Question: What is the question being asked?

Key Words and concepts:

Read the question and circle the key words or phrases that get you started. Identify what you want to figure out. What are the key concepts that you will need to be able to answer the question?
The goal of this step is to make connections to the online coursework and reading material. By doing this step, you want to learn how to start problems correctly. If you do not know how to start problems, you want to be able to identify the basics that underlie the problem and begin to review that material until the "solution" or direction is revealed. As you work through this step, you want to ask and answer questions like:

- How am I supposed to know how to answer this question?
- Why/how is this question connected to the material being covered in the text or lecture?

Note: It may be difficult to identify concepts initially. You may have to do step 2 first in order to see the connections. However, by the time an exam is approaching, you will have to be able to do this step first in order to solve problems quickly and correctly the first time by yourself (as is needed on an exam).

Connections: Understanding the problem.

What are you given? What do you want to find? What additional information do you need to be able to answer the question?
The goal of this step is to organize the information and to identify and gather additional information still needed to solve the problem. Use some of the questions below to help you identify the path for each individual problem.

- Restate what you want to find by identifying the desired unknown and naming specific variables.
- What needs to be calculated?
- Identify what information is important and information that can be ignored.
- Write down a simple statement of what you want to find out, and ideas useful in solving the problem.
- Gather information, look up definitions.
- Describe what is happening using chemical equations and/or visual diagrams.
- Set up a table to organize data.
- Write out equations you may need.
- Be as specific as possible. Include units if that is appropriate.
- What additional information is needed?

Solution.

Make connections to devise a plan. Decide how you will solve the problem using an outline before doing calculations. Determine if the plan will yield a reasonable solution. Select an equation that specifies how the variables are related. (Use symbols and units). Insert all known quantities into the solution and determine an answer.

Beginning to solve the problem is the very last thing you should do. You should have outlined all your information above. A common mistake that students make is that they read a question and immediately start to try and solve it. Working stepwise as above allows you to process the information in the question.

When you do begin to solve, be deliberate and detailed. Take notes on what you did and why you did it. When you use equations explain *why* it was the correct equation. If you get the question wrong go back and determine where you went wrong and if the equation or relationship was wrong why! When it comes time for a test using this template may be difficult, but using it for all your homework and practice problems will train you to think about the questions when test time comes.

If you have to use mathematical equations be sure to use dimensional analysis. Write down what units you start with, what units your answer should be in and use units on every step in between!

Check: Evaluate the Solution.

Check your work to see that it is properly stated, reasonable, and that it answers the original question. Do an estimate if appropriate. Explain or restate the solution in terms that relate to the original problem. Use the following if appropriate:

- How does the answer connect to the physical meaning of the topic/question?
- Is the sign correct?
- Is the order of magnitude of the answer correct?
- Use dimensional analysis to arrive at correct units.
- Is there information included in the question that you did not need?
- Can you arrive at the same answer another way (using reasoning rather than a calculation for example)? Is there an appropriate shortcut?

Check

Do you know a second way to solve the problem or another way to think about it? Try it! There are often multiple ways to solve problems and you should be double checking yourself!

Question:

Key Words:

Concepts:

Connections

What is given?

What do I want to know?

Solution

Check