Math 127
Application Problems Handout
06/03/2008

A Guide to Solving Application Problems

Step 1: Read Read through the problem in its entirety at least twice. The second time through, take note of the *facts* you are told and the *unknown(s)* that you will be required to find.

Step 2: Name Give letter names to the unknown(s) in the problem. Be sure that you clearly define each unknown.

Step 3: Draw Draw a sketch or digram that illustrates the situation that is being described (if applicable).

Step 4: Organize List out all known facts that you discover by reading through the problem carefully and equations that relate the known and unknown quantities together. If necessary, consult references to find equations that relate to the problem you are solving.

Step 5: Build Combine the facts and equations from the previous step into a single equation that expresses the variable you are trying to find in terms of other known quantities. You final equation should only have one variable (later when we get to more complicated application problems, there may be more than one variable and more than one equation).

Step 6: Solve Use algebraic methods to solve the equation you built above in order to find the unknown quantity.

Step 7: Check Verify that the solution you found satisfies *both* the equation(s) you found earlier *and* the stated conditions of the original problem. If so, hooray, you are done! If not, go back and try to find your error.

Some Key Formulas:

- *Simple Interest:* $I = Prt$, where $P =$ principle invested, $r =$ interest rate, and $t =$ time invested.
- *Simple Motion:* $d = rt$, where $d =$ distance traveled, $r =$ rate, and $t =$ time period.
- *Combined Work:* $\frac{1}{t} = \frac{1}{t_1} + \frac{1}{t_2}$, where $t =$ combined time needed, $t_1 =$ time for "1" working alone, and $t_2 =$ time for "2" working alone.

Example: Suppose that a certain investment has an average return of 12% annually. How much would you need to invest today in order to expect to have \$50,000 in a year?

Solution: Let $P =$ initial amount invested, $r =$ rate of return, and $A =$ final amount 1 year later.
Then $A = \$50,000$, $r = 12\% = 0.12$, and P is unknown.
Therefore, $A = P + rP$, or $50,000 = P + 0.12P = 1.12P$.
Hence $P = \frac{\$50,000}{1.12} \approx \$44,642.86$

Check: $44,642.86 + (0.12)44,642.86 = 44,642.86 + 5357.14 = 50,000$.

Example: Suppose that you have two types of fertilizer on hand: one containing 60% Nitrogen and another containing 45% Nitrogen. How much of each should you mix together in order to get 100lbs of fertilizer with 50% Nitrogen content?
Solution:

Example: Suppose that it takes Chef Emeril 3 hours to make dinner and it takes Chef Ramsay 2 hours to cook dinner. How long would it take for them to make dinner if they worked together?
Solution: