NUMBER SYSTEM

#1:- Find no. of 'x' in N!

case1: x is prime no.
Keep dividing by x till NUM ≥ Den.
Ex: No of 3's in 10!
$\frac{10}{3} = 3$, $\frac{3}{3} = 1$ Total = 3+1 = 4

case2: x is exact power of prime no.
Ex: No. of 4's (2^2) in 25!
Find no. of 2's & divide by power (2)

case3: x is composite no.
Ex: No. of 6 in 25!
6 = (2×3) Find no. of 2's & 3's. Take min.

* No. of 0's = No. of 10's = No. of 5's

#2:- Unit digit value (UDV)

NO.	2	3	4	5	6	7	8	9
Power cycle	4	4	2	1	1	4	4	2
UDV	6	1	6	5	6	1	6	1

i) Divisibility by 4 → check last 2 digits divisibility by 4.
ii) Divisibility by 11 → sum of digits at odd place = sum of digits at even place
iii) Jitna digit pucha jaye utne pr dhyan do
Ex: UDV of $(9562)^{4467}$ ~ check ÷4 & take remainder
$= 2^{67} = 2^3 = 8$ (becoz power cycle of 2 is 4)
iv) $4^{odd} = 4$, $4^{even} = 6$
$9^{odd} = 9$, $9^{even} = 1$
v) N! (N ≥ 2) is always even.
vi) $Odd^{kuch\ bhi}$ → always odd
$even^{kuch\ bhi}$ → always even
vii) Find rightmost non zero digit
Neglect 0's in no. & find UDV.
Ex: $(40)^{123489} = 4^{odd} = 4$

NOTE: True except = False
False except = True

#3. Last two Digits :- (L2D)

Case1: UDV of no. is 1.
$\cancel{4}21^{23}$
6 1
• write 1 as it is at unit place
• Multiply tens digit of no. with unit digit of power

Case2: UDV of no. is 3/7/9
Make UDV = 1 using $3^4 = 81$, $7^4 = 2401$, $9^2 = 81$

NOTE: N! , N ≥ 5 UDV = 0
N! is divisible by K ∀ N ≥ K

case3: UDV is 2/4/6/8
$24^{odd} = 24$, $24^{even} = 76$

• $2^{10} = 1024$
• $4 = 2^2$, $8 = 2^3$, $6 = 2 \times 3$

case4: UDV = 5
L2D = 25

#4. Factorization:

i) A no. is perfect square if power of all prime factors is even.
ii) Perfect cube → power should be multiple of 3.
iii) $N = a^p \times b^q \times c^r$
No. of factors/divisors of N
$n = (p+1)(q+1)(r+1)$
iv) Product of factors, $P_n = (N)^{n/2}$
Ex: $144 = 2^4 \times 3^2$ $n = 5 \times 3 = 15$
$P_n = (144)^{\frac{15}{2}} = (12)^{15}$
v) Sum of factors :-
$N = a^p \times b^q \times c^r$
$S_N = \frac{(a^{p+1}-1)(b^{q+1}-1)(c^{r+1}-1)}{(a-1)(b-1)(c-1)}$
vi) No. of factors divisible by a given no.
Ex: $12 = 2^2 \times 3$
No. of factors ÷ by 2
Remove 2 from factorization & find no. of factors
$12 = 2^1 \times 3^1$, $n = 2 \times 2 = 4$
vii) To find no. of odd factors :-
find no. of factors using odd prime factors.
Ex: $12 = 2^2 \times 3^1$ $n_{odd} = (1+1) = 2$
viii) No. of even factors = No. of factors divisible by 2.

To compare ele like $a^{1/b}$

$2^{1/2}$ $3^{1/3}$ Multiply power with LCM(2, 3) = 6
$2^3 = 8$, $3^2 = 9$

#5. Coprime / Relative prime:

i) Two nos are coprime if their HCF = 1 ie have nothing in common.
ii) No. of coprimes of N less than N
$= N\left(1-\frac{1}{a}\right)\left(1-\frac{1}{b}\right)\left(1-\frac{1}{c}\right)$ ← Euler Totient fun (φ(n))
where $N = a^p \times b^q \times c^r$
iii) Sum of coprimes $= \frac{N}{2}\left[N\left(1-\frac{1}{a}\right)\left(1-\frac{1}{b}\right)\left(1-\frac{1}{c}\right)\right]$

Sequence trick:

$\frac{1}{a \times b} + \frac{1}{b \times c} + \frac{1}{c \times d} = \frac{1}{(b-a)}\left(\frac{1}{a} - \frac{1}{d}\right)$
difference is constant
Ex: $\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} = \frac{1}{2}\left(\frac{1}{1} - \frac{1}{7}\right)$

Logarithm:

1) If $a^x = y \Rightarrow x = \log_a y$ $\quad y>0, a>0, a\neq 1$

2) $\log_a a = 1$

3) $\log_{10} 2 = 0.3$ $\qquad \log_{10} 6 = 0.80$

$\log_{10} 3 = 0.5$ $\qquad \log_{10} 7 = 0.85$

$\log_{10} 4 = 0.6$ $\qquad \log_{10} 8 = 0.90$

$\log_{10} 5 = 0.7$ $\qquad \log_{10} 9 = 0.95$

$\qquad\qquad\qquad \log_{10} 10 = 1.00$

4) $\log(m \times n) = \log m + \log n$

5) $\log(m/n) = \log m - \log n$

6) $\log_a m = \dfrac{1}{\log_m a} = \dfrac{\log_k m}{\log_k a}$

7) $\log_a m^n = n * \log_a m$

8) $\log_{a^b} m = \dfrac{1}{b} * \log_a m$

9) $\log_{a^b} m^n = \dfrac{n}{b} * \log_a m$

10) Antilog :-

$\log_x 100 = 2 \xrightarrow{\text{Antilog}} x^2 = 100$

NOTE:- $\log(mnp) = \log m + \log n + \log p$

if $\log m + \log n + \log p = 0$

$\log_k(mnp) = 0 \Rightarrow mnp = k^0 = 1$

11) $a^{\log_x b} = b^{\log_x a}$

HCF/LCM :

1) HCF (GCD) : take out common

LCM : take highest power of each prime factor.

2) If HCF of two nos is 27 then nos are $27x$ & $27y$ (x & y are coprimes). both can't be even

NOTE: In no. of sol^n, order does not matter i.e (1,7) & (7,1) r same.

3) LCM x HCF = product of 2 Nos.

4) HCF/LCM of fractions $\left(\frac{a}{b}, \frac{c}{d}, \frac{e}{f}\right)$

$HCF = \dfrac{HCF(a,c,e)}{LCM(b,d,f)}$; $LCM = \dfrac{LCM(a,c,e)}{HCF(b,d,f)}$

5) HCF/LCM of factorials (2!, 3!, 7!)

HCF = smallest no (2!)

LCM = Largest no (7!)

P&C :

1) Or : + : $\cup$

And : * : $\cap$

2) first satisfy the condition then immediately go to 1st digit & proceed (in formation of numbers).

3) In P&C, its assumption that repeatition is allowed in number formation.

4) In case of double inequality attack from middle.

Q: 3 digit no. using 1-5 — — —

$\underset{3/4/5}{\underline{3}} \times \underline{1} \times \underline{1}$ $\qquad \underline{2} \times \underline{1} \times \underline{2}$ $\qquad \underline{1} \times \underline{1} \times \underline{3}$

$= \underline{3+4+3}_{\text{it repeats}} = 10$

5) combination :- selection

Permutation :- selection with arrangement

${}^nC_r = \dfrac{n!}{r!(n-r)!}$ $\qquad {}^nP_r = \dfrac{n!}{(n-r)!}$

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

7) ${}^nP_r = {}^nC_r * r!$

8) ${}^nC_0 = {}^nC_n = 1$, ${}^nC_1 = n$

9) Arrangement of 'n' different things $= {}^nC_n * n! = n! = {}^nP_n$

10) Arrangement of 1,1,1,2,2 $= \dfrac{5!}{3!\,2!}$

11) $({}^nC_r)$ max at-

- if n is even, $r = n/2$
- if n is odd, $r = \dfrac{(n-1)}{2}$ & $\dfrac{(n+1)}{2}$

12) m-boys , n-girls

NO 2 boys together $= n!\,({}^{n+1}C_m * m!)$

13) On dividing these permutations with total (i.e no condition) we will get probability.

14) Password & dice me arrangement hota hai.

15) No. of words formed from GARDEN such that $A \leftarrow E \leftarrow G$

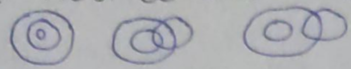
$= \dfrac{6!}{3!}$ don't change relative position of A, E & G

$\leftarrow$ No. of digits in comparison

Logical connectives:

1) Just consider whatever is given don't assume anything.

NOTE: Most common Syllogism



2) Connectives :-

(i) Or / Either P or Q / P otherwise Q / Unless

$\bar{P} \to Q$, $\bar{Q} \to P$

(ii) If P then Q / Q if P / Q when P / Q whenever P

$P \to Q$, $\bar{Q} \to \bar{P}$

iii) And

iv) Only if P then Q

$Q \to P$, $\bar{P} \to \bar{Q}$

v) iff $\leftrightarrow$

*NOTE :- Either or — $\bar{P} \to Q$, $\bar{Q} \to P$; if then — $P \to Q$, $\bar{Q} \to \bar{P}$; Only if — $Q \to P$, $\bar{P} \to \bar{Q}$

P&C :-

1) All problems which have 2 choices like T/F → use binomial theorem.

2) $^nC_0 + {}^nC_1 + \cdots + {}^nC_n = 2^n$

3) Arranging n different items in a line $= n!$
" in a circle $= (n-1)!$

4) If there are n-vertices, total no. of lines possible $= {}^nC_2$

5) Assuming all points r non collinear,
NO. of diagonals $= {}^nC_2 - n$
NO of $\Delta = {}^nC_3$

NOTE: $\circ$ Point, $\mapsto$ Ray, $\longleftrightarrow$ Line, $\vdash\!\dashv$ Line Segment

6) Straight Lines $= {}^{Total}C_2 - {}^{collinear}C_2 + 1$

7) Triangles $= {}^{Total}C_3 - {}^{collinear}C_3$

8) चाहिए = Total − नहीं चाहिए

NOTE: Grid means rectangle box (angle 90°) (chess board)

9) In a grid
NO. of rectangles $= {}^{Horizontal\ lines}C_2 * {}^{vertical\ lines}C_2$
NO. of squares $= \frac{1}{6} n(n+1)(2n+1)$
$n \to$ max size of square possible

10) If m ||" lines intersect n ||" lines
NO. of ||gm $= {}^mC_2 * {}^nC_2$

11) Handshake / Gift exchange / Tournament
If b/w 2 entries k transaction takes place,
Among n entries total $= K * {}^nC_2$ transaction.

12) Sum of numbers formed using digits $1, 2, 3, \cdots, n$

$= \underbrace{(n-1)!}_{} * [1+2+\cdots+n] * [10^{n-1} + 10^{n-2} + \cdots + 1 0]$

1 digit 1 column me kitne baar repeat kr rha hai

Ex: digits = 3/5/7
sum $= 2! [3+5+7] * (111)$

NOTE: using digits 1/1/2/2/2
$= \frac{4!}{2! * 3!} * [1+1+2+2+2] * (11111)$ ← Repetition

13) NO. of sol^n :-
$x + y + z = 15$ ← n , $x \geq 0, y > 0, z > 1$
• Find min value of each variable & substract it from n.
• Find $^{n+r-1}C_{r-1}$ $r \to$ NO of variables
$x_{min} = 0, y_{min} = 1, z_{min} = 2 \Rightarrow x + y + z = 12$
NO of sol^n $= {}^{12+3-1}C_{3-1} = {}^{14}C_2$

14) NO. of variables in $(a+b)^n = {}^{n+r-1}C_{r-1}$
$n \to$ power , $r \to$ no. of variables
Ex: $(a+b+c)^5$
NO. of terms $= {}^{5+3-1}C_{3-1} = {}^7C_2$

Probability:-

1) $P(E) = \frac{\text{Favourable event}}{\text{sample space}}$

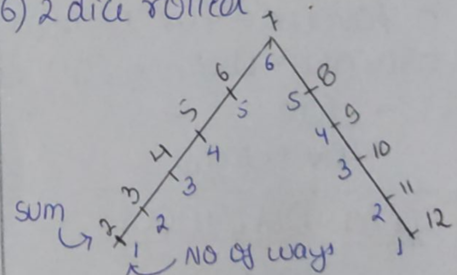
2) Sample space in dice $= 6^n$
$n \to$ n dice thrown once or 1 dice thrown n times.

3) अथवा → + → or → ∪
और → and → * → ∩

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

5) In dice, arrangement is important

6) 2 dice rolled



7) $P(E) + P(\bar{E}) = 1$

NOTE: Leap year → 366 days = 52 weeks + 2 day

NOTE: If P(getting flood) = 1/5 it means 1 flood is coming every 5 years
Avg time b/w 2 floods = 5 yrs

8) drawn: simultaneously → without Repetition ; one after other / successively → with Repetition

9) 4 digit nos $\div 4$ using digits 0-9.
Make 2 cases (zero & non zero)
$\underline{8} \times \underline{7} \times$ (containg 0, $\div 4$) + $\underline{7} \times \underline{7} \times$ (Not contain 0, $\div 4$)

10) cards(52)
- Red(26)
  - Heart(13)
  - Diamond
- Black(26)
  - Spade
  - club

↳ Ace, 2, 3, ..., 10, K, Q, J

11) K/Q/J : Face card (12)

12) K/Q/J/A : Honour card (16) (suit)

13) conditional probability:
$$P(A/B) = \frac{P(A \cap B)}{P(B)}, \quad P(B) \neq 0$$
Prob of occurance of A when B has occured

14) Independent Event:
Ek dusre se matlab nhi
- $P(A \cap B) = P(A) \cdot P(B)$
- $P(A/B) = P(A)$, $P(B/A) = P(B)$

15) Mutually exclusive event:
Cant occur together
- $P(A \cap B) = 0$
- $P(A \cup B) = P(A) + P(B)$

16) $P(A/B) = \frac{P(B/A) * P(A)}{P(B)} = \frac{P(A \cap B)}{P(B)}$

17) $P(All) = 1 - P(None)$

NOTE: Perfect integer: if sum of factors except itsey is equal to no.
Ex: 6, 28
There is only one single digit, one 2 digit, one 3 digit, ... perfect integer.

18) Odds in favour = fav : unfav event
Odds against = unfav : fav event

19) $P(fav) = \frac{fav}{fav + unfav}$

Time Speed Distance:-

1) $1 \text{ km/h} = \frac{5}{18}$ m/s

2) Avg speed = $\frac{\text{Total distance}}{\text{Total time}}$

$A \xrightarrow[t_1 \text{ hr}]{S_1 \text{ km/h}} B \xrightarrow[t_2]{S_2} C \xrightarrow[t_3]{S_3} D$

Avg speed = $\frac{S_1t_1 + S_2t_2 + S_3t_3}{t_1 + t_2 + t_3}$

3) $A \xrightarrow{x \text{ km/h}} B$, D km, $B \xrightarrow{y \text{ km/h}} A$

Avg speed = $\frac{2D}{D/x + D/y} = \frac{2xy}{x+y}$

4) use time difference in case two times are given.

5) Relative speed:-

$A \xrightarrow{x \text{ km/h}}$, $B \xrightarrow{y \text{ km/h}}$: RS = $|x - y|$ km/h

$A \xrightarrow{x \text{ km/h}}$, $\xleftarrow{y \text{ km/h}} B$: RS = $(x+y)$ km/h

6) Train passing a man/pole
time = $\frac{L_T}{S_T}$ ← Length of train, ← speed of train

7) Time taken to cross platform
$= \frac{L_P + L_T}{S_T}$ L_P → Length of platform

8) Time taken by train to pass a moving man.

L_T $T \xrightarrow{S_T}$ $M \xrightarrow{S_M}$: $t = \frac{L_T}{|S_T - S_M|}$

$T \rightarrow \quad \leftarrow M$: $t = \frac{L_T}{(S_T + S_M)}$

9) When A & B met, A has covered 'K' km more than B $A \xrightarrow{x \text{ km/h}} \quad \xleftarrow{y \text{ km/h}} B$
$D = S * t$
$= (x+y) * \frac{K}{|x-y|}$
In 1 hr gap is $|x-y|$ so K km gap is in $K/|x-y|$ time.

NOTE: If each term of an AP is +/−/*/÷ K, result is an AP.

10) In linear race, time is constant
⇒ speed ∝ Distance
⇒ $\frac{S_A}{S_B} = \frac{D_A}{D_B}$

11) If distance is constant, $S \propto \frac{1}{T}$
$\frac{S_1}{S_2} = \frac{T_2}{T_1}$

12) Downstream: boat $\rightarrow$ x km/h, ~~y km/h~~
Speed = $(x+y)$ km/h

Upstream: boat $\rightarrow$ x km/h, $\leftarrow$ y km/h
$S = |x - y|$ km/h

NOTE: Its not relative as boat is in water.

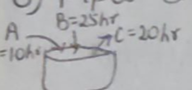
13) In x km race on circular track, no of times A will cross B = $\frac{\text{total distance gain by A in covering x km}}{\text{circumference of track}}$

REMEMBER: $1/1 = 100\%$; $1/2 = 50\%$; $1/4 = 25\%$,
$1/8 = 12.5\%$; $1/16 = 6.25\%$; $1/32 = 3.125\%$

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{1024} \Rightarrow \frac{1023}{1024}$ -1

Work and Time :-

1) 1 work = 100% work
work remaining = 100 − % of work done
2) A does a piece of work in X days
B does in Y days
⇒ A's 1 day work $= \frac{1}{X}$; B's 1 day work $= \frac{1}{Y}$
⇒ (A+B)'s 1 day work $= \frac{1}{X} + \frac{1}{Y} = \frac{X+Y}{XY}$
(A+B) will finish work in $\left(\frac{XY}{X+Y}\right)$ days
3) Solve these ques either using fraction or percentage.
4) Wage depends on fraction of work done.
Ex: A → 10 days, B → 15 d, gets ₹3000
(A+B) takes $= \frac{10 \times 15}{10+15} = 6$ days
A's total work $= 6 * \frac{1}{10}$
A's salary $= 6 \times \frac{1}{10} \times 3000 =$ ₹1800
5) If pipe A can fill a tank in x hr
A's 1 hr work $= \frac{1}{x}$
Solve in terms of %.
6) Pipes are on in alternate manner



3hr ⟶ (10% + 4 − 5) = 9%
×11 ×11
33hr → 99% wrong
As there is −ve work of C, check for 1 less no. of hr
30hr → 90%. Now remaining 10% will be done by A.
7) W = DMTE
work, day, men, time, E → Efficiency
8) $D_1M_1 = D_2M_2$
$D_1M_1T_1 = D_2M_2T_2$

NOTE: work is given in form of volume sometimes.

9) $\frac{D_1M_1}{W_1} = \frac{D_2M_2}{W_2}$, $\frac{M_1T_1}{W_1} = \frac{M_2T_2}{W_2}$
10) 4 men or 7 women can do a piece of work in 10 days means efficiency of 4M = eff of 7W ⇒ 4M = 7W

NOTE: sometimes, W = DMTE
W → vol/output, E → pump/pipe/machine

NOTE: If 2 men work for 3 days
W = 2*3 = 6MD work

Data interpretation:

1) % change $= \frac{(\text{Final} - \text{Initial})}{\text{Initial}} * 100\%$
2) In pie chart, 100% ⟷ 360°
3) Increasing $x\%$ on each items will overall increase by $x\%$.
4) Change of $a\%$ followed by $b\%$, overall change $= \left(a + b + \frac{ab}{100}\right)\%$

$\bigcirc \xrightarrow{a\%} \bigcirc \xrightarrow{b\%} \bigcirc$
$(a + b + ab/100)\%$

5) $x \xrightarrow{+25\%} (x * 1.25) \to 1 + 0.25$
$x \xrightarrow{-32\%} (x * 0.68) \to 1 - 0.32$
6) $x \xrightarrow{20\%} \xrightarrow{25\%} x * 1.2 * 1.25$
7) % Gain $= \frac{(SP - CP)}{CP} * 100$
% Loss $= \frac{(CP - SP)}{CP} * 100$
% Margin $= \frac{SP - CP}{SP} * 100$

Percentage:

1) $a\% \cdot b = b\% \cdot a = ab/100$
2) $\bigcirc \xrightarrow{+10\%} \xrightarrow{+20\%} \bigcirc$
overall increase = 1.1 * 1.2 = 1.32
= (1.32 − 1) * 100 = 32%
(3) $x * y =$ constant
if $x \uparrow r\%$ ⇒ $y \downarrow \left(\frac{r}{100+r}\right) * 100\%$
if $x \downarrow r\%$ ⇒ $y \uparrow \left(\frac{r}{100-r}\right) * 100\%$
* if $x \uparrow 10\%$ i.e $\frac{1}{10}$ ⇒ $y \downarrow \frac{1}{10+1} = \frac{1}{11}$ Num
if $x \downarrow 10\%$ i.e $\frac{1}{10}$ ⇒ $y \uparrow \frac{1}{10-1} = \frac{1}{9}$
4) Usage of above formula:
- Expenditure = Price * consumption
- Area = Length * breadth
- Distance = speed * time
- Revenue = Price * sale

Set Theory:

1) Profitability = $\frac{\text{Profit}}{\text{Sales}} * 100\%$

NOTE: Perform calculations in no. with decimal after 2 digits (40.78), it will give min error.

2) MRP $\xrightarrow{-}$ SP $\xrightarrow{+}$ CP
Discount% Profit%
commission% Loss%

Mixture:

1) Averages of average = $\frac{A_1n_1 + A_2n_2 + \dots + A_kn_k}{n_1+n_2+\dots+n_k}$

Ex:- Avg speed = $\frac{s_1t_1 + s_2t_2 + \dots + s_kt_k}{t_1+t_2+\dots+t_k}$

2) For 2 quantity (n_1 & n_2) mixture

$$A_w = \frac{A_1n_1 + A_2n_2}{n_1+n_2}$$

$$\frac{n_1}{n_2} = \frac{A_2 - A_w}{A_w - A_1}$$

3) If not given in ques consider
CP_{milk} = ₹1 , CP_{water} = ₹0

4) There is xL milk, yL taken out & yL water added; this process repeated n times. Finally milk left = $x\left(1-\frac{y}{x}\right)^n$

SI, CI:

1) Amount = Principle + Interest $\nearrow$ SI $\searrow$ CI

2) SI = $\frac{PRT}{100}$ P → Principle R → Rate T → Time

3) In CI, Amount = $P\left(1+\frac{r}{100}\right)^t$

CI = Amount − Principle

4) By default, SI → bank
CI → population, Metal, asset price

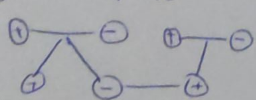
5) By default, it's compounded anually

NOTE: In indexing, take base year value 100

NOTE: In alphabet pattern, grouping is of 3/4/5/6 letter.

Remember: M:13 P:16 W:23

* Blood Rel^n:



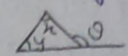
+ → Male
− → female

Geometry:

1) Colinear points: 3 or more points lying on a line.

2) $\theta < 90°$ Acute $\theta = 90°$ Right ∠
$\theta > 90°$ obtuse $\theta = 180°$ Linear ∠

3) Exterior ∠ is equal to sum of two interior opposite angle.



$\theta = x + y$

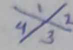
4) Regular Polygon: All sides & angles are equal

$∠ = \frac{(n-2) * 180°}{n}$

Sum of all interior ∠ = $(n-2) * 180°$

Sum of all exterior ∠s = 360° always

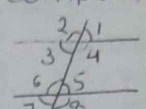
5) Vertically opposite ∠s



∠1 = ∠3 && ∠2 = ∠4

6) Supplementary ∠s : ∠A + ∠B = 180°
Complementory ∠s : ∠A + ∠B = 90°

7)



Corresponding ∠ : ∠1 = ∠5
Supplementary ∠ : ∠4 + ∠5 = 180°
Alternate ∠ : ∠4 = ∠6

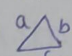
Triangle:

1) Sum of ∠s = 180°

2) Sum of any 2 sides > Third side

3) Difference b/w any 2 sides < 3rd side

4)



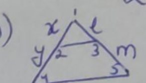
$a \sim b < c < a+b$

5) Area of Δ = $\frac{1}{2}$ * base * height

6) Area of Δ = $\sqrt{s(s-a)(s-b)(s-c)}$
$s = (a+b+c)/2$

7) Area = $\frac{1}{2} ab \sin C = \frac{1}{2} bc \sin A = \frac{1}{2} ca \sin B$

8)



$\frac{Ar\Delta 123}{Ar\Delta 145} = \frac{xl}{(x+y)(l+m)}$

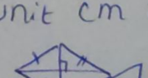
9) Ar of equilateral Δ = $\frac{\sqrt{3}}{4}a^2$

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

10) Special Δ

11) If mid points are infinitely joined
- In square, bahar se andar jane pr jiski unit cm hai → * $1/\sqrt{2}$
- In Δ, jiski unit cm hai → * $1/2$

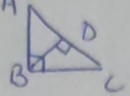
NOTE: Kite



12) If mid points of square r infinitely joined & circle is drawn about square
→ circle also follows sq property ($* 1/\sqrt{2}$)

• If circle is drawn about Δ's (mid point infinitely joined), circle follows property of triangle ($* 1/2$)

13) $BD = \frac{1}{2} AC$



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

15) Diameter is the longest chord

16) Tangent makes 90° angle with diameter

17) Area of sector = $\frac{\theta}{360°} * (\pi r^2)$

18) Length of sector = $\frac{\theta}{360°} * (2\pi r)$

19) ⊥or line from center bisects the chord & vice versa

20) Area of rhombus = $\frac{1}{2}$ * product of diagonals

21) Area of square = $\frac{1}{2} * (\text{Diagonal})^2$

Sitting Arrangement:

1) If nothing is given, stand man facing North.

NOTE: $(p-4)(p-3) < 0$
$\Rightarrow 3 < p < 4$

2) If $x+y=30$, $(xy)_{max} \Rightarrow x=15,\ y=15$
Product is max when values are equal or closer.

NOTE: AM ≥ GM $\Rightarrow \frac{x+y}{2} \geq \sqrt{xy}$

3) For any +ve integer
$x + \frac{1}{x} \geq 2$, $\frac{x}{y} + \frac{y}{x} \geq 2$

Remember Figure of speech:
Simile, Metaphor, Oxymoron, Hyperbole, irony.

Calendar:

1) Ordinary year: 365 days
Leap year : 366 days

2) Test for leap yr

÷4 — No → ordinary year
÷4 — yes → ÷100
÷100 — No → Leap year
÷100 — yes → ÷400
÷400 — yes → Leap year
÷400 — No → ordinary year

3) Odd days:

0	1	2	3	4	5	6
Sun	Mon	Tues	Wed	Thur	Fri	Sat

4)

Jan	Feb	Mar	Apr	May	June
(3)	(0/1)	(3)	(2)	(3)	(2)
July	Aug	Sep	Oct	Nov	Dec
(3)	(3)	(2)	(3)	(2)	(3)

Leap yr (366 days) → 2
Non Leap yr (365 days) → 1

5)

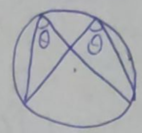
100yr	200yr	300yr	400yr
(5)	(3)	(1)	(0)

6) Break yr as multiple of 400
Jan 1960 = $(400*4) + (300) + 59 + \text{Jan}$
LY NLY

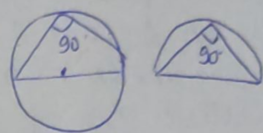
1)

center ∠ = 2 * inscribed ∠

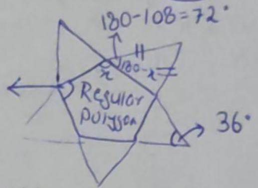
2)



3)



3) Star:
$\frac{180°(n-2)}{n}$
$n=5 \Rightarrow 108°$



Similarity of Δ's:

1) 2 ∠s equal ⇒ Δ's r similar

2) If (ΔABC ~ ΔPQR) then

• Corresponding sides r proportional
$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{Alti_{ABC}}{Alti_{PQR}} = \frac{Median_{ABC}}{Median_{PQR}}$

• $\frac{Ar(\Delta ABC)}{Ar(\Delta PQR)} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{CA^2}{RP^2}$

Clock:

1) Minute hand → 1 min: 6°
Hour hand → 1 min: $\frac{1}{2}°$

2) Angle b/w hr & min hand
$\theta = \left| 30 * \text{hr hand} - \frac{11}{2} * \text{Min hand} \right|$

NOTE: Angle taken in opposite direction is $(360° - \theta)$. Match both with option.

Cut to cubes (max):

1) Bde cube ko chote cube me katne ke liye teeno axis pr cut krna h:

2) From 10 cuts, find max no. of small identical cubes:

$$\begin{array}{ccc} & 10 & \\ \swarrow & \downarrow & \searrow \\ 3 & 3 & 4 \\ +1 & +1 & +1 \\ \hline \end{array}$$

(divide with min divergence)

$= 4 * 4 * 5 = \underline{\underline{80}}$ cubes

3) cubes to min cut: do reverse

Ex: 64 small cubes, find min cut

$64 = 4 \cdot 4 \cdot 4 \Rightarrow 3 + 3 + 3 = 9$ cuts

Ex: 34 cubes, $34 = 2 \times 17$

$34 = 1 \cdot 2 \cdot 17 \Rightarrow 0 + 1 + 16 = 17$ cuts

* In a cube,

Face (6), vertex (8), edge (12)

* cubes on face → 1 side painted

cubes on edge → 2 " "

" " vertex → 3 " "

* calculate no. of cubes for 1 face, 1 edge & 1 vertex then multiply to calculate total.