Math AA HL at KCA - Chapter 12 Notes

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1 Arrangements using Permuatations

The number of arrangements of n elements is

$$n!$$

The number of ways to arrange a **multiset** (a collection that, unlike sets, allows for repeated instances) of N elements is given by

$$\frac{N!}{n_1 n_2 n_3 \ldots n_k}$$

where

- n_i is the number of instances of each distinct element

2 The Binomial Coefficient

The following finds the number of ways to choose r groups from n entries when *the order does not matter*

$$^nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

3 Permutation of Groups

The following finds the number of ways to choose r unique groups from n entries when *the order does matter*

$$^nP_r = {}^n C_r \times r! = \frac{n!}{(n-r)!}$$

4 Combinations with Repetition

Suppose a sequence of n balls are to be colored from m different colors, then the total number of possible arrangements with repetitions permitted is

$$m^n$$

Example: the number of binary number combinations using m digits is 2^m