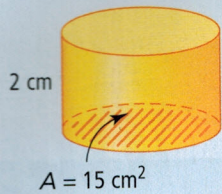


Communicate the Ideas

1. Evan calculated the volume of a right cylinder. Charlotte calculated the volume of a right rectangular prism. Did either of them make an error in their solutions? Explain how you know.

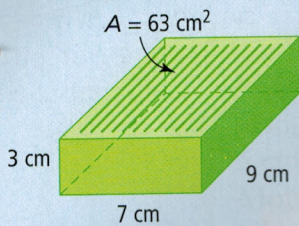


Volume = area of base \times height

$$V = 15 \times 2$$

$$V = 30$$

The volume of the cylinder is 30 cm³.



Volume = area of base \times height

$$V = 63 \times 7$$

$$V = 441$$

The volume of the rectangular prism is 441 cm³.



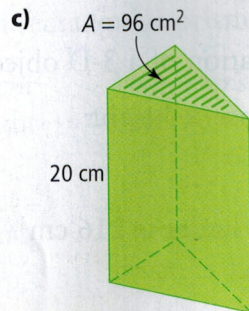
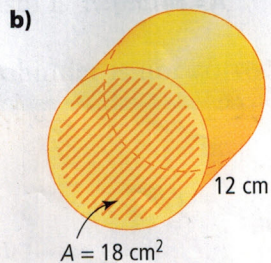
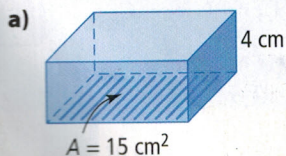
2. Does the volume of a right prism depend on which face is used as the base in the calculations? Use examples to support your position.

Check Your Understanding

Practise

For help with #3 and #4, refer to Example 1 on pages 247–248.

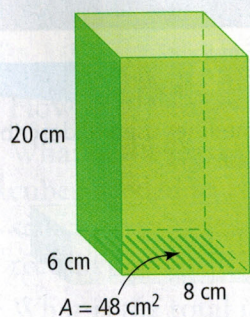
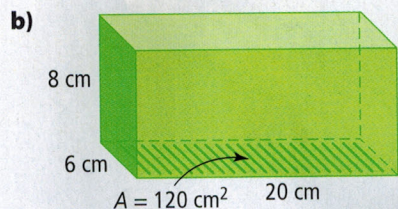
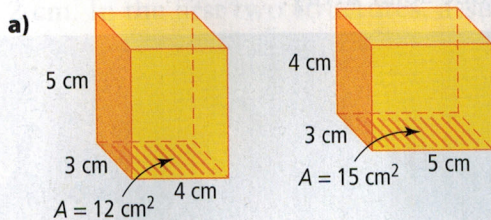
3. Determine the volume of each right prism or cylinder.



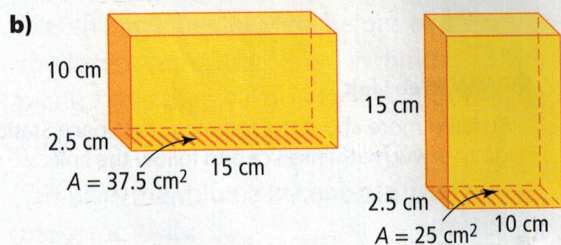
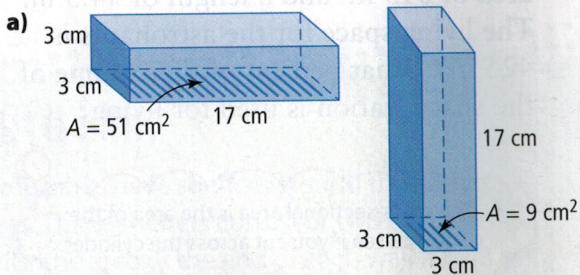
4. What is the volume of each right prism?
- area of base = 12 cm², height = 8 cm
 - area of base = 18 cm², height = 4 cm
 - height = 9 cm, area of base = 14 cm²

For help with #5 and #6, refer to Example 2 on page 248.

5. Determine the volume of each right rectangular prism.



6. What is the volume of each right rectangular prism?



Apply

7. What is the height of each of the following right rectangular prisms?
- volume = 32 cm^3 , area of base = 8 cm^2
 - volume = 35 cm^3 , area of base = 5 cm^2
 - area of base = 9 cm^2 , volume = 36 cm^3
8. Nina uses 15 centimetre cubes to make the base of a rectangular prism. Determine the volume if the prism has a total of 5 layers of cubes. Show your thinking.
9. How many ways can you build a rectangular prism from 16 centimetre cubes? Use diagrams or centimetre cubes to show your designs.
10. A water trough is in the shape of a right triangular prism with base area of 1250 cm^2 and a height of 100 cm. How much water can be put in before it overflows?



11. José is having vegetable soup. The area of the base of the soup can is 10.4 cm^2 , and the height is 10 cm. When José opens the can, he sees that the soup comes up to a height of only 9 cm. What volume of soup is in the can?



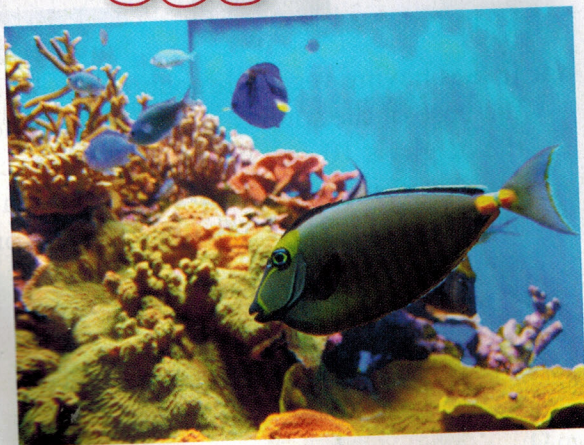
12. Bill is building a wooden sandbox with a base area of 8 m^2 for his granddaughters. He does not want to order more than 1.5 m^3 of sand to fill it. He has enough wood to build the sandbox up to 0.22 m deep. What is the minimum height he should build the sandbox to allow the sand to be spread evenly? Justify your answer.



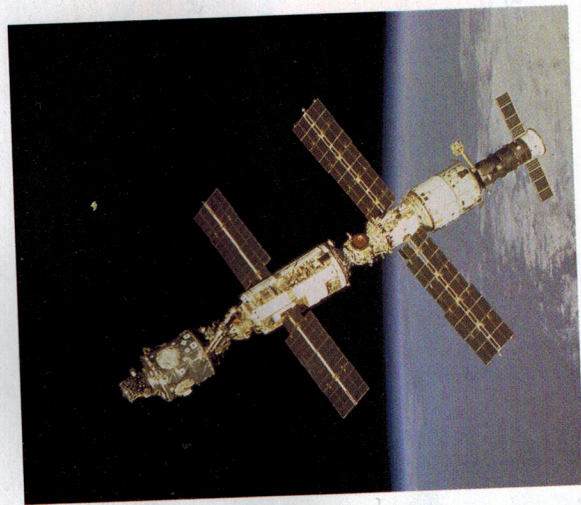
13. Ocean City Aquarium is building a new tank for its coral reef fish. The area of the base is $18\,750 \text{ cm}^2$ and the height is 90 cm .

- What is the volume of the tank in cubic centimetres?
- What is the volume in litres?

$1 \text{ L} = 1000 \text{ cm}^3$

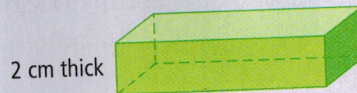


14. One of the solar arrays on the International Space Station is a rectangular prism with a base area of 892 m^2 and a thickness of 27.5 m . What is the volume of one solar array?



Literacy Link

The word *thick* is sometimes used to describe the height of an object.



15. The International Space Station is shaped like a cylinder that has a cross-sectional area of 615 m^2 and a length of 44.5 m . The living space for the astronauts is 425 m^3 . What percent of the volume of the space station is used for living?

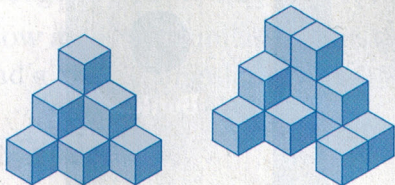
The cross-sectional area is the area of the circle you see if you cut across the cylinder.

WWW Web Link

To learn more about the International Space Station, go to www.mathlinks8.ca and follow the links.

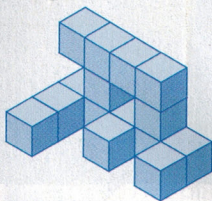
Extend

16. In the structures below, each small cube has a base area of 4 cm^2 and a height of 2 cm . In the first two structures, assume the side facing away from you is solid.



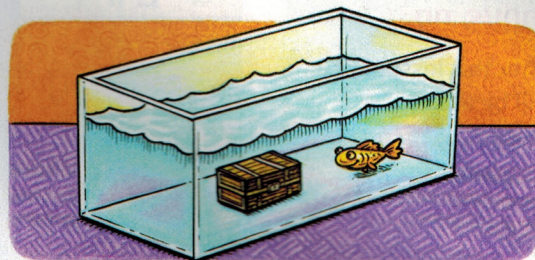
Structure 1

Structure 2



Structure 3

- How many cubes are in each structure?
 - What is the least number of small cubes needed to complete each structure so that it becomes a rectangular prism?
 - What is the total number of cubes in each completed structure?
 - What is the volume of each completed rectangular prism?
17. Callie's rectangular fish tank has a base area of 800 cm^2 and contains water to a depth of 15 cm . She adds a solid decoration in the shape of a rectangular prism to the bottom of the tank. The decoration has a base area of 40 cm^2 and a height of 5 cm . What is the new level of water in the tank?



18. A cube with a base area of 4 cm^2 and a height of 2 cm is inside a box with a base area of 16 cm^2 and a height of 4 cm .
- What is the ratio of the volume of the cube to the volume of the box?
 - What is the ratio of the area of the base of the cube to the area of the base of the box?
 - What is the ratio of the height of the cube to the height of the box?
 - What relationship exists among these three ratios?

MATH LINK

Some parks have shelters around the eating areas. These shelters consist of two or three walls. The area of the end of each wall is 0.48 m^2 .

- Sketch and label the dimensions of a sheltered eating area. Keep in mind that the picnic table that will go inside is about 1.8 m long and 0.74 m wide.
- Calculate the volume of concrete used to make the walls.

