A Cat, a Parrot, and a Bag of Seed:

* A man finds himself on a riverbank with a cat, a parrot and a bag of seed. He needs to transport all three to the other side of the river in his boat. However, the boat has room for only the man himself and one other item (either the cat, parrot or seed). In his absence, the cat could eat the parrot, and the parrot would eat the bag of seed. Show how he can get all the passengers to the other side, without leaving the wrong ones alone together.  
    
  **1)  Define the problem** 
  + a)  How can the man get himself, the cat, the parrot, and the bag of seed to the other side of the river?
  + b)  The problem really isn’t getting across the river, but getting all three across the river intact.
  + c)  The overall goal is to get everything across the river, intact.
* 2)  **Break the problem apart**a) What are the constraints?   
  The cat and the parrot cannot be alone together.   
  The parrot and the seed cannot be alone together.   
  The boat has only room for the man and one other “item.”   
    
    
  b) What are the sub-goals?  
   Keeping the cat and the parrot apart.  
   Keeping the parrot and the seed apart.
* 3)  **Identify potential solutions**

a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?  
  
The solution is to bring one or more of the items on more than one trip, so that he does not leave each item alone individually.

* **4)  Evaluate each potential solution** 
  1. a) Does each solution meet the goals?    
     1. Yes.   
          
        b) Will each solution work for ALL cases?   
          
        Yes.
* **5)  Choose a solution and develop a plan to implement it.** a) Step one – The man brings the parrot across and then rows back alone to the 1st shore.  
    
  Step two – The man brings the seed across and then rows back to the 1st shore with the parrot  
    
  Step three – the man leaves the parrot on the 1st shore and brings the cat back, leaving it on shore with the seed before rowing back alone.   
    
  Step four – The man gets the parrot on the 1st shore, and rows back to the 2nd shore, getting himself, the parrot, the cat, and the seed there successfully.
* b) Describe some test cases you tried out to make sure it works.

Socks in the Dark:

There are 20 socks in a drawer: 5 pairs of black socks, 3 pairs of brown and 2 pairs of white. You select the socks in the dark and can check them only after a selection has been made. What is the smallest number of socks you need to select to guarantee getting the following:

a) At least one matching pair b) At least one matching pair *of each color.*

Predicting Fingers:

A little girl counts using the fingers of her left hand as follows: She starts by calling her thumb 1, the first finger 2, middle finder 3, ring finger 4, and little finger 5. Then she reverses direction, calling the ring finger 6, middle finger 7, first finger 8 and thumb 9, after which she calls her first finger 10 and so on. If she continues to count in this manner, on which finger will she stop?

a) What if the girl counts from 1 to 10 b) What if the girl counts from 1 to 100 c) What if the girl counts from 1 to 1000