**A Cat, a Parrot and a bag of Seeds.**

**Define Problem**

A man wishes to move these three items across the a river. He has a small boat. He can only take one at a time. All three seem to want to eat another one. He needs to do this in a way that allows all the items to survive the crossing.

**Insight**

When an item is moved to the goal side of the river, there is no reason it could not cross back to the other side.

**Goal**

The goal is an order of moves to be made that ensures the safe crossing of all items.

**Restraints**

The restraints for this problem are that only one item can be moved at one time. There are two combinations of items that will eat one or the other.

**Subgoals**

The sub goals are to keep the items from eating another item. In the first move you must recognize what item can be taken that will not leave the other items to eat each other. Each move after that must not leave a combination on a bank that could result in two items being eaten.

**Sub solutions**

The cat will not eat the seeds so we can leave the cat and seeds on bank 1 and proceed with the parrot to bank 2. The last move we want to make is also moving the parrot to bank 2 with the cat and seeds on bank 2. We are going to have to keep the parrot from the seeds and the cat from the parrot. We want to keep the parrot safe from the cat and the seeds from the parrot. He is key in the solution.

**Evaluate Solution**

Leaving the cat and seeds together keeps all of the items safe. The first and last moves we want to make should have the cat and seeds together with the parrot in the boat.

**Chosen solution**

The problem can be divided into moves. Move 1 is to take the parrot out of danger of the cat and away from the tempting seeds. With the Parrot on bank 2 we go back to fetch the cat. Move 2 is to take the cat to bank 2. Cat will eat the Parrot so we must take the Parrot back with us to the first bank this is move 3. The seeds will tempt the Parrot so we must move the seeds to bank 2 to be safe with Cat this is Move 4. Now we can fetch the Parrot from bank 1 and bring him over to bank 2 and under our supervision the cat will not eat him and the seeds will not tempt him this is move 5.

**Socks in the dark.**

**Define problem.**

A matching pair of socks are needed to be pulled from a drawer. There are three different types of socks in the drawer and a total of 20 socks. We need to pull out at least one matching pair of socks out of the drawer. We want to pull out the minimum that will give us a matching pair.

**Constraints.**

We can not see the socks we are pulling so we must pull in bulk to assure that we get a matching pair. There are three different types of socks. Out of twenty, ten are black, six are brown and 4 are white.

**Subgoals**

How many do we need to take that will result in a matching pair. What number of socks taken will result in a mismatch.

**Possible solutions**

We could pull out two socks and hope they match. We could pull out four socks and double our chances of having a matching pair. Or we could pull out eight socks, with eight socks pulled or four pairs we are bound to have a matching pair.

**Evaluation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| white | brown | black | white | black | brown | white | black |
| black | white | brown | black | white | black | brown | white |
| brown | black | white | brown | black | white | black | brown |

With the table above I have determined that we need to pull out a total of four socks to find one matching pair. If we want a matching pair for each of the three types of sock we need to pull eight socks.

**Predicting Fingers**

We are trying to guess at a certain number what finger a girl is counting to. She is counting them on one hand going counting continuously, and starting in the opposite direction once an end finger is met. The goals are to find what finger she is on at ten,a hundred, and a thousand.

**Constraints**

She has ten fingers. She started on her thumb as the first finger. We do not have time to count it out.

**Subgoals**

We need to figure out if there is a way to predict the finger she will land on. Once that is found we can quickly solve for each number.

**Possible solutions**

We could count on our hand to each number, but this would be time consuming. We can figure out the pattern and come up with the answer more quickly.

**Evaluation**

Solution one is thrown out in the interest of time but could be used to check our answer. To figure out solution two we can make a table and see if a pattern exists.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | 2 | 3 | 4 | 5 | 4 | 3 | 2 | 1 | 2 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **1** | **2** | **3** | **4** | **5** | **4** | **3** | **2** | **1** | **2** | **3** | **4** | **5** | **4** | **3** | **2** | **1** | **2** | **3** | **4** |

**Choose solution and solve**

I have choosen solution two and given the pattern I have observed I belive that the girl counting will start on ten on finger two, one hundred on finger two and one thousand on finger two as well.