DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :5

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(a)**
Since total number are 15, but three special members constitute one member.

Therefore, required number of arrangements are $12! \times 2$, because, chairman remains between the two specified persons and person can sit in two ways

2 **(b)**
Let there be n participants. Then, we have
$^nC_2 = 45$
$\Rightarrow \frac{n(n-1)}{2} = 45 \Rightarrow n^2 - n - 9 = 0 \Rightarrow n = 10$

3 **(d)**
Required number of ways $= {}^{12-1}C_{9-1}$

$$= {}^{11}C_8 = \frac{11 \times 10 \times 9}{3 \times 2 \times 1} = 165$$

5 **(c)**
A number is divisible by 3, if the sum of the digits is divisible by 3
Since, 1+2+3+4+5=15 is divisible by 3, therefore total such numbers is 5! *ie*, 120
And, other five digits whose sum is divisible by 3 are 0, 1, 2, 4, 5
Therefore, number of such formed numbers $= 5! - 4! = 96$
Hence, the required number if numbers=120+96=216

7 **(b)**
Each child will go as often as he (or she) can be accompanied by two others
$\therefore$ Required number $= {}^7C_2 = 21$

8 **(a)**
We have,
Required sum $= (2+3+4+5)(4-1)!\left(\frac{10^4-1}{10-1}\right)$

$$= 14 \times 6 \times \left(\frac{10^4-1}{10-1}\right) = 93324$$

9 **(b)**

Here, we have to divide 52 cards into 4 sets, three of them having 17 cards each and the fourth one having just one card. First we divide 52 cards into two groups of 1 card and 51 cards. This can be done in $\frac{52\,!}{1\,!\,51\,!}$ ways

Now, every group of 51 cards can be divided into 3 groups of 17 each in $\frac{51\,!}{(17\,!)^3\,3\,!}$

Hence, the required number of ways

$$=\frac{52\,!}{1\,!51\,!}\cdot\frac{51\,!}{(17\,!)^3 3\,!}=\frac{52\,!}{(17\,!)^3 3\,!}$$

10 **(d)**

The required number is ${}^9C_5+{}^9C_4\times{}^8C_1+{}^9C_3\times{}^8C_2=3486$

11 **(c)**

If there were no three points collinear, we should have ${}^{10}C_2$ lines; but since 7 points are collinear we must subtract ${}^7C_2$ lines and add the one corresponding to the line of collinearity of the seven points.

Thus, the required number of straight lines $={}^{10}C_2-{}^7C_2+1=25$

13 **(d)**

The required number of points

$$={}^8C_2\times 1+{}^4C_2\times 2+\left({}^8C_1\times{}^4C_1\right)\times 2$$

$$=28+12+32\times 2=104$$

14 **(d)**

${}^{16}C_r={}^{16}C_{r+1}$

$\Rightarrow\ {}^{16}C_{16-r}={}^{16}C_{r+1}\quad[\because\ {}^nC_r={}^nC_{n-r}]$

$\Rightarrow\ 16-r=r+1\ \Rightarrow\ 2r=15$

$\Rightarrow\ r=7.5$

Which is not possible, since r should be an integer

15 **(a)**

We have,

$$\sum_{r=0}^{m}{}^{n+r}C_n=\sum_{r=0}^{m}{}^{n+r}C_r\qquad[\because\ {}^nC_r={}^nC_{n-r}]$$

$$\Rightarrow\sum_{r=0}^{m}{}^{n+r}C_n={}^nC_0+{}^{n+1}C_1+{}^{n+2}C_2+\dots+{}^{n+m}C_m$$

$$\Rightarrow\sum_{r=0}^{m}{}^{n+r}C_n=[1+(n+1)]+{}^{n+2}C_2+{}^{n+3}C_3+\dots+{}^{n+m}C_m$$

$$\Rightarrow\sum_{r=0}^{m}{}^{n+r}C_n=\left({}^{n+2}C_1+{}^{n+2}C_2\right)+{}^{n+3}C_3+\dots+{}^{n+m}C_m$$

$$\Rightarrow\sum_{r=0}^{m}{}^{n+r}C_n=\left({}^{n+3}C_2+{}^{n+3}C_3\right)+{}^{n+4}C_4+\dots+{}^{n+m}C_m$$

$$\Rightarrow \sum_{r=0}^{m} {}^{n+r}C_n = \left({}^{n+4}C_3 + {}^{n+4}C_4\right) + \dots + {}^{n+m}C_m$$

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$$= {}^{n+m}C_{m-1} + {}^{n+m}C_m$$

$$\Rightarrow \sum_{r=0}^{m} {}^{n+r}C_n = {}^{n+m+1}C_m$$

$$\Rightarrow \sum_{r=0}^{m} {}^{n+r}C_n = {}^{n+m+1}C_{n+1} \; [\because {}^{n}C_r = {}^{n}C_{n-r}]$$

16 **(a)**

Taking option (a)

$${}^{n-1}P_r + r\,{}^{n-1}P_{r-1} = \frac{(n-1)!}{(n-1-r)!} + \frac{(n-1)!}{(n-r)!}$$

$$\left(\therefore\ {}^{n}P_r = \frac{n!}{(n-r)!}\right)$$

$$= \frac{(n-1)!}{(n-1-r)!}\left(1 + r.\frac{1}{n-r}\right)$$

$$= \frac{(n-1)!}{(n-1-r)!}\left(\frac{n}{n-r}\right) = \frac{n!}{(n-r)!} = {}^{n}P_r$$

17 **(a)**

First we fix the position of 6 men, the number of ways to sit men = 5! and the number of ways to sit women ${}^{6}P_5$

$\therefore$ Total number of ways $= 5!\,{}^{6}P_5 = 5! \times 6!$

18 **(b)**

In a octagon there are eight sides and eight points

$\therefore$ Required number of diagonals

$= {}^{8}C_2 - 8 = 28 - 8 = 20$

19 **(a)**

The required number of ways=The even number of 0's *ie*, $\{0, 2, 4, 6, \dots\}$

$$= \frac{n!}{n!} + \frac{n!}{2!(n-2)!} + \frac{n!}{4!(n-4)!} + \dots$$

$$= {}^{n}C_0 + {}^{n}C_2 + {}^{n}C_4 + \dots = 2^{n-1}$$

20 **(c)**

We have,

$${}^{n-1}C_3 + {}^{n-1}C_4 > {}^{n}C_3$$

$$\Rightarrow {}^{n}C_4 > {}^{n}C_3 \quad [\because {}^{n}C_{r-1} + {}^{n}C_r = {}^{n+1}C_r]$$

$$\Rightarrow \frac{n\,!}{(n-4)\,!4\,!} > \frac{n\,!}{(n-3)\,!3\,!}$$

$\Rightarrow \frac{1}{4} > \frac{1}{n-3} \Rightarrow n > 7$

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