

## Volume of a Cylinder

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

MG9-12.G.MG.2

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### EXAMPLE

### Comparing Densities

You gather data about two wood logs that are approximately cylindrical. Based on the data in the table, which wood is denser, Douglas fir or American redwood?

Type of Wood	Diameter (ft)	Height (ft)	Weight (lb)
Douglas fir	1	6	155.5
American redwood	3	4	791.7

- A Find the volume of the Douglas fir log.

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

$$V = \pi (0.5)^2 \cdot 6 \quad \text{Substitute 0.5 for } r \text{ and 6 for } h.$$

$$V \approx 4.7 \text{ ft}^3 \quad \text{Use a calculator. Round to the nearest tenth.}$$

- B Find the volume of the American redwood log.

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

$$V = \pi (1.5)^2 \cdot 4 \quad \text{Substitute 1.5 for } r \text{ and 4 for } h.$$

$$V \approx 28.3 \text{ ft}^3 \quad \text{Use a calculator. Round to the nearest tenth.}$$

- C Calculate and compare densities.

The density of the wood is the weight per unit volume.

$$\text{Density of Douglas fir} = \frac{155.5}{4.7} \approx 33 \text{ lb/ft}^3 \quad \text{Round to the nearest unit.}$$

$$\text{Density of American redwood} = \frac{791.7}{28.3} \approx 28 \text{ lb/ft}^3 \quad \text{Round to the nearest unit.}$$

So, Douglas fir is denser than American redwood.

### REFLECT

- 2a. Explain in your own words what your results tell you about the two types of wood.

Given blocks of wood with the same dimensions, Douglas fir is heavier