DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :6

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(d)**

Let the total number of contestants $= n$

A voter can vote to $(n-1)$ candidates

$\therefore\ {}^nC_1 + \dots + {}^nC_{n-1} = 126$

$\Rightarrow\ 2^n - 2 = 126$

$\Rightarrow\ 2^n = 128 = 2^7$

$\Rightarrow\ n = 7$

2 **(c)**

We have,

${}^nC_{n-r} + 3\cdot {}^nC_{n-r+1} + 3\cdot {}^nC_{n-r+2} + {}^nC_{n-r+3} = {}^xC_r$

$\Rightarrow\left({}^nC_{n-r} + {}^nC_{n-r+1}\right) + 2\left({}^nC_{n-r+1} + {}^nC_{n-r+2}\right)$

$+\left({}^nC_{n-r+2} + {}^nC_{n-r+3}\right) = {}^xC_r$

$\Rightarrow {}^{n+1}C_{n-r+1} + 2\,{}^{n+1}C_{n-r+2} + {}^{n+1}C_{n-r+3} = {}^rC_r$

$[\because {}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r]$

$\Rightarrow\left\{{}^{n+1}C_{n-r+1} + {}^{n+1}C_{n-r+2}\right\} + \left\{{}^{n+1}C_{n-r+2} + {}^{n+1}C_{n-r+3}\right\} = {}^xC_r$

$\Rightarrow {}^{n+2}C_{n-r+2} + {}^{n+2}C_{n-r+3} = {}^xC_r$

$\Rightarrow {}^{n+3}C_{n-r+3} = {}^xC_r$

$\Rightarrow {}^{n+3}C_r = {}^xC_r \qquad [\because {}^{n+3}C_{n-r+3} = {}^{n+3}C_r]$

$\Rightarrow x = n + 3$

3 **(b)**

A 2×2 matrix has 4 elements such that each element can two values. Thus, total number of matrices

$= 2\times 2\times 2\times 2 = 16$

4 **(a)**

$\because$ Total number of seats $= n$

and number of people $= m$

Ist person can be seated in n ways

IInd person can be seated in $(n-1)$ ways

……………

……………

…………

mth person can be seated in $(n-m+1) ways$

$\therefore$ Total number of ways

$=n(n-1)(n-2)\ldots(n-m+1)={}^{n}P_{m}$

Alternate In out of n seats m people can be seated in ${}^{n}P_{m}$ ways

5 **(c)**

Given word is EAMCET

Here number of vowels are 3 *ie*, E, A, E and number of consonants are 3, *ie*, M, C, T and number of ways of arranging three consonants $=3!=6$

V C V C V C V

In the places 'V', we shall arrange vowels

There are 4 places marked V

$\therefore$ Number of ways of arranging vowels

$={}^{4}P_{3}+\frac{1}{2}=12$ [$\because$ E is repeated twice]

$\therefore$ Total number of words $=6\times 12=72$

7 **(d)**

The vowels in the word "COMBINE" are O, I, E which can be arranged at 4 places in ${}^{4}P_{3}$ ways and other words can be arranged in 4! ways

Hence, total number of ways $={}^{4}P_{3}\times 4!$

$=4!\times 4!$

$=576$

8 **(b)**

Number of ways of giving one prize for running $=16$

Number of ways of giving one prizes for swimming $=16\times 15$

Number of ways of giving three prizes for riding $=16\times 15\times 14$

$\therefore$ Required ways of giving prizes $=16\times 16\times 15\times 16\times 15\times 14$

$=16^{3}\times 15^{2}\times 14$

9 **(b)**

First we fix the alternate position of girls and they arrange in 4! ways and in the five places five boys can be arranged in ${}^{5}P_{5}$ ways

$\therefore$ Total number of ways $=4!\times {}^{5}P_{5}=4!\times 5!$

10 **(c)**

Number of vertices=15

$\therefore$ Number of lines $={}^{15}C_{2}=105$

$\therefore$ Number of diagonals=105-15=90

11 **(b)**

At least one green ball can be selected out of 5 green balls in $2^5 - 1 = 31$ ways. Similarly at least one blue ball can be selected from 4 blue balls in $2^4 - 1 = 15$ ways and at least one red or not red can be select in $2^3 = 8$ ways

Hence ,required number of ways $= 31 \times 15 \times 8 = 3720$

12 **(c)**
We have,
The required number of words
$= \left({}^2C_1 \times {}^4C_2 + {}^2C_2 \times {}^4C_1 \right) 3\,! = 96$

13 **(c)**
First deduct the n things and arrange the m things in a row taken all at a time, which can be done in $m!$ ways. Now in $(m+1)$ spaces between them (including the beginning and end) put the n things one in each space in all possible ways. This can be done in ${}^{m+1}P_n$ ways.

So, the required number $= m\,!\,{}^{m+1}P_n = \frac{m\,!\,(m+1)\,!}{(m+1-n)\,!}$

14 **(b)**
Number greater than 1000 and less than or equal to 4000 will be of 4 digits and will have either 1 (expect 1000) or 2 or 3 in the first place with 0 in each of remaining places.
After fixing 1st place, the second place can be filled by any of the 5 numbers.
Similarly, third place can be filled up in 5 ways and 4th place can be filled up in 5 ways. Thus, there will be $25 \times 5 = 125$
Ways in which 1 will be in first place but this include 1000 also hence there will be 124 numbers having 1 in the first place. Similarly, 125 ways for each 2 or 3 in the Ist place.
One number will be in which 4 in the first place *ie*, 4000
Hence, the required number of numbers

$$= 124 + 125 + 125 + 1 = 375$$

15 **(a)**
Considering four particular flowers as one flower, we have five flowers which can be strung to form a garland in 4! ways. But, 4 particular flowers can be arranged in 4! ways. Thus, the required number $= 4\,! \times 4\,!$

16 **(b)**
Any number between 1 to 999 is a 3 digit number xyz where the digits x,y,z are any digits from 0 to 9.

Now, we first count the number in which 3 occurs once only. Since 3 can occur at one place in ${}^3C_1$ ways, there are ${}^3C_1.(9 \times 9) = 3.9^2$ such numbers.

Again, 3 occur in exactly two places in ${}^3C_2.(9)$ such numbers. Lastly 3 can occur in all the three digits in one such number only 333

$\therefore$ The number of times 3 occurs

$= 1 \times (3 \times 9^2) + 2 \times (3 \times 9) + 3 \times 1 = 300$

17 **(b)**

Number of triangles = ${}^{n+3}C_3 = 220$

$\Rightarrow \quad \frac{(n+3)!}{3!n!} = 220$

$\Rightarrow \quad (n+1)(n+2)(n+3) = 1320$

$= 12 \times 10 \times 11$

$= (9+1)(9+2)(9+3)$

$\therefore \quad n = 9$

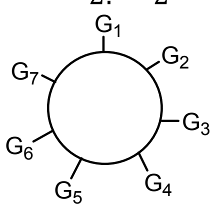
18 **(a)**

First we fix the alternate position of 7 gentlemen in a round table by 6! ways.

There are seven positions between the gentlemen in which 5 ladies can be seated in ${}^7P_5$ ways

$\therefore$ required number of ways

$= 6! \times \frac{7!}{2!} = \frac{7}{2}(720)^2$



19 **(c)**

The number between 999 and 10000 are of four digit numbers.

The number of four digit numbers formed by digits 0, 2, 3, 6, 7, 8 is ${}^6P_4 = 360$

But here those numbers are also involved which being from 0.

So, we take those numbers as three digit numbers.

Taking initial digit 0, the number of ways to fill remaining 3 places from five digits 2, 3, 6, 7, 8 are ${}^5P_3 = 60$

So the required numbers $= 360 - 60 = 300$

20 **(b)**

Required sum $= 3!(3+4+5+6)$

$= 6 \times 18 = 108$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	C	B	A	C	A	D	B	B	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	C	C	B	A	B	B	A	C	B