**1.Ajay and Vijay have some marbles with them. Ajay told Vijay “if you give me ‘x’ marbles, both of us will have equal number of marbles”. Vijay then told Ajay “if you give me twice as many marbles, I will have 30 more marbles than you would”. Find ‘x’?**

**SOLUTION:**

If Vijay gives 'x' marbles to Ajay then Vijay and Ajay would have V - x and A + x marbles.  
V - x = A + x --- (1)  
If Ajay gives 2x marbles to Vijay then Ajay and Vijay would have A - 2x and V + 2x marbles.  
V + 2x - (A - 2x) = 30 => V - A + 4x = 30 --- (2)  
From (1) we have V - A = 2x  
Substituting V - A = 2x in (2)  
6x = 30 => x = 5.

**2.A box contains 2 white shirts, 3 black shirts, and 4 red shirts. In how many ways can 3 shirts be drawn from the box, if at least one black shirt is to be included in the draw?**

**SOLUTION:** To find the number of ways to draw 3 shirts from the box, if at least one black shirt is to be included in the draw, we need to use the concept of combination and selection. According to the search results[1](https://www.britannica.com/science/permutation), a combination is a way of selecting items from a collection where the order of selection does not matter. The number of combinations of n items taken r at a time is denoted by nCr and given by the formula:

nCr = n! / (r! (n - r)!)

where n! means n factorial, which is the product of all positive integers from 1 to n.

In this problem, we have two cases to consider:

Case 1: We draw exactly one black shirt and two other shirts. In this case, we have 3 choices for the black shirt and 6 choices for the other two shirts (2 white and 4 red). The number of ways to select one black shirt is 3C1, which is 3. The number of ways to select two other shirts is 6C2, which is 15. Therefore, by the multiplication principle, the number of ways to draw one black shirt and two other shirts is:

3C1 x 6C2 = 3 x 15 = **45**

Case 2: We draw exactly two black shirts and one other shirt. In this case, we have 3 choices for the two black shirts and 6 choices for the other shirt. The number of ways to select two black shirts is 3C2, which is 3. The number of ways to select one other shirt is 6C1, which is 6. Therefore, by the multiplication principle, the number of ways to draw two black shirts and one other shirt is:

3C2 x 6C1 = 3 x 6 = **18**

Hence, by adding the two cases, we get the total number of ways to draw 3 shirts from the box, if at least one black shirt is to be included in the draw as:

45 + 18 = **63**