

### Exercise 1.83

A thief plans to steal a gold sphere with a radius of 28.9 cm from a museum. If the gold has a density of  $19.3 \text{ g/cm}^3$ , what is the mass of the sphere in pounds? [The volume of a sphere is  $V = (4/3)\pi r^3$ .] Is the thief likely to be able to walk off with the gold sphere unassisted?

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#### Solution

Determine the mass of gold by multiplying the density by the volume.

$$\begin{aligned}\text{Mass} &= \text{Density} \times \text{Volume} \\ &= \left(19.3 \frac{\text{g}}{\text{cm}^3}\right) \times \left[\frac{4}{3}\pi(28.9 \text{ cm})^3\right] \\ &= \left(19.3 \frac{\text{g}}{\text{cm}^3} \times \frac{1 \text{ lb}}{453.59 \text{ g}}\right) \times \left[\frac{4}{3}\pi(28.9 \text{ cm})^3\right] \\ &\approx 4.30 \times 10^3 \text{ lb}\end{aligned}$$

The thief will likely need assistance.