(Verbal) ~Aptitude~ Budgeting, time management, cooking, baking, shopping

(numbers) learn while doing for ?

1. Natural no's – all +ve no's except 0 (1, 2, 3, ----)

2. whole no's – all +ve no's including 0 (0, 1, 2, 3, 4, ---)

3. Integers – all +ve, -ve, 0 numbers = ... -3, -2, -1, 0, 1, 2, 3 ---

4. Rational nos = can be expressed in form of ratios

$= p/q = -3.4, -3, \sqrt{49}, 1.414, -5/4, 3/7$

5. Irrational no's – cannot be expressed in form of ratio

$= \pi, e, \sqrt{8/4}, \sqrt{10}, 1.414731 ---, -2$

6. Real no's – collection of rational + irrational no's

7. Imaginary no's – having i as a part $i = \sqrt{-1}$ (iota)

8. Complex no's – having both real part + imaginary part

$= a + ib = (3 + i4)$ eg

9. operators – add = +

subtract = −

multiply = *

divide = /

10. Cardinal no's – one, two, three --

Ordinal no's – First, second, third

11. even and odd nos – even = (n % 2 == 0)

odd = (n % 2 == 1)

(1 is neither prime nor composite)

12. Prime and composite no's –

Prime no's = real no's with are divisible by 1 or itself

Coprime – divisible by 1, itself and other divisors in the range

13. Coprime no's – a and b said to be coprime when they have 1 as their common factor → Coprime = 12 and 25, 8 and 15, 24 and 35 eg

(a and b may not be prime)

14. perfect nos – those natural no's whose sum of divisors excluding themselves is equal to no. itself.

$6 = 1 + 2 + 3$ divisors of 6

eg. 28, 496, 8128 etc.

SHOT ON POCO M2

* Prime factorization - expressing composite (coprime) no's as the product of prime no's

$x = 12 = 2^2 \times 3 = \underbrace{2 \times 2 \times 3}_{\text{all are prime}}$

$15 = 5 \times 3$, $36 = 3^2 \times 2^2 = (3 \times 3 \times 2 \times 2)$

* HCF (Highest common factor) - largest possible no. that can divide two or more no's without leaving any remainder → GCD (greatest common divisor)

eg- $12 = 4 \times 3 = 2 \times 6$
$18 = 6 \times 3 = (2 \times 3) \times 3$] → 6 as GCD or HCF

14, 21] → 7×2, 7×3] → 7 as GCD

* LCM (Lowest common multiple) - Smallest common multiple of 2 or more no's when divided by all no's leave 0 at end

LCM(21, 24) = 21 = 21, 42, 63, 84, 105, 126, 147, 168
24 = 24, 48, 72, 96, 120, 144, 168 → LCM

LCM(3, 8) = 3 = 3, 6, 9, 12, 15, 18, 21, 24
8 = 8, 16, 24 → LCM

* Tricks for LCM and HCF

• $HCF \times LCM = (A \times B)$ → product of both no's
HCF(A, B), LCM(A, B)

• HCF of a ratio = $\frac{A}{B} = \frac{HCF(A, B)}{LCM(A, B)}$

• LCM of a ratio = $\frac{A}{B} = \frac{LCM(A, B)}{HCF(A, B)}$

POCO
SHOT ON POCO M2

Aptitude-

for ? ↗ Budgeting, time management, cooking, baking, shopping

(1, 2, 3, - - -)

...stem

- Decimal nos- 0, 1, 2, 3, - - - 9 (0-9)
- Octal nos= 0, 1, 2, - - 7 (0-7)
- Binary = (0 and 1) , • Hexadecimal = 0 - - - 9, A, B, C, D, E, F (0-15)

$A \rightarrow 10$, $F \rightarrow 15$

→ Commutative property = $(a \times b) = (b \times a)$

+ Associative ↳ $a \times (b \times c) = (a \times b) \times c$

+ Distributive = $a \circ (b \times c) = (a \circ b) \times (a \circ c)$

for eg = $a + (b \times c) = (a + b) \times (a \times c)$

2- Work and wages-

Total ~~no of days~~ work = (no of days) × (efficiency)

→ if a person does work in n days

↳ 1 day = he does $1/n$ work

total work in 1 day by (A+B) = work by A in 1 day + work by B in 1 day

↳ for A, B, C

$= (A)_{1 day} + (B)_{1 day} + (C)_{1 day}$

If A → 10 days a work

B → 15 days " a work

1 day = $1/10$ work = A

1 day = $\frac{1}{15}$ = B

1 day (A+B) = $\frac{1}{10} + \frac{1}{15} = \frac{3+2}{30}$ = 6 days ↳ total work

efficiency = (A+B) efficiencies

→ leaving work in b/w

for eg A → does work alone in 800 days

A → leaves in 100 and rest is done by B in 350 days,

time for them to work together (days) ?

let work day = 800

A efficiency = $\frac{800}{800} = 1$

A eff in 100 days = 100 unit work

∴ total days left = 800 − 100 = 700 unit work

efficiency of B = $700/350 = 2$

→ combined eff = (A+B) = (2+1) = 3

∴ work by both = $800/3$ = 266.6 days

3 workers → do work = collective wages = 800
↳ individual basis

if A day alone = 6 days
$B = 8$ days
$C = 24$ days

→ ~~days~~ work = LCM(6, 8, 24) =
∴ A → efficiency = $24/6 = 4$
$B = 24/8 = 3$
$C = 24/24 = 1$

∴ ratio of salary = 4 : 3 : 1
= 400 : 300 : 100

** → (efficiency$_1$) × days$_1$ = (efficiency$_2$) × days$_2$

3 Averages = Average = $\dfrac{\text{Sum of values}}{\text{Total no of values}} = \dfrac{\sum_{i=1}^{n} x_i}{n} = \dfrac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$

- AM = $\dfrac{(n_1 + n_2 + n_3 + \cdots n_n)}{n}$
- GM = $\sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdots n}$

HM = $\dfrac{n}{\left\{\dfrac{1}{x_1} + \dfrac{1}{x_2} + \dfrac{1}{x_3} + \cdots \dfrac{1}{x_n}\right\}}$

* Sum of n nos = $\dfrac{n(n+1)}{2}$, Average = $\dfrac{(n+1)}{2}$

* Sum of square of n natural nos = $\dfrac{n(n+1)(2n+1)}{6}$, Average = $\dfrac{(n+1)(2n+1)}{6}$

* Sum of cube of n natural nos = $\left(\dfrac{n(n+1)}{2}\right)^2$, Average = $\dfrac{n(n+1)^2}{4}$

* Sum of n natural odd nos = n^2, Average = n

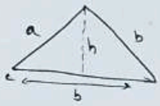
* Sum of n natural even no's = $n(n+1)$, Average = $(n+1)$

* **Area**

= Area $= a^2$

$= \frac{1}{2}(d^2)$ = diagonal (d)

Area = $(l \times b)$



area = $\frac{1}{2}(b \times h)$ → for all triangles
isosceles
Scalene
equilateral

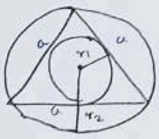
$= \sqrt{s(s-a)(s-b)(s-c)}$

a, b, c = lengths of all sides

$s = \frac{\text{perimeter}}{2} = \left(\frac{a+b+c}{2}\right)$


→ inscribed circle in Δ


→ circumscribed



for equilateral Δ of sides a

radius for incircle $= r_1 = \frac{a}{2\sqrt{3}}$

radius for circumcircle

$r_2 = 2r_1 = \frac{a}{\sqrt{3}}$

for equilateral Δ

height $= \sqrt{3}a/2$

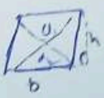
$a^2 = \left(\frac{a}{2}\right)^2 + h^2$

$\frac{3a^2}{4} = h^2, \quad h = \pm\sqrt{\frac{3}{2}}\, a$

area of ||gm
$= b \times h$
(perpendicular height)

area $= \frac{1}{2}(d_1 \times d_2)$

rhombus = also ||gm all sides equal

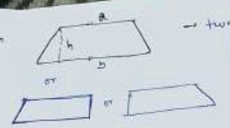


= Sides are equal but diagonals are not equal

not at 90°

→ i.e $d_1 != d_2$

area = $(b \times h)$ or $\frac{1}{2}(d_1 \times d_2)$

Trapezium 

→ two parallel sides to each other, other sides may be parallel or not it depends

area = $\frac{1}{2}$ (sum of parallel sides) × height

$= \frac{1}{2}(a+b) \times$ height

Area = πr^2

for semicircle

Area = $\frac{\pi r^2}{2}$ for $\theta = 180°$

for radius r → sector find area under the angle of θ

Area = $\frac{\pi r^2}{360°} \times \theta°$

Circumference = $2\pi r$

= length of arc for angle θ°

$= \frac{2\pi r}{360} \times \theta°$

Area of 4 walls = $2(l+b) \times h$

+ Area of regular hexagon = $\frac{3\sqrt{3}}{2} a^2$

→ Profit and Loss

Profit = Selling price − Cost price

Loss = Cost price − Selling price

Profit percentage = $\left(\frac{\text{Selling Price} - \text{Cost price}}{\text{Cost price}}\right) \times 100$

Loss percentage = $\left(\frac{\text{Cost price} - \text{Selling price}}{\text{Cost price}}\right) \times 100$

Selling price (SP) = $\frac{(\text{Cost price})(\text{Profit}\%)}{100}$ + Cost price

$= \frac{\text{Cost price}(100 + \text{profit}\%)}{100}$

Cost price = $\frac{(100 \times \text{Selling price})}{(100 + \text{profit}\%)}$

* After discount case

↳

* Selling price (SP) $= \frac{(100 - \text{Loss\%})}{100} \times$ cost price

* Cost price $= \frac{100 \times \text{Selling price}}{(100 - \text{Loss\%})}$

Discount % $= \left(\frac{\text{marked} - \text{selling}}{\text{marked}}\right) \times 100$

* Discount price = Market price − Selling price

* Pipes and Cisterns

→ either water would fill through pipes or would leak out through pipes

If a pipe takes n hours to fill tank

for n hours → volume V

for 1 hour $= \frac{V}{n}$

for second pipe for 1 hour $= \frac{V}{p}$

Since total volume remains same

$\therefore \frac{V}{n} + \frac{V}{p} = \frac{V}{r}$ (both pipes simultaneously)

$\therefore r = \frac{np}{n+p}$

for 3 pipes $= \frac{npq}{np + pq + qn}$

If one fills and 1 empties ∴ total time to fill it

$\frac{V}{n} - \frac{V}{p} = \frac{V}{r}$

↳ leak

$\frac{p-n}{np} = \frac{1}{r}$

$r = \frac{np}{p-n}$

+ Speed / time and distance →

from km / hr ⟷ m/s $= \frac{5}{18} \times$ value

$\text{Speed} = \frac{\text{distance}}{\text{time}}$

$\text{Avg Speed} = \frac{\Sigma \text{ distance}}{\Sigma \text{ time}}$

for same distance: $\text{Avg Speed} = \frac{2d}{x+y}$

$d = \text{Speed} \times x$

$d = \text{Speed} \times y$ $\quad \therefore x = y$ $\quad \therefore \text{Avg Speed} = \frac{d}{x}$

Relative Speeds

$v_2 \leftarrow \quad \rightarrow v_1$

$\text{relative Speed} = v_1 - (-v_2)$

$= v_1 + v_2$

$\text{time} = \frac{L_1 + L_2}{v_1 + v_2} = \frac{\text{total length}}{\text{total speed}}$

$\rightarrow v_1 \quad \rightarrow v_2$

$\text{relative Speed} = v_1 - v_2$

$\text{time} = \frac{L_1 + L_2}{v_1 - v_2}$

+ Boats and Streams

Stream → moving water in a river or any other water body

upstream → moving against direction of stream $(u - v)$

downstream → moving along direction of stream $(u + v)$

total time to cover = $t = t_1 + t_2$

$t = \frac{d}{u - v} + \frac{d}{u + v}$

* Ratios and Proportions

1- For two numbers = a/b or $a:b$ (ratio)

if $a:b = c:d$

$$\frac{a}{b} = \left(\frac{d}{c}\right)^{-1} \text{ or } \frac{a}{b} = \left(\frac{c}{d}\right)$$

$$\therefore a \times d = c \times b$$

* geometric mean = $\sqrt{ab}$

* if $a/b = \frac{c}{d}$ = $\frac{a+b}{a-b} = \frac{c+d}{c-d}$ ↗ Componendo dividendo

if $a \propto b$ = $a = kb$ (k = constant)

if $a \propto \frac{1}{b}$ = $a = \frac{k}{b}$ i.e $a \times b = k$ (constant)

* Alligation or mixture

R = adulterated material

n = no of adulterations

P - pure element quantity

$\therefore$ new mixture = $P\left(1 - \left(\frac{R}{P}\right)\right)^n$

$x \times p_1 + y \times p_2 = (x+y)\, p_3$ ↗ mixture of 2 same things with different quality and prices

* Algebra

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a+b)^2 - (a-b)^2 = 4ab$

$(a+b)^2 + (a-b)^2 = 2(a^2+b^2)$

$(a^2 - b^2) = (a+b)(a-b)$

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

$(a^3 + b^3) = (a+b)(a^2 - ab + b^2)$

$(a^3 - b^3) = (a-b)(a^2 + ab + b^2)$

$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

$(a^3 + b^3 + c^3 - 3abc)$

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

if $a+b+c = 0$

then

$a^3 + b^3 + c^3 = 3abc$

for quadratic eq

$ax^2 + bx + c = \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

→ sum of roots = $x_1 + x_2 = \frac{-b}{a}$

product = $x_1 \times x_2 = \frac{c}{a}$

* **Ages** n years from today = n + x (hence)

n years before = x − n (ago) → Just look for similarity

* Permutations and Combinations

${}^nC_r = \frac{n!}{r!\,(n-r)!}$ = in how many ways can we select r objects

${}^nP_r = \frac{n!}{(n-r)!}$ = selecting and arranging r objects

$0! = 1, \quad 1! = 1, \quad 3! = 3 \times 2 \times 1$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

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

(1) Arranging of different objects

WATCH → how many ways can we arrange the letters of this

_ _ _ _ _ → $5! = 120$

ENGINEERING

→ since some letters are repeating

$\frac{11!}{3! \times 2! \times 2 \times 3!}$

E → 3
G → 2
N → 3
I → 2

→ DIGEST → In how many words are vowels at start or end

→ 2 vowels

and = ×

or = +

$\ominus$ — — — — $\ominus$

$2!$ vowels = → $4!$

$4! \times 2!$

+ Chain method

→ All vowels together

DAUGHTER

vowels = AUE → 1

consonants = DGHTR

Chain can be put in = $8 - 3 + 1 = 6$ places

= ~~Splitting working involved = $n!$~~

AUE → inner permutation = $3!$

$(3! \times 6!)$ → n! - together

For not together = $8!$ − together cases

if any letter repeats divide by particular factorial $(n!)$

* Probability

$$\frac{\text{no of favourable outcomes}}{\text{Total no of outcomes}}$$

if AND gives → probability ×

OR case → probability +

1. | 4B |
   | 6W |

→ 2 Balls taken at random → probability of choosing ball of same colours = 1 − probability of different colours

$1 - \left(\frac{1}{4} \times \frac{1}{6}\right)$ ×

$1 - \left(\frac{1}{24}\right) = \frac{23}{24}$

or

$$\left[\frac{{}^6C_2 \times {}^4C_0 + {}^6C_0 \times {}^4C_2}{{}^{10}C_2}\right] = \frac{7}{15}$$

[illegible], [illegible] that [illegible] [illegible]

$\frac{14}{{}^{6}C_{1} \times {}^{6}C_{1}} = \frac{14}{36} = \frac{7}{18}$

↳ practice [illegible] to [illegible] [illegible]

Simple and Compound Interest

Simple interest – interest on given amount at [illegible] for a given time (years)

$SI = \frac{P \times R \times T}{100}$, P = principal [illegible]

R = rate of interest [illegible]

T = time [illegible]

A = Amount = P + SI

↳ [illegible] [illegible]

P = A − SI

$A = P + \frac{PRT}{100} = P\left(1 + \frac{RT}{100}\right)$

— use these formulas to solve the questions (easy but time taking)

Compound interest

↳ Amount on which every year interest is being imposed changes significantly

↳ e.g. P = 1000 at 10% for 1 year

next year P = 1000 + SI = 1100 [illegible] goes for 10% for next year and goes on

$CI = P\left(1+\frac{R}{100}\right)^n$ n: no of years (time)

P = Principal

R = rate of interest

if interest rate at any year is different (R_1, R_2, R_3 --- rates at 3 years)

$\therefore CI = P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)\left(1+\frac{R_3}{100}\right)$

for half year

$A = P\left(1+\frac{R}{2\times100}\right)^4$ for 1 year = 4 quarter

quarterly

$A = P\left(1+\frac{R}{4\times100}\right)^{14}$ = as 1 year = 4 quarters, 3.5 years = 14 quarters

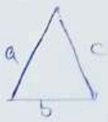
for Annually basis

for eg 3 years, 3 months

$CI = P\left(1+\frac{R}{100}\right)^3\left(1+\frac{3}{12}\times\frac{R}{100}\right)^1$

→ Solve some problems to clear your doubts

* Mensuration 2D formulas :-

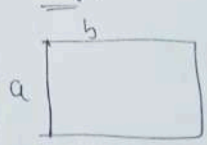


Perimeter = $\frac{a+b+c}{2} = s$

Area = $\sqrt{s(s-a)(s-b)(s-c)}$

(Heron's formula)

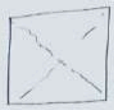
* Rectangle



Perimeter = $2(a+b)$

Area = $a \times b$

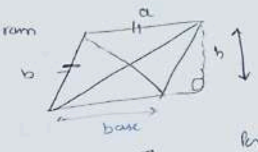
+ Square



Perimeter = $a \times 4$

Area = a^2 or $\frac{1}{2}(d^2)$

+ For Parallelogram



Perimeter = $2 \times (a+b)$

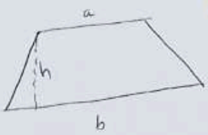
Area = $h \times$ base

+ For Rhombus

Perimeter = $4 \times$ side length

Area = $0.5 \times$ product of diagonals

+ Trapezium



Perimeter = Sum of all sides

Area = $2 \times (a+b) \times h$

+ Circle

Perimeter = $2\pi r$

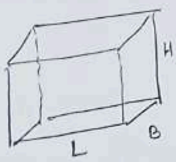
Area = πr^2

For equilateral Δ = Area = $\frac{\sqrt{3}}{4} a^2$

Perimeter = $3a$

→ For 3D Shapes

1. Cuboid



Volume = $l \times b \times h$

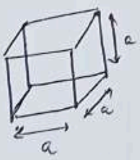
Curved Surface area = $2 \times h(l+b)$

TSA = $2(lb + bh + lh)$

length of diagonal = $\sqrt{l^2+b^2+h^2}$

↳ length of the longest

2. Cube

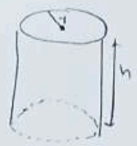


Volume = a^3

CSA = $4a^2$

TSA = $6a^2$

length of diagonal = $\sqrt{3}a$

3. 

Volume $= \pi r^2 h$

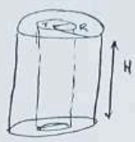
CSA $= 2\pi r h$

TSA $= 2\pi h r + 2\pi r^2$

$= 2\pi r (h + r)$

Right Cylinder

4. Hollow Cylinder

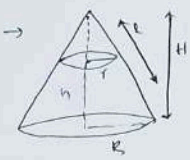


Volume $= \pi (R^2 - r^2) H$

CSA $= 2\pi r H + 2\pi R H = 2\pi H (R + r)$

TSA $= 2\pi H (R + r) + 2\pi (R^2 - r^2)$

* Cone →



l = Slant height

$l^2 = (\sqrt{R^2 + H^2})^2$

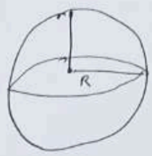
$l = \sqrt{R^2 + H^2}$

* CSA $= \pi R L$

Volume $= \dfrac{\pi R^2 H}{3}$

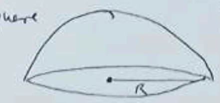
* TSA $= \pi R L + \pi R^2$

* Sphere



Volume $= \dfrac{4}{3} \pi R^3$, Surface Area $= 4\pi R^2$

* Hemisphere



Volume $= \dfrac{2}{3} \pi R^3$

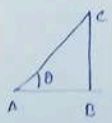
CSA $= 2\pi R^2$

TSA $= 2\pi R^2 + \pi R^2$

$= 3\pi R^2$

* Heights and Distances (Trigonometry)

$\sin\theta = \dfrac{\text{Prependicular}}{\text{Hypotenuse}}$



$AB^2 + BC^2 = AC^2$

$\operatorname{cosec}\theta = \dfrac{1}{\sin\theta} = \dfrac{AC}{BC}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta} = \dfrac{BC}{AB}$

$\sin\theta = \dfrac{BC}{AC}$

$\cos\theta = \dfrac{\text{Base}}{\text{Hypotenuse}} = \dfrac{AB}{AC}$

$\sec\theta = \dfrac{1}{\cos\theta} = \dfrac{AC}{AB}$

$\cot\theta = \frac{1}{\tan\theta} = \frac{AB}{BC}$

$\sin^2\theta + \cos^2\theta = 1$

$1 + \tan^2\theta = \sec^2\theta$

$\csc^2\theta + 1 = \cot^2\theta$

→ practice its question

→ practice its question to get the pattern in mind

$\theta =$	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin\theta =$	0	$\frac{1}{2}$	$1/\sqrt{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta =$	1	$\frac{\sqrt{3}}{2}$	$1/\sqrt{2}$	$1/2$	0

- Cloud problems

+ Angle of depression, elevation etc

---

* Progression

1. Arithmetic progression (AP)   d = common difference

$a, a+d, a+2d, \ldots\ a+(n-1)d$ = d = (second − first)

n^{th} term: $a+(n-1)d$

$AM = \frac{\sum \text{all terms}}{\text{no of terms}}$, Sum of n terms in AP $= \frac{1}{2}(2a+(n-1)d)\,n$

$= \frac{1}{2}n(\text{first} + \text{last term})$

2. Geometric progression (GP)

$a, ar, ar^2, \ldots\ ar^{n-1}$ r = common ratio $= \frac{\text{second}}{\text{first}}$

n^{th} term $= ar^{n-1}$

GM = geometric mean $\sqrt[n]{\text{product of all terms}}$

Sum of n terms = $GP = \frac{a(1-r^n)}{(1-r)}$ for $n = \infty = \frac{a}{(1-r)}$

⇒ Harmonic mean (HP)

If a, b, c, d, e, f ... are in HP

$\frac{1}{a}, \frac{1}{b}, \frac{1}{c}, \cdots \frac{1}{f}$ in AP

Harmonic mean = $\frac{2ab}{(a+b)}$

also $(AM)\cdot(HM) = (GM)^2$

+ practice some of their question and it would be completed

GFG - progression

+ Logarithms

$\log_b x = y \rightleftarrows b^y = x$

$\log x = y \log b$

+ $\log(b, xy) = \log(b, x) + \log(b, y)$
+ $\log(b, x/y) = \log(b, x) - \log(b, y)$
+ $\log(b, x\text{^}p) = p \log(b, x)$

For eg

$8^{x+1} - 8^{x-1} = 63$

$8^x(8 - \frac{1}{8}) = 63$

$8^x \frac{(\cancel{63})}{8} = \cancel{63}$

$8^x = 8$

$x \cancel{\log} 8 = \cancel{\log} 8$

$x = 1$

$\log_{0.25} x = 16$

$\log x = 16 \log(1/4)$

$x = \left(\frac{1}{4}\right)^{16}, \quad x = 4^{-16}$

→ practice 16 questions

GFG

* Geometry

1. A polygon with n vertices → $^nC_2 - n$
   ↳ find no of diagonals

For octagon = $^8C_2 - 8$ = no of diagonals
= 20

2. Sum of interior angles

For any polygon, sum of its interior angles (n sides)

$2(n-2)90^\circ$

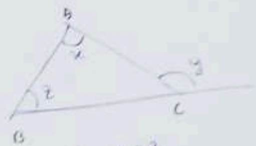
For $\triangle$ = n = 3 $\quad 2(3-2)90^\circ = 180^\circ$ = sum of interior angle

 n = 4 $\quad 2(4-2)90^\circ = 360^\circ$

$2(5-2)90^\circ = 540^\circ$

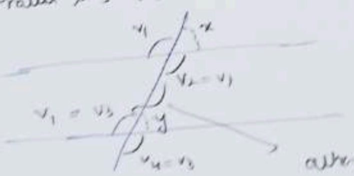
2. Sum of exterior angles = 360° (fixed)

3. exterior angle property of triangle (2 interior angle sum = 1 exterior angle)



$y = x + z$

3. Parallel lines and transversals (angles)



alternate interior angles

Complementry angles = Sum of angles is 90°

Supplementry angles = Sum of angles is 180°

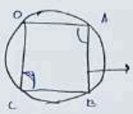
$x = y$ (angles)

and $x + v_3 = 180^\circ$

or

$v_3 + y = 180^\circ$

→ cyclic quadilatral (circle)

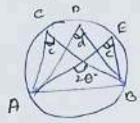


→ cyclic quadilatral

$\angle a + \angle c = \angle b + \angle d = 180^\circ$

$\angle a + \angle b + \angle c + \angle d = 360^\circ$

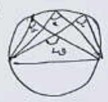
→ angle substended by chord of circle → practice its question ? GFG



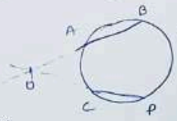
$\angle c = \angle d = \angle e$

angle subtending by chord

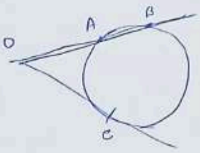
• chord angle = $\frac{1}{2}$ (circumference angle)



⇒ Intersecting chord theorem

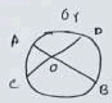


$OA \times OB = OC \times OD$



$OC^2 = OA \times OB$

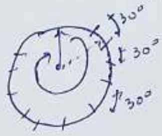
or



$OA \times OB = OC \times OD$

+ Clocks → • hour hand - Small

• minute - Longer



1 hour = 60 min = 360°

for minute hand (60 min)

1 min = 60 seconds

∴ 1 hour = 3600 sec

$1\ min = \frac{360^\circ}{60} = 6^\circ$

5 min = 30° = difference b/w 12 points

∴ 1 hour = 60 min = 30°

$1\ min = \frac{1}{2}^\circ$ for d hour hand

for hour hand

in 1 hour = 30° covered only

for 6 hours = 180°

for 12 hours = 360°

in 60 mins = min hand gains 55 mins over hour hand

as for 60 mins = ~~hour~~ minute hand moves = 380° = 60 mins
hour hand = 30° = 5 mins] → 55 mins diff

→ both hour hand and minute hand coincide how many times ?

both hands coincide once every hour

∴ for 24 hours = coincide 24 times × 22

from 2:00 am to 2:00 pm
↳ it coincides 11 times not 12 ✓

∵ [as b/w 11 and 1 they coincide only once]

→ no of times both these hands are in opposite direction to each other

→ 1 hour = 1 time
12 hours = 11 time
24 hours = 22 times] → b/w 5 to 7 they are opposite only once time

→ hands at 90° to each other

In 1 hour = both hands will be 2 times ⊥ (90°) to each other

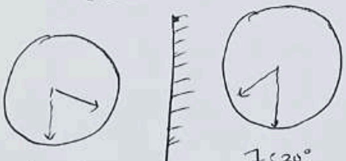
in 12 hours = b/w 2 and 4 they are at 3 times 90° to each other
→ for 2 hours = 3 times

common case of 8 o' clock
↳ and 8 to 10 o' clock
↳ 2 hours = 3 times

∴ 22 times

and 24 hours = 44 times

* Clock mirror images



4:30°   7:30°

↳ subtract by 12 hours

for 5:17 ⇒ 6:43 hrs

→ Practice its questions from clock section in GFG

* Calendar Maptitude

→ No of days (odd) in leap year = $\left(\frac{366}{7}\right)$ = 2 days (mod)

for ordinary = 1

1 year = 365 days 6 hours

4 years = 366 days → leap year

Feb = 29 days

* odd days Concept – 1 week = 7 days (0 odd days)

for eg Jan has 31 days
28 days for 4 weeks
but 3 days left
∴ no of odd days in a month of 31 days = 3

For Feb = 0 days (28 day)

if a year is divisible by 4 = Leap year
but not the same for case of century
(1500, 1600) → last 2 digits is 00

eg- 1997 = not divisible by 4 = ordinary year, 1888 = divisible by 4 = leap year

↳ for century years = if given year is divisible by 400 (leap year)

for 100 years (calculate no of odd days) → 76 non-leap + 24 leap

$$= [(76 \times 1) + (24 \times 2)] \% 7$$

= 5 days

1600 = Leap year

1700 = not a leap year

For every 400 years = no of odd days = 0

Jan, march, ~~June~~, ~~August~~ may July, ~~Sept~~, August, October, Dec – 3 odd days

Feb = 0/1 odd days

april, June, Sept, Nov = 2 odd days

0	1	2	3	4	5	6
Sun	Mon	Tues	wed	Thurs	Fri	Sat

→ odd days table

↳ Do question practice from GFG etc.

* encoding - decoding

message $\longrightarrow$ $\boxed{\text{encoder}}$ $\longrightarrow$ (encoded) $\longrightarrow$ $\boxed{\text{decoder}}$ $\longrightarrow$ (decoded)

① letter encoding

↳ method of arranging info. from original message into coded (replacing letters)

② Number

↳ assigning numbers to various letters in a word (for data security) → then decrypted

③ Substitution

↳ substituting words with other names

① → If EARTH = FCUXM , then MOON → ?

$E \xrightarrow{+1} F$
$A \xrightarrow{+2} C$
$R \xrightarrow{+3} U$
$T \xrightarrow{+4} X$
$H \xrightarrow{+5} M$

$M \xrightarrow{+1} N$
$O \xrightarrow{+2} Q$
$O \xrightarrow{+3} R$
$N \xrightarrow{+4} R$

** DEHIT as FDMHJ
NEPAL as ? → (ans) → OPBZM

→ If SYMBOL is coded NZTMPC then what is NUMBER?

+1 SYM → N Z T | BOL → M P C +1

+1 NUMBER → N V O S F C

(NVOSFC)

ii NEWYORK → 111 , NEWJERSEY = ?

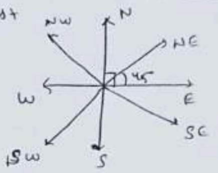
N = 14
E = 5
W = 23
Y = 25
O = 15
R = 18
K = 11

→ 111 as sum

↓ ? = sum of letters = 124

→ Practice from GFG types

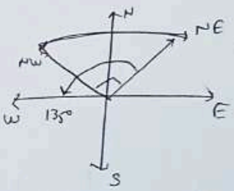
+ Direction test



Facing North – moves up and turns right, moves left

→ man facing N/W, turns 90° in clockwise and then 135° in anti-clockwise

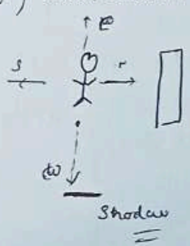
↳ what direction is he facing now



= west

(Practice more questions from utube channels)

→ on morning of sunrise GOPAL was standing facing a pole → shadow of pole exactly to his right, which direction was he facing

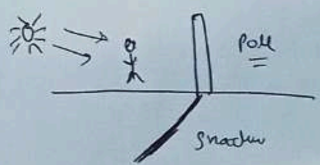


as sun rises in east

↳ shadow in west

∴ gopal standing

answer



14. perfec

* Blood relations

(i) mother's or father's brother = uncle

(ii) mother's or father's sister = aunt

(iii) mother's or father's father = grand father

(iv) " " " mother = grand mother

↓

Some more relation

(A) (B)

male female

For siblings A − B or A − A or B − B or B − A

Husband / wife = AB

(Family tree)

Parents AD (a is mother of B)

B − C

A and B are brothers

A − B

A is the brother of B

A − B or A − B

Niece → bhai / behan ki beti / beta

Nephew

mother in law | sister in law | brother in law

→ Practice from GFG

* Mirror images

A | A

F | ꟻ

E | Ǝ

Z | S

→ observe the images just once and it is good to go

(figures, no. & practice)

water images → B / B

FRUIT → water image

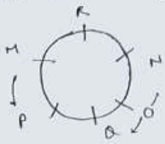
AIM3b

- Circular arrangement and Linear sitting arrangement

→ Based on question, we need to make some arrangements, based on those arrangements we need to make judgements

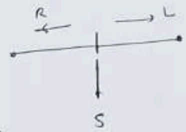
i) Six persons M, N, O, P, Q, R → playing cards sitting in a circle facing centre
R is sitting b/w M and N and Q is sitting b/w O and P
P is sitting immediate right of M

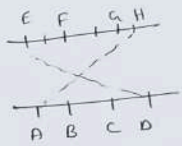
→ Find person sitting immediate left of O?
↳ Q



neighbours of R = M, N

⇒ For Linear arrangement :-





Practice 1 time from youtube video only

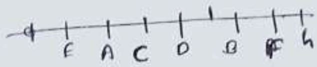
(A, H) → diagonal
D, E) are

ii) A group of 7 singers facing audience are standing in a line stage as follows

C→D
→D

FG or GF
B_F
F - A
C _ B
/B _ C
A — D/
D —

→ D is right of C
→ F is standing beside G
→ B is left of F
→ E is left of A
→ C and B have 1 person b/w them
→ A and D have 1 person b/w them



↳ right arrangement

Practice this question 1 once!!

* Reasoning (logical Topics to)
  - → odd one / missing one in a series
  - → puzzles
  - → syllogism
  - → cubes
  - → dices
  - → Statement analysis
  - → go through once glance and it will be done

* verbal reasoning → read and learn from book

→ Practice 1.5 hrs daily for 10-12 days should be done (Aptitude)