Permutation & Combination

rs Multiplication Principle/Rule

1. If an operation can be carried out in r ways and another operation can be carried out in s ways, then the number of ways to carry out both the operations consecutively is r x s, i.e. rs.

2. The rs multiplication principle can be expanded to three or more operations. If the numbers of ways for the occurrence of events A, B and C are r, s and p respectively, the number of ways for the occurrence of all the three events consecutively is r x s x p, i.e. rsp.

Permutation

Fundametal

1. The number of permutations of n different objects is n!, where

$$^{n}P_{n} = n!$$

2. n!, is read as n factorial.
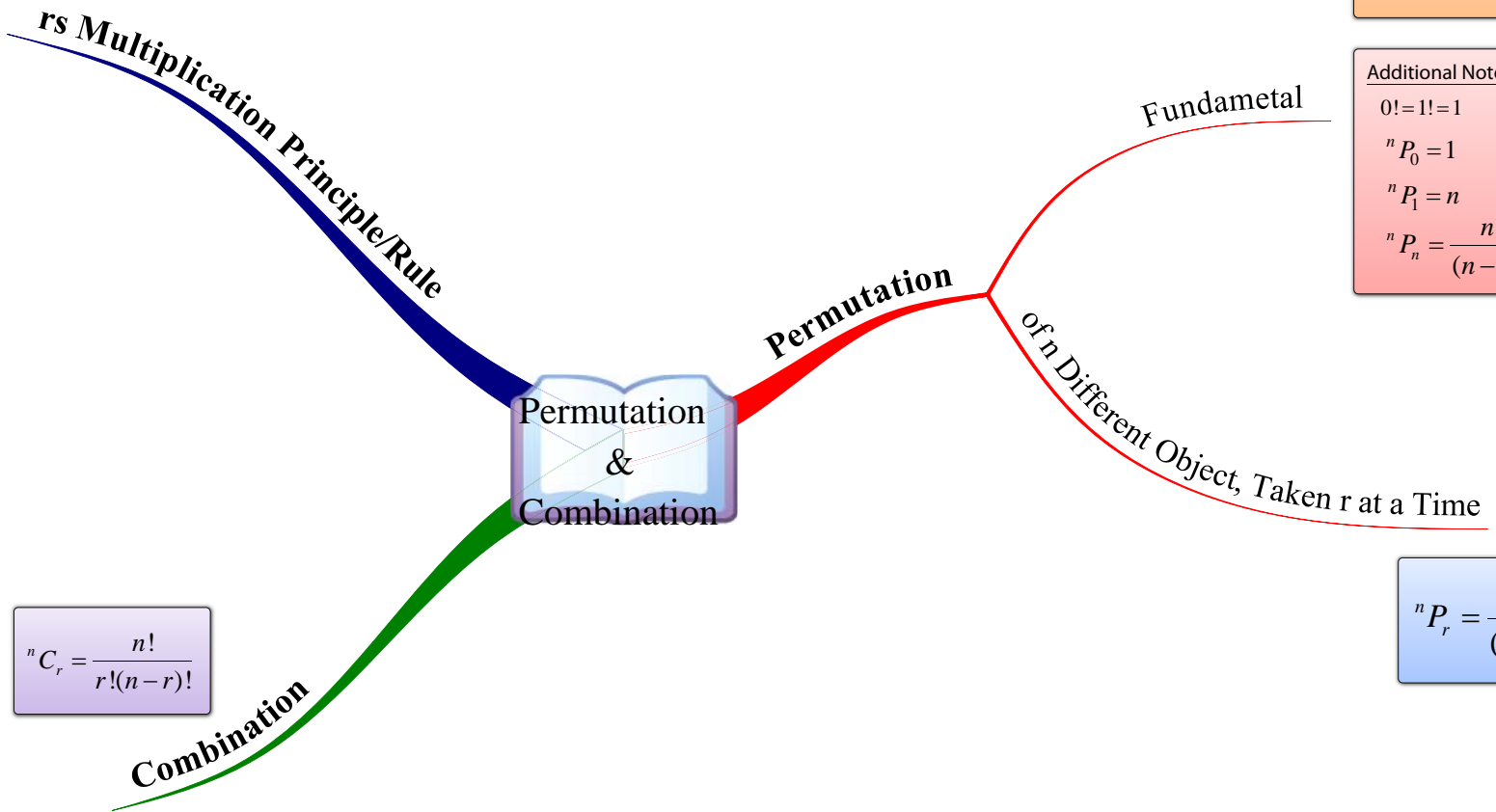
$$n! = n(n-1)(n-2)\ldots\ldots 3 \times 2 \times 1$$

Additional Notes

$$0! = 1! = 1$$

$$^{n}P_{0} = 1$$

$$^{n}P_{1} = n$$

$$^{n}P_{n} = \frac{n!}{(n-n)!} = \frac{n!}{0!} = \frac{n!}{1} = n!$$

of n Different Object, Taken r at a Time

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

Combination

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

Aditional Notes

$$^{n}C_{0} = 1$$

$$^{n}C_{n} = 1$$

$$^{n}C_{r} = {}^{n}C_{n-r}$$

$$^{n}C_{r} \times r! = {}^{n}P_{r}$$