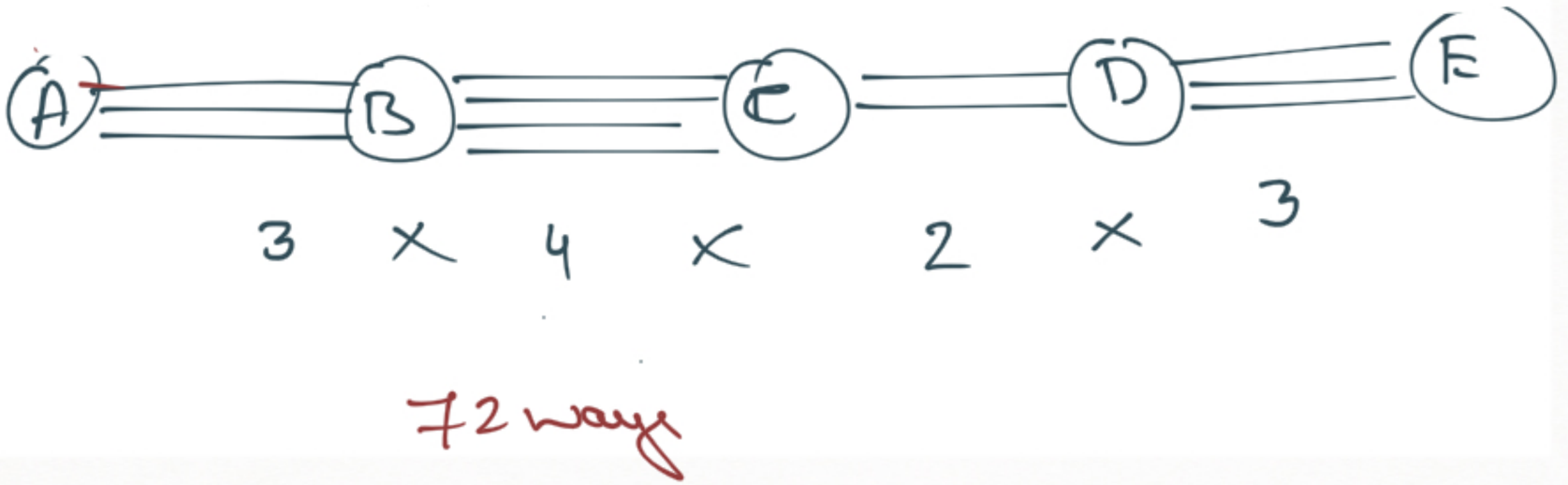
Suppose you can travel from a place A to a place B by 3 buses, from place B to place C by 4 buses, from place C to place D by 2 buses and from place D to place E by 3 buses. In how many ways can you travel from A to E?

A. 52 B. 62 C. 72 D. 82



Combination

(Keyword-select, pick, drawn)

- Combination means selection of things. Order is not important.
- The number of combination of n different things taking r of them at a time is denoted by n_{C_r} where C stands for combinations.

$$n_{C_r} = \frac{n!}{(n-r)!r!}$$

$n_{C_n} = n_{C_0} = 1$

$n_{C_1} = n$

$15C_3 = \frac{15!}{(15-3)! \times 3!}$

$15C_3 = \frac{15 \times 14 \times 13}{3!}$

$3 \times 2 \times 1 \Rightarrow 3! = 6$

$0! = 1$

$1! = 1$

$2! = 2$

$3! = 6$

$4! = 24$

$5! = 120$

$6! = 720$

$7! = 5040$

$8! = 40320$

$9! = 362880$

$10! = 3628800$

Neeraja Anand V

In how many ways 2 shirts and 3 pants can be selected from 5 shirts and 7 pants?

A. 350 B. 400 C.450 D. 550

$\Rightarrow {}^5C_2 \times {}^7C_3$

$\frac{5\times4}{2!} \times \frac{7\times6\times5}{3!} = 350$

In how many ways 2 shirts or 3 pants can be selected from 5 shirts and 7 pants?

A. 25 B. 35 C. 45 D. 55

${}^5C_2 + {}^7C_3 = 45$

A class has 8 football players. A 5-member team and a captain will be selected out of these 8 players. How many different selections can be made ?

A. 168 B. 210 C. 10!/6! D. 1260

$^nC_r = {}^nC_{n-r}$

$^8C_5 \times {}^3C_1$ (or) $^8C_1 \times {}^7C_5$

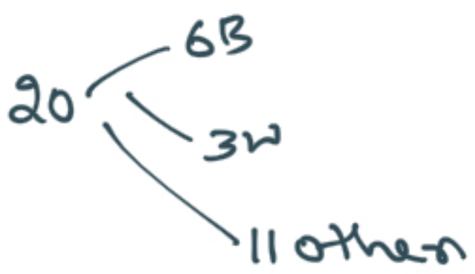
$^8C_3 \times {}^3C_1$

$\frac{8 \times 7 \times 6}{6} \times 3$

Neeraja Anand V

A cricket team of 11 players is to be formed from 20 players including 6 bowlers and 3 wicket keepers. The number of ways in which a team can be formed having exactly 4 bowlers and 2 wicket keepers is

A. 20790 B. 6390 C. 360 D. 10790



4B and 2W and 5 others

$${}^{6}C_4 \times {}^{3}C_2 \times {}^{11}C_5$$

$${}^{6}C_2 \times {}^{3}C_1 \times {}^{11}C_5 = \frac{6\times5\times4}{2} \times 3 \times \frac{11\times10\times9\times8\times7}{120}$$

(1) use unit digit
(2) use digital root

Neeraja Anand V

There are 16 players in selection list of Indian cricket team

{Dhoni, Kohli, 14 other}, select 11 to form a team for next match and it should according to following conditions?

- Both Dhoni and Kohli should be in group.

A. 12_{C_3} B. 14_{C_9} C. $14_{C_{11}}$ D. None

- Neither Dhoni nor Kohli is selected.

A. 12_{C_3} B. 14_{C_9} C. $14_{C_{11}}$ D. None

- If Dhoni is in team Kohli should not be there and vice versa.

A. 1001 B. 2002 C. 2022 D. 2004

$2C_1 \times {}^{14}C_{10}$

Neeraja Anand V

In how many ways can a committee of 4 be formed if there are 4 men and 5 women, if the following conditions exist?

4m & 5W

$^4C_1 \times {}^5C_3$

- The committee must have only 1 man.

A. 10 B. 20 C. 30 ✓D. 40

2m 2W

3m 1W

4m

- The committee must have at least 2 men.

~~A. 81~~ B. 71 C. 61 D. 51

$^4C_2 \times {}^5C_2 + {}^4C_3 \times {}^5C_1 + {}^4C_4$

- The committee must have at most 3 women.

A. 101 B. 120 ~~C. 121~~ D. 131

total − Selecting(4W)

$^9C_4 - {}^5C_4 = 121$

3W 1m (or) 2W 2m (or) 1W 3m (or) 0W 4m ✓

✗ Selecting 4W

Invalid

Neeraja Anand V

If a team of four is to be selected from 5 females and 6 males, then how many ways can the selection be made to include at least one male?

A. 350 B. 325 C. 330 D. 250

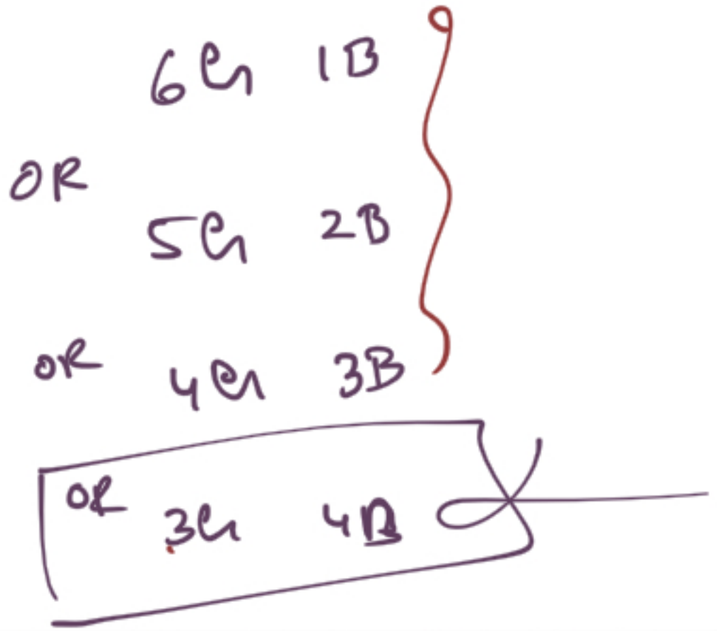
Invalid

total − (4F)

$^{11}C_4 - {}^{5}C_4$

Out of 4 boys and 6 girls of a class, a committee of 7 is to be selected. Find the number of ways in which this can be done when there is a majority of girls.

A. 86 B. 112 C. 100 D. 64



total − Invalid

$^{10}C_7 - {}^6C_3 \times {}^4C_4$

${}^6C_6 \times {}^4C_1 + {}^6C_5 \times {}^4C_2 + {}^6C_4 \times {}^4C_3$

15 Tennis players take part in a tournament. Every player plays twice with each of his opponents. How many games are to be played?

A. 120 B. 180 C. 140 D. 210

$^{15}C_2 \times 2 = 210$

$7C_2 = \frac{7 \times 6}{2}$

$nC_2 = \frac{n \times (n-1)}{2}$

In a meeting there were a total of 36 handshakes. If each participant shook hands with every other participant exactly once, then what is the total number of guests?

A. 9 B. 18 C. 27 D. 36

$nC_2 = 36$

$nC_3 = \frac{n(n-1)(n-1)}{3!}$

$\frac{n(n-1)}{2} = 36$

$n(n-1) = 72$

$9 \times 8 = 72$

Neeraja Anand V

In how many ways can 5 pens be selected from 10 different pens such that one particular pen is never selected and one particular pen is always selected?

A. 56 B. 126 C. 70 D. 100

10
−1 fixed pen
9
−1 (never be selected)
8

$^8C_4$

Neeraja Anand V

Permutation

(Keyword-arrange)

- Permutation means arrangement of things. Order is very important
- The number of permutation of 'n' different things taking 'r' of them at a time is denoted by n_{P_r} where P stands for permutation.

$$n_{P_r} = \frac{n!}{(n-r)!}$$

$n_{P_n} = n!$

$n_{P_0} = 1$

$n_{P_1} = n$

$n_{P_r} = n_{C_r} \times r!$

$15C_3 = \frac{15 \times 14 \times 13}{3!}$

$15P_3 = 15 \times 14 \times 13$

ABC

Select two	Arrange two
AB	AB
BC	BA
AC	AC
	CA
	BC
	CB

Neeraja Anand V

In how many ways any three letters of the word "MANGO" can be arranged without repetitions?

A. 20

B. 40

C. 60

D. 80

without rep

5 4 3 ⇒ 60 ways

with rep

5 × 5 × 5 ⇒ 125 ways

Neeraja Anand V

In how many ways the letters of the word "STOREKEEPER" can be arranged?

A. 832000

B. 831600 ✓

C. 830300

D. 832410

Without

$$\frac{11!}{4! \times 2!}$$

$$\frac{10! \times 11}{24 \times 2}$$

$$\frac{134600 \times 11}{600}$$

134600

1814400

~~2~~6 28800 × 11

~~24~~ × 2

2

INDIA

↳ $\frac{5!}{2!}$

INDIA

~~INDIA~~

IINDA

~~IINDA~~

Neeraja Anand V

How many new words are possible from the letters of the word PERMUTATION?

A. 11!/2!

B. (11! 2!)-1

C. 11!-1

D. (11!/2!)-1

(Permutation) remove this

$$\frac{11!}{2!} - 1$$

Neeraja Anand V

How many 5 digit number can be formed with 3, 4, 6, 6 and 7? How many of these numbers are odd?

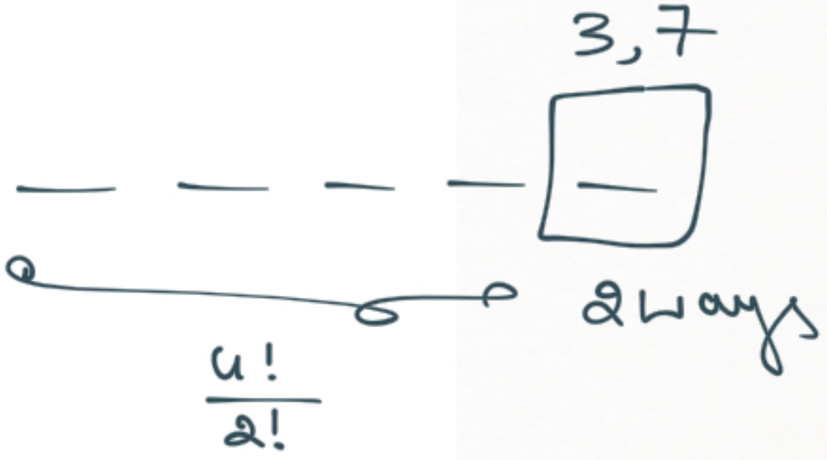
A. 60 and 24

B. 50 and 24

C. 60 and 12

D. None

$\frac{5!}{2!} = 60$



$\frac{4!}{2!}$

$\frac{4!}{2!} \times 2$

24

Neeraja Anand V

In how many ways can 7 indian's, 5 Pakistan's and 6 Dutch be seated in a row so that all persons of the same nationality sit together?

A. 3!

B. 7!5!6!

C. ~~3!~~7!5!6!

D. None

$\begin{pmatrix} I_7 & P_5 & D_6 \\ 7! & 5! & 6! \end{pmatrix} \times 3!$ ← country wise

Neeraja Anand V

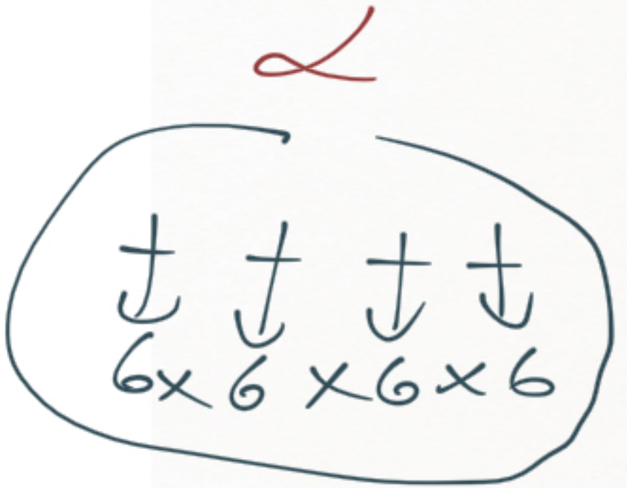
In how many ways can a person send invitation cards to 6 of his friends, if he has four servants to distribute the cards?

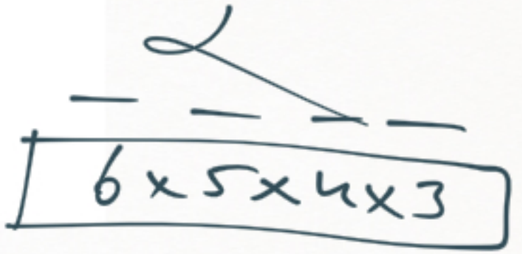
A. 6^4

B. ~~4^6~~

C. 24

D. None





Neeraja Anand V

In how many ways a letters of a word ORANGE can be re-arranged without repetitions where all the arrangements start with O and ends with A ?

A. 24

B. 120

C. 720

D. 5040

$4! = 24$

In how many ways 8 cars can be parked so that there should be four Cars between two Particular cars?

A. 240

B. 360

C. 4720

~~D. 4320~~

$(C_1 \& C_2)$ (remaining cars) (shifting)

$2! \times 6! \times 3$

720×6

Neeraja Anand V

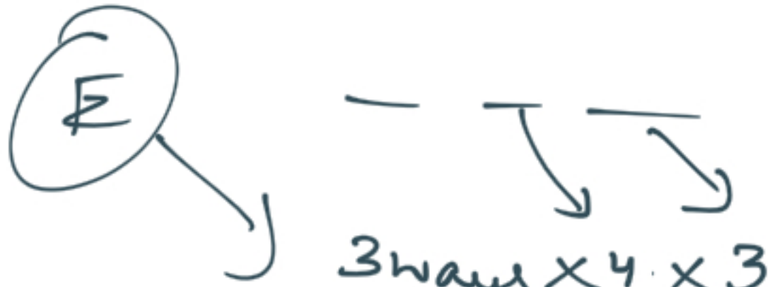
Find the number of permutation of 5 vowels taking 3 of them at a time in which E always occurs.

A. 12

B. 24

C. 36

D. 48



$\Rightarrow 36$

E _ _

_ E _

_ _ E

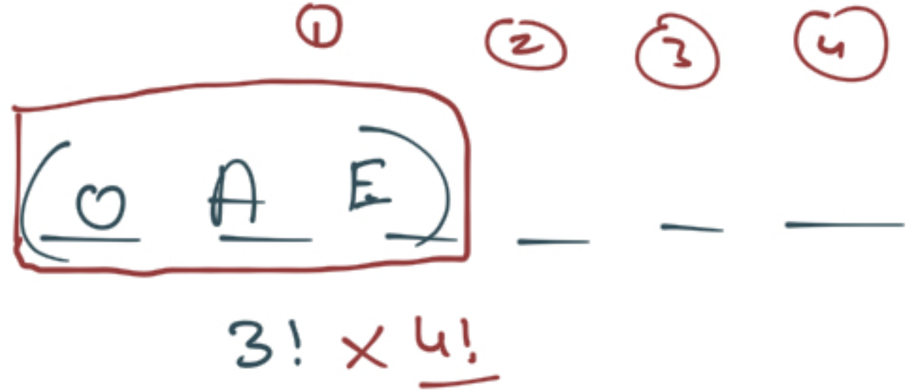
In how many ways a letters of a word ORANGE can be re-arranged without repetitions where the all vowels occur together?

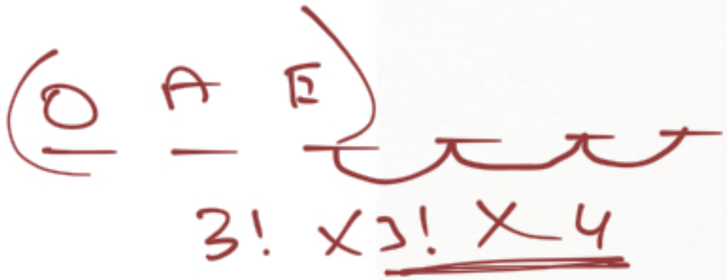
A. 120

B. 134

C. 144

D. 156





How many ways a letters of a word ORANGE can be re-arranged without repetitions where the all vowels not occur together?

A. 573

B. 567

C. 576

D. 588

total − all vowel occur together

6! − 144

Neeraja Anand V

In how many different ways can the letters of the word BOOKLET be arranged such that B and T always come together?

A. 360

B. 720

C. 480

D. 5040

$2! \times \frac{6!}{2!} = 720$

not occur together

$\frac{7!}{2!} - 720$

How many numbers of 4 digits can be formed with the digits 0, 1, 2, 3 (repetition of digits being allowed)?

A. 12

B. 108

C. 256

D. 192

With rep

⇒ 3 digits

_ _ _ _

(1,2,3) (0,1,2)

3 ways × 4 × 4 × 4 ⇒ 192

Without rep

_ _ _ _

3 × 3 × 2 × 1 ⇒ 18

(1,2,3)

Neeraja Anand V

How many numbers greater than 800 and less than 4000 can be formed with digits 0, 1, 3, 4, 5, 7, 8 and 9 without repetition of any digits in any number?

A. 504

B. 403

C. 304

D. 203

800 < < 4000

8, 9

2 ways × 7 × 6

⇒ 84

1, 3

2 ways × 7 × 6 × 5

420

8 nos

504

How many 4 digit numbers contain number 2.

A. 3170

B. 3172

C. 3174

D. 3168

total 4 digit numbers

$\Rightarrow 9000$

$\Rightarrow 5832$

$8 \times 9 \times 9 \times 9 = 3168$

0, 1, ~~2~~, 3 ... 9

9 no...

0 to 9

$9 \times 10 \times 10 \times 10 \Rightarrow 9000$

1000 → 9999

2 _ _ _

2 2 _ _

2 2 2 _

2 2 2 2

_ 2 _ _

_ _ 2 _

$9 \times 10 \times 10$

In how many ways 8 people can be arranged around a circular table?

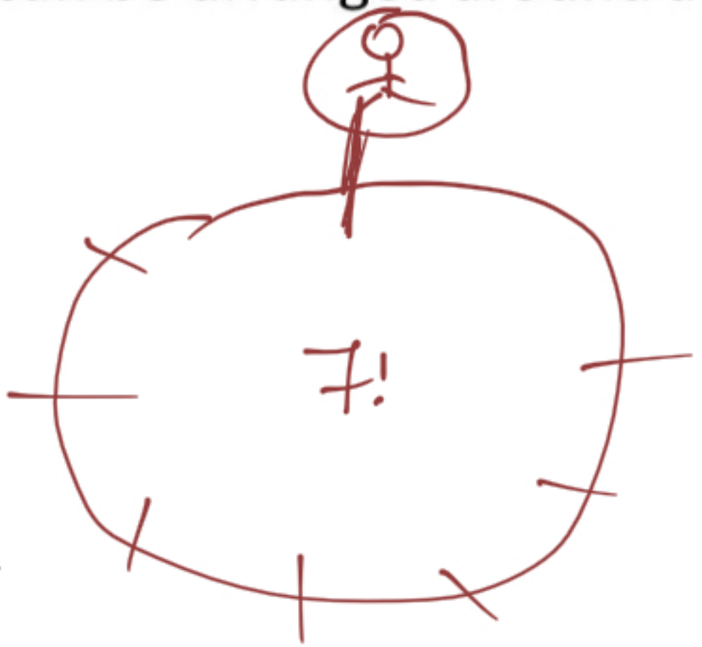
A. 120

B. 720

C. 5040

D. 40320

$(n-1)!$



Neeraja Anand V

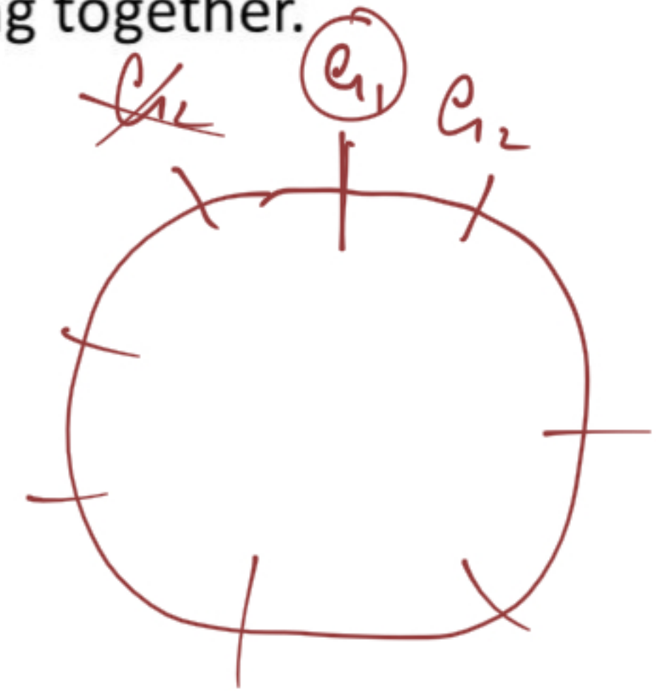
Find the number of different ways in which 6 boys and 2 girls can sit in a circle with the girls sitting together.

A. 1240

B. 1440

C. 1234

D. 1450



G2 6 Boys

2 ways × 6!

Neeraja Anand V

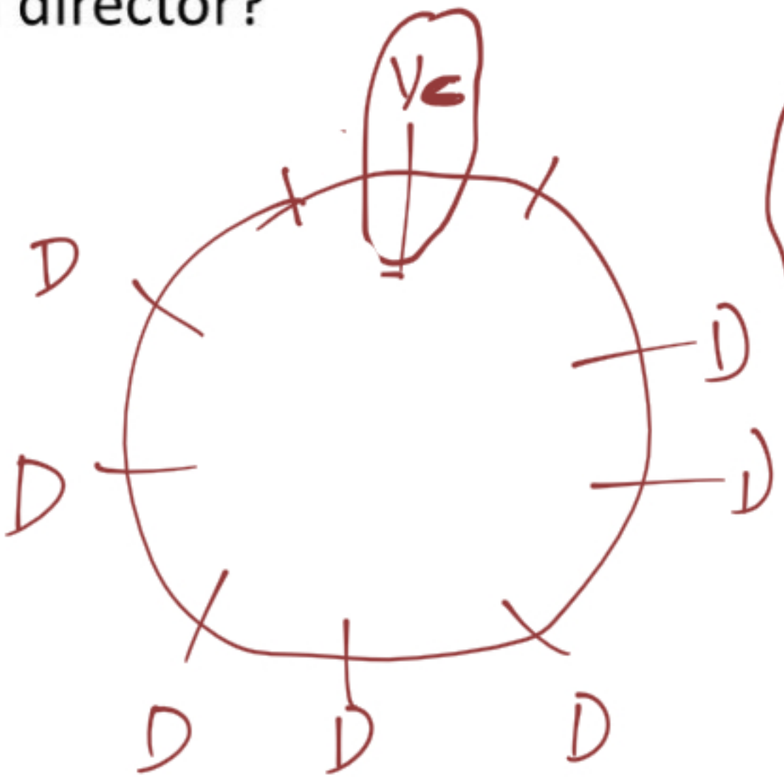
How many ways can eight directors, vice chairman and chairman of a party be seated at a round table, if the chairman has to sit between the vice chairman and a director?

A. 8!

B. 2!8!

C. 2!7!

D. None



C ↓ 8 Directors

2 ways × 8!

In how many ways can 7 beads be strung into necklace ?

A. 2520

B. 5040

C. 720

D. 360

$$\frac{(n-1)!}{2} = \frac{6!}{2} = 360$$

Neeraja Anand V

What is the sum of all the 3 digit number obtained by rearranging the digits {1, 2 and 3} without repetition?

A. 1332

B. 1330

C. 1336

D. 1323

(1) $(n-1)! = (3-1)! = 2! = 2$

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

(3) $6 \times 2 = \boxed{12}$

123
132
213
231
321
312

1332

1200
120
12

1332

Neeraja Anand V

What is the sum of all the 4 digit number obtained by rearranging the digits {1, 2, 3 and 4} with repetition?

A. 133200

B. 435260

C. 711040

D. 675480

(1) $n^{(n-1)} = 4^3 = 64$

(2) $1+2+3+4 = 10$

(3) $64 \times 10 = 640$

640000
64000
6400
640
711040

_ _ _ _
$4 \times 4 \times 4 \times 4$
$\Rightarrow 256$
NO

Neeraja Anand V