Problem 3

The micrometer (1 μm) is often called the *micron.* (a) How many microns make up 1.0 km? (b) What fraction of a centimeter equals 1.0 μm? (c) How many microns are in 1.0 yd?

Solution

Part (a)

Convert from kilometers to meters to micrometers.

$$1.0 \text{ km} = 1.0 \text{ km} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{10^6 \text{ } \mu\text{m}}{1 \text{ m}} = 1.0 \times 10^9 \text{ } \mu\text{m}$$

Therefore, there are 10^9 microns in 1 km.

Part (b)

Convert from micrometers to meters to centimeters.

$$1.0 \text{ } \mu\text{m} = 1.0 \text{ } \mu\text{m} \times \frac{1 \text{ m}}{10^6 \text{ } \mu\text{m}} \times \frac{100 \text{ cm}}{1 \text{ m}} = \frac{1.0 \text{ cm}}{10^4}$$

Therefore, $1/10\,000$ of a centimeters equals 1.0 μm.

Part (c)

Convert from yards to microns.

$$1.0 \text{ yd} = 1.0 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{12 \text{ inches}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ inches}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{10^6 \text{ } \mu\text{m}}{1 \text{ m}} \approx 9.1 \times 10^5 \text{ } \mu\text{m}$$