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SDI – Problem Solving

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**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: The cat could eat the parrot, the parrot could eat the seed, and he only has room for himself and one other item on the boat. His overall goal is to transport all the three items across the river.
2. Constraints: Cat could eat parrot, parrot could eat seed, and the boat isn’t big enough; Sub-Goals: Figuring out which item to take first.
3. Potential Solutions: The cat could eat the parrot and the parrot could eat the seed, but the cat doesn’t eat seed. The cat could be carried across first.
4. This solution meets all of the goal needs and will work for all cases.
5. The cat doesn’t eat seed so therefor that would be the most logical item to leave behind along with the seed. Testing: The cat would eat parrot, the parrot would eat seed, the cat doesn’t eat seed.

**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:

1. At least one matching pair
2. Problem: It’s dark and you need a matching pair of socks. Overall goal: To find a matching pair of socks.
3. Constraints: It’s dark. Sub-Goal: Selecting the smallest amount of socks to get a single matching pair.
4. Solution 1: If you take all of the socks then there is a 100% chance that you will get a matching pair.

Solution 2: You could just turn the light on.

Solution 3: If your selection is not a matching pair; return a single sock to the drawer until you find a matching one.

1. Each solution meets the overall goal and will work for all cases.
2. Turning the light on provides a 100% chance of selecting a single matching pair of socks. Tests: Logical thought. There is no other way to get a 100% guarantee that you would select a matching pair without seeing the socks first without taking all of the socks.
3. At least one matching pair of each color.
4. Problem: You need at least one matching pair of each color.
5. Constraints: It’s dark. You need at least one matching pair of socks from each color.
6. Solution 1: The first of three possible solutions that are 100% guaranteed would be be to take ALL of the socks.

Solution2 : Turn the light on.

1. Each solutions meets the overall goal and works for all cases.
2. Turning the light on is the easiest way of gaining a 100% of completing the task.

**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. Problem: Finding out which finger the girl will land on.
2. Constraints: She skips the little finger when counting to 10.
3. Solution: She counts with the same pattern through each of the three sets of numbers.
4. The solution works for all cases.
5. Considering that she is counting by 10’s she will always land on her first finger no matter if she counts from 1 – 10, 1 -100, or 1 – 1000.