1. Walker3 1.P.002. [544521] 0/2 points

A human hair has a thickness of about 74 \( \mu m \).

(a) What is this in meters?

\[
7.4 \times 10^{-5} \text{ m}
\]

(b) What is this in kilometers?

\[
7.4 \times 10^{-8} \text{ km}
\]

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 \text{ \( \mu m \)} \times \frac{1 \times 10^{-6} \text{ m}}{\text{\( \mu m \)}} = 7 \times 10^{-5} \text{ m}
\]

(b) Convert the units again:

\[
70 \text{ \( \mu m \)} \times \frac{1 \times 10^{-6} \text{ m}}{\text{\( \mu m \)}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 7 \times 10^{-8} \text{ km}
\]

2. Walker3 1.P.004. [544534] 0/1 points

A particular computer can do 221.1 kilocalculations per second. How many calculations can it do in a femtosecond?

\[
2.21 \times 10^{-10} \text{ calculations}
\]

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

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

Solution: Convert the units:

\[
70.72 \text{ teracalculations/s} \times \frac{1 \times 10^{15} \text{ calculations}}{\text{teracalculations}} \times \frac{1 \times 10^{-6} \text{ s}}{\mu s} = 7.072 \times 10^7 \text{ calculations/\( \mu s \)}
\]

Insight: The inside back cover of the textbook has a helpful chart of the metric prefixes.
3. Walker3 1.P.021. [544530] 0/1 points

An electronic advertising sign repeats a message every 44 seconds, day and night, for a week. How many times did the message appear on the sign?

\[ \frac{13700 \text{ times}}{} \]

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

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

Solution: Convert seconds to weeks:

\[ \left( \frac{1 \text{ msg}}{6 \text{ s}} \right) \left( \frac{3600 \text{ s}}{1 \text{ h}} \right) \left( \frac{24 \text{ h}}{1 \text{ d}} \right) \left( \frac{7 \text{ d}}{1 \text{ wk}} \right) = \frac{1 \times 10^5 \text{ msg}}{1 \text{ wk}} \]

Insight: In this problem there is only one significant figure associated with the phrase, “6 seconds.”

4. Walker3 1.P.025. [544638] 0/1 points

What is the speed in miles per hour of a beam of light traveling at \( 3.00 \times 10^8 \text{ m/s} \)?

\[ 6.71 \times 10^8 \text{ mi/h} \]

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

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

Solution: Convert m/s to miles per hour:

\[ 3.00 \times 10^8 \text{ m/s} \left( \frac{1 \text{ mi}}{1609 \text{ m}} \right) \left( \frac{3600 \text{ s}}{1 \text{ h}} \right) = 6.71 \times 10^4 \text{ mi/h} \]

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.