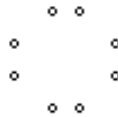


Puzzle 5 - SOLUTION

Problem 1 *Mr and Mrs Brown are having a party. They invited three other married couples, so there are eight people present. When greeting each other, some people shake hands with some people. Of course, nobody shakes hands with his/her spouse. When Mr Brown asks the other seven people: "How many people did you shake hands with?", he receives seven different answers. How many people did Mrs. Brown shake hands with?*

Solution 1 *Mr. Brown receives 7 different answers. First we need to figure out what those answers were. What is the highest possible number among the answers? Suppose I am the one who shook hands with everyone I could. There are 8 people, I won't shake my own hand, and I won't shake hands with my spouse, so that leaves 6 hand shakes for me.*

What is the lowest possible number among the answers? Clearly 0. Now we know that the answers were 7 different numbers between 0 and 6. Those numbers can only be 0, 1, 2, 3, 4, 5, and 6. Let us represent the 4 married couples on the picture below.



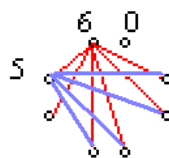
By symmetry, we may arbitrarily pick the person with 6 handshakes. We denote the number of handshakes by a little number. Let us represent the handshakes with lines. Now our picture looks like this:



Can you see it? Our choice of the person with 6 handshakes determines the identity of the one with 0 handshakes: they have to be married! So now our picture is:



This is the main idea; we only need to apply it again and again. Let us pick the person with 5 hand shakes. Now the picture is:



Now we see that the person with 5 hand shakes and the person with 1 hand shake has to be married. And so on, we play this game until we find that the married couples are:

6 and 0,

5 and 1,

4 and 2.

The only number that was not paired up, is 3. This means that the person who said s/he shook hands with three people, is someone whose spouse was not asked. Mr. Brown did not ask himself, so his number is missing. So Mrs. Brown MUST BE the one with 3 hand shakes. Thus, Mrs. Brown shook hands with 3 people.