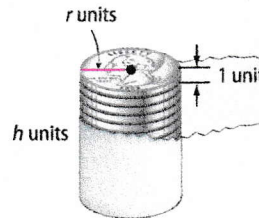


Volumes of Cylinders

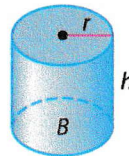
2 Volume of Cylinders Like a prism, the volume of a cylinder can be thought of as consisting of layers. For a cylinder, these layers are congruent circular discs, similar to the coins in the roll shown. If we interpret the area of the base as the volume of a one-unit-high layer and the height of the cylinder as the number of layers, then the volume of the cylinder is equal to the volume of a layer times the number of layers or the area of the base times the height.



Key Concept Volume of a Cylinder

Words The volume V of a cylinder is $V = Bh$ or $V = \pi r^2 h$, where B is the area of the base, h is the height of the cylinder, and r is the radius of the base.

Model



Symbols $V = Bh$ or $V = \pi r^2 h$

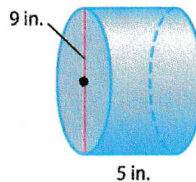


Example 2 Volume of a Cylinder

Find the volume of the cylinder at the right.

Estimate: $V \approx 3 \cdot 5^2 \cdot 5$ or 375 in^3

$$\begin{aligned} V &= \pi r^2 h && \text{Volume of a cylinder} \\ &= \pi(4.5)^2(5) && r = 4.5 \text{ and } h = 5 \\ &\approx 318.1 && \text{Use a calculator.} \end{aligned}$$



The volume of the cylinder is about 318.1 cubic inches. This is fairly close to the estimate, so the answer is reasonable.

Guided Practice

2. Find the volume of a cylinder with a radius of 3 centimeters and a height of 8 centimeters.

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

$$= \pi \cdot 3^2 \cdot 8$$

$$V = 3.14 \cdot 9 \cdot 8$$

$$V = 226.08 \text{ cm}^3$$

Use 3.14 for π