**Problem Solving & Critical Thinking**

1. **Define the problem:**

“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.”

The man needs to bring three items across a river. Those items are a cat, a parrot and a seed. The cat will eat the bird, the bird will eat the seed and he can only carry one passenger at a time. How can he complete this task, without allowing them to eat each other?

1. **Break the problem apart:**

Bank A = Beginning point

Bank B = End point

Cat will eat bird and cannot be left alone

Bird will eat seed and cannot be left alone

1. **Identify potential solutions:**

Man could take parrot first, as cats can be left alone with the bag of seed then take the cat and return with the parrot.

Man could take cat, let bird fly and come back for the bag of seed.

Man could take cat, leave bird and seed, and then return for bird

Man could take the bag of seed, and then come back for cat

1. **Evaluate each potential solution:**

Man takes parrot across river, then returns for cat, and takes it across. Then, he returns with the parrot so it won’t be left alone with the cat.

This method should satisfy all requirements.

Man takes cat, lets bird fly and then returns for seed.

Can the parrot fly?

The cat will eat the parrot when the man leaves to get the seed.

Man could take cat, leave parrot and seed, and then return for parrot.

The Parrot will eat the seed.

Man could take the bag of seed, and then come back for cat, then parrot.

The cat will eat the parrot.

1. **Choose a solution and develop a plan to implement it.**

The man takes the parrot from bank A to bank B first.

The man then returns to bank A.

The man takes the cat from bank A to bank B second.

The man then returns to bank A WITH the parrot.

The man takes the bag of seed from bank A to bank B.

The man then returns to bank A.

The man takes the parrot from bank A to bank B.

This method will ensure that all three passengers will cross the river in a safe manner and all will survive the man’s absence.

1. **Define the problem:**

There are 20 socks in a drawer: 5 pairs of black socks, 3 pairs of brown and 2 pairs of white. You select 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. At least one matching pair of each color
3. **Break the problem apart:**

The values are as follows:

10 black socks (5 pair)

6 brown socks (3 pair)

4 white socks (2 pair)

1. **Identify potential solutions:**

Since there are 20 socks total, the total amount of selections will be between 2 and 20.

S ≥ 2

S ≤ 20

Any number between 2 and 20 is therefore a potential solution to this problem.

1. **Evaluate each potential solution:**

Since there are three colors of socks, the fourth sock will be the maximum draw to find a pair of socks of ONE color. (S≤4)

For the second part of the problem, the answer is more complicated. Since the goal is to determine the MAXIMUM amount of selections to achieve a pair of each color, the solution will involve determining how many selections can be made without achieving the goal.

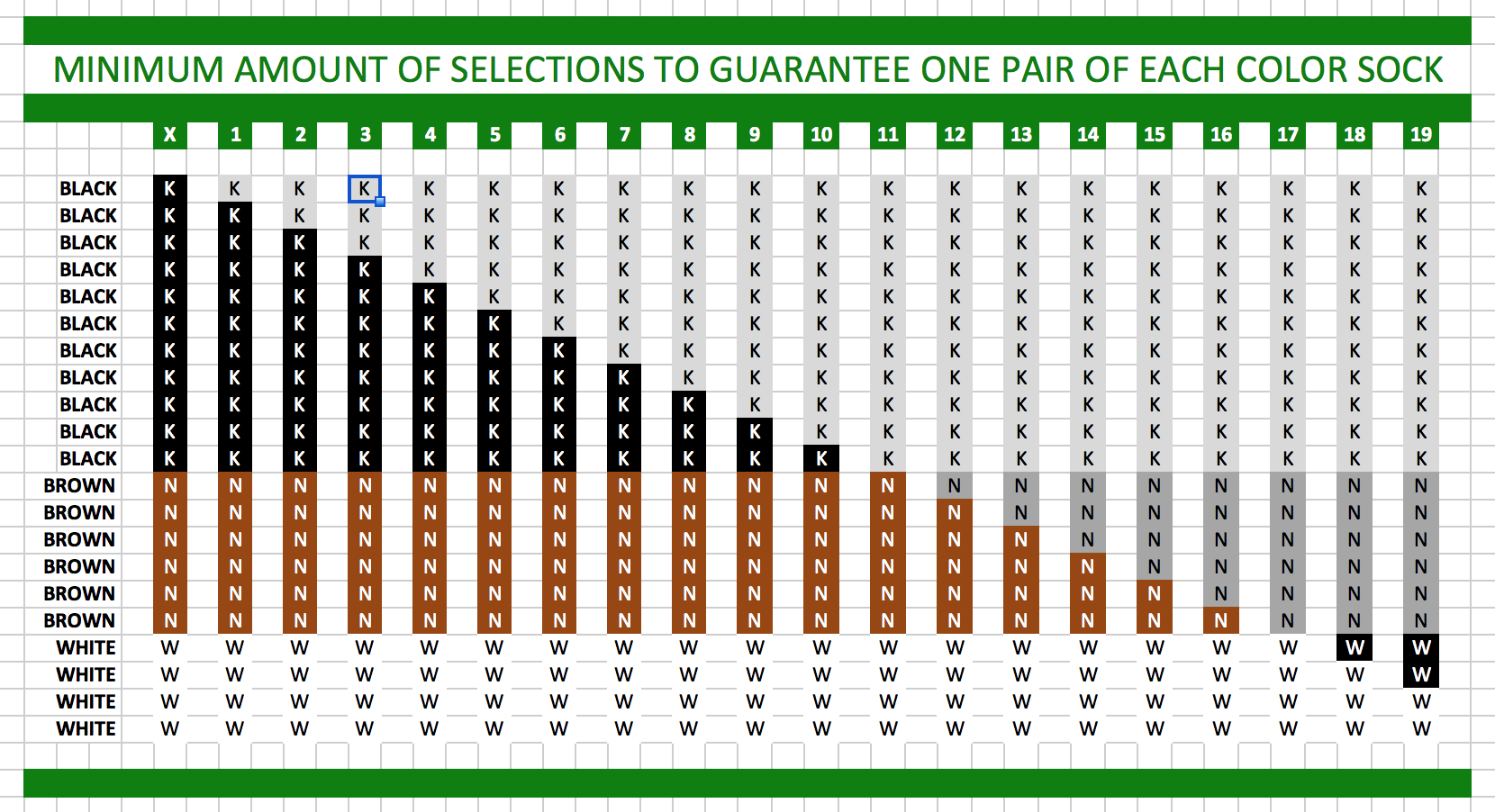


Figure . This chart details the selections of each sock showing the minimum amount of selections to achieve one pair of each color.

1. **Choose a solution and develop a plan to implement it.**

To select at least one matching pair, 4 selections must be made at maximum. The minimal amount of selections would be 2, however to guarantee the results would require 4 selections.

To find at least one pair of each color would require between 6 and 19 selections. To guarantee the requirements of on pair of each color, 19 socks would be selected.

1. **Define the problem:**

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?

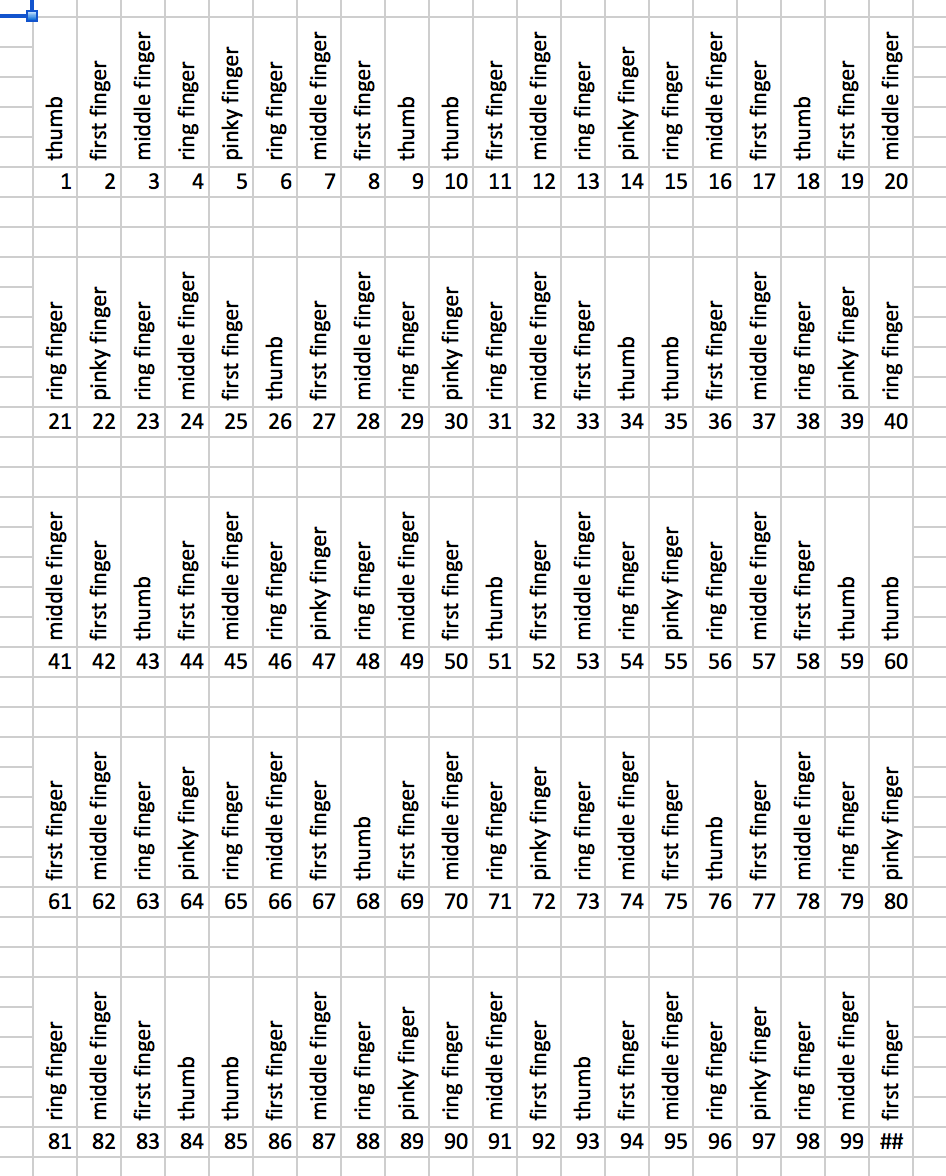
1. **Break the problem apart:**

The girl counts back and forth across her fingers from 1 to 10,100 and 1000. The problem is determining which finger she will land on while counting on her fingers in this manner.

1. **Identify potential solutions:**

This

1. **Evaluate each potential solution:**
2. 1 to 10 = First finger
3. 1 to 100 = First finger
4. 1 to 1000 = First finger



1. **Choose a solution and develop a plan to implement it.**

By graphing the path of counting across the girls fingers, a pattern emerges. By counting in this manner, the girl lands on the same finger every 100 counts. Thus, she will land on the same finger for each value of 10^x.