Instructions: Unit Conversions. Printout and turn in the second page only.

In Physical Geology Lab you will have to solve many problems that require unit conversions. In fact you will have to be able to do unit conversions at some point in business, education, and most other fields. The following examples show how to approach and solve conversion problems. Here is a good step-by-step guide to unit conversions on YouTube, and another on the Khan Academy site.

1. Always write the problem out with the units. This may seem like overkill for simple problems, but it is a good habit to get into, and when the problems become complex, it is key to solving the problem correctly (and in an understandable way).

Example: If you drove 150 miles in 3 hours: $\frac{150 \text{ mile}}{3 \text{ hours}} = \frac{50 \text{ miles}}{\text{hour}}$ *{This is a rate or velocity, which is given in terms of a unit of time -- per 1 hour here, but could be per second, or per day, or per year.}*

2. When converting from one unit to another, choose an appropriate conversion factor. See the inside **back** cover of the lab manual for common conversion factors.

Example: If you were asked to convert 60 miles to kilometers.

The conversion factor that you could use is: 1 mile = 1.6094 km (or 1 km = 0.6213 mile). Because 1 mile = 1.6094 km, you can write this as (1 mile/1.6094 km) or (1.6094 km/1 mile), **and** because if 1.6094 km = 1 mile, then they must represent equal physical dimensions, just as 37/37 = 1. Multiplying any number by 1 does not change the physical dimension that the number represents.

Now write out the problem (you can see whether the 1 mile or the 1.6094 km goes in the numerator {top} by writing 60 miles divided by 1. You want the miles unit to cancel and you want to be left with km, so the miles part of the conversion factor must go on the bottom):

Correct: $\frac{60 \text{ miles}}{1} \times \frac{1.6094 \text{ km}}{1 \text{ mile}} = 96.6 \text{ km}$ {Units are Correct!}

Incorrect: $\frac{60 \text{ miles}}{1} \times \frac{1 \text{ mile}}{1.6094 \text{ km}} = \frac{60 \text{ miles}^2}{1.6094 \text{ km}} = \frac{37.3 \text{ miles}^2}{\text{km}}$ {Units are wrong}

Homework I: Unit Conversions

Name: _____ (1 pt)

Student I.D. _____ (1 pt)

Complete the following problems. To get full credit **show ALL work**: 1) **WRITE OUT** and cancel units; 2) then use a calculator to do the math. Need a review? Here is a video. Still need help? Contact your instructor, or talk a Geology Tutor (no cost and judgment free).

1. (4 pts) Convert 14 miles into **km**:

2. (4 pts) Convert 14 km into **miles**:

3. (4 pts) Convert 23 km into **cm**:

4. (8 pts) Convert 45 mi/hr into **ft/sec**. *(hint: **break the problem into two parts** and convert hours to minutes; minutes to seconds; one conversion step at a time)*:

5. (8 pts) Convert 82 km/yr into **cm/sec**. *(hint: **break the problem into two parts** and convert hours to minutes; minutes to seconds; one conversion step at a time)*: