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Solution to Practice Problems

Type:- 1

(i) 6, 5, 2, 3, 0

6, 5, 2, 0, $\boxed{3}$ ← odd

6, 3, 2, 0, $\boxed{5}$ ← odd

when 3 is ~~ab~~ at the end;

total odd numbers that can be created = $^4P_4$

= 24

when 5 is at the end;

total odd numbers that can be created = $^4P_4$

= 24

But if we keep 0 at the ~~begining~~ beginning it becomes a 4th digit number. So, we need to subtract those from the total number.

when 3 at the end;

$24 - {}^3P_3 = 24 - 6 = 18$

when 5 at the end;

$24 - {}^3P_3 = 24 - 6 = 18$,

$\therefore$ total number $= 18 + 18 = 36$ (Ans).

(iii) when 0 ~~at last~~ is at the end;

total number $= {}^4P_4 = 24$

when, 2 is at the end;

total number $= {}^4P_4 = 24$

but for 0 being at the beginning $= {}^4P_4 - {}^3P_3$
$= 24 - 6$
$= 18$

when, 6 is at the end;

total number $= {}^4P_4 = 24$

but for 0 being at the beginning $= {}^4P_4 - {}^3P_3$
$= 24 - 6$
$= 18$

$\therefore$ total number $= 24 + 18 + 18$
$= 60$ (Ans)

Type-2:

(i)

$\square \; \square \; \square \; \square \; \square$

$9 \times 10 \times 10 \times 10 \times 10$

We can fill each box with any number from 0-9 (10 types)

But ~~and~~ only for the first box we can't use 0 because telephone number doesn't start with 0. therefore our options are 1-9 or 9 types.

$\therefore$ total connections $= 9 \times 10^4$ (Ans).

(ii)

$\square \; \square \; \square$

15 options, 15 options, 15 options

$\therefore$ total ~~combinations~~ permutations possible $= 15 \times 15 \times 15$
$= 15^3$

$\therefore$ ~~Wrong~~ number of wrong permutation
$= 15^3 - 1$ (Ans).

(iii) $\square \ \square \ \square$

5 options, 5 options, 5 options

$\therefore$ Total numbers possible $= 5 \times 5 \times 5 = 125$

Number of ~~poss~~ output where no numbers are the same $= {}^5P_3 = 60$

Numbers which have the same digit twice or thrice $= 5^3 - 60 = 65$ (Ans).

Type-3:

(i) Number of arrangements $= {}^8P_8$

$= 40320$ (Ans).

(ii) Let "I,A,E" Be one letter. (Let's consider it as K) therefor total number of letters;

TRNGLK → 6

$\therefore$ They can be arranged in $= {}^6P_6 = 720$ ways

~~For Taking all letters they can be arranged,~~

~~${}^8P_8 = 40320$.~~

~~$\therefore$ Total number $= 40320 - 720$~~

Again,

The 3 letters can be arranged in ${}^3P_3 = 6$ ways

$\therefore$ Number of permutations ~~that~~ where the vowels are ~~at the~~ togather $= 720 \times 6$

$= 4320$;

Now,

Taking all ~~tete~~ letters they can be arranged,

$= {}^8P_8 = 40320$ way.

$\therefore$ Number of permutations where the vowels are not togather $= 40320 - 4320$

$= 36000$ (Ans).

(iii) Total arrangements $= \frac{8!}{2! \times 2!}$
(letting the vowels as one letter)
$= 10080$

Again,
The vowels can arrange ~~in~~ among them $= \frac{4!}{2!} = 12$

$\therefore$ finally $= 10080 \times 12$

$= 120960$ (Ans)

(iv) Part (i);

total arrangements $= \frac{10!}{2!\,2!\,2!\,2!} = 226800$ (Ans).

Part (ii);

When M is both at the beginning and at the end;

arrangements $= \frac{8!}{2!\,2!\,2!} = 5040$

(Ans).

(v) P $\boxed{e}$ r m $\boxed{u}$ t $\boxed{a}$ t $\boxed{i}$ $\boxed{o}$ n

Changable letters → P r m t t n

$\therefore$ arrangements $= \frac{6!}{2!} = 360$.

~~But the vowels can be re arranged among them as well, which is $= \frac{5!}{2}$~~

But permutation itself is an arrangement.

Therefore, re-arrangement $= 360 - 1$
$= 359$. (Ans).

Type-4:

(i) (cmbrdg) (aie)
6 3

selection $= {}^6C_2 \times {}^3C_3$
$= 15$

total number of words $= 15 \times 5!$
$= 1800$ (Ans).

(ii) selection of consonents $= {}^{12}C_3$

" of vowels $= {}^{5}C_2$

$\therefore$ total number of words $= {}^{12}C_3 \times {}^{5}C_2 \times 5!$

$= 264000$ (Ans).

(iii) Consonents $\Rightarrow$ (p, r, m, t, t, n, s) 7 letters

vowels $\Rightarrow$ (e, u, a, i, o) 5 letters

t is repeated, therefore we will consider 6 letters

$\therefore$ taking 2 of 6 $= {}^{6}C_2$

taking 1 of 5 $= {}^{5}C_1$

$\therefore$ total way of selecting $= {}^{6}C_2 \times {}^{5}C_1 = 75$

But the consonents can arrange between them as the vowel is stays in the middle.

$\therefore$ The consonents can arrange $= {}^{2}P_2 = 2$ ways

$\therefore$ Total arrangements $= 75 \times 2$

$= 150$ ways.

Now, ~~for t~~

If we selected both t's then,

total arrangements $= {}^{2}C_2 \times {}^{5}C_1 \times {}^{1}P_1$

$= 1 \times 5 \times 1 = 5$ ways

$\therefore$ ~~Total arra~~

Finally total arrangements $= 150 + 5$

$= 155$ ways.

(Ans).

Type-5:

(i)

	Experienced bowlers (6)	rest of the players (8)	
5+6=11 $\Rightarrow$	5	6	$= {}^{6}C_5 \times {}^{8}C_6$
6+5=11 $\Rightarrow$	6	5	$= {}^{6}C_6 \times {}^{8}C_5$
		(+)	224

$\therefore$ total teams of 11 that can be created $= 224$

(Ans).

(ii)

	Group of 6	Group of 8	
4+7=11 ⇒	4	7	⇒ $^6C_4 \times {^8C_7}$
5+6=11 ⇒	5	6	⇒ $^6C_5 \times {^8C_6}$
6+5=11 ⇒	6	5	⇒ $^6C_6 \times {^8C_5}$

(+)

344

(Ans).

(iii)

	Math (6)	Physics (4)	
4+2=6 ⇒	4	2	⇒ $^6C_4 \times {^4C_2}$
5+1=6 ⇒	5	1	⇒ $^6C_5 \times {^4C_1}$
6+0=6 ⇒	6	0	⇒ $^6C_6 \times {^4C_0}$

(+)

115

(Ans).

Type-6:

(i) $^5C_4 \times {^{(12-5)}C_2} = 105$ (Ans).

(ii)

	Group (1)	Group (2)		
4+2=6 ⇒	4	2 ⇒	$^5C_4$	$\times\ {^5C_2}$
3+3=6 ⇒	3	3 ⇒	$^5C_3$	$\times\ {^5C_3}$
2+4=6 ⇒	2	4 ⇒	$^5C_2$	$\times\ {^5C_4}$

(+)

200 (Ans)

Type-7:

(i) (a) 1 'e' and 3 different letters $= {^3C_3}$

(b) 2 'e' " 2 " " $= {^3C_2}$

(c) 3 'e' " 1 " " $= {^3C_1}$

(+)

7

(Ans).

(ii) ~~(a) 1 's' and~~

(a) Assuming only 1 's' selection $= {^5C_4}$

(b) keeping 2 's' always in the word and taking the other 2 from the rest 4 letters $= {^4C_2}$

∴ total selection $= {^5C_4} + {^4C_2} = 11$ (Ans).

(iii) (a) Assuming only 1 'a' total letter stand = 6 types.

∴ total words that can be formed $= {^6P_3}$

$= 120$

(b) Keeping 2 'a' in the word,

selection $= {}^5C_1 = 5$

arrangements $= 5 \times \frac{3!}{2!} = 15$

<u>finally,</u>

$\therefore$ total words ~~tot~~ $= 15 + 120$

$= 135$ (Ans).

Type-8:

(i) We need 3 points for a triangle

We have 17 points

$\therefore$ Number of triangles $= {}^{17}C_3$

$= 680$ (Ans).

(ii) ~~${}^{12}C$~~ ${}^{12}C_3 = 220$ (Ans).

${}^{12}C_2 = 66$ (Ans).