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Problem Solving Activity

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

1. Define the problem
   1. The problem with this scenario is that the man has to get to the other side of the river but can only bring himself and one other passenger on the boat. He must now choose which one is plausible to bring with him.
   2. The insight that I can offer to the problem is that cats don’t eat seed and parrots can fly.
   3. The overall goal is to get everyone across the river safely without the cat eating the parrot or the parrot eating the seed.
2. Break the problem apart
   1. The constraints are that the man can only have one item inside the boat with him and needs to watch what which items he leaves behind so that the items don’t eat one another.
   2. The subgoals are not to leave the bird with the bag of seed and not to leave the cat with the bird.
3. Identify potential solutions
   1. One solution, you can bring the cat first and risk the bird eating the seed.
   2. You can bring the seed first and risk the cat eating the bird.
   3. You can bring the bird first.
   4. You can make the bird fly while you take two trips. One with the seed and one with the cat.
4. Evaluate each potential solution
   1. No each solution does not meet all of the goals, with the exception of the last solution, at some point you would be leaving two items together that shouldn’t be.
   2. Only one solution will work for all cases, which would be the last solution.
5. Choose a solution and develop a plan to implement it.
   1. The solution I would choose is the fourth solution, which would be to take advantage of the fact that parrots can fly. Make the bird fly alongside the boat while you make two sets of trips carrying one item at a time.
   2. In this solution, no matter which item you bring across the river first it will help to settle both cases. If you bring across the cat first and make the bird fly along then the seed is safe from eating and the cat isn’t left with the parrot. If you bring the seed across first then the same thing is true, the parrot isn’t left alone with the seed nor with the cat.

**Socks in the Dark:**

1. Define the problem
   1. The problem is selecting socks in the dark and the probability of receiving at least one matching pair and at least one matching pair of each color.
   2. The insight I can offer is that there’s ½ a chance of selecting a black pair, 3/10 a chance of selecting brown, and 1/5 chance of selecting a white pair.
   3. The overall goal is selecting the least amount of pairs possible while making the cases true.
2. Break the problem apart
   1. The constraints are that we need to select the socks in the dark at random and that we need to select the least amount of socks possible.
   2. The sub-goals are to select one pair of white (x), one pair of brown (y), one pair of black (z), and another pair of any color.
3. Identify potential solutions
   1. Probability that both solutions will be satisfied within four picks.
   2. Regardless, both will be satisfied by 6 picks.
4. Evaluate each potential solution
   1. Does each solution meet the goals?
   2. Will each solution work for ALL cases?
5. Choose a solution and develop a plan to implement it.
   1. Explain the solution in full
   2. Describe some test cases you tried out to make sure it works. (you can include drawings and diagrams as part of you explanation as long as they are clearly communicating the solution).

**Predicting Fingers:**

1. Define the problem
   1. Do this in your own words.
   2. What insight can you offer into the problem that isn’t apparent in the word problem alone?
   3. What is the overall goal?
2. Break the problem apart
   1. What are the constraints?
   2. What are the sub-goals?
3. Identify potential solutions
   1. For each of the sub-problems you’ve discussed in #2, what is a possible solution?
4. Evaluate each potential solution
   1. Does each solution meet the goals?
   2. Will each solution work for ALL cases?
5. Choose a solution and develop a plan to implement it.
   1. Explain the solution in full
   2. Describe some test cases you tried out to make sure it works. (you can include drawings and diagrams as part of you explanation as long as they are clearly communicating the solution).