LOCUS, VARIOUS FORMS OF LINES

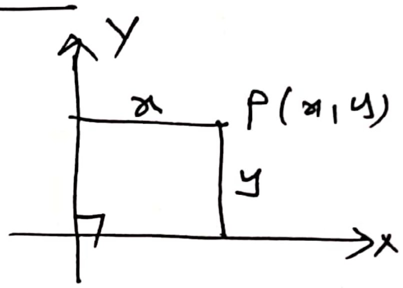
Class: IX, Mathematics

F^+

SOLUTIONS

Teaching TASK

01. $x^2+y^2=25$



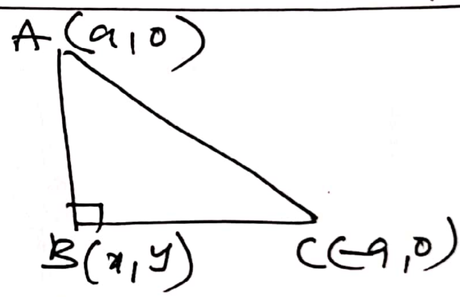
Ans. A

02. $AB^2+BC^2=AC^2$

$(x-a)^2+y^2+(x+a)^2+y^2=(2a)^2$

$2x^2+2y^2+2a^2=4a^2$

$\Rightarrow x^2+y^2=a^2$



Ans: B

03. let $P(x,y)$, $A(0,4)$, $B(0,-4)$

$|PA-PB|=6$

$\Rightarrow PA-PB=\pm 6$

$\Rightarrow PA=\pm 6+PB$

S.O.B.S

$\Rightarrow PA^2=36+PB^2\pm 12PB$

$\Rightarrow (x-0)^2+(y-4)^2=36+(x-0)^2+(y+4)^2\pm 12PB$

upon simplification, we get

$9x^2-7y^2+63=0$

Ans. A

04

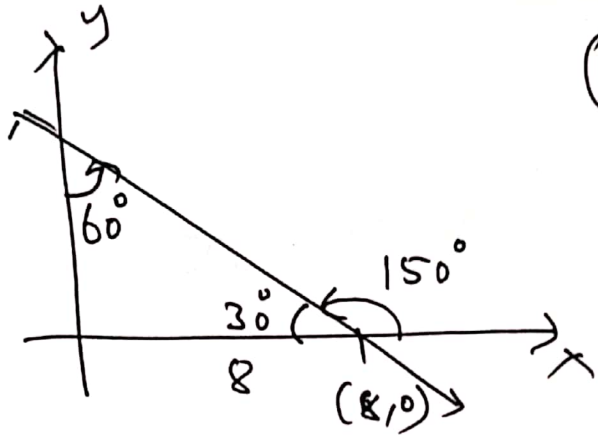
$\theta = 150^\circ$

slope $= m = \tan 150^\circ$

$= \tan(180^\circ - 30^\circ)$

$= -\tan 30^\circ$

$= -\dfrac{1}{\sqrt{3}}$



$\therefore P(8,0),\ m = -\dfrac{1}{\sqrt{3}}$

Eq^n of the line $x + \sqrt{3}y = 8$

Ans: B

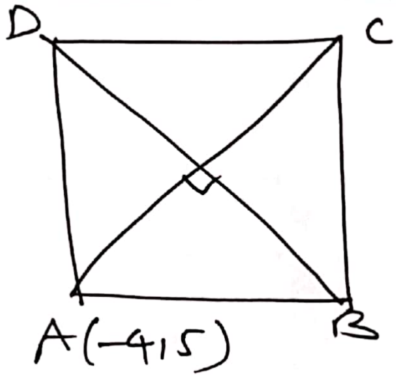
05

Eq^n of BD $\Rightarrow 7x - y + 8 = 0$

Eq^n of AC $\Rightarrow x + 7y + k = 0$

$\therefore (-4,5) \Rightarrow -4 + 35 + k = 0$

$k = -31$



eq^n AC $\Rightarrow x + 7y - 31 = 0$

Ans: —

06.

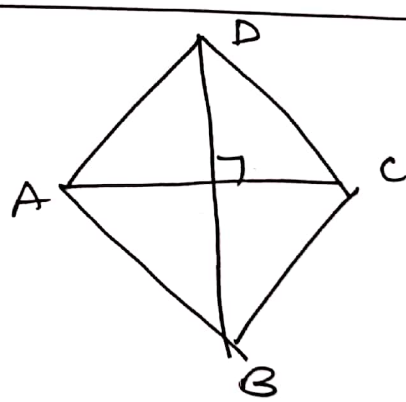
AC $\rightarrow 3x + 4y - 7 = 0$

BD $\rightarrow 4x - 3y + k = 0$

$(-1,-2) \Rightarrow -4 + 6 + k = 0$

$k = -2$

$\therefore$ BD $\rightarrow 4x - 3y - 2 = 0$

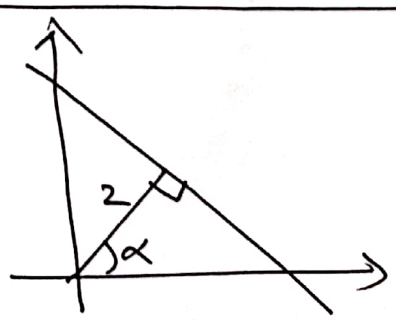


Ans: C

07.

$p = 2$

$\therefore x\cos\alpha + y\sin\alpha = 2$



Ans: C

08

$90° + \alpha = 135°$

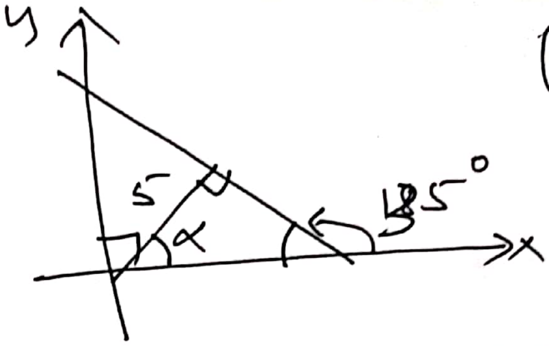
$\therefore \alpha = 45°$

$x \cos\alpha + y \sin\alpha = p$

$x \cos 45° + y \sin 45° = 5$

$$\frac{x}{\sqrt{2}} + \frac{y}{\sqrt{2}} = 5$$

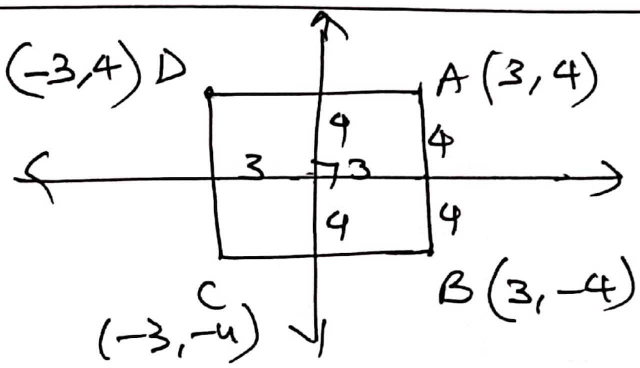
$$\Rightarrow \frac{x}{5\sqrt{2}} + \frac{y}{5\sqrt{2}} = 1$$



$$\begin{array}{r} 185 \\ -\ 90 \\ \hline 95 \end{array}$$

Ans: C

09



Ans: A

10. option verification method

opt: C $\quad 14x + 6y = 21$

$$\Rightarrow \frac{14x}{21} + \frac{6y}{21} = \frac{21}{21}$$

$$\Rightarrow \frac{x}{\left(\frac{21}{14}\right)} + \frac{y}{\left(\frac{21}{6}\right)} = 1$$

$$\text{Sum} = \frac{\cancel{21}^{3}}{\cancel{14}_{2}} + \frac{\cancel{21}^{7}}{\cancel{6}_{2}}$$

$$= \frac{3}{2} + \frac{7}{2} = \frac{10}{2} = 5$$

$$\text{product} = \frac{21}{14} \times \frac{21}{6} = \frac{3}{2} \times \frac{7}{2} = \frac{21}{4}$$

Ans: C

11. Given eq^n. $3x+4y=12$

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

X-intercept $=4$

y-intercept $=3$

New $\rightarrow$ X-intercept $= 2\times 4 = 8$

y-intercept $= 3\times 3 = 9$

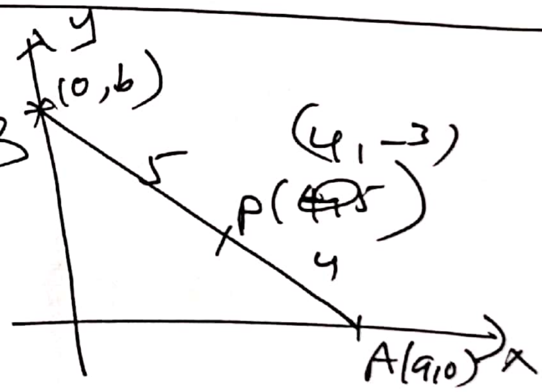
New Eq^n. $\frac{x}{8}+\frac{y}{9}=1$

$\Rightarrow 9x+8y-72=0$

$ax+by+c=0$

Ans.. A, B, C

12. $\left(\frac{5a+0}{9}, \frac{0+4b}{9}\right)=(4,-3)$



$\therefore a=\frac{36}{5}$, $b=\frac{-27}{4}$

$\therefore \frac{x}{\left(\frac{36}{5}\right)}+\frac{y}{\left(\frac{-27}{4}\right)}=1$

$\Rightarrow \frac{5x}{36}-\frac{4y}{27}=1$

$\Rightarrow 15x-16y=108$

$\Rightarrow 15x-16y-108=0$

$\Rightarrow a=15,\ b=-16,\ c=-108$

$a+b+c=-109$

9 | 36, 27
3 | 12, 3
4, 1

$27 \times 4 = 108$

Ans: A, B, C, D

13. Statement I: $x - 7y + 5 = 0$

$\perp r \Rightarrow 7x + y + k = 0$

x-intercept $= -\frac{k}{7} = 3$

$k = -21$

$\therefore$ Required Equ $\rightarrow 7x + y - 21 = 0$ (True)

Statement II: Conceptual (True) Ans: A

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14. Statement I: $4x + 3y = 12$

$(-3, 8) \Rightarrow 4(-3) + 3(8)$

$= -12 + 24$

$= 12$ ✓

$\Rightarrow 4x + 3y = 12$

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

Sum $= 3 + 4 = 7$ ✓ (True)

Statement II: Conceptual (True) Ans: B

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15. $x + y + 1 = 0$

$\Rightarrow x + y = -1$

$\Rightarrow -x - y = 1$

$\Rightarrow x\cos\alpha + y\sin\alpha = p$

$\cos\alpha = -\frac{1}{\sqrt{2}}$, $\sin\alpha = -\frac{1}{\sqrt{2}}$

$\therefore \alpha \in Q_3$

$\therefore \alpha = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$

$x\left(-\frac{1}{\sqrt{2}}\right) + y\left(-\frac{1}{\sqrt{2}}\right) = \frac{1}{\sqrt{2}}$

$\therefore x\cos\frac{5\pi}{4} + y\sin\frac{5\pi}{4} = \frac{1}{\sqrt{2}}$

Ans: D

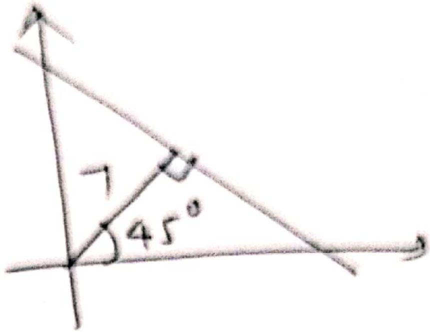
16. $\alpha = 45^\circ, \; p = 7$

$x\cos\alpha + y\sin\alpha = p$

$x\cos 45^\circ + y\sin 45^\circ = 7$

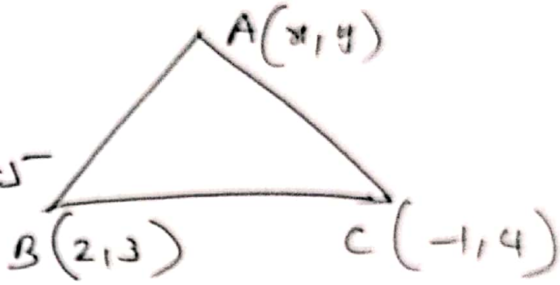
$\frac{x}{\sqrt{2}} + \frac{y}{\sqrt{2}} = 7$

$\Rightarrow \; x + y = 7\sqrt{2}$



Ans : B

17. Area ABC = 5



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

$\left| -x + 8 - 2y - y + 3 \right| = 10$

$\Rightarrow \left| -x - 3y + 11 \right| = 10$

$\Rightarrow -x - 3y + 11 = \pm 10$

$\Rightarrow -x - 3y + 11 = 10$ or $-x - 3y + 11 = -10$

$\Rightarrow x + 3y - 1 = 0$ or $x + 3y - 21 = 0$

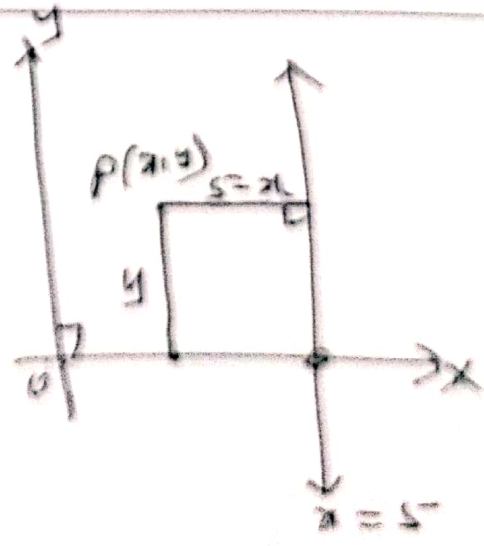
Ans: D.

18. Given

$y = 3(5 - x)$

$\Rightarrow y = 15 - 3x$

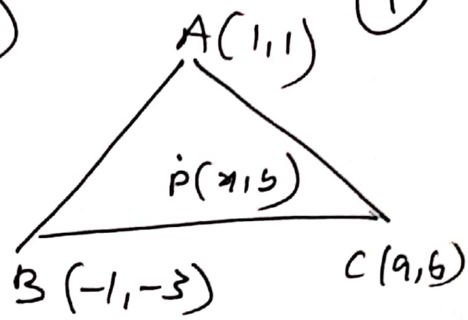
$\Rightarrow 3x - y - 15 = 0$



Ans : B

19. $A(1,1)$, $B(-1,-3)$, let $C(a,b)$

let $P(x,y)$



$$\left(\frac{1-1+a}{3},\ \frac{1-3+b}{3}\right) = (x,y)$$

$\therefore a = 3x,\quad b = 3y+2$

$\therefore A(1,1),\ B(-1,-3),\ C(3x,\ 3y+2)$

Ar $\triangle ABC = 6$

$$\frac{1}{2}\left|1(-3-3y-2) -1(3y+2-1) +3x(1+3)\right| = 6$$

$$|-3y-5-3y-1+12x| = 12$$

$$|12x-6y-6| = 12$$

$$|2x-y-1| = 2$$

$2x-y-1 = \pm 2$

$2x-y-1 = 2$ or $2x-y-1 = -2$

$2x-y-3=0$ or $2x-y+1=0$

$2x-y+k_1=0$ $\quad$ $2x-y+k_2=0$

$\therefore k_1+k_2 = -3+1 = -2$

Ans: -2

20. $P(x,y)$ $\quad A(0,-7)$

$PA = 8$

$\Rightarrow PA^2 = 64$

$\Rightarrow (x-0)^2 + (y+7)^2 = 64$

$\Rightarrow x^2+y^2+14y+49-64=0$

$x^2+y^2+14y-15=0$

$k = -15$

Ans: -15

21) a) opt: t $\Rightarrow$ $3x+2y=2$

$(0,1) \Rightarrow 3(0)+2(1)=2$ ✓

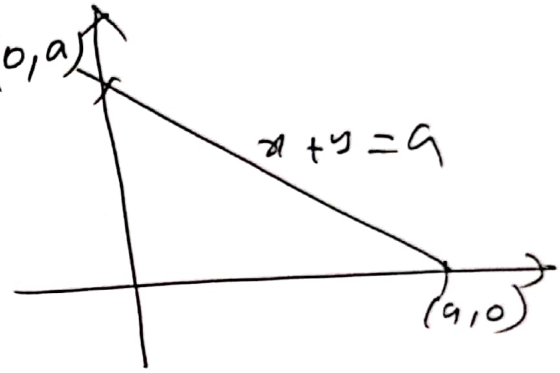
Now, $\frac{3x}{2}+\frac{2y}{2}=\frac{2}{2}$

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

$a:b=\frac{2}{3}:1$

$=\frac{2}{\cancel{3}}:3$

b) $x+y=a$



$\Rightarrow \frac{x}{a}+\frac{y}{a}=1$

$\therefore A(a,0),\ B(0,a)$

$AB=\sqrt{a^2+a^2}=\sqrt{2}\,a.$

Also, $x+y=ar$

$\Rightarrow \frac{x}{ar}+\frac{y}{ar}=1$

$A(ar,0),\ B(0,ar)$

$AB=\sqrt{a^2r^2+a^2r^2}=\sqrt{2a^2r^2}=\sqrt{2}\,ar$

$\therefore$ Sum of the lengths $=\sqrt{2}a+\sqrt{2}ar+\sqrt{2}a^2r^2$

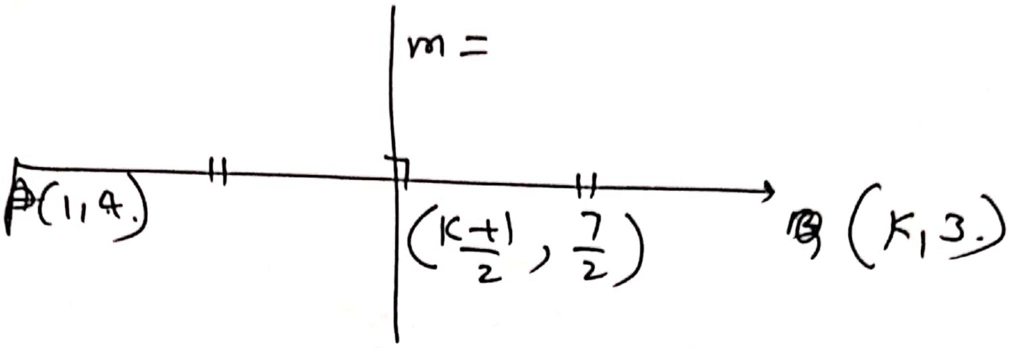
$=\sqrt{2}a\left(1+r+r^2+\cdots\right)$

$=\sqrt{2}a\left(\frac{1}{1-r}\right)$ Since $S_\infty=\frac{a}{1-r}$

$=\sqrt{2}a\left(\frac{1}{1-\frac{1}{2}}\right)$

$=2\sqrt{2}a$ Ans

(iii)



(9)

slope of $PQ = \frac{4-3}{1-k} = \frac{1}{1-k}$

Slope of $\perp r = -(1-k) = k-1$

Eqn of $\perp r \Rightarrow y - \frac{7}{2} = (k-1)\left(x - \frac{k+1}{2}\right)$

y-intercept $\Rightarrow x=0 \Rightarrow y - \frac{7}{2} = (k-1)\left(-\frac{k+1}{2}\right)$

$\therefore y = (k-1)\left(-\frac{1}{2}(k+1)\right) + \frac{7}{2} = -4$

sloving $k = -4$

(iv) $(\alpha, \beta) \Rightarrow y = 6x - 1$

$\Rightarrow \beta = 6\alpha - 1$

$6\alpha - \beta - 1 = 0 \longrightarrow (1)$

$(\beta, \alpha) \Rightarrow 2x - 5y = 5$

$2\beta - 5\alpha - 5 = 0 \longrightarrow (1)$

Soluing (1),(2) $\Rightarrow (\alpha, \beta) = (1, 5)$

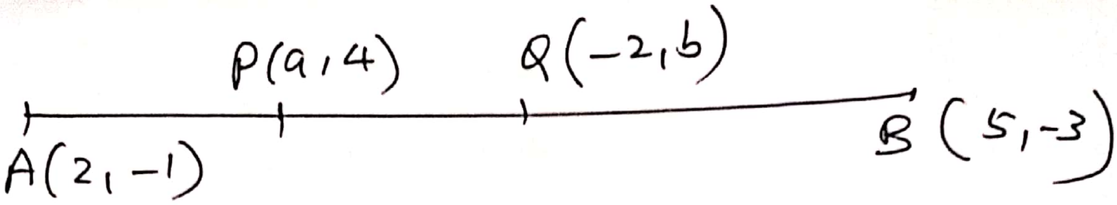
$\therefore P(1,5), Q(5,1)$ eqn of the line

~~$PQ = \sqrt{16+16}$~~ = $x + y = 6$

Ans:

t, p, q, r

22 (i)



Eqn of the line passing through A, B is

$$y-y_1=\left(\frac{y_2-y_1}{x_2-x_1}\right)(x-x_1)$$

$$\Rightarrow y+1=\frac{-3+1}{5-2}(x-2)$$

$$\Rightarrow 3y+2x=1$$

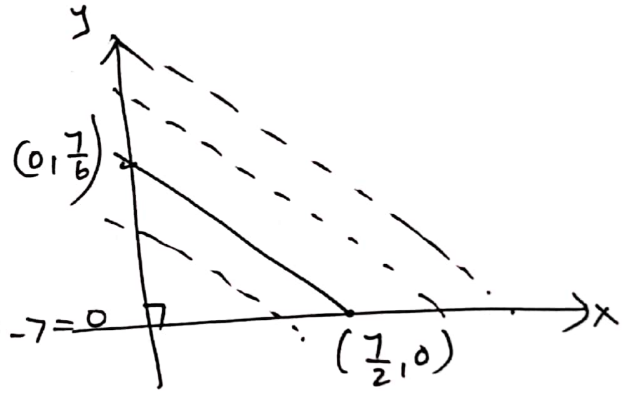
$(a, 4) \Rightarrow 12+2a=1$ | $(-2, b) \Rightarrow 3b-4=1$

$\Rightarrow a=\frac{-11}{2}$ | $b=\frac{5}{3}$

opt. q $\quad 2x+6y+1=0$ satisfies.

(ii) $2x+6y-7=0$

$$\Rightarrow \frac{x}{\left(\frac{7}{2}\right)}+\frac{y}{\left(\frac{7}{6}\right)}=1$$



Lines parallel to $2x+6y-7=0$ are $2x+6y=c$

at $x=0$, $\quad y=\frac{c}{6}$

at $y=0$, $\quad x=\frac{c}{2}$

Coordinate $A\left(\frac{c}{2}, 0\right)$, $B\left(0, \frac{c}{6}\right)$

Distance $=10$

$AB=10$

$\Rightarrow AB^2=100$

$\Rightarrow \left(\frac{c}{2}-0\right)^2+\left(0-\frac{c}{6}\right)^2=100$

$\Rightarrow \frac{c^2}{4}+\frac{c^2}{36}=100$

$\Rightarrow 9c^2+c^2=3600$

$\Rightarrow 10c^2=3600$

$\Rightarrow c^2=360$

$\Rightarrow c=\pm\sqrt{360}$

c has two values

$\therefore$ Two lines

(iii) $(x-y+1)+K(y-2x+4)=0$

$x-y+1+Ky-2Kx+4K=0$

$(1-2K)x+(K-1)y+1+4K=0$

put $y=0 \Rightarrow$ x-Intercept $= \dfrac{-1-4K}{1-2K} = \dfrac{1+4K}{2K-\cancel{2K+1}}$

put $x=0 \Rightarrow$ y-intercept $= \dfrac{-1-4K}{K-1} = \dfrac{1+4K}{1-K}$

Given $\dfrac{1+4K}{2K-1} = \dfrac{1+4K}{1-K}$

$\Rightarrow 1+4K=0$ or $\qquad 2K-1=1-K$

$K=-\frac{1}{4} \qquad 3K=2$

$K=\frac{2}{3}$

(iv) conceptual $\quad x\cos\alpha + y\sin\alpha = 2$

Ans. q, p, t, s

STUDENTS TASK

CUQ'S

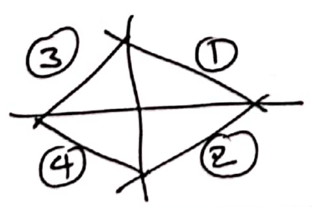
01 Conceptual

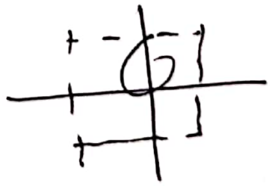
Ans: A

$|x|+|y|=a$

$\pm x \pm y = a \Rightarrow x+y=a,\ x-y=a,\ -x+y=a$ &

$-x-y=a.$

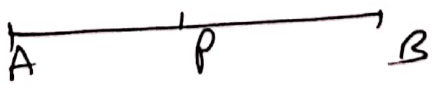


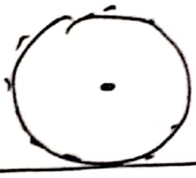


Ans. A

02 Conceptual

Ans A



03  Circle Ans: A

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04. $ax+by+c=0$

parallel to x-axis $\Rightarrow$ slope $=0$

$\Rightarrow -\frac{a}{b}=0$

$\Rightarrow a=0.$

opt A: $\frac{a^2-1^2}{c^2+b^2}$ is defined since denominator does not contain 'a'

Ans: A

---

05 $\frac{1}{a}+\frac{1}{b}=\frac{1}{c}$

$\Rightarrow \frac{c}{a}+\frac{c}{b}=1$

$\Rightarrow \frac{x}{a}+\frac{y}{b}=1$

Line passes through (c,c)

Ans: B

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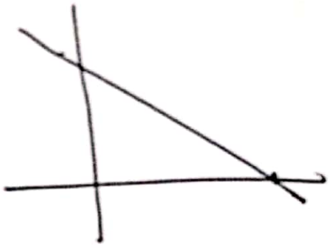
06. $ax+by+c=0$

$ax+by=-c$

$\frac{ax}{-c}+\frac{by}{-c}=1$



$\frac{x}{\left(-\frac{c}{a}\right)}+\frac{y}{\left(-\frac{c}{b}\right)}=1$ $\Rightarrow$

$-\frac{c}{a}>0,\quad -\frac{c}{b}>0$

$-ac>0$ | $-bc>0$

$ac<0$ | $bc<0$

Ans: D

(13)

07	Conceptual	Ans : B
08.	Conceptual	Ans : B
09.	Conceptual	Ans : A

10. Slope $= m = \tan\frac{\pi}{4} = 1$

$(-1, 2)$ point

Eqn of the line

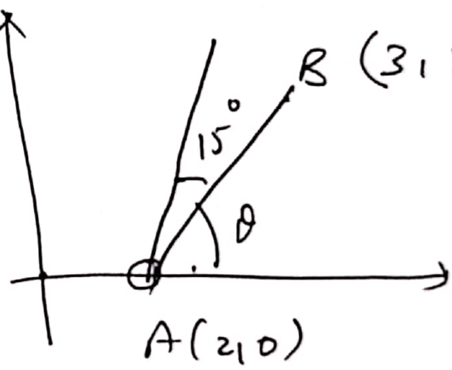
$y - 2 = 1(x+1)$

$y - 2 = x + 1$

$\Rightarrow x - y + 3 = 0.$ Ans: —

JEE MAINS LEVEL

01. here



Slope of $AB = \frac{1-0}{3-2} = \frac{1}{1} = 1$

$\therefore \tan\theta = 1$

$\Rightarrow \theta = \frac{\pi}{4}$ or 45°

$\therefore$ Total angle $= 15^\circ + 45^\circ$
$= 60^\circ$

$\therefore A(2, 0),\ \theta = 60^\circ$

$y - 0 = \sqrt{3}(x-2) \Rightarrow y = \sqrt{3}(x-2)$

Ans : B

02. $2x + 3y = 6 \Rightarrow$ meets X-axis at $A(3,0)$

$2x + 3y = 8 \Rightarrow$ meets X-axis at $B(4,0)$

Let L meets X-axis at $C(c, 0)$.

Given $3, 4, C$ are A.P $\Rightarrow c = 5$

$\therefore (5,0), (2,2) \Rightarrow$ Eqn of line $2x + 3y = 10$

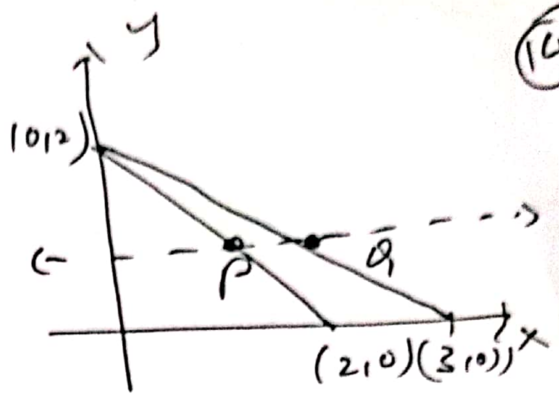
Ans.: A

03 $x+y=2 \Rightarrow \frac{x}{2}+\frac{y}{2}=1$

$2x+3y=6 \Rightarrow \frac{x}{3}+\frac{y}{2}=0$

$\therefore P(1,1),\ Q\left(\frac{3}{2},1\right)$

Eq$^{\underline{n}}$ of the line $y=1$



Ans: B

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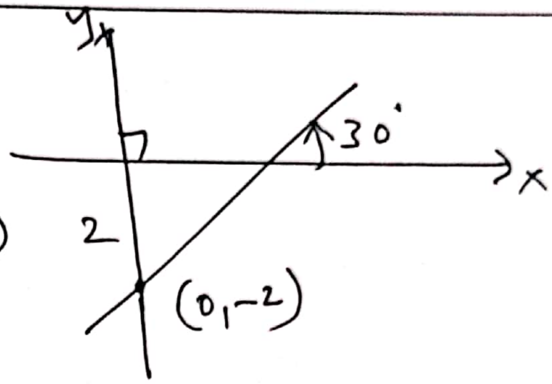
04 $\theta = 30^\circ$

$\Rightarrow m = \frac{1}{\sqrt{3}}\ ,\ (0,-2)$

Eq^n of line $\Rightarrow y+2 = \frac{1}{\sqrt{3}}(x-0)$

$\Rightarrow \sqrt{3}y + 2\sqrt{3} = x$

$\Rightarrow x - \sqrt{3}y - 2\sqrt{3} = 0$ (or) $\sqrt{3}y - x + 2\sqrt{3} = 0$



Ans: D

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05 $\theta = 135^\circ$,

$m = \tan 135^\circ$

$= \tan(180^\circ - 45^\circ)$

$= -\tan 45^\circ$

$= -1$

$\theta = -60^\circ$

$\tan\theta = -\tan 60^\circ = -\sqrt{3}$

point $(1,0)$

$y - 0 = -\sqrt{3}(x-1)$

$y = -\sqrt{3}x + \sqrt{3}$

$\Rightarrow \sqrt{3}x + y - \sqrt{3} = 0$

Ans: C

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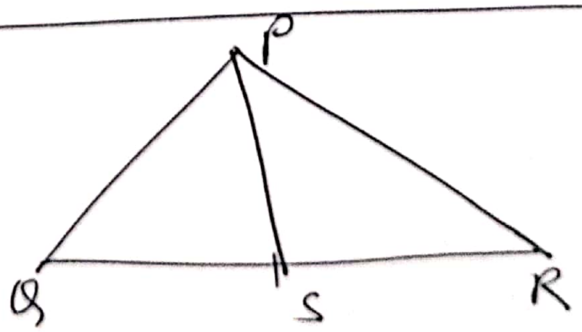
06. $P(2,2)$

$S\left(\frac{6+7}{2}, \frac{-1+3}{2}\right) = \left(\frac{13}{2}, 1\right)$

slope of $PS = \left(\frac{1-2}{\frac{13}{2}-2}\right.$

$= -1 \times \frac{2}{9} = \frac{-2}{9}$

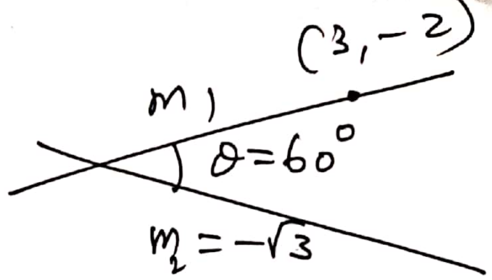


$\therefore (1,-1),\ m = -\frac{2}{9}$ Eq$^{\underline{n}}$ of line $\Rightarrow 2x+9y+7=0$

Ans: B

15

07. $\tan\theta = \left|\dfrac{m_1 - m_2}{1 + m_1 m_2}\right|$



$\tan 60^\circ = \left|\dfrac{m+\sqrt{3}}{1-\sqrt{3}m}\right|$ $\sqrt{3}x + y = 1$

$\Rightarrow \pm\sqrt{3} = \dfrac{m+\sqrt{3}}{1-\sqrt{3}m}$

$\Rightarrow \sqrt{3} - 3m = m + \sqrt{3}$

$\Rightarrow m = 0.$

$-\sqrt{3} + 3m = m + \sqrt{3}$

$2m = 2\sqrt{3}$

$m = \sqrt{3}$

Case(i) $(3,-2)$, $m=0$

$y + 2 = 0$

Case(ii) $(3,-2)$, $m = \sqrt{3}$

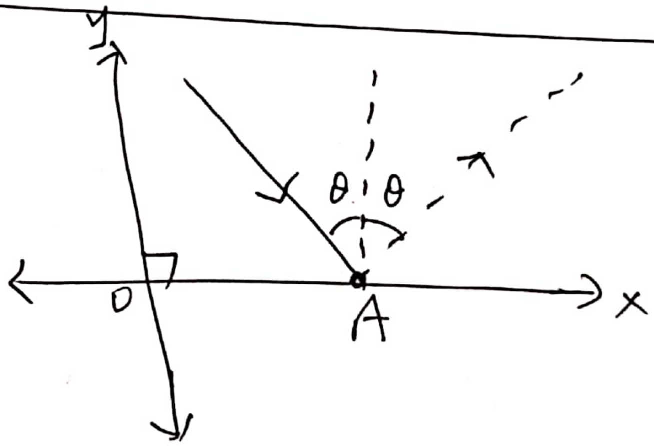
$y + 2 = \sqrt{3}(x-3)$

$y + 2 = \sqrt{3}x - 3\sqrt{3}$

$\Rightarrow y - \sqrt{3}x + 2 + 3\sqrt{3}$

Ans: B

08 $x + \sqrt{3}y = \sqrt{3}$



$A(\sqrt{3}, 0)$

$m_1 = -\dfrac{1}{\sqrt{3}}$

$\Rightarrow \tan\theta = \tan\left(\pi - \dfrac{\pi}{6}\right)$

$= \tan\dfrac{5\pi}{6} =$

$\therefore \theta = 150^\circ$

Now, $\theta + 90^\circ = 150^\circ \Rightarrow \theta = 60^\circ$

$\therefore (\sqrt{3}, 0)$, Slope $= m = \tan 30^\circ = \dfrac{1}{\sqrt{3}}$

Eqn. $y - 0 = \dfrac{1}{\sqrt{3}}(x - \sqrt{3})$

~~$y = \sqrt{3}x - 3$~~ $\Rightarrow \sqrt{3}y = x - \sqrt{3}$ Ans: C

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09. $(2,-3) \Rightarrow \frac{x}{a}+\frac{y}{b}=1$

$\Rightarrow \frac{2}{a}-\frac{3}{b}=1$

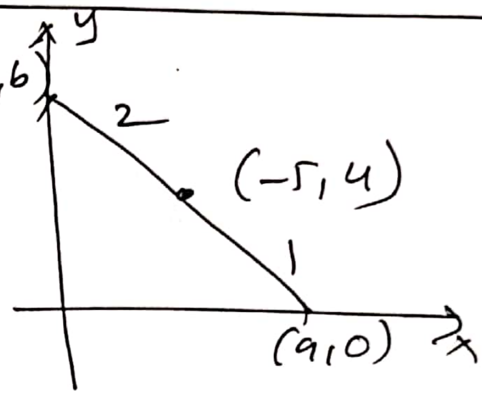
$(4,-5) \Rightarrow \frac{4}{a}-\frac{5}{b}=1$

options D(−1, −1) satisfies above two Equations

Ans : D

---

10 $\left(\frac{1\cdot 0+2\cdot a}{3}, \frac{1\cdot b+2\cdot 0}{3}\right)=(-5,4)$



$\frac{2a}{3}=-5$

$a=\frac{-15}{2}$

$\frac{b}{3}=4$

$b=12$

Eq. $\frac{x}{\left(\frac{-15}{2}\right)}+\frac{y}{12}=1$

$\Rightarrow 8x-5y+60=0$

Ans : A

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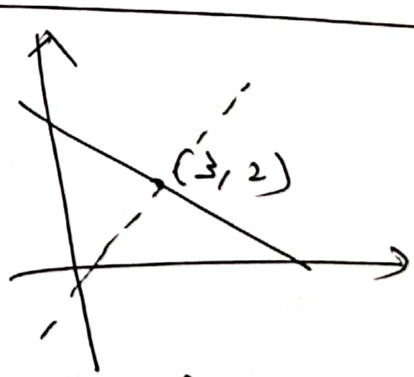
11. $(3,2)$

opt A: $2x+3y=12$ Satisfies

opt B: $4x+6y=24$ satisfy



Ans : A, B

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12. $ax+by+c=0$

$(1,-2) \Rightarrow a-2b+c=0 \Rightarrow 2b=a+c \Rightarrow a, b, c$ AP

Ans : A

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13. Statement I: $x+3y=4 \Rightarrow m_1=\frac{-1}{3}$

$6x-2y=7 \Rightarrow m_1=-\frac{6}{-2}=3$

$m_1 \times m_2=-1 \Rightarrow$ diagonals $\perp$r $\Rightarrow$ Rhombus (True)

Statement II: Conceptual (True) Ans. A

14. **Statement I:**

$$x - \sqrt{3}y + 8 = 0$$
$$\Rightarrow x - \sqrt{3}y = -8$$
$$\Rightarrow -x + \sqrt{3}y = 8$$

Divide with $\sqrt{(-1)^2 + (\sqrt{3})^2} = 2$

$$\Rightarrow x\left(-\frac{1}{2}\right) + y\left(\frac{\sqrt{3}}{2}\right) = 4$$
$$x\cos\alpha + y\sin\alpha = 4$$

$\therefore \cos\alpha = \frac{-1}{2}, \ \sin\alpha = \frac{\sqrt{3}}{2}$

$\therefore \alpha \in Q_2$

$\therefore \alpha = \pi - \frac{\pi}{6} = 120^\circ$

$\therefore x\cos 120^\circ + y\sin 120^\circ = 4$ (True)

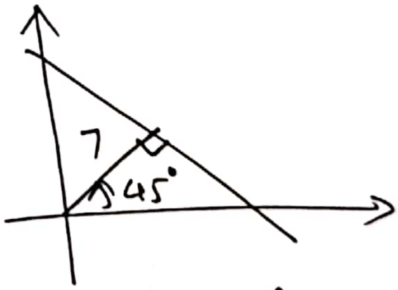
Statement II: Conceptual (True) Ans. A

15. $\alpha = 45^\circ, \ p = 7$

$x\cos\alpha + y\sin\alpha = 7$

$x\cos 45^\circ + y\sin 45^\circ = 7$

$x + y = 7\sqrt{2}$

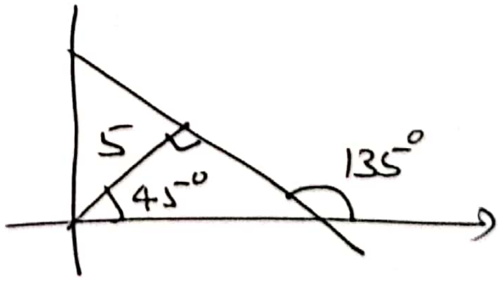


Ans: B

16. $p = 5, \ \alpha = 45$

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

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



Ans: C

17 $(\alpha, \beta) \Rightarrow \beta = 6\alpha - 1 \rightarrow (1)$

$(\beta, \alpha) \Rightarrow 2x - 5y = 5$

$2\alpha - 5\beta = 5 \rightarrow (2)$

Solving we get $P(\alpha, \beta)$., $Q(\beta, \alpha)$

$\therefore$ ~~p(x+0)~~ $\therefore$ $x + y = 6$

Ans: C

18 $2x + 3y = 6 \Rightarrow A(3, 0)$ $(a, 0)$

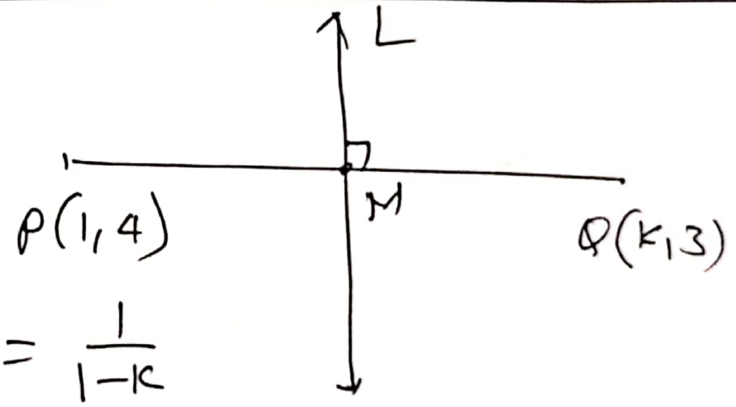
$2x + 3y = 8 \Rightarrow$ meet x-axis at B $\Rightarrow B(4, 0)$ $(b, 0)$

$\therefore$ let $c(c, 0) \Rightarrow a, b, c$ are AP $\Rightarrow C(5, 0)$

$\therefore$ proceeding like this eq. of $L \Rightarrow 2x + 3y = 10$

Ans: A

19. $M\left(\frac{1+k}{2}, \frac{4+3}{2}\right)$



$\Rightarrow M\left(\frac{1+k}{2}, \frac{7}{2}\right)$

slope of $PQ = \frac{4-3}{1-k} = \frac{1}{1-k}$

$\therefore$ slope of $L = k - 1$

$\therefore$ Eqn of $L \Rightarrow y - \frac{7}{2} = (k-1)\left(x - \left(\frac{1+k}{2}\right)\right)$

Y-intercept $\Rightarrow x = 0$ ~~and~~ and solve $k = -4$

Ans: -4

20 Number of lines are 2

Ans: 2

21 (a) i) $3x-4y-6=0 \Rightarrow \perp$ line $\Rightarrow 4x+3y+k=0$ (19)

$$\text{Area} = \frac{k^2}{2|4\times 3|} = 6$$

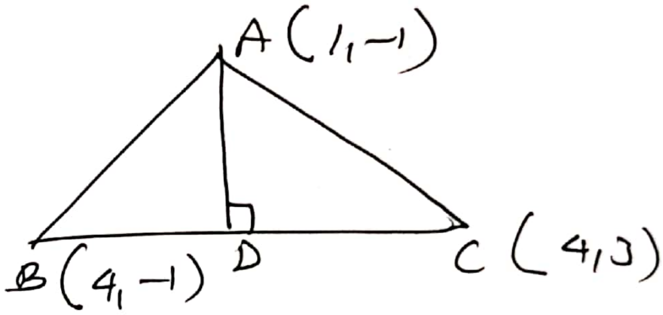
$$\Rightarrow k^2 = 6\times 2\times 4\times 3$$

$$\Rightarrow k = \pm(6\times 2)$$

$$\Rightarrow k = \pm 12$$

$\therefore$ Required line $4x+3y+12=0$ (a)

$4x+3y-12=0$



(b) ii) $A(1,-1)$

$$\text{slope of } AD = \frac{-1}{\left(\frac{3+1}{4-4}\right)} = 0.$$

$\therefore$ $y+1=0$

c) iii) $5x-2y-7=0 \Rightarrow \perp$ line $\Rightarrow 2x+5y+17=0$

Ans: ..

(iv) $(x-y+1)+k(y-2x+4)=0$

$\Rightarrow x-y+1+ky-2kx+4k=0$

$\Rightarrow (1-2k)x+(k-1)y+1+4k=0$

$$\therefore x\text{-intercept} = \frac{-1-4k}{1-2k} = \frac{1+4k}{2k-1}$$

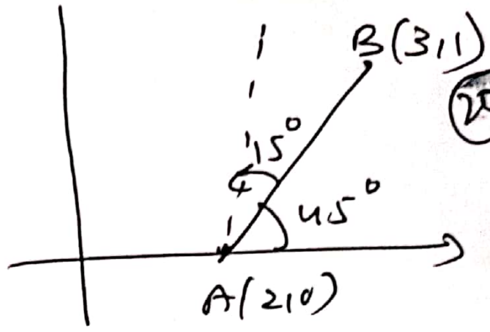
$$y\text{-intercept} = \frac{-1-4k}{k-1} = \frac{1+4k}{1-k}$$

Given $\frac{1+4k}{2k-1} = \frac{1+4k}{1-k} \Rightarrow k = \frac{2}{3} = 0.66$

Ans: t, p, q, r

22. (i) slope of $AB = \frac{1-0}{3-2} = 1$

$\therefore \theta = 45^\circ$

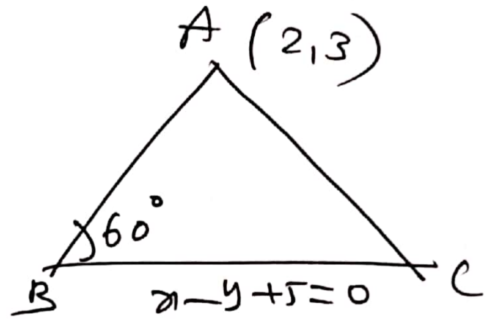


total angle $= 15^\circ + 40^\circ = 60^\circ$

$\therefore A(2,0), \quad m = \sqrt{3}$

Required eqn $y = \sqrt{3}(x-2)$

(ii) let slope of $AB = m$,



slope of $BC = m_2 = 1$

$\therefore \tan\theta = \left|\frac{m_1 - m_2}{1+m_1 m_2}\right|$

$\Rightarrow \tan 60^\circ = \left|\frac{m-1}{1+m}\right|$

$\Rightarrow \sqrt{3} = \left|\frac{m-1}{1+m}\right|$

$\frac{m-1}{1+m} = \pm\sqrt{3}$

$m - 1 = \pm\sqrt{3} \pm \sqrt{3}m$

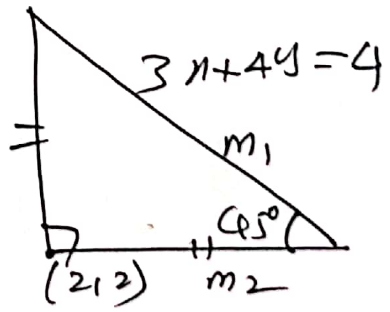
$m \mp \sqrt{3}m = 1 \pm \sqrt{3}$

$m(1 \mp \sqrt{3}) = 1 \pm \sqrt{3}$

$\frac{1 \pm \sqrt{3}}{1 \mp \sqrt{3}}$

$\therefore$ Required eqn $y - 3 = (2 \pm \sqrt{3})(x-2)$

(iii) $m_1 = -\frac{3}{4}, \quad m_2 = ?$

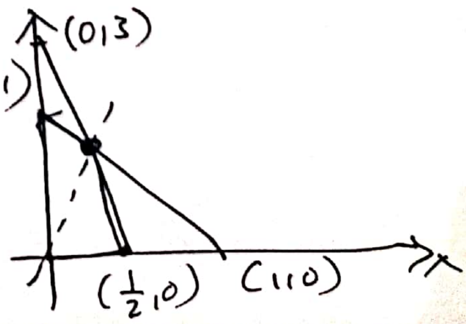


$\tan 45^\circ = \left|\frac{m + \frac{3}{4}}{1 - \frac{3m}{4}}\right|$

$\Rightarrow m = -7$ or $\frac{1}{7}$

Eqn of the line $7x - y = 16$

(iv) solving given eqns. $\left(\frac{2}{5}, \frac{3}{5}\right)$



Eqn of the line

$3x - 2y = 0$

$\Rightarrow$ THE ENDE Ans. q, p, t, r