# Some Word Problems

1. Chemistry unit questions: You may need to research some units.

   - If a raindrop weighs 65mg on average and 5.1×10^5 raindrops fall on a lawn every minute, what mass in (kg) of rain falls on the lawn in 1.5 hours?
   - The density of a liquid is .821 g/mL. How many grams of this liquid will fill a test tube that is shaped like a 10 cm long cylinder with a hemisphere on the bottom (that has a radius of 1cm)?

2. Medical unit questions: You may need to research some units.

   - Amiodarone comes preloaded as 150mg amiodarone HCL in 3 mL of solution. You need to give 65 mg to a pediatric patient. How many mL should you push?
   - You have a syringe with 150 mg of adenosine in 50 mL of solution. The MD has ordered a dose of .1 mg/kg for a 30kg pediatric patient. How many mL should you administer?

3. A salesperson find that her sales average 40 cases per store when she visits 20 stores a week. Each time she visits an additional store per week, the average sales per store decrease by 1 case. How many stores should she visit if she wants to maximize her sales?

4. You have \$5000 in a retirement fund and would like a return of 5% (to do slightly better than the historical trends of inflation). There are 5 year CDs (certificate of deposits) being offered with an annual rate of 3.05% and index funds (a collection of stocks from companies included in measures like the S&P 500) that returned 17.3% in the 1990's. How much money do you relegate to a CD and how much money do you put in an index fund to get a return of 5% for the next five years?

5. Potassium ferrate has been considered for use in batteries but costs \$100 per gram. You have a battery case that is currently *full* with 50 grams of a mixture that is 10% potassium ferrate. You would like to build the battery but you need a higher concentration of the potassium ferrate (40% should do it). What is the minimum amount of potassium ferrate you will have to buy and add to the battery case (after you dumped out some of the original mixture to make room) to get the cathode to work?

6. I like my chili spicier than my brother does. I like mine to be 1% habanero sauce, and he likes it to be 0.25% hobanero sauce. Here is the plan: I'm going to make a gallon of chili the way my brother likes it. I'll measure out a half-gallon, and put it in a container for him. Then I will add some more habanero sauce so that the remaining chili will be the say I like it.

   - How much habanero sauce should I put in initially?
   - How much extra habanero sauce should I put in my portion after I've divided it up?

7. An airplane flew with the wind for 2.5 hours and returned on the same route against the wind in 3.5 hours. If the cruising speed of the plane was a constant 360 mph in air, how fast was the wind blowing?

8. James T. Kirk is in this course and would like to know if it is still possible to earn a 2.5 now that he's taken two exams. He has looked at the gradebook on catalyst and has computed the averages listed below.

   Assuming James' work does not drastically change in the remaining 3 weeks and his averages remain about the same, find what grade he needs to get on the final to receive a 2.5 in the course. In case you don't remember, the weights specified in the syllabus and the graph of the function f that takes your class percentage x and returns your score on a 4. scale are also provided.

	weight	James' ave
Mini-Quizzes	5%	95%
WeBWork	10%	10%
WrittenHW	15%	0%
Quizzes	15%	70%
2 Midterms	30%	100%
Final	25%	
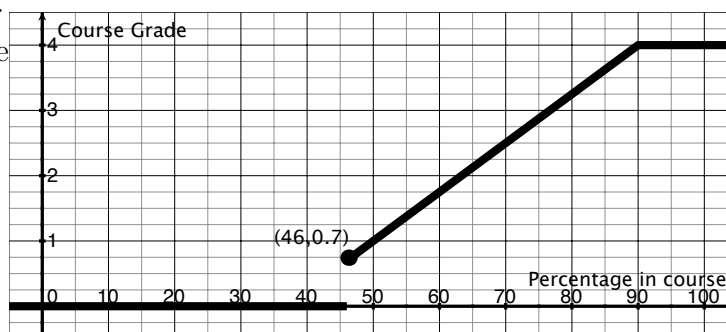
9. The Athenians when suffering from the great plague of eruptive typhoid fever in 430BC consulted the oracle as Delos as to how they could stop it. Apollo replied that they must *double the size* of his alter which was in the form of a *cube.* The Athenians constructed a new alter where the *edges* where double that of the old. Apollo made the pestilence worse than before.

   - By what factor did the Athenians increase the size of Apollo's alter?
   - Give new directions for the construction of Apollo's alter to guarantee Apollo's request that the new alter is twice the volume of his first.

10. Is the following reasoning sound?
    Let $a = b$. Then,
    $a * a = a * b$
    $a^2 = a * b$
    $a^2 - b^2 = a * b - b^2$
    $(a + b)(a - b) = b(a - b)$
    $(a + b)\cancel{(a - b)} = b\cancel{(a - b)}$
    $a + b = b$
    $a = 0$ Thus all numbers are just zero!

11. One of the following problems from Section 2.6: 24, 28, 30