

Chapter 1 Problem 42 †

Given

radius of earth = $6.37 \times 10^6 \text{ m}$

radius of sun = $6.96 \times 10^8 \text{ m}$

Solution

How many earths would fit within the sun?

Divide the volume of the sun by the volume of the earth.

$$\frac{V_{sun}}{V_{earth}} = \frac{\frac{4}{3}\pi r_{sun}^3}{\frac{4}{3}\pi r_{earth}^3} = \frac{r_{sun}^3}{r_{earth}^3} = \frac{(6.96 \times 10^8 \text{ m})^3}{(6.37 \times 10^6 \text{ m})^3}$$

$$1.30 \times 10^6 \text{ earths}$$

This value is assuming that we are pulverizing the earths so there is no empty space due to packing together of spheres.

†Problem from Essential University Physics, Wolfson