Ph150 – Exercise #2

SI Units

1. Express the following in SI without using a prefix:
   a. 349.0 km
   b. 2.2 Mm
   c. 0.034 7 μs
   d. 5 679 ms
   e. 792 μg
   f. 4.2×10^3 mm
   g. 295 ns
   h. 0.075 Gm

2. Express the following as a quantity between 0.1 and 999 with a suitable prefix:
   a. 2 460.0 L
   b. 5 690 000 m
   c. 0.000 2340 g
   d. 0.028 9 s
   e. 5.89×10^4 s
   f. 98.2×10^5 m
   g. 12.3×10^4 g
   h. 0.000 444 99 m

3. Convert the following to SI base or derived units:
   a. 23 mm
   b. 23 mm^2
   c. 23 mm^3
   d. 6 km/day
   e. 23 g
   f. 0.38 g/cm^3

4. Estimate how fast your hair grows, and convert to SI derived units. How much longer does your hair get in one second?

Problem-solving

5. Calculate the following, and put your answer in base units:
   a. Find the volume and surface area of a cube whose sides are 1.05 cm long.
   b. Find the area of a right triangle whose perpendicular sides are 2.35 cm and 4.2 cm long.

6. Determine the densities of the following objects:
   a. A sample of rock has a mass of 0.587 kg and a volume of 84.6 cm^3.
   b. A ball bearing with a diameter of 1.20 cm has a mass of 7.90 g.

7. A glass marble with a radius of 12.0 mm has a density of 2500 kg/m^3. Determine the mass of the marble. Express your answer in mg.

8. Each water molecule has a mass of roughly 3.0×10^{-26} kg. How many water molecules are there in a glass of water (250 mL)? Note: 1 mL = 1 cm^3, and the density of water is 1.00 g/cm^3.

9. The mass of the Earth is 5.98×10^{24} kg, and its radius is 6400 km. What's the average density of the earth? Looking at the chart of densities handed out in class, what can you conclude about the composition of the Earth?

10. The mass of Saturn is 95 times the mass of the earth, and its radius is 9.4 times the radius of the earth. What's the density of Saturn? If you filled a big enough bathtub with water, and placed Saturn inside, would it sink or float?