

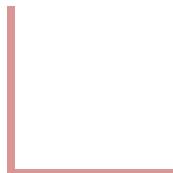
# Mathematical Foundations for Computer Applications

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## Permutation with multisets

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## Permutation with multisets

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The number of permutations of a multi set(a set with same of the objects are alike) is :  $P(n:n_1, n_2 \dots n_r)$  is the number of permutation of  $n$  objects , in which  $n_1$  is alike,  $n_2$  is alike etc Then

$$P(n:n_1, n_2 \dots n_r) = \frac{n!}{n_1!*n_2!.....nr!}$$

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## Problems

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1. In how many ways can the letters of the word 'LEADER' be arranged ?

The word 'LEADER' has 6 letters.

But in these 6 letters, 'E' occurs 2 times and rest of the letters are different.

Hence, number of ways to arrange these letters  
 $= 6! / 2! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 / 2 \times 1 = 360$

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2. How many arrangements can be made out of the letters of the word 'ENGINEERING' ?

- The word 'ENGINEERING' has 11 letters.  
'E' occurs 3 times, 'N' occurs 3 times, 'G' occurs 2 times, 'I' occurs 2 times and rest of the letters are different.  
Hence, number of ways to arrange these letters

$$= 11! / (3!)(3!)(2!)(2!)$$

$$= 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 / (3 \times 2)(3 \times 2)(2)(2)$$

$$= 277200$$

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3. In how many different ways can the letters of the word 'RUMOUR' be arranged?

Hence, number of ways to arrange these letters

$$= 6! / (2!)(2!)$$

$$= 6 \times 5 \times 4 \times 3 \times 2 / 2 \times 2$$

$$= 180$$

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4. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

The 5 vowels can be grouped and considered as a single letter. that is, CRPRTN(OOAIO).

Hence we can assume total letters as 7. But in these 7 letters, 'R' occurs 2 times and rest of the letters are different.

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Number of ways to arrange these letters

$$=7!/2! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 / 2 \times 1 = 2520$$

In the 5 vowels (OOAIO), 'O' occurs 3 and rest of the vowels are different.

Number of ways to arrange these vowels among themselves  $= 5! / 3! = 5 \times 4 \times 3 \times 2 \times 1 / 3 \times 2 \times 1 = 20$

Hence, required number of ways  $= 2520 \times 20 = 50400$



**THANK YOU**

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