1. Q — How many strings are there over the alphabet A,B,C with exactly 10 A's, 10 B's, and 10 C's? Please write a short explanation.

A — The total number of such strings are:

$$\binom{30}{10, 10, 10}$$

Since there are 10 A's + 10 B's + 10 C's = 30 total symbols to choose from, but among the A's, the B's and the C's there is no difference in the symbols, the number of rearrangements equals the Multinomial Coefficient:

$$\binom{n}{k_1, k_2, .., k_r}$$