Q. Show that the number of different triples that can be chosen from N items is precisely $N * (N - 1) * (N - 2)/6$.

A. Number of ways to choose 1st element t_0 of 3 tuple = N
Number of ways to choose 2nd element t_1 without repetition = (N - 1)
Number of ways to choose 3rd element t_2 = (N - 2)
So, total number of ways to choose a unique tuple = $N * (N - 1) * (N - 2)$

The total number of ways includes all permutations of a tuple as well.
(a, b, c) and (b, a, c) would be counted seperately.
For each unique 3 tuple, there are 6 different configurations (3!)
So, to calculate each tuple only once, the total number needs to be divided by 6.

Hence, number of triples = $N * (N - 1) * (N - 2)/6$