1. 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 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.

1. **Define the Problem** – A man needs to get across the river in a small boat. Not enough room in the boat for himself, the cat, the bird, and the birdseed. He only has enough room for himself and one other item. He needs to make sure that the cat isn’t left alone with the parrot or the parrot isn’t left alone with the birdseed. The problem is whether these are the only two scenarios that can be dangerous. The overall goal is to get all of them with the birdseed to the other side of the river.
2. **Break the problem apart** – The boat is too small for everything to fit and some of these animals/item cannot be left together alone. The cat cannot be left alone with the parrot because he may hurt it. The parrot cannot be left alone with birdseed because he may eat it. The sub-goals would be to prevent anyone from falling out of the boat, keep the birdseed dry, and get across as quickly as possible.
3. 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.
2. At least one matching pair of each color.
3. Predicting Fingers:

A little girl counts the fingers of her left hand as follows: She starts by calling her thumb 1, the first finger 2, middle finger 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?

1. What if the girl counts from 1 to 10?
2. What if the girl counts from 1 to 10?
3. What if the girl counts from 1 to 1000?