

Problem 26

The following lengths are given using metric prefixes on the base SI unit of length: the meter. Rewrite them in scientific notation without the prefix. For example, 4.2 Pm would be rewritten as 4.2×10^{15} . (a) 89 Tm; (b) 89 pm; (c) 711 mm; (d) 0.45 μm .

Solution

The prefixes and their meanings are listed in Figure 1.2 on page 17.

$$89 \text{ Tm} = 8.9 \times 10^1 \cancel{\text{Tm}} \times \frac{10^{12} \text{ m}}{1 \cancel{\text{Tm}}} = 8.9 \times 10^{13} \text{ m}$$

$$89 \text{ pm} = 8.9 \times 10^1 \cancel{\text{pm}} \times \frac{1 \text{ m}}{10^{12} \cancel{\text{pm}}} = 8.9 \times 10^{-11} \text{ m}$$

$$711 \text{ mm} = 7.11 \times 10^2 \cancel{\text{mm}} \times \frac{1 \text{ m}}{10^3 \cancel{\text{mm}}} = 7.11 \times 10^{-1} \text{ m}$$

$$0.45 \mu\text{m} = 4.5 \times 10^{-1} \cancel{\mu\text{m}} \times \frac{1 \text{ m}}{10^6 \cancel{\mu\text{m}}} = 4.5 \times 10^{-7} \text{ m}$$