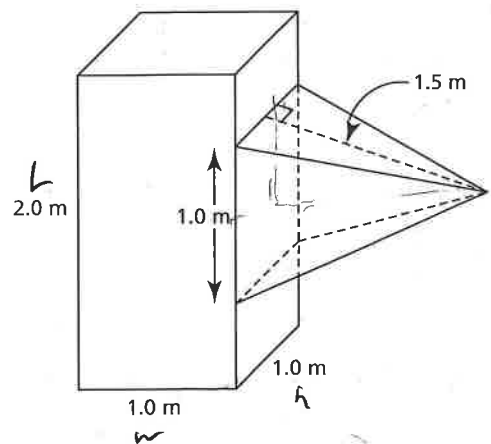
- For which composite objects in question 3 could you calculate the volumes without determining any further dimensions?
  - Determine the volume of each composite object you identified in part a.

### B

- Determine the surface area and volume of each composite object. Write the answers to the nearest tenth of a unit.
  - right cylinder and hemispheres

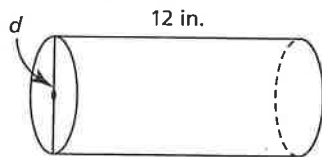


- right square prism and right square pyramid



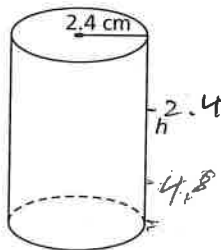
6. For each object, its surface area,  $SA$ , and some dimensions are given. Calculate the dimension indicated by the variable. Write each answer to the nearest tenth of a unit.

a) right cylinder



curved  $SA = 219 \text{ in.}^2$

b) right cylinder

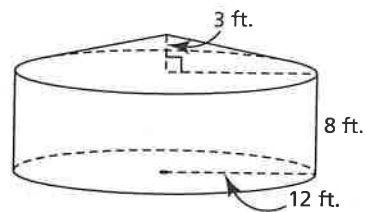
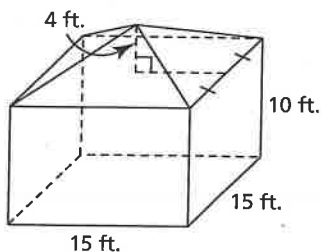


total  $SA = 137.2 \text{ cm}^2$

7. A rocket has a cylindrical body and a cone-shaped nose. The cylinder is 55 cm long with a radius of 6 cm. The cone has a slant height of 12 cm and has the same radius as the cylinder.
- Sketch and label a diagram of the rocket.
  - Determine the surface area of the rocket to the nearest square centimetre.
  - Determine the volume of the rocket to the nearest cubic centimetre.
  - One-third of the interior space of the rocket is used for fuel storage. How much fuel can the rocket hold?

8. A solid sphere just fits inside a cube that has an edge length equal to the diameter of the sphere. The edge length of the cube is 5.8 cm. What is the volume of air in the cube to the nearest cubic centimetre?

9. Here are two different grain storage bins.



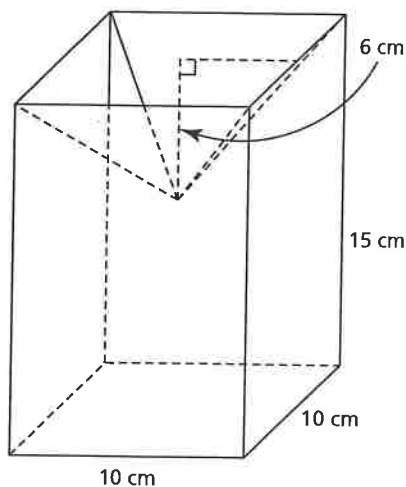
- a) Which storage bin holds more grain?

b) Each storage bin has a cement base.

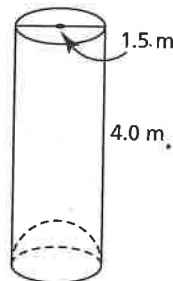
The materials for the walls and roof of the square-based bin cost \$10.49 per square foot. The materials for the walls and roof of the circular-based bin cost \$9.25 per square foot. Which bin is cheaper to build? Justify your answer.

10. Determine the volume of each object to the nearest tenth of a cubic unit.

a) a right square prism with a right square pyramid removed

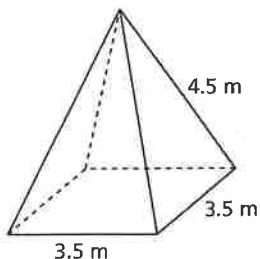


b) a right cylinder with a hemisphere removed



11. Determine the surface area of each object in question 10 to the nearest tenth of a square unit.

15. a)



- b) 3.8 m                      c) 15.3 m<sup>3</sup>  
 16. 401 ft.<sup>3</sup>  
 17. a) 15 cm<sup>2</sup>                      b) 23 cm<sup>3</sup>  
 c) No, there is also some air inside the tea bag.  
 18. a) 4.7 cm                      b) 10.5 m  
 c) 3.3 m                          d) 7.4 cm  
 19. b) 8.0 cm  
 20. a) 22.9 kL                      b) Approximately 8.3 kL  
 21. 10 yd.  
 22. 49.6 m<sup>3</sup>

**1.6 Surface Area and Volume of a Sphere, page 51**

3. a) 314 cm<sup>2</sup>                      b) 32 m<sup>2</sup>  
 c) 201 ft.<sup>2</sup>                          d) 99 cm<sup>2</sup>  
 4. a) 524 cm<sup>3</sup>                      b) 17 m<sup>3</sup>  
 c) 268 ft.<sup>3</sup>                          d) 92 cm<sup>3</sup>  
 5. a) 339 m<sup>2</sup>, 452 m<sup>3</sup>              b) 191 yd.<sup>2</sup>, 191 yd.<sup>3</sup>  
 7. 886.7 m, 2482.7 m<sup>3</sup>  
 8. 3.2 cm  
 9. 12 in.  
 10. a) 2.1 L                          b) 8 cups  
 11. a) Hemisphere                      b) Hemisphere  
 12. a) 784 m<sup>2</sup>                          b) 2065 kL  
 13. a) 511 185 933 km<sup>2</sup>  
 b) 357 830 153 km<sup>2</sup>  
 c) 1 086 781 293 000 km<sup>3</sup>  
 d) 1 078 037 876 000 km<sup>3</sup>  
 14. Approximately 1 082 696 932 000 km<sup>3</sup>;  
 approximately 1 093 440 264 000 km<sup>3</sup>  
 15. 239 spheres  
 16. a) 11 cm; 5 in.                      b) 1387 cm<sup>2</sup>; 277 in.<sup>2</sup>  
 c) 4855 cm<sup>3</sup>; 434 in.<sup>3</sup>              d) Basketball  
 17. a) 16.4 m<sup>3</sup>                          b) 1.0 m<sup>2</sup>  
 18. 529.6 m<sup>2</sup>; 882.2 m<sup>3</sup>  
 19. 42 pumps  
 20. 45 cookies

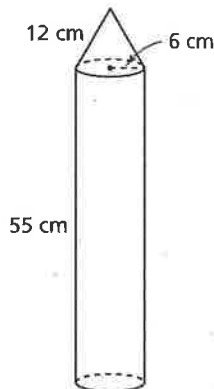
21. a) Approximately 69%  
 b) Assumptions: Ball is created from one solid piece and has greatest possible diameter.  
 22.  $SA = \pi a^2$ ;  $V = \frac{1}{6} \pi a^3$   
 23. Approximately 5 in.  
 24. a) Inflated balloon's circumference is 3 times as great  
 b) Inflated balloon's surface area is 9 times as great  
 c) Inflated balloon's volume is 27 times as great

**Chapter 1: Checkpoint 2, page 54**

1. a) 80 ft.<sup>2</sup>                          b) 21 m<sup>2</sup>  
 c) 1127 m<sup>2</sup>  
 2. 425 m<sup>2</sup>  
 3. 183 in.<sup>2</sup>  
 4. a) 41 ft.<sup>3</sup>                          b) 6 m<sup>3</sup>  
 c) 1947 m<sup>3</sup>  
 5. a) 9.5 cm                          b) 2.7 m  
 c) 17.4 cm  
 6. a) 973.1 km<sup>2</sup>, 2854.5 km<sup>3</sup>  
 b) 109.0 cm<sup>2</sup>, 82.3 cm<sup>3</sup>  
 7. 7946 cm<sup>2</sup>

**1.7 Solving Problems Involving Objects, page 59**

3. a) 170 cm<sup>2</sup>                          b) 1040 ft.<sup>2</sup>  
 c) 95 in.<sup>2</sup>                          d) 314 in.<sup>2</sup>  
 4. a) Object in part c                      b) Approximately 38 in.<sup>3</sup>  
 5. a) 273.3 cm<sup>2</sup>, 353.4 cm<sup>3</sup>              b) 12.0 m<sup>2</sup>, 2.5 m<sup>3</sup>  
 6. a)  $5\frac{4}{5}$  in.                          b) 6.7 cm  
 7. a)

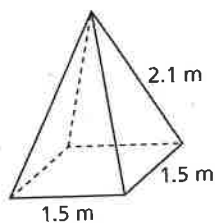


- b) 2413 cm<sup>2</sup>                          c) 6612 cm<sup>3</sup>  
 d) Approximately 2204 cm<sup>3</sup>, or 2204 mL

8.  $93 \text{ cm}^3$
9. a) Circular-based bin  
b) Square-based bin
10. a)  $1300.0 \text{ cm}^3$       b)  $6.2 \text{ m}^3$
11. a)  $856.2 \text{ cm}^2$       b)  $24.2 \text{ m}^2$
12. Approximately  $26.4 \text{ m}^2$
13. a)  $1060 \text{ in.}^3$       b) 15 in. by 15 in. by 12 in.  
c)  $1820 \text{ in.}^3$

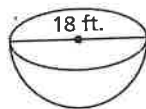
### Chapter 1: Review, page 64

1. Answers may vary. For example:  
a) Inch      b) Foot  
c) Yard
3. a) 42 ft.      b) 8800 yd.  
c) 75 in.      d) 3 yd. 1 ft. 3 in.
4. 320 in., or 8 yd. 2 ft. 8 in.
6. Answers will vary depending on the conversion ratios used.  
a) 8 ft. 7 in.      b) 136 yd. 2 ft. 1 in.  
c) 3 mi. 1282 yd.      d) 1 ft. 2 in.
7. Answers will vary depending on the conversion ratios used.  
a) 12.5 m      b) 6.8 km  
c) 48.3 cm      d) 215.9 mm
8. Answers will vary depending on the conversion ratio used.  
670 750 strides
9. a)  $75 \text{ ft.}^2$       b)  $85 \text{ cm}^2$   
c)  $898 \text{ mm}^2$       d)  $192 \text{ m}^2$
10.  $160 \text{ yd.}^2$
11. a)



- b) 2.0 m  
c)  $6 \text{ m}^2$
12. a)  $8\frac{7}{10} \text{ in.}$       b)  $173 \text{ in.}^2$
13.  $125.8 \text{ cm}^2$
14.  $5810 \text{ ft.}^2$
15. a)  $11 \text{ m}^3$       b)  $8822 \text{ in.}^3$   
c)  $7 \text{ ft.}^3$       d)  $221 \text{ mm}^3$

16. No; approximately  $132.7 \text{ cm}^3$
17. 12 cm
18. a)  $24 \text{ in.}^3$       b) 6 in.  
19. a) 2.1 m      b)  $2.3 \text{ cm}^3$
20. a)  $254 \text{ in.}^2, 382 \text{ in.}^3$   
b)  $133 \text{ m}^2, 144 \text{ m}^3$
- 21.



- a)  $763 \text{ ft.}^2$       b)  $1527 \text{ ft.}^3$
22.  $4\frac{3}{5} \text{ in.}$
23. Approximately  $98 \text{ cm}^3$
24.  $523 \text{ in.}^3$
25. a)  $480 \text{ cm}^2, 595 \text{ cm}^3$       b)  $108 \text{ ft.}^2, 84 \text{ ft.}^3$
26. a)  $113\,981 \text{ cm}^3$       b)  $11\,878 \text{ cm}^2$
27. a) 8 cm      b) 10 mm

### Chapter 1: Practice Test, page 67

1. B
2. C
3. The volume of the right cylinder is 3 times the volume of the right cone.
4. a)  $28.3 \text{ cm}^3, 69.3 \text{ cm}^2$   
b)  $1215.8 \text{ m}^3, 647.2 \text{ m}^2$
5. a) A ruler with inches marked
6. 5.8 cm

### Chapter 2 Trigonometry, page 68

#### 2.1 The Tangent Ratio, page 75

3. a)  $\tan A = \frac{6}{7}; \tan C = \frac{7}{6}$   
b)  $\tan D = \frac{3}{2}; \tan F = \frac{2}{3}$   
c)  $\tan H = \frac{5}{4}; \tan J = \frac{4}{5}$   
d)  $\tan K = \frac{5}{7}; \tan M = \frac{7}{5}$
4. a)  $14^\circ$       b)  $51^\circ$   
c)  $68^\circ$       d)  $87^\circ$
5. a)  $27^\circ$       b)  $45^\circ$   
c)  $61^\circ$       d)  $69^\circ$