Physics 201

201 Why the Sky is Blue - Homework #1

I.

1) Write the following numbers in scientific notation:

\[ 1,000 = 1 \times 10^3 \]
\[ \frac{1}{10,000} = 1 \times 10^{-4} \]
\[ 2,500,000 = 2.5 \times 10^6 \]
\[ .000025 = 2.5 \times 10^{-5} \]
\[ 1 = 1 \times 10^0 \]

2) Calculate the following using and giving answers in scientific notation:

\[ .001 \times 10^4 = 1 \times 10^1 \]
\[ \frac{5 \times 10^{-4}}{2 \times 10^{-3}} = 2.5 \times 10^{-1} \]
\[ \frac{10^6}{.01} = 1.0 \times 10^8 \]
\[ 3 \times 10^{35} \times 7 \times 10^{-3} = 2 \times 10^{33} \]
\[ \frac{10^5}{10^2} = 1.0 \times 10^3 \]

II. The Speed of Light

A Light Year (L.Y.) is defined as the distance light travels in the time of one year.

Physicists use the symbol \( c \) to designate the speed of light. The value of \( c \) is:

\[ c = 3.0 \times 10^8 \] \text{ meter/sec.} \\
\[ = 1.86 \times 10^5 \] \text{ miles/sec.} \\

1. Find the value of 1 L.Y. in both meters and miles.

2. The sun is 93 million miles from earth. Find the time in minutes, for light to travel from the sun to the earth.

Note: In your calculations above, make sure you show all your work. An answer with no work shown will receive no credit.

1. \( d = \frac{v \cdot t}{c} = \frac{3.0 \times 10^8 \cdot (1 \times 365 \times 24 \times 60 \times 60)}{9.5 \times 10^{15}} \approx 9.5 \times 10^6 \) m

2. \( t = \frac{d}{V} = \frac{93 \times 10^6}{1.86 \times 10^5} \approx 500 \approx 8.3 \text{ minutes} \)