



### Permutations Ex 16.5 Q22

In a dictionary the words at each stage are arranged in alphabetical order.

Starting with letter I, and arranging the other 5 letters, we obtain  $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ .

Then starting with R, and arranging the other five letters I, I, S, T, U in different ways,

we obtain  $\frac{5!}{2!} = \frac{120}{2} = 60$ .

Number of words beginning with S is  $\frac{5!}{2!}$ , but one of these words is the word SURITI itself.

So, we first find the number of words beginning with SI, SR, ST, SUI and SURI.

Number of words starting with SI =  $4! = 24$

Number of words starting with SR =  $\frac{4!}{2!} = 12$

Number of words starting with ST =  $\frac{4!}{2!} = 12$

Number of words starting with SUI =  $3! = 6$

Now, the words beginning with 'SUR' must follow.

There are  $\frac{3!}{2!} = 3$  words beginning with SUR one of these words is the word SURITI.

The first word beginning which SUR is the word SURIIT and the next word is SURITI.

$$\begin{aligned}\therefore \text{Rank of SURITI} &= 120 + 60 + 24 + 2 \times 12 + 6 + 2 \\ &= 180 + 56 \\ &= 236.\end{aligned}$$

### Permutations Ex 16.5 Q23

In a dictionary the words at each stage are arranged in alphabetical order. In the given problem we must therefore consider the words beginning with A, E, L, T in order.

'A' will occur in the first place as often as remaining 3 letters all at a time i.e A will occur in the first place the same number of times.

$\therefore$  Number of words starting with A =  $3! = 6$

Number of words starting with E =  $3! = 6$

Number of words beginning with L is  $3!$ , but one of these words is the word LATE itself.

The first word beginning with L is the word LATE and the next word is LATE.

$$\begin{aligned}\therefore \text{Rank of LATE} &= 2 \times 6 + 2 \\ &= 12 + 2 \\ &= 14.\end{aligned}$$

### Permutations Ex 16.5 Q24

In the dictionary the words at each stage are arranged in alphabetical order. In the given problem we must therefore consider the words beginning with E, H, M, O, R, T in order. E will occur in the first place as often as there are ways of arranging the remaining 5 letters

$$\therefore \text{Number of words starting with E} = 5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

$$\text{Number of words starting with H} = 5! = 120.$$

Number of words beginning with M is 5!, but one of these words is the word MOTHER.

So, we first find the number of words beginning with ME and MH.

$$\text{Number of words starting with ME} = 4! = 4 \times 3 \times 2 \times 1 = 24.$$

Now, the words beginning with 'MO' must follow.

There are 4! words beginning with MO, one of these words is the word MOTHER itself.

So, we first find the number of words beginning with MOE, MOH and MOR.

$$\text{Number of words starting with MOE} = 3! = 6$$

$$\text{Number of words starting with MOH} = 3! = 6$$

$$\text{Number of words starting with MOR} = 3! = 6$$

Number of words beginning with MOT is 3! but one of these words is the word MOTHER itself

So, we first find the number of words beginning with MOTE.

$$\text{Number of words starting with MOTE} = 2! = 2$$

Now, the words beginning with MOTH must follow.

There are 2! words beginning with MOTH, one of these words is word MOTHER itself.

The first word beginning with MOTH is the word MOTHER.

$$\begin{aligned} \therefore \text{Rank of MOTHER} &= 2 \times 120 + 2 \times 24 + 3 \times 6 + 2 + 1 \\ &= 240 + 48 + 18 + 3 \end{aligned}$$

$$= 309$$

## Permutations Ex 16.5 Q25

In a dictionary the words at each stage are arranged in alphabetical order. In the given problem we must therefore consider the words beginning with a,b,c,d,e in order. 'a' will occur in the first place as often as there are ways of arranging the remaining 4 letters all at a time i.e 'a' will occur 4! times. similarly b and c will occur in the first place the same number of times

$$\therefore \text{Number of words starting with 'a'} = 4! = 4 \times 3 \times 2 \times 1 = 24$$

$$\text{Number of words starting with 'b'} = 4! = 4 \times 3 \times 2 \times 1 = 24$$

$$\text{Number of words starting with 'c'} = 4! = 4 \times 3 \times 2 \times 1 = 24$$

Number of words beginning with 'd' is 4!, but one of these words is the word debac.

So, we first find the number of words beginning with da, db, dc, and dea

$$\text{Number of words starting with da} = 3! = 6$$

$$\text{Number of words starting with db} = 3! = 6$$

$$\text{Number of words starting with dc} = 3! = 6$$

$$\text{Number of words starting with dea} = 2! = 2$$

There are 2! words beginning with deb one of these words is the word debac itself

The first word beginning with deb is the word debac.

$$\therefore \text{Rank of debac} = 3 \times 24 + 3 \times 6 + 2 + 1$$

$$= 72 + 18 + 3$$

$$= 90 + 3$$

$$= 93$$

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