Sri Chaitanya IIT Academy, India

A.P, TELANGANA, KARNATAKA, TAMILNADU, MAHARASHTRA, DELHI, RANCHI

A right Choice for the Real Aspirant

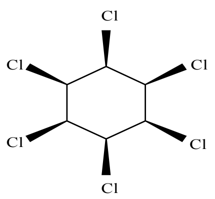
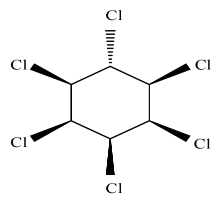
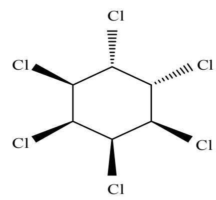
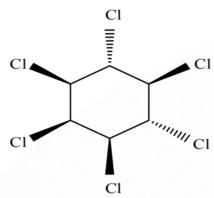
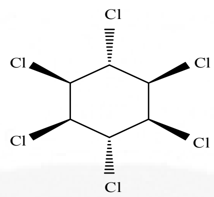
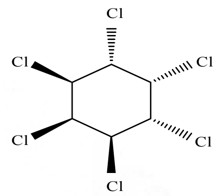
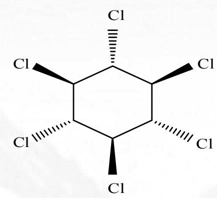
ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr. IPLCO **Date: 01-08-15**

Time: 9:00 AM to 12:00 Noon **RPTM-1** **Max.Marks: 360**

KEY SHEET

PHYSICS			CHEMISTRY			MATHS	
Q.NO	ANSWER		Q.NO	ANSWER		Q.NO	ANSWER
1	1		31	3		61	3
2	2		32	4		62	2
3	3		33	1		63	4
4	1		34	2		64	2
5	2		35	3		65	4
6	1		36	4		66	2
7	4		37	3		67	3
8	1		38	3		68	4
9	2		39	3		69	3
10	3		40	4		70	3
11	4		41	3		71	2
12	2		42	2		72	3
13	4		43	3		73	3
14	2		44	3		74	1
15	3		45	2		75	2
16	1		46	4		76	2
17	2		47	1		77	3
18	2		48	1		78	3
19	2		49	2		79	3
20	3		50	4		80	2
21	2		51	3		81	2
22	3		52	1		82	4
23	4		53	2		83	4
24	1		54	4		84	1
25	3		55	1		85	3
26	3		56	3		86	3
27	4		57	4		87	3
28	4		58	4		88	3
29	1		59	3		89	3
30	3		60	4		90	2

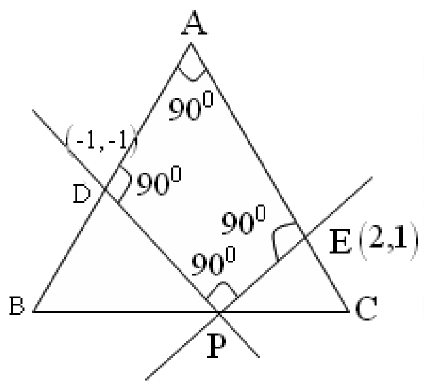








MATHS- HINTS

61) Clearly $x+y+2=0$,

$x-y-1=0$ are perpendicular to each other

$\therefore \underline{|BAC} = 90^0$



$\therefore$ A is the ortho centre of Δ^{le}ABC

Mid point of BC = P = circum centre = $\left(\frac{-1}{2}, \frac{-3}{2}\right)$

$\therefore\ PA^2 = DE^2 = \sqrt{9+4} = \sqrt{13}$

62) Equation of line passing through P (3, 1) is $y-1=m\left(x-3\right)\Rightarrow mx-y-3m+1=0$

Its distance from origin is $\left|\frac{3m-1}{\sqrt{m^2+1}}\right|=f\left(m\right)$ say

$f\left(m\right)$ is maximum Iff m = -3. Then the line is $y-1=-3\left(x-3\right)$

$3x+y=10$

$\therefore$ Required area = $\frac{1}{2}\times\frac{10}{3}\times 10=\frac{50}{3}\text{sq.units}$

63) Suppose AB – subtends θ at C

Then $\tan\theta=\left|\frac{\frac{h}{9}-\frac{h}{4}}{1+\frac{h^2}{36}}\right|=\left|\frac{5h}{36+h^2}\right|=\left|\frac{5}{h+\frac{36}{h}}\right|$

$AM\ge GM\Rightarrow h+\frac{36}{h}\ge 2\sqrt{\cancel{h}.\frac{36}{\cancel{h}}}=12 \qquad \therefore\frac{1}{h+\frac{36}{h}}\le\frac{1}{12}$

$\therefore\tan\theta$ is maximum. Iff $h+\frac{36}{h}=12$

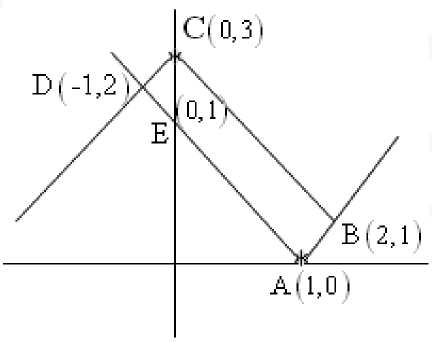
$\Rightarrow h^2-12h+36=0$

$\left(h-6\right)^2=0\Rightarrow h=6$

64) The lines are $y=\left|x-1\right|,\ y=-\left|x\right|+3$

They Intersect at B(2, 1) and D(-1, 2)

Area of react angle ABCD = $\sqrt{8}\times\sqrt{2}=4$



Area of $\Delta^{le}CDE=\frac{1}{2}\times\left(2\right)\times 1=1$

$$\therefore R_1 = 1,\ R_2 = 4-1 = 3 \Rightarrow \frac{R_1}{R_2} = \frac{1}{3}$$

65) Let the equation of the line passing through (0, 0) is y = mx. Which meets $2x+y=2$ at A

$\therefore\ A = \left(\frac{2}{2+m}, \frac{2m}{2+m}\right)$ and $y = mx$ meets $x-2y+2=0$ in B. Where

$$B = \left(\frac{2}{2m-1}, \frac{2m}{2m-1}\right)$$

Let (h,k) both mid point of AB

$$\therefore k = mh \Rightarrow m = k/h$$

and $\dfrac{\frac{2}{2+m}+\frac{2}{2m-1}}{2} = h$

$$\frac{1}{2+m}+\frac{1}{2m-1} = h$$

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

$\therefore$ Locus of (h, k) is $\dfrac{1}{2+\frac{y}{x}}+\dfrac{1}{\frac{2y}{x}-1} = x$

$$\therefore \frac{x}{2x+y}+\frac{x}{2y-x} = x$$

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

$$3y \to x = 4xy+2y^2-2x^2-xy$$

$$\Rightarrow 2x^2-3xy-2y^2+x+3y = 0$$

66) Clearly $OC = 10$

$$CP = 10$$

Shortest path from O to P

Which does not go inside the circle is

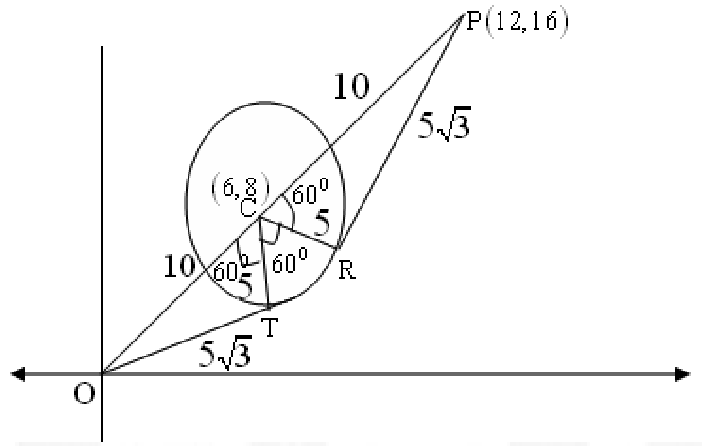
$$\overline{OT}+\overset{\frown}{TR}+\overline{RP}$$

When $\overline{OT}$ = length of tangent from O to the circle = $5\sqrt{3}$

$\overline{RP}$ = length of tangent from O to the circle = $5\sqrt{3}$

$\overset{\frown}{TR}$ = are length TR

$$=5\frac{\pi}{3}$$



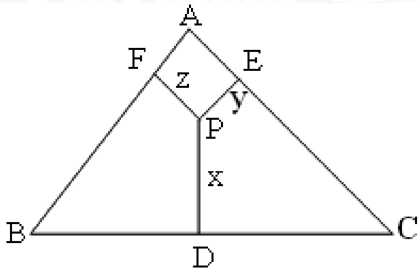
Required answer is $5\sqrt{3}+5\sqrt{3}+\frac{5\pi}{3}=\frac{5\pi}{3}+10\sqrt{3}$

67) Area of $\Delta^{le}\text{ABC}$ $\Delta=\frac{1}{2}BC(x)+\frac{1}{2}(AC)y+\frac{1}{2}(AB)z$ ....(1)

Let $\lambda=\frac{BC}{PD}+\frac{CA}{PE}+\frac{AB}{PF}$

$\therefore\ \lambda=\frac{a}{x}+\frac{y}{b}+\frac{c}{z}$

Now $2\Delta(\lambda)=(ax+by+cz)\left(\frac{a}{x}+\frac{b}{y}+\frac{c}{z}\right)$



Let BC = a and PD = x

AC = b PE = y

AB = c PF = z

$$2\Delta\lambda \equiv \left(ax+by+cz\right)\left(\frac{a}{x}+\frac{b}{y}+\frac{c}{z}\right)$$

$$a^2+b^2+c^2+ab\left(\frac{x}{y}+\frac{y}{x}\right)+bc\left(\frac{y}{z}+\frac{z}{x}\right)+ac\left(\frac{x}{z}+\frac{z}{x}\right)$$

$$\geq\ a^2+b^2+c^2+2ab+2bc+2ac=\left(a+b+c\right)^2$$

$$\left(\because \frac{x}{y}+\frac{y}{x}\geq 2, \frac{y}{z}+\frac{z}{y}\geq 2, \frac{x}{z}+\frac{z}{x}\geq 2\right)$$

$$\therefore \lambda\ \geq \frac{\left(a+b+c\right)^2}{2\Delta}$$

λ is minimum Iff $\frac{x}{y}+\frac{y}{x}=2\Rightarrow x=y$ and $\frac{y}{z}+\frac{z}{y}=2\Rightarrow y=z$

$\therefore \lambda$ is minimum Iff $x=y=z$

$\therefore$ P is incentre of $\Delta^{le}\mathrm{ABC}$

68) Let A = (0, 0), B= (4, 0) , C(0, 3).

Circumcentre of circle S is $\left(2, 3/2\right)$ and circumradius = $\frac{5}{2}$

Equation of S is $\left(x-2\right)^2+\left(y-3/2\right)^2=\frac{25}{4}$ ....(1)

If circle S_1 is having radius r_1 and touching AB and AC

$\Rightarrow$ Its centre is $\left(r_1, r_1\right)$.

S_1 and S touch internally $\Rightarrow \sqrt{\left(r_1-2\right)^2+\left(r_1-3/2\right)^2}=\left|r_1-5/2\right|$

$$\Rightarrow r_1^2-2r_1=0\Rightarrow r_1=2$$

If S_2 is having radius r_2 and touching AB and AC $\Rightarrow$ centre of $S_2=\left(r_2, r_2\right)$

S_2 touches S externally $\Rightarrow \left(r_2-2\right)^2+\left(r_2-3/2\right)^2=\left(r_2+5/2\right)^2$

$$\Rightarrow r_2^2-12r_2=0\Rightarrow r_2=12\Rightarrow r_1r_2=24$$

69) Let r be the radius of the circle and A = (0, 0) AB is along x – axis. AD is along y – axis .

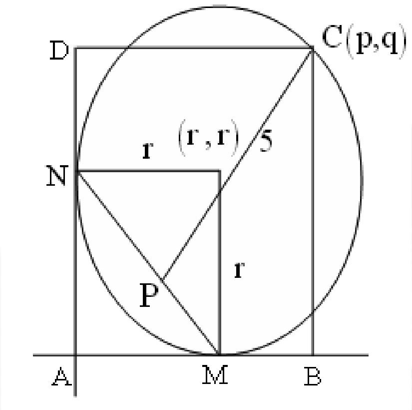
Equation of circle is $\left(x-r\right)^2+\left(y-r\right)^2=r^2$ ....(1)

Equation of MN is $x+y=r$

Now $\perp^{lar}$ distance from $C(p,q)$ to the above line is 5

$\Rightarrow \left|\frac{p+q-r}{\sqrt{2}}\right|=5 \Rightarrow (p+q-r)^2=50$ ....(2)

(p,q) lies on circle (1) $\Rightarrow$ $p^2+q^2-2r(p+q)+r^2=0$



$$\Rightarrow (p+q-r)^2-2pq=0$$

$$50-2pq=0 \Rightarrow pq=25$$

$\therefore$ Area of rectangle ABCD is 25.

70) $AB=\sqrt{1+3}=2 \quad BC=\sqrt{1+3}=2, AC=2$

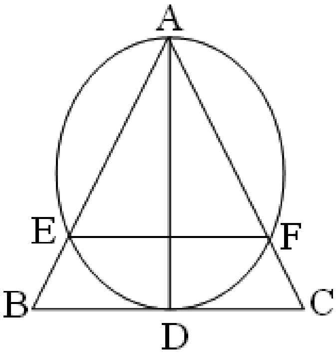
$\therefore \Delta^{le}$ ABC is equilateral triangle.

In Δ^{le} $AEF.\frac{EF}{\sin A}=AD$

$EF=AD\sin 60^0$

$$=\sqrt{3}.\frac{\sqrt{3}}{2}=3/2$$

$\therefore EF=3/2$



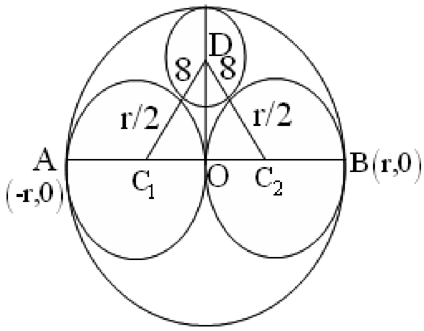
$$\left(\because \frac{AD}{AB} = \sin 60^0,\ AD = \cancel{2}\frac{\sqrt{3}}{\cancel{2}} = \sqrt{3}\right)$$

71) Let $A = (-r, 0), B = (r, 0)$ where r is radius of circle having AB as diameter.

$$OD^2 = \left(\frac{r}{2} + 8\right)^2 - \left(\frac{r}{2}\right)^2$$

But $OD = |r - 8|$

$$\therefore (r-8)^2 = \left(\frac{r}{2} + 8\right)^2 - \frac{r^2}{4}$$



$$r^2 - 16r + 64 = \frac{r^2}{4} + 8r + 64 - \frac{r^2}{4}$$

$$r^2 - 24r = 0 \Rightarrow r = 24$$

$$\therefore\ AB = 48$$

72) Let x both sides of $\Delta^{le} DEF$

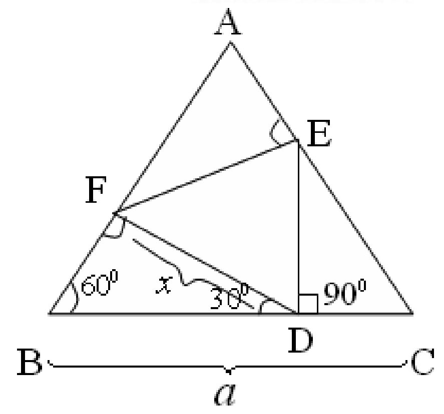
a be the side of $\Delta^{le} ABC$.

$$\frac{x}{BD}=\cos 30 \Rightarrow BD=\frac{2x}{\sqrt{3}}$$

$$\frac{DC}{x}=\cot 60^0 \Rightarrow DC=\frac{x}{\sqrt{3}}$$

$$\therefore BD+DC=\frac{3x}{\sqrt{3}}=x\sqrt{3}$$

$$a=x\sqrt{3}$$



$$\therefore \frac{Area\ of\ \Delta^{le}\ DEF}{Area\ of\ \Delta^{le}\ ABC}=\frac{\frac{\sqrt{3}}{4}.x^2}{\frac{\sqrt{3}}{4}a^2}=\frac{x^2}{3x^2}=\frac{1}{3}$$

73) Let the required equation of the chord is $y=mx\equiv \overleftrightarrow{OP}$

Circle cuts y – axis at (0,6) ≡ Q

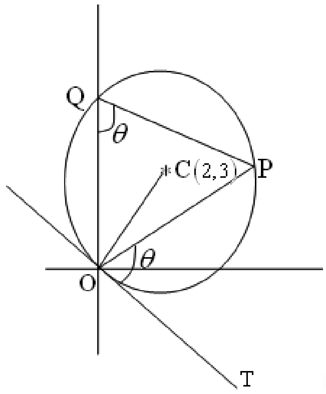
Let $\underline{|OQP}=\theta$ where $\tan\theta=7/4$

Let OT be the tangent of the circle at origin.

$\therefore \underline{|POT}=\theta$ By alternate segment theorem.

Slope of $OC=3/2 \Rightarrow Slope\ Of\ OT=-2/3$

$$\therefore\ \tan\theta=\frac{m+2/3}{1-\frac{2m}{3}}=7/4 \Rightarrow m=\frac{1}{2}$$



$\therefore$ Equation of $\overline{OP}$ is $y=\frac{1}{2}x \Rightarrow x-2y=0$

74) Let θ be the inclination of line PAB.

Any point on this line is $\left(1+r\cos\theta,-2+r\sin\theta\right)$

Substitution circle $x^2+y^2-x-y=0$

$\therefore r^2+r\left(\cos\theta-5\sin\theta\right)+6=0$

$\therefore$ roots of this equation are PA, PB

$PA+PB=\cos\theta-5\sin\theta \Rightarrow \text{maximum value of } PA+PB\ is\ \sqrt{26}$

$PA\times PB=6$

$\frac{PA+PB}{2}\geq\sqrt{PA.PB}\Rightarrow PA+PB\geq 2\sqrt{6}$

$PA+PB\geq\sqrt{24}$

$\therefore \quad \sqrt{24}\leq PA+PB\leq\sqrt{26}$

Range of $PA+PB$ is $\left[\sqrt{24}.\sqrt{26}\right]$

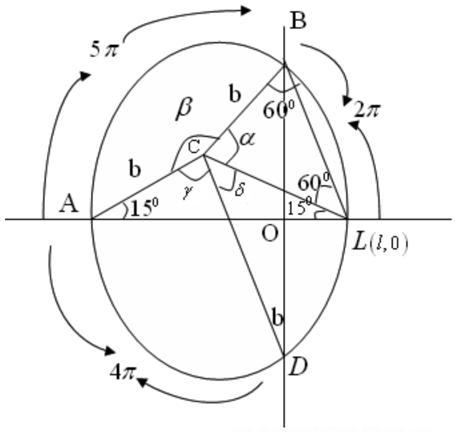
75) $6\alpha=2\pi\Rightarrow\alpha=\frac{\pi}{3}=60^0$

Ily $\beta=150^0,\gamma=120^0$

$\Rightarrow\delta=30^0$

In $\Delta^{le}\ ACL \qquad \angle ACL=150^0$

$\angle BLO=75^0$



$$\cos 75^0 = \frac{l}{6} \Rightarrow l = 3\cancel{6} \times \frac{\sqrt{3}-1}{\cancel{2}\sqrt{2}} = \frac{3\left(\sqrt{3}-1\right)}{\sqrt{2}}$$

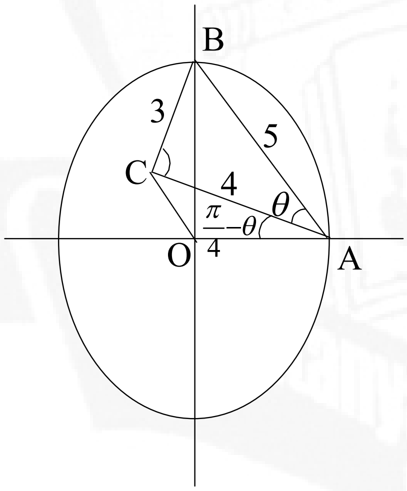
$\therefore$ coordination of centre $C \equiv \left(l + 6\cos 165^0, 6\sin 165^0\right) = \left(-3\sqrt{2}, \dfrac{3\sqrt{3}-1}{\sqrt{2}}\right)$

76) Let $OC = r,\ C = (x, y)$

In $\Delta^{le}\ ABC = \cos\theta = 4/5;\ \sin\theta = 3/5$

In $\Delta^{le}\ OAC$

$$r^2 = 16 + \frac{25}{2} - 2 \times 4 \times \frac{5}{2}\cos(45 - \theta)$$



$$r^2 = \frac{1}{2}$$

Locus of C is $x^2 + y^2 = \dfrac{1}{2}$

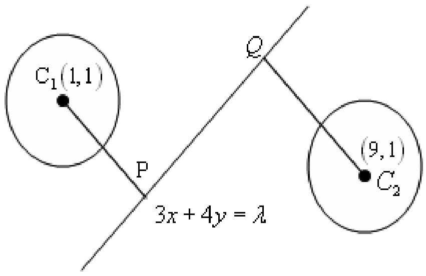
77) $S = x^2 + y^2 - 2x - 2y + 1 = 0$

Centre $C_1 = (1,1), r_1 = 1$

$S' = x^2 + y^2 - 18x - 2y + 78 = 0$

$C_2 = (9,1)\ r_2 = 2$

$C_1P > 1 \qquad C_2Q > 2$



And C_1, C_2 lies on opposite side of given line.

$\Rightarrow (7-\lambda)(31-\lambda) < 0 \Rightarrow 7 < \lambda < 31$.........(1)

$C_1P > 1 \Rightarrow \lambda < 2,\ \lambda > 12$ ....(2)

$C_2Q > 2 \Rightarrow \lambda < 21, \lambda > 41$ ....(3)

$\therefore 12 < \lambda < 21.$

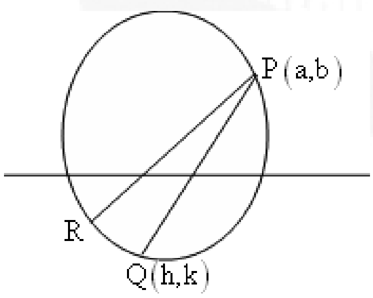
78) Let other end of chord be $Q(h,k)$

Mid point of $PQ = \left(\dfrac{h+a}{2}, \dfrac{k+b}{2}\right)$ which lies on x-axis $\Rightarrow \dfrac{k+b}{2} \Rightarrow k = -b$

$\therefore Q(h,-b)$ lies on the circle

$h^2 - ah + 2b^2 = 0$

This has two distinct real roots $\Rightarrow Disc > 0$



$\therefore a^2 - 8b^2 > 0$

$\Rightarrow a^2 > 8b^2$

79) required line is common chord of $(x-\alpha)^2+(y-\beta)^2=d^2$

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

i.e $\alpha x+\beta y=a^2-\dfrac{d^2}{2}$

80) Let $P=(x_1,y_1)$

Let the inclination of the line $\overleftrightarrow{PAB}$ is θ any point on this line is $(x_1+r\cos\theta,\ y_1+r\sin\theta)$

Substitute this point in given curve.

$$a(x_1+r\cos\theta)^2+2h(x_1+r\cos\theta)(y_1+r\sin\theta)+b(y_1+r\sin\theta)^2=1$$

$$r^2\left(a\cos^2\theta+b\sin^2\theta+2h\sin\theta\cos\theta\right)+2r(ax_1\cos\theta+by_1\sin\theta+hx_1\sin\theta+hy_1\cos\theta)$$

$$+ax_1{}^2+2hx_1y_1+by_1{}^2-1=0$$

It has two roots PA and PB.

$$PA\times PB=\frac{ax_1{}^2+2hx_1y_1+by^2-1}{a\cos^2\theta+b\sin^2\theta+2h\sin\theta\cos\theta}$$

It is independent of θ Iff $a=b,h=0$

Under this condition $ax^2+2hxy+by^2=1$ represents

$$ax^2+ay^2=1\Rightarrow x^2+y^2=\frac{1}{a}$$

It is a circle of radius $\dfrac{1}{\sqrt{a}}$.

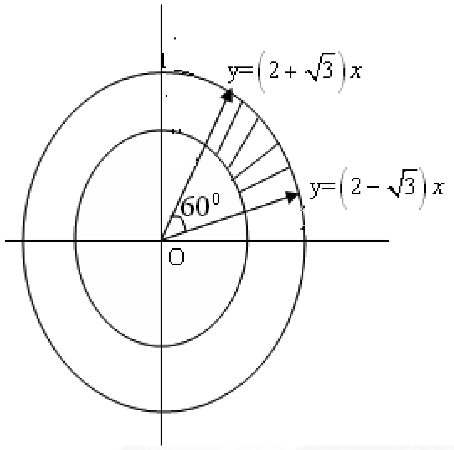
81) (a,b) lies between two circle $x^2+y^2=4$ and $x^2+y^2=9$

$$b^2-4ab+a^2\le 0\Rightarrow(b-2a)^2-3a^2\le 0$$

$$\Rightarrow\left(b-2a-\sqrt{3}a\right)\left(b-2a+\sqrt{3}a\right)\le 0$$

$$\left(b-\left(2+\sqrt{3}\right)a\right)\left(b-\left(2-\sqrt{3}\right)a\right)\le 0$$

$\therefore (a,b)$ satisfying $\left(y-\left(2+\sqrt{3}\right)x\right)\left(y-\left(2-\sqrt{3}\right)x\right)\le 0$



$\left(2-\sqrt{3}\right)x \le y \le \left(2+\sqrt{3}\right)x$

Required area $\frac{9\pi}{3}-\frac{4\pi}{3}=3\pi-\frac{4\pi}{3}=\frac{5\pi}{3}$

82) Equation of $\overline{AB}$ is

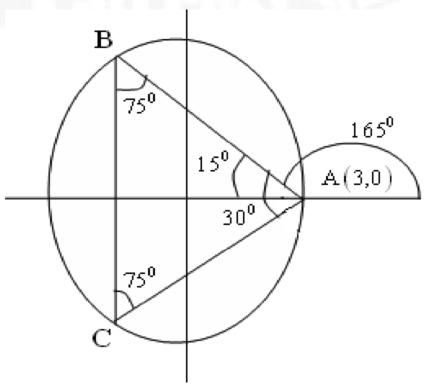
$y-0=\tan 165^0\left(x-3\right)$

$y=-\tan 15^0\left(x-3\right)$

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

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

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



Substitution circle $x^2+y^2=9$

$$\left(\frac{y}{\sqrt{3}-2}+3\right)^2+y^2=9$$

$$\frac{y^2}{\left(\sqrt{3}-2\right)^2}+6.\frac{y}{\left(\sqrt{3}-2\right)}+y^2=0$$

$$\frac{y}{\left(\sqrt{3}-2\right)^2}+\underline{y}+\frac{6}{\sqrt{3}-2}=0$$

$$\frac{y\left(1+\left(\sqrt{3}-2\right)^2\right)}{\left(\sqrt{3}-2\right)^2}=\frac{+6}{2-\sqrt{3}}\Rightarrow y\left(8-4\sqrt{3}\right)=6\left(2-\sqrt{3}\right)$$

$$y=\frac{6\left(2-\sqrt{3}\right)}{4\left(2-\sqrt{3}\right)}=3/2$$

$\therefore$ y – coordinate of B is 3/2 $\Rightarrow y$ coordinate of C is -3/2 $\Rightarrow$ product is -9/4

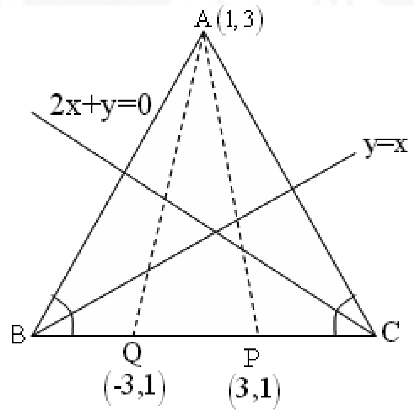
83) $P\rightarrow$ Image of A in $y=x$

$Q\rightarrow$ Image of A in $y=-2x$

If $Q=(h,k)$

$$\frac{h-1}{2}=\frac{k-3}{1}=\frac{-2(2+3)}{5}$$

$$\frac{h-1}{2}=\frac{k-3}{1}=\frac{-2(2+3)}{5h=-3,k=1}$$



$\therefore$ Equation of $\overline{BC}$ is $y=1$.

$\therefore$ Solve with $y = x \Rightarrow B = (1,1)$

Solve with $y = -2x \Rightarrow C = \left(-\frac{1}{2},1\right)$

$\therefore$ Area of $\Delta^{le} ABC = \frac{1}{2}\begin{vmatrix} 0 & 2 \\ \frac{3}{2} & 2 \end{vmatrix} = \left|\frac{1}{2}(-3)\right| = 3/2$

84) Given two circles are point circle $\Rightarrow P = \left(\sqrt{2},\sqrt{3}\right)$

$$Q = \left(-\sqrt{3},\sqrt{2}\right)$$

Required circle is having P, Q as ends of diameter

$$\left(x-\sqrt{2}\right)\left(x+\sqrt{3}\right)+\left(y-\sqrt{3}\right)\left(y-\sqrt{2}\right)=0$$

85) Let the equation of a chord be y = mx + c

It cuts the curve $3x^2 - y^2 - 2x + 4y = 0$ at A and B making the curve homogeneous to get the pair of lines OA and OB.

$$3x^2 - y^2 - 2x\left(\frac{y-mx}{c}\right) + 4y\left(\frac{y-mx}{c}\right) = 0$$

$$3\left(x^2 - cy^2 - 2xy + 2mx^2 + 4y^2 - 4mxy\right) = 0$$

$$(3c+2m)+(-c+4)=0$$

$$2c+2m+4=0$$

$$c+m+2=0$$

$$c=-m-2$$

$$\therefore\ y = mx - m - 2$$

$$y+2-m(x-1)=0$$

This equation represents family of lines passing through intersection of $y+2=0,\ x-1=0$

i.e., (1, -2)

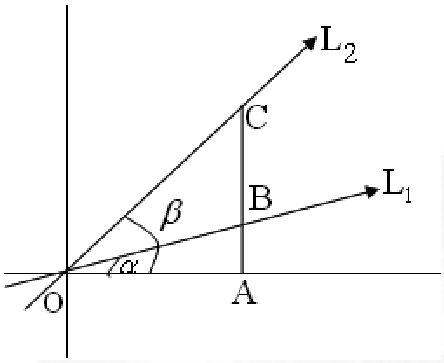
86) $Tan\alpha = \frac{AB}{OA}$

$$Tan\beta = \frac{AC}{OA} = \frac{2AB}{OA}$$

$$Tan\beta = 2Tan\alpha$$

$\therefore$ Slope of L_1 is m

Slope of L_2 is 2m.



$$m + 2m = \frac{-2h}{b} \Rightarrow m = \frac{-2h}{3b}$$

$$m \times 2m = a/b \Rightarrow 2m^2 = a/b$$

$$2\frac{4h^2}{ab} = \frac{a}{b}$$

$$\frac{h^2}{ab} = \frac{9}{8}$$

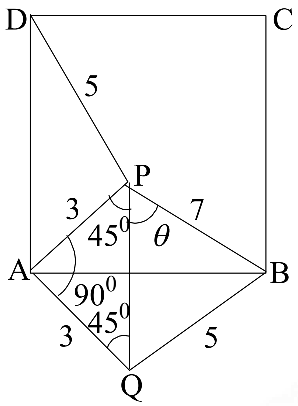
87) rotate $\Delta^{le}\text{APD}$ about A through an angle 90^0. So that P – goes to Q.

$\therefore \Delta^{le}\text{APQ}$ is Isosceles right angled triangle $PQ = \sqrt{9+9} = 3\sqrt{2}$.

$BQ = 5$.

$\therefore$ Area of $\Delta^{le}BPQ = \sqrt{\frac{12+3\sqrt{2}}{2}.\frac{3\sqrt{2}-2}{2}\frac{3\sqrt{2}+2}{2}.\frac{12-3\sqrt{2}}{2}} = \frac{21}{2}$

$$= \frac{1}{2}PQ.PB.\sin\theta$$



$\therefore \frac{1}{2}\times 3\sqrt{2}.7.\sin\theta = \frac{21}{2} \Rightarrow \sin\theta = \frac{1}{\sqrt{2}} \Rightarrow \theta = 45^0$

$\angle APB = 90^0 \Rightarrow AB = \sqrt{9+49} = \sqrt{58}$

$\therefore$ Area of ABCD = 58.

88) $P(x,y)$ moves such that sum of its distances from given lines is 2, then locus of P is a reactangle of sides $\frac{2}{\sin\theta/2}, \frac{2}{\cos\theta/2}$ and area is $\frac{2d^2}{\sin\theta} = \frac{8}{\sin\theta}\ (\because d = 2)$

Where θ is angle between given lines

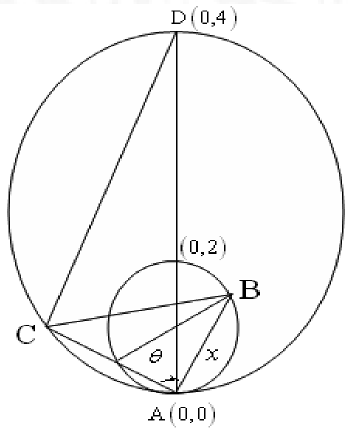
Clearly $\sin\theta = \frac{1}{2}$

$\therefore$ required area = $\frac{8}{\left(\frac{1}{2}\right)} = 16$ sq.units

89) Let $AB = x = AC = BC$

AC cuts small circle at E

$x = AC = 4\cos\theta = 2(2\sin\theta) = 2(AE)$



$$AE = \frac{x}{2}$$

$$BE^2 = x^2 + \frac{x^2}{4} - \frac{x^2}{2} = \frac{3x^2}{4} \Rightarrow BE = \frac{\sqrt{3}}{2}x = 2\sin 60^0 \Rightarrow x = 2$$

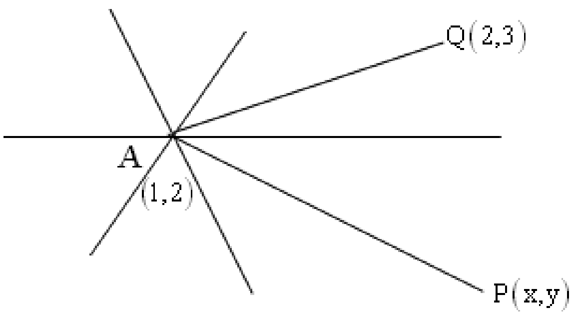
90) Given family passing through intersection of

$$x - 2y + 3 = 0.........(1)$$

$$2x - 3y + 4 = 0.........(2)$$

$$2x - 4y + 6 = 0$$

$$y - 2 = 0 \Rightarrow y = 2 \Rightarrow x = 1$$



Concurrent point is $(1,2)$ = A

Let $Q = (2,3)$

Let $P(x,y)$ is its Image

$$AQ = AP$$

$$= AP^2 = AQ^2$$

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

$$x^2 - 2x + 1 + y^2 - 4y + 4 = 2$$

$$x^2 + y^2 - 2x - 4y + 3 = 0$$