**A cat, a parrot, and a bag of seed**

1. Define the problem.
   1. A man needs to get a bird, a cat, and a bag of seed to the other side in his boat that has room enough for himself and 1 other item at a time.
   2. The problem presented is pretty straightforward but the condition it proposes makes the problem seem to be more trivial than it really is. Additionally, the parameters ambiguity seems to play a large part in the illusion of a complex scenario. I had to keep things simple and in perspective in order not to get lost in attempting to find out unnecessary details. Clearing my mind and thinking of the problem in the context of a video game using simple logic (i.e. Light Bot) will definitely help simplify the problem and quickly find a solution.
   3. The overall goal is to get the man, cat, parrot, and bag of seed to the other side of the river via his boat. Without leaving 2 alone where one can consume the other (i.e. cat & parrot, parrot & seed).
2. Break the problem apart
   1. Constraints:
      1. The boat has room for the man and one other item at a time.
      2. If alone, the cat can eat the parrot.
      3. If alone, the parrot can eat the seed.
   2. Sub-goals:
      1. Transport all passengers across to the other sides.
      2. Do not leave the cat alone with parrot.
      3. Do not leave the parrot alone with the see
3. Identify potential solutions
   1. Take the passengers 1 by 1 to the other side
   2. Hold the cat, have the bird on your shoulder, and the bag of seed in your pocket and take them across.
   3. Take the cat and the bag of seed over first and let the bird fly over.
4. Evaluate each potential solution
   1. ★★★★★Solution a: most logical and rational of all the solution possibilities and passed all the user case tests.
   2. ★★★★★This is the ideal solution except the user case testing didn’t all support this solution.
   3. ★★★★★ This solution presents many assumed situations not supported by the word problem but can happen and could be a possible solution. Not as logical, or rational as the other two and didn’t pass all user case tests.
5. Choose a solution and develop a plan to implement it
   1. ★★★★★ I chose the most logical and rational of the solutions. The man would first take the parrot to the other side leaving the cat and bag of seed behind. He would drop off the parrot and return to pick up the seed and leave the cat behind. The man takes the seed to the other side and drops it off while picking the bird back up. Taking the bird back to the original side of the river where the cat is and drop the bird off but then pick up the cat to take it over to the other side. After dropping the cat off on the other side, once again return to the original side and pick up the parrot and finally arrive to the other side.
   2. User cases:
      1. The boat has a weight limit due to its small size.
      2. The bag of seed was rather large.
      3. The bag of seed was the size of a small Ziploc bag.
      4. The river was rather small enough to practically hop over.
      5. The passengers were people with names A. Cat, A. Parrot, and A. Bag O’seed.

**Socks in the dark**

1. Define the problem
   1. A sock drawer is holding 20 socks (10 pairs of socks: 5 black, 3 brown, and 2 white). In choosing socks from the drawer in the dark, it is asking me to find out how many socks do I have to choose to make up one matching pair and at least one matching pair of each color.
   2. The problem is calling for me to figure out the minimal number of socks it takes to create a single matching pair of socks (regardless of color) and a single matching pair of socks in each of the colors black, brown, and white.
2. Break the problem apart
   1. Constraints:
      1. Have to choose pairs while in the dark.
      2. The problem is assuming I will be thinking of the probability of me selecting the right colored pairs of socks by stating rules such as being unable to check until after I’ve already chosen the socks.
   2. Sub-goals:
      1. Find out how many socks make up one matching pair of socks.
      2. How many socks make up 3 pairs of socks.
3. Identify potential solutions
   1. Potential solutions:
      1. Two matching socks need to be selected to create one matching pair.
      2. A total of 6 socks. Two matching socks of a specific color need to be selected in order to create at least one matching pair of any specified color.
4. Evaluate each potential solution
   1. ★★★★★This solution was great but not specific enough to cover both goals only enough to cover goal a.
   2. ★★★★★This solution was more specific and detailed. The solution provided enough specificity that it could be general enough to solve the problem at hand.
5. Choose a solution and develop a plan to implement it.
   1. Solution b is the solution. Since the problem is asking to find out the smallest number of socks needed to make up one matching pair of socks and one matching pair of each of the colors would be 6. Solution b trumps solution a only because it gives more specificity of the color that is being asked of in sub-problem b of the overall “Socks in the Dark” problem. Additionally since solution B breaks the problem down to where it explains how each individual pair of socks is created, it solves the overall goal asking how many socks needed to create one matching pair: 2.
   2. 

Figure Created by Albert Martinez (me), Socks icon from [Icon Finder](https://www.iconfinder.com/icons/63030/socks_icon) <https://www.iconfinder.com/icons/63030/socks_icon>

**Predicting Fingers**

1. Define the problem
   1. A little girl counts on her left hand starting from her thumb as 1 until the little finger 5. When she reverses the direction she doesn’t recount the small finger and continues with 6 on the ring finger. This leaves the thumb at 9 and the first finger as 10.
   2. The little girl doesn’t recount the little finger when she reverses the direction in counting.
   3. The overall goal is to see what finger the little girl will stop on when counting the way she does.
2. Break the problem apart
   1. Constraints:
      1. In order to accurately find a solution one has to count the way the little girl does.
   2. Sub-goals:
      1. Find out what finger the girl stops on when she counts to 10.
      2. Find out what finger the girl stops on when she counts to 100.
      3. Find out what finger the girl stops on when she counts to 1000.
3. Identify possible solutions
   1. Count using your left hand the same way the little girl did in the word problem. When she counts to 10 she will stop at her first finger and so on until 100, and then 1000.
   2. Using your left hand you can count by 10’s starting at 10 with you first finger, then move to your ring finger and count it twice (20, 30). Next jump back and do the same with your first finger (40, 50). Keep alternating this way until you reach 100. This solution shows that she will stop at her ring finger.
   3. Using an excel spreadsheet you can label 8 columns with column titles corresponding to each finger counted including when the counting is reversed up until the First finger Reversed (FR) because the table loops back to the first column TH for Thumb. Number each cell under the correct finger you count it on until 1000. This solution says that when she counts to 1000 she will stop at her first finger.
4. Evaluate each potential solution
   1. ★★★★★ This solution works well but for small counting like for solving sub-goal “i”. On the other hand it is not efficient for the other sub-goals. It becomes extremely time consuming and tedious to keep track of.
   2. ★★★★★ This solution is a better time conscious solution being able to count to large values pretty quickly with less effort than the first solution. The downside is similar to the first solution where you can lose track of your place when counting to larger values. Without some way to keep track of your place you find yourself starting back at 1.
   3. ★★★★★ The digital version presented the most effective, practical, and time-efficient solution. I was able to produce the table in just a couple minutes.
5. Choose a solution and develop a plan to implement it
   1. I chose plan 4.a.iii.: Using the excel sheet to determine the finger the little girl will stop on when she reaches 10, 100, and 1000. I chose this because it was the quickest method, room for error is minimal when compared to the first two solutions, and can be customized to determine any number she counts to.

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*TH = Thumb*

*F = First*

*M = Middle*

*R = Ring*

*L = Little*

*RR = Ring Reversed*

*MR = Middle Reversed*

*FR = First Reversed*