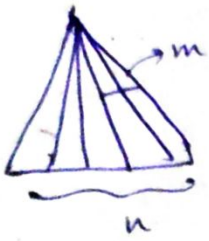
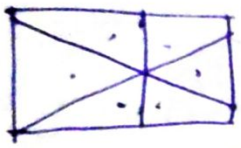
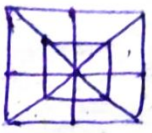
$\longrightarrow \frac{n(n+1)}{2} = 1+2+\cdots+n$

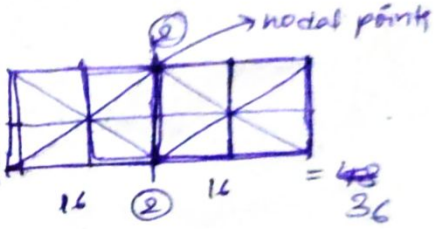


$\longrightarrow \frac{n(n+1)}{2} + m$

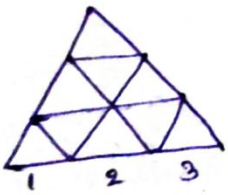


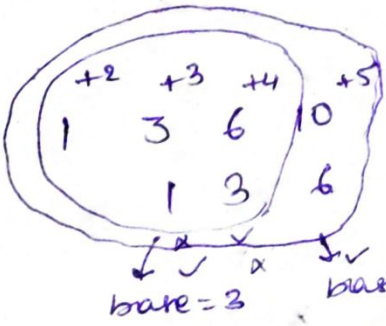
$\longrightarrow (n \times 2)$





series question





+6 +7 +8

15 21 28 36

10 15 21

1+3+6+3 = 13

1+3+6+10

---

permutations - ${}^{n}P_{r} = \frac{n!}{(n-r)!}$ ↓ Arrangement

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

⇒ Education - all vowels together

e o a i o

d c t n

5! 5!

- never together 9! - 5! 5!

⇒ Psychology - vowels → 2! 2! - consonants →

p s y c h l g

2! 2!

11

00

⇒ P s y c h o l o g y ① → all vowels together / never together

o o ⑥
y y

$\frac{9!\,2!}{2!\,2!}$ / $10! - \frac{9!\,2!}{2!\,2!}$

② → consonants together

$\frac{8!\,3!}{2!\,2!}$

③ → vowels never together

- P - s - y - c - h - l - g - y -

$\frac{{}^9P_2 \times 8!}{2!\,2!}$

④ → vowels/consonants - odd/even places

vowels - odd/even places ${}^5P_2 \times 8!$ / $2!\,2!$

- education ① → $5!\,5!$
② → $6!\,4!$
e u a i o
d c t n
③ → _ d _ c _ t _ n _ ④ → consonants odd

${}^5P_5 \times 4!$ ${}^5P_4 \times 5!$

⇒ No of words formed

	without rep	with rep
run	$3!$	3^3

⇒ Rank

M O T H E R
⑤ ④ ⑥ ② ① ⑤ - order of letters

2 2 3 1 0 0 - number of less letters than
× × × × × × that number in the right
5! 4! 3! 2! 1! 0!

$2(5!) + 2(4!) + 3(3!) + 1(2!) + 0(1!) + 0(1!) = 309$

$+ 1$

S E C R E T
④ ② ① ③ ② ⑤

4 1 0 1 0 0

5! 4! 3! 2! 1! 0!

→ 4 × 5! + 4! + 2! + 1

= 240 + 12 + 2 + 1 = 255

Crypt arithmetic

→ donot start with zero

→ each alphabet - 0-9

Rate & work

A → 6 mins (1/6) B → 12 mins (1/12) → 1/6 + 1/12 = 1/4 ⇒ 1 min

A - 2 pcs
B - 1 pc

work together :-

1/6 + 1/12 = 1/4 → 4 cycles

alternatively :- 4 cycles × 2

Direct & Indirect proportions

$$\frac{N_1 \times H_1 \times D_1 \times R_1}{W_1} = \frac{N_2 \times H_2 \times D_2 \times R_2}{W_2}$$

Time, speed & distance

speed = dist / time , avg speed = total dist / total time

dist / product of time = product of speed / dist = diff of speed / diff in time

speed downstream = speed of stream + boat in still water

speed upstream = speed of stream − boat in still water

stream = $\frac{down - up}{2}$

boat in still water = $\frac{down + up}{2}$

up = down T = $\frac{\text{still water} \times D}{up \times down}$

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seating arrangement

facing inside – down (first person) | anticlockwise → right
outside – up | clockwise → left

---

cubes, cuboids

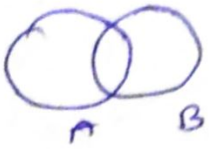
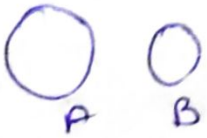
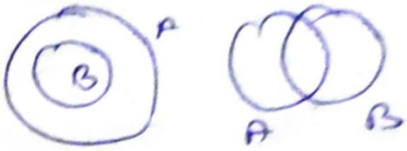
faces – 6
edges – 12
corner – 8

formula 3 faces → 8
2 → 12(n−2)
1 → $6(n-2)^2$
0 → $(n-2)^3$

---

logical connectors

	implication	negation
If P then Q whenever P then Q	$P \to Q$ $\sim Q \to \sim P$	$P \& \sim Q$ $\sim Q \& P$
Either P or Q Unless P then Q	$\sim P \to Q$ $\sim Q \to P$	$\sim P \& \sim Q$ $\sim Q \& \sim P$
Only if P then Q	$\sim P \to \sim Q$ $Q \to P$	$\sim P \& Q$ $Q \& \sim P$

	Basic	possible
All As are Bs		A=B 
No A is B		
Some As are Bs		
some As are not Bs		

some / All → Basic

No → Basic / possibility

Being possibility → Basic (or) possibility

some not → Basic

Third proportion → $p : q = q : x$

mean → $\sqrt{p}\sqrt{q}$

fourth proportion → $\frac{p}{q} = \frac{q}{x}$

duplicate → $\frac{p^2}{q^2}$

Triplate → $\frac{p^3}{q^3}$

Simple Interest

$$SI = \frac{P \times T \times R}{100}$$

$$CI = P\left(1 + \frac{R}{n(100)}\right)^{nT} - P$$

n – no. of times money compounded annually

$$CI - SI = P\left(\frac{R}{100}\right)^2 \longrightarrow \text{2 yrs}$$

$$CI - SI = P\left[\left(\frac{R}{100}\right)^3 + 3\left(\frac{R}{100}\right)^2\right] \longrightarrow \text{3 yrs}$$

$$A = P\left(1 + \frac{R_1}{100}\right)^{T_1} + \left(1 + \frac{R_2}{100}\right)^{T_2}$$

$$A = P\left(1 + \frac{R}{100}\right)^{WT} + \left(1 + \frac{FTR}{100}\right)$$

$$\text{Gain \%} = \frac{SP - CP}{CP} \times 100$$

$$\text{loss \%} = \frac{CP - SP}{CP} \times 100$$

$$SP = MP\left(1 - \frac{D}{100}\right)$$

collection = sale × price

Percentage

$$\text{Net \% change} = x + y + \frac{xy}{100}$$

$$\text{\% reduction} \longrightarrow \frac{x}{100+x} \times 100$$

$$\text{\% excess} \longrightarrow \frac{x}{100-x} \times 100$$

Avg of new items added $= A + 1 - \left(1 + \frac{N}{n}\right) x$

" removed $= A + 1 - \left(1 - \frac{N}{n}\right) x$

A – orig. avg

N = original no

n = added / removed items

X = by which avg is inc/dec

Replacement of items $A - R = \pm N x$