Due Date:

HOMEWORK: MATH INTERLUDES V – DIMENSIONAL ANALYSIS

Remember – neatness and completeness count. Also, you must show your work. The correct result without a sufficient amount of correct and appropriate work is worth zero points. Finally, please remember that you will have a cumulative Math Interludes Quiz covering Math Interludes I through V on the day this assignment is due, so be sure to bring your calculator to class.

Note: For the dimensional analysis (unit conversion) problems, you must the *Measurement Equivalencies* tables provided with the Math Interludes V activity.

1) Write the two unit fractions for each of the following unit equivalencies.

   a) 60 seconds (sec) = 1 minute (min)

   b) 2.54 cm = 1 in

   c) 1.06 quart (qt) = 1 liter (L)

   d) 4 qt = 1 gallon (gal)

2) Use dimensional analysis with unit fractions to convert each measurement.

   a) How many kilometers are in a 5-mile race?

   b) How many feet are in a 10 kilometer race? Round to one decimal place.

3) Each of these require more than one unit fraction and you may need to use the Measurement Equivalencies table. Round to two decimal places.

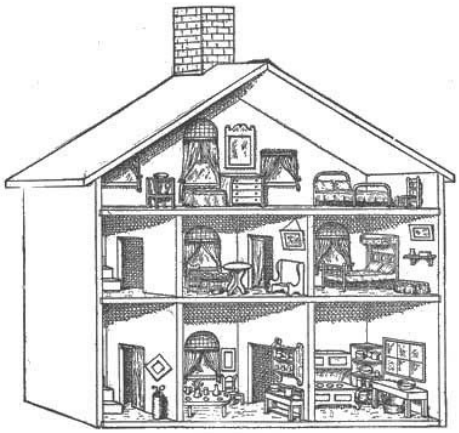
   a) How many pints are in a 2-liter bottle of Dr. Pepper?

   b) If one liter of freshwater weighs 2.2 pounds, how much does the water in a 22,000-gallon swimming poll weigh?

(Problem 4 was borrowed from *Pathways to Math Literacy* by Dave Sobecki and Brian Mercer)

4) Dollhouses are excellent examples of scale modeling. For most dollhouses, ½ inch (or 0.5 inch) on the doll house corresponds to 1 foot for life-sized objects.

a) The width of one doll house is 34 in. assuming that is uses the ½ inch scale, what is the width of the full-size house?



b) Suppose you're building a model stove for the dollhouse. How tall should it be, if the standard height for a full-size stove is 3 ft?

5) Use dimensional analysis to calculate the following unit conversions for chemical substances. Round to two decimal places.

a) If 55.85 g of iron (Fe) = 1 mole of Fe, how many grams of Fe are in 3.2 moles of Fe?

b) If 58.44 g of salt (NaCl) = 1 mole of NaCl, how many moles of NaCl are required to make 40 g of NaCl?

c) If 342.3 g of sucrose ($C_{12}H_{22}O_{11}$) = 1 mole of $C_{12}H_{22}O_{11}$, how many grams of $C_{12}H_{22}O_{11}$ are in 0.75 mole of $C_{12}H_{22}O_{11}$?

Math Interludes V Homework:

1a) $\frac{1\ min}{60\ sec}, \frac{60\ sec}{1\ min}$ **1b)** $\frac{1\ in}{2.54\ cm}, \frac{2.54\ cm}{1\ in}$ **1c)** $\frac{1\ L}{1.06\ qt}, \frac{1.06\ qt}{1\ L}$ **1d)** $\frac{1\ gal}{4\ qt}, \frac{4\ qt}{1\ gal}$ **2a)** 8.05 km

2b) 32,795.0 ft **3a)** 4.24 pt **3b)** 183,436 lbs **4a)** 68 ft **4b)** 1.5 in

5a) 178.72 g of Fe **5b)** 0.68 mole of NaCl **5c)** 256.73 g of $C_{12}H_{22}O_{11}$

MEASUREMENT EQUIVALENCIES

English Measurements

Length	Weight
12 inches (in) = 1 foot (ft) 3 feet (ft) = 1 yard (yd) 5280 feet (ft) = 1 mile (mi)	16 ounces (oz) = 1 pound (lb) 2000 pounds (lb) = 1 ton (T)
Liquid Volume	**Time**
3 teaspoons (tsp) = 1 tablespoon (tbs) 8 fluid ounces (oz) = 1 cup (c) 2 cups (c) = 1 pint (pt) 2 pints (pt) = 1 quart (qt) 4 quarts (qt) = 1 gallon (gal)	60 seconds (sec) = 1 minute (min) 60 minutes (min) = 1 hour (hr) 24 hours (hr) = 1 day 7 days = 1 week 52 weeks = 1 year 365 days = 1 year

The Metric System

Kilo (1,000)	**Hecto** (100)	**Deka** (10)	**Base Unit**	**Deci** (1/10)	**Centi** (1/100)	**Milli** (1/1000)
km	hm	dam	**Length:** meter (m)	dm	cm	mm
kg	hg	dag	**Weight:** gram (g)	dg	cg	mg
kL	hL	daL	**Volume:** liter (L)	dL	cL	mL

Conversion Between Systems

Length	Weight	Volume
2.54 cm = 1 in 1 m = 3.28 ft 1.61 km = 1 mi	28.3 g = 1 oz 2.2 lb = 1 kg	1.06 qt = 1 L 3.79 L = 1 gal