Baggett\_Henry\_ProblemSolving

1) A Cat, a Parrot, and a Bag of Seed: 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.

a) Define the problem

The problem:

C = Cat, P = Parrot, and B = Bag of Seed

You can only take one item across the lake at a time. C will eat P if left alone; P will eat B if left alone.

b) What insight can you offer into the problem that is not immediately visible from the word problem alone?

One problem I see is, if I take C first, P may eat B, if I take P first, C may run away, so how can he transport them separately and know that C or P wont run away while he’s transporting B across the lake.

c) What is the overall goal?

Get C, P and B to the other side of the river without losing any of them.

2) Break the problem apart

1. What are the constraints?

The constraint: C & P together or P & B together alone

b) What are the sub-goals?

The sub-goal would be how to get all items across the river in as few trips as possible and not lose any of them

3) Identify potential solutions

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

Since C wont eat B, but C will eat P not B, he will have to take P leaving C & B on shore.

4) Evaluate each potential solution

a) Does each solution meet the goals?

Yes, the solution will not let C & P nor P & B alone and any given time

1. Will each solution work for ALL cases?

Yes, but will require numerous trips across the river.

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

1. Explain the solution in full.

The man takes P across first, C won’t eat B, and then the man will come back and take C across the river. Next the man will bring P back across, leaving P on the bank and carry B across the river. Then the man will cross back over, picking up P and cross to the other side which would place them all together again.

c) 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).

R = River

RB= Right Bank

LB + Left Bank

C = Cat

P = Parrot

B = Bag of Seed

RB: C,B P R LB: P

RB: B C R LB: C & P

RB: B&P P R LB: C

RB: P B R LB: C&B

RB: P R LB: C,B&P

2) 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?

1. At least one matching pair

You would have 5:5 ratio chances in getting a black pair

1. At least one matching pair of each color.

You have a 5:5 chance in getting a black pair, a 3:7 chance in getting a brown pair and a 2:8 chance in getting a white pair

1) Define the problem

The problem is selecting a pair of matching in the dark

1. What insight can you offer into the problem that is not immediately visible from the word problem alone?

How do you know what color of socks are in the drawer?

1. What is the overall goal?

Matching a pair of socks in the dark as quickly as possible

2) Break the problem apart

1. What are the constraints?

The color of socks: Black, brown and white.

1. What are the sub-goals?

20 socks:

5 pairs of black socks

3 pairs of brown socks

2 pairs of white socks

3) Identify potential solutions

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

50% chance of choosing Black pair of socks

30% chance of choosing brown pair of socks

20% chance of choosing white pair of socks

The only solution is try to select a black pair of socks, for every five pairs you will get matching black socks

4) Evaluate each potential solution

1. Does each solution meet the goals?

Yes, with enough time

1. Will each solution work for ALL cases?

Yes, given enough time this solution will work on each color of socks

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

a) Explain the solution in full.

1. 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).

It’s all about the law of averages, unless a or b are different shapes,

3) 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 100

1) Define the problem

The problem

1. The little girl doesn’t start from one end of the hand and count in order from thumb to little finger
2. What insight can you offer into the problem that is not immediately visible from the word problem alone?

The ability of the little girl to remember how many times she went over each hand to count above 10

1. What is the overall goal?

Determent which finger she stops on for 10, 100, 1000

2) Break the problem apart

1. What are the constraints?

The little girls fingers on her hand

1. What are the sub-goals?

The order in which she courts

3) Identify potential solutions

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

Yes, determent the pattern

4) Evaluate each potential solution

1. Does each solution meet the goals?

Yes

1. Will each solution work for ALL cases?

Yes

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

a) Explain the solution in full.

Set up columns and rows that represent each finger

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).

Based on the pattern she would stop on her first finger for 10, 100 and 1000

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Right Hand | | | | | Left Hand | | | | |
| Thumb | First Finger | Middle Finger | Ring Finger | Little Finger | Ring Finger | Middle Finger | First Finger | Thumb | First Finger |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |