**A Cat, a Parrot, and 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) Do this in your own words.

The man can’t fit all his items in his boat.

b) What insight can you offer into the problem that is not immediately visible from the word problem alone?

Assuming the animals are alive when they get to the other side.

c) What is the overall goal?

To get all 3 animals to the other side of the riverbank.

**2) Break the problem apart**

a) What are the constraints?

The boat can only carry the man and one other thing. The cat could eat the parrot if left alone. The parrot could eat the seed if left alone.

b) What are the sub-goals?

Not leaving the wrong animals alone together.

**3) Identify potential solutions**

a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?

1) Take parrot across the water and leave it, Return, Take cat over across the water and leave it, Return with the parrot, Take seed across the water and leave it, Return, Take parrot across the water. Now all 3 items are across the water without being left alone.

2) Take the parrot across the water and leave it, Return, Take the seed across the water and leave it, Return with the parrot, Take the cat across the water and leave it, Return, Take the parrot across the water. All 3 items are across the water without being let alone

**4) Evaluate each potential solution**

a) Does each solution meet the goals?

Yes it does, everything gets across intact.

b) Will each solution work for ALL cases?

Each solution worked for all cases.

**5) Choose a solution and develop a plan to implement it.**

a) Explain the solution in full.

If you take the parrot across first, then the cat wont eat the seeds. Next you will need to bring the cat across and take the parrot back so that way the cat won’t eat the parrot. Leave the parrot but bring back the seeds because the cat on the other side will not eat the seeds. Go back and get the parrot and now you have all 3 on the other side.

b) Describe some test cases you tried out to make sure it works. (You can include drawings and diagrams as part of your explanation as long as they are clearly communicating the solution).

I found a game on <http://www.mathcats.com/explore/river/crossing.html> that is similar to this problem. I played the game until I was able to figure out the solution. The cabbage= the seed. The wolf= the cat. The goat= the parrot. Once I able to get all 3 items to the other side I knew I got the solution and tried it a few more times to make sure It was right.

**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.

**1) Define the problem**

a) Do this in your own words.

b) What insight can you offer into the problem that is not immediately visible from the word problem alone?

c) What is the overall goal?

**2) Break the problem apart**

a) What are the constraints?

b) What are the sub-goals?

**3) Identify potential solutions**

a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?

**4) Evaluate each potential solution**

a) Does each solution meet the goals?

b) Will each solution work for ALL cases?

**5) Choose a solution and develop a plan to implement it.**

a) Explain the solution in full.

b) Describe some test cases you tried out to make sure it works. (You can include drawings and diagrams as part of your explanation as long as they are clearly communicating the solution).

**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

**1) Define the problem**

a) Do this in your own words.

b) What insight can you offer into the problem that is not immediately visible from the word problem alone?

c) What is the overall goal?

**2) Break the problem apart**

a) What are the constraints?

b) What are the sub-goals?

**3) Identify potential solutions**

a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?

**4) Evaluate each potential solution**

a) Does each solution meet the goals?

b) Will each solution work for ALL cases?

**5) Choose a solution and develop a plan to implement it.**

a) Explain the solution in full.

b) Describe some test cases you tried out to make sure it works. (You can include drawings and diagrams as part of your explanation as long as they are clearly communicating the solution).