## Chapter 2

### 2.1 Units of Area and Volume, pages 61 to 65

**1.** **a)** 1 500 000 $m^2$ **b)** 82.8 $km^2$
**c)** 2258.1 $cm^2$ **d)** 97.5 $m^2$

**2.** **a)** 75 000 $mm^2$ **b)** 0.005 16 $m^2$
**c)** 27 870.9 $cm^2$

**3.** 194 $yd^2$

**4.** **a)** 3540 $cm^3$ **b)** 39 329 $cm^3$

**5.** 1.3 $m^3$

**6.** 58.8 $ft^2$, 5.46 $m^2$

**7.** **a)** The bedroom in the new house is bigger by 3.9%.
**b)** $177.23

**8.** 51 $km^2$

**9.** **a)** 2604 in.$^2$ **b)** 180 tiles

**10.** **a)** The locker from the double stack has more volume.
**b)** It has 0.158 $m^3$ more space.

**11.** Example: When converting from a smaller unit to a larger unit, divide by a power of 10. The conversion factor for SI units of volume is found by raising the conversion factor from the smaller unit to the larger unit, to the power of 3. This result is the power of 10 to be used when dividing. The same method is used when converting from larger to smaller units, except for multiplying by the power of 10.
**a)** 1 000 000 $cm^3$
**b)** 0.000 355 $m^3$
**c)** 2 500 000 000 $mm^3$

**12.** **a)** 80 586 $ft^2$
**b)** 7487 $m^2$
**c)** 0.7487 ha

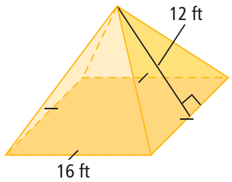
**14.** Example: architect, draftsperson, mechanic, carpenter, electrician, grocer, tile layer, plumber, engineer

**16.** Example: There may be a need for conversions in the meat, deli, and produce department. Some customers may still think in imperial measurements when purchasing a mass of meat, cheese, vegetables, or fruit.

### 2.2 Surface Area, pages 74 to 79

**1.** **a)** 13.6 $m^2$ **b)** 4775.2 in.$^2$
**c)** 275.7 $cm^2$ **d)** 237 in.$^2$
**e)** 162.9 $cm^2$

**2.** 640 $ft^2$




**3.** **a)** 43.1 cm **b)** 11.0 m **c)** 2.7 m

**4.** 6 in.

**5.** 734.3 $cm^2$

**6.** Example: There are no computational errors in Austin's work. But, he does not need to paint the ends of the pillars if they will be standing upright. I would just paint the lateral surface area which is 50.24 $ft^2$ for each pillar.

**7.** 182.46 $m^2$

**8.** **a)** 664 $cm^2$ **b)** 414.34 $cm^2$

**9.** I assumed there were two bases. 96.9 cm

**10.** 58 307 960 $mi^2$

**11.** 314 $in^2$

**12.** 1841 $m^2$

**13.** 380 $mm^2$

**14.** 5 $m^2$

**15. a)** Minimum: 4902 $mm^2$;
Maximum: 5153 $mm^2$

**b)** Minimum: 39.5 mm by 39.5 mm by 39.5 mm;
Maximum: 40.5 mm by 40.5 mm by 40.5 mm

**16.** 192.3 $cm^2$

**17.** 1353.2 $mm^2$

**18. a)**

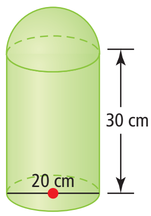
| Investigating Changes in Dimensions of a Sphere | | | |
|---|---|---|---|
| Stretch Ratio | Radius | Surface Area | Ratio of New SA to Original SA |
| 1 | 2 | 50.265 | 1 |
| 2 | 4 | 201.06 | 4 |
| 3 | 6 | 452.385 | 9 |
| 4 | 8 | 804.24 | 16 |
| 5 | 10 | 1256.625 | 25 |
| 6 | 12 | 1809.54 | 36 |

**b)** It is the square of the stretch ratio.

**c)** 1809.54 square units

**d)** Example: The stretch ratio causes the area to change by the square of the stretch ratio.

**19.** Example: The surface area is 2826 $cm^2$. To convert to square inches, divide 2826 by 6.45. So, the surface area in imperial units is 438.14 $in.^2$




**20.** Example: Surface area is the sum of the areas of the faces of a three-dimensional object. Area is measured in square units, so surface area is also measured in square units.

## 2.3 Volume, pages 86 to 91

**1. a)** 192 666.7 $cm^3$ or 0.2 $m^3$

**b)** 578 000 $cm^3$ or 0.6 $m^3$

**c)** 1005.3 $ft^3$

**d)** 335.1 $ft^3$

**e)** 2 226 094.9 $mm^3$

**2. a)** 48 $in.^3$ **b)** 754 $cm^3$

**3.** 0.1 $m^3$

**4. a)** Erin is correct. Example: Janine is incorrect because she divided the volume of the entire object by 3.

**b)** Example: Erin's method.

**5. a)** 8.4 cm **b)** 12 in.

**c)** 6.0 cm **d)** 1.8 yd

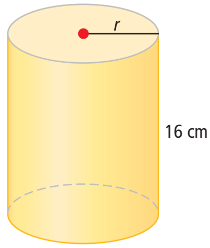
**6.** 801 599.64 $m^3$

**7.** 6 in. by 6 in. by 6 in.

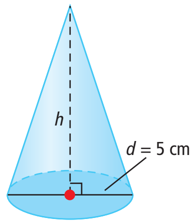
**8.** 18 $cm^3$

**9.** 160 $cm^3$

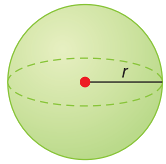
**10. a)** $r = 3.2$ cm




**b)** $h = 3.1$ cm




**c)** $r = 2.3$ cm




**11.** 5.1 $m^3$

**12.** 12 ft

**13. a)** 45 $ft^3$ **b)** Example: 35 $ft^3$

**c)** 33.75 $ft^3$; The volume decreased by $\frac{1}{4}$.

**14.** 81.5 $cm^3$

**15.** Example: 70 $in.^3$

**16.** 621.12 songs/$cm^3$ on the MP3;
0.06 songs/$cm^3$ on the vinyl record

**17.** Example: If a cone and a sphere have the same radius and the height of the cone is the same measurement as the radius of the cone, then the volume of the sphere is 4 times the volume of the cone.

**18.** 11.2 $cm^3$

**19. a)**

| Investigating Changes in Radius of a Sphere | | | |
|---|---|---|---|
| Stretch Ratio | Radius | Volume | Ratio of New Volume to Original Volume |
| 1 | 3 | 113.1 | 1 |
| 2 | 6 | 904.8 | 8 |
| 3 | 9 | 3053.7 | 27 |
| 4 | 12 | 7238.4 | 64 |
| 5 | 15 | 14137.5 | 125 |
| 6 | 18 | 24429.6 | 216 |

**b)** Example: The stretch ratio is cubed.

**c)** Example: The ratio will be 6 cubed or 216.

**d)** Example: The volume is increased by the cube of the stretch ratio or the radius.

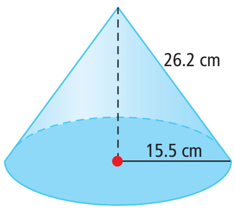
20. Example:

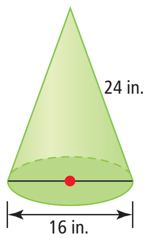
| Investigating Changes in Dimensions of a Square Pyramid | | | | Ratio of New Volume to Original Volume |
|---|---|---|---|---|
| Stretch Ratio | Side | Height | Volume | |
| 1 | 2 | 2 | 2.67 | 1 |
| 2 | 4 | 4 | 21.33 | 8 |
| 3 | 6 | 6 | 72.00 | 27 |
| 4 | 8 | 8 | 170.67 | 64 |
| 5 | 10 | 10 | 333.33 | 125 |
| 6 | 12 | 12 | 576.00 | 216 |

21. Example: stereo cabinet
   a) Estimate the volume to be 0.5 $m^3$ in SI units and 0.5 $yd^3$ in imperial units.
   b) In imperial units it is actually 0.4703 $yd^3$ and in SI units it is 0.35958 $m^3$.
   c) The estimate was closer to the imperial units. My personal referent for imperial units is more accurate.

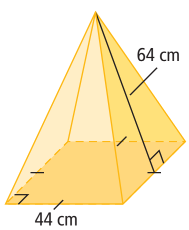
## Chapter 2 Review, pages 92 to 94

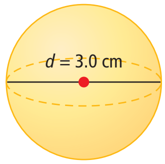
1. a) 8100 $cm^2$  b) 0.54 $in.^2$
2. a) 423.84 $ft^3$  b) 1029.63 $cm^3$
3. Example: For 1 $cm^2$, my referent is the area of my little finger nail. For 1 $in.^2$, my referent is the area of a 25¢ coin. For 1 $m^2$, my referent is the front of the square bookshelf in my bedroom.
4. 25.84 lb
5. a) 2030.57 $cm^2$  b) 804.25 $in^2$



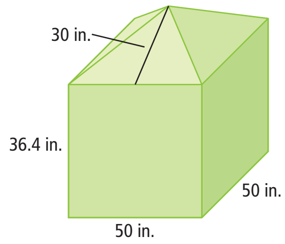




   c) 7568 $cm^2$  d) 28.27 $cm^2$




6. a) $s = 1.64$ m  b) $s = 40$ cm
   c) $r = 5.54$ cm
7. 2 $m^2$, assuming the tire is a cylinder and the cover will enclose the total surface
8. a) 50 in. by 50 in. by 36.4 in.
   b) 28 in. by 28 in. The dog should be able to walk in without crouching down.
   c)




   d) 12 780 $in.^2$
9. 1.77%
10. a) 21 205.75 $ft^3$  b) 74.22 $cm^3$
   c) 1008 $ft^3$  d) 288.70 $cm^3$
11. a) 0.73 m  b) 4.66 cm
   c) 4.20 m  d) 8.38 cm
12. a) 4300 $m^3$  b) 239 truckloads
13. a) 6 283 185 $mm^3$  b) 5 497 787 $mm^3$

## Chapter 2 Practice Test, pages 95 to 97

1. A
2. A
3. D
4. A
5. B
6. $SA = 2463$ $cm^2$; $V = 11\ 494$ $cm^3$
7. 24 572.5 $mm^3$
8. 58.24 $m^2$
9. The small size should be the container with radius 7 cm and height 18 cm since its volume is 2770.88 $cm^3$. The large size should be the container with the radius of 8 cm and height of 16 cm since its volume is 3216.99 $cm^3$.
10. a) 760.7 $cm^3$  b) 1051.3 $cm^3$
11. $SA = 72.2$ $in^2$; $V = 39.65$ $in^3$
12. a) 100 000 000 $m^3$, assuming the kimberlite is a cylindrical shape with a height of 2 km and base area of 50 000 $m^2$
13. a) 3.9 ft
   b) The prism has a surface area of 94 $ft^2$. The cylinder has a surface area of 85.15 $ft^2$. Therefore, the cylinder's surface area is the least.