

Problem 47

A light-nanosecond is the distance light travels in 1 ns. Convert 1 ft to light-nanoseconds.

Solution

Note that the speed of light is 3×10^8 m/s. Multiply the conversion factors appropriately so that light-nanoseconds appears in the numerator, starting with the given distance of 1 ft.

$$1 \cancel{\text{ft}} \times \frac{381 \cancel{\text{m}}}{1250 \cancel{\text{ft}}} \times \frac{1 \cancel{\text{m}}}{3 \times 10^8 \cancel{\text{m}}} \times \frac{10^9 \cancel{\text{ns}}}{1 \cancel{\text{ns}}} \times \frac{1 \text{ light-nanosecond}}{1 \cancel{\text{ns}}} \approx 1 \text{ light-nanoseconds}$$