

Name: \_\_\_\_\_ Section: \_\_\_\_\_  
Challenging Dimensional Analysis Questions (*High School/College "Stuff"*)

**Directions:** The following questions were taken from the website <http://www.geocities.com/Athens/Thebes/5118/chemprob.htm>. Do your best to apply your understanding of dimensional analysis to solve the problems. I have provided you with the answers so you should be able to show the work necessary to get those answers. Some of these questions may be frustrating so be patient and don't just give up.

1. How long would it take (in hours) an airplane traveling at the speed of sound (740 miles per hour; "mach 1") to travel around the earth, at the equator? The circumference of the earth is 25,000 miles. (**Answer = 34 hours**)
  
2. What speed would be needed for an airplane to travel around the earth (again, at the equator) in 10 hr? (**Answer = 2500 mi/hr**)
  
3. We are currently moving toward Los Angeles at the rate of 0.02 m/year (slipping along the San Andreas fault). At this rate, how long will it take us to reach L.A., 640 km away? (**Answer =  $3.2 \times 10^7$  years**)

4. How much does  $15.0 \text{ cm}^3$  of aluminum weigh? The density of aluminum is  $2.70 \text{ g/cm}^3$ . **(Answer = 40.5 g)**
5. What is the volume of 25 g of ethyl alcohol (density =  $0.79 \text{ g/mL}$ )? **(Answer = 32 mL)**
6. The relationship between electric power (P), current (i) and voltage (V) is given by  $P=iV$ . i is in amps, V is in volts; therefore P is in amp·volts. A more common unit of power is the watt: 1 watt = 1 amp·volt. Ordinary house current is 120 volts. How many amps of current are drawn by a 60 watt light bulb? **(Answer = 0.5 amp)**
7. An electric heater is listed as drawing a current of 10 amps. What is its power, in kilowatts? **(Answer = 1.2 kw)**