Permutations Ex 16.4 Q1

There are 4 vowels and 3 consonants in the word 'FAILURE'

We have to arrange 7 letters in a row such that consonants occupy odd places. There are 4 odd places $\{1,3,5,7\}$. There consonants can be arranged in these 4 odd places in ${}^4P_3$ ways.

Remaining 3 even places $\{2,4,6\}$ are to be occupied by the 4 vowels. This can be done in ${}^4P_3$ ways.

Hence, the total number of words in which consonants occupy odd places = ${}^4P_3 \times {}^4P_3$

$$= \frac{4!}{(4-3)!} \times \frac{4!}{(4-3)!}$$
$$= 4 \times \times 3 \times 2 \times 1 \times 4 \times 3 \times 2 \times 1$$
$$= 24 \times 24$$
$$= 576.$$

Permutations Ex 16.4 Q2

There are 7 letters in the word 'STRANGE', including 2 vowels (A, E) and 5 consonants (S, T, R, N, G).

(i) Considering 2 vowels as one letter, we have 6 letters which can be arranged in ${}^6p_6 = 6!$ ways

A, E can be put together in 2! ways.

Hence, required number of words

$= 6! \times 2!$

$= 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 2$

$= 720 \times 2$

$= 1440.$

(ii) The total number of words formed by using all the letters of the words 'STRANGE'

is ${}^7p_7 = 7!$

$= 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 5040.$

So, the total number of words in which vowels are never together

= Total number of words − number of words in which vowels are always together

$= 5040 - 1440$

$= 3600$

(iii) There are 7 letters in the word 'STRANGE'. out of these letters 'A' and 'E' are the vowels.

There are 4 odd places in the word 'STRANGE'. The two vowels can be arranged in ${}^4p_2$ ways.

The remaining 5 consonants can be arranged among themselves in ${}^5p_5$ ways.

The total number of arrangements

$= {}^4p_2 \times {}^5p_5$

$= \frac{4!}{2!} \times 5!$

$= 1440$

Permutations Ex 16.4 Q3

There are 6 letters in the word 'SUNDAY'. The total number of words formed with these 6 letters is the number of arrangements of 6 items, taken all at a time, which is equal to ${}^6P_6 = 6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720.$

If we fix up D in the beginning, then the remaining 5 letters can be arranged in ${}^5P_5 = 5!$ ways.

so, the total number of words which begin with D = 5!

$= 5 \times 4 \times 3 \times 2 \times 1 = 120.$

Permutations Ex 16.4 Q4

There are 4 vowels and 4 consonants in the word 'ORIENTAL'. We have to arrange 8 leeters in a row such that vowels occupy odd places. There are 4 odd places $(1,3,5,7)$. Four vowels can be arranged in these 4 odd places in 4! ways. Remaining 4 even places $(2,4,6,8)$ are to be occupied by the 4 consonants.

This can be done in 4! ways.

Hence, the total number of words in which vowels occupy odd places = $4! \times 4!$

$= 4 \times 3 \times 2 \times 1 \times 4 \times 3 \times 2 \times 1$

$= 576.$

*********** END **********