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SDI- Section 01

Problem Solving

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 he 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

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?

A mans wants to travel to the other side of a river. He has a cat, parrot and a bag of seeds. The only problem he has is that he feels that there is only room for one of them in his boat. He wants to make it to the other side of the river without leaving the wrong ones alone to wait for him to return.

The man could place the bag of seed on the floor of the boat and allow the cat to ride on top of the bag of seed while he holds the parrot to get across. This will prevent him from making multiple trips across the river.

The overall goal is to get all items to the other side of the river unharmed or damaged.

1. Break the problem apart
2. What are the constraints?

The constraints are the parrot, cat, and bag of seeds.

b) What are the sub-­‐goals?

I would also consider finding the weight of the items and the weight capacity of the boat. The man can then load all items and travel to the other side of the river.

If the weight is the problem for the man the, he could depending on the weight of each item take more than 1 item across not to exceed two items at a time.

1. Identify potential solutions

If the weight of the three items and the weight of the man do not exceed the maximum capacity weight of what the boat can hold, then the man can re-evaluate how he loads the items on to the boat and save travel time.

If the weight is a problem he can reduce how many he takes across to a maximum of two items per trip.

4) Each solution can meet the goals for traveling across the river. Based on the circumstance of ensuring the items will remain safe, But only one solution can guarantee the safety of the items.

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

The solution I would choose for the man. Is to take all three items at once. The man would place the bag of seeds in the floor of the boat. Allow his cat to sit on the bag of seeds and he would hold the parrot in his arms for the ride across the river. I feel this method would allow him to ensure all item are safe and that no item is harmed or missing. I took into consideration that the parrot could fly away or his cat could run off. The problem never stated that the parrot of cat were in a cage because it left the possibility of the cat eating the parrot and the parrot being free enough to eat the seeds.

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**

Assuming that the socks are not rolled into pairs you at need to grab 6 socks.

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

Assuming that the socks are not rolled into pairs you at need to grab 14 socks.

1. **Define the problem**

There are 20 pairs of socks 5 pair are black, 3 pair are brown, and 2 pairs are white. What is the least amount you have to take out in the dark in order to create a matching pair of socks?

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

Whether the socks are already pair together in the drawer, if the socks are mixed up or neatly separated by color.

c) What is the overall goal?

The overall goal is to find a matching pair of socks effectively in the dark.

**2) Break the problem apart**

a) What are the constraints?

The Constraints are 10 black socks, 6 brown socks, and 4 white socks

B) What are the sub-­‐goals?

To determine how many socks you need to pull out in the dark to get a matching pair.

To determine how many you need to pull out of the drawer in the dark to get one pair of each color.

**3) Identify potential solutions**

If the socks are pre-rolled together and paired, then only pulling one pair of socks, which are two socks out of the drawer would be necessary.

If the socks are pre-rolled and separated by color being black , brown, and white from left to right . You would only need to select one pair from each area in the dark to pull out a different color pair of socks from all color categories.

**4) Evaluate each potential solution**

1. Does each solution meet the goals?

Each solution does me the goals of obtaining matching pairs of socks

1. Will each solution work for ALL cases?

Yes, each solution will work all cases.

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

The socks are pre-rolled and organized by color black, brown, and white from left to right. Pre-rolling the socks into pairs and placing the in the drawer by color all the black pairs on the left side, the brown pairs in the center and the white pairs on the right side of the drawer.

**a) Explain the solution in full.**

Having the drawer organized by pre-rolling pairs together and becoming more detailed to create sections for each other, eliminates the problem of picking a pair of sock in the dark that do not match. This also ensures that each color can be picked in the dark as well.

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 little girl decides to count from 1 to 10, 1 to 100, and 1 to 1000 using only her left had. She starts to count from her thumb to her pinky when she reaches the number 5 she not only goes in reverse but she starts with her ring finger going towards her thumb. When she reaches her thumb she counts her first finger as 10 instead of her pinky.

1. What insight can you offer into the problem that is not immediately visible from the word problem alone?
2. What is the overall goal?

The overall goal is to determine what finger the little girl will stop on if she continues to count in the manner she is counting.

**2) Break the problem apart**

The girl is counting to ten every set of numbers she decides to count to can be multiplied by 10 to get the ending number she will decided to stop counting to.

1. What are the constraints?

The constraints are her thumb, first finger, middle finger, ring finger, and little finger.

1. What are the sub-­‐goals?

The goal is to determine which finger the little girl will stop on each time.

**3) Identify potential solutions**

The solution is to see that every 10th number she reaches she will always stop counting on the same finger, which is her first finger.

**4) Evaluate each potential solution**

The solution meets the goal of determining what finger she will stop when she counts from 1 to 10, 1 to 100, and 1 to 1000.

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

The solution is to see that every 10th number she reaches she will always stop counting on the same finger, which is her first finger.

Once the little girl begins her counting when she gets to 10 she stops on her first finger, when she starts over she begins with her thumb. When the little girl counts from 1 to 100 once she will get to the number 11 by counting her thumb and going from left to right. This will always lead to her getting to her 10th number with her first finger. So whether she stop on 10, 100, or 1000 she will end on her first finger.