**Problem 1 | Cat, Parrot and Bag of Seed**

**Issue:**

A man needs to get a cat, parrot and bag of seed across the river in a boat.

**Insights and/or Barriers:**

• The boat can only hold the man and one object at a time.

• If he takes the seed, the cat will eat the parrot. If he takes the cat, the parrot will eat the seed.

**Assumptions:**

• The man has two oars.

• The man has rope.

• The man is able to think logically.

• The man cares for these objects.

• The river is either to wide or deep to cross otherwise.

**Objective:**

The man must find a way to bring all three objects from point A to point B, without loosing any of them.

**Concept 1:**

Step 1: The man will empty the bag of seed in the bottom of the boat.

Step 2: The man will blow up empty bag and turn it into a flotation device.

Step 3: The man will attach floatation device to the boat.

Step 4: The man will place the cat on the flotation device.

Step 4: The man will tie one end of a string to the parrot.

Step 5: The man will tie the other end of a string to the boat.

Step 6: The man will take the cat, parrot and seed from point A to point B.

**Concept 2:**

Step 1: The man and the parrot will go from point A to point B.

Step 2: The man will return to point A.

Step 3: The man and the cat will go from point A to point B.

Step 4: The man and the parrot will return to point A.

Step 5: The man and the bag of seed will go from point A to point B.

Step 6: Repeat Step 2.

Step 7: Repeat Step 1.

Both concepts are viable, however there is less risk for the animals in Concept 2.

**Problem 2 | Pairing Socks in the Dark**

**Issue:**

In order to **guarantee** a matched pair of socks for two examples (1 pair) and (3 pairs of each color) from the least amount chosen without seeing the socks.

**Insights and/or Barriers:**

• There are 5 pairs of black socks, 4 pairs of brown and 2 pairs of white.

• The room in which the drawer is located is dark.

**Assumptions:**

• A pair of socks are two socks of the same color.

• A light cannot be acquired during the process, and you are unable to see the socks until they have been retrieved.

• There is no difference to the socks other than color (for example, size, shape, weight, knit, gage etc.).

**Unit Characteristics:**

10 black socks

6 brown socks

4 white socks

**Objective:**

1. **Select the smallest number of socks to guarantee making one pair.**
2. **Select the smallest number of socks to guarantee matching one pair   
   of each color.**

**Problem A:**

Fact: 2 socks of the same color = 1 pair

**Option 1:** In the best case scenario a person could draw two socks and make a pair, but there is **not guarantee** that this will happen.

**Option 2:** Because you only need two of the same color sock to equal a pair you would need to draw four socks; 1 black, 1 brown and 1 white, for a total of three socks without a pair, but one more sock would pair with one of the three colors.

Therefore: The fourth sock would make a match to one of the first three.

**Solving A:**

**Option 2:** Drawing four socks would be the least number in order to **guarantee** a pair.

**Problem B:**

Fact: 2 socks of the same color = 1 pair

**Option 1:** There are 20 socks in a drawer a person could draw all 20 and **guarantee** all three pairs of socks, but this would not be the least amount of units needed to accomplish the task.

**Option 2:** In order to **guarantee** three pairs of each color a person would have to solve for the least common denominator (white), because it has the least chance for collection.

Therefore: All other colors would have to be collected in total (10 black) and (6 brown) so that the least common denominator could be solved for.

**Solving B:**

**Option 2:** A total of 18 socks would have to be drawn in order to guarantee three pairs of each color of socks were matched.

In both A and B Problems, the Option 2 solves for the actual issue; which is to draw the least amount of socks while accomplishing the task.

**Problem 3 | Finger Sequence**

**Issue:**

In a sequential manner, figure out what finger on the left hand would represent 10, 100 and 1000.

**Insights and/or Barriers:**

Starting with a left hand; a pinky would equal the 1st digit on the hand, the ring finger would equal the 2nd digit, the middle finger would equal the 3rd digit, the index finger would equal the 4th digit, and the thumb would equal the 5th digit, then to continue the sequence the index finger would equal the 6th digit, and so on.

• You are not able to use both hands.

• You are not able to repeat the thumb two times in a row.

**Assumptions:**

• That you must use fingers to do this assignment.

**Objective:**

What finger would indicate 10, 100 and 1000 in this counting sequence?

1. **What finger does 10 land on?**
2. **What finger does 100 land on?**
3. **What finger does 1000 land on?**

**Problem solving:**

**Step 1:**

• Convert each finger to a column in a chart. Since we are using a base of 10, we will create 10 buckets.

For each bucket we will place 1 ball.