

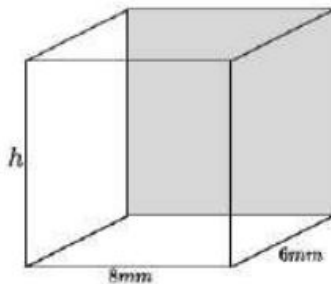
Lesson 10: Volumes of Familiar Solids—Cones and Cylinders

Classwork

Opening Exercise

a.

- i. Write an equation to determine the volume of the rectangular prism shown below.

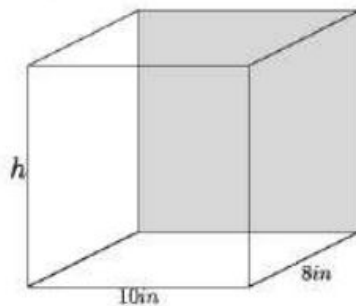


$$V = l \times w \times h$$

$$V = (8\text{mm})(6\text{mm}) \times h$$

$$V = 48\text{mm}^2 \times h$$

- ii. Write an equation to determine the volume of the rectangular prism shown below.

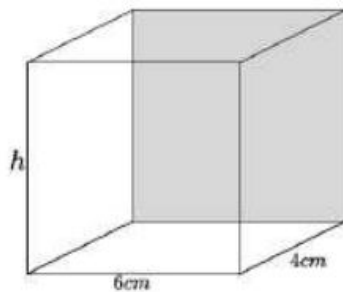


$$V = l \times w \times h$$

$$= 10 \times 8 \times h$$

$$= 80\text{in}^2 \times h$$

- iii. Write an equation to determine the volume of the rectangular prism shown below.



$$V = l \times w \times h$$

$$= 6\text{cm} \times 4\text{cm} \times h$$

$$= 24\text{cm}^2 \times h$$

$$A = l \times w$$

↓

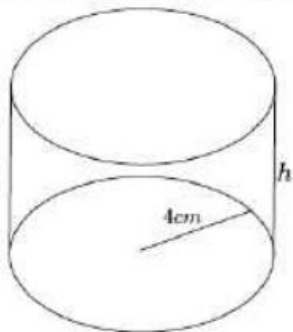
iv. Write an equation for volume, V , in terms of the area of the base, B .

$$V = Bh$$

↑
area of Base
← height

b. Using what you learned in part (a), write an equation to determine the volume of the cylinder shown below.

$$A = \pi r^2$$



$$V = Bh$$

$$V = \pi r^2 \times h$$

$$V = \pi (4)^2 \times h$$

$$V = \pi (16) \times h$$

$$V = 16\pi \times h$$

Exercises 1–6

1. Use the diagram at right to answer the questions.

a. What is the area of the base?

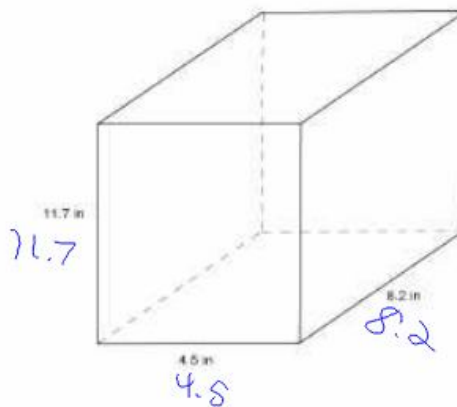
$$A = l \times w$$

$$= 4.5 \times 8.2$$

$$= 36.9 \text{ in}^2$$

b. What is the height?

$$h = 11.7 \text{ in}$$



c. What is the volume of the rectangular prism?

$$V = Bh$$

$$= 36.9 \text{ in}^2 \times 11.7 \text{ in}$$

$$= 431.73 \text{ in}^3$$

2. Use the diagram at right to answer the questions.

a. What is the area of the base?

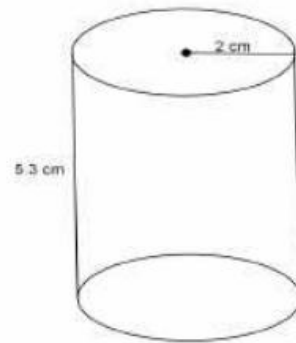
$$A = \pi r^2$$

$$= \pi (2)^2$$

$$= 4\pi \text{ cm}^2$$

b. What is the height?

$$h = 5.3 \text{ cm}$$



c. What is the volume of the right circular cylinder?

$$V = Bh$$

$$V = 4\pi \text{ cm}^2 \times 5.3 \text{ cm}$$

$$= 21.2 \text{ cm}^3$$

$$V = \pi r^2 \times h$$

$$= \pi (2)^2 \times 5.3$$

$$= 4\pi \times 5.3$$

$$= 21.2 \text{ cm}^3$$

3. Use the diagram at right to answer the questions.

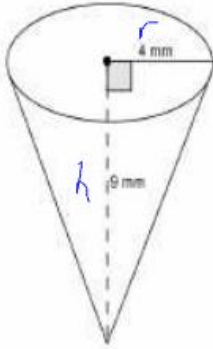
a. What is the area of the base?

b. What is the height?

c. What is the volume of the right circular cylinder?

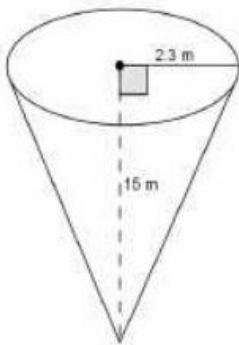


4. Use the diagram to find the volume of the right circular cone.



$$\begin{aligned}
 V &= \frac{1}{3} \pi r^2 \times h \\
 &= \frac{1}{3} \pi (4)^2 \times 9 \\
 &= \frac{1}{3} \pi (16 \times 9) \\
 &= \frac{1}{3} \pi (144) \\
 &= 48 \pi \text{ mm}^3
 \end{aligned}$$

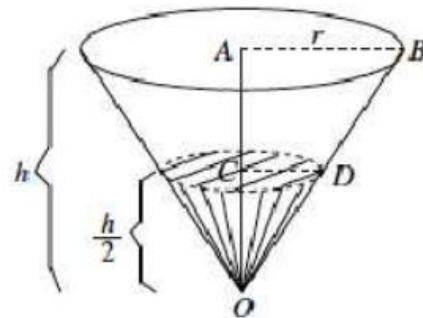
5. Use the diagram to find the volume of the right circular cone.



$$\begin{aligned}
 V &= \frac{1}{3} \pi r^2 \times h \\
 &= \frac{1}{3} \pi (2.3)^2 \times 15 \\
 &= \frac{1}{3} \pi (5.29) \times 15 \\
 &= \frac{1}{3} \pi (79.35) \\
 &= 26.45 \pi \text{ m}^3
 \end{aligned}$$

6. Challenge: A container in the shape of a right circular cone has height h , and base of radius r , as shown. It is filled with water (in its upright position) to half the height. Assume that the surface of the water is parallel to the base of the inverted cone. Use the diagram to answer the following questions:

a. What do we know about the lengths of AB and AO ?



b. What do we know about the measure of $\angle OAB$ and $\angle OCD$?