

HCF & LCM (1)

• LCM of fraction $\frac{\text{LCM } N}{\text{HCF } D}$

• HCF $\frac{\text{HCF } N}{\text{LCM } D}$

• When the num is same = 1, different = $\frac{1}{\text{HCF}}$

• $AB = \text{HCF of } AB \times \text{LCM of } AB$

• Given ratio of 2 nos, common factor = HCF (syk)

Simplification (3)

• $\text{BODMAS} \leftarrow$ Parenthesis

• $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

• $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

• $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

• $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

• $(a+b+c)^2 = (a^2 + b^2 + c^2) + 2(ab + bc + ca)$

• $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

• $(a+\frac{1}{a})^2 = (a^2 + \frac{1}{a^2}) + 2 \cdot a \cdot \frac{1}{a} = a^2 + \frac{1}{a^2} + 2$

• $(a-\frac{1}{a})^2 = (a^2 + \frac{1}{a^2}) - 2 \cdot a \cdot \frac{1}{a} = a^2 + \frac{1}{a^2} - 2$

• $(a+\frac{1}{a})^3 = (a^3 + \frac{1}{a^3}) + 3(a+\frac{1}{a})$

• $(a-\frac{1}{a})^3 = (a^3 - \frac{1}{a^3}) - 3(a-\frac{1}{a})$

• $a^3 - b^3 - c^3 - 3abc = (a-b-c)(a^2 + b^2 + c^2 + ab + bc + ca)$

• $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Time, distance & speed (4)

• $\frac{D}{S} \rightarrow \frac{D}{S} = T$

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Fraction & decimals (2)

• $0.3523 \rightarrow$ so in D write 2 95(99)

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• If $\frac{a}{b} > \frac{c}{d}$ - which one is largest fraction?

1st way if $D > 10$, then

$\frac{a}{b} > \frac{c}{d}$

$\frac{a}{b} > \frac{c}{d}$

$\frac{a}{b} > \frac{c}{d}$

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$\frac{a}{b} > \frac{c}{d}$

$$P_n = \frac{n!}{(n-p)!}$$

$$n C_2$$

no. of hand shakes take place (on matched rounds take place)

n students share hands with e/o (only once) → NOT MENTIONED

Formula $\rightarrow n \times 2$ ($\because A \in B$ twice)

Sum $>$ Avg \times total no.

Sum of total sum = nothing but odd

Numbers

Reverse pos. of an alphabet = (total no. of alphabet)

$$new\ w = existing\ w + weight\ increased/decreased + \sum_{i=1}^n w_i$$

the w increases for boxes

Profit & Loss ⑤

- $SP = CP + \text{Profit (in Rs)}$ ← Profit
- $SP = CP - \text{Loss (in Rs)}$ → Loss
- $\% \text{ Profit} = \frac{\text{Profit (in Rs)}}{CP} \times 100$
- $\% \text{ Loss} = \frac{\text{Loss (in Rs)}}{CP} \times 100$
- $SP = (100\% + \text{Profit}\%) \times CP$
- $SP = (100\% - \text{Loss}\%) \times CP$
- $SP - CP = (+ve)$ ← Profit & $SP - CP = (-ve)$ ← Loss

Work & Wages ⑥

- 1st journey, 2nd journey, 3rd journey, 4th journey, 5th journey, 6th journey, 7th journey, 8th journey, 9th journey, 10th journey
- Income of work, 1 day = $\frac{1}{n}$ amt. of work (just invert)
- If 1 day $\frac{1}{n}$ amt. of work is done, total work = would be done in n days

when $\% \text{ Profit} = \% \text{ Loss}$ & SP are also same for 2 trades on objects or something like this, then, the person will always be a LOSS &

$$\% \text{ Loss} = \frac{(\% \text{ Profit} \times \% \text{ Loss})}{100}$$

Partnership ⑦

Ratio of Investment \times Time = Ratio of Profit

(A's investment \times A's time) : (B's investment \times B's time) = A's Profit : B's Profit

$I \times T = P$

Ratio & Proportion ⑧

If $a:b :: c:d$

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

If $\frac{a}{b} = \frac{c}{d}$ then $ad = bc$

If $\frac{a}{b} > \frac{c}{d}$, which ratio is antony to the other

If $ad > bc$, then LHS > RHS

If $ad < bc$, then, LHS < RHS

If $ad = bc$, then LHS = RHS

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

If $\frac{a}{b} = \frac{c}{d}$ (they are proportional) by dividendo-componendo rule,

$$\frac{a+b}{a-b} = \frac{c+d}{c-d}$$

$$p \cdot T = 0$$

alphabet

it group

alphabet

sum of

ts of

the

that

be, we

relation

alphabet

PR.

It not check if they are of 1st with other

(14) Permutation & Combination

• Find a man
Linear m
ways possi

• See the word
- treat as a? → make it a

• AND = 'x', OR = '+'

• Per 'linear' (select & arrange) → nP_r
Per 'circular' (select & arrange)

Ratio & Proportion
Rest

if, $\frac{a}{b} = \frac{c}{d}$ then,

$\frac{a+b}{a-b} = \frac{c+d}{c-d}$ (always equal to)

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

$\frac{b}{a} = \frac{d}{c}$ (Invertendo)

if, $a:b::c$,
1st p 2nd p 3rd p

$a:b::b:c$

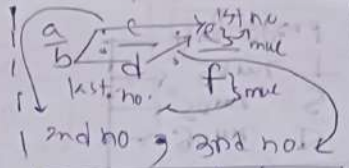
if $a:b::c:d$,

$a:b::c:d$

Ratio = $a:b$

$\frac{a}{b} = k$ (common factor) (let)

ak, bk → actual vals.



1st no. = mul. of all
2nd no. = $b+c$
3rd no. = $b+d$
4th no. = mul. of all ps

Percentage (5)

$\frac{1}{100}$ of Quantity = $\frac{1}{100} \times \text{Quant}$

$\frac{x}{100}$ of Quantity = $\frac{x}{100} \times \text{Quant}$

$\frac{x}{100}$ of $y\%$
 $\frac{10}{100} \times 100\%$

$\frac{1}{2}$ of 100
 $\frac{1}{2} \times 100\%$

let, how much % is Q_1 of Q_2

→ % of the quant = $\frac{Q_1}{Q_2} \times 100$

% of the quant with respect to which we want to calculate that Q_2

$\frac{\text{change} \times 100}{\text{current price of unit}} = \text{How much \% B is more than A}$

Problems on ages (10)

$\text{Avg} = \frac{\text{Sum}}{\text{Total obsrv.}}$

1 Work time days, i.e.
(more work less time, less days taken)

$\frac{\text{Work}}{\text{Speed}} = \frac{\text{time taken}}{\text{days taken}}$

Time & Work (11)

$\frac{\text{no. of men} \times \text{amt of work}}{\text{days taken}}$

Then, amt. of work & time days taken

the w. increase / decreased to the other n. no. of boxes

(16) Nur

• i) Find the relation

alphabet (will be 27 days) → alphabet (1) - original no. of that alphabet

12) Boats & Streams

x = Speed of boat (in still water)
 y = Speed of river

$\xrightarrow{x+y}$ → Downstream

• $D = x + y$

$\xrightarrow{x-y}$ → Upstream

• $U = x - y$

$\frac{D}{S} = \frac{U}{T} \Rightarrow D = S \cdot T$

Shortcut

• If given $a+b$, find $\frac{1}{x}$,
 then, if $(a^2 - b^2)$ is
 equal to 1, i.e. the diff.
 is 1, then just write $a-b$
 i.e. $\frac{1}{x} = a-b$

• If, $u + \frac{1}{u} = ?$ then → $2 \times$ biggest no.
 • If, $u - \frac{1}{u} = ?$ then → $2 \times$ smallest no.

13) Algebra

• If large expression is given / insufficient
 no. of eqns are given etc
 then rather doing
 the large calculation
 use Substitution method

Method
 $(5x^3 + 20x^2 + 17x + 42) \div (x+2)$; Rem?
 $f(x) = 5x^3 + 20x^2 + 17x + 42$
 $\Rightarrow 5(-2)^3 + 20(-2)^2 + 17(-2) + 42$
 $= \text{Rem (what will be the ans will be the rem)}$

• If in qn, it is said that,
 'dividend is completely / exactly /
 absolutely divided by divisor'
 then $\text{Rem} = 0$, otherwise rem $\neq 0$

Some imp formulas

$(a+b)^2 = a^2 + 2ab + b^2$
 $(a-b)^2 = a^2 + b^2 - 2ab$
 $a^2 - b^2 = (a+b)(a-b)$
 $(a+b)^2 = (a-b)^2 + 4ab$
 $(a-b)^2 = (a+b)^2 - 4ab$
 $a^2 + b^2 = \frac{1}{2} [(a+b)^2 + (a-b)^2]$
 $a^3 + b^3 = (a+b) [(a+b)^2 - 3ab]$
 $a^3 - b^3 = (a-b) [(a+b)^2 + 3ab]$

could be given in qn

fix this any m.

Assume the
 val. of $a \rightarrow$ Substitute
 var. (smaller the val. in
 val's like the exp. of
 0, 1, 2, 3...)
 check the
 ans with the given
 o/p's ans
 by putting the val. direct check

• 1 eqn, 2 var. then,
 assume extra var. = 0

• 2 eqn, 3 var. then,
 assume extra var. = 0, from
 2 eqn we will get some val.

ENJOY THIS
THIS MOMENT
IS YOUR
Moment Life

④ Permutation & Combination

• For arranging n things in linear manner we have $n!$ ways possible

• For arranging n things in circular manner we have $(n-1)!$

• Combination = select

• Permutation = select & arrange

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

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

• See the word together? →

• And = '+', OR = '+'
make it a group or no. of groups of same things

• In general, but if some special case like a customised statement like 'vow not together' like this, then,

total ways = vow together + vow not together

• n students shake hands with e/o for 'only once' (or, played game e/o - only once)

nC_2

no. of hand shakes take place (or, matched rounds take place)

• n students shake hands with e/o ('only once' → NOT MENTIONED) → $n-1$ (twice)

• For 'linear' (select & arrange) → $n!$
For 'circular' (select & arrange) → no permutation

Do it manually

• When arrange the letter is said = '!'
When select the letter is said = 'C' (here 1 letter has 1 chance to go)

Averages ⑤

• Avg means (average) distribution

$$\text{Avg} = \frac{\text{Sum}}{\text{total no.}}$$

$$\text{Sum} = \text{Avg} \times \text{total no.}$$

$$\text{Sum} = \text{total} - \text{missing sum but I did}$$

Ratio & Proportion ⑧

• when $a:b :: c:d$ & S_1 and S_2 for 2 trades or objects or something like this, then, the proportion is

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

Profit & Loss ⑤

$$SP = CP + \text{Pro}(\text{in } \%) \rightarrow \text{Profit}$$

$$SP = CP - \text{Lo}(\text{in } \%) \rightarrow \text{Loss}$$

$$\% \text{ Pro} = \frac{\text{Pro}(\text{in } \%) \times 100}{CP}$$

• when $\% \text{ Pro} = \% \text{ Lo}$ & S_1 and S_2 for 2 trades or objects or something like this, then, the

thru me q work
 1 day = $\frac{1}{n}$ amt. of work
 (just invent)
 In 1 day $\frac{1}{n}$ amt. of work is done
 Total work = would be done in
 W days

$I \times T = P$

By dividendo-componendo rule,
 $\frac{a+b}{a-b} = \frac{c+d}{c-d}$
 $\circledast P \cdot T = 0$

Students share hands with

e/o (only once) → NOT MENTIONED

Formula $\rightarrow n_2 \times 2$ ($\because A \leftrightarrow B$ (twice))

rounds take place

Sum of total sum = nothing but add

Numbers

Alphabet

Reverse pos. of an

Alphabet = (total no. of alphabet + 1) - original pos. of that alphabet
 (will be 27-always)

new $w = \text{existing } w + \text{weight increased/decreased}$
 $\sum_{i=1}^n w_i$
 the w increase/decreased to the other n no. of boxes

- 1) Find the relation b/w given d's
- 2) Solve & get the ans.

Numbers

- Diff.
 - increasing \rightarrow Add. Series
 - decreasing \rightarrow sub. "
 - Rapidly increasing \rightarrow mul.
 - Rapidly decreasing \rightarrow div.

For alphabet series

Find the relation b/w the current & next alphabet
 Find the relation b/w the current & next group
 For groups we have to find out the relation b/w the current & next elements/alphabets of that group & also the next group.

Number

If, can't find the pattern/recognize the pattern

apply tricks
 share cube mean to it
 think like this
 means
 is the no. near to it/
 near to cube like that.

DEF

Alphabets

Rev. pos. of an alphabet =

27 - original pos. of that alphabet

Alphanumeric

same thing for both nos & letters

2F2.1112
 whatever the no. will be, we need to check if there is any relation b/w those nos & the pos. of alphabet or not.

Number

It can be possible that there are 2 series in 1 series or 2 operations are going on in together/simultaneously.

If not, check if they are related to e/o or not

⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳ ㉑ ㉒ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ ㉙ ㉚ ㉛ ㉜ ㉝ ㉞ ㉟ ㊱ ㊲ ㊳ ㊴ ㊵ ㊶ ㊷ ㊸ ㊹ ㊺ ㊻ ㊼ ㊽ ㊾ ㊿

try this way
to check find the
pattern

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

fibrous
slime (mucopolysaccharide)

• 26, 34, 55, 89, 144
19, 21, 36, 57

when these happens
then always remember the
series is Fibonacci series

⑦ Probability

- $P = \text{chance} = \frac{\text{what I want}}{\text{total}}$

- AND $\rightarrow \wedge$
- OR $\rightarrow +$

- total $p = 1$ is

ALWAYS

$$P + \bar{P} = 1; \quad \bar{P} = 1 - P$$

- Common types

$$\vec{F} = \text{cain}(H, T)$$

Compound 52

Price (6 times)
1.2/34.50

• Another type

↓
Socks, balls, knaples, shirts
etc (colorful)

possibilities depend upon
Case by Case

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

[$P(A \cap B)$ can be 0]

- Given, Do an event step by step \rightarrow Do it

• Given, Do an event at a random selection \rightarrow Do it directly

- Leap Year $\rightarrow 366$ days $\rightarrow 52$ weeks & 2 days
- Non Leap Year

- NM leap year $\rightarrow 365$ days $\rightarrow 52$ weeks

$$P(A) + P(\bar{A}) = 1$$

$$\sqrt{A+A} = \sqrt{2A}$$

1 day
(where event is
chances)

- In p & c + prob sum

11 Pine
spruce
candy

26 Blair
lands

→ 2 possibilities

$$2) \rightarrow S(13) = A$$

$\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$

$$\rightarrow (13) \Rightarrow$$

② ③ ④

26 Feb
contd

(18) Pipes & Cisterns

- It is same as time & work, work & wages.

$$N \rightarrow \frac{1}{N}$$

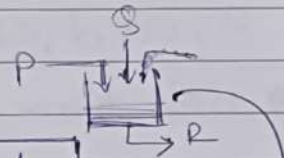
- eg Pipe fills tank in 8 hrs
In 1 hr $\rightarrow \frac{1}{8}$ amt of tank is filled

$$\begin{array}{l} T \rightarrow W \\ W \rightarrow T \end{array}$$

- Filling $\rightarrow +$
Removing $\rightarrow -$

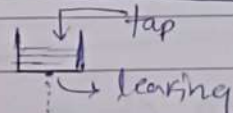
$$P + Q + (-R) = \text{Filling the total amt of tank in 1 hr}$$

(Filling) (Filling)
(Removing)



$$\text{Tap - leak} = \text{Filling the total amt of tank in 1 hr}$$

(Filling)
(Removing/Leaking)



- If in the Qn, 'time taken' on any other's pov is given, then solve the ans by that method i.e., that pov.

- While doing sums, verify it logically too, not for this topics, but for every topics.

It has a big deal with time management, so practice it from now, eventually it will be adopted.

⑩ Arithmetic Progression

- $a_1, a_2, a_3, \dots, a_n \rightarrow$ For this series to be A.P the most imp condition \rightarrow the diff b/w consecutive terms should be same, throughout the series
i.e., $a_2 - a_1 = a_3 - a_2 = \dots$

- If $a = 1^{st}$ term & the common diff b/w each consecutive terms $= d$, then the series will be \rightarrow
 $a, a+d, a+2d, a+3d, \dots$

- n^{th} term $(a_n) = \boxed{a + (n-1)d} = \boxed{T_n}$
 $\swarrow \quad \quad \quad \searrow \quad \quad \quad \swarrow$
 n^{th} term (last term) 1st term total no. of terms in A.P. c.d.
 Also denoted as T_n or n^{th} term in A.P.

$$n = \frac{\text{1st term} - \text{nth last term}}{d} + 1$$

- Sum of an A.P series $\boxed{S_n = a + \frac{n(n-1)}{2}d}$

$$\boxed{S_n = \frac{n}{2} [2a + (n-1)d]} \quad \boxed{S_n = \frac{n}{2} (a + a_n)}$$

(Sum of n terms) \rightarrow A.M

$$\boxed{S_n = \frac{n}{2} (\text{1st} + \text{last term})}$$

- a, b, c
(series of odd terms no. of)

A.M or Arithmetic mean

$$\boxed{b = \frac{a+c}{2}}$$

eg, $(1, 3, 5)$
 total no. of terms, 3
 5 odd no. of terms
 $A.M = \frac{1+5}{2} = 3$
 [If $1, 2, 3, 4, 5$]
 $A.M = \frac{1+5}{2} = 3$

→ that means whenever there is a series of odd no. of terms the $A \cdot m = \text{middle term}$ (In general mean) $\left[\begin{array}{c} 1, 3, 5 \\ 1+3+5 \\ 3 \end{array} = 3 \cdot 6 \right]$

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• $a_1, a_2, a_3, \dots, a_n$

$$A \cdot m = \frac{a_1 + a_2 + a_3 + \dots + a_n}{n}$$

• The 1st is,

a_1 $\xrightarrow{\text{insert } n}$ b last term
first term arithmetic means into these 2 given nos

$a, m_1, m_2, \dots, m_n, b$

Considering

$$C \cdot d = \frac{b-a}{n+1} \quad \text{Here}$$

$$m_1 = \frac{a+b-a}{n+1}$$

$$m_2 = \frac{a+2(b-a)}{n+1}$$

(If we know C.d we'll get the mean terms)

$$m_n = \frac{a+(n-1)(b-a)}{n+1}$$

• If,

i) We add/subtract a particular no or constant with an ap series on all terms of an ap series $\xrightarrow{\text{the res. series}} \boxed{\text{AP series}}$

OXFORD

ii) \times mul / Div $\xrightarrow{\text{the res. series}} \boxed{\text{AP series}}$

iii) we add 2 ap series $\xrightarrow{\text{the res. series}} \boxed{\text{An AP series}}$

Teacher's Signature _____

$\frac{2}{5}$

30
26
7

7

- i) used to check it's AP or not
- ii) If AP then only can apply formula
- If AP but the c.d. is not same, they are in pattern (like upper) then it's a mixup of 2 series.

mixup

In this case group 2 consecutive no. /
add 2 consecutive no. & the no. of terms
will be $\frac{n}{2}$ ($\frac{60}{2}$, we are grouping 2 nos)

Then solve it. method (Time)

• In AP, if it's given $\left| \begin{array}{l} \text{Sum of 3 nos} \\ \text{Sum of 3 nos} \end{array} \right|$

Take this $\xrightarrow{\text{take the no.s as}}$ $[a-d, a, a+d]$ Give this
(not like $a, a+d, a+2d$) $\left[\because \text{In this case we can cancel ds \& easily get values} \right]$

(not like $a, a+d, a+2d$) $\left[\because \text{In this case we can cancel ds \& easily get values} \right]$

↓
∴ In this case we can
conclude as & easily get
values]

- While the nos ~~are~~ don't have enough info & the solving may look a bit lengthy, take help from options, i.e. by analyzing options find ans (like in 2 or in 1A)

20) Number system or Problem on numbers

- Need to find an no more a_n from the no.
- Consecutive nos $n, n+1, n+2, n+3, \dots$
- While there will be i) - ans ii) ans, iii) ① or ② then, seek for 3rd option (\because both are valid)
If 3rd option is not given, then, 2nd will be correct (\because They asked for the value & haven't told that which one is greater)
(as we don't know which one is greater we may go for that reason, so the '-' is negligible)
- In about digit take $[H, U, T] \dots$
- To save time rather than doing the full calculation; get the $a_n \rightarrow$ put options \rightarrow see which one is satisfying
mark as ans \leftarrow

21) Problems on Trains

- ↓
3 elements — ① Length of train in distance traveled will be considered

② length of pole, car, man etc \Rightarrow (by difficulty);
it mentioned some in or any
other units then only consider it.

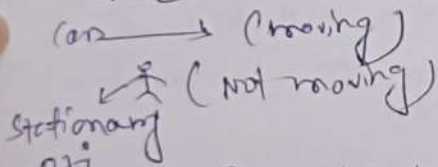
③ Relative speed



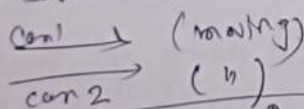
speed of obj 1 in relation to
obj 2 or vice versa. \Rightarrow Relative speed

• when we are trying to find out the speed/
velocity of a moving obj in relation to
another moving obj.

• speed is related to stationary obj \Rightarrow Normal speed



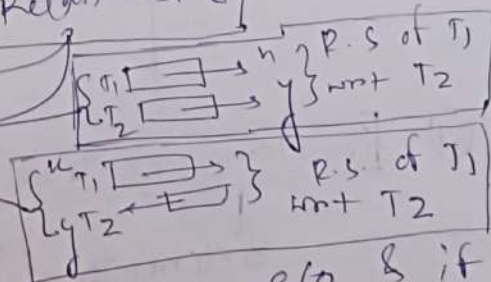
• speed is related to moving obj \Rightarrow Relative speed



• 2 moving obj $\xrightarrow{\text{find out}}$ Relative speed

• Same dir \Rightarrow not

• opposite
dir \Rightarrow +



• while 2 trains are crossing e/o & if
asked how much total distance is travelled

by them = addition of their lengths
 $= L_1 + L_2$

- when some time is wasted then, for much time is wasted =

how much is wasted
good/ideal speed

• If during the calculation of P.S we get
 -1 on even during - - - - - S we get
 -1 that is to be discarded as its negligible
 -1e as it is implying diffraction (-1 may
 opposite dir) we don't know which one
 is greater.

22

Measurement & Geometry

- Chord & Secant are 2 independent sets
 & mutually exclusive (no direct relation)
- Poly & (Pentagon) Polygon

Interior angle (angles inside) Sum = $(n-2) \times 180^\circ$

For regular polygon [all sides] ($n = \text{no. of sides}$)
 & angles are equal]

If not \rightarrow Irregular (both interior & exterior)

Individual angle = $\frac{(n-2) \times 180^\circ}{n}$ (for regular fig.)

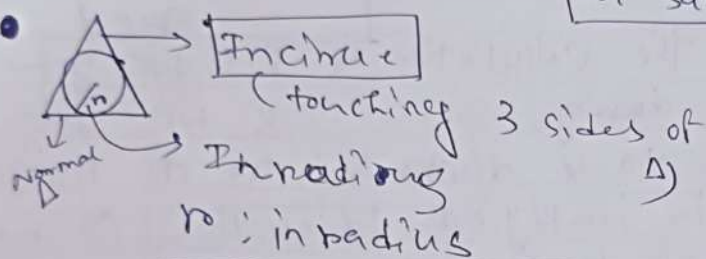
- Interior + corresponding exterior = 180°

Teacher's signature (for regular & irregular polygons)

- Any interior + any exterior $> 180^\circ$

(for regular polygon)

- If interior angles are same \rightarrow Extensions are also same
- If interior not same \rightarrow Extensions are not same



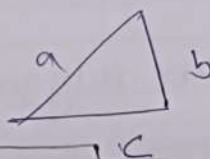
$$r = \frac{\text{area of } \Delta}{\text{Semi Perimeter of } \Delta}$$

ΔABC

$$\begin{aligned} \text{Semi Perimeter} &= \frac{\text{Perimeter}}{2} \\ \text{Perimeter} &= a + b + c \\ \therefore S &= \frac{a + b + c}{2} \end{aligned}$$

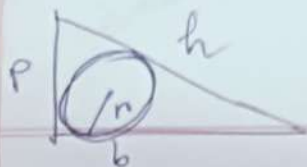
(general case)

- Area of Δ
Heron's formula



$$\begin{aligned} A(\text{Area}) &= \sqrt{s(s-a)(s-b)(s-c)} \\ s &= \frac{a + b + c}{2} \end{aligned}$$

- For right angle Δ (1b, 1p (height), 1h \rightarrow (1 angle $= 90^\circ$))



$\text{inradius} = \frac{\text{area}}{\text{Semi-perimeter}}$
 $= \frac{\frac{1}{2} \times b \times h}{\frac{b+p+h}{2}}$

$$r = \frac{b \times h}{b+p+h}$$

→ Direct formula to get r

$$r = \frac{b+p-h}{2}$$

- when a Δ will be right angle Δ if it satisfies this formula (Pythagorean theorem)

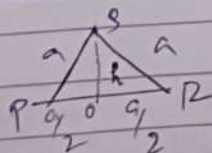
$$h^2 = b^2 + p^2$$

- For equilateral Δ (all sides are same)

$$r (\text{inradius}) = \frac{\text{area}}{\text{Semi-p}} = \frac{\frac{\sqrt{3}}{4} a^2}{\frac{a+a+a}{2}}$$

$$r = \frac{a}{2\sqrt{3}}$$

Now,



ΔGOR

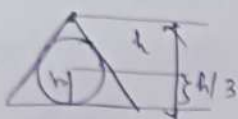
$$a^2 = h^2 + \frac{a^2}{4}$$

$$h = \frac{\sqrt{3}a}{2}$$

Teacher's Signature

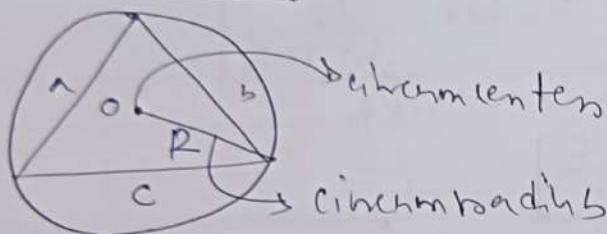
$$r = \frac{2h}{\frac{\sqrt{3}}{2\sqrt{3}}}$$

$$r = \frac{h}{3}$$



∴ For radius of equilateral Δ
= $\frac{\text{height of it}}{3}$

Circumcircle



R (Circumradius) = $\frac{\text{Product of sides of } \Delta}{4 \times \text{area of } \Delta}$

$$R = \frac{abc}{4A} \quad \text{General case}$$

For right angle Δ



$$R = \frac{b \times p \times h}{4 \times \frac{1}{2}ab \times p} = \frac{hy}{2}$$

$$R = \frac{\text{Hypotenuse}}{2}$$

Equilateral Δ

$$R = \frac{a \times a \times a}{4 \times \frac{\sqrt{3}a^2}{4}}$$



$$\Rightarrow R = \frac{a}{\sqrt{3}}$$

$$\therefore R = \frac{\text{Side}}{\sqrt{3}}$$

(23) Elementary Statistics

Mean

n items arranged in ascending/descending order

i) $n \rightarrow$ odd, median = $\left(\frac{n+1}{2}\right)^{\text{th}}$ term

ii) $n \rightarrow$ even, median = $\frac{\frac{n}{2}^{\text{th}} + (\frac{n}{2}+1)^{\text{th}} \text{ term}}{2}$

Mode

\rightarrow term with most occurrences

(or)

term having highest freq

will \rightarrow must be from data may be from data/may not be from data

mean \rightarrow X

mode \rightarrow ✓

median \rightarrow X

mean = $\frac{\text{Sum}}{n}$

\Rightarrow mean = $\frac{\text{Int}}{n}$

\Rightarrow mean $\times n = \text{Int}$

Int is to find mean fast more

Teacher's Signature

advised.

- $\text{Bredian} = \text{mode} + 2 \times \text{mean}$

- If in ratio is asked, consider $K=1$

- To be mode

$\text{freq of the data} > 1$ (must)

(if $K=1$ is asked to be eliminated any thing)

- $$\begin{aligned} S.d &= \sigma = \sqrt{\text{var}} \\ \text{var} &= \sigma^2 \end{aligned}$$

- $$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

\swarrow \searrow
 in form no. of obs mean $\rightarrow \text{var}$

- Effect & mean [effect of avg]

If actual avg = x & then m 's added with each of data points/terms.

\downarrow
~~new~~
 new avg = $x + m$

Similarly, for

x	\rightarrow	$x + m$
$-$	\rightarrow	$x - m$
$/$	\rightarrow	x/m

- The replaced value, the val. to be replaced - total reduction