Physics 100A – Summer 2010
Chapter 1

Solutions are provided only for problems from your textbook. The other problems already have so much guidance and notes that you should be able to understand where you have gone wrong.

Problems

2. Picture the Problem: This is simply a units conversion problem.

Strategy: Multiply the given number by conversion factors to obtain the desired units.

Solution: (a) Convert the units: $70\ \mu\text{m} \times \dfrac{1.0\times10^{-6}\ \text{m}}{\mu\text{m}} = \boxed{7.0\times10^{-5}\ \text{m}}$

(b) Convert the units again: $70\ \mu\text{m} \times \dfrac{1.0\times10^{-6}\ \text{m}}{\mu\text{m}} \times \dfrac{1\ \text{km}}{1000\ \text{m}} = \boxed{7.0\times10^{-8}\ \text{km}}$

17..**Picture the Problem**: This is a significant figures question.

Strategy: Follow the given rules regarding the calculation and display of significant figures.

Solution: 1. (a) The leading zeros are not significant: 0.0000 5 4 has 2 significant figures

2. (b) The middle zeros are significant: 3.0 0 1×10^5 has 4 significant figures

Insight: Zeros are the hardest part of determining significant figures. Scientific notation can remove the ambiguity of whether a zero is significant because any trailing zero to the right of the decimal point is significant.

34. Picture the Problem: This is a units conversion problem.

Strategy: Multiply the known quantity by appropriate conversion factors to change the units.

Solution: 1. Convert m/s to ft/s: $\left(20.0\ \dfrac{\text{m}}{\text{s}}\right)\left(\dfrac{3.28\ \text{ft}}{\text{m}}\right) = \boxed{65.6\ \text{ft/s}}$

2. (b) Convert m/s to mi/h: $\left(20.0\ \dfrac{\text{m}}{\text{s}}\right)\left(\dfrac{1\ \text{mi}}{1609\ \text{m}}\right)\left(\dfrac{3600\ \text{s}}{1\ \text{h}}\right) = \boxed{44.7\ \text{mi/h}}$

Insight: Conversion factors are conceptually equal to one, even though numerically they often equal something other than one. They are often helpful in displaying a number in a convenient, useful, or easy-to-comprehend fashion.

47. Picture the Problem: This is a units conversion problem.
Strategy: Multiply the known quantity by appropriate conversion factors to change the units.

Solution: 1. (a) Convert m/s to mi/h:

$$\left(140\ \frac{\text{m}}{\text{s}}\right)\left(\frac{1\ \text{mi}}{1609\ \text{m}}\right)\left(\frac{3600\ \text{s}}{1\ \text{h}}\right)=\boxed{310\ \frac{\text{mi}}{\text{h}}}$$

2. (b) Convert m/s to m/ms

$$\left(140\ \frac{\text{m}}{\text{s}}\right)\left(\frac{1\times10^{-3}\ \text{s}}{1\ \text{ms}}\right)=0.14\ \frac{\text{m}}{\text{ms}}\times5.0\ \text{ms}=\boxed{0.70\ \text{m}}$$