

The stages of the modeling process are as follows, according to the Angela and George Shiflet book. Note: Please refer to pages 8, 9 and 10 (pages 4, 5, and 6 of the online FREE PDF).of Module 1.2 of their book [Introduction to Computational Science: Modeling and Simulation for the Sciences](#). Here is a direct link to the [Module 1.2 PDF](#), in case you can't find it on the previous page about the book.

1. Analyze the problem.
2. Formulate a model.
3. Solve the model.
4. Verify and interpret the model's solution.
5. Report on the model.
6. Maintain the model.

Step one of the Modeling Process: Analyze the problem. One paragraph consisting of three sentences. Please feel free to totally ignore the 2nd sentence, except for the first 8 words: "At this stage, we determine the problem's objective ...".

"We must first study the situation sufficiently to identify the problem precisely and understand its fundamental questions clearly."

"Only with a clear, precise problem identification can we translate the problem into mathematical symbols and develop and solve the model."

Reread the Ghostbuster's and waggle dancing bees material and pull out ideas that seem to throw more light on the ANALYZE THE PROBLEM Step of the Modeling Process. Take some notes on how Dr. Peter Venkman and the Step One: Understand the problem – focus on WHAT it is you are trying to solve (from ghost.txt and from waggle.txt) compares to the Shiflet **Step One of the Modeling Process – ANALYZE THE PROBLEM**.

Key phrases here from the sentences above:

- i. Our goal – "determine the problem's objective"
- ii. "study the situation" Look up the dictionary definition of the word "situation"
- iii. "identify the problem precisely"
- iv. "understand its fundamental questions clearly"
- v. "clear, precise problem identification"
- vi. "translate the problem into" ... and then be ready for STEP 2 Formulate the Model, which here is anticipated as the GOAL, to "develop and solve the model".

GB1 - Take home test question is writing and exploring task. Journal, note take, write and clarify. Make a connection to ghost.txt and/or waggle.txt.

Turn in a few ideas or notes which can be diagrams, quotes from ghost.txt or waggle.txt, your comments, reactions, analogies, your own favorite movie or book or poetry or sports parallel, to each of the above phrases. Each one will have a few sentences and/or diagrams that relates to it and show me you thought about it. Call this six part question and journal/writing/note-taking exercise GB 1, as in Ghostbuster #1 question on the take-home test.

GB2 – Take home Ghostbusters GB question #2. **Step 2: Formulate a Model** from the Shiflet book and Steps of the Modeling Process module. Explain in notes and in reference to ideas from waggle.txt (waggle dancing bees and Ghostbusters) and ghost.txt (Ghostbusters and problem solving) that you see a possible connection to Dr. Raymond Stantz and the Develop a PLAN, i.e. focus on the HOW, develop; the PLAN, i.e. ALGORITHM, the recipe. This should be only a paragraph or a few paragraphs.

GB3 – **Step 3: Solve the model.**

3. Solve the model

This stage implements the model. It is important not to jump to this step before thoroughly understanding the problem and designing the model. Otherwise, we might waste much time, which can be most frustrating. Some of the techniques and tools that the solution might employ are algebra, calculus, graphs, computer programs, and computer packages. Our solution might produce an exact answer or might simulate the situation. If the model is too complex to solve, we must return to Step 2 to make additional simplifying assumptions or to Step 1 to reformulate the problem.

The 2nd sentence here is key. In light of the ghost.txt Ghostbuster's readings and in light of the waggle.txt Waggle Dancing bees readings, please explain WHY – "It is important not to JUMP to this step before THOROUGHLY UNDERSTANDING the PROBLEM (step #1) and DESIGNING THE MODEL (step #2). Dr. Egon Spengler represents this phase, the step #3 of the troubleshooting, problem solving and programming process in the ghost.txt and waggle.txt discussions and resources. Does he or could he represent **Step 3 of the Modeling Process: SOLVE THE MODEL** ?

Feel free to relate this mainly to the programming proverb: **RESIST THE URGE TO CODE!**

Resist the Urge to Code means to respect the necessity to spend lots of time in **Step 1: Understand WHAT the problem is** and in **Step 2: Plan out HOW to solve the problem**, before you go to **Step 3: Code it** – implement it on the computer in software – write the program or create the application - (in NetLogo, Vensim, Flash, After Effects, Microsoft Excel or C++).

Slow motion gets you there faster. A humble attitude is more likely to enable you to produce a better model and simulation or program, and something you can be proud of.