Online Problem Solving
Marissa Paul

1. Which problems did you work through?
The Three Jugs Problem, The Tower of Hanoi, and Trio Match

2. Which problem was the easiest to solve?
The Tower of Hanoi was the easiest problem to solve.

3. Why was it easy to solve?
The Tower of Hanoi was the easiest problem to solve because the rules were simple, precise, the moves were recorded for you, and you could actually work on the problem, not just have to do it in your head or on paper. Trial and error were possible and you could improve on your number of moves.

4. What type of problem was it (see Kirkley, 2003 article pg. 8)? Explain.
I believe that the Tower of Hanoi is a well-structured problem because the player uses the same step-by-step instructions, a smaller disk can not be placed on a larger disk, to come to a solution. This was a very straightforward problem. On the chart, page 8, under characteristics, solution strategy is usually predictable, convergent answer, and all starting information is usually part of the problem statement and all were present in the Tower of Hanoi under a well-structured problem. Under the chart section, Implications for Teaching and Testing, the learner simply memorizes the procedure; tasks often become automated with practice on page 8 of the article definitely stood out to me. I felt that as I played the game I memorized the task and it eventually became easier to understand and find the solution in a smaller number of moves.

5. What strategy did you use to solve the problem?
I feel that I used figure 1 of the Current Problem Solving Models on page 4 of the Kirkley article where I was Representing the Problem, Solution Searching, and Implementing the Solution. Under Representing the Problem I looked at the three towers and observed the sizes of the rings, and established which tower was Tower number 3. For Solution Searching, I developed a strategy in my head as to how to move the three different size rings in the least amount of moves. Finally, for Implementing the Solution, I did trial and error, started over and learned from experience, until I reached the least amount of moves successfully.

6. How did you develop this strategy?
I used recall to find the solution in the least amount of steps. I learned from my past experience of trial and error.

7. What declarative knowledge was needed to solve this problem?
The declarative knowledge needed to solve this problem was under facts. The number of towers and the three different-sized rings was straightforward.

8. What procedural knowledge was needed to solve this problem?
I felt this game fell under well-structured problem solving because you had to follow a set of rules to reach the solution. Just like following instructions to boil pasta, the number of minutes may vary depending on the strength of the stove, but the overall goal is still reached. The number of moves may have varied, but the overall solution was obtainable.

9. Which problem was the most challenging for you to solve?
The most challenging problem for me to solve was the 3 Jugs Problem.
I immediately thought of Die Hard with a Vengeance, which made me laugh because my husband loves those movies, and then gave me the confidence to try and solve it.
10. Why was it difficult to solve?
I believe that it was difficult to solve because I had to write out the problem and manipulate it on my own. My computer was giving me a hard time about playing the actual game. I didn't have the option to restart on the computer and try it over and over again. I had to set up the problem in my notebook and decide on how I would manipulate it. The computer wasn't helping me like in the Tower of Hanoi and Trio Match.

11. What type of problem was it (see Kirkley, 2003 article pg. 8)? Explain.
I believe the 3 Jugs Problem was a moderately structured problem because there are different paths to solve the problem. Under the definition and characteristics of moderately structured problem solving there is more than one acceptable strategy to find the solution.

12. What strategy did you use to solve the problem?
I feel that I used figure 1 of the Current Problem Solving Models on page 4 of the Kirkley article where I was Representing the Problem, Solution Searching, and Implementing the Solution. Under the title Representing the problem, I needed to use my mathematical skills to set up the three jugs and prepare to move the water

from one to another without using any measuring devices except the jugs themselves. For Solution Searching, I had to develop a plan for having equal amounts of liquids, 4 ounces, in two containers for the two friends. Finally, for Implementing the Solution I just started trial and error and made a mental image in my mind of the 3 jugs. I wrote out my steps and thought maybe that fractions would help. I wanted to watch a video, and do some research, but I resisted the internet and went on to answer it myself.

13. How did you develop this strategy?
I just did a lot of trial and error, mental modeling, to find a solution.

14. What declarative knowledge was needed to solve this problem?
You have to use your declarative knowledge of mathematical skills of addition and subtraction, and fractions to solve this problem.

15. What procedural knowledge was needed to solve this problem?
I felt this challenge fell under the moderately structured problems because it required more declarative knowledge of mathematics, there was more than one way to arrive at the answer, required mental modeling, needed information must be gathered as you are working out the problem, and the strategy to find the solution had to fit the parameters of the jugs.