Formula Sheet
Pair of Straight Line

- Combined eqn:-

  Let, $u = 0$ $v = 0$

  $\therefore$ Combined eqn : $uv = 0$

- Homogeneous eqn of degree two:-

  1] Combined eqn of degree 2 — $ax^2 + 2hxy + by^2 = 0$

  2] $h^2 - ab > 0 \rightarrow$ Distinct lines

  $h^2 - ab = 0 \rightarrow$ coincidence lines

  $h^2 - ab < 0 \rightarrow$ Not represent line.

  3] m_1 and m_2 are slopes of two given lines,

  $\therefore m_1 + m_2 = \dfrac{-2h}{b}$ $m_1 m_2 = \dfrac{a}{b}$

- Short tricks:-

  1] Combine eqn of pair of line passing through origin

  and 1^{ler} to $ax^2 + 2hxy + by^2 = 0$

  $\therefore bx^2 - 2hxy + ay^2 = 0$.

  2] If diff. bet^n slopes of lines represented by $ax^2 + 2hxy + by^2$

  is k then,

  $4(h^2 - ab) = k^2 b^2$.

  3] If slope of one line is k times other then,

  $(k+1)^2 ab = 4kh^2$

- Auxillary equation:- $bm^2 + 2hm + a = 0$.

- Acute angle between lines :-
$$\tan\Theta = \left| \frac{2\sqrt{h^2-ab}}{a+b} \right|$$

lines perpendicular $\longrightarrow$ $a+b=0$
lines coincident $\longrightarrow$ $h^2-ab=0$

- General second degree eqn in x and y :-
$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0.$$
Eqn represent pair of Line:
1] $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$
2] $h^2 - ab \geqslant 0$
3] This are parallel to $ax^2 + 2hxy + by^2 = 0$.
4] perpendicular $\rightarrow a+b = 0$
5] parallel $\rightarrow h^2 - ab = 0$
6] point of intersection $\rightarrow \left(\frac{hf-bg}{ab-h^2}, \frac{gh-af}{ab-h^2} \right)$

7] Joint eqn of bisector of angle :$\rightarrow$
$$hx^2 - (a-b)xy - hy^2 = 0$$

- $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$ <u>a</u>ll <u>h</u>appy <u>g</u>irls
<u>h</u>aving <u>b</u>eautiful <u>f</u>aces
<u>g</u>oing <u>f</u>or <u>c</u>inema