**1) A: Define the problem:** A man has to transport a cat, a parrot, and a bag of seed to the other side of the river. He only has room in his boat for himself and one other item. How can he transport himself and the other three items safely? He also has to watch which items he leaves together since the cat will eat the parrot and the parrot will eat the bag of seed. The overall goal is for the man and the three items to make it safely across the river.

**1) B: Break the problem apart:** The constraints are that the man has to be careful which items he leaves together. The cat will eat the parrot and the parrot will eat the bag of seed. Which items does he leave together since he can only take one other item beside himself at a time? The sub goal would be to figure out which items can be together safely.

**1) C: Identify potential solutions:** A possible solution for figuring out which items to leave together would be to leave the cat and the bag of seed behind since the cat wouldn’t want to eat the seeds. Another potential solution would be for the parrot to fly around while the man dropped off the seeds and then the cat. Or another solution might be to take the bird back and forth while the other stuff was moved to the other side.

**1) D: Evaluate each potential solution:** One solution would be to leave the cat and the bag of seeds behind while taking the parrot to the other side of the river. This would work until the man drops off the second item, then either the seeds or the parrot would be eaten. The other potential solution would be for the man to get the parrot to fly around while he took the seeds and the cat to the other side. Then he could go get the parrot. This would work as long as the parrot didn’t fly away; which isn’t in the problems constraints. Another solution would be for the parrot to go over and then bring over the seeds and take the parrot back to the beginning while the cat was taken over and then the parrot could be taken back over with the other two.

**1) E: Choose a solution and develop a plan to implement it:** My original plan of leaving the cat behind with the bag of seeds wouldn’t work because once the next item was taken to the other side of the river, either the cat would eat the parrot or the parrot would eat the seeds. So my next idea would be to get the parrot to fly around while the cat and the seeds were taken to the other side. Once the other items were delivered then the parrot could be retrieved and taken over with the man to the other items. A solution that would work would be for the parrot to be taken over and then the seeds. The parrot would be taken back to the original side while the cat was taken to the other side. Then the man could go back and get the parrot.

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**2) A: Define the problem:** There are 20 socks in a drawer. 10 black socks, 6 brown, and 4 white. What is the smallest number of socks that can be selected in the dark to get one matching pair and one matching pair of each color?

**2) B: Break the problem apart:** The constraints are that there are 4 more black socks than brown and 2 more brown socks than white. Half of the socks in the drawer are black. The sub goal would be to make sure your grabbing two of the same color socks out of the 20 in the drawer.

**2) C: Identify potential solutions:** A potential solution would be to just randomly pick out two socks. The odds are in your favor for grabbing two black socks since half of the socks in the drawer are black. To grab one matching pair of each color would be easier if all of the black socks were already selected. Randomly selecting and weighing in the odds might get you to the point of selecting all the black socks first off.

**2) D: Evaluate each potential solution:** Neither of these solutions would work for identifying the amount of socks that need to be grabbed to determine what you would get.

**2) E: Choose a solution and develop a plan to implement it:** Neither of the two solutions mentioned would determine the amount of socks needed to pick out a matching pair or a matching pair of each color. A formula would be needed to determine the exact number of tries. I would say that the odds are in favor of black socks being picked out.