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PROBABILITY RULES

RULE 1: The Fundamental Counting Principle: If one operation can be done in m number of ways and a second operation can be done in n number of ways, then the total possible number of different ways in which both operations can be done is $m \times n$.

RULE 2: The number of arrangements of n different things taken in n ways is $n!$

RULE 3: The number of arrangements of n different things taken r at a time is given by: $\frac{n!}{(n-r)!}$

RULE 4: The number of different ways that n letters can be arranged where m_1 of the letters are identical, m_2 of the letters are identical, m_3 of the letters are identical, ... Is given by:

$$\frac{n!}{m_1! \times m_2! \times m_3! \times \dots \dots \dots}$$

Where the repeated letters are treated as identical.

ARRANGING ITEMS WHERE THE ORDER OF THE ITEMS MATTERS IS CALLED A PERMUTATION

EXAMPLE:

How many five digit codes can be formed from the numbers 1, 2, 3, 4 and 5 if:

1. No digit may be used more than once.
2. No digit may be used more than once and the code must start with 5.
3. There is no restriction on how often a digit is used but the code must end with 5.
4. There is no restriction on how often a digit is used, but the code must start with 5 and end with 1.
5. There is no restriction on how often a digit is used, but the code must start with 5 or 1.