Permutations

- The number of permutations of n objects is the number of ways in which the objects can be arranged in terms of order:
- Permutations of n objects :

$$n! = (n) \times (n-1) \times (n-2) \ldots \times 2 \times 1$$

- The symbol n! is read “n factorial”.
- In permutations and combinations problems, n is always positive. Also, note that by definition $0! = 1$ in mathematics.

Combinations

- In the case of permutations, the order in which the objects are arranged is important.
- In the case of combinations, we are concerned with the number of different groupings of objects that can occur without regard to their order.
- Therefore, an interest in combinations always concerns the number of different subgroups that can be taken from n objects. The number of combinations of n objects taken r at a time is

Permutations

Suppose a four letter code is made from the letters $\{a,b,c,d,e\}$, where repetitions are allowed and the order of the letters in the code is significant

For example a,a,e,c is a different code to a,c,e,a.

Permutations

- Let $\mathscr{U}$ be the set of all such codes.
- Let $\mathscr{V}$ be the set of all such codes beginning with a vowel.
- Let $\mathscr{P}$ be the set of all such codes which are palindromic.

(A palindromic code is a string of letters which read the same backwards as forwards, for example a,e,c,e,a is a 5 letter palindromic code.)

Permutations

How many elements are there in the set $\mathscr{U}$?

(i)	(ii)	(iii)	(iv)

Permutations

How many elements are there in the set $\mathscr{V}$?

(i)	(ii)	(iii)	(iv)

Permutations

How many elements are there in the set $\mathscr{P}$?

(i)	(ii)	(iii)	(iv)

Permutations

How many elements are there in the sets $\mathscr{V}$ and $\mathscr{P}$?

(i)	(ii)	(iii)	(iv)

Empty