

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 = ${}^4P_3 \times {}^4P_3$

$$= \frac{4!}{(4-3)!} \times \frac{4!}{(4-3)!}$$

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

$$= 24 \times 24$$

$$= 576.$$

Permutations Ex 16.4 Q2

There are 7 letters in the word $^{\circ}$ 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 $^{6}p_{6}$ = 6! ways A,E can be put together in 2! ways.

Hence, required number of words

- $= 61 \times 2$
- $= 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 2$
- $=720 \times 2$
- = 1440.
- (ii) The total number of words formed by using all the letters of the words 'STRANGE' is $^{7}p_{7} = 7!$
- $=7\times6\times5\times4\times3\times2\times1$
- =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

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

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.