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**Problem Solving Activity**

**A Cat, a Parrot, and a Bag of Seed**

The issue is that the man could lose the parrot or the seed if he leaves the parrot alone with the cart, or the seed with the parrot. Approaching this issue in a linear fashion, as if you can only move each thing once, makes the scenario impossible.

We cannot leave the parrot with the seed or the cat with the parrot or we will lose one. The sub-goals are then to prevent the parrot form eating the seed and the cat from eating the parrot.

There is only one solution to the first step, the parrot must move across first. This is fine because the cat is left with the seed and there is no conflict. Any other solution would result in the cat being left with the parrot or the parrot being left with the seed.

The second step has two potential solutions. We can either move the seed or the cat over. However, this presents another conflict. If we leave either with the parrot on the far side we will lose either the parrot or the seed.

So the third step must be to take the parrot with us back across to the first side. Now we can take the cat or the seed, whichever is left. This leaves the cat and the seed on the far side which is not an issue.

For the final step we go back and bring the bird across. Now all the items are on the far side with the man and there is no chance of loss.

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: a) At least one matching pair b) At least one matching pair of each color.

**Socks in the Dark**

We need to find a pair of matching socks and a pair of black, brown and white socks. Since socks are not foot specific we can actually pull any two socks to make a pair.

There are two constraints to this problem; one is the inability to see and the other is the fact that we need to find the smallest number of socks necessary. The sub-goals are to find a pair of matching socks and a pair of black, brown and white socks.

To get to our goal we will have to pick socks at random.

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?

2) Break the problem apart

a) What are the constraints?

b) What are the sub-goals?

3) Identify potential solutions

a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?

4) Evaluate each potential solution

a) Does each solution meet the goals?

b) Will each solution work for ALL cases?

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

a) Explain the solution in full.

b) Describe some test cases you tried out to make sure it works. (You can include drawings and diagrams as part of your explanation as long as they are clearly communicating the solution).

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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