

Name _____

Directions: Show all work on a separate sheet of paper.

1. Write the following numbers in scientific notation. Include the appropriate units in your answers.

- a) 5,990,000,000,000,000 kilometers
- b) 0.000135 centimeters
- c) 299,794.5 kilometers/second
- d) 1.458 trillion cubic kilometers (Hint: one trillion is 1,000,000,000,000)

2. Write the following numbers in standard notation. Include the appropriate units in your answers.

- a) 1.45×10^{-3} centimeters
- b) 3.1×10^{12} cubic centimeters
- c) 8.7×10^4 seconds
- d) 3.905×10^{-13} seconds

3. Evaluate the expressions. Write your answers in scientific notation and standard notation. Include the appropriate units in your answers. Round your answers to 3 decimal places as appropriate.

- a) Number of seconds in 1 year:
 $8.6 \times 10^4 \cdot 3.1 \times 10^7$
- b) Centimeters in 1 light year:
 $(6.32 \times 10^4)(1.47 \times 10^{11})$
- c) Number of stars in the visible universe:
 $2.5 \times 10^{11} \cdot 7.5 \times 10^{10}$
- d) Density of a star in grams/cc:
 $\frac{2.1 \times 10^{33}}{3.1 \times 10^{32}}$
- e) Density of a proton in grams/cc:
 $\frac{1.64 \times 10^{-24}}{3.7 \times 10^{-38}}$
- f) Speed of Sun around Milky Way galaxy in centimeters/second:
 $\frac{2.7 \times 10^{23}}{6.3 \times 10^{15}}$

4. Perform the following unit conversions. Write your answers in scientific notation (if appropriate).

- a) The sun produces 3.9×10^{33} ergs per second of radiant energy. How much energy does it produce in one year (3.1×10^7 seconds)?

Start:

End: ergs per year

- b) Pluto is located at a distance of 5.9×10^{14} centimeters from Earth. At the speed of light (2.99×10^{10} cm/sec) how long does it take a light signal to travel to Pluto **and return**?

(one way)

Start:

End:

- c) The NASA data archive at the Goddard Space Flight Center contains 25 terabytes of data from over 1000 science missions and investigations. (1 terabyte = 10^{12} bytes.) How many 16 gigabyte USB flash drives does this equal? (1 gigabyte = 10^9 bytes.)

If you need help with this problem (and/or others), head to the Math Lab on the 2nd floor of Building 9.

Start:

End: USB flash drives

Also due Thursday: Complete online survey found on class website :

<http://www.smccd.net/accounts/humd/spring2010/math120/>