PROBLEM SOLVING

For each of the problems be sure to identify each of the steps discussed in the problem-solving lesson.

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).

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) Problem:

Boat only holds man + 1 item (cat, parrot, or seed). Result: have to get everyone to the other side safely.

2) Break it Apart:

Constraints

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if  {cat paired with parrot}
                    else if {parrot paired with seed}
                       result {not safe}
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Sub goals: get each animal or items across safely

3) Identify:

The potential solution would be to keep the proper two items apart, divided, or separated at all times throughout this adventure across the river. But, yet still transporting the sequential items across to get the desired result.

4) Evaluate:

Each solution I tried ended up in the pairing of two improper items to which would result in failure. Through multiple attempts, I broke it to come up with a formidable solution.

5) Solution:

The man takes the parrot across the river, (leaving the cat and seed safe on the one river bank), he leaves the parrot on the other side and goes back across the river. The man then putts the cat in the boat to cross the river, and since he can't leave the cat and parrot alone together, he transports the parrot back. Again, since the parrot and seed can't be sharing space alone together, he leaves the parrot and he takes the seed across the river and leaves it with the cat. He then returns to transport the parrot one more final time across the river.

Socks in the Dark:

There are 20 socks in a drawer:

5 pairs of black socks, 3 pairs are 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: answer 4
b) At least one matching pair of each color: 8

1) Problem:
You have 20 socks of 3 colors in a drawer and you are in the dark. You need to pull at least one matching pair, and one matching pair of each color.

2) Break it Apart:
20 socks total: 10 black, 6 brown, and 4 white, 5 pairs black, 3 pairs brown, and 2 pairs white

3) Identify:
Division in the form of a pie will give you the answer. You have to break down the probability of getting a pair, and a pair of each color.

4) Evaluate:
I picture it being like two pies that you need to dissect equally into a final number that will provide you the greatest probability that each time will yield the correct result.

5) Solution:
In problem A; one pair, I broke it down like this:

If sock drawer = 20 socks, 3 colors
Then answer must be 4 socks
Result = 1 pair
Simple logic is; taking one more sock than the amount to which the number of colors are will result in a pair

Problem B answer is 10, because the probability is the sum of problem A, times two, plus two. Example: A=4; A x A=8 (8+2=10)

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 finger 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? First finger
b) What if the girl counts from 1 to 100? Ring finger
c) What if the girl counts from 1 to 1000? First finger

1) Problem:
In an accurate digit counting system of 10 fingers, all ten fingers would be accounted for. The little girl is eliminating one finger every time she reverses direction. The goal is to figure out what finger she will land on when she reaches 10,100, and 1000.

2) Break it Apart:
10 fingers total. 2 eliminated on every 10-count pass, leaving 8.

3) Identify:
The first finger and the ring finger are always an even tens place number every 10-count pass. The first finger and the ring finger are rotated every accumulated 100-count.

4) Evaluate:
On every 100-count in the little girl's counting method, the ring and the first finger are swapped. Ring finger has odd one hundred's place counts, and first finger has even one hundred's place counts.

5) Solution:
When this riddle is broken apart, identified, and evaluated for a solution, the solution becomes simple math.

A = first finger, B = ring finger, and C = first finger
B = 100; B = 100,300,500,700, and 900. Therefore c = 1000; Thus being the first finger.