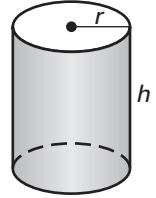


Goal: Find the volumes of cylinders.

Volume of a Cylinder

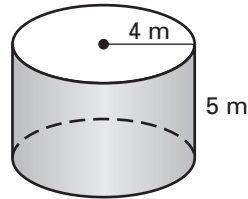
Words The volume of a cylinder is the **product** of the **area** of the base and the **height**.

Algebra $V = Bh = \pi r^2 h$



EXAMPLE 1 Finding the Volume of a Cylinder

What is the volume of the cylinder? Use 3.14 for π .



You have learned many properties and formulas related to solids. Writing a summary of what you have learned may help you prepare for the chapter test.

Solution

$$\begin{aligned} V &= \pi r^2 h \\ &\approx (3.14)(4)^2(5) \\ &= 251.2 \end{aligned}$$

Write formula for volume of a cylinder.

Substitute 3.14 for π , 4 for r , and 5 for h .

Multiply.

Answer: The volume of the cylinder is about **251.2 cubic meters**.

Check: To check that your answer is reasonable, use 3 for π .

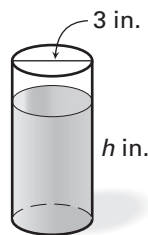
$$\begin{aligned} V &\approx (3)(4)^2(5) \\ &= 240 \end{aligned}$$

Substitute values.
Multiply.

Because 240 is close to **251.2**, a volume of 251.2 cubic meters is **reasonable**.

EXAMPLE 2 Finding the Height of a Cylinder

The cylindrical glass has volume of about 42.39 cubic inches. Find the height of the glass. Use 3.14 for π .

**WATCH OUT!**

Make sure to use the diameter, in the formula for the volume of a cylinder.

Solution

The radius of the glass is half the diameter, or 1.5 inches.

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

Write formula for volume of prism.

$$42.39 \approx (3.14) (1.5)^2 h$$

Substitute values.

$$42.39 \approx 7.065h$$

Multiply.

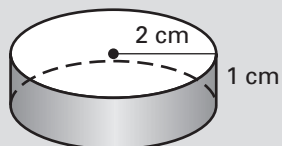
$$6 \approx h$$

Divide each side by 7.065.

Answer: The height of the glass is about 6 inches.

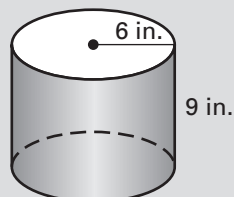
Guided Practice Find the volume of the cylinder. Use 3.14 for π .

1.



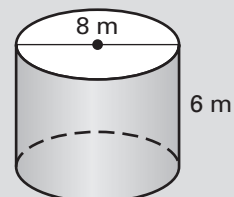
$$12.56 \text{ cm}^3$$

2.



$$1017.36 \text{ in.}^3$$

3.



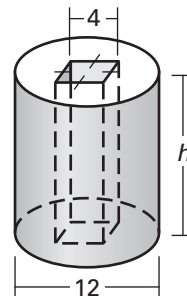
$$301.44 \text{ m}^3$$

4. Find the height of a cylinder that has a radius of 7 inches and a volume of 1538.6 cubic inches. Use 3.14 of π .

$$10 \text{ in.}$$

EXAMPLE 3 Multiple Choice Practice

A hole in the shape of a rectangular prism is cut through a cylinder, as shown at the right. Which expression represents the volume of the solid in terms of the height h ? Use 3.14 for π .



- (A) $21.68h$ (B) $97.04h$
 (C) $105.04h$ (D) $436.16h$

Solution

- The volume of the cylinder is $\pi r^2 h \approx (3.14)(6^2)h = 113.04h$.
- The volume of the hole is $Bh = (4 \cdot 4)h = 16h$.
- Find the difference of the volumes: $113.04h - 16h = 97.04h$.

Answer: The expression $97.04h$ represents the volume of the solid. The correct answer is **B**. (A) (B) (C) (D)

Guided Practice Solve the following problem.

5. In Example 3, suppose that the cylinder has a diameter of 6 and that the hole has a length of 2 and a width of 3. Write an expression for the volume of the solid in terms of the height h .

$$22.26h$$