DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :2

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(b)**

Now, ${}^{n}C_{r+1} + {}^{n}C_{r-1} + 2.{}^{n}C_{r}$

$= {}^{n}C_{r+1} + {}^{n}C_{r} + {}^{n}C_{r-1} + {}^{n}C_{r}$

$= {}^{n+1}C_{r+1} + {}^{n+1}C_{r} = {}^{n+2}C_{r+1}$

2 **(a)**

$$\frac{2}{9!} + \frac{2}{3!7!} + \frac{1}{5!5!}$$

$$= \frac{1}{1!9!} + \frac{1}{3!7!} + \frac{1}{5!5!} + \frac{1}{3!7!} + \frac{1}{9!1!}$$

$$= \frac{1}{10!}\left[\frac{10!}{1!9!} + \frac{10!}{3!7!} + \frac{10!}{5!5!} + \frac{10!}{3!7!} + \frac{10!}{9!1!}\right]$$

$$= \frac{1}{10!}\{{}^{10}C_1 + {}^{10}C_3 + {}^{10}C_5 + {}^{10}C_7 + {}^{10}C_9\}$$

$$= \frac{1}{10!}(2^{10-1}) = \frac{2^9}{10!} = \frac{2^a}{b!} \text{ (given)}$$

$\Rightarrow a = 9, b = 10$

3 **(c)**

Total number of lines obtained by joining 8 vertices of octagon is ${}^{8}C_2 = 28$. Out of these, 8 lines are sides and remaining diagonal.

So, number of diagonals $= 28 - 8 = 20$

4 **(b)**

The number of times he will go to the garden is same as the number of selecting 3 children from 8 children

$\therefore$ The required number of times $= {}^{8}C_3 = 56$

5 **(c)**

$\because \quad {}^{n}C_r + {}^{n}C_{r-1} = {}^{n+1}C_r$

$\therefore \quad {}^{189}C_{36} + {}^{189}C_{35} = {}^{190}C_{36}$

But ${}^{189}C_{35} + {}^{189}C_x = {}^{190}C_x$

Hence, value of x is 36

6 **(d)**

Required number of ways $= {}^{3n}C_n = \frac{3n\,!}{n\,!\,2n\,!}$

7 **(a)**

The word EXAMINATION has 2A, 2I, 2N, E, M, O, T, X therefore 4 letters can be chosen in following ways

Case I When 2 alike of one kind and 2 alike of second kind is ${}^{3}C_2$

$\therefore$ Number of words $= {}^{3}C_2 \times \frac{4!}{2!2!} = 18$

Case II When 2 alike of one kind and 2 different *ie*, ${}^{3}C_1 \times {}^{7}C_2$

$\therefore$ Number of words $= {}^{3}C_1 \times {}^{7}C_2 \times \frac{4!}{2!} = 756$

Case III When all are different *ie*, ${}^{8}C_4$

Hence, total number of words

$= 18 + 756 + 1680 = 2454$

8 **(a)**

Required number of ways $= 5! \times 6!$

9 **(d)**

Number of diagonals in a polygon of n sides

$= {}^{n}C_2 - n$

Here, $n = 20$

$\therefore$ required number of diagonals $= {}^{20}C_2 - 20$

$= \frac{20 \times 19}{2 \times 1} - 20 = 170$

10 **(c)**

$${}^{47}C_4 + \sum_{r=1}^{5} {}^{52-r}C_3 = {}^{47}C_4 + {}^{51}C_3 + {}^{50}C_3 + {}^{49}C_3 + {}^{48}C_3 + {}^{47}C_3$$

$$= {}^{51}C_3 + {}^{50}C_3 + {}^{49}C_3 + {}^{48}C_3 + ({}^{47}C_3 + {}^{47}C_4)$$

$$= {}^{52}C_4$$

11 **(a)**

First we fix the alternate position of 21 English book, in which 22 vacant places for Hindi books, hence total number of ways are ${}^{22}C_{19} = 1540$

12 **(d)**

Required number of ways

$=$ Total number of ways in which 8 boys can sit

$-$ Number of ways in which two brothers sit together

$= 8\,! - 7\,! \times 2\,! = 7\,! \times 6 = 30240$

13 **(c)**

In forming even numbers, the position on the right can be filled with either 0 or 2. When 0 is filled, the remaining positions can be filled in 3! ways, and when 2 is filled, the position on the left can be filled in 2 ways (0 cannot be used) and the middle two positions in 2! ways (0 can be used)

So, the number of even numbers formed $= 3! + 2(2\,!) = 0$

15 **(a)**

Let the number of participants at the beginning was n

$\therefore \quad \frac{n(n-1)}{2} = 117 - 12$

$\Rightarrow \; n(n-1) = 2 \times 105$

$\Rightarrow \; n^2 - n - 210 = 0$

$\Rightarrow \quad (n-15)(n+14) = 0$

$\Rightarrow \; n = 15 \quad [\because n \neq -14]$

16 **(a)**

The number will be even if last digit is either 2, 4, 6 or 8 *ie* the last digit can be filled in 4 ways and remaining two digits can be filled in ${}^8P_2$ ways. Hence, required number of number of three different digits $= {}^8P_2 \times 4 = 224$

17 **(b)**

We have, $= {}^{x+2}P_{x+2} = (x+2)!$,

and $b = {}^xP_{11} = \frac{x!}{(x-11)!}$

and $c = {}^{x-11}P_{x-11} = (x-11)!$

Now, $a = 182\, bc$

$\therefore \; (x+2)! = 182.\frac{x!}{(x-11)!}(x-11)!$

$\Rightarrow (x+2)! = 182\; x!$

$\Rightarrow (x+2)(x+1) = 182$

$\Rightarrow x^2 + 3x - 180 = 0$

$\Rightarrow (x-12)(x+15) = 0$

$\Rightarrow x = 12, \; -15$

$\therefore$ Neglect the negative value of x.

$\Rightarrow x = 12$

18 **(c)**

Since, the books consisting of 5 Mathematics, 4 physics, and 2 chemistry can be put together of the same subject is 5!4!2! ways

But these subject books can be arranged itself in 3! ways

$\therefore$ Required number of ways $= 5!4!3!2!$

19 **(a)**

If the function is one-one, then select any three from the set B in ${}^7C_3$ ways *i.e.*, 35 ways.

If the function is many-one, then there are two possibilities. All three corresponds to same element number of such functions $= {}^7C_1 = 7$ ways. Two corresponds to same element. Select any two from the set B. The lerger one corresponds to the larger and the smaller one corresponds to the smaller the third may corresponds to any two. Number of such functions $= {}^7C_2 \times 2 = 42$

So, the required number of mappings $= 35 + 7 + 42 = 84$

20 **(b)**

The number of ordered triples of positive integers which are solution of $x + y + z = 100$

$= \text{coefficient of } x^{100} \text{ in } (x + x^2 + x^3 + ..)^3$

$=\text{coefficient of } x^{100} \text{in } x^3(1 - x)^{-3}$

$=\text{coefficient of } x^{97} \text{in}$

$$\left(1 + 3x + 6x^2 + \dots\dots\dots + \frac{(n+1)(n+2)}{2}x^n + \dots\right)$$

$$= \frac{(97+1)(97+2)}{2} = 49 \times 99 = 4851$$

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