

Chapter 07

PERMUTATIONS AND COMBINATIONS

Selection from identical objects:

Suppose there are 'n' identical objects. How many ways one object can be selected?

Answer is '1' as we have no options to select. We can blindly pick any object. Similarly, number of ways of selecting two objects is also 1. In fact, no. of ways of selecting any number of objects say 'r' is 1.

I. Selection of zero or more objects from 'n' identical objects:

Here, we can select zero, one, two, three or more objects (up to all objects).

So, number of ways are:

$$1 + 1 + 1 + 1 + \dots + 1 ((n + 1) \text{ times}) = n + 1.$$

II. Selection of atleast one object from 'n' identical objects:

Clearly, here zero selection is not allowed, example, we have to select one, two, three or more objects (up to all objects).

So, number of ways of selection are:

$$1 + 1 + 1 + \dots + 1 (n \text{ times}) = n.$$

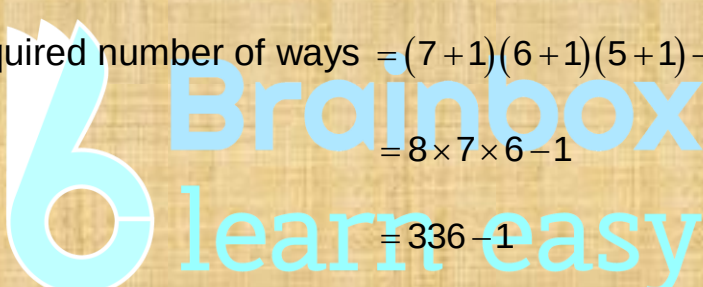
III. Selection from distinct and identical objects:

The total number of ways of selecting one or more items from 'p' identical items of one kind; 'q' identical items of second kind; 'r' identical items of third kind and 'n' different items is $(p+1)(q+1)(r+1)2^n - 1$.

EXAMPLE:

The number of ways in which 7 pencils, 6 books and 5 pens be disposed off is_____

SOLUTION:



Required number of ways $= (7+1)(6+1)(5+1) - 1$
 $= 8 \times 7 \times 6 - 1$
 $= 336 - 1$
 $= 335$

∴ Required number of ways = 335.