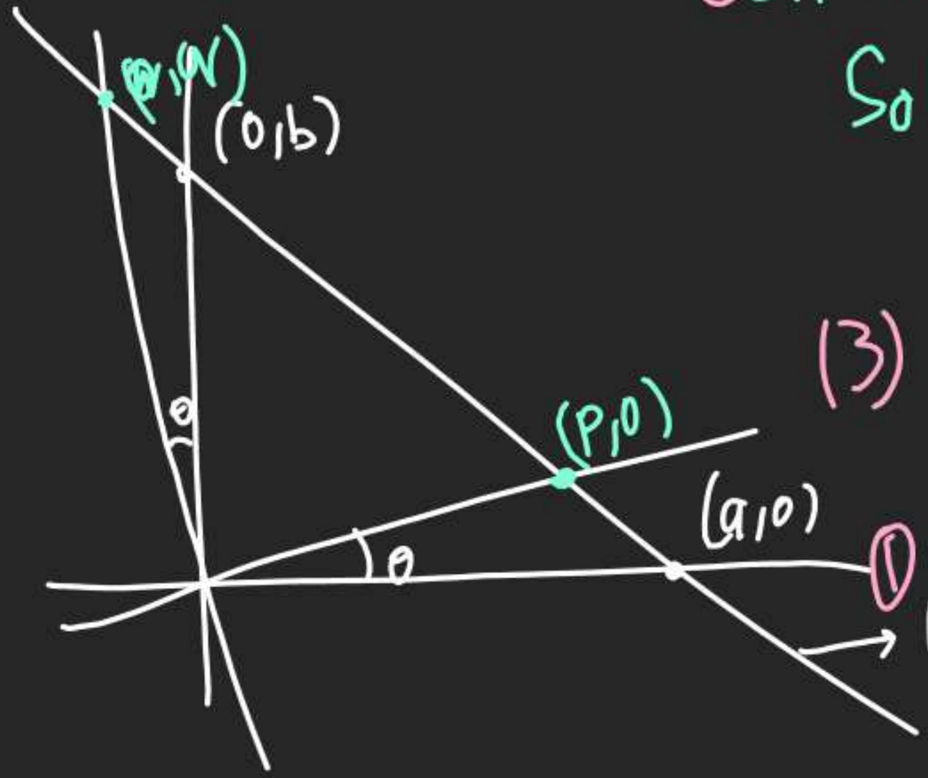
Nishant Jindal

In 2
Future
3D
में
करेंगे
आएगा।

Q Line L has Intercept a, b on Co-axes.
When axes are rotated thru an angle
θ keeping $\boxed{\text{Origin Same}}$. Same Line
has Intercept p & q. P.T.

$$\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}+\frac{1}{q^2}$$




(1) Line $\frac{x}{a}+\frac{y}{b}=1$ (old Cord System)

(2) Intercepts are changed
So New eqn of line is
$$\frac{x}{p}+\frac{y}{q}=1$$

(3) as Line is same So distance
from (0,0) will be same

$$d_1 = d_2$$

$$\Rightarrow \frac{\left|\frac{0}{a}+\frac{0}{b}-1\right|}{\sqrt{\frac{1}{a^2}+\frac{1}{b^2}}}=\frac{\left|\frac{0}{p}+\frac{0}{q}-1\right|}{\sqrt{\frac{1}{p^2}+\frac{1}{q^2}}}$$

$$\Rightarrow \frac{1}{\frac{1}{a^2}+\frac{1}{b^2}}=\frac{1}{\frac{1}{p^2}+\frac{1}{q^2}}$$

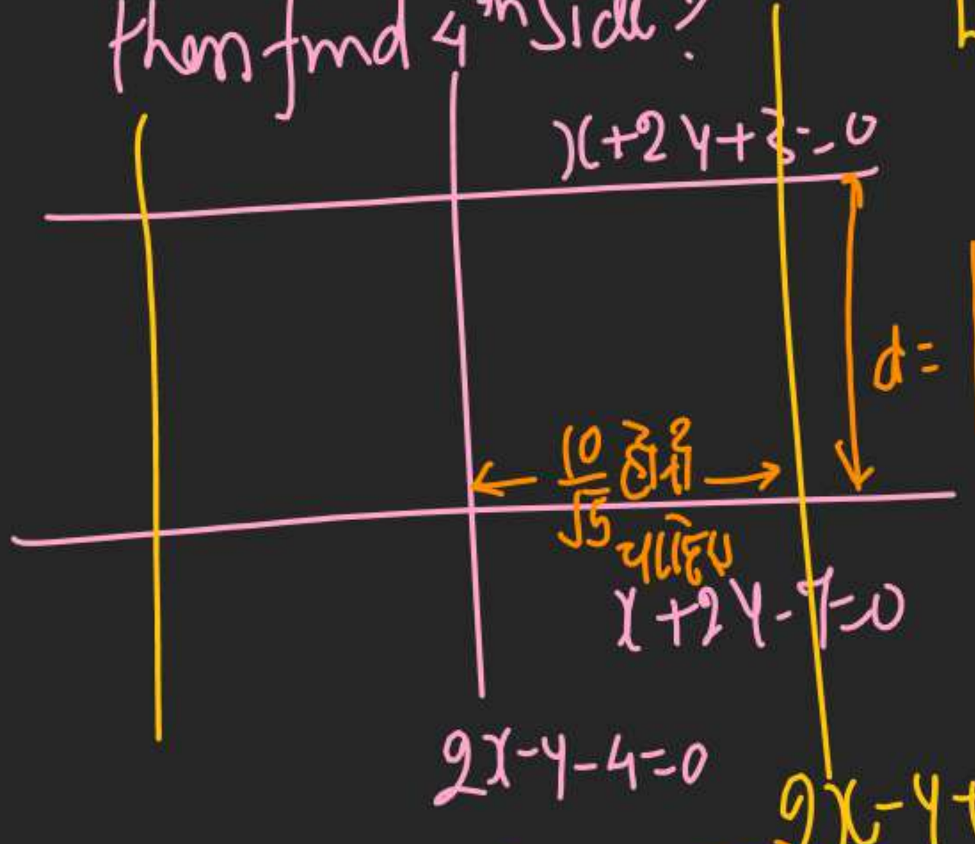
$$\Rightarrow \boxed{\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}+\frac{1}{q^2}}$$

Q 3 Lines $L_1: x+2y+3=0$

$L_2: x+2y-7=0$ → Idea Pd Rha Ki Lines are $\|^{m}$

$L_3: 2x-y-4=0$

$L_2, L_3$ are Clearly $\perp^r$ form Sides of $sq^r$ then find $4^{th}$ Side?




$$d = \left|\frac{3-(-7)}{\sqrt{1^2+2^2}}\right| = \frac{10}{\sqrt5}$$

2 Lines are Possible

Line → $2x-y+K=0$

$$d = \frac{|K-(-4)|}{\sqrt{2^2+1^2}} = \frac{|K+4|}{\sqrt5}$$

(2) Equating distances

$$\frac{|K+4|}{\cancel{\sqrt5}} = \frac{10}{\cancel{\sqrt5}}$$

$K+4 = \pm 10$

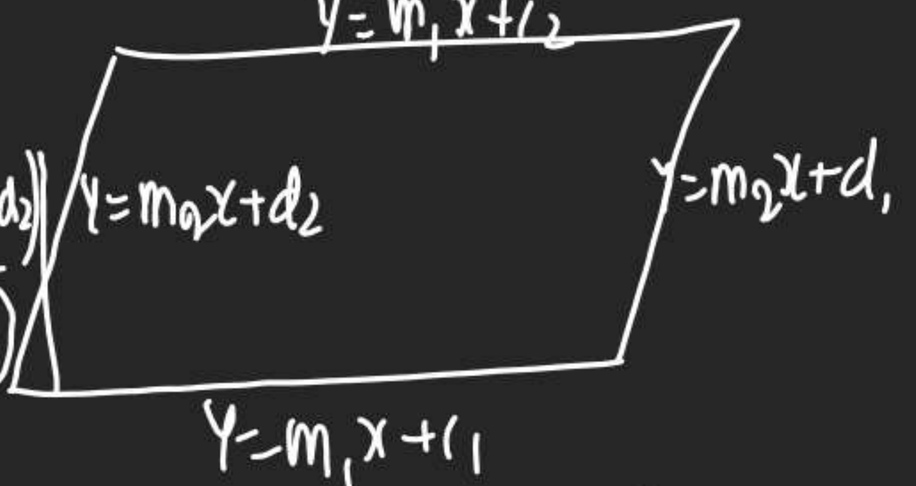
$K+4=10$, $K=6$ | $K+4=-10$, $K=-14$

$2x-y+6=0$ or $2x-y-14=0$

Q 3 Find area of ||gm if Sides are

$x+y=1$, $x+y=3$, $3x-4y=1$

& $3x-4y=5$




$$\Delta = \left|\frac{(c_1-c_2)(d_1-d_2)}{(m_1-m_2)}\right|$$

$y=-x+1$, $y=-x+3$ | $y=\frac{3}{4}x-\frac{1}{3}$, $y=\frac{3}{4}x-\frac{5}{3}$

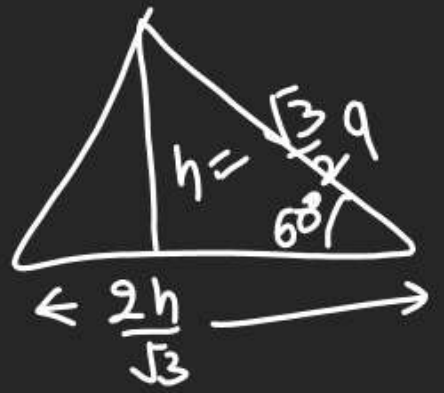
$$\Delta = \left|\frac{(1-3)\left(-\frac{1}{3}+\frac{5}{3}\right)}{\left(-1-\frac{3}{4}\right)}\right| = \left|-\frac{8}{3}\times-\frac{3}{7}\right|$$

$$= \frac{8}{7}$$

Nishant Jindal

Q 4

Area of eql $\Delta$ in diagram



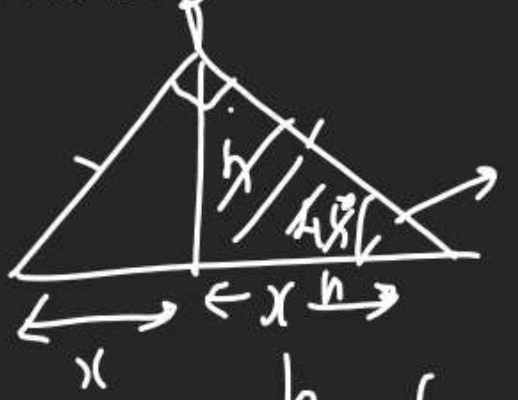

$a = \frac{2h}{\sqrt{3}}$

$\Delta = \frac{1}{2} B \times H = \frac{1}{2} \times \frac{2h}{\sqrt{3}} \times h$

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

Q 5

Area of Rt. Isosceles $\Delta$ in diagram



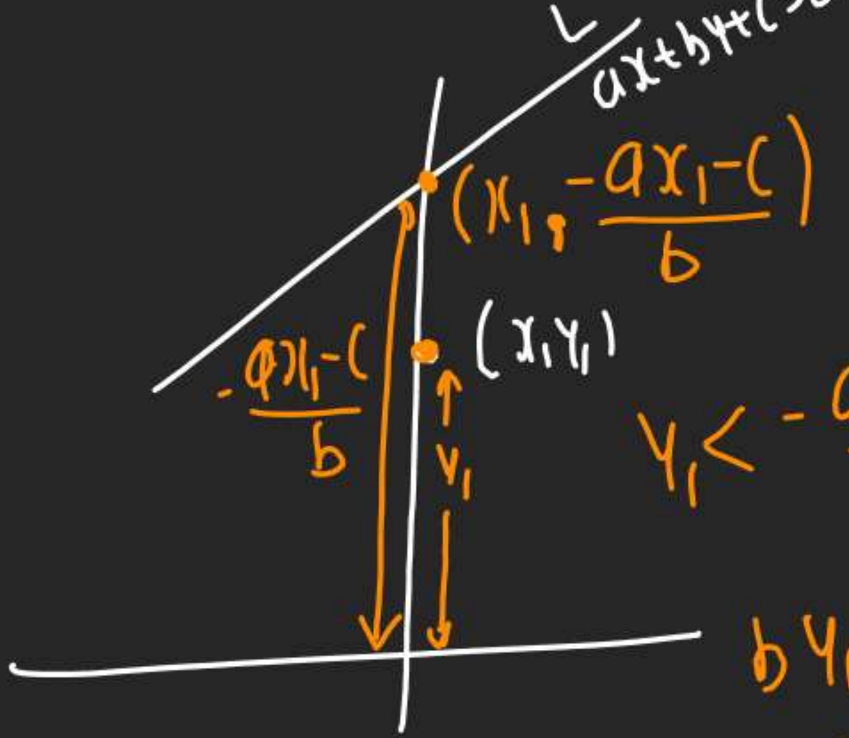

$\Delta = \frac{1}{\cancel{2}} \times h \times h \times \cancel{2}$

$= h^2$

$\frac{h}{x} = \tan 45° \Rightarrow h = x$

## Position of a Pt. WRT given line

We can Predict without making diagram about Position of Pt. that Pt. is above or Below to the line!!




$y_1 < \frac{-ax_1-c}{b}$ if Pt $(x_1, y_1)$ is below to the line.

$by_1 < -ax_1 - c$

$ax_1 + by_1 + c < 0$ (when $b > 0$)

if P is below to line $L(\text{Pt.}) < 0$ होगा

Nishant Jindal

2) If Pt. $(x_1, y_1)$ & Line is $ax+by+c=0$

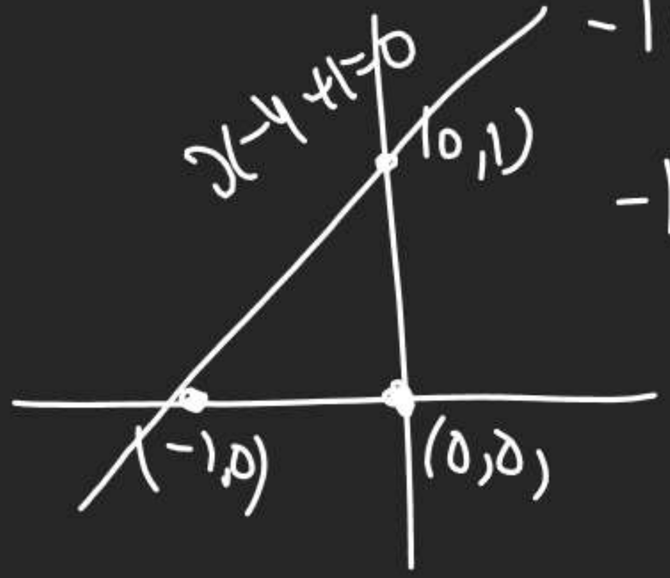
1) $b\cdot(ax_1+by_1+c) < 0$ then Pt is below to Line.

2) $b\cdot(ax_1+by_1+c) > 0$ then Pt is above the Line.

---

Q) find Position of $(0,0)$ WRT $x-y+1=0$

$b=-1$




$-1(1\times 0-1\times 0+1)$

$-1(1) = -1 < 0 \Rightarrow (0,0)$ will be below Line

$x-y=-1$

$\frac{x}{-1}+\frac{y}{1}=1$

Q Find Position $(1,1)$ WRT $3x-4y+5=0$

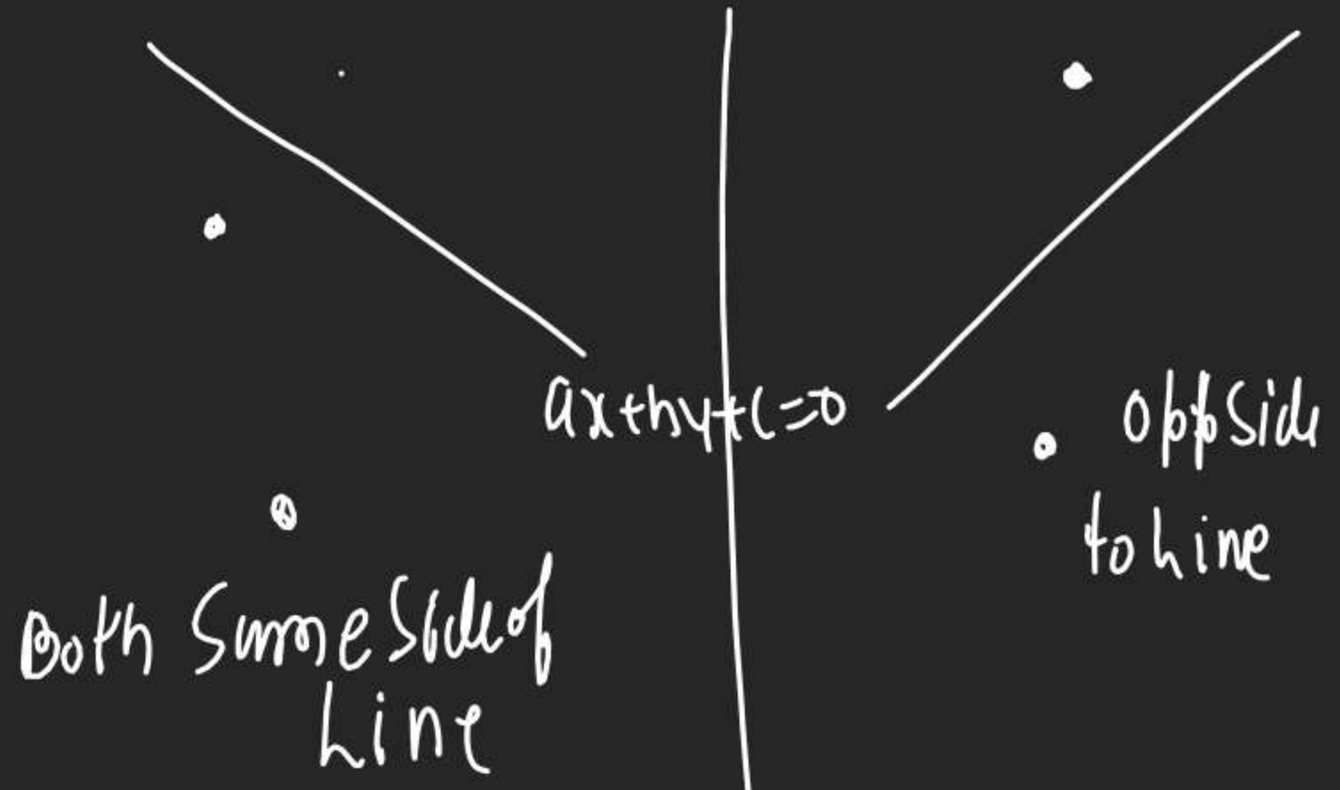
$a=3,\ b=-4,\ c=5$

$(-4)(3\times 1-4\times 1+5)$

$(-4)(4) = -16 < 0$ Below Line

---

Relative Position of 2 Pt. WRT a Line



Nishant Jindal

Let 2 pts are $(x_1, y_1)$ & $(x_2, y_2)$

Line $ax+by+c=0$

① Find $L(P_1) \cdot L(P_2)$

② If $L(P_1)\,L(P_2) > 0$ Same Side of Line.

If $L(P_1)\,L(P_2) < 0$ opp Side of Line.

Q Find Position of $(0,0)$ & $(15,2)$

WRT $x+y=3$

Line $x+y-3=0$

$(0+0-3)(15+2-3)$

$-3 \times 14 = -ve$ both Pts are opp.

Q (3,4) & (-2,6) are .... side to

8) Line $3x-4y=8$?

Line $3x-4y-8=0$

$(9-16-8)(-6-24-8) > 0$

Same Side of Line

Nishant Jindal

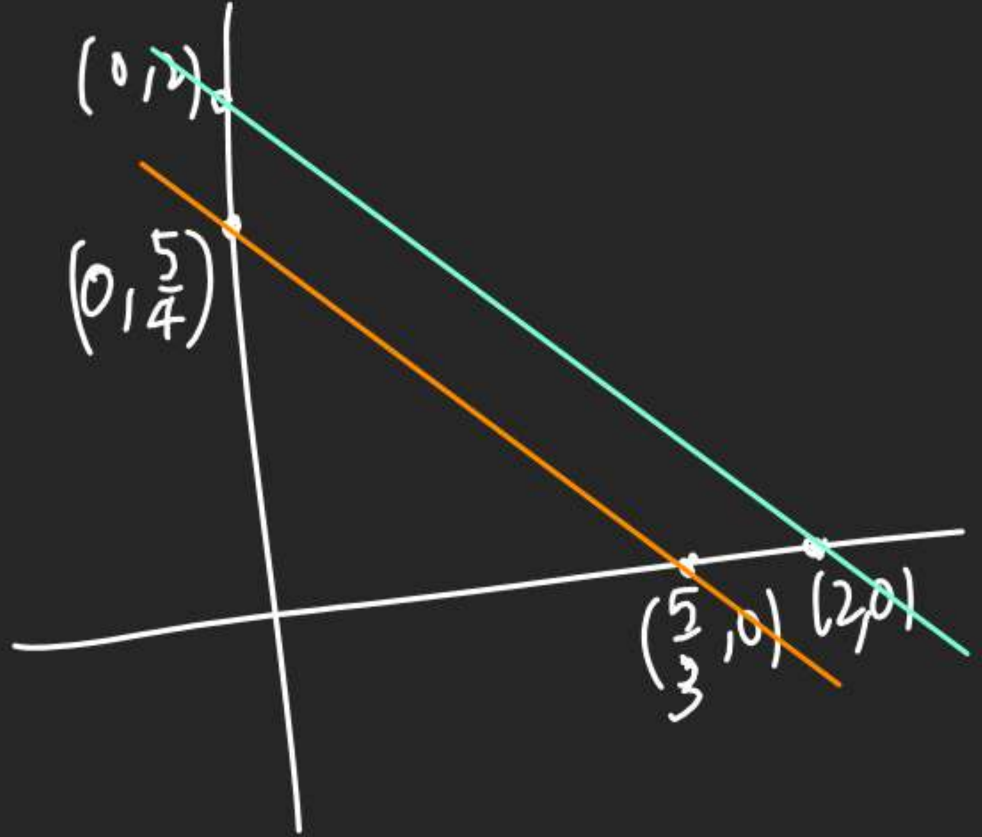
# making Perfect diagram of line.

$3x+4y-5=0 \quad \& \quad x+y-2=0$

① Intercept form

$3x+4y=5$ | $x+y=2$

$\frac{x}{\left(\frac{5}{3}\right)}+\frac{y}{\left(\frac{5}{4}\right)}=1$ | $\frac{x}{2}+\frac{y}{2}=1$



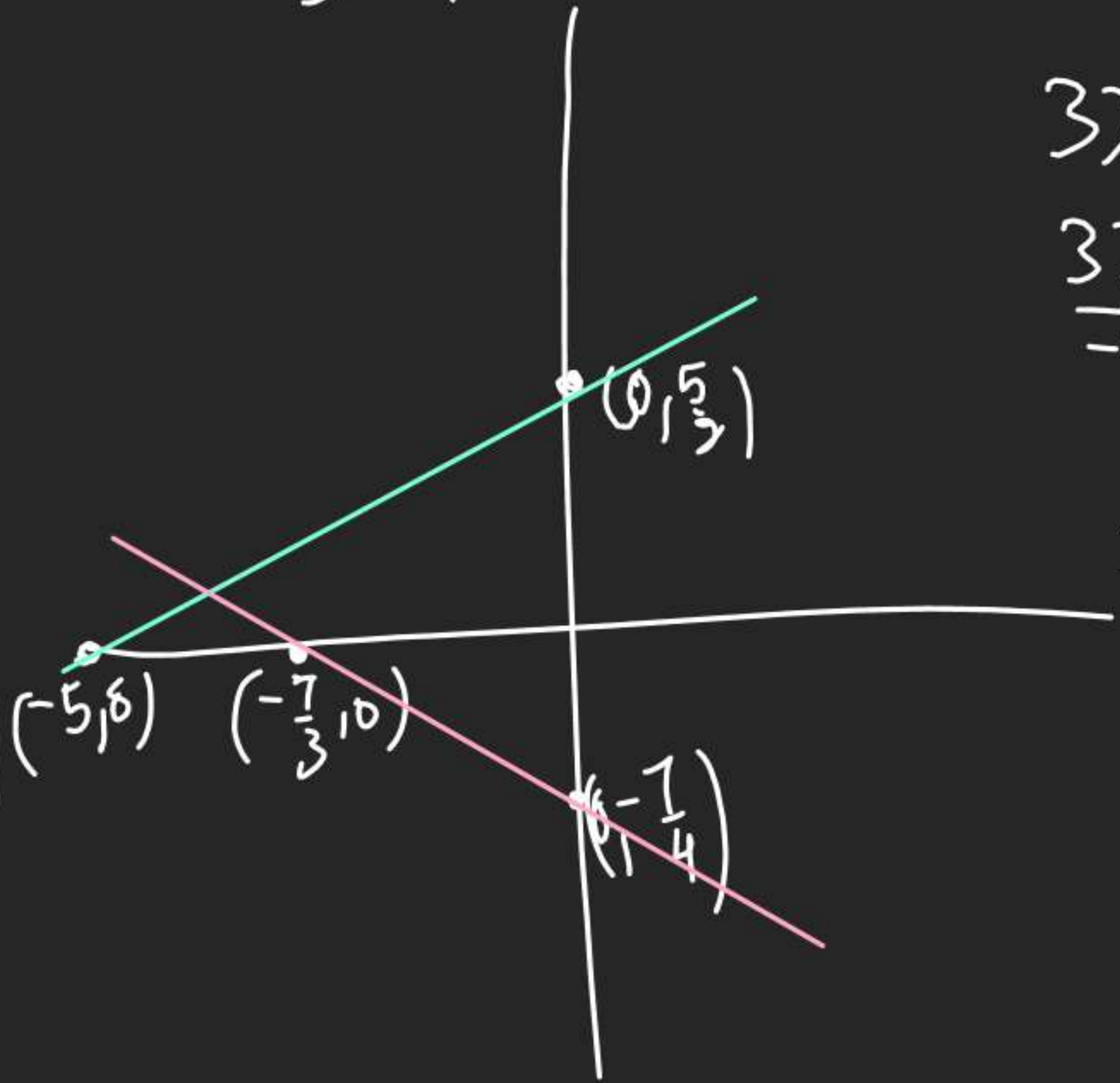

Q $3x+y+7=0 \quad \& \quad x-2y+5=0$

$3x+4y=-7$

$\frac{x}{\frac{-7}{3}}+\frac{y}{\frac{-7}{4}}=1$

$x-2y=-5$

$\frac{x}{-5}+\frac{y}{5/2}=1$



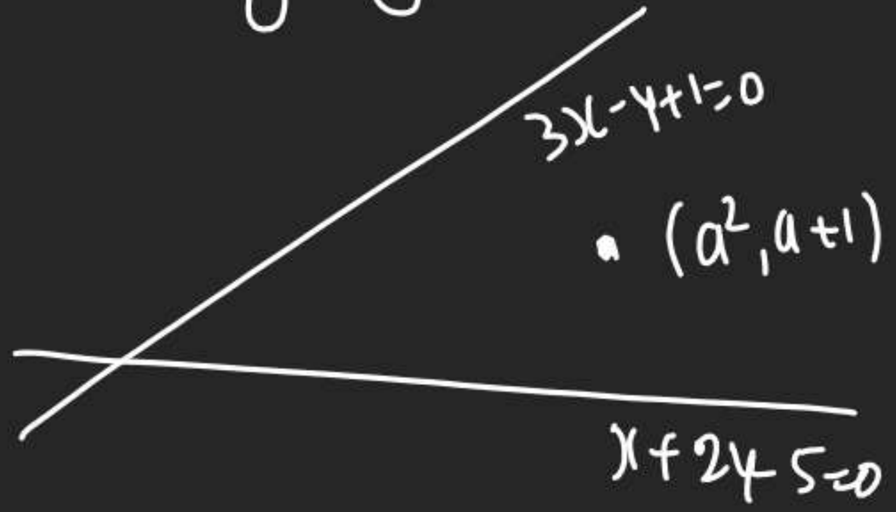

$3x+4y=-7$

$\frac{3x}{-7}+\frac{4y}{-7}=1$

$\frac{x}{\frac{-7}{3}}+\frac{y}{\frac{-7}{4}}=1$

Nishant Jindal

Q Pt. $(a^2, a+1)$ Lies in angle betⁿ Lines $3x-y+1=0$ & $x+2y-5=0$ Containing origin then $a=$?




① $(a^2, a+1)$ is Somewhere betⁿ line as Per diagram.

(2) So it above to One Line & below to another

$$(3a^2-(a+1)+1)(a^2+2(a+1)-5)<0$$

$$(3a^2-a)(a^2+2a-3)<0$$

$$(a)(3a-1)(a-1)(a+3)<0$$


$$x \in (-3,0) \cup \left(\tfrac{1}{3},1\right)$$

Nishant Jindal

Q Determine $\alpha$ for which $A(\alpha, \alpha^2)$ Lies inside $\Delta$ formed by

12

$2x+3y=1$, $x+2y-3=0$ & $5x-6y=1$

(1) Make correct Lines

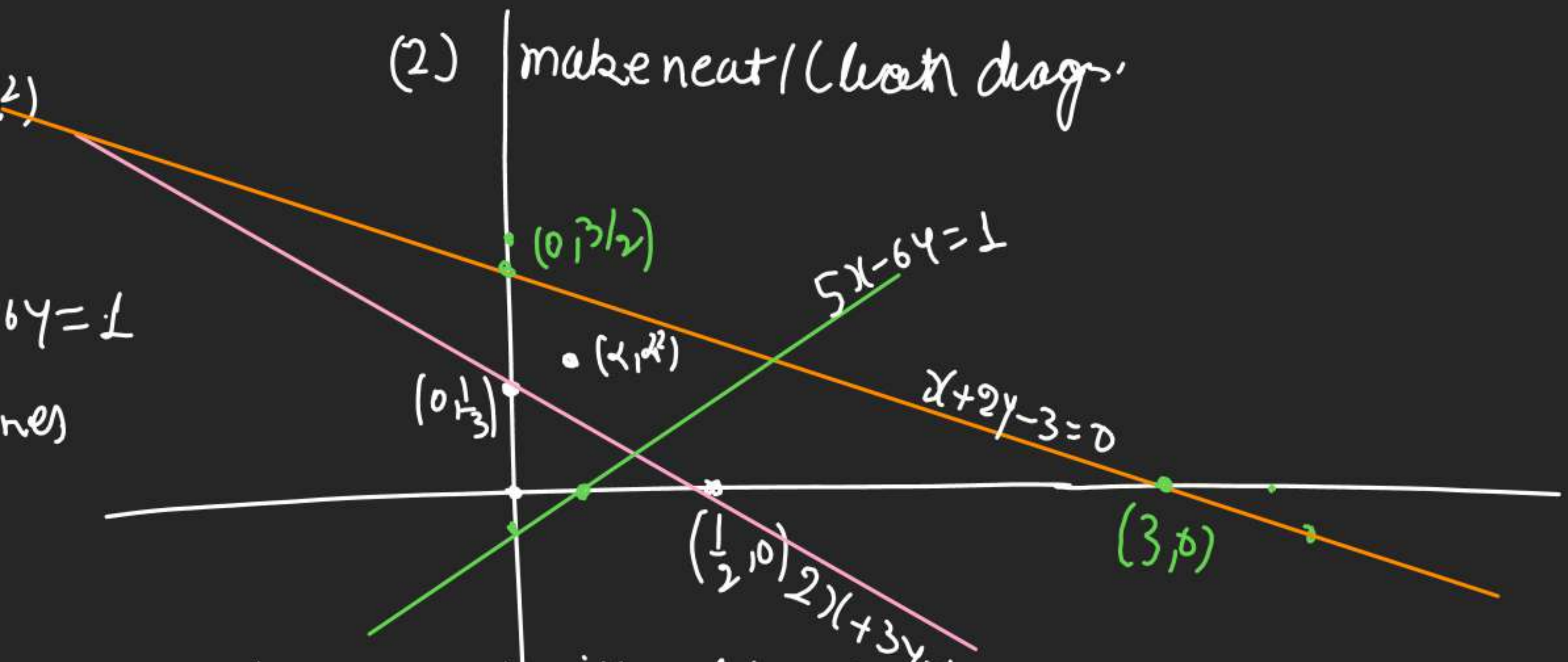
(1) Intercept form Banao

1) $2x+3y=1 \Rightarrow \frac{x}{\left(\frac{1}{2}\right)}+\frac{y}{1/3}=1$

2) $x+2y=3 \Rightarrow \frac{x}{3}+\frac{y}{3/2}=1$

3) $5x-6y=1 \Rightarrow \frac{x}{1/5}+\frac{y}{-1/6}=1$

(2) make neat / clean diags.




(3) Check Position of $(0,0)$ & $(\alpha,\alpha^2)$

(1) $(0-0-1)(5\alpha-6\alpha^2-1)>0 \Rightarrow 6\alpha^2-5\alpha+1>0$

$(2\alpha-1)(3\alpha-1)>0$

(2) $(0+0-3)(\alpha+2\alpha^2-3)>0 \Rightarrow 2\alpha^2+\alpha-3<0$

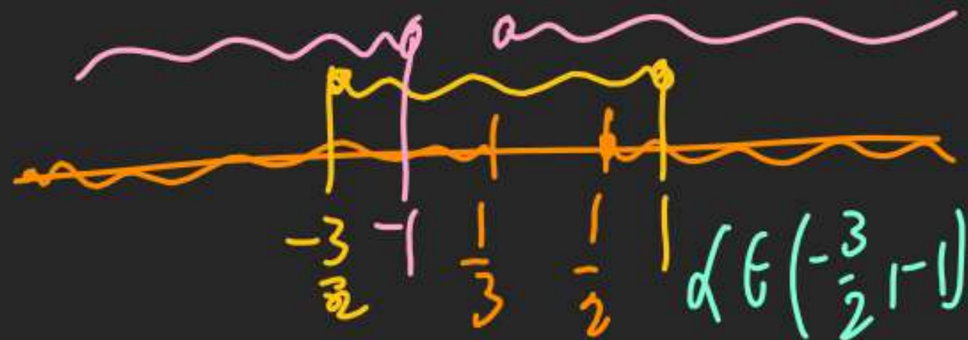
$(2\alpha+3)(\alpha-1)<0$

(3) $(0+0-1)(2\alpha+3\alpha^2-1)<0 \Rightarrow 3\alpha^2+2\alpha-1>0$

$(3\alpha-1)(\alpha+1)>0$

(4) $\alpha\in\left(-\infty,\frac{1}{3}\right)\cup\left(\frac{1}{2},\infty\right)$

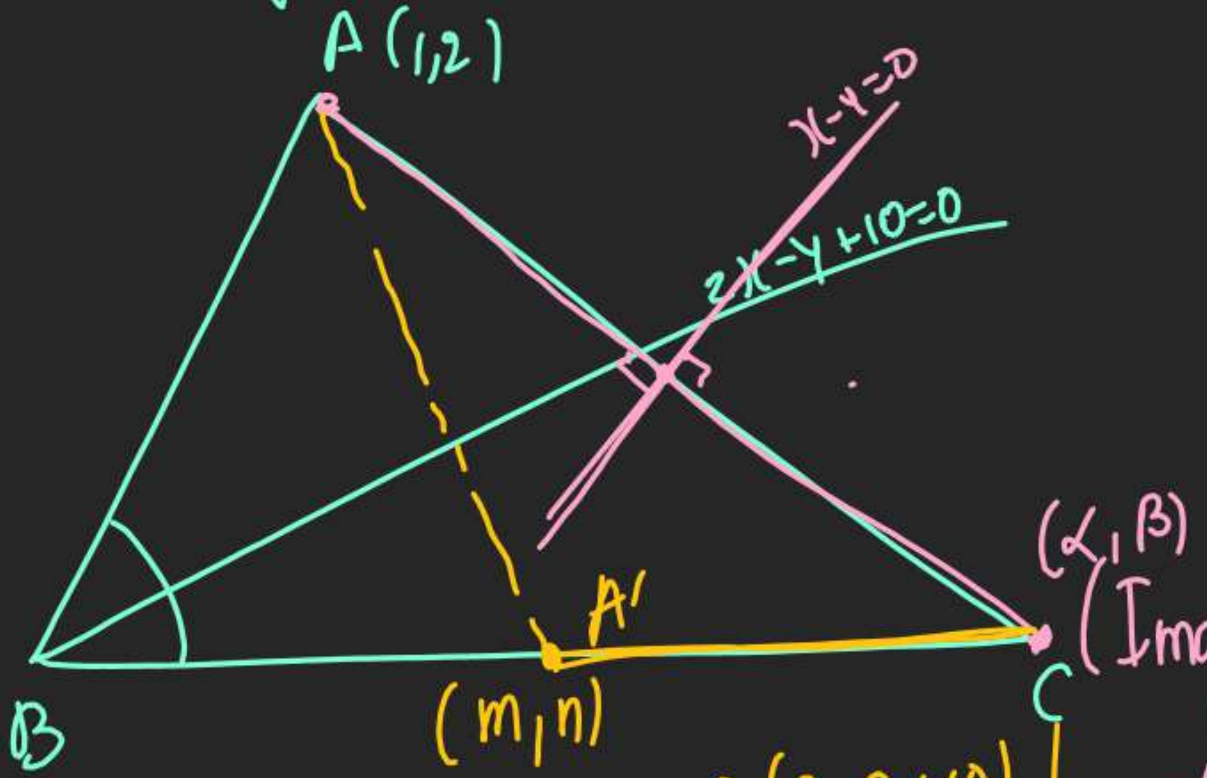
$\alpha\in\left(-\frac{3}{2},1\right)$ & $\alpha\in(-\infty,-1)\cup\left(\frac{1}{3},\infty\right)$




$\alpha\in\left(-\frac{3}{2},-1\right)\cup\left(\frac{1}{2},1\right)$

Nishant Jindal

Q 13 In △ABC Vertex A is (1,2). If Internal angle Bisector of ∠B is $2x-y+10=0$ & $\perp^r$ Bisector of AC is $y=x$ find Line BC




(Image of A in $x-y=0$

$$\frac{m-1}{2}=\frac{n-2}{-1}=\frac{-2(2-2+10)}{2^2+(-1)^2}$$

A' आएगा

$$\frac{\alpha-1}{1}=\frac{\beta-2}{-1}=\frac{-2(1-2+0)}{1^2+(-1)^2}$$

→ (आएगा

* Reflection of any vertex in Angle Bisector drops in Line opposite to that vertex.

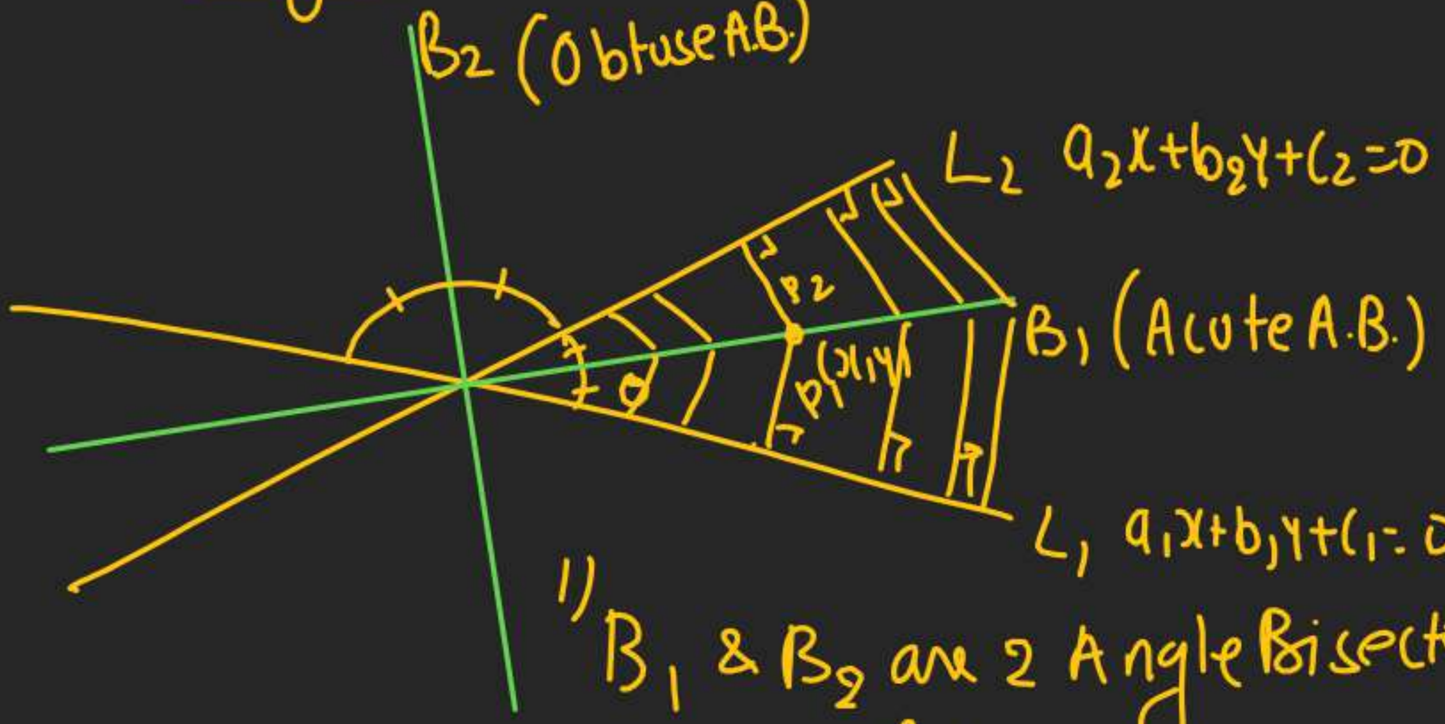

Now find A'C that will be BC

(60-67) x

Rest try Sheet No 3

Nishant Jindal

# Angle Bisector




1) $B_1$ & $B_2$ are 2 Angle Bisectors of $L_1$ & $L_2$

(2) Angle Bisector is actually Locus it follows $p_1 = p_2$

$$\frac{|a_1x+b_1y+c_1|}{\sqrt{a_1^2+b_1^2}} = \frac{|a_2x+b_2y+c_2|}{\sqrt{a_2^2+b_2^2}}$$

$$\Rightarrow \boxed{\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \pm \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}}$$

This formula will give $B_1$ & $B_2$

(3) To find Acute / Obtuse Angle Bisector.

① $c_1, c_2$ +ve करो

② find $a_1a_2+b_1b_2$ का Sign

if $a_1a_2+b_1b_2$ +ve then $\ominus$ Sign will give Acute AB

if $a_1a_2+b_1b_2$ $\ominus$ then $\oplus$ Sign वाला Ans. is Obtuse A.B.