SESSION : 2025-26

DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :1

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(b)**

$\because f(x_i) \neq y_i$

ie, no object goes to its scheduled place. Then, number of one-one mappings

$= 6!\left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \frac{1}{6!}\right)$

$= 6!\left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \frac{1}{6!}\right)$

$= 360 - 120 + 30 - 6 + 1 = 265$

2 **(d)**

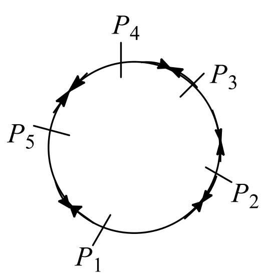
We have,
Required number of ways

$= {}^{m+n}C_m \times (m-1)! \times (n-1)! = \frac{(m+n)!}{m\,n}$

3 **(a)**

$\because$ Remaining 5 can be seated in 4! ways.

Now, on cross marked five places 2 person can sit in ${}^5P_2$ ways



So, number of arrangements

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

$= 24 \times 20 = 480$ ways

4 **(a)**

Given, ${}^{2n+1}P_{n-1} : {}^{2n-1}P_n = 3:5$

$\Rightarrow \dfrac{(2n+1)!}{(n+2)!} \times \dfrac{(n-1)!}{(2n-1)!} = \dfrac{3}{5}$

$\Rightarrow \dfrac{(2n+1)2n}{(n+2)(n+1)n} = \dfrac{3}{5}$

$\Rightarrow 10\,(2n+1) = 3(n^2 + 3n + 2)$

$\Rightarrow 3n^2 - 11n - 4 = 0$

$\Rightarrow (3n+1)(n-4) = 0$

$\Rightarrow \;\; n = 4 \qquad\qquad \left(n \neq -\dfrac{1}{3}\right)$

5 **(b)**

Required number of ways

$= {}^4C_1 \times {}^6C_4 + {}^4C_2 \times {}^6C_3 + {}^4C_3 \times {}^6C_2 + {}^4C_4 \times {}^6C_1$

$= 60 + 120 + 60 + 6$

$= 246$

6 **(a)**

Required number of ways $= {}^8C_5$

$= \dfrac{8 \times 7 \times 6}{3 \times 2 \times 1} = 56$

The total number of ways a voter can vote

$= {}^8C_1 + {}^8C_2 + {}^8C_3 + {}^8C_4 + {}^8C_5$

$= 8 + 28 + 56 + 70 + 56 = 218$

7 **(c)**

From the first set, the number of ways of selection two lines $= {}^4C_2$

From the second set, the number of ways of selection two lines $= {}^3C_2$

Since, these sets are intersect, therefore they from a parallelogram,

$\therefore$ Required number of ways $= {}^4C_2 \times {}^3C_2$

$= 4 \times 3 = 12$

8 **(b)**

Since, a set of m parallel lines intersecting a set of another n parallel lines in a plane, then the number of parallelograms formed is ${}^mC_2 \times {}^nC_2$.

9 **(a)**

$$^{50}C_4 + \sum_{r=1}^{6} {}^{56-r}C_3$$
$= {}^{50}C_4 + {}^{55}C_3 + {}^{54}C_3 + {}^{53}C_3 + {}^{52}C_3 + {}^{51}C_3 + {}^{50}C_3$
$= {}^{51}C_4 + {}^{51}C_3 + {}^{52}C_3 + {}^{53}C_3 + {}^{54}C_3 + {}^{55}C_3$
$[\because \ {}^{n}C_r + {}^{n}C_{r+1} = {}^{n+1}C_{r+1}]$
$= {}^{52}C_4 + {}^{52}C_3 + {}^{53}C_3 + {}^{54}C_3 + {}^{55}C_3$
$= {}^{53}C_4 + {}^{53}C_3 + {}^{54}C_3 + {}^{55}C_3$
$= {}^{54}C_4 + {}^{54}C_3 + {}^{55}C_3 = {}^{55}C_4 + {}^{55}C_3 = {}^{56}C_4$

10 **(a)**

Total number of four digit numbers $= 9 \times 10 \times 10 \times 10$

$= 9000$

Total number of four digit numbers which divisible by 5

$= 9 \times 10 \times 10 \times 2 = 1800$

$\therefore$ Required number of ways $= 9000 - 1800 = 7200$

11 **(a)**

Man goes from Gwalior to Bhopal in 4 ways and they come back in 3 ways.

$\therefore$ Total number of ways$= 4 \times 3 = 12$ ways

12 **(c)**

Here, we have 1 M, 4 I's, 4 S's and 2 P's
$\therefore$ Total number of selections
$= (1 + 1)(4 + 1)(2 + 1) - 1 = 149$

13 **(c)**

Number of lines from 6 points $={}^6 C_2 = 15$

Points of intersection obtained from these lines $={}^{15} C_2 = 105$

Now, we find the number of times, the original 6 points come.

Consider one point say A_1.Joining A_1 to remaiming 5 points, we get 5 lines and any two lines from these 5 lines gives A_1 as the point of intersection.

$\therefore A_1$ is commom in ${}^5C_2 = 10$ times out of 105 points of intersections.

Similar is the case with other five points.

$\therefore$ 6 original points come $6\times 10 = 60$ times in points of intersection.

Hence, the number of distinct points of intersection

$= 105 - 60 + 6 = 51$

15 **(b)**

At first we have to a accommodate those 5 animals in cages which cannot enter in 4 small cages, therefore, number of ways are ${}^6P_5$ and rest of the five animals arrange in 5! ways.

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

$= 120 \times 720 = 86400$

16 **(b)**

$T_n = {}^nC_3$ and $T_{n+1} - T_n = 21$

$\Rightarrow \quad {}^{n+1}C_3 - {}^nC_3 = 21$

$\Rightarrow \quad {}^nC_2 + {}^nC_3 - {}^nC_3 = 21$

$\Rightarrow \quad {}^nC_2 = 21$

$\Rightarrow \quad \frac{n(n-1)}{2} = 21$

$\Rightarrow \quad n^2 - n - 42 = 0$

$\Rightarrow \quad (n-7)(n+6) = 0$

$\therefore \quad n = 7 \qquad [\because \neq -6]$

17 **(b)**

Total number of ways

$= {}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + {}^{10}C_4$

$= 10 + 45 + 120 + 210 = 385$

18 **(b)**

The total number of two factors product= ${}^{n+2}C_8$. The number of numbers from 1 to 200 which are not multiples of 5 is 160. Therefore, total number of two factors product, which are not multiple of 5, is ${}^{160}C_2$

Hence, required number of factors= ${}^{200}C_2 - {}^{160}C_2$

$= 19900 - 12720$

$= 7180$

19 **(b)**

Total number of m-elements subsetcs of $A = {}^nC_m$ ...(i)

and number of m-elements subsets of A each containing the element $a_4 = {}^{n-1}C_{m-1}$

According to question, ${}^nC_m = \lambda . {}^{n-1}C_{m-1}$

$\Rightarrow \frac{n}{m} . {}^{n-1}C_{m-1} = \lambda . {}^{n-1}C_{m-1}$

$\Rightarrow \lambda = \frac{n}{m}$ or $n = m\lambda$

20 **(a)**

The number of 1 digit numbers= 9

The number of 2 digit non-repeated numbers= $9 \times 9 = 81$

The number of 3 digit non-repeated number

$= 9 \times {}^{9}P_2 = 9 \times 9 \times 8 = 648$

$\therefore$ Required number of ways =9+81+648=738

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

SESSION : 2025-26

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DAILY PRACTICE PRODUCTS

CLASS : XIth

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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)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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 ${}^{7}C_{3}$ 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 $= {}^{7}C_{1} = 7$ 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 $= {}^{7}C_{2} \times 2 = 42$

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

20 **(b)**

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

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

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

=coefficient of x^{97}in

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

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

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

SESSION : 2025-26

DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth

DATE :

Solutions

SUBJECT : MATHS

DPP NO. :3

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(b)**

Word MEDITERRANEAN has 2A, 3E, 1D, 1I, 1M, 2N, 2R, 1T

In out of four letters E and R is fixed and rest of the two letters can be chosen in following ways

Case I Both letter are of same kind *ie*, ${}^3C_2$ ways, therefore number of words = ${}^3C_2 \times \frac{2!}{2!} = 3$

Case II Both letters are of different kinds *ie*, ${}^8C_2$ ways, therefore number of words= ${}^8C_2 \times 2! = 56$

Hence, total number of words=56+3=59

2 **(c)**

Required number of ways

=coefficient of x^{2m}in $(x^0 + x^1 + \ldots + x^m)^4$

=coefficient of x^{2m} in $\left(\frac{1-x^{m+1}}{1-x}\right)^4$

=coefficient of x^{2m} in $(1 - 4x^{m+1} + 6x^{2m+2} + \ldots)(1-x)^{-4}$

$= {}^{2m+3}C_{2m} - 4\,{}^{m+2}C_{m-1}$

$$= \frac{(2m+1)(2m+2)(2m+3)}{6} - \frac{4m(m+1)(m+2)}{6}$$

$$= \frac{(m+1)(2m^2+4m+3)}{3}$$

3 **(c)**

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

Therefore, the required number of ways = ${}^8C_3 = 56$

4 **(c)**

The number of ways that the candidate may select

(i) if 2 questions from A and 4 question from B

$= {}^5C_2 \times {}^5C_4 = 50$

(ii) 3 question from A and 3 questions from B

$= {}^5C_3 \times {}^5C_3 = 100$

and (iii) 4 questions from A and 2 questions from B

$= {}^5C_4 \times {}^5C_2 = 50$

Hence, total number of ways $= 50 + 100 + 50 = 200$

5 **(a)**
Since, $240 = 2^4 . 3.5$

$\therefore$ Total number of divisors $= (4+1)(1+1)(1+1) = 20$

Out of these 2, 6, 10 and 30 are of the form $4n + 2$

7 **(a)**
Required number of arrangements

$= \frac{6!}{2!\,3!} - \frac{5!}{3!} = 60 - 20 = 40$

8 **(b)**
As we know the last two digits of 10! and above factorials will be zero-zero
$\therefore \quad 1! + 4! + 7! + 10! + 12! + 13! + 15! + 16! + 17!$
$= 1 + 24 + 5040 + 10! + 12! + 13! + 15! + 16! + 17!$
$= 5065 + 10! + 12! + 13! + 15! + 16! + 17!$in this series, the digit in the ten palce is 6 which is divisible by 3!
9 **(c)**
As the players who are to receive the cards are different
So, the required number of ways $= \frac{52\,!}{(13\,!)^4}$
10 **(c)**
We have, in all 12 points. Since 3 points are used to form a triangle, therefore the total number of triangles, including the triangles formed by collinear points on AB, BC and CA, is ${}^{12}C_3 = 220$. But, this includes the following:
The number of triangles formed by 3 points on AB
$= {}^3C_3 = 1$,
The number of triangles formed by 4 points on BC
$= {}^4C_3 = 4$,
The number of triangles formed by 5 points on CA
$= {}^5C_3 = 10$,
Hence, required number of triangles $= 220 - (10 + 4 + 1) = 205$
11 **(b)**
Given, $\quad {}^nP_r = 3024$

$\Rightarrow \quad \frac{n!}{(n-r)!} = 3024$

And $\ ^nC_r = \frac{n!}{r!(n-r)!}$

$\Rightarrow \quad 126 = \frac{3024}{r!}$

$\Rightarrow \quad r! = 24 = 4!$

$\Rightarrow \quad r = 4$

12 **(d)**

We have,

$^{35}C_8 + \sum_{r=1}^{7} {}^{42-r}C_7 + \sum_{s=1}^{5} {}^{47-s}C_{40-s}$

$= {}^{35}C_8 + \{{}^{41}C_7 + {}^{40}C_7 + {}^{39}C_7 + {}^{38}C_7 + \cdots + {}^{35}C_7\}$

$+\{{}^{46}C_{39} + {}^{45}C_{38} + \cdots + {}^{42}C_{35}\}$

$= {}^{35}C_8 + \{{}^{35}C_7 + {}^{36}C_7 + \cdots + {}^{41}C_7\}$

$+\{{}^{42}C_7 + {}^{43}C_7 + \cdots + {}^{46}C_7\} \qquad [\because {}^nC_r = {}^nC_{n-r}]$

$= ({}^{35}C_8 + {}^{35}C_7) + ({}^{36}C_7 + \cdots + {}^{41}C_7 + \cdots + {}^{46}C_7)$

$= ({}^{36}C_8 + {}^{36}C_7) + {}^{37}C_7 + \cdots + {}^{46}C_7$

$= {}^{37}C_8 + {}^{37}C_7 + {}^{38}C_7 + \cdots + {}^{46}C_7$

$= \ldots\ldots\ldots\ldots\ldots$

$= {}^{46}C_8 + {}^{46}C_7 = {}^{47}C_8$

13 **(b)**

Taking A_1, A_2 as one group we have 9 candidates which can be ranked in 9! ways. But A_1 and A_2 can be arranged among themselves in 2 ! ways

Hence, the required number = (9 !)(2 !) = 2(9 !)

14 **(c)**

Considering $A\mathcal{U}$ as one letter, we have 4 letters, namely $L, A\mathcal{U}, G, H$ which can be permuted in 4! ways. But, A and $\mathcal{U}$ can be put together in 2! Ways.

Thus, the required number of arrangements = 4 ! × 2 ! = 48

155 **(c)**

Total number of ways in which all letters can be arranged in 6! ways.

There are two vowels in the word GARDEN

Total number of ways in which these two vowels can be arranged= 2!

∴ Total number of required ways= $\frac{6!}{2!} = 360$

16 **(a)**

The possible cases are

Case I A man invites 3 ladies and woman invites 3 gentleman

$\Rightarrow \quad {}^4C_3\, {}^4C_3 = 16$

Case II A man invites (2 ladies, 1 gentlemen) and woman invites (2 gentlemen, 1 lady)

$\Rightarrow \quad ({}^4C_2 .\, {}^3C_1).({}^3C_1 .\, {}^4C_2) = 324$

Case III A man invites (1 lady, 2 gentlemen) and woman invites (2 ladies, 1 gentlemen)

$\Rightarrow \quad ({}^4C_1 .\, {}^3C_2).({}^3C_2 .\, {}^4C_1) = 144$

Case IV A man invites (3 gentlemen) and woman invites (3 ladies)

$\Rightarrow\ \ {}^{3}C_3 . {}^{3}C_3 = 1$

$\therefore$ Total number of ways

$= 16 + 324 + 144 + 1 = 485$

18 **(a)**

A number between 5000 and 10,000 can have any of the digits 5,6,7,8,9 at thousand's place. So, thousand's place can be filled in 5 ways. Remaining 3 places can be filled by the remaining 8 digits in ${}^{8}P_3$ ways

Hence, required number $= 5 \times {}^{8}P_3$

20 **(d)**

Two circles intersect maximum at two distinct points. Now, two circles can be selected in ${}^{6}C_2$ ways.

$\therefore$ Total number of points in intersection are

${}^{6}C_2 \times 2 = 30$

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

SESSION : 2025-26

DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :4

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(b)**

The numbers formed will be divisible by 4 if the number formed by the two digits on the extreme right is divisible by 4, i.e. it should be 04,12,20,24,32,40

The number of numbers ending in $04 = 3! = 6$

The number of numbers ending in $12 = 3! - 2! = 4$

The number of numbers ending in $20 = 3! = 6$

The number of numbers ending in $24 = 3! - 2! = 4$

The number of numbers ending in $32 = 3! - 2! = 4$

The number of numbers ending in $40 = 3! = 6$

So, the required number $= 6 + 4 + 6 + 4 + 4 + 6 = 30$

2 **(c)**

The four girls can first be arranged in $4!$ ways among themselves. In each of these arrangements there are 5 gaps (including the extremes) among the girls. Since the boys and girls are to alternate, we have to leave the first gap or last gap blank while arranging the boys. But, in each case the boys and girls can be arranged in $4! \cdot 4!$ ways

$\therefore$ Required number of ways $= 2(4! \times 4!) = 2(4!)^2$

3 **(a)**

The product of r consecutive natural numbers

$= 1.2.3.4 \ldots\ldots r = r!$

The natural number will divided by $r!$

4 **(d)**

The number of ways in which at least 5 women can be included in a committee

$= {}^9C_5 \times {}^8C_7 + {}^9C_6 \times {}^8C_6 + {}^9C_7 \times {}^8C_5 + {}^9C_8 \times {}^8C_4 + {}^9C_9 \times {}^8C_3$

(i) Women are in majority, then number of ways

$= {}^9C_7 \times {}^8C_5 + {}^9C_8 \times {}^8C_4 + {}^9C_9 \times {}^8C_3$

$= 2016 + 630 + 56 = 2702$

(ii) Men are in majority, then number of ways

$= {}^9C_5 \times {}^8C_7 = 126 \times 8 = 1008$

5 **(c)**

In the number which is divisible by 5 and lying between 3000 and 4000, 3 must be at thousand place and 5 must be at unit place. Therefore rest of the digits (1, 2, 3, 4, 6) fill in two places. The number of ways$= {}^4P_2$

6 **(b)**

We have 12 letters including 2 C's. Let us ignore 2 C's and thus we have 10 letters $(4\ A'\text{s}, 3\ B'\text{s}, 1\ D, 1\ E, 1\ F)$ and these 10 letters can be arrange in $\frac{10!}{4!3!}$ ways.

Now, after arranging these 10 letters there will be 11 gaps in which two different letters can be arranged in ${}^{11}P_2$ ways. But, since 2 C's are alike, the number of arrangements will be $\frac{1}{2!}\ {}^{11}P_2 = \frac{11!}{9!2!}$

So, total number of ways in which C's are separated from one another $= \frac{10!}{4!3!} \cdot \frac{11!}{9!2!} = 1386000$

7 **(d)**

An odd number has an odd digit at unit's place

So, unit's place can be filled in 4 ways

Each of ten's and hundred's place can be filled in 6 ways

Thousand place can be filled in 5 ways

Hence, required number of numbers$= 5 \times 6 \times 6 \times 4 = 720$

8 **(c)**

$\because \quad {}^{12}P_r = 1320 = 12 \times 11 \times 10$

$\Rightarrow \quad \dfrac{12!}{(12-r)!} = 12 \times 11 \times 10$

$\therefore \quad r = 3$

9 **(c)**

Total time required=(total number of dials required to sure open the lock)$\times\ 5s$

$= 10^5 \times 5s$

$= \dfrac{500000}{60 \times 60 \times 13}$ days $= 10.7$ days

Hence, 11 days are enough to open the safe.

10 **(a)**

There are 6 rings and 4 fingers.

Since, each ring can be worn on any finger.

$\therefore$ Required number of ways$= 4^6$

11 **(c)**

Consider the product

$(x^0 + x^1 + x^2 \dots + x^9)(x^0 + x^1 + x^2 \dots + x^6) \dots$ 6 factors

The number of ways in which the sum of the digits will be equal to 12 is equal to the coefficient of x^{12} in the above product. So, required number of ways

$= \text{Coeff. Of } x^{12} \text{ in } \left(\frac{1-x^{10}}{1-x}\right)^6$

$= \text{Coeff. Of } x^{12} \text{ in } (1-x^{10})^6(1-x)^{-6}$

$= \text{Coeff. Of } x^{12} \text{ in } (1-x)^{-6}(1- {}^6C_1 x^{10} + \cdots)$

$= \text{Coeff. Of } x^{12} \text{ in } (1-x)^{-6} - {}^6C_1 \cdot \text{Coeff. of } x^2 \text{ in } (1-x)^{-6}$

$= {}^{12+6-1}C_{6-1} - {}^6C_1 \times {}^{2+6-1}C_{6-1} = {}^{17}C_5 - 6 \times {}^7C_5 = 6062$

12 **(c)**

We observe that a point is obtained between the lines of two of points on first line are joined by line segments to two points on the second line

Hence, required number of points = ${}^nC_2 \times {}^nC_2$

14 **(c)**

Let there be $'n'$ men participants. Then, the number of games that the men play between themselves is 2. ${}^nC_2$ and the number of games that the men played with the women is 2. $(2n)$

$\therefore$ 2. ${}^nC_2 - 2.2n = 66$ (given)

$\Rightarrow n(n-1) - 4n - 66 = 0$

$\Rightarrow n^2 - 5n - 66 = 0$

$\Rightarrow (n+5)(n-11) = 0$

$\Rightarrow n = 11$

$\therefore$ Number of participants =11 men+2 women=13

15 **(b)**

There are total $20 + 1 = 21$ persons. The two particular persons and the host be taken as one unit so that these remaining $21 - 3 + 1 = 19$ persons be arranged in round table in 18! ways. But the two persons on either side of the host can themselves be arranged in 2! ways

$\therefore$ required number of ways= $2! \times 18!$

16 **(b)**

Let the total number of persons in the room = n

$\therefore$ Total number of handshakes= ${}^nC_2 = 66$ (given)

$\Rightarrow \frac{n!}{2!(n-2)!} = 66 \Rightarrow \frac{n(n-1)}{2} = 66$

$\Rightarrow n^2 - n - 132 = 0$

$\Rightarrow (n-12)(n+11) = 0$

$\Rightarrow n = 12$ $[\because n \neq -11]$

17 **(d)**

Given word is 'PENCIL'.

Total alphabets in the given word=6

Number of vowels=2 and number of consonants=4

$\because$4 consonants can be arranged in 4! ways.

$\therefore$ Remaining two places can be filled by two vowels in ${}^5P_2$ ways.
$\therefore$ Total number of ways$4! \times {}^5P_2 = 24 \times 20 = 480$

20 **(b)**

Let there are n teams.

Each team play to every other team in ${}^nC_{23}$ ways

$\therefore\ {}^nC_2 = 153$ (given)

$$\Rightarrow \frac{n!}{(n-2)!\,2!} = 153$$

$\Rightarrow\ n(n-1) = 306$

$\Rightarrow\ n^2 - n - 306 = 0$

$\Rightarrow\ (n-18)(n+17) = 0$

$\Rightarrow\ n = 18 \quad (\because n$ is never negative)

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

SESSION : 2025-26

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
$^{n}C_2 = 45$
$\Rightarrow \dfrac{n(n-1)}{2} = 45 \Rightarrow n^2 - n - 9 = 0 \Rightarrow n = 10$
3 **(d)**
Required number of ways $=^{12-1} C_{9-1}$

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

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 = $^{7}C_2 = 21$
8 **(a)**
We have,
Required sum = $(2+3+4+5)(4-1)!\left(\frac{10^4-1}{10-1}\right)$
$= 14 \times 6 \times \left(\dfrac{10^4 - 1}{10 - 1}\right) = 93324$
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

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

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

14 **(d)**

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

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

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

$\Rightarrow \quad r = 7.5$

Which is not possible, since r should be an integer

15 **(a)**

We have,

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

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

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

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

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

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

… … … … … … … … … … … … … … … … …

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

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

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

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, …}

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

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

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

SESSION : 2025-26

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

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

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

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

$\Rightarrow\ n = 7$

2 **(c)**

We have,

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

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

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

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

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

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

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

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

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

$\Rightarrow x = n + 3$

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

$\dots\dots\dots\dots\dots$

$\dots\dots\dots\dots\dots$

$\dots\dots\dots\dots$

mth person can be seated in $(n-m+1) ways$
∴ Total number of ways
$= n(n-1)(n-2) \dots (n-m+1) = {}^{n}P_{m}$
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
∴ Number of ways of arranging vowels
$= {}^{4}P_{3} + \frac{1}{2} = 12$ [∵ E is repeated twice]
∴ 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 $= 16 \times 15 \times 14$

∴ 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

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

10 **(c)**

Number of vertices=15
∴ Number of lines$= {}^{15}C_{2} = 105$
∴ 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
$= ({}^2C_1 \times {}^4C_2 + {}^2C_2 \times {}^4C_1) \, 3\,! = 96$
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= ${}^{n+3}C_3 = 220$

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

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

$= 12 \times 10 \times 11$

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

$\therefore \quad n = 9$

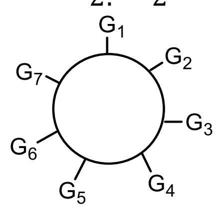
18 **(a)**

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

SESSION : 2025-26

DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth

DATE :

Solutions

SUBJECT : MATHS

DPP NO. :7

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(c)**

Since, no two lines are parallel and no three are concurrent, therefore n straight lines intersect at ${}^nC_2 = N$ (say) points. Since, two points are required to determine a straight line, therefore the total number of lines obtained by joining N points is ${}^NC_2$. But in this each old line has been counted ${}^{n-1}C_2$times. Since, on each old line there will be $n-1$ lines.

Hence, the required number of fresh lines.

$= {}^NC_2 - n\,{}^{n-1}C_2$

$= \dfrac{N(N-1)}{2} - \dfrac{n(n-1)(n-2)}{2}$

$= \dfrac{{}^nC_2({}^nC_2 - 1)}{2} - \dfrac{n(n-1)(n-2)}{2} \quad (\because N = {}^nC_2)$

$= \dfrac{\frac{n(n-1)}{2}\left(\frac{n(n-1)}{2} - 1\right)}{2} - \dfrac{n(n-1)(n-2)}{2}$

$= \dfrac{n(n-1)}{8}[(n^2 - n - 2) - 4(n-2)]$

$= \dfrac{n(n-1)}{8}[n^2 - 5n + 6]$

$= \dfrac{n(n-1)(n-2)(n-3)}{8}$

2 **(c)**

The required number of ways

$= ({}^2C_1 \times {}^4C_2 + {}^2C_2 \times {}^4C_1) \times 3!$

$= (2 \times 6 + 1 \times 4)6 = 96$

3 **(a)**

The factor of $216 = 2^3 . 3^3$
The odd divisors are the multiple of 3
$\therefore$ The number of divisors=3+1=4

4 **(c)**

We have,

$E_3(100\,!) = \left[\frac{100}{3}\right] + \left[\frac{100}{3^2}\right] + \left[\frac{100}{3^3}\right]\left[\frac{100}{3^4}\right] = 33 + 11 + 3 + 1 = 48$

5 **(b)**

Case I When number in two digits.

Total number of ways= $9 \times 9 = 81$

Case II When number in three digits

Total number of ways $= 9 \times 9 \times 9 = 729$

$\therefore$ Total number of ways $= 81 + 729 = 810$

6 **(b)**

We have,

${}^{56}P_{r+6} : {}^{54}P_{r+3} = 30800 : 1$

$\Rightarrow \frac{56\,!}{(50-r)\,!} = 3800\left(\frac{54\,!}{(51-r)\,!}\right)$

$\Rightarrow 56 \times 55 = \frac{3800}{51-r}$

$\Rightarrow 51 - r = 10 \Rightarrow r = 41$

7 **(c)**

We have,

Required number of numbers

= Total number of numbers formed by the digits 1,2,3,4,5

− Number of numbers having 1 at ten thousand's place

− Number of numbers having 2 at ten thousand's place and 1 at thousand's place

− Number of numbers having 2 at ten thousand's place and 3 at thousand's place

$= 5\,! - 4\,! - 3\,! - 3\,! = 120 - 24 - 6 - 6 = 84$

8 **(c)**

The number of ways of selecting 3 points out of 12 points is ${}^{12}C_3$. Three points out of 7 collinear points can be selected in ${}^{7}C_3$ ways

Hence, the number of triangles formed $= {}^{12}C_3 - {}^{7}C_3 = 185$

9 **(d)**

Required sum=(sum of the digits) $(n-1)!\left(\frac{10^n-1}{10-1}\right)$

$= (1+2+3+4+5)(5-1)!\left(\frac{10^5-1}{10-1}\right)$

$= 360\left(\frac{100000-1}{9}\right) = 40 \times 99999 = 3999960$

10 **(c)**

Total number of words formed by 4 letters form given eight different letters with repetition= 8^4 and number of words with no repetition=$^8P_4$

$\therefore$ Required number of words= $8^4 - {}^8P_4$

11 **(d)**

Given number of flags= 5

Number of signals formed using one flag= ${}^5P_1 = 5$

Similarly, using 2 flags= ${}^5P_2$

Using 3 flags= ${}^5P_3$

Using 4 flags= ${}^5P_4$

Using 5 flags= ${}^5P_5$

$\therefore$ Total number of signals that can be formed

$= {}^5P_1 + {}^5P_2 + {}^5P_3 + {}^5P_4 + {}^5P_5$

$= 5 + 20 + 60 + 120 + 120$

$= 325$

12 **(d)**

Required number of permutations= $\frac{6!}{3!2!} = 60$

13 **(c)**

Out of 22 players 4 are excluded and 2 are to be included in every selection. This means that 9 players are to be selected from the remaining 16 players which can be done in ${}^{16}C_9$ ways

234 **(b)**

The letters in the word 'CONSEQUENCE' are 2C, 3E, 2N, 1O, 1Q, 1S, 1U

$\therefore$ Required number of permutations= $\frac{9!}{2!2!}$

15 **(c)**

The number of different sums of money Sita can form is equal to the number of ways in which she can select at least one coin out of 5 different coins

Hence, required number of ways = $2^5 - 1 = 31$

16 **(a)**

For the first player, distribute the cards in ${}^{52}C_{17}$ ways. Now, out of 35 cards left 17 cards can be put for second player in ${}^{35}C_{17}$ ways. Similarly, for third player put them in ${}^{18}C_{17}$ways. One card for the last player can be put in ${}^1C_1$ way. Therefore, the required number of ways for the proper distribution

$= {}^{52}C_{17} \times {}^{35}C_{17} \times {}^{18}C_{17} \times {}^1C_1$

$$= \frac{52!}{35!\,17!} \times \frac{35!}{18!\,17!} \times \frac{18!}{17!\,1!} \times 1! = \frac{52!}{(17!)^3}$$

17 **(b)**

Suppose $x_1\ x_2\ x_3\ x_4\ x_5\ x_6\ x_7$ represents a seven digit number. Then x_1 takes the value 1,2,3, … ,9 and $x_2, x_3, \dots, x_7$ all take values 0,1,2,3, … ,9

If we keep $x_1, x_2, \dots, x_6$ fixed, then the sum $x_1 + x_2 + \cdots + x_6$ is either even or odd. Since x_7 takes 10 values 0,1,2, … 9, five of the numbers so formed will be even and 5 odd

Hence, the required number of numbers

$= 9 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 5 = 4500000$

19 **(a)**

The required number of ways is equal to the number of dearrangements of 10 objects.

$\therefore$ Required number of ways

$= 10!\left\{1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \ldots + \frac{1}{10!}\right\}$

20 **(a)**

The number of words starting from A are =5!=120

The number of words starting from I are =5!=120

The number of words starting from KA are =4!=24

The number of words starting from KI are =4!=24

The number of words starting from KN are =4!=24

The number of words starting from KRA are =3!=6

The number of words starting from KRIA are =2!=2

The number of words starting from KRIN are =2!=2

The number of words starting from KRISA are=1!=1

The number of words starting from KRISNA are=1!=1

Hence, rank of the word KRISNA

$= 2(120) + 3(24) + 6 + 2(2) + 2(1) = 324$

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

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DAILY PRACTICE PROBLEMS

CLASS : XIth
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SUBJECT : MATHS
DPP NO. :8

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(a)**

Total number of words

= Number of arrangements of the letters of the word 'MATHEMATICS'

$= \frac{11\,!}{2\,!\,2\,!\,2\,!}$

2 **(c)**

We have,

$P_m = {}^mP_m = m\,!$

$\therefore 1 + P_1 + 2 \cdot P_2 + 3 \cdot P_3 + \cdots + n \cdot P_n$

$= 1 + 1 + 2 \cdot 2\,! + 3 \cdot 3\,! + \cdots + n \cdot n\,!$

$= 1 + \sum_{r=1}^{n} r \cdot (r\,!) = 1 + \sum_{r=1}^{n} \{(r+1) - 1\} r\,!$

$= 1 + \sum_{r=1}^{n} [(r+1)\,! - r\,!]$

$= 1 + \{(2\,! - 1\,!) + (3\,! - 2\,!) + (4\,! - 3\,!) + \cdots + ((n+1)\,! - n\,!)\}$

3 **(a)**

$\because \quad \frac{n(n-3)}{2} = 54$

$\Rightarrow \quad n^2 - 3n - 108 = 0$

$\Rightarrow \quad (n-12)(n+9) = 0$

$\Rightarrow \quad n = 12 \qquad [\because n \neq -9]$

4 **(c)**

In all, we have 8 squares in which 6 'X' have to be placed and It can be done in ${}^8C_6 = 28$ ways.

But this includes the possibility that either the top or horizontal row does not have any 'X'. Since, we want each row must have at least one 'X', these two possibilities are to be excluded.

Hence, required number of ways $= 28 - 2 = 26$

5 **(c)**

We have, 11 letters, viz. $A, A; I, I; N, N; E, X; M; T; O$

For groups of 4 we may arrange these as follows:

(i) Two alike, two others alike
(ii) Two alike, two different
(iii) all four different
(i) gives rise ${}^{3}C_{2}$ selections, (ii) gives rise $3 \times {}^{7}C_{2}$ selection and (iii) gives rise ${}^{8}C_{4}$ selections
So, the number of permutations
$= 3\frac{4\,!}{2\,!\,2\,!} + 63\frac{4\,!}{2\,!} + 70.4\,! = 2454$
6 **(b)**
There are total 20+1=21 persons. The two particular persons and the host be taken as one unit so that these remain $21 - 3 + 1 = 19$ persons be arranged in round table in 18! ways. But the two persons on either sides of the host can themselves be arranged in 2! ways.

$\therefore$ Required number of ways $= 2!\,18! = 2.18!$

7 **(d)**
${}^{n-1}C_3 + {}^{n-1}C_4 > {}^{n}C_3$
$\Rightarrow \quad {}^{n}C_4 > {}^{n}C_3$
$\Rightarrow \quad \frac{n!}{(n-4)!\,4!} > \frac{n!}{(n-3)!\,3!}$
$\Rightarrow \quad (n-3)(n-4)! > (n-4)!\,4$
$\Rightarrow \quad n > 7$
8 **(c)**
We know that $\frac{(m\,n)!}{(m\,!)^n}$ is the number of ways of distributing mn distinct object in n persons equally
Hence, $\frac{(mn)\,!}{(m\,!)^n}$ is a positive integer
Consequently, $(mn)\,!$ is divisible by $(m\,!)^n$
Similarly, $(mn)\,!$ is divisible by $(n\,!)^m$
Now,
$n < m \Rightarrow m + n < 2m \leq mn$ and $m - n < m < mn$
$\Rightarrow (m+n)\,!\,|(mn)\,!$ and $(m-n)\,!\,|(mn)\,!$
9 **(d)**
The number of subsets containing more than n elements is equal to
${}^{2n+1}C_{n+1} + {}^{2n+1}C_{n+2} + \cdots + {}^{2n+1}C_{2n+1}$
$= \frac{1}{2}\{{}^{2n+1}C_0 + {}^{2n+1}C_1 + \cdots + {}^{2n+1}C_{2n+1}\} = \frac{1}{2}(2^{2n+1}) = 2^{2n}$
11 **(a)**
We have, 9 letters $3a's, 2b's$ and $4\,c's$. These 9 letters can be arranged in $\frac{9\,!}{3\,!\,2\,!\,4\,!} = 1260$ ways
12 **(c)**
The total number of subsets of given set is $2^9 = 512$
Case I When selecting only one even number {2, 4, 6, 8}
Number of ways= ${}^{4}C_1 = 4$
Case II When selecting only two even numbers= ${}^{4}C_2 = 6$
Case III When selecting only three even numbers= ${}^{4}C_3 = 4$

Case IV When selecting only four even numbers $= {}^{4}C_4 = 1$

$\therefore$ Required number of ways

$= 512 - (4 + 6 + 4 + 1) - 1 = 496$

[here, we subtract 1 for due to the null set]

14 **(a)**

The number of ways of choosing a committee if there is no restriction is

${}^{10}C_4 \cdot {}^{9}C_5 = \dfrac{10\,!}{4\,!\,6\,!} \cdot \dfrac{9\,!}{4\,!\,5\,!} = 26460$

The number of ways of choosing the committee if both Mr. A and Ms. B are included in the committee is ${}^{9}C_3 \cdot {}^{8}C_4 = 5880$

Therefore, the number of ways of choosing the committee when Mr. A and Ms. B are not together = $26480 - 5880 = 20580$

15 **(d)**

(1)It is true that product of r consecutive natural numbers is always divisible by r.

(2) Now, 115500=$2^2 \times 3^1 \times 5^3 \times 7^1 \times 11^1$

$\therefore$ Total number of proper divisor

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

$= 96 - 2 = 94$

(3) Total number of ways $= \frac{52!}{(13!)^4}$

Hence, all statements are true

16 **(d)**

Total numbers formed by using given 5 digits= $\frac{5!}{2!}$

For number greater than 40000, digit 2 cannot come at first place. Hence, number formed in which 2 is at the first place $= \frac{4!}{2!}$

Hence, total numbers formed greater than 40000

$= \dfrac{5!}{2!} = \dfrac{4!}{2!} = 60 - 12 = 48$

17 **(c)**

In the case of each book we may take 0,1,2,3, … p copies; that is, we may deal with each book in $p + 1$ ways and therefore with all the books in $(p + 1)^n$ ways. But, this includes the case where all the books are rejected and no selection is made

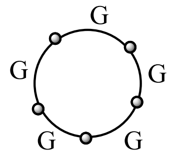
$\therefore$ Number of ways in which selection can be made

$= (p + 1)^n - 1$

18 **(b)**

First we fix the alternate position of the girls. Five girls can be seated around the circle in $(5 - 1)! = 4!$, 5 boys can be seated in five vacant place by 5!

$\therefore$ Required number of ways= $4! \times 5!$



19 **(c)**

The number of words start with $D = 6! = 720$

The number of words start with $E = 6! = 720$

The number of words start with $MD = 5! = 120$

The number of words start with $ME = 5! = 120$

Now sthe first word start with MO is MODESTY.

Hence, rank of MODESTY $= 720 + 720 + 120 + 120$

$= 1681$

20 **(c)**

Starting with the letter A and arranging the other four letters, there are $4! = 24$ words. The starting with G, and arranging A, A, I, and N in different ways, there are $\frac{4!}{2!} = 12$ words. Next the 37^{th} word starts with I, there are 12 words starting with I. This accounts upto the 48^{th} word. The 49^{th} word in NAAGI. The 50^{th} word is NAAAIG

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

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CLASS : XIth

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SUBJECT : MATHS

DPP NO. :9

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(c)**

We have the following possibilities:

Number of selections *Number of Arrangements*

$^3C_1 \times {}^2C_2$ $\quad$ $^3C_1 \times {}^2C_2 \times \frac{5!}{3!} = 60$

$^3C_2 \times {}^1C_1$ $\quad$ $^3C_2 + {}^1C_1 \times \frac{5!}{2!\,2!} = 90$

Three bottles of one type and two distinct. Two bottles of one type, two bottles of second type and one from the remaining.

Hence, required number of ways $= 60 + 90 = 150$

2 **(a)**

Six '+' signs can be arranged in a row in $\frac{6\,!}{6\,!} = 1$ way. Now, we are left with seven places in which 4 minus signs can be arranged in

$^7C_4 \times \frac{4\,!}{4\,!} = 35$

3 **(b)**

$\because$ The candidate is unsuccessful, if he fails in 9 or 8 or 7 or 6 or 5 papers.

$\therefore$ Numbers of ways to be unsuccessful

$= {}^9C_9 + {}^9C_8 + {}^9C_7 + {}^9C_6 + {}^9C_5$

$= {}^9C_0 + {}^9C_1 + {}^9C_2 + {}^9C_3 + {}^9C_4$

$= \frac{1}{2}({}^9C_0 + {}^9C_1 + \ldots\ldots + {}^9C_9)$

$= \frac{1}{2}(2^9) = 2^8 = 256$

4 **(d)**

Using the digits 0, 1, 2, …… ,9 the number of five digits telephone numbers which can be formed is 10^5(since repetition is allowed).

The number of five digits telephone numbers, which have none of digits repeated = $^{10}P_5 = 30240$

$\therefore$ The required number of telephone number

$= 10^5 - 30240 = 69760$

5 **(d)**

The number of words beginning with $'a'$ is same as the number of ways of arranging the remaining 4 letters taken all at a time. Therefore $'a'$ will occur in the first place 4 ! times. Similarly, b or c will occur in the first place the same number of times. Then, d occurs in the first place. Now, the number of words beginning with $'da, db$ or dc' is 3 !. Then, the words beginning with $'de'$ must follow. The first one is $'de\ abc'$, the next one is $'de\ acb'$ and the next to the next comes $'de\ bac'$.

So, the rank of $'de\ bac' = 3 \cdot 4! + 3 \cdot 3! + 3 = 93$

6 **(b)**

Required number $= 2\ ^{20}C_2$

7 **(c)**

The total number of combinations which can be formed of five different green dyes, taking one or more of them is $2^5 - 1 = 31$. Similarly, by taking one or more of four different red dyes $2^4 - 1 = 15$ combinations can be formed. The number of combinations which can be formed of three different red dyes, taking none, one or more of them is $2^3 = 8$

Hence, the required number of combinations of dyes

$= 31 \times 15 \times 8 = 3720$

8 **(b)**

We observe that

4 lines intersect each other in $^4C_2 = 6$ points

4 circles intersect each other in $^4C_2 \times 2 = 12$ points

A line cuts a circle in 2 points

$\therefore$ 4 lines will cut four circles into $2 \times 4 \times 4 = 32$ points

Hence, required number of points $= 6 + 12 + 32 = 50$

9 **(a)**

From the given relation it is evident that ^nC_r is the greatest among the values $^nC_0, {^nC_1}, \dots, {^nC_n}$

We know that ^nC_r is greatest for $r = \frac{n}{2}$. Hence, $r = \frac{n}{2}$

10 **(d)**

A committee may consists of all men and no women or all women and no men or 3 men and 1 women whose is not among wives of 3 chosen men or, 2 men and 2 women who are not are not among the wives of 2 chosen men or 1 men and 3 women none of whom is wife of chosen men

$\therefore$ Required number of committees

$= {^4C_4} + {^4C_4} + {^4C_3} \times {^1C_1} + {^4C_2} \times {^2C_2} + {^4C_1} \times {^3C_3} = 16$

11 **(d)**

The women choose the chairs amongst the chairs marked 1 to 4 in $^4P_2$ways and the men can select the chairs from remaining in $^6P_3$ ways

Total number of ways $= {^4P_2} \times {^6P_3}$

12 **(a)**
Let n be the number of diagonals of a polygon.

Then, ${}^{n}C_2 - n = 44$

$\Rightarrow \dfrac{n(n-1)}{2} - n = 44$

$\Rightarrow n^2 - 3n - 88 = 0$

$\Rightarrow n = -8$ or 11

$\therefore n = 11$

13 **(b)**
In the word $'exercises'$ there are 9 letters of which 3 are e's and 2 are s's
So, required number of permutations $= \frac{9\,!}{3\,!\,2\,!} = 30240$
14 **(b)**
Total number of functions

=Number of dearrangement of 5 objects

$= 5!\left(\dfrac{1}{2!} - \dfrac{1}{3!} + \dfrac{1}{4!} - \dfrac{1}{5!}\right) = 44$

15 **(a)**
The total number of ways in which words with five letters are formed from given 10 letters = $10^5 = 100000$

Total number of ways in which words with five letters are formed (no repetition) $= 10 \times 9 \times 8 \times 7 \times 6 = 30240$

$\therefore$ Required number of ways $= 100000 - 30240 = 69760$

17 **(d)**
We have,
Required number of numbers = Number of three digit numbers divisible by 5 + number of 4 digit numbers divisible by 5
$= {}^{3}C_2 \times 2\,! \times 1 + ({}^{3}C_3 \times 3\,!) \times 1 = 6 + 6 = 12$
19 **(c)**
In 8 squares $6x$ can be placed in 28 ways but there are two methods in which there is no x in first or last row.
$\therefore$ required number of ways=28-2=26
20 **(d)**
Total number of points on a three lines are $m + n + k$
$\therefore$ maximum number of triangles
$= {}^{m+n+k}C_3 - {}^{m}C_3 - {}^{n}C_3 - {}^{k}C_3$

(subtract those triangles in which point on the same line)

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

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DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

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SUBJECT : MATHS
DPP NO. :10

Topic :-PERMUTATIONS AND COMBINATIONS

1 **(d)**

In the word RAHUL the letters are (A, H, L, R, U)

Number of words starting with A= $4! = 24$

Number of words starting with H=$4! = 24$

Number of words starting with L= $4! = 24$

In the starting with R first one is RAHLU and next one is RAHUL.

$\therefore$ Rank of the word RAHUL= $3(24) + 2 = 74$

2 **(a)**

The required natural numbers consist of 4 digits, 3 digits, 2 digits and one digit so that their number is equal to

$9 \cdot 9 \cdot 8 \cdot 7 + 9 \cdot 9 \cdot 8 + 9 \cdot 9 + 9 = 5274$

3 **(a)**

We have 26 letters (a to z) and 10 digits (0 to 9). The first three places can be filled with letters in $^{26}P_3$ ways and the remaining 2 places can be filled with digits $^{10}P_2$ ways. Hence, the number of ways in which the code word can be made

$= ({}^{26}C_3 \times 3\,!) \times ({}^{10}C_2 \times 2\,!) = 1404000$

4 **(c)**

The first digit a can take any one of 1 to 8

The third digit c can take any one of 0 to 9

When a =1, b can take any one of 2 to 9=8 values

When $a = 2$, b can take any one of 3 to 9=7 values

When $a = 3$, b can take any one of 4 to 9=6 values

… … … …

… … … …

When $a = 8, b$ can take any one $(b = 9) = 1$ values Thus, the number of total numbers

$= (8+7+6+\ldots+2+1) \times 10 = \frac{8 \times 9}{2} \times 10 = 360$

5 **(c)**

Since, out of eleven members two numbers sit together, then the number of arrangements= $9! \times 2$

($\because$ Two numbers can be sit in two ways)

6 **(c)**

There are 4 odd places and there are 4 odd numbers viz. 1, 1, 3, 3. These, four numbers can be arranged in four places in

$\frac{4!}{2!\,2!} = 6$ ways

In a seven digit are 3 even places namely 2nd, 4^{th} and 6^{th} in which 3 even numbers 2, 2, 4 can be arranged in $\frac{3!}{2!} = 3$ ways

Hence, the total number of numbers $= 6 \times 3 = 18$

7 **(d)**

The number of words starting from E are =5!=120

The number of words starting from H are =5!=120

The number of words starting from ME are=4!=24

The number of words starting from MH are=4!=24

The number of words starting from MOE are =3!=6

The number of words starting from MOH are =3!=6

The number of words starting from MOR are =3!=6

The number of words starting from MOTE are =2!=2

The number of words starting from MOTHER are =1!=1

Hence, rank of the word MOTHER

$= 2(120) + 2(24) + 3(6) + 2 + 1$

$= 309$

8 **(c)**

(1) Total number of ways of arranging m things $= m!$ To find the number of ways in which p particular things are together, we consider p particular thing as a group.

$\therefore$ Number of ways in which p particular things are together $= (m-p+1)!\,p!$

So, number of ways in which p particular things are not together

$= m! - (m - p + 1)!\, p!$

(2) Each player shall receive 13 cards.

Total number of ways $= \frac{52!}{(13!)^4}$

Hence, both statements are correct

9 **(d)**
Now, 770=2.5.7.11

We can assigned 2 to $x_1$or $x_2$or x_3 or x_4. That is 2 can be assigned in 4 ways.

Similarly each of 5, 7 or 11 can be assigned in 4 ways.

$\therefore$ Required number of ways $= 4^4 = 256$

10 **(c)**
There are five seats in a bus are vacant. A man sit on any one of 5 seats in 5 ways. After the man is seated his wife can be seated in any of 4 remaining seats in 4 ways.
Hence, total number of ways of seating them= $5 \times 4 = 20$
11 **(c)**
Required number = ${}^9C_5 - {}^7C_3 = 91$
12 **(b)**
Since, there are n distinct points on a circle.

For making a pentagon it requires a five points

According to given condition

${}^nC_5 = {}^nC_3 \Rightarrow n = 8$

13 **(b)**
The total number of ways= $6^4 = 1296$
$\therefore$ required number of ways
=1296-(none of the number shows 2)
$= 1296 - 5^4 = 671$
14 **(c)**
Required number of ways
$= {}^{11}C_5 - {}^{11}C_4$
$= \frac{11!}{5!\,6!} = \frac{11!}{4!\,7!} = 132$
15 **(d)**
There are $(m + 1)$ choices for each of n different books. So, the total number of choice is $(m + 1)^n$ including one choice in which we do not select any book.
Hence, the required number of ways is $(m + 1)^n - 1$

16 **(b)**

There are 6 letters in the word 'MOBILE'. Consequently, there are 3 odd places and 3 even places. Three consonants M, B and L can occupy three odd places in $3\,!$ ways. Remaining three places can be filled by 3 vowels in $3\,!$ ways.

Hence, required number of words $= 3\,! \times 3\,! = 36$

17 **(b)**

As the seats are numbered so the arrangement is not circular

Hence, required number of arrangements $= {}^nC_m \times m\,!$

18 **(d)**

Two circles can intersect at most in two points. Hence, the maximum number of points of intersection is ${}^8C_2 \times 2 = 56$

19 **(b)**

There are two cases arise

Case I They do not invite the particular friend

$= {}^8C_6 = 28$

Case II They invite one particular friend

$= {}^8C_5 \times {}^2C_1 = 112$

$\therefore$ Required number of ways =28+112=140

20 **(d)**

The consonants can be arranged in 4! ways, and the vowels in $\frac{3\,!}{2\,!}$ ways

So, the required number of arrangements $= \frac{4\,!\,3\,!}{2}$

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