Number System

N : Natural numbers (1, 2, 3, …)
W : Whole numbers (0, 1, 2, …)
I or Z: Integers (–3, –2, –1, 0, 1, 2, 3 …)
Q : Rational numbers (p/q, p, q are integers, $q \neq 0$)
R : Real numbers
(All numbers, including irrationals like $\sqrt{3}$, $\sqrt{2}+\sqrt{3}$, $\sqrt[3]{5}$, etc.

Even numbers: 2, 4, 6, ...
Odd numbers: 1, 3, 5, ...
Prime numbers
Divisible by 1 and itself
Co-Prime numbers
Their H.C.F. is 1
Composite numbers
Have more then two factors
(It can be both Odd and Even)
e.g., 4, 6, 8, 9, 10.....

Test of Divisibility
Shortcuts to check the given number is divisible by 2, 3, 5, 4, 7, 8, 9, 10, 11 and 13

To check number is prime
- Choose 'K' such that $K^2 \geq l$
- Find the primes less than K
- If those do not divide 'l', then 'l' is prime

- A.M. = $\frac{a+b}{2}$
- G.M. = $\sqrt{ab}$
- A.M. ≥ G.M.

Counting number of zeros at the end of $n!$ is integral value of
$\left(\frac{n}{5}+\frac{n}{5^2}+\frac{n}{5^3}+...\right)$

- Term in A.P. are $a, a+d, a+2d$ …
- Term in G.P. are a, ar, ar^2 …

A.P.	G.P.
• $T_n = a+(n-1)d$	• $T_r = ar^{n-1}$
• $S_n = \frac{n}{2}\left[2a+(n-1)d\right]$	• $S_n = \frac{a(1-r^n)}{1-r}, r<1$
• $S_n = \frac{n}{2}(a+l)$ (Where l = last term)	• $S_n = \frac{a(r^n-1)}{r-1}, r>1$

H.C.F. and L.C.M.
- Highest Common Factor
- Least Common Multiple
- Methods to find factorization / division
- $a \times b$ = H.C.F. (a, b) × L.C.M. (a, b)
- H.C.F. of fractions = $\frac{\text{H.C.F. of Numerators}}{\text{L.C.M. of Denominators}}$
- L.C.M. of fractions = $\frac{\text{L.C.M. of Numerators}}{\text{H.C.F. of Denominators}}$

Division Algorithm
Dividend = Divisor × Quotient + Remainder

Trace the Mind Map
▸ First Level ▸ Second Level ▸ Third Level

Simplification

V BODMAS Rule

V means Vinculum or bar. (The bar you see on the top of the values $\bar{x}$)
B means Brackets - ( ) {} [ ]
O means of [i.e., Powers and square roots, etc.]
D means Division [÷]
M means Multiplication [×]
A means Addition [+]
S means Subtraction [−]

Modulus: $|a| = \begin{cases} a, & a \geq 0 \\ -a, & a < 0 \end{cases}$

Square Root and Cube Root

$l = k^2$
l is square of k
k is square root of l

Methods of finding
- Prime factorization method
- Division method

$l = k^3$
l is cube of k
k is cube root of l

Method of finding
- Prime factorization method

Rules of Indices

- $a^m \times a^n = a^{m+n}$
- $\frac{a^m}{a^n} = a^{m-n}$

Fractions

$\frac{a}{b}$; $a, b \in I$
and $b \neq o$

Types of Fractions
- Proper fractions, improper fractions, like fractions unlike fractions, mixed fraction, continuous fraction

Rules of Surds

- $\sqrt[n]{a} = a^{\frac{1}{n}}$
- $\left(\sqrt[m]{p}\right)^m = p$

Some Root Value

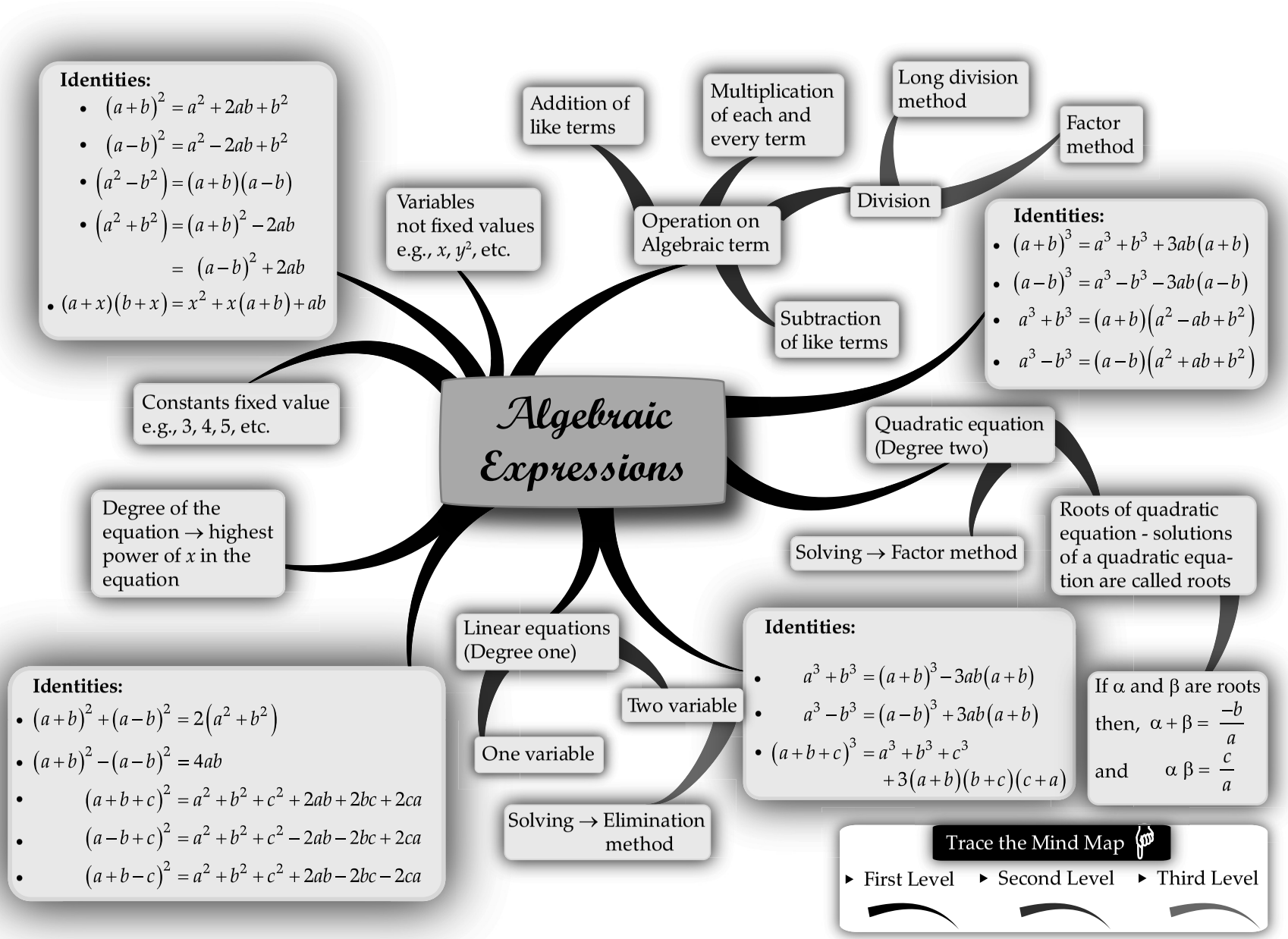
- $\sqrt{2} = 1.414$
- $\sqrt{3} = 1.732$
- $\sqrt{5+\sqrt{11+\sqrt{19+\sqrt{29+\sqrt{49}}}}} = 3$

Decimals

- Recurring decimals
- Non - recurring decimals
- Decimal fractions

Trace the Mind Map

▸ First Level ▸ Second Level ▸ Third Level


Algebraic Expressions
Identities:
$(a+b)^2 = a^2 + 2ab + b^2$
$(a-b)^2 = a^2 - 2ab + b^2$
$(a^2 - b^2) = (a+b)(a-b)$
$(a^2 + b^2) = (a+b)^2 - 2ab$
$= (a-b)^2 + 2ab$
$(a+x)(b+x) = x^2 + x(a+b) + ab$
Variables not fixed values e.g., x, y², etc.
Addition of like terms
Multiplication of each and every term
Long division method
Factor method
Division
Operation on Algebraic term
Subtraction of like terms
Identities:
$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$
$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$
Constants fixed value e.g., 3, 4, 5, etc.
Quadratic equation (Degree two)
Roots of quadratic equation - solutions of a quadratic equation are called roots
Solving → Factor method
Degree of the equation → highest power of x in the equation
Linear equations (Degree one)
Two variable
One variable
Solving → Elimination method
Identities:
$a^3 + b^3 = (a+b)^3 - 3ab(a+b)$
$a^3 - b^3 = (a-b)^3 + 3ab(a+b)$
$(a+b+c)^3 = a^3 + b^3 + c^3 + 3(a+b)(b+c)(c+a)$
If α and β are roots
then, $\alpha + \beta = \frac{-b}{a}$
and $\alpha\beta = \frac{c}{a}$
Identities:
$(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$
$(a+b)^2 - (a-b)^2 = 4ab$
$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
$(a-b+c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$
$(a+b-c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$
Trace the Mind Map
First Level
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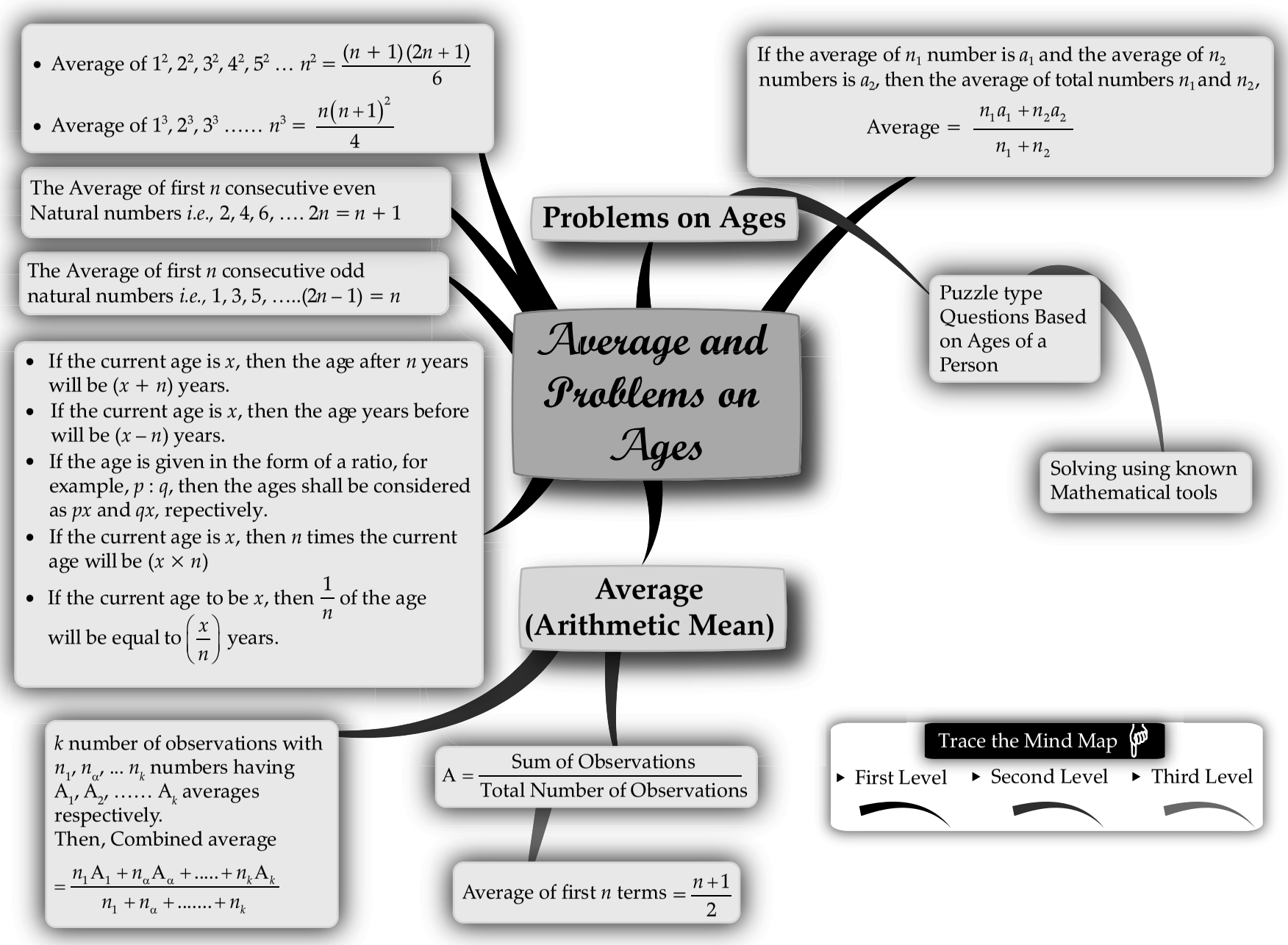
Average and Problems on Ages
Problems on Ages
Average (Arithmetic Mean)
• Average of $1^2, 2^2, 3^2, 4^2, 5^2 \ldots n^2 = \frac{(n+1)(2n+1)}{6}$
• Average of $1^3, 2^3, 3^3 \ldots\ldots n^3 = \frac{n(n+1)^2}{4}$
The Average of first n consecutive even Natural numbers *i.e.*, 2, 4, 6, …. $2n = n + 1$
The Average of first n consecutive odd natural numbers *i.e.*, 1, 3, 5, …..$(2n - 1) = n$
• If the current age is x, then the age after n years will be $(x + n)$ years.
• If the current age is x, then the age years before will be $(x - n)$ years.
• If the age is given in the form of a ratio, for example, $p : q$, then the ages shall be considered as px and qx, repectively.
• If the current age is x, then n times the current age will be $(x \times n)$
• If the current age to be x, then $\frac{1}{n}$ of the age will be equal to $\left(\frac{x}{n}\right)$ years.
k number of observations with $n_1, n_\alpha, \ldots n_k$ numbers having $A_1, A_2, \ldots\ldots A_k$ averages respectively.
Then, Combined average
$= \frac{n_1A_1 + n_\alpha A_\alpha + \ldots\ldots + n_kA_k}{n_1 + n_\alpha + \ldots\ldots + n_k}$
$A = \frac{\text{Sum of Observations}}{\text{Total Number of Observations}}$
Average of first n terms $= \frac{n+1}{2}$
If the average of n_1 number is a_1 and the average of n_2 numbers is a_2, then the average of total numbers n_1 and n_2,
$\text{Average} = \frac{n_1a_1 + n_2a_2}{n_1 + n_2}$
Puzzle type Questions Based on Ages of a Person
Solving using known Mathematical tools
Trace the Mind Map
First Level
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Percentage

If a man sells two similar objects, one at a loss of $x\%$ and another at a gain of $x\%$, then he always incurs loss in this transaction and loss% is $\frac{x^2}{100}\%$

- If x is reduced to x_0, then Reduction $\% = \frac{x - x_0}{x} \times 100$
- If x is increased to x_1, then, Increment $x_1\ \% = \frac{x_1 - x}{x} \times 100$

Depreciation

Value after n years $= P\left(1 - \frac{R}{100}\right)^n$

'Per' hundred denoted by %

Fraction to % $\frac{3}{4} \times 100 = 75\%$

Population after n years $= P\left(1 + \frac{R}{100}\right)^n$

- Cost Price (C.P.)
- Selling Price (S.P.)
- Marked Price (M.P.)
- Profit-Loss (P-L)

Profit / Loss

% to fraction $50\% = \frac{50}{100}$

- Profit $= S.P. - C.P.$
- Loss $= C.P. - S.P.$
- Profit % $= \frac{P}{C.P.} \times 100\%$
- Loss % $= \frac{L}{C.P.} \times 100\%$
- Gain/Loss% $= \left[\frac{x - y}{y}\right] \times 100$
- S.P. $= \left[\frac{100 \pm \left(\frac{\text{gain}}{\text{loss}}\right)}{100}\right] \times C.P.$

Where $x = S.P.$, $y = C.P.$

- If an object is sold on $r\%$ loss, then, $S.P. = \frac{[100 - \text{Loss}\%]}{100} \times C.P.$ or $C.P. = \frac{100}{[100 - \text{Loss}\%]} \times S.P.$

Discount $=$ Marked Price $-$ Selling Price

Discount % $= \frac{\text{discount}}{\text{Marked price}} \times 100$

Discount

If an article is sold at D% discount, then $S.P = MP\left(\frac{100 - D}{100}\right)$ or $MP = \frac{S.P \times 100}{100 - D}$

More/less Percentage

- A is R % more than B, then B is less than A by $\left(\frac{R}{R + 100} \times 100\right)\%$
- A is R% less than B, then B is more than A by $\left(\frac{R}{100 - R} \times 100\right)\%$

- If a% and b% are two succeissive losses then (negative sign shown loss and positive sign shows profit). Total loss $\% = [-a - b + \frac{ab}{100}]$
- If $a\%$ profit and $b\%$ loss occur, simultaneously then overall loss or profit % is $[a - b - \frac{ab}{100}]\%$
- If $a\%$ loss and $b\%$ profit occur then, total $\frac{\text{loss}}{\text{profit}}$ is $\left[-a + b - \frac{ab}{100}\right]\%$

(–ve sign for loss, +ve sign for profit)

Single discount $= \left(x + y - \frac{xy}{100}\right)\%$ where x and y are two successive discounts.

Trace the Mind Map

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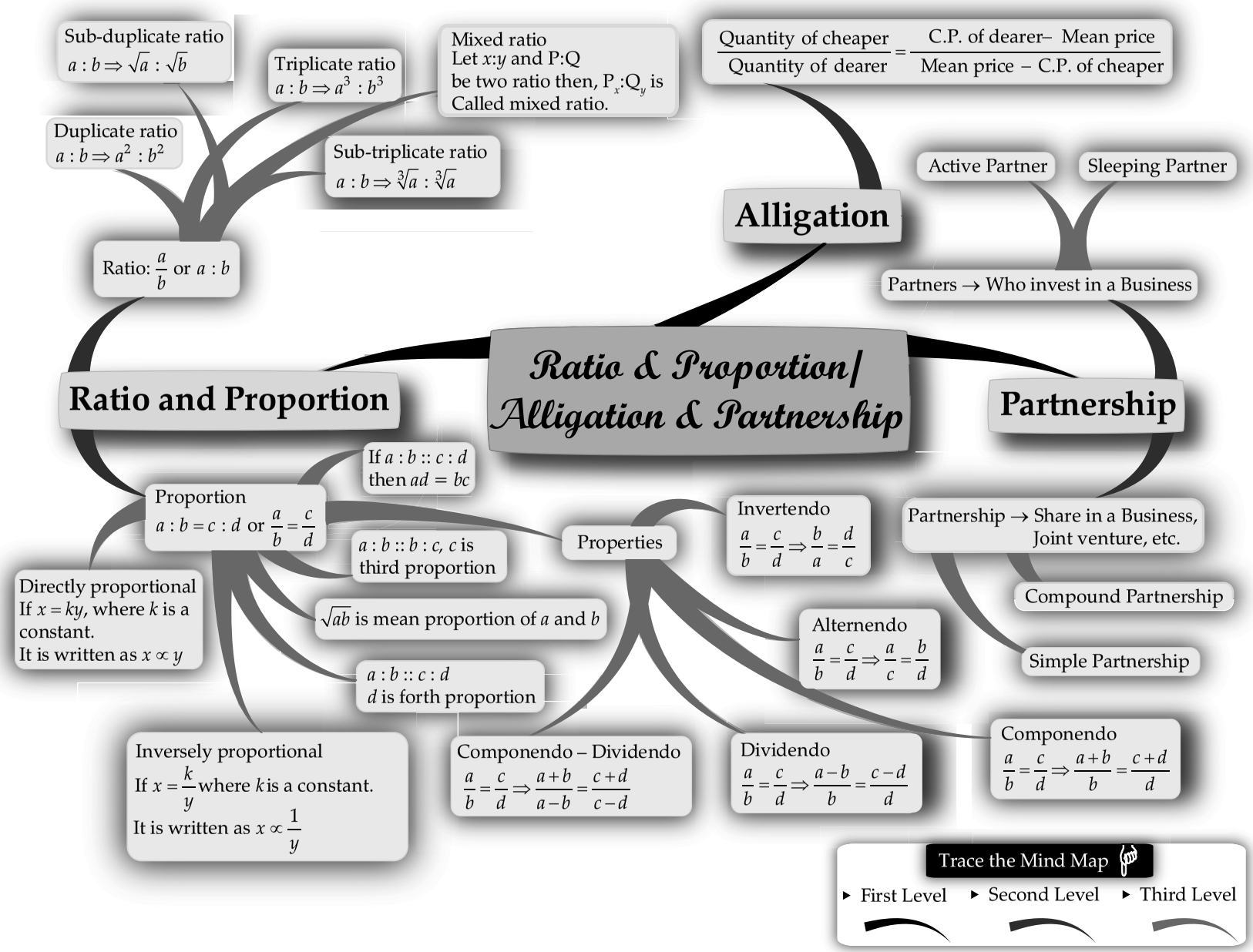
Ratio & Proportion/ Alligation & Partnership
Ratio and Proportion
Ratio: $\frac{a}{b}$ or $a : b$
Sub-duplicate ratio $a : b \Rightarrow \sqrt{a} : \sqrt{b}$
Triplicate ratio $a : b \Rightarrow a^3 : b^3$
Duplicate ratio $a : b \Rightarrow a^2 : b^2$
Sub-triplicate ratio $a : b \Rightarrow \sqrt[3]{a} : \sqrt[3]{a}$
Mixed ratio Let x:y and P:Q be two ratio then, P_x:Q_y is Called mixed ratio.
Proportion $a : b = c : d$ or $\frac{a}{b} = \frac{c}{d}$
If $a : b :: c : d$ then $ad = bc$
$a : b :: b : c$, c is third proportion
$\sqrt{ab}$ is mean proportion of a and b
$a : b :: c : d$ d is forth proportion
Directly proportional If $x = ky$, where k is a constant. It is written as $x \propto y$
Inversely proportional If $x = \frac{k}{y}$ where k is a constant. It is written as $x \propto \frac{1}{y}$
Properties
Componendo – Dividendo $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d}$
Invertendo $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{b}{a} = \frac{d}{c}$
Alternendo $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a}{c} = \frac{b}{d}$
Dividendo $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a-b}{b} = \frac{c-d}{d}$
Componendo $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{b} = \frac{c+d}{d}$
Alligation
$\frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = \frac{\text{C.P. of dearer} - \text{Mean price}}{\text{Mean price} - \text{C.P. of cheaper}}$
Partners → Who invest in a Business
Active Partner
Sleeping Partner
Partnership
Partnership → Share in a Business, Joint venture, etc.
Compound Partnership
Simple Partnership
Trace the Mind Map
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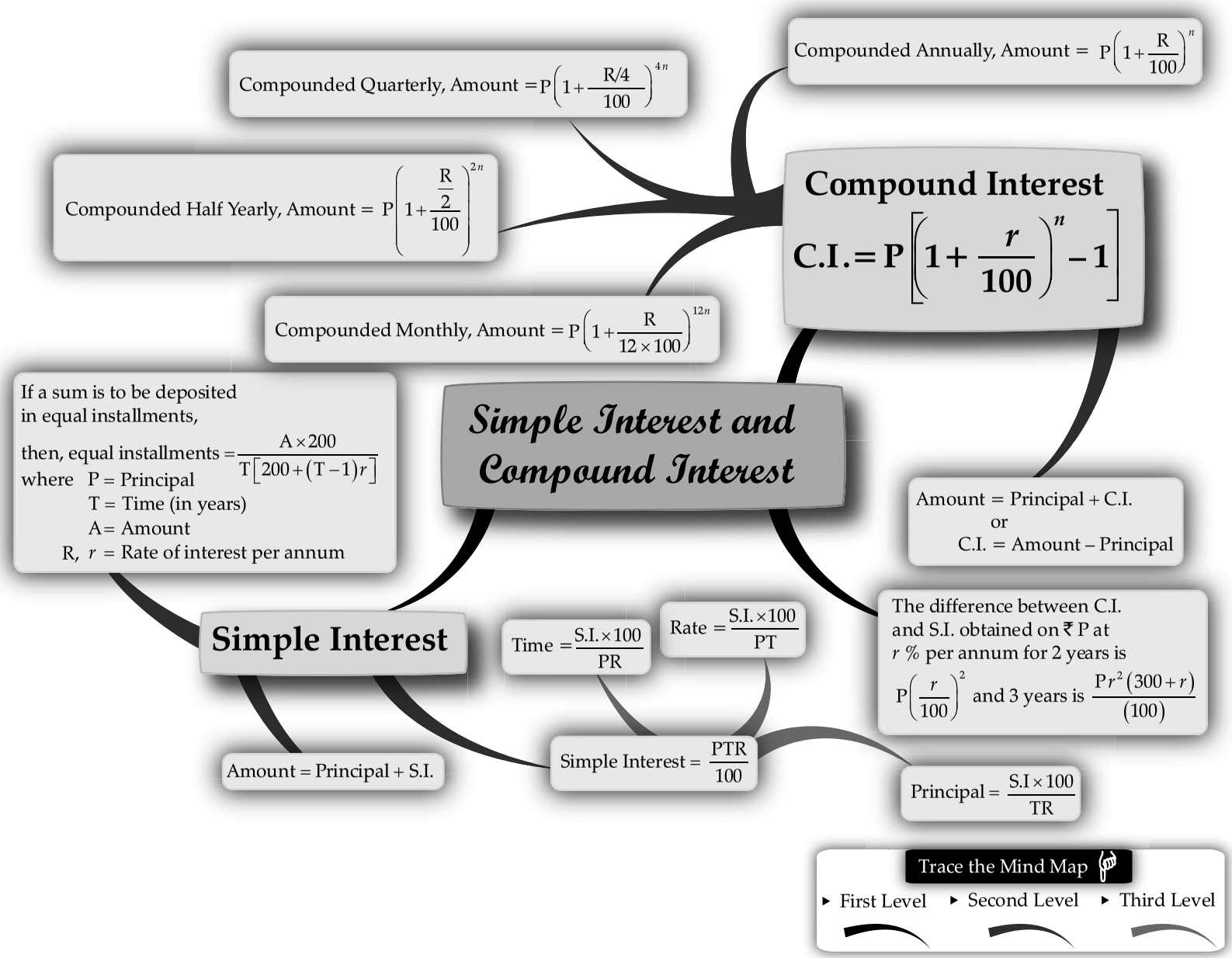
Simple Interest and Compound Interest
Compound Interest
$C.I. = P\left[\left(1+\frac{r}{100}\right)^n - 1\right]$
Compounded Annually, Amount $= P\left(1+\frac{R}{100}\right)^n$
Compounded Quarterly, Amount $= P\left(1+\frac{R/4}{100}\right)^{4n}$
Compounded Half Yearly, Amount $= P\left(1+\frac{\frac{R}{2}}{100}\right)^{2n}$
Compounded Monthly, Amount $= P\left(1+\frac{R}{12\times100}\right)^{12n}$
If a sum is to be deposited in equal installments,
then, equal installments $= \frac{A\times200}{T\left[200+(T-1)r\right]}$
where P = Principal
T = Time (in years)
A = Amount
R, r = Rate of interest per annum
Amount = Principal + C.I.
or
C.I. = Amount – Principal
The difference between C.I. and S.I. obtained on ₹ P at r % per annum for 2 years is $P\left(\frac{r}{100}\right)^2$ and 3 years is $\frac{Pr^2(300+r)}{(100)}$
Simple Interest
Time $= \frac{S.I.\times100}{PR}$
Rate $= \frac{S.I.\times100}{PT}$
Amount = Principal + S.I.
Simple Interest $= \frac{PTR}{100}$
Principal $= \frac{S.I\times100}{TR}$
Trace the Mind Map
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Time & Work

Time taken $= \frac{1}{\text{Rate of work}}$

or

Rate of work $= \frac{1}{\text{Time taken}}$

Efficiency and Time are inversely proportional to each other

Work done = Time taken × Rate of work

Efficiency
↑ more efficiency,
↑ more work done

↓ less efficiency,
↓ less work done

Work man
Man-Day

Total work done = Number of days × Efficiency

If M_1 men can finish W_1 work in D_1 days, working T_1 time each day and M_2 men finish W_2 work in D_2 days, working T_2 time then, Relation is

$$\frac{M_1 \times D_1 \times T_1}{W_1} = \frac{M_2 \times D_2 \times T_2}{W_2}$$

If M_1 men can finish W_1 work in D_1 days and M_2 men can finish W_2 work in D_2 days then, Relation is

$$\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$$

A and B need x and y days to complete the work, A & B together need $\frac{xy}{x+y}$ days

A, B and C complete the work in x, y and z days.
Together they complete the work in $\frac{xyz}{xy+yz+zx}$ days

A and B together need x days to complete the work and A need y days to complete the work.
Then B needs $\frac{xy}{4-x}$ days

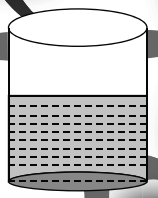
Working together A & B need x days B & C need y days & A & C need z days to complete the work together
A, B & C need $\frac{2xyz}{xy+yz+zx}$ days

A needs x days, B is k times efficient than A
Then A and B together need $\frac{x}{1+k}$ days

Pipes & Cisterns

Similar to time & work, deals with problems on filling and emptying the tank

'A' can finish a work in x hours, then work done by A in one hour $= \frac{1}{x}$



Inlet treated as +ve work

Tank

1 m^3 = 1000 litre

Outlet treated as –ve work

When two pipes fills and one pipe empty, then $(F_2 + F_2 - E)$

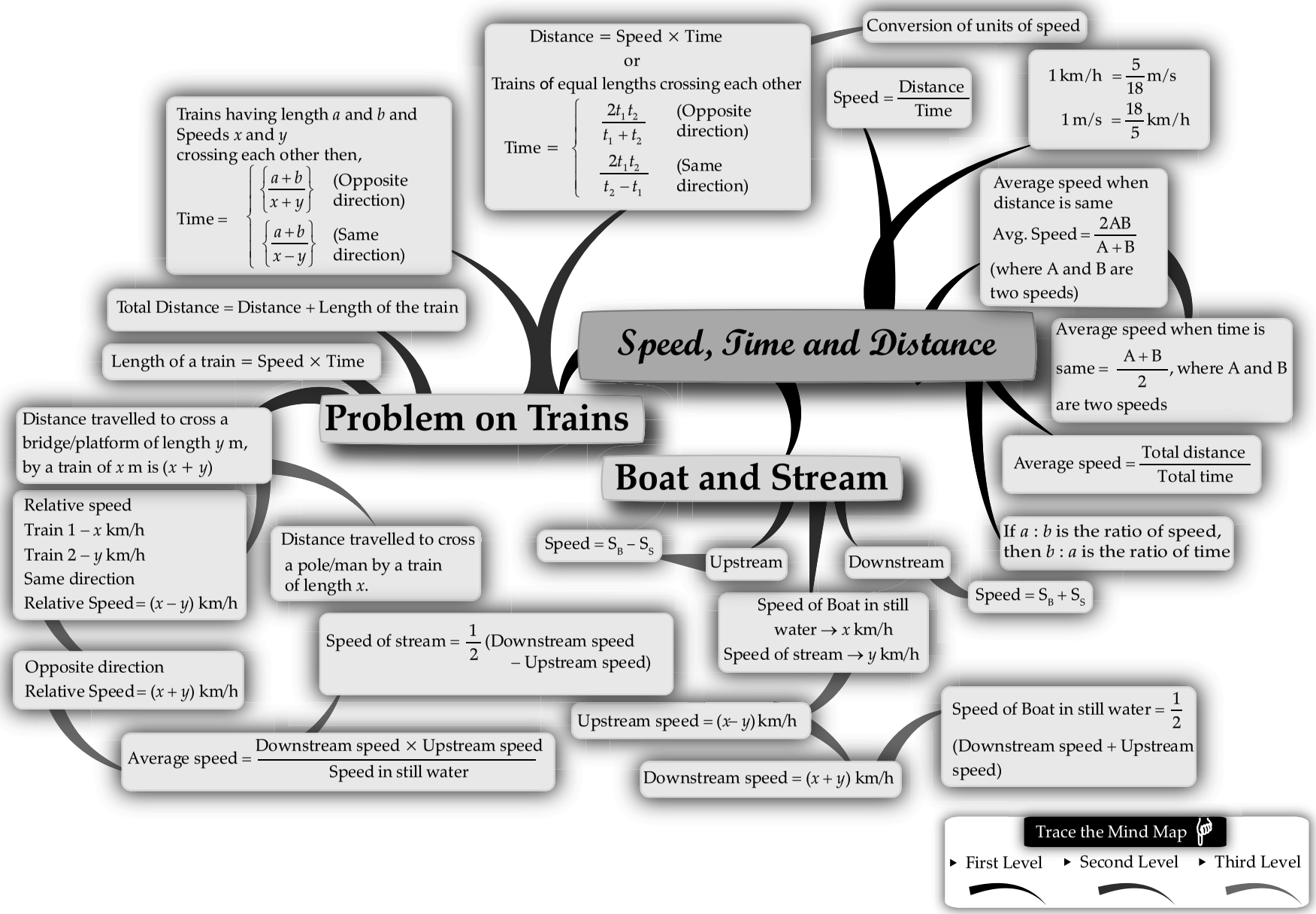
Fills tank in x hours, then part filled in one hour $= \frac{1}{x}$

If x can finish $\frac{m}{n}$ part of the work in D days, then total time taken to finish the work

$$x = \frac{n \times D}{m}$$

Trace the Mind Map

▸ First Level ▸ Second Level ▸ Third Level


Speed, Time and Distance
Distance = Speed × Time
or
Trains of equal lengths crossing each other
Time = (2t1t2)/(t1+t2) (Opposite direction)
Time = (2t1t2)/(t2−t1) (Same direction)
Conversion of units of speed
1 km/h = 5/18 m/s
1 m/s = 18/5 km/h
Speed = Distance/Time
Trains having length a and b and Speeds x and y crossing each other then,
Time = {(a+b)/(x+y)} (Opposite direction)
Time = {(a+b)/(x−y)} (Same direction)
Average speed when distance is same
Avg. Speed = 2AB/(A+B)
(where A and B are two speeds)
Total Distance = Distance + Length of the train
Length of a train = Speed × Time
Average speed when time is same = (A+B)/2, where A and B are two speeds
Problem on Trains
Distance travelled to cross a bridge/platform of length y m, by a train of x m is (x + y)
Average speed = Total distance/Total time
Boat and Stream
Relative speed
Train 1 – x km/h
Train 2 – y km/h
Same direction
Relative Speed = (x – y) km/h
Distance travelled to cross a pole/man by a train of length x.
Speed = S_B – S_S
Upstream
Downstream
If a : b is the ratio of speed, then b : a is the ratio of time
Speed = S_B + S_S
Speed of Boat in still water → x km/h
Speed of stream → y km/h
Speed of stream = 1/2 (Downstream speed – Upstream speed)
Opposite direction
Relative Speed = (x + y) km/h
Upstream speed = (x– y) km/h
Speed of Boat in still water = 1/2 (Downstream speed + Upstream speed)
Average speed = Downstream speed × Upstream speed / Speed in still water
Downstream speed = (x + y) km/h
Trace the Mind Map
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A = Area
P = Perimeter
C = Circumference

TSA = Total Surface Area
LSA = Lateral Surface Area
CSA = Curved Surafec Area

Mensuration

2D Mensuration

Scalene triangle

$A = \frac{1}{2}bh$
$P = a + b + c$

Right angle triangle

$A = \frac{1}{2}bh$
$P = a + b + c$

Rectangle

$A = lb$
$P = 2(l + b)$

Rhombus

$A = \frac{1}{2}d_1d_2$
$P = 4a$

Equilateral triangle

$A = \frac{\sqrt{3}}{4}a^2$
$P = 3a$

Square

$A = a^2$
$P = 4a$

Circle

$A = \pi r^2$
$C = 2\pi r$

Trapezium

$A = \frac{1}{2}(a + b)h$
$P = a + b + c + d$

Sector of a circle

$A = \frac{\theta}{360}\pi r^2$
$P = 2r + \frac{\pi r\theta}{180°}$

Regular Hexagon

$A = \frac{3\sqrt{3}}{2}a^2$
$P = 6a$

Parallelogram

$A = B \times h$
$P = 2(a + b)$

Semi-circle

$A = \frac{\pi r^2}{2}$
$C = r(\pi + 2)$

Regular pentagon

$A = \frac{1}{4}\sqrt{5 + (5 + 2\sqrt{2})}a^2$

3D Mensuration

- Total area of wall $= 2(l + b) \times h$
- Total volume of the room $= l \times b \times h$

Cube

$V = a^3$
$TSA = 6a^2$
$LSA = 4a^2$

Cylinder

$V = \pi r^2 h$
$CSA = 2\pi rh$
$TSA = 2\pi rh + 2\pi r^2$

Cuboid

$CSA = 2(l + b)h$
$V = lbh$
$TSA = 2(lb + bh + lh)$

Sphere

$V = \frac{4}{3}\pi r^3$
$TSA = 4\pi r^2$

Hemisphere

$V = \frac{2}{3}\pi r^3$
$TSA = 3\pi r^2$
$CSA = 2\pi r^2$

Cone

$V = \frac{1}{3}\pi r^2 h$
$CSA = \pi rl$
$TSA = \pi r(l + r)$

Frustum of Cone

If a cone is cut by a plane parallel to the base, so as to divide the cone into upper part and lower part, then the lower part is called frustum.

- Slant height (l) $= \sqrt{h^2 + (R - r)^2}$
- Curved surface area $= \pi(R + r)l$
- Total surface area $\pi(R + r)l + \pi(R^2 + r^2)$

Volume $= \frac{\pi h}{3}(r^2 + R^2 + rR)$

Where, r = radius of top, R = radius of base
h = height, l = slant height

l = Slant height

Trace the Mind Map

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Trigonometry

Trigonometry Ratios Table

Angles (In Degrees) / Angles (In Radians)	0° / 0	30° / $\frac{\pi}{6}$	45° / $\frac{\pi}{4}$	60° / $\frac{\pi}{3}$	90° / $\frac{\pi}{2}$
sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞ (not defined)

Pythagoras theorem

Consider the triangle given below where *a* is the perpendicular *b* is the base, *c* is the hypotenuse.

$c^2 = a^2 + b^2$

- On Y-axis $[90° \pm \theta, 270° \pm 0]$ sin ⇄ cos, sec ⇄ cosec and tan ⇄ cot
- On X-axis $180° \pm \theta, 360° \pm 0]$ sin → sin, cos → cos similarly, for other trigonometric ratios.

Fundamental relation

- $\frac{1}{\sin\theta} = \text{cosec}\ \theta$
- $\frac{1}{\cos\theta} = \sec\theta$
- $\frac{1}{\tan\theta} = \cot\theta$

Radian

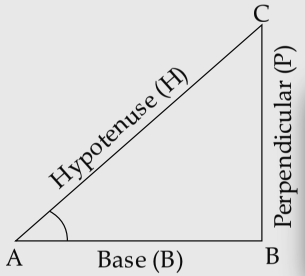
$R^C = \left(\frac{180}{\pi}\right)^\circ$

Degree

$180° = \pi^C$

Trigonometry Formulas

- $\sin A = \frac{BC}{AC} = \frac{P}{H}$
- $\cos A = \frac{AB}{AC} = \frac{B}{H}$
- $\tan A = \frac{BC}{AB} = \frac{P}{B}$
- $\text{cosec}\ A = \frac{AC}{BC} = \frac{H}{P}$
- $\sec A = \frac{AC}{AB} = \frac{H}{B}$
- $\cot A = \frac{AB}{BC} = \frac{B}{P}$



- Angle in Degrees = Angle in Radians = $\frac{180°}{\pi}$
- 1 radians = $\frac{180°}{\pi}$

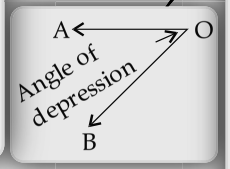
Trigonometric Identities

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = \text{cosec}^2\theta$
- $\tan\theta = \frac{\sin\theta}{\cos\theta}$

- Domain
- Range
- Period

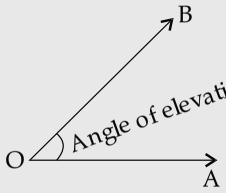
Trigonometric Functions

- $\sin\left(\frac{\pi}{2} - \theta\right) = \cos\theta \quad \left(\because \frac{\pi}{2} = 90°\right)$
- $\cos\left(\frac{\pi}{2} - \theta\right) = \sin\theta$
- $\tan\left(\frac{\pi}{2} - \theta\right) = \cot\theta$
- $\cot\left(\frac{\pi}{2} - \theta\right) = \tan\theta$
- $\sec\left(\frac{\pi}{2} - \theta\right) = \text{cosec}\ \theta$
- $\text{cosec}\left(\frac{\pi}{2} - \theta\right) = \sec\theta$



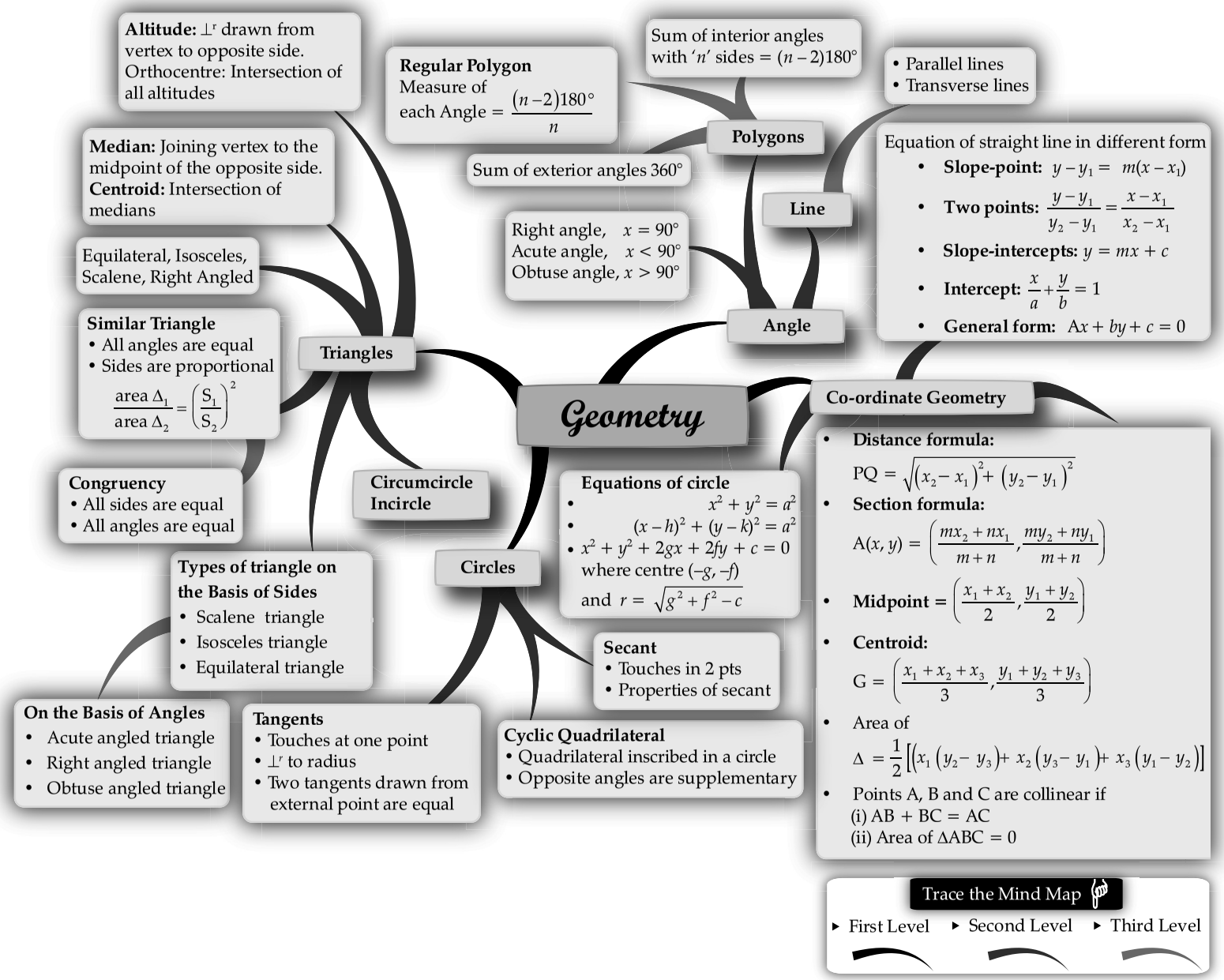
Height and Distance

Elevation and Depression Angles



Trace the Mind Map

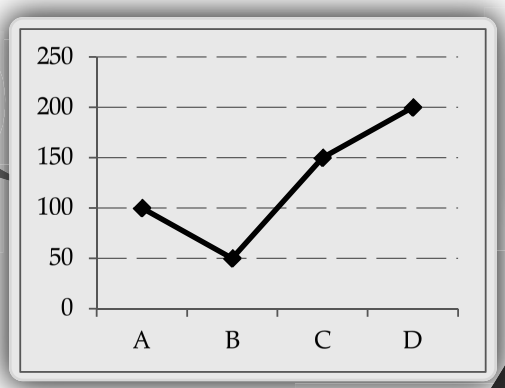
▸ First Level ▸ Second Level ▸ Third Level


Geometry
Triangles
Altitude: ⊥r drawn from vertex to opposite side. Orthocentre: Intersection of all altitudes
Median: Joining vertex to the midpoint of the opposite side. Centroid: Intersection of medians
Equilateral, Isosceles, Scalene, Right Angled
Similar Triangle
• All angles are equal
• Sides are proportional
area Δ1 / area Δ2 = (S1/S2)^2
Congruency
• All sides are equal
• All angles are equal
Types of triangle on the Basis of Sides
• Scalene triangle
• Isosceles triangle
• Equilateral triangle
On the Basis of Angles
• Acute angled triangle
• Right angled triangle
• Obtuse angled triangle
Polygons
Regular Polygon
Measure of each Angle = (n−2)180°/n
Sum of interior angles with 'n' sides = (n−2)180°
Sum of exterior angles 360°
Angle
Right angle, x = 90°
Acute angle, x < 90°
Obtuse angle, x > 90°
Line
• Parallel lines
• Transverse lines
Co-ordinate Geometry
Equation of straight line in different form
• Slope-point: y − y1 = m(x − x1)
• Two points: (y − y1)/(y2 − y1) = (x − x1)/(x2 − x1)
• Slope-intercepts: y = mx + c
• Intercept: x/a + y/b = 1
• General form: Ax + by + c = 0
• Distance formula: PQ = √((x2 − x1)^2 + (y2 − y1)^2)
• Section formula: A(x, y) = ((mx2 + nx1)/(m + n), (my2 + ny1)/(m + n))
• Midpoint = ((x1 + x2)/2, (y1 + y2)/2)
• Centroid: G = ((x1 + x2 + x3)/3, (y1 + y2 + y3)/3)
• Area of Δ = 1/2 [x1(y2 − y3) + x2(y3 − y1) + x3(y1 − y2)]
• Points A, B and C are collinear if
(i) AB + BC = AC
(ii) Area of ΔABC = 0
Circles
Circumcircle
Incircle
Equations of circle
• x^2 + y^2 = a^2
• (x − h)^2 + (y − k)^2 = a^2
• x^2 + y^2 + 2gx + 2fy + c = 0
where centre (−g, −f)
and r = √(g^2 + f^2 − c)
Secant
• Touches in 2 pts
• Properties of secant
Tangents
• Touches at one point
• ⊥r to radius
• Two tangents drawn from external point are equal
Cyclic Quadrilateral
• Quadrilateral inscribed in a circle
• Opposite angles are supplementary
Trace the Mind Map
First Level
Second Level
Third Level

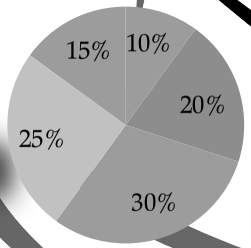
Data Interpretation

Graphs

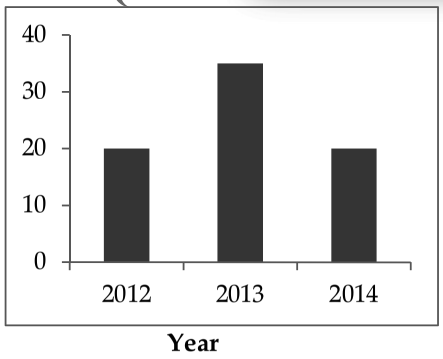
- **Line Graph**

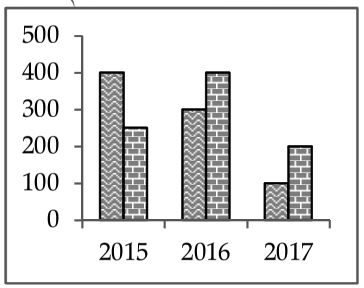


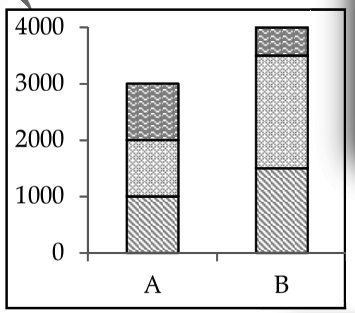
- **Pie-Chart**



- **Bar Graphs**
  - Simple Bar Graph
  - Multiple Bar Graph
  - Sub-divided Bar Graph







Tables

Complex Table:
More than one attribute or characteristic of the data are presented.

Simple Table:
In a simple table, only one attribute (quality) or specialty of the data is presented

Representing data Systematically in Rows and Columns

Angle of a sector

$$= \frac{\text{Value of the sector}}{\text{Total value}} \times 360°$$

Value of sector

$$= \frac{\text{Angle of the sector}}{360°} \times \text{Total value}$$

Trace the Mind Map

▸ First Level ▸ Second Level ▸ Third Level