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.

**Define.** The predicament in this situation is that the man cannot transport everything at the same time.

**Break the problem apart.** My first thought of resolve was, of course, that he transports the creatures/item one at a time, leaving them on the other side. However, there are certain predicaments that arise considering if he leaves anything on either side:

1. If he carries the bag of seed first, the cat will eat the parrot
2. Carry the cat, and the parrot will eat the bag of seed!

**Possible Solutions.** Thus, this leaves one instant solution: carry the parrot first since the cat isn’t interested in the bag of seed.  
However, this opens up a second set of problems:

1. If the man brings the cat next, when he goes back for the bag of seeds, the cat will eat the bird!
2. If he brings the bag of seeds to the other side, when he leaves for the cat, the bird will eat the bag of seeds.

**Final Resolve.** This does not mean he cannot bring a creature/item back from the other side; transport is available to and from both sides. My final suggestion is that he does the following:

1. Bring the parrot
2. Go back, bring the cat to the other side
3. Bring the parrot back from the other side, leaving the cat
4. Leave the parrot on the original side, bring the bag of seeds
5. Leave the bag of seeds with the cat, go back for the parrot

This solution will work since there are no rules or constraints against switching items/creatures, complying with the rule to transporting one creature/item one at a time on the boat.

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.*

**Define.** The first part of the problem is to find a matching pair of socks, regardless of color.

**Solution/Resolve.** To get any pair of socks, we must draw two socks from the 20 (in terms of fractions: 2/20). The fraction simplified is 1/10.

For the smallest amount of socks to draw a matching pair, **you’ll need only 10 socks.**

**Define.** As for obtaining one matching pair of each color: Since there is a total of 20 socks in a drawer, the chances of obtaining a certain sock color are as follows:

1. Black—10:20
2. Brown – 6:20
3. White – 4:20

Thus, if we put this situation in terms of fractions, the following facts are true:

1. Half the socks in the drawer are black.
2. 2/5ths of the socks are NOT black.

**Solution/Resolve.** There are 3 types of colors: black, brown, and white. Again, obtaining any random pair of socks is 2/20—two socks out of the 20 total. Therefore, individually, we can break down the problem as thus:

1. Black – 10/20 🡪 divided by 2/20🡪 5/10 🡪 only 5 socks needed
2. Brown – 6/20 🡪 divided by 2/20 🡪 3/10 🡪 3 socks
3. White – 4/20 🡪 divided by 2/20 🡪 2/10🡪 2 socks

But to get a pair of each color, and with there being 3 colors, we must divide the 20 socks in 3.   
To guarantee a pair of each, we would need **30 socks total.**

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

**Define.** The goal is to predict, when counting according to the little girl’s method, which finger would she land on when she counts to 10, 100, and 1000.

**Solution.** One suggestion to solve this is that we *could* count to 10, 100, and 1000 ourselves the way the girl does, which would be extremely tedious.

But since there is a pattern to her method— and one can draft it out as such:

**Final Resolve part a: Finding 10**There are 5 digits on one hand. The first set of 5, numbers to digits, is as follows:

1. Thumb
2. Index finger
3. Middle finger
4. Ring finger
5. Pinky

Then, she goes back and counts her ring finger as 6. If this follows, to 10, the pattern is as follows:

1. Ring
2. Middle
3. Index
4. Thumb
5. Index

The answer to a) is the **Index** finger.

If we count even further to 20, the pattern goes as such:

1. Middle
2. Ring
3. Pinky
4. Ring
5. Middle
6. Index
7. Thumb
8. Index
9. Middle
10. Ring

Notice that the *Ring* and the *Index* finger are counted *twice* in one round—one round counting every 10 to 5 fingers: therefore, there is a 2 of 10 chance of every tenth number to land on either the *Ring* or *Index* finger.

Going to 30…

21) Pinky

22) Ring

23) Middle

24) Index

25) Thumb

26) Index

27) Middle

28) Ring

29) Pinky

30) RING

Going to 40…

31) Middle

32) Index

33) Thumb

34) Index

35) Middle

36) Ring

37) Pinky

38) Ring

39) Middle

40) INDEX

We can deduce that for every 10, she will *NOT* land on the *Thumb, Middle,* or *Pinky*.

Going to 60…

41) Thumb

42) Index

43) Middle

44) Ring

45) Pinky

46) Ring

47) Middle

48) Index

49) Thumb

50) INDEX

51) Middle

52) Ring

53) Pinky

54) Ring

55) Middle

56) Index

57) Thumb

58) Index

59) Middle

60) RING

For every 20, we can count on landing on the *Index* or *Ring* finger.

Therefore, if we eliminate the chances of landing on the Thumb, Middle, or Pinky with this fact:

We are now left with 2 fingers instead of 5: Ring and Index.

From the number 30 onward, for every 20 counts, we can rely on the girl landing on either the *Ring* or *Index* finger.

If this pattern continues, at 70, we will land on the *Ring* finger, 80— *Index*, 90 – *Index*, 100 – *RING.*

**Final Resolve.** Therefore the answer to b) is *RING* finger

**Define.** —but will she always land on the *Ring* finger for every 100?

We can go further to answer c) for 1000. If we count by what we know (*every* ***20*** the finger will change):

100 – Ring

120 – Index

140 – Ring

160 – Index

180 – Ring

200 – *INDEX*

220 – Ring

240 – Index

260 – Ring

280 – Index

300 – *RING*

320 – Index

340 – Ring

360 – Index

380 – Ring

400 – *INDEX*

It is safe to say that for every 100, the finger the girl lands on will change.

If this pattern continues:

500 will be *Ring*

600 – Index

700 – Ring

800 – Index

900 – Ring

1000 – *INDEX*

**Resolve.** The answer to c) is Index finger.