Surface areas and Volumes

Cone

Volume - $\frac{1}{3}\pi r^2 h$

CSA - $\pi r l$

TSA - $\pi r(l+r)$

$l = \sqrt{h^2+r^2}$

[l - slant height]

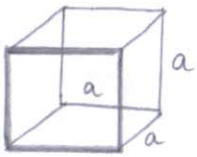
Hemisphere

CSA - $2\pi r^2$

TSA - $3\pi r^2$

Volume : $\frac{2}{3}\pi r^3$

Cube



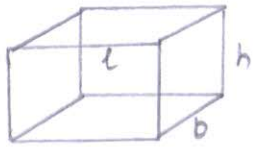
LSA - $4a^2$

TSA - $6a^2$

Volume - a^3

[a = side]

Cuboid



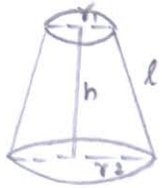
LSA - $2(l+b)h$

TSA : $2(lb+bh+hl)$

Volume : $l \times b \times h$

[l - length
b - breadth
h - height]

Frustum



$l = \sqrt{h^2+(r_1^2-r_2^2)}$

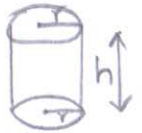
Volume - $\frac{1}{3}\pi h(r_1^2+r_2^2+r_1 r_2)$

TSA - $\pi l(r_1+r_2)+\pi r_1^2+\pi r_2^2$

CSA - $\pi(r_1+r_2)l$

[l - slant height]

Cylinder



CSA - $2\pi rh$

TSA - $2\pi r(h+r)$

Volume : $\pi r^2 h$

[h - height
r - radius]

Circle

area : πr^2

circumference - $2\pi r$

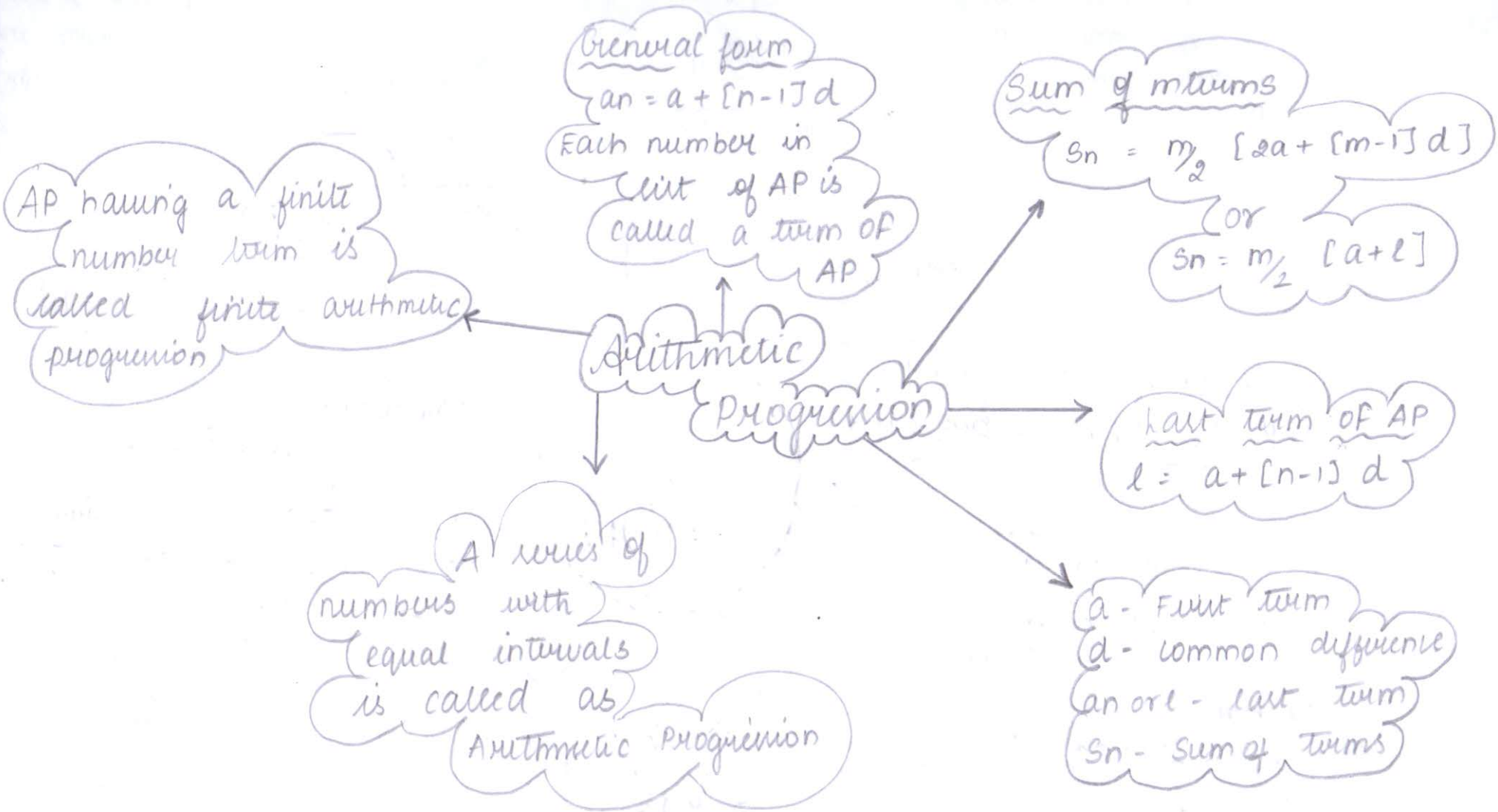
[r - radius]

Sphere

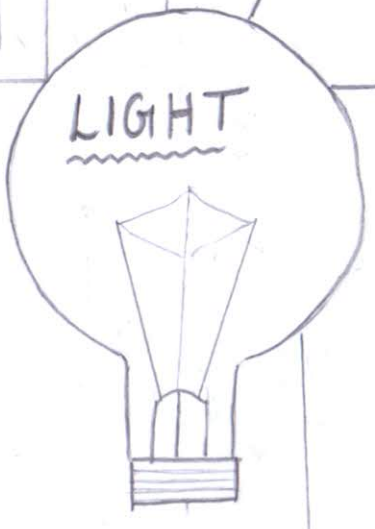
Surface area : $4\pi r^2$

Volume - $\frac{4}{3}\pi r^3$

[r - radius]


Arithmetic Progression
A series of numbers with equal intervals is called as Arithmetic Progression
AP having a finite number term is called finite arithmetic progression
General form
an = a + [n-1] d
Each number in list of AP is called a term of AP
Sum of n terms
Sn = n/2 [2a + [n-1] d]
or
Sn = n/2 [a+l]
Last term of AP
l = a + [n-1] d
a - First term
d - common difference
an or l - last term
Sn - Sum of terms

LIGHT



Mirror

Formula $\frac{1}{F} = \frac{1}{v} + \frac{1}{u}$

* sign convention

→ Convex mirror
- F = +ve
- u = -ve
- v = +ve

→ Concave mirror
- F = -ve
- u = -ve
- v = -ve

magnification $= -\frac{v}{u} = \frac{hi}{ho}$

lens

Formula $\frac{1}{F} = \frac{1}{v} - \frac{1}{u}$

* sign convention

→ convex lens
- F = +ve
- u = -ve
- v = +ve

→ concave lens
- F = -ve
- u = -ve
- v = -ve

magnification $= \frac{v}{u} = \frac{hi}{ho}$

* height of object - ho
* Focal length - F
* image distance - v
* Object distance - u
* height of image - hi

Uses of mirror

concave
* torches
* headlight
* Search light

convex
* rear view mirror

Power of lens

$\frac{1}{F} = P$

unit = Dioptre (D) or m^{-1}

refractive index

$n = c/v$

$v = 3 \times 10^8$ m/s

Types of mirror

Concave

Ray Diag:
* At Infinity
* Blw C and F
* Beyond C
* At F
* At C
* Blw P and F

Convex
* At Infinity
* Blw Infinity and pole

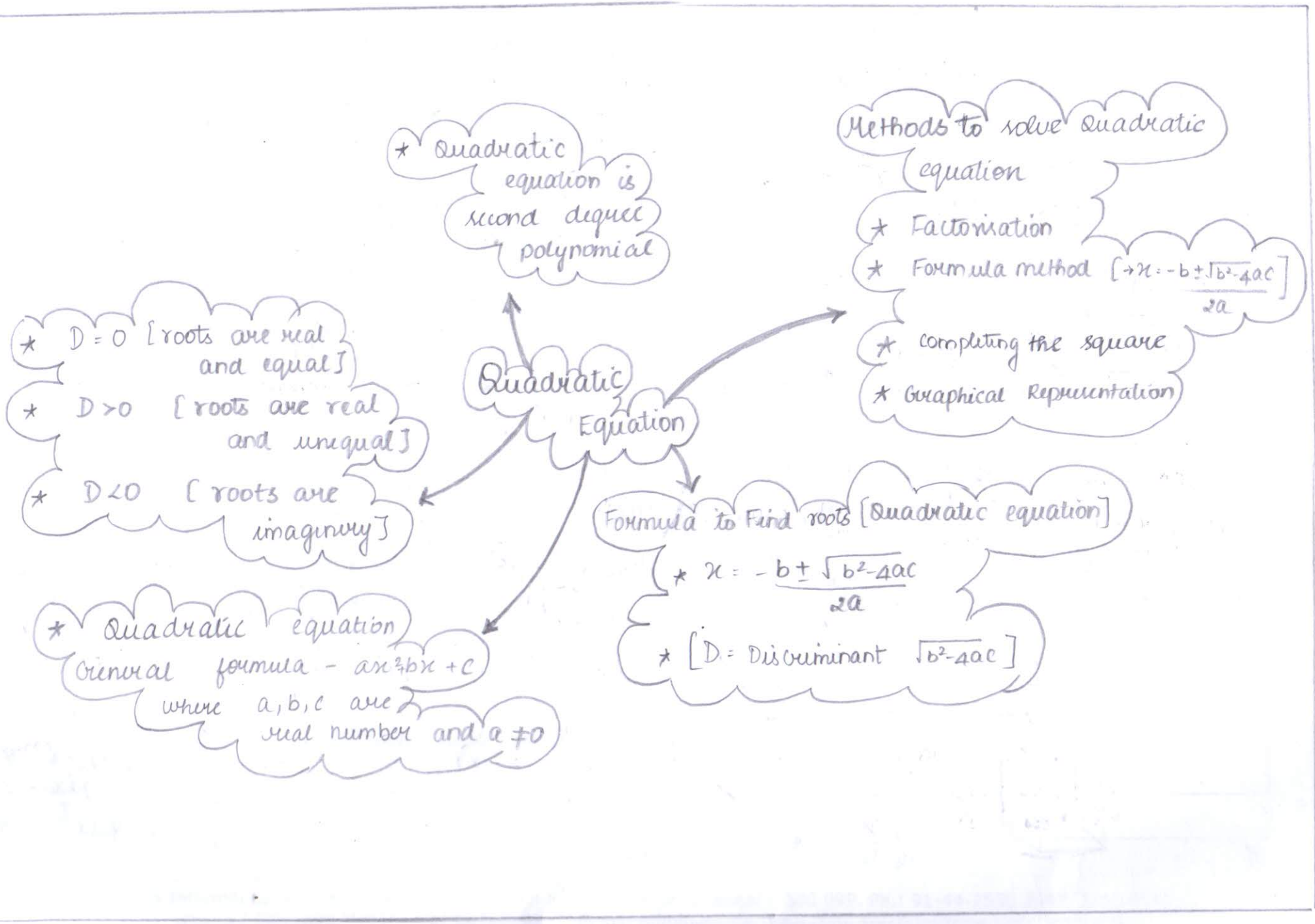
Types of lens

convex
* At Infinity
* Beyond $2F_1$
* At $2F_1$
* Blw F_1 and $2F_1$
* At Focus
* Blw F_1 and optical centre

concave
* At Infinity
* Blw infinity and O (optical centre)

IMAGE FORMED

* Convex mirror - Virtual and erect
* Convex lens - Real and inverted
* Concave mirror - Real and inverted
* Convex lens - Virtual and erect


Quadratic Equation
* Quadratic equation is second degree polynomial
Methods to solve Quadratic equation
* Factorization
* Formula method [→ x = -b ± √(b²-4ac) / 2a]
* completing the square
* Graphical Representation
* D = 0 [roots are real and equal]
* D > 0 [roots are real and unequal]
* D < 0 [roots are imaginary]
Formula to Find roots [Quadratic equation]
* x = -b ± √(b²-4ac) / 2a
* [D = Discriminant √(b²-4ac)]
* Quadratic equation Universal formula - ax²+bx+c where a, b, c are real number and a ≠ 0

Co-ordinate Geometry

2 dimensions

Y'

X ← → X'

Y

Distance from origin

$\sqrt{x^2+y^2}$

Section Formula

$\left[\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right]$ Internally

$\left[\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right]$ Externally

Distance Formula

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Mid point

$\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

centroid

$\left[\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{2}\right]$

centroid Ratio - 2 : 1

area of Δle

$\frac{1}{2}\left|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right|$

Properties of Δle

* Equilateral Δle $AB=BC=CA$
* Isosceles Δle $AB=BC$ or $BC=CA$ or $CA=AB$
* Right Δle $AB^2+BC^2=CA^2$

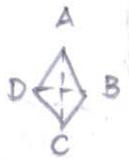
Properties of Shapes

* Square

$AB=BC=CD=DA$

$AC=BD$

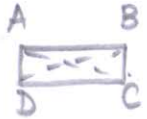
* Rhombus



$AB=BC=CD=DA$

$AC \neq BD$

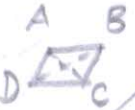
* Rectangle



$AB=CD$ $BC=DA$

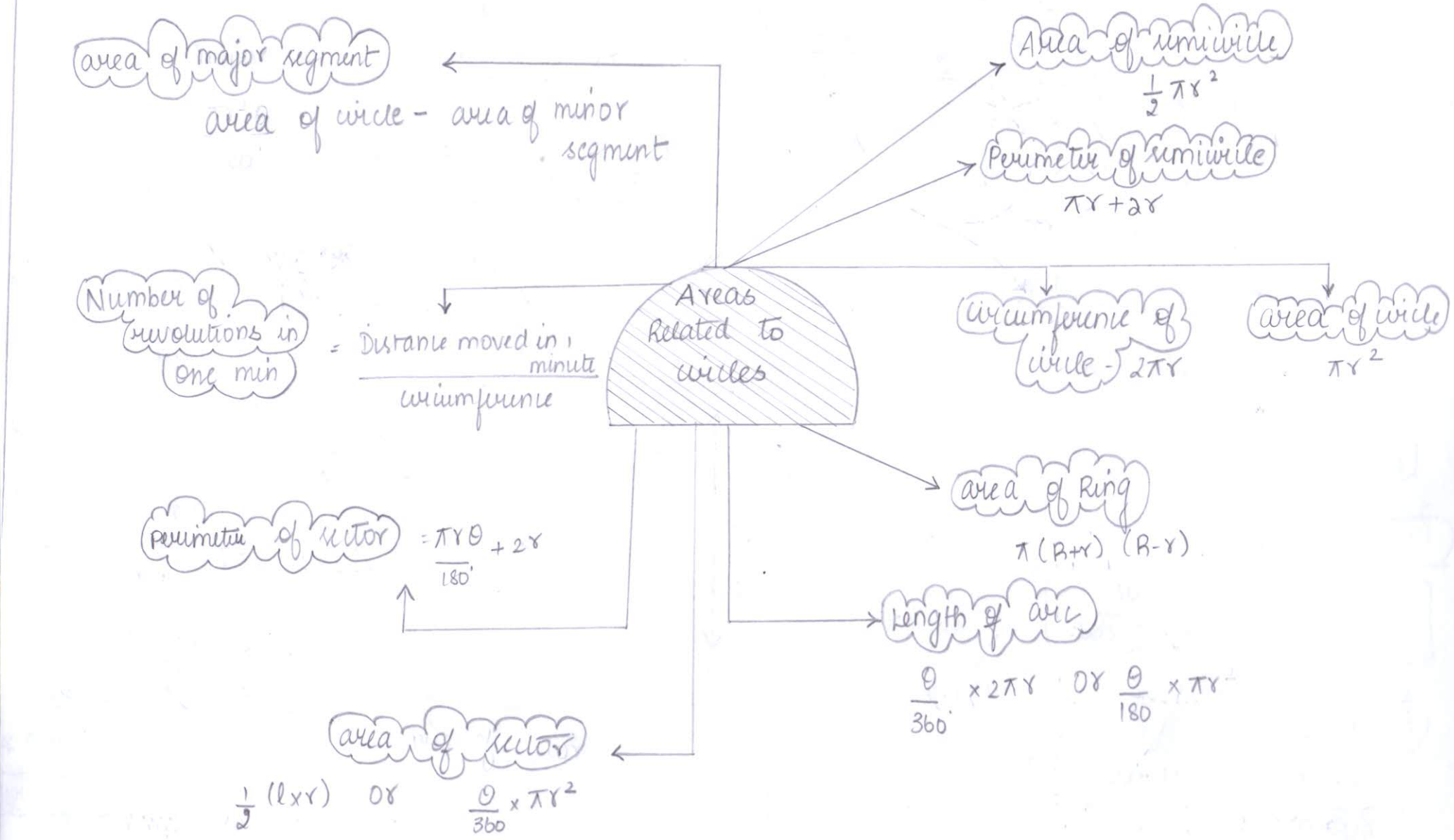
$AC=BD$

* Parallelogram



$AB=CD$, $BC=DA$

$AC \neq BD$


Areas Related to circles
area of major segment
area of circle - area of minor segment
Area of semicircle
$\frac{1}{2}\pi r^2$
Perimeter of semicircle
$\pi r + 2r$
Number of revolutions in one min
$= \frac{\text{Distance moved in 1 minute}}{\text{circumference}}$
circumference of circle - $2\pi r$
area of circle
πr^2
perimeter of sector
$= \frac{\pi r \theta}{180} + 2r$
area of Ring
$\pi (R+r)(R-r)$
Length of arc
$\frac{\theta}{360} \times 2\pi r$ or $\frac{\theta}{180} \times \pi r$
area of sector
$\frac{1}{2}(l \times r)$ or $\frac{\theta}{360} \times \pi r^2$

PROBABILITY

* Probability lies blw 0 and 1
* Impossible event = 0
* Sure event = 1
* $P(E) + P(\bar{E}) = 1$
* $P(\bar{E}) = 1 - P(E)$
* $P(E) = 1 - P(\bar{E})$

$$P(E) = \frac{\text{No. of favourable outcome}}{\text{Total outcomes}}$$

Cards

13 cards - Spade
13 cards - clover
} Spade

13 cards - Heart
13 cards - Diamond
} Red

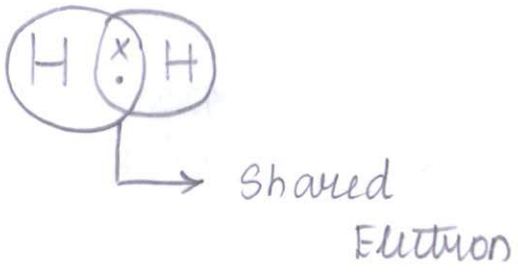
* coin toss one time
  H, T
* coin toss 2 times
  HT, TH, HT, TT
* coin toss 3 times
  HHH, HTH, HHT, HTT
  TTT, THT, TTH, THH

Sample space of 1 die
(1), (2), (3), (4), (5), (6)

Sample space of 2 dice

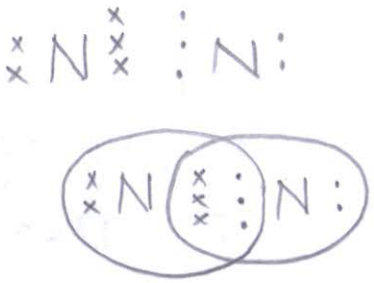
(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
(4,1)	(4,2)	(4,4)	(4,3)	(4,5)	(4,6)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
(6,1)	(6,2)	(6,3)	(6,5)	(6,4)	(6,6)

Molecule of Hydrogen



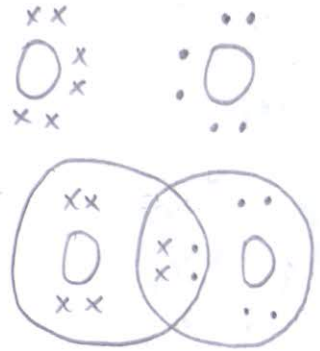
H-H

Single bond b/w 2 Hydrogen atoms



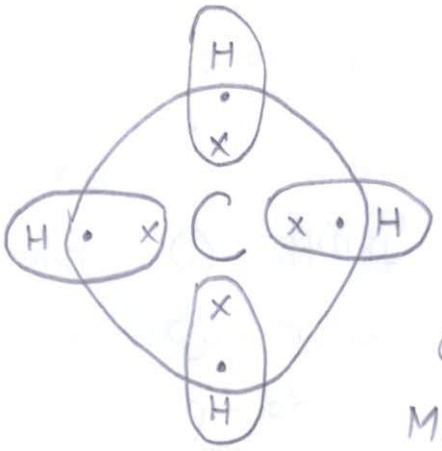
N≡N

Triple bond b/w 2 Nitrogen atom.



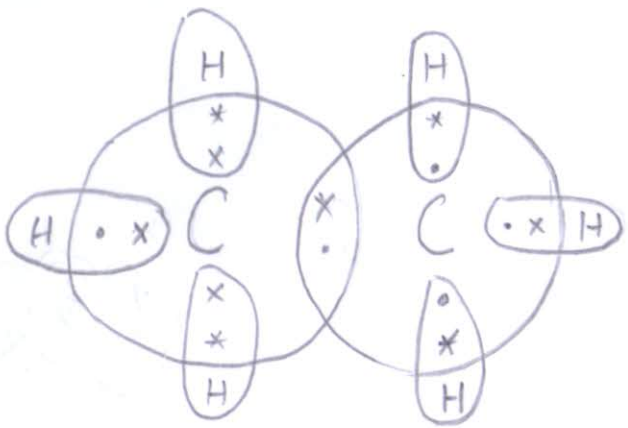
O=O

Double bond between 2 oxygen atoms.



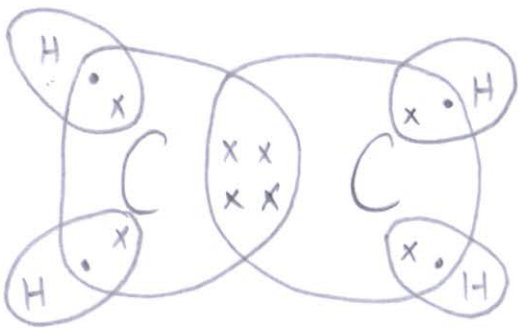
CH_4

Methane



Ethane.

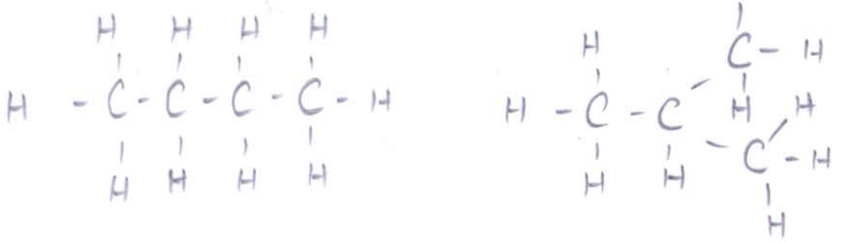
C_2H_6



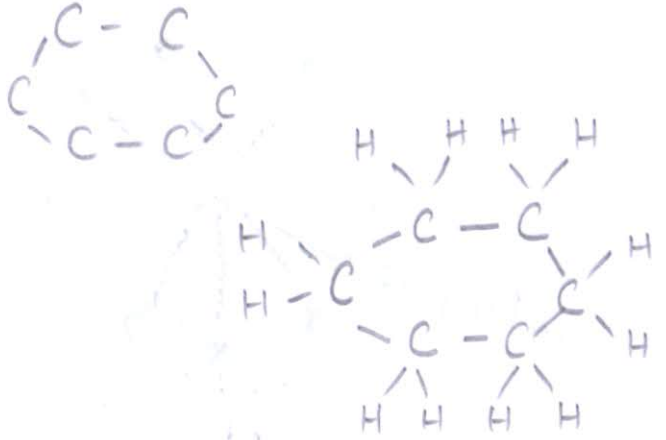
Ethene

C_2H_4

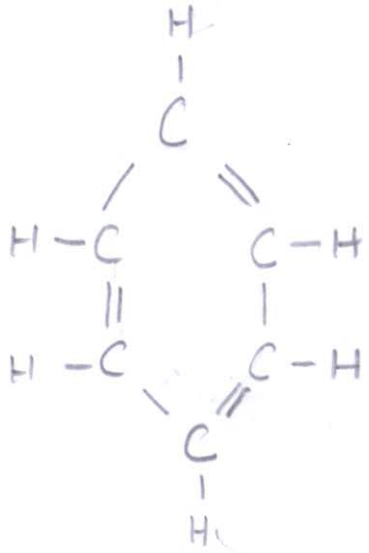
2 poiuble carbon skuuton



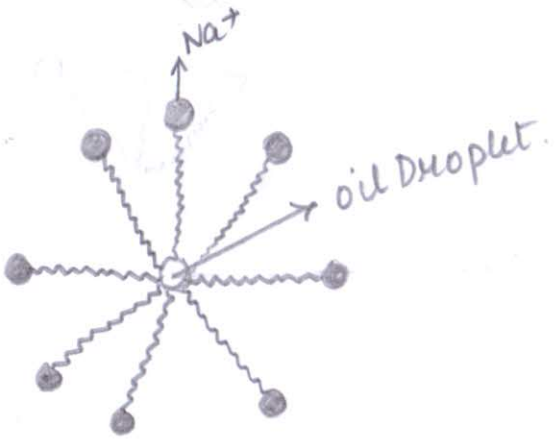
2 slructures of C_4H_{10}



Cyclonexane.



Benzene C_6H_6



Formation of micelle