**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.