

## Even Even More Problems for Dimensional Analysis

Geology 1P

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Period: \_\_\_\_\_

Date: \_\_\_\_\_

Work the following problems using dimensional analysis/factor label method. **You absolutely must show your work!** Use the conversion table given below and also the metric conversion table given to you in the assignment "Metric System: Friend of the Scientist." The answers are given. **Show how we get these answers using the factor label method and express your answer in scientific notation.**

Helpful Conversion Factors	
1 inch (in.)	2.54 centimeters (cm)
1 mile (mi.)	1.6 kilometers (km)
1 liter (l)	0.264 gallons (g)
1 fluid ounce (oz.)	29.57 milliliters (mL)
1 pound (lb.)	0.45 kilograms (kg)
1 gallon (g)	3.79 Liters (L)
1 short ton (2,000 lbs.)	907.2 kilograms (kg)
1 meter (m)	3.28 feet (ft.)
1 mile (mi.)	5,280 feet (ft.)
60 seconds (sec.)	1 minute (min.)
60 minutes (min.)	1 hour (hr.)
24 hours (hr.)	1 day
365.25 days	1 year

1. The world's oceans and seas hold a combined  $3.6 \times 10^{22}$  gallons of water. How many **kiloliters (KL)** of water is this? Correct answer is **KL**.

$$\frac{3.6 \times 10^{22} \text{ gal}}{1} \times \frac{1 \text{ L}}{0.264 \text{ gal}} \times \frac{1 \text{ KL}}{1000 \text{ L}} = \frac{(3.6 \times 10^{22} \times 1 \times 1)}{(1 \times 0.264 \times 1000)} = \frac{3.6 \times 10^{22}}{264} = 1.4 \times 10^{20} \text{ KL}$$

2. The radius of planet Earth is 6,378 kilometers. How far would we have to dig in **feet** if we wanted to get to the center of the Earth? Correct answer is **feet**.

$$\frac{6378 \text{ km}}{1} \times \frac{1 \text{ mile}}{1.6 \text{ km}} \times \frac{5280 \text{ feet}}{1 \text{ mile}} = \frac{(6378 \times 5280)}{(1 \times 1.6 \times 1)} = \frac{33675840}{1.6} = 21047400 \text{ feet} = 2.1 \times 10^7 \text{ feet}$$

3. The mass of Earth is  $5.97 \times 10^{24}$  kilograms (kg). What is this in **pounds**? Correct answer is **pounds**.

$$\frac{5.97 \times 10^{24} \text{ kg}}{1} \times \frac{1 \text{ lb.}}{0.45 \text{ kg}} = \frac{(5.97 \times 10^{24} \times 1)}{(1 \times 0.45)} = \frac{5.97 \times 10^{24}}{0.45} = 1.33 \times 10^{25} \text{ lb.} =$$

4. If there are approximately 150 million ( $1.5 \times 10^8$ ) kilometers in one Astronomical Unit (AU), then how far away is the planet Mercury from the Sun in **miles** if Mercury is 0.39 Astronomical Units from the Sun? Express your answer in **miles**. Correct answer is **miles**.

~~$$\frac{1.5 \times 10^8 \text{ km}}{1}$$~~

$$\frac{0.39 \text{ AU}}{1} \times \frac{1.5 \times 10^8 \text{ km}}{1 \text{ AU}} \times \frac{1 \text{ mile}}{1.6 \text{ km}} = \frac{(0.39 \times 1.5 \times 10^8 \times 1)}{(1 \times 1 \times 1.6)} = \frac{5.85 \times 10^7}{1.6} = 36562500 \text{ miles} = 3.7 \times 10^7 \text{ miles}$$