Homework #1

1. 8 nanoliters = 8 x 10^{-9} L
   22 microliters = 2.2 x 10^{-5} L
   40 milliliters = 4.0 x 10^{-2} L
   9 deciliters = 9.0 x 10^{-1} L
   6 kiloliters = 6 x 10^{3} L

2. 6.1 mg = 6.1 x 10^{-3} g
   22 μg = 2.1 x 10^{-5} g
   21 mg = 2.1 x 10^{-2} g
   103 ng = 1.03 x 10^{-7} g
   10 kg = 1.0 x 10^{4} g

3.
   a $\frac{1 \text{ mole}}{\text{L}}$ of Tris x $\frac{121.4 \text{ g}}{\text{mole}}$ x 0.2 L = 24.28 g of Tris

   Dissolve 24.28 g of Tris in about 100 ml of H_2O. Once dissolved, adjust to pH 8 using a pH meter, and then dilute to 200 ml with H_2O in a graduated cylinder.

   b $\frac{5 \text{ moles}}{\text{L}}$ of NaCl x $\frac{58.44 \text{ g}}{\text{mole}}$ x 1 L = 292.2 g of NaCl

   Dissolve 292.2 g of NaCl in about 0.7 L of H_2O. Once dissolved, dilute to 1 L with H_2O in a graduated cylinder.

   c $\frac{100 \text{ mg}}{\text{ml}}$ of ampicillin x 10 ml = 1 g of ampicillin

   Dissolve 1 g of ampicillin in about 5 ml of H_2O. Once dissolved, dilute to 10 ml with H_2O in a graduated cylinder.

   d $\frac{0.5 \text{ moles}}{\text{L}}$ of EDTA x $\frac{292.2 \text{ g}}{\text{mole}}$ x 0.2 L = 29.22 g of EDTA

   Dissolve 29.22 g of EDTA in about 100 ml of H_2O. Once dissolved, dilute to 200 ml with H_2O in a graduated cylinder.

e $\frac{1 \text{ mole}}{\text{L}}$ of $MgCl_2$ x $\frac{203.3 \text{ g}}{\text{mole}}$ x 0.5 L = 101.65 g of $MgCl_2$

Dissolve 101.65 g of $MgCl_2$ in about 300 ml of H_2O. Once dissolved, dilute to 500 ml with H_2O in a graduated cylinder.

4. For dilutions, use the formula $C_1V_1=C_2V_2$.
This solution has 2 components:

Tris: dilute 1M to 10 mM $C_1V_1=C_2V_2$

$$1000 \text{ mM} \times V_1 = 10 \text{ mM} \times 200 \text{ ml}$$

$$V_1 = \frac{10 \text{ mM} \times 200 \text{ ml}}{1000 \text{ mM}}$$

$$= 2 \text{ ml of 1 M Tris}$$

EDTA: dilute 0.5 M to 1 mM $C_1V_1=C_2V_2$

$$500 \text{ mM} \times V_1 = 1 \text{ mM} \times 200 \text{ ml}$$

$$V_1 = \frac{1 \text{ mM} \times 200 \text{ ml}}{500 \text{ mM}}$$

$$= 0.4 \text{ ml or } 400 \text{ } \mu\text{L of 0.5 M EDTA}$$

Using a 100 ml graduated cylinder, add 2 ml of 1M Tris and 400 μL of 0.5 M EDTA. Add water to dilute to a final volume of 200 ml.