Scientific Notation

1. Rewrite the following numbers in **scientific notation**. Include units.

a. Altitude of summit of Mt. Ka'ala (highest point on O'ahu): 4020 ft =

b. Altitude of summit of Mauna Kea: 13,796 ft =

c. Thickness of a human hair: 0.015 cm =

d. Wavelength of reddish light: 0.0000007 m =

e. Height of your instructor: 1.80 m =

f. Number of galaxies in the universe: 1 trillion galaxies =

g. Age of the universe in seconds: 430,000,000,000,000,000 s =

h. Volume of a hydrogen atom: 0.000 000 000 000 000 000 000 000 621 cm3 =

2. Calculate the following, and write your answer to each in **scientific notation**.

a. $10^{10} \times 10^{4}$ =

b. $10^{10} \div 10^{4}$ =

c. $10^{10} \div 10^{-4}$ =

d. $10^{10} \times ^{10\text{-}4}$ =

3. Calculate the following, and write your answer to each in **scientific notation**.

a. $(34.9 \times 10^{6}) \times (212 \times 10^{-15})$ =

b. $(0.88 \times 10^{-3}) \times (6.3 \times 10^{-10})$ =

c. $(9.876 \times 10^{35}) \div (5.4321 \times 10^{-13})$ =

d. mass of Earth ÷ mass of Moon = $(5.974 \times 10^{27}\ g) \div (7.348 \times 10^{25}\ g)$ =

e. mass of Earth – mass of Moon = $(5.974 \times 10^{27}\ g) - (7.348 \times 10^{25}\ g)$ =

Powers of Ten

4. Insert the correct **metric prefix** abbreviations (be careful to distinguish upper case from lower case!):

10^{-2} m = 1 _____m	10^{9} y = 1 _____y	10^{3} W = 1 _____W
10^{-3} m = 1 _____m	10^{6} W = 1 _____W	10^{-6} s = 1 _____s
10^{-9} m = 1 _____m	10^{3} g = 1 _____g	10^{9} bytes = 1 _____B
10^{6} Hz = 1 _____Hz	10^{-12} s = 1 _____s	10^{12} bytes = 1 _____B

5. Match each of the following **length units** to the distance which it is best or most frequently used to describe:

A. Size of an ant	_____ 0.1 nm = 1 Å
B. Size of a person	_____ 100 nm = 1000 Å
C. Distances between neighboring stars	_____ 100 μm
D. Diameter of human hair	_____ 1 mm
E. Size of an atom	_____ 100 cm = 1 m
F. Size of viruses and small bacteria	_____ 1 km
G. Distances within our Solar System	_____ 10^{8} km
H. Distances around Oahu	_____ 10^{13} km

6. a. Starting with your age in years, calculate **your age in days**. (You do not need to be exact: forget about leap days, etc.)
b. Approximately how many **days** long is your **total life expectancy(78 years)**?

7. Use your weight in pounds (while standing on the surface of the Earth) to calculate **your mass in kilograms** and **in grams**. (1 kg weighs approx. 2.205 lb on the surface of the Earth) This is a useful thing to know, since almost every other country in the world uses kilograms!

8. Convert the speed 1.0000 m/s to **mi/h**.

9. Perform the following UNIT conversions

45 μg = _____ kg

550 nm = _____ km

14 Gy = _____ s (*Note:* 1 y = 3.156 × 107 s)

10. Imagine that you are living long ago and you are having a discussion about the shape of the world with your colleagues. Write a hypothesis (in if/then format) and then devise a **simple test or experiment** that you could perform to test (either support or disprove) it, based on the following observation and question:

As I stood on the beach watching the sun set, it slowly and gradually disappeared into the ocean. I now wonder, is the surface of the Earth really flat?