## Chapter 7

7.1 Understanding Volume, pages 250–253

3. a) 60 cm^3 **b)** 216 cm^3 **c)** 1920 cm^3
4. a) 96 cm^3 **b)** 72 cm^3 **c)** 126 cm^3
5. a) 60 cm^3; 60 cm^3 **b)** 960 cm^3; 960 cm^3
6. a) 153 cm^3; 153 cm^3 **b)** 375 cm^3; 375 cm^3
7. a) 4 cm **b)** 7 cm **c)** 4 cm
8. 75 cm^3

9. There are four ways to build a rectangular prism from 16 centimetre cubes.
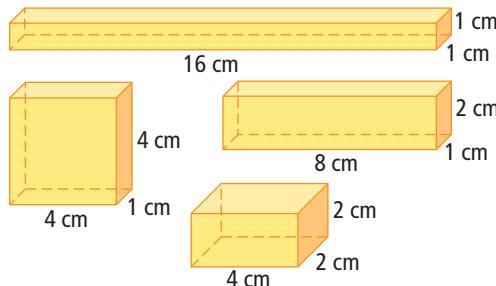
Changing the orientation of each figure does not form a new figure.

Length (cm)	Width (cm)	Height (cm)	Volume (cm³)
16	1	1	16
4	4	1	16
2	8	1	16
2	2	4	16

10. 125 000 cm³
11. 93.6 cm³
12. 0.1875 m
13. a) 1 687 500 cm³ **b)** 1687.5 L
14. 24 530 m³
15. 1.6%
16. a) Structure 1: 10 cubes; Structure 2: 14 cubes; Structure 3: 15 cubes **b)** Structure 1: 17 cubes; Structure 2: 22 cubes; Structure 3: 30 cubes **c)** Structure 1: 27 cubes; Structure 2 : 36 cubes; Structure 3: 45 cubes **d)** volume of Structure 1: 216 cm³, volume of Structure 2: 288 cm³, volume of Structure 3: 360 cm³
17. level of water in the tank: 15.25 cm
18. a) volume of cube to vo1ume of box = 1 to 8 **b)** area of base of cube to area of base of box = 1 to 4 **c)** height of cube to height of box = 1 to 2 **d)** When the side length of a cube is doubled, the area of the base is four times as large and the volume of the cube is eight times as large.

7.2 Volume of a Prism, pages 258–261

4. a) 15 m³ **b)** 792 m³ **c)** 49.6 m³
5. a) 40 m³ **b)** 504 cm³ **c)** 213.759 mm³ **d)** 253.952 cm³
6. a) 1000 cm³ **b)** 27 cm³ **c)** 15.625 cm³
7. a) 294 cm³ **b)** 133.65 m³ **c)** 13 440 000 mm³
8. a) 84 m³ **b)** 1200 cm³ **c)** 514.15 mm³
9. a) 200 cm³ **b)** 320.625 cm³ **c)** 5 460 000 mm³
10. a) 200 cm³ **b)** 84 cm³ **c)** 1800 cm³
11.

Length (cm)	Width (cm)	Height (cm)	Volume (cm³)
7	2	5	70
12	9	10	1080
16	15	5	1200

12.

Base (cm)	Height of Triangle (cm)	Height of Prism (cm)	Volume (cm³)
7	2	10	70
18	12	10	1080
20	14	5	700

13. The landscaper does not have enough gravel. She needs 0.728 m³ of gravel and has 0.5 m³ of gravel. She will need 0.228 m³ more gravel.
14. 4800 cm³
15. 18 m³
16. 460 800 cm³
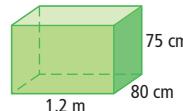
17. 40 trips
18. a) No. There is no whole number that can be cubed that will equal 18. **b)** Suki would need 27 cubes to make a 3 × 3 × 3 cube.
19. volume of cube: 343 cm³ ; volume of rectangular prism: 360 cm³; volume of triangular prism: 367.5 cm³. Harvey the guppy will have the most water in the triangular prism.
20. 562.5 cm³
21. 16 rectangular prisms with the dimensions shown in the table can be sketched.

Length (cm)	Width (cm)	Height (cm)
1	1	120
2	60	1
3	40	1
4	30	1
5	24	1
6	20	1
8	15	1
10	12	1
2	2	30
2	3	20
4	2	15
5	2	12
2	6	10
6	4	5
8	3	5
4	10	3

22. maximum volume of cement: 16.59 m³, assuming the tank is 1 m high
23. Both prisms have the same volume.
24. a) depth of water: 0.8 m **b)** water left after 2.5 h: 810 m³; new depth of water: 0.675 m **c)** length of time: 12 h

7.3 Volume of a Cylinder, pages 265–267

4. a) 1805.5 cm³ **b)** 7385.28 cm³ **c)** 1.1775 m³
5. a) 628 cm³ **b)** 4179.34 cm³ **c)** 9.87844 m³ **d)** 1589.625 cm³
6. a) 1570 cm³ **b)** 0.785 m³ **c)** 1907.55 cm³
7. a) 602.88 cm³ **b)** 21.98 m³ **c)** 4239 cm³ **d)** 309.976875 m³
8. 3 cm

9. 3234.9065 cm³

10. a) P6 Truss solar array; volume: 6578.82438 m³.
b) Estimate of the total volume is 7000 m³. Total volume: 7209.078115 m³

11. 3.925 m³

12. Martha should buy the "Popcorn Lover's' container because it has a larger volume. The volume of the "Jumbo" popcorn container is 12 560 cm³. The volume of the "Popcorn Lover's" container is 14 130 cm³.

13. 5 m³

14. 251.2 m³

15. a) The volume of the cylinder is four times as large. The volume of the cylinder is calculated using the formula $V = (\pi \times r^2) \times h$. If the radius is doubled, the formula will be $V = (\pi \times (2r)^2) \times h$
$$V = (\pi \times 4r^2) \times h$$
$$V = 4(\pi \times r^2) \times h$$
b) The volume of the cylinder is twice as large. The volume of the cylinder is calculated using the formula $V = (\pi \times r^2) \times h$. If the height is doubled, the formula will be $V = (\pi \times r^2) \times 2h$
$$V = 2(\pi \times r^2) \times h$$

16. 1695.6 cm³; Assume that one quarter of the block of cheese was cut away.

17. a) 1.884 m³ **b)** 0.4 m³ **c)** 0.628 m³

18. 7 h

7.4 Solving Problems Involving Prisms and Cylinders, pages 273–275

3. a) To build a giant prism with a triangular base of length 5.6 m and height 6.8 m requires four prisms on the bottom layer. $4 + 3 + 3 + 2 + 2 + 1 + 1 = 16$
The artist would need 16 small prisms to build the large prism. With 20 prisms, he has enough. **b)** 22.47 m³

4. 46.9 cm

5. 2.826 m³

6. 2.0 cm³

7. 48 937.5 cm³

8. One crate will be enough. The volume of the crate is 63 m³ and the volume of the 25 000 boxes is 50 m³.

9. All of the files will fit in the carton. The volume of the carton is 72 000 000 cm³ and the volume of 9000 boxes is 70 200 000 cm³.

10. a) 372 875 cm³ **b)** 1 864 375 cm³ **c)** To reach this goal the garbage can should be 0.5 full on each lunch hour on each of the five school days.

11. 60 cm

12. 91 pails

13. 27 prisms

14. $12.78 per jar

15. a) 1300 cm³ **b)** You can check your calculations by dividing the shape into a different set of rectangular prisms.

16. a) 203 472 cm³ **b)** 13 200 cm³ **c)** 15.4 pails

17. Answers may vary. Example: Rolling the cylinder so that the circumference is 28 cm and the height is 22 cm will produce the larger volume. The cylinder with a circumference of 22 cm and a height of 28 cm has a

volume of 1077 cm³. The cylinder with a circumference of 28 cm and a height of 22 cm has a volume of 1373 cm³.

18. 5 cm

19. 6280 cm³

20. 2.5 m

21. a) 149 250 m³ **b)** 4 h and 9 min

Chapter Review, pages 276–277

1. B **2.** D **3.** A **4.** C

5. a) 84 cm³ **b)** 14 080 cm³ **c)** 81 cm³

6. a) 24 cm³ **b)** 40 cm³ **c)** 150 cm³

7. 196 cm³

8. a) 168 cm³ **b)** 2250 cm³

9. a) 1000 cm³ **b)** 614.125 cm³

10. a) 120 cm³ **b)** 70 cm³

11. a) 100 cm³ **b)** 14 400 mm³

12. 0.6 m³

13. a) 55 080 m³ **b)** 1311.4 truck loads **c)** 11 days

14. a) 125 600 cm³ **b)** 327 910.2 m³

15. a) 2317.32 cm³ **c)** 4578.12 cm³

16. 141.3 m³

17. 76.93 m³ or 77 m³

18. 301.3 mm³

19. 8.79 m

20. a) volume of water: 0.9375 m³
b) length of time: 1 min 34 s