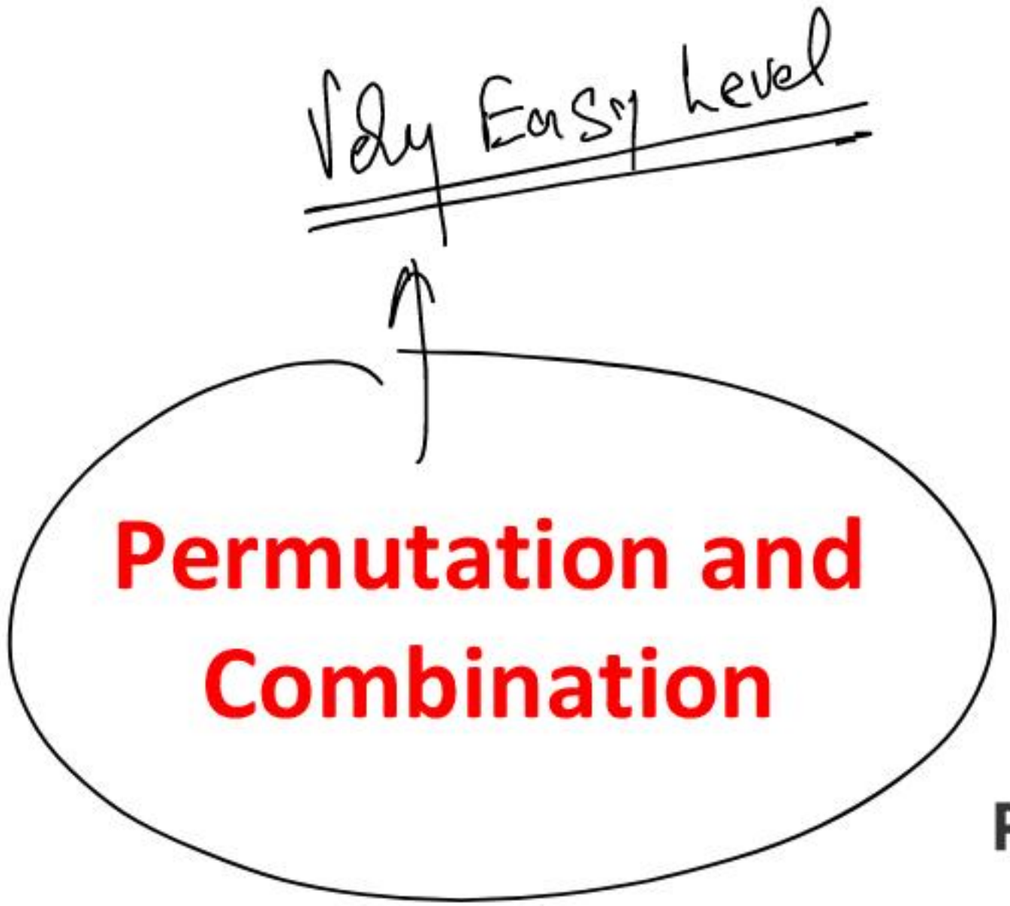



BYJU'S EXAM PREP

The Most Comprehensive Preparation App For All Exams

# Some Formulas

$n! = n \times (n-1) \times (n-2) \times \text{----} \times 3 \times 2 \times 1$

$5! = 120$

$4! = 24$

$3! = 6$

$2! = 2$

$1! = 1$

$0! = 1$ *

$$\frac{10!}{8!} = \frac{10 \times 9 \times \cancel{8!}}{\cancel{8!}} = 90$$

$$\frac{18!}{15!} = \frac{18 \times 17 \times 16 \times \cancel{15!}}{\cancel{15!}} = \text{.....}$$

* Arrangement of n Distinct objects.

# Some Formulas

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

ways to Select r out of n Distinct object

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

$$^{10}C_{7} = {}^{10}C_{3}$$

$$^{12}C_{4} = {}^{12}C_{8}$$

$$^{11}C_{8} = {}^{11}C_{3}$$

$$^{n}C_{n-r} = \frac{n!}{(n-r)!\,(n-(n-r))!} = \frac{n!}{(n-r)! \times r!} = {}^{n}C_{r}$$

$$^{n}C_{0} = 1 \qquad ^{n}C_{3} = \frac{n(n-1)(n-2)}{6}$$

$$^{n}C_{1} = n$$

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

# Some Formulas

$${}^{10}C_7 = {}^{10}C_3 = \frac{10!}{3!\,7!} = \frac{10\times 9\times 8\times 7!}{3!\times 7!} = 120$$

$${}^{15}C_{13} = {}^{15}C_2 = \frac{15!}{2!\,13!} = \frac{15\times 14\times 13!}{2!\times 13!} = 105$$

$${}^{12}C_2 = \frac{12\times 11}{2!} \qquad {}^{13}C_3 = \frac{13\times 12\times 11}{3!} \qquad {}^{14}C_2 = \frac{14\times 13}{2!}$$

$${}^{18}C_{16} = {}^{18}C_2 = \frac{18\times 17}{2!}$$

# Some Formulas

$$^{n}P_{r} = \frac{n!}{(n-r)!} = {}^{n}C_{r} \times r!$$

Arrangement of $n$ Distinct objects at $r$ places.
$r$ " " at $n$ "

# Some Formulas

# Key Points

- Identical Vs Distinct

Selection

A B

= B A

20 Identical Apples

Select 1 A → 1 way

2A → 1 way

3A → 1 way

4A → 1 way

20A → 1 way

8 Different Chocolates.

Select 1 → 8 ways.

Select 2 → ~~8×7~~ = ~~56~~ ways

$^8C_2$ ways.

# Key Points

- Identical Vs Distinct
- Repetition Allowed or not

if not Denied, means allowed

1-6 Digits — 4 Digit No.

(I) Repetition allowed

$6 \times 6 \times 6 \times 6 = 6^4 = 1296$

(II) Repetition not allowed

$6 \times 5 \times 4 \times 3 = 360$ ways.

# Key Points

- Identical Vs Distinct
- Repetition Allowed or not
- Order is important or not

Arrange

Selection

Q.1 20 friends, Each shakes hand with others. No. of Handshakes.

A B C D - - - -

$AB = BA$

order Not Imp.

$^{20}C_2$

$= \frac{20 \times 19}{2}$

$= 190$ ways.

Delhi → A B C D ← Chandigarh

No. of Different Tickets can be Printed on this Route.

from Delhi → A

≠ from A → Delhi

Order is Imp.

$^6P_2$

$= \frac{6!}{4!}$

$= 6 \times 5$

$= 30$ ways.

$^6C_2 \times 2!$ → order

$\frac{6 \times 5}{2}$

$= 15 \times 2 = 30$

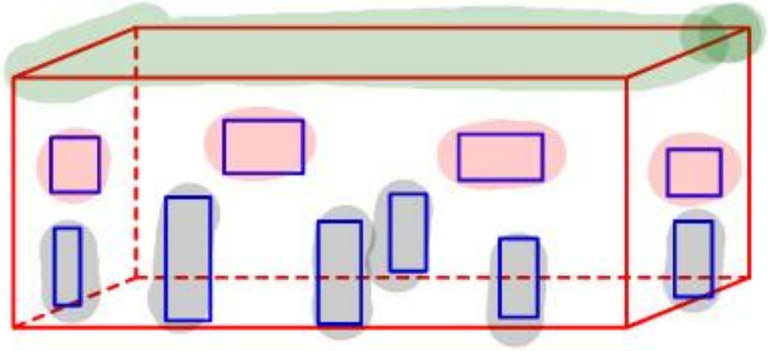
# Key Points

- Identical Vs Distinct
- Repetition Allowed or not
- Order is important or not

# Fundamental Principle of Counting

'and' × one Task / then / फिर

'or' + Cases / if / अगर



6 Doors 4 Windows.

Q. Ways a theif can enter via Window and Exit via Door.

Window and Door

4 × 6

= 24 ways.

Q. Ways a theif can enter the Hall

Door or Window.

6 + 4 = 10 ways.

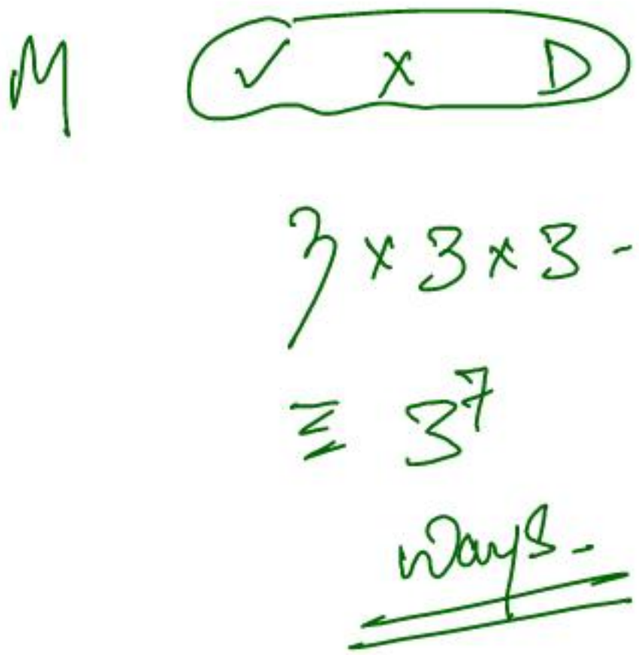
Q. Ways theif can enter and exit in the hall

enter Exit

(6+4) × (6+4) = 100 ways.

# Fundamental Principle of Counting

# Fundamental Principle of Counting




Find the number of ways of possible outcome for a series of 7 matches. (Matches can end with win, loss and draw)

A. 7!

B. $7^3$

C. $3^7$

D. 49

E. None of these

**How many 4-digit numbers can be formed using the digits 9, 8, 7, 6, 0, 4 and 3 such that repetition of digits is not allowed?**

$6 \times 6 \times 5 \times 4$

1 ↓ Non zero Digit

1 ↓ 0 or (1) any other (5) Digit

$= 720$ ways

0, 6 Non-zero Digit

if Repetition allowed

$6 \times 7 \times 7 \times 7$

$= 6 \times 343$

$= 2058$

How many 4-digit numbers can be formed using the digits 9, 8, 7, 6, 0, 4 and 3 such that repetition of digits is allowed?

$7 \times 6 \times 6 \times 6$

any Digit other than on the immediate left

How many 4-digit numbers can be formed using the digits 9, 8, 7, 6, 5, 4 and 3 such that repetition of digits is allowed but no two adjacent digits are same?

9887 ✗✗

9897 ✓

989

At least one = Total - None

= Total No. - Without Rep.

**Find the number of 5-digit natural numbers by using the digits 0, 1,2,3,4,5, 6, 7 such that atleast one of digit is repeated?**

$7 \times 8 \times 8 \times 8 \times 8 - 7 \times 7 \times 6 \times 5 \times 4 = \text{Ans.}$

# Selection

$^nC_r$ = Ways to select r out of n Distinct.

Order is Not Imp -

One by one

Selection ≡ Arrangement

10 Boys. 3 Boys.

$= \frac{a\ b\ c}{b\ a\ c}$

$^{10}C_4 \times {}^{9}C_4 \times {}^{8}C_4 = 720$

✓ $^{10}C_3 = 120$.

# Selection

5 persons to be selected from a group of 8 persons. Ways to do so?

① No condition $^8C_5 = {}^8C_3$

$= \frac{8 \times 7 \times 6}{3!} = 56$

② Ramesh can't be selected

R ✗ 7 other

$^7C_5 = {}^7C_2 = 21$ ways.

③ Ram must be selected.

R ✓ 7 other

$1 \times {}^7C_4 = {}^7C_3 = \frac{7 \times 6 \times 5}{3!} = 35$ ways.

There are 7 Male and 5 Females in a family. Out of the family members, 6 person to be selected. In how many ways it can be done if...

No female

1. No Condition $^{12}C_6$
2. At least one female member $\leftarrow {}^{12}C_6 - {}^{7}C_6$
3. At least 2 Males and 2 Females

| M | F | |
|---|---|---|
| 2 | 4 | $\rightarrow {}^{7}C_2 \times {}^{5}C_4 = 105$ |
| 3 | 3 | $\rightarrow {}^{7}C_3 \times {}^{5}C_3 = 350$ |
| 4 | 2 | $\rightarrow {}^{7}C_4 \times {}^{5}C_2 = 350$ |

$\rightarrow$ 805 ways.

# Selection

SELECTION.

4 letter selection

Two same 2 Diff $\oplus$ All 4 Diff

$1 \times {}^{7}C_{2}$

${}^{8}C_{2}$

In how many ways 4 letters can be chosen from GRADEUP

${}^{7}C_{4}$

In how many ways 3 letters can be chosen from APPLE


$1 \times {}^{3}C_{1}$ (PP) 3 other 1

2 Same 1 Diff

$+$

${}^{4}C_{3}$

All Diff

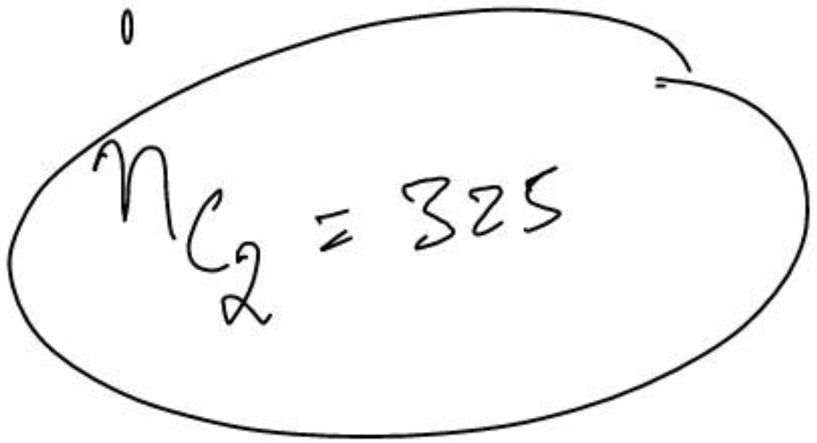
7 Ways

# Selection

Amruta hosted a House Party in which every person shook hand with every other person. Find the total number of handshakes done in the party if 18 members were present.

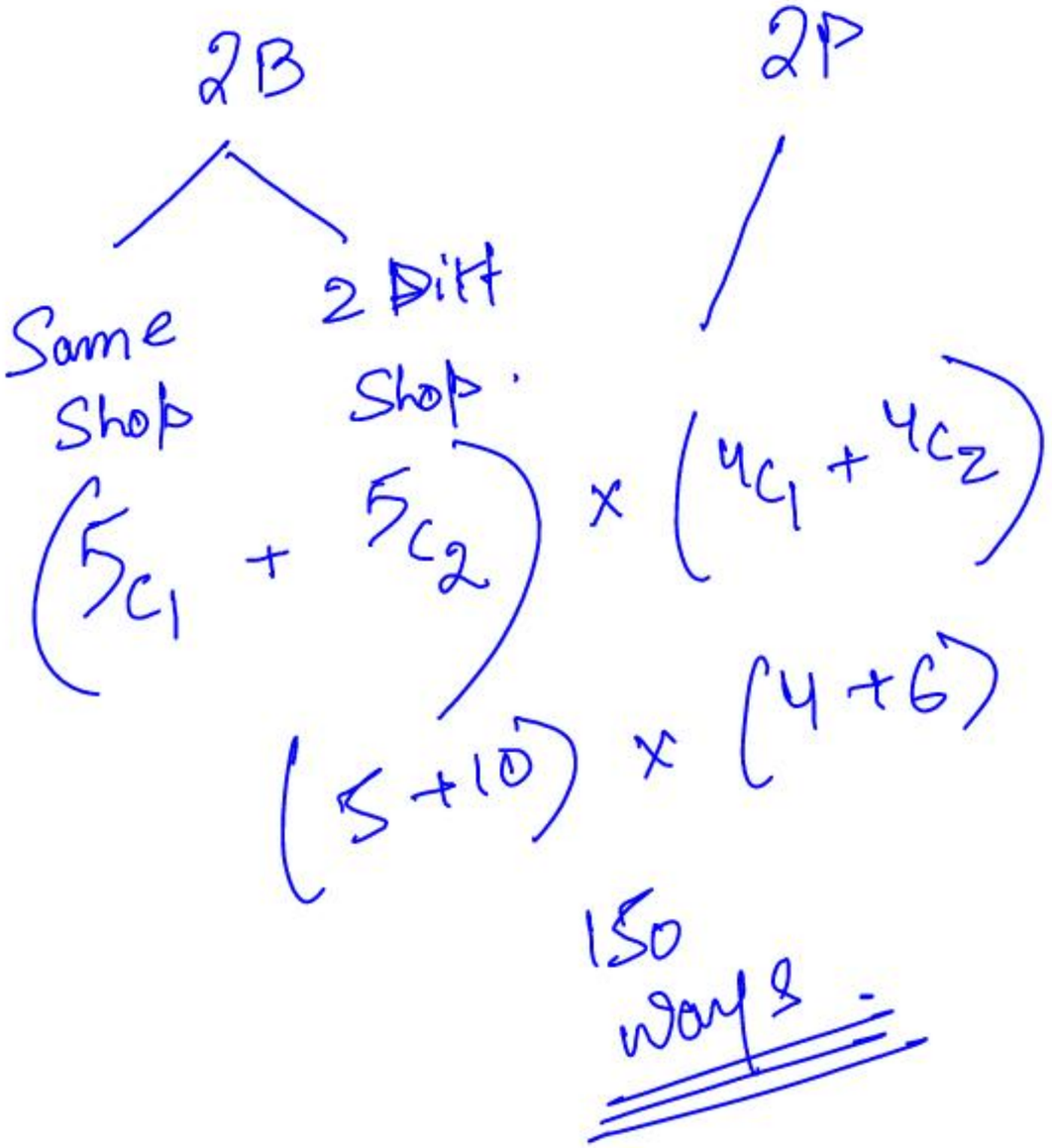
In a monthly review meeting conducted by TCS, each delegate shook hand with other delegate just once. If the total handshakes done in the Meeting was 325. Find the number of delegates in the meeting.

A. 36
B. 13
C. 58
D. 26
E. None




$$\frac{n(n-1)}{2} = 325$$

$$n(n-1) = 650$$




Ananya ordered 2 Burger and 2 Parathas. There are 5 different outlets for Burger and 4 different outlets for Paratha. Find in how many ways she can order 2 Burgers and 2 Parathas.

# Arrangement

ORANGE

$6!$

PERFECT

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

APPLE

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

SUCCESS.

$\frac{7!}{2!3!}$

CC ↩ ↪ SSS

- Arrangements of n different objects

$n!$

- Arrangement of n objects if p are identical and q are identical

$\frac{n!}{p!q!}$

ARRANGE

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

MALAYALAM


$= \frac{9!}{4!\,2!\,2!}$

TAMIL
$5!$

Hindi
$\frac{5!}{2!}$

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

# Arrangement

10 friends. 8 Places.

$^{10}C_8 \times 8! = {}^{10}P_8$

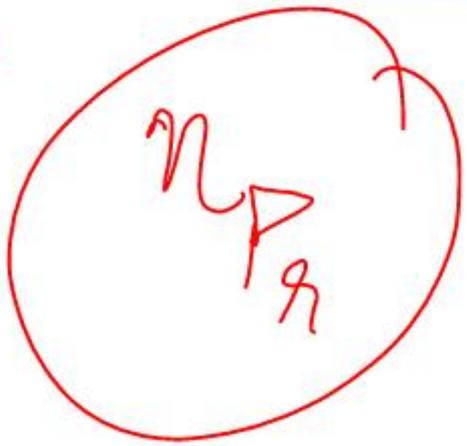
8 Friends 10 Places

$^{10}C_8 \times 8! = {}^{10}P_8$

- Arrangement of n distinct objects at r places

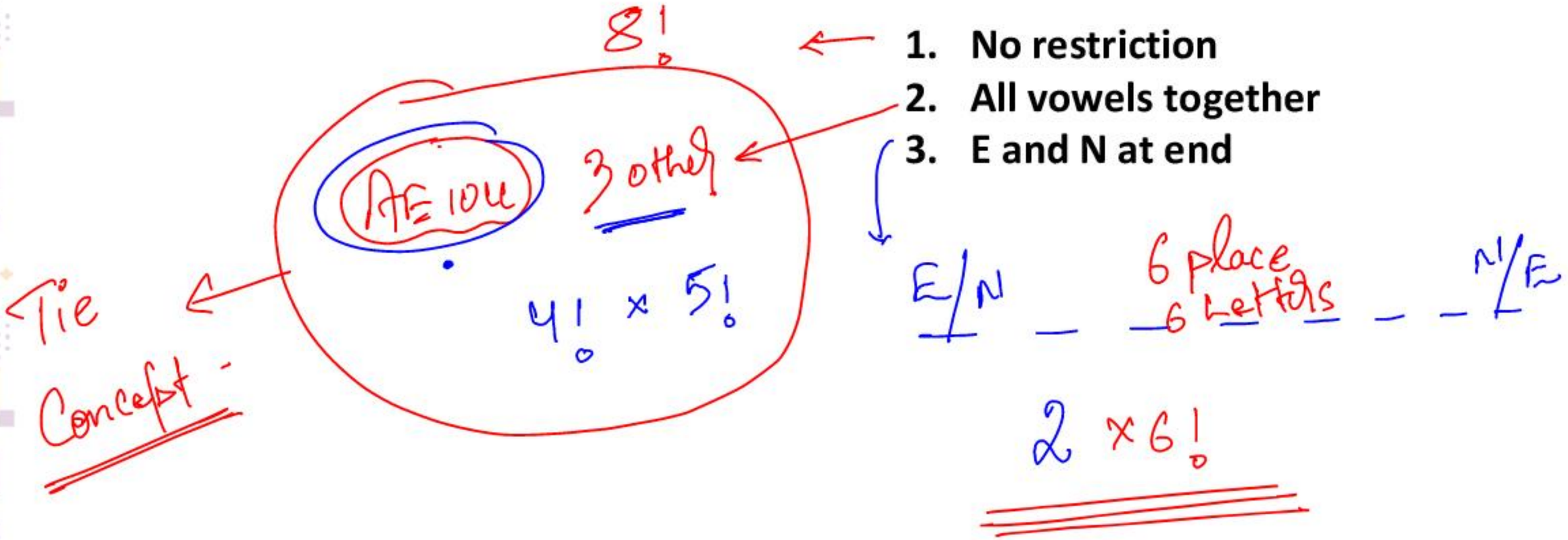
Or

- Arrangement of r distinct objects at n places



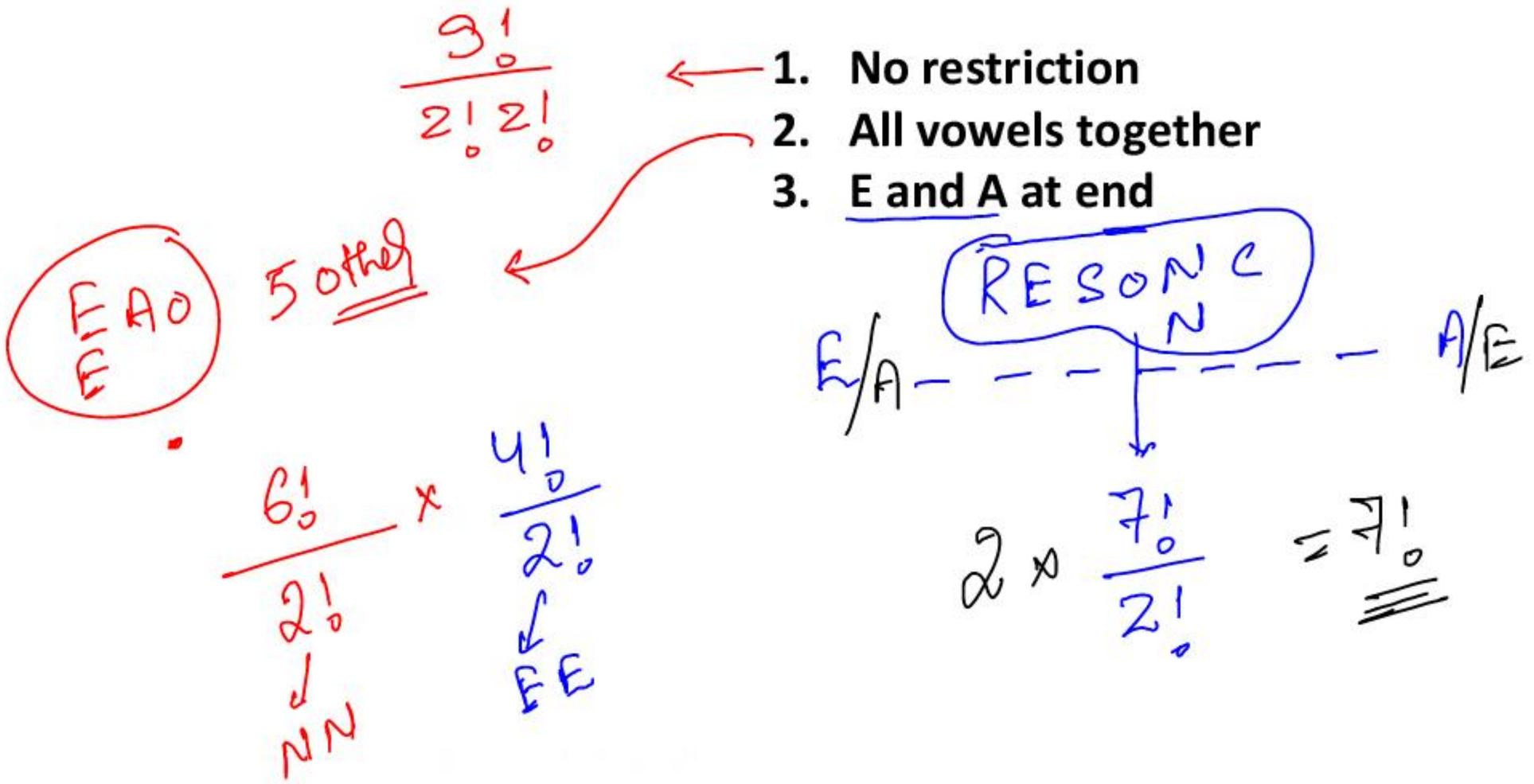

EQUATION

**Find the number of words formed by using all the letters of EQUATION.**



Find the number of words formed by using all the letters of RESONANCE.

1. No restriction
2. All vowels together
3. E and A at end



Find the number of words formed by using all the letters of COMPUTER.

_C_M_P_T_R_

$5! \times {}^{6}C_3 \times 3!$

**NO two vowel together**

1. arrange others first
2. Select places for objects to be separated.
3. arrange

Find the number of 3 letter words containing vowels only formed by using letters of TRIANGLE.

A. 3

B. 6

C. 8

D. 12

E. None of these

Find the number of words formed by using all letters of the word KOLKATA.

A. 860

B. 960

C. 1260

D. 5040

E. None of these

In how many ways the letters of the word BEAUTY be arranged so that the vowel and consonants occupy alternate positions?

A. 72

B. 64

C. 60

D. 48

E. 24

In how many ways can the letters of word 'MOUNTAIN' be arranged such that all the vowels come together?

A. 1120

B. 1240

C. 1420

D. 1440

E. None of these

In how many ways can the letters of word ‘MOUNTAIN’ be arranged such that no two vowels come together?

# Circular Arrangement