← ULTIMATE MATHEMATICS (BY: AJAY MITTAL) →

Chapter: PERMUTATION & COMBINATION

← CLASS NO: 2 →

WORDS

INVOLUTE

data. total = 8 ; vowels = I, O, U, E = 4

Consonants = N, V, L, T = 4

(1) total no of words using all letters

$n = 8$, $r = 8$

no of words = ${}^8P_8 = 8! =$ ☐ Ans.

(2) using 5 letters

$n = 8$; $r = 5$

no of words = ${}^8P_5 = \frac{8!}{3!} = \frac{8 \times 7 \times 6 \times 5 \times 4 \times 3!}{3!} =$ ☐ Ans.

(3) Start with N and end with T

$\frac{N}{(1)}$ ☐ $\frac{T}{(1)}$ ☐ = 6!

No of words = $1 \times 6! \times 1 = 6! = 720$ Ans.

(4) using 5 letters. Start with N and end with T

$\frac{N}{(1)}$ ☐ $\frac{T}{(1)}$ ☐ = ${}^6P_3$

No of words = $1 \times {}^6P_3 \times 1$

$= \frac{6!}{3!} = \frac{6 \times 5 \times 4 \times 3!}{3!}$

$= 120$ Ans.

(5) Starting & ending with a vowel

4 | 6! | 3 No of words

= 4 × 6! × 3

= 12 × 720 = □

(6) Using 5 letters start and end with a Consonant

4 | $^6P_3$ | 3 = 4 × $^6P_3$ × 3 = □

(7) "All vowels occur together"

(·) Consider 4 vowels as 1 letter. (I, O, UE) = 1

(·) Now we have to arrange (4+1) = 5 letters

(·) then 5 letters can be arranged in = 5! ways

(·) 4 vowels can mutually arranged in = 4! ways

(·) Required no of ways in which all the vowels occur together = 5! × 4!

(8) all vowels occur together & all Consonants occur together.

(·) (I, O, U, E) = 1 and (N, V, L, T) = 1

(·) Now we have to arrange 2 letters =

(·) then two letters can be arranged in = 2! ways

(·) 4 vowels can mutually arranged in = 4! ways

(·) 4 Consonant " " " = 4! ways

(·) Required No of words = 2! × 4! × 4! = 2 × 24 × 24 = □

(9) N is always next to E

(EN) = 1

- ✓ Consider E & N as 1 letter
- ✓ Now have to arrange = (6+1) = 7 letters
- ✓ these 7 letters can be arranged in 7! ways
- ✓ Req number of words = $7! \times 1 = 7!$

(10) all vowels never together

Shortcut | not together = total − together |

total no. of words = 8!

all vowels together = $5! \times 4!$ --- (From (7))

Req. no of words = $8! - 5! \times 4! =$ ☐

(11) I & V never/not together

I & V together = (I,V) = 1 = $7! \times 2!$

I & V not together = $8! - 7! \times 2!$

(12) vowels occupy odd places

$= 4! \times 4! = 24 \times 24 =$ ☐

(13) Vowels and consonants are alternating:

Case (I) VCVCVCVCV

Case (II) CVCVCVCVC

Case I = $4! \times 4!$ =

Case II $4! \times 4!$ =

Required No of ways = Case I + Case II = $(4! \times 4!) + (4! \times 4!)$

=

(14) "No two" vowels are together

Ans

$- C_1 - C_2 - C_3 - C_4 -$

(·) There are 5 places available for 4 vowels which they can be arranged in = $^5P_4$ ways

(·) 4 Consonants can mutually arranged in = $4!$ ways

(·) Req. no of ways in which "No two" vowels are together = $^5P_4 \times 4!$

(15) There are always three letters b/w I & N

I	I	I	I	N	N	N	N

$= (6! \times 4) \times 2$

WORD — INEFFECTIVE

total letters : 11

Vowels = I, I, E, E, E = 5

Consonants = N, F, F, C, T, V = 6

(1) total no of words = $\frac{11!}{2!\,3!\,2!}$ = ☐

(2) all vowels occur together

(I, I, E, F, E) = 1

$= \frac{7!}{2!} \times \frac{5!}{2!\,3!}$

(3) "No two" vowels are together.

$- C_1 - C_2 - C_3 - C_4 - C_5 - C_6 -$

$= \frac{{}^7P_5}{2!\,3!} \times \frac{6!}{2!}$

(4) Starting with a vowel

(X) ~~2~~ ☐ 10!

Case I — I — ☐ $= 1 \times \frac{10!}{3!\,2!}$

Case II — E — ☐ $= 1 \times \frac{10!}{2!\,2!\,2!}$

∴ Required no of ways = Case I + Case II Ans — x —

← WORKSHEET No: 1 → (class=2)

← Permutation & combination →

Qn 1 → How many words can be formed from the letters of the word DAUGHTER so that

(i) the vowels always come together

(ii) the vowels never come together

Ans (1) 4320 (2) = 36000

Qn 2 → Word EQUATION. How many words

(i) begin with E ?

(2) begin with E and end with N ?

(3) the word begin and end with a constant ?

Ans (1) 7! (2) 6! (3) 4320

Qn 3 → In how many ways can the letters of the word PERMUTATIONS be arranged if

(i) the words start with P end with S Ans 1814400

(2) vowels are all together (2) Ans 241920

(3) there are always 4 letters b/w P & S (3) Ans 25401600

Qn 4 → In how many ways can the letters of the word INTERMEDIATE be arranged so that:

(i) the vowels always occupy even places ?

(2) the relative order of vowels and consonants do not alter ?

Ans (1) 21600 (2) 21600

Qn-5 → If $P(2n-1, n) : P(2n+1, n-1) = 22 : 7$
Find n Ans $n = 10$

Qn 6 → If ${}^{n}C_{r-1} = 36$; ${}^{n}C_{r} = 84$ and ${}^{n}C_{r+1} = 126$
Find r Ans $r = 3$

Qn-7 In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?
Ans 151200

Qn 8 → In how many of the distinct permutations or arrangements of the letter in MISSISSIPPI do the four I's not come together?
Ans 33810

—x—