



MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

PAIR OF STRAIGHT LINES

Example

1. Find the joint equation of lines y =x and y=-x.

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2. Find the separate equation of lines represented by the equation by the

equation $x^2-6xy+8y^2=0$

3. Find the condition that the slope of one of the lines represented by

 $ax^2+2hxy+by^2=0$ should be n times the slope of the other .

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4. If the slope of one of the lines represented by $ax^{22}hxy + by^2 = 0$ be the nth power of the , prove that , $(ab^n)^{rac{1}{n+1}} + (a^nb)^{rac{1}{n+1}} + 2h = 0.$

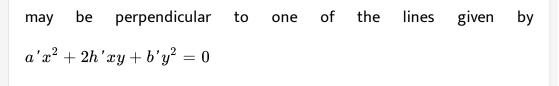
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5. Find the product of the perpendiculars drawn from the point (x_1, y_1)

on the lines $ax^2 + 2hxy + by^2 = 0$

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6. Find the condition that the one of the lines given by $ax^2 + 2hxy + by^2 = 0$



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7. Show that the centroid (x',y') of the riangle with sides ax^2+2hxy+by^2=0

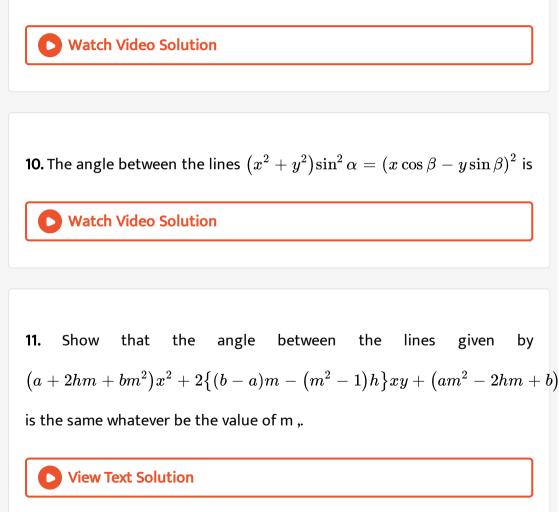
and lx +my =1, is given by $\frac{x'}{bl-hm} = \frac{y'}{am-hl} = \frac{2}{3(am^2-2hlm+bl^2)}$

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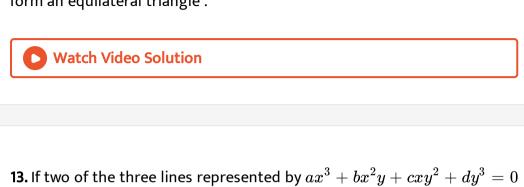
8. Show that the area of the triangle formed by the lines $ax^2 + 2hxy + by^2 = 0$ and lx+my+n=0 is $\frac{n^2\sqrt{(h^2 - ab)}}{|(am^2 - 2hlm + bl^2)|}$ Watch Video Solution 9. Show that the two straight lines

$$x^2ig(an^2 heta+\cos^2 hetaig)-2xy an heta+y^2\sin^2 heta=0$$

Move with the axis of x angles such that the difference of their tangents is 2.



12. Show that the straight lines $x^2 + 4xy + y^2 = 0$ and the line x-y=4 form an equilateral triangle .



may be at right angles then

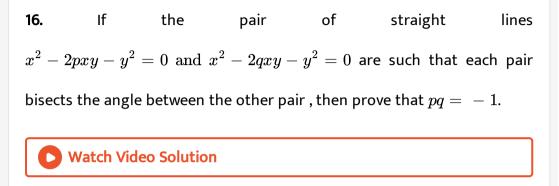
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14. Find the equation of the bisectors of the angle between the lines represented by $3x^2 - 5xy + 4y^2 = 0$

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15. The lines y=mx bisects the angle between the lines $ax^2+2hxy+by^2=0$ if



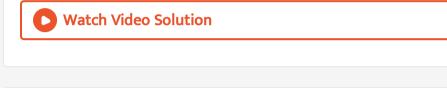


17. If the lines given by $ax^2+2hxy+by^2=0$ are equally inclined to the lines given by $ax^2+2hxy+by^2+\lambdaig(x^2+y^2ig)=0$, then

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18. Show that the pair of lines given by $a^2x^2 + 2h(a+b)xy + b^2y^2 = 0$ is equally inclined to the pair given by $ax^2 + 2hxy + by = 0$.

19. If the lines represented by $x^2 - 2pxy - y^2 = 0$ are rotated about the origin through ann angle θ , one clockwise direction and other in anticlockwise direction, then the equation of the bisectors of the angle between the lines in the new position is



20. For what value of λ does the equation $12x^2-10xy+2y^2+11x-5y+\lambda=0$

represent a pair of straight lines ? Find their equations and the angle between them.

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21. Prove that the equation $8x^2 + 8xy + 2y^2 + 26x + 13y + 15 = 0$ represents a pair of parallel straight lines . Also find the perpendicular distance between them . 22. Find the combined equation of the straight lines passing through the point (1,1) and parallel to the lines represented by the equation . $z^2 - 5xy + 4y^2 + x + 2y - 2 = 0$.

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23. If $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a pair of lines ,

prove that the area of the triangle formed by their bisectors and axis of x

is

1

$$\displaystyle rac{\left|\left(a-b
ight)^2+4h^2
ight.}{\left|2h
ight|}.\left|rac{ca-g^2}{ab-h^2}
ight|$$

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24. Find the point of inersection of lines represented by $2x^2 - 7xy - 4y^2 - x + 22y - 10 = 0$

25. Find the new equation of curve $12x^2 + 7xy - 12y^2 - 17x - 31y - 7 = 0$ after removing the first degree terms.

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26. Transform the equation $x^2 + 4xy + y^2 - 2x + 2y + 4 = 0$ into the

form

$$rac{y^{\,\prime 2}}{b^2} - rac{x^{\,\prime 2}}{a^2} = 1$$

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27. Prove that the angle between the lines joining the origin to the points of intersection of the straight line y = 3x + 2 with the curve $x^2 + 2xy + 3y^2 + 4x + 8y - 11 = 0$ is $\tan^{-1}\left(\frac{2\sqrt{2}}{3}\right)$

28. Find the equation to the pair of straight lines joining the origin to the intersections oi the straight line y = mx + c and the curve $x^2 + y^2 = a^2$. Prove that they are at right angles if $2c^2 = a^2(1+m^2)$.

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29. Prove that the pair of lines joining the origin to the intersection of the

curve
$$\displaystyle rac{x^2}{a^2} + \displaystyle rac{y^2}{b^2} = 1 b y$$

the line lx+my+n=0 are coincident, if a $a^2l^2+b^2m^2=n^2$

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curves

30. The pair of lines joining origin to the points of intersection of, the two

$$ax^2+2hxy+by^2+2gx=0$$
 and

 $a^{\,\prime}x^2+2h^{\,\prime}xy+b^{\,\prime}y^2+2g^{\,\prime}x=0$ will be at right angles, if

31. If the pairs of lines $x^2 + 2xy + ay^2 = 0$ and $ax^2 + 2xy + y^2 = 0$ have exactly one line in common, then the joint equation of the other two lines is given by $3x^2 + 8xy - 3y^2 = 0$ $3x^2 + 10xy + 3y^2 = 0$ $y^2 + 2xy - 3x^2 = 0$ $x^2 + 2xy - 3y^2 = 0$ A. $3x^2 + 8xy - 3y^2 = 0$ B. $3x^2 + 10xy + 3y^2 = 0$ C. $x^2 + 2xy - 3y^2 = 0$ D. $3x^2 + 2xy - y^2 = 0$

Answer: b

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32. The combined equation of the lines L_1 and L_2 is $2x^2 + 6xy + y^2 = 0$, and that of the lines L_3 and L_4 is $4x^2 + 18xy + y^2 = 0$. If the angle between L_1 and L_4 be α , then the angle between L_1 and L_3 will be.

A.
$$rac{\pi}{2}-lpha$$

B.
$$\frac{\pi}{4} + \alpha$$

D. 2α

C. α

Answer: c

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33. If the pair of lines $\sqrt{3}x^2 - 4xy + \sqrt{3}y^2 = 0$ is rotated about the origin by $\frac{\pi}{6}$ in the anticlockwise sense, then find the equation of the pair in the new position.

A.
$$x^2-\sqrt{3}xy=0$$

B. $y^2-\sqrt{3}xy=0$
C. $\sqrt{3}x^2-xy=0$
D. $\sqrt{3}y^2-xy=0$

Answer: c



34. If the pair of lines $ax^2 - 2xy + by^2 = 0$ and bx^2-2xy+ay^2=0`

be such that each pair bisects the angle between the other pair , then |ab| equals to

A. 1 B. 2 C. 3 D. 4

Answer: b



35. The equation of line which is parallel to the line common to the pair of lines given by $3x^2 + xy - 4y^2 = 0$ and $6x^2 + 11xy + 4y^2 = 0$ and at a distance of 2 units from it is

A.
$$3x - 4y = -10$$

B. $x - y = 2$
C. $3x + 4y = 10$
D. $2x + y = -2$

Answer: c

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36. The lines joining the origin to the point of intersection of $x^2 + y^2 + 2gx + c = 0$ and $x^2 + y^2 + 2fy - c = 0$ are at right angles if

A.
$$g^2 + f^2 = c$$

B. $g^2 - f^2 = c$
C. $g^2 - f^2 = 2c$
D. $g^2 + f^2 = c^2$

Answer: c



37. The lines joining the origin to the point of intersection of The lines joining the origin to the point of intersection of $3x^2 + mxy = 4x + 1 = 0$ and 2x + y - 1 = 0 are at right angles. Then which of the following is not a possible value of m? -4 (b) 4 (c) 7 (d) 3

A. -4

B. 3

C. 4

D. 7

Answer: (a,b,c,d)

38. The lines $\left(lx + my
ight)^2 - 3 (mx - ly)^2 = 0$ and lx + my + n = 0

forms

A. an isosecles triangle

B. a right angled triangle

C. an equilateral triangle

D. None of these

Answer: (a,c)

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39. If the equation $ax62 - 6xy + y^2 + bx + cy + d = 0$ represents a pair of lines whose slopes are m and m^2 , then the values (s) of a is / are

A. -27

B. -8

C. 8

D. 27

Answer: (a,c)



40. Consider the equation of a pair of straight lines as

 $\lambda xy - 8x + 9y - 12 = 0$

A. 0

B. 2

C. 4

D. 6

Answer: d

41. The point of intersection of lines is (α, β) , then the equation whose roots are α, β , is

A.
$$4x^2 + x - 8 = 0$$

B. $6x^2 + x - 12 = 0$
C. $4x^2 - x - 8 = 0$
D. $6x^2 - x - 12 = 0$

Answer: b

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42. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is

four times their product , then the value of c is

43. If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is 3x + 4y = 0 ,then

value of |c| is



44. Statement I . The combined equation of l_1, l_2 is $3x^2 + 6xy + 2y^2 = 0$ and that of $m_1, m_2is5x^2 + 18xy + 2y^2 = 0$. If angle between $l_1, m_2is\theta$, then angle between $l_2, m_1is\theta$.

Statement II . If the pairs of lines $l_1l_2 = 0$, $m_1m_2 = 0$ are equally inclinded that angle between l_1 and m_2 = angle between l_2 and m_1 .

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45. Statement I . The equation $2x^2 - 3xy - 2y^2 + 5x - 5y + 3 = 0$ represents a pair of perpendicular straight lines.

Statement II A pair of lines given by $ax^2+2hxy+by^2+2gx+2fy+c=0$ are perpendicular if a+b=0

46. If the lines represented by $2x^2 - 5xy + 2y^2 = 0$ be the sides of a parallelogram and the line 5x + 2y = 1 be one of its diagonal. Find the equation of the other diagonal, and area of the parallelogram .



47. Prove that the equation
$$(a + 2h + b)x^2 - 2(a - b)xy + (a - 2h + b)y^2 = 0$$
 represents a pair of lines each inclined at an angle of 45° to one or other of the lines given by , $ax^2 + 2hxy + by^2 = 0$

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48. If
$$u\equiv ax^2+2hxy+by^2+2gx+2fy+c=0$$

represents a pair of straight lines , prove that the equation of the third

pair of straight lines passing through the points where these meet the axes is cu+4(fg+ch)xy=0.

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49. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a

pair of parallel lines, prove that

$$h = \sqrt{ab}$$
 and $g\sqrt{b} = f\sqrt{a}$ or $(h = -\sqrt{ab}$ and $g\sqrt{b} = -f\sqrt{a})$.
The distance between them is $2\sqrt{\left(\frac{(g^2 - ac)}{a(a + b)}\right)}$.

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50. A parallelogram is formed by the lines $ax^2 + 2hxy + by^2 = 0$ and the lines through (p,q) parallel to them. Show that the equation of the diagonal of the parallelogram which doesn't pass through origin is (2x - p)(ap + hq) + (2y - q)(hp + bq) = 0

51. A point moves so that the distance between the foot of perpendiculars from it on the lines $ax^2 + 2hxy + by^2 = 0$ is a constant 2d. Show that the equation to its locus is $(x^2 + y^2)(h^2 - ab) = d^2 \{(a - b)^2 + 4h^2\}$.

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52. Show that if two of the lines $ax^3 + bx^2y + cxy^2 + dy^2 = 0 (a \neq 0)$ make complementary angles with X -axis in anti -clockwise sense, then a(a-c)+b(b-d)=0.

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53. Show that the equation $a(x^4 + y^4) - 4bxy(x^2 - y^2) + 6cx^2y^2 = 0$ represents two pairs of lines at right angles and that if $2b^2 = a^2 + 3ac$, the two pairs will coincide. 54. Show that the locus of a point such that the product of the perpendiculars let fall from it on three lines represented by $ay^3 + by^2 + cyx^2 + dx^3 = 0$ is constant = k^3 , is $ay^3 + by^2 + cyx^2 + dx^3 = k^2 \sqrt{(a-c)^2 + (b-d)^2}$.

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55. if one of the lines given by the equation $ax^2 + 2hxy + by^2 = 0$ coincides with one of the lines given by $a'x^2 + 2h'xy + b'y^2 = 0$ and the other lines representted by them be perpendicular, then .

$$\frac{ha'b'}{b'-a'}=\frac{h'ab}{b-a}=\frac{1}{2}\sqrt{(-aa'\mathbf{\prime})}.$$

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Exercise For Session 1

1. The lines given by the equation $(2y^2 + 3xy - 2x^2)(x + y - 1) = 0$ form a triangle which is

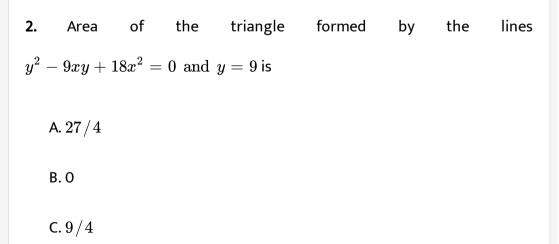
A. equilateral

B. isosceles

C. right angled

D. obtuse angled

Answer: C



Answer: A

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3. The equation $3x^2 + 2hxy + 3y^2 = 0$ represents a pair of straight lines passing through the origin . The two lines are

- A. real and distinct , if $h^2>3$
- B. real and distinct , if $h^2>9$
- C. real and coincident , if $h^2=3$
- D. real and coincident , if $h^2>3$

Answer: B

4. if one of the lines the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between positive directions of the axes , then a, b, h, satisfy the relation

A. a+b=2|h|B. a+b=-2hC. a-b=2|h|D. $(a-b)^2=4h^2$

Answer: B

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5. If the slope of the lines given by $a^2x^2 + 2hxy + b^2y^2 = 0$ be three times of the other , then h is equal to

A. $2\sqrt{3}ab$

 $\mathsf{B.} - 2\sqrt{3}ab$

C.
$$\frac{2}{\sqrt{3}}ab$$

$$\mathsf{D.} - \frac{2}{\sqrt{3}}ab$$

Answer: C::D



6. Find the separate equation of two straight lines whose joint equation

is ab $ig(x^2-y^2ig)+ig(a^2-b^2ig)xy=0$

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7. Find the coordinates of the centroid of the triangle whose sides are

 $12x^2 - 20xy + 7y^2 = 0$ and 2x - 3y + 4 = 0

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8. If the lines $ax^2 + 2hxy + by^2 = 0$ be two sides of a parallelogram and the line lx+my=1 be one of its diagonal, show that the equation of the

other diagonal is y (bl-hm)=x(am-hl).



9. Find the condition that one of the lines given by $ax^2 + 2hxy + by^2 = 0$ may coincide with one of the lines given by $a'x^2 + 2h'xy + b'y^2 = 0$

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Exercise For Session 2

1. The angle between the pair of straight lines $y^2 \sin^2 heta - xy \sin^2 heta + x^2 (\cos^2 heta - 1) = 0$ si

A.
$$\frac{\pi}{4}$$

B. $\frac{\pi}{2}$
C. $\frac{\pi}{3}$

 π

D.
$$\frac{2\pi}{3}$$

Answer: B

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2. The angle between the lines $ay^2 - (1 + \lambda^2))xy - ax^2 = 0$ is same as the angle between the line:

A.
$$5x^2 + 2xy - 3y^2 = 0$$

B. $x^2 - 2xy - 3y^2 = 0$
C. $x^2 - y^2 = 100$

D. xy=0

Answer: C::D

3. Which of the following pair of straight lines intersect at right angles ?

A.
$$2x^2 = y(x + 2y)$$

B. $(x + y)^2 = x(y + 3x)$
C. $2y(x + y) = xy$
D. $y = +2x$

Answer: A

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4. if $h^2 = ab$, then the lines represented by $ax^2 + 2hxy + by^2 = 0$ are

- A. Parallel
- B. perpendicular
- C. coincident
- D. None of these

Answer: C



5. Equation $ax^3 - 9x^2y - xy^2 + 4y^3 = 0$ represents three straight lines.

If the two of the lines are perpendicular, then a is equal to

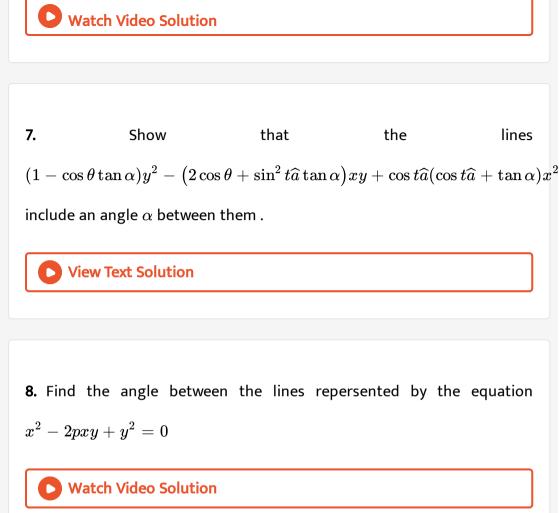
A. -5 B. 5 C. -4

D. 4

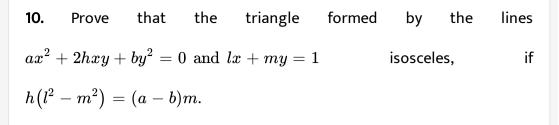
Answer: B::C



6. Find the angle between the lines whose joint equation is $2x^2 - 3xy + y^2 = 0$



9. Show that the lines $x^2 - 4xy + y^2 = 0$ and x + y = 1 form an equilateral triangle and find its area.



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Exercise For Session 3

1. If the coordinate axes are the bisectors of the angles between the pair

of lines $ax^2+2hxy+by^2=0$, then

A. a=b

B. h=0

 $\mathsf{C}.\,a^2=b=0$

 $\mathsf{D}.\,a+b^2=0$

Answer: B

2. The equation of the bisectors of angle between the lines $x^2 - 4xy + y^2 = 0$ is

A.
$$\frac{\sqrt{5}-1}{2}$$
B.
$$\frac{\sqrt{5}+1}{2}$$
C.
$$-\left(\frac{\sqrt{5}+1}{2}\right)$$
D.
$$-\left(\frac{\sqrt{5}-1}{2}\right)$$

Answer: A::C

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3. If one of the lines of $my^2+ig(1-m^2ig)xy-mx^2=0$ is a bisector of the angle between lines xy=0 , then $\cos^{-1}(m)$ is

A. 0

B. $\pi/2$

 $\mathsf{C.}\,\pi$

D. $3\pi/2$

Answer: A::C



4. The bisectors of the angles between the lines $(ax + by)^2 = c(bx - ay)^2, c > 0$ are respectively parallel and

perpendicular to the line

A.
$$bx - ay + \mu = 0$$

B. $ax + by + \lambda = 0$

$$\mathsf{C}.\,ax = by + v = 0$$

D.
$$bx + ay + au = 0$$

Answer: B

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5. If the pairs of straight lines $ax^2 + 2hxy - ay^2 = 0$ and $bx^2 + 2gxy - by^2 = 0$ be such that each bisects the angles between the other, then

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6. Prove that the lines $2x^2+6xy+y^2=0$ are equally inclined to the lines $4x^2+18xy+y^2=0$

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7. Show that the equation of the pair of lines bisecting the angles between the pair of bisectors of the angles between the pair of lines $ax^2 + 2hxy + by^2 = 0$ is $(a - b)(x^2 - y^2) + 4hxy = 0$.

8. Prove that the bisectors of the between the lines $ax^2 + acxy + cy^2 = 0$ and $\left(3 + \frac{1}{c}\right)x^2 + xy + \left(3 + \frac{1}{a}\right)y^2 = 0$ are

always the same .

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9. The lines represented by $x^2+2\lambda xy+2y^2=0$ and the lines represented by $1+\lambda_x^2-8xy+y^2=0$ are equally inclined, then

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Exercise For Session 4

1. if $\lambda x^2 + 10xy + 3y^2 - 15x - 21y + 18 = 0$ represents a pair of straight lines. Then , the value of λ is

A. -3

C. 4

D. -4

Answer: B

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2. Prove that the equartion $3y^2 - 8xy - 3x^2 - 29x + 3y - 18 = 0$ represents two straight lines. Find also their point of intersection and the angle between them.

A.
$$\left(1, \frac{1}{2}\right)$$

B. $\left(1, -\frac{1}{2}\right)$
C. $\left(-\frac{3}{2}, \frac{5}{2}\right)$
D. $\left(-\frac{3}{2}, -\frac{5}{2}\right)$

Answer: D

3. if the equation $12x^2 + 7xy - py^2 - 18x + qy + 6 = 0$ represents two

perpendicular lines , then the value of p and q are

A. 12,1

B. 12**,-**1

C. 12,
$$\frac{23}{2}$$

D. $-\frac{23}{2}$

Answer: A::C

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4. If the angle between the two lines represented by $2x^2 + 5xy + 3y^2 + 2y + 4 = 0 is \tan^{-1}(m)$, then m is equal to

$$\mathsf{A.}-\frac{1}{5}$$

B.
$$\frac{1}{5}$$

C. $-\frac{3}{5}$
D. $\frac{3}{5}$

Answer: B



5. The equation of second degree $x^2 + 2\sqrt{2}x + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines.The distance between them is a. 4 b. $\frac{4}{\sqrt{3}}$ c. 2 d. $2\sqrt{3}$ A. 2

B. $2\sqrt{3}$

C. 4

D. $4\sqrt{3}$

Answer: A

6. Find the area of the parallelogram formed by the lines

$$2x^2 + 5xy + 3y^2 = 0$$
 and $2x^2 + 5xy + 3y^2 + 3x + 4y + 1 = 0$

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7. Find the locus of the incentre of the triangle formed by

 $xy-4x-4y+16=0 \,\, ext{and} \,\, x+y=aig(a>4, a
eq \sqrt{2} \,\,\,\, ext{and a is the parameter}$

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8. If the equation 2hxy + 2gx + 2fy + c = 0 represents two straight lines, then show that they form a rectangle of area $\frac{|fg|}{h^2}$ with the coordinate axes.

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9. Find the area of the triangle formed by the lines represented by $ax^2+2hxy+by^2+2gx+2fy+c=0$ and axis of x .

10. Find the combined equation of the straight lines passing through the point (1,1) and parallel to the lines represented by the equation . $z^2-5xy+4y^2+x+2y-2=0$.

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Exercise For Session 5

1. If the straight lines joining origin to the points of intersection of the line x+y=1 with the curve $x^2 + y^2 + x - 2y - m = 0$ are perpendicular to each other , then the value of m should be

A.
$$-rac{1}{2}$$

C.
$$\frac{1}{2}$$

D. 1

Answer: A

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2. The angle between the pair of straight lines formed by joining the points of intersection of $x^2 + y^2 = 4$ and y = 3x + c to the origin is a right angle. Then c^2 is equal to

A. -1

B. 6

C. 13

D. 20

Answer: A



3. If θ is an angle by which axes are rotated about origin and equation $ax^2 + 2hxy + by^2 = 0$ does not contain xy term in the new system, then prove that $\tan 2\theta = \frac{2h}{a-b}$. A. $\frac{(a-b)}{2h}$ B. $\frac{2h}{(a+b)}$ C. $\frac{(a+b)}{2h}$

D.
$$rac{2h}{(a-b)}$$

Answer: A



4. The lines joining the origin to the points of intersection of $2x^2 + 3xy - 4x + 1 = 0$ and 3x + y = .1 given by

A.
$$x^2 - y^2 - 5xy = 0$$

B. $x^2 - y^2 + 5xy = 0$
C. $x^2 + y^2 - 5xy = 0$
D. $x^2 + y^2 + 5xy = 0$

Answer: A



5. The equation of the line joining the origin to the point of intersection of the lines $2x^2 + xy - y^2 + 5x - y + 2 = 0$ is

A. x+y=0

B. x-y=0

C. x-2y=0

D. 2x+y=0

Answer: A

6. The lines joining the origin to the points of intersection of the line 3x-

2y -1 and the curve $3x^2+5xy-3y^2+2x+3y=0$, are

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7. If the straight line joining the origin and the points of intersection of $y=mx+1~{
m and}~x^2+y^2=1$ be perpendicular to each other , then find the value of m.

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8. Prove that the straight lines joining the origin to the point of intersection of the straight line hx + ky = 2hk and the curve $(x - k)^2 + (y - h)^2 = c^2$ are perpendicular to each other if $h^2 + k^2 = c^2$.

9. Show that for all values of λ , the lines joining the origin to the points common to $x^2+2hxy-y^2+gx+fy=0$ and fx -gy= λ are at right angles .

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10. Find the equations of the straight lines joining the origin to the points of intersection of $x^2 + y^2 - 4x - 2y = 0$ and $x^2 + y^2 - 2x - 4y = 4$.

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Exercise Single Option Correct Type Questions

1. If the sum of the slopes of the lines given by $4x^2+2\lambda xy-7y^2=0$ is

equal to the product of the slope, then λ is equal to

| A4 | |
|------|--|
| В2 | |
| C. 2 | |
| D. 4 | |

Answer: B

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2. The equation $3ax^2 + 9xy + (a^2 - 2)y^2 = 0$ represents two perpendicular straight lines for

A. only one value of a

B. for all values of a

C. for only two values of a

D. for no value of a

Answer: C

3. The image of the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ by the line mirror y = 0 is

A.
$$ax^{2} + 2hxy + by^{2} = 0$$

B. $bx^{2} - 2hxy + ay^{2} = 0$
C. $bx^{2} + 2hxy + ay^{2} = 0$

D.
$$ax^2-2hxy+by^2=0$$

Answer: D

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4. Number of points lying on the line 7x + 4y + 2 = 0 which is equidistant from the lines $15x^2 + 56xy + 48y^2 = 0$ is

| Β. | 1 |
|----|---|
| | |

C. 2

D. 4

Answer: C

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5. Orthocentre of the triangle formed by the lines xy - 3x - 5y + 15 = 0 and 3x + 5y = 15 is A. (-5,-3) B. (5,3) C. (-3,-5)

D. (3,5)

Answer: B

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6. Two of the straight lines given by $3x^3 + 3x^2y - 3xy^2 + dy^3 = 0$ are at right angles , if d equal to

A. -4 B. -3

- C. -2
- D. -1

Answer: B



7. Two lines are given by $\left(x-2y
ight)^2+k(x-2y)=0$. The value of k, so that the distance between them is 3, is :

A.
$$\sqrt{5}$$

 $\mathsf{B.}\,2\sqrt{5}$

C. $3\sqrt{5}$

D. $4\sqrt{5}$

Answer: C



8. The four straight lines given by the equations $2x^2 + 7xy - 12y^2 = 0$ and $12x^2 + 7xy - 12y^2 - x + 7y - 1 = 0$ lie

along the sides of a

A. square

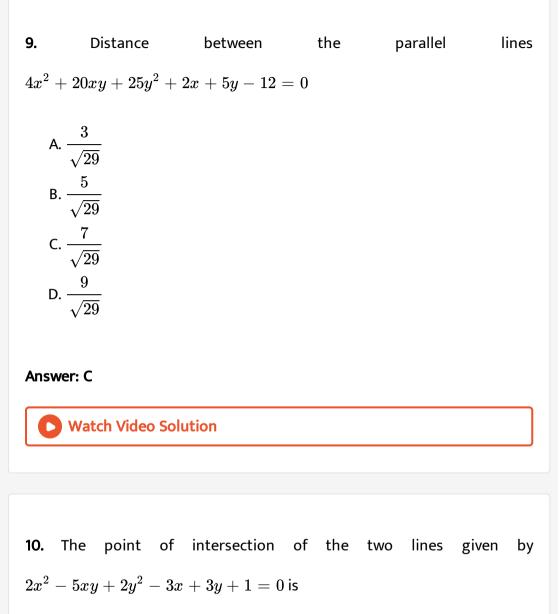
B. rhombus

C. rectangle

D. parallelogram

Answer: A

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A. (-2,2)

B. (-3,3)

C. (3,3)

D. (2,2)

Answer: C

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11. If
$$\alpha, \beta > 0$$
 and $\alpha < \beta$ and $ax^2 + 4\gamma xy + \beta y^2 + 4p(x+y+1) = 0$

represents a pair of straight lines , then

A.
$$lpha \leq p \leq eta$$

 $\texttt{B.}\,p\leq\alpha$

$$\mathsf{C}.\,p\leq\alpha \ \text{or} \ p\geq\beta$$

D.

Answer: D

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12. If the equation of the pair of straight lines passing through the point (1, 1), one making an angle θ with the positive direction of the x-axis and the other making the same angle with the positive direction of the y-axis, is $x^2 - (a+2)xy + y^2 + a(x+y-1) = 0, a \neq 2$, then the value of $\sin 2\theta$ is a - 2 (b) a + 22(a + 2) (d) $\frac{2}{a}$

A. a-2

B.a+2

C.
$$\frac{2}{(a+2)}$$

D. $\frac{2}{a}$

Answer: C

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Exercise More Than One Correct Option Type Questions

1. The equation of image of pair of lines y = |x - 1| with respect to y-axis is :

A. y=|x+1|

B. y=|x-1|+3

C.
$$x^2-y^2+2x+1=0$$

D.
$$x^2 - y^2 + 2x - 1 = 0$$

Answer: A::C

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2. If the equation $ax^2 + by^2 + cx + cy = 0$ represents a pair of straight

lines, then

A. a+b=0

B. c=0

C. a+c=0

D. c(a+b)=0

Answer: A::B::D



3. If $x^2+lpha y^2+2eta y=a^2$ represents a pair of perpendicular straight lines , then A. $lpha=1,\,eta=a$

- $\texttt{B.}\,\alpha=1,\beta=\ -a$
- $\mathsf{C}.\,\alpha=\,-\,1,\beta=\,-\,a$
- $\mathsf{D}.\,\alpha=\,-\,1,\beta=a$

Answer: C::D

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4. If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on the y-axis then

A.
$$f^2 = bc$$

B. abc=2fgh

$$\mathsf{C}.\,bg^2\neq ch^2$$

D.
$$2fgh = bg^2 + ch^2$$

Answer: A::D

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5. Two pair of straight lines have the eqautions
$$y^2 + xy - 12x^2 = 0$$
 and $ax^2 + 2hxy + by^2 = 0$. One line will be common among them if

A. a=-3(2h+3b)

B. a=8 (h-2b)

C. a=2(b+h)

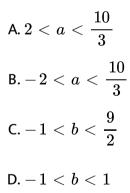
D. a=-3(b+h)

Answer: A::B

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6. The three sides of a triangle are given by $ig(x^2-y^2ig)(2x+3y-6)=0.$

If the points (-2,a) lies inside and (b,1) lies outside the triangle, then



Answer: A::D

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1. Consider the equation of a pair of straight lines as $x^2-3xy+\lambda y^2+3x=5y+2=0$ The value of λ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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2. Consider the equation of a pair of straight lines as $x^2 - 3xy + \lambda y^2 + 3x = 5y + 2 = 0$

The point of intersection of line is (lpha,eta) , then the value of $lpha^2+eta^2$ is

| A. 2 | |
|-------|--|
| B. 5 | |
| C. 10 | |
| D. 17 | |

Answer: C



3. Consider the equation of a pair of straight lines as $x^2 - 3xy + \lambda y^2 + 3x = 5y + 2 = 0$

The angle between the lines is θ then the value of $\cos 2\theta$ is

A.
$$\frac{1}{3}$$

B. $\frac{2}{3}$
C. $\frac{3}{5}$
D. $\frac{4}{5}$

Answer: D



4. Let
$$f_1(x, y) \equiv ax^2 + 2hxy + by^2 = 0$$
 and let $f_{i+1}(x, y) = 0$ denote
the equation of the bisectors of $f_i(x, y) = 0$ for all i=1,2,3,....
 $f_3(x, y) = 0is$
A. $hx^2 - (a - b)xy - hy^2 = 0$
B. $(a - b)x^2 + 4hxy - (a - b)y^2 = 0$
C. $ax^2 + 2hxy + by^2 = 0$

D. None of the above

Answer: B

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5. Let $f_1(x,y)\equiv ax^2+2hxy+by^2=0$ and let $f_{i+1}(x,y)=0$ denote the equation of the bisectors of $f_i(x,y)=0$ for all i=1,2,3,....

If $f_{i+1}(x,y)=0$ repersents the equation of a pair of perpendicular lines , then $f_3(x,y)=0$ is same as

A.
$$f_1(x,y)=0$$

B. $f_2(x,y)=0$
C. $hx^2-(a-b)xy-hy^2=0$

D. None of the above

Answer: A

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6. Let $f_1(x,y)\equiv ax^2+2hxy+by^2=0$ and let $f_{i+1}(x,y)=0$ denote

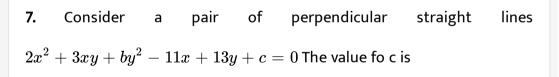
the equation of the bisectors of $f_i(x,y)=0$ for all i=1,2,3,....

The value of $\sum_{n=2}^5 rac{f_{n+2}(x,y)}{f_n(x,y)} is$

| A. 14 | | |
|-------|--|--|
| B. 4 | | |
| C. 54 | | |
| D. 6 | | |

Answer: B

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A. -2

B. 2

C. -3

D. 3

Answer: A

8. Consider a pair of perpendicular straight lines $2x^2 + 3xy + by - 11x + 13y + c = 0$ The value of |b+2c|is A. 4 B. 6 C. 8 D. 10

Answer: B



9. Consider a pair of perpendicular straight lines $2x^2 + 3xy + by - 11x + 13y + c = 0$ The value fo c is

| A. 2 | | |
|------|--|--|
| B. 3 | | |
| C. 4 | | |
| D. 5 | | |

Answer: C

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Exercise Single Integer Answer Type Questions

1. Equation $\lambda x^3 - 10x^2y - xy^2 + 4y^3 = 0$ represented three straight lines ,out of these three , two makes equal angle with y=x $\lambda < 0$, then the value of λ is

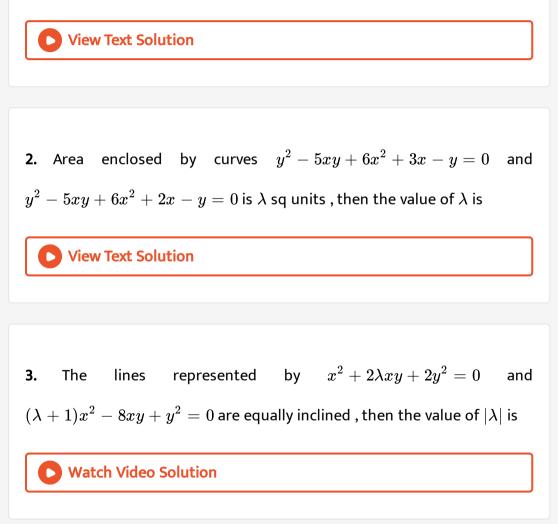
A. Area enclosed by curves $y^2-5xy+6x^2+3x-y=0$ and

 $y^2-5xy+6x^2+2x-y=0is\lambda$ sq units , then the value of λ is



D.

Answer: (7)



4. If the lines joining the origin to the intersection of the line y=nx+2 and the curve $x^2+y^2=1$ are at right angles, then the value of n^2 is

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5. Area of the triangle formed by the line x + y = 3 and angle bisectors of the pair of straight lines $x^2 - y^2 + 2y = 1$ is 2squal nits b. 4squal nits c. 6squal nits d. 8squal nits

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Exercise Statement I And Ii Type Questions

1. Statement I. The four straight lines given by

 $6x^2+5xy-6y^2=0 ext{ and } 6x^2+5xy-6y^2-x+5y-1=0$ are the sides of a square .

Statement II . The lines represented by general equation of second

degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ are perpendicular if a+b=0.

- A. Statement I is true, Statement II is true , Statement II is a correct explanation for Statement I
- B. Statement I is true , Statement II is true , Statement II is not a

correct explanation for statement I

C. Statement I is true, Statement II is false

D. Statement I is false , Statement II is true

Answer: b

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2. Statement I. Two of the straight lines represented by $dx^3+cx^2y+bxy^2+ay^3=0$ will be at right angles if $d^2+bd+bc+a^2=0$

Statement II. Product of the slopes of two perpendicular line is -1

A. Statement I is true, Statement II is true, Statement II is a correct

explanation for Statement I

B. Statement I is true, Statement II is true, Statement II is not a

correct explanation for statement I

C. Statement I is true, Statement II is false

D. Statement I is false, Statement II is true

Answer: b

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3. Statement I. if $\alpha\beta = -1$ then the pair of straight lines $x^2 - 2\alpha xy - y^2 = 0$ and $y^2 + 2\beta xy - x^2 = 0$ are the angle bisector of each other.

Statement II. Pair of angle bisector lines of the pair of lines $ax^2+2hxy+by^2=0ishig(x^2-y^2ig)=(a-b)xy.$

A. Statement I is true, Statement II is true, Statement II is a correct

explanation for Statement I

B. Statement I is true, Statement II is true, Statement II is not a

correct explanation for statement I

C. Statement I is true, Statement II is false

D. Statement I is false, Statement II is true

Answer: a

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4. Statement 1 : If -h2 = a + b, then one line of the pair of lines $ax^2 + 2hxy + by^2 = 0$ bisects the angle between the coordinate axes in the positive quadrant. Statement 2 : If ax + y(2h + a) = 0 is a factor of $ax^2 + 2hxy + by^2 = 0$, then b + 2h + a = 0 Both the statements are true but statement 2 is the correct explanation of statement 1. Both the statements are true but statement 2 is not the correct explanation of

statement 1. Statement 1 is true and statement 2 is false. Statement 1 is false and statement 2 is true.

A. Statement I is true, Statement II is true, Statement II is a correct

explanation for Statement I

B. Statement I is true , Statement II is true , Statement II is not a

correct explanation for statement I

C. Statement I is true, Statement II is false

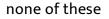
D. Statement I is false, Statement II is true

Answer: b

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Exercise Subjective Type Questions

1. The straight lines represented by $(y-mx)^2=a^2ig(1+m^2ig)$ and $(y-nx)^2=a^2ig(1+n^2ig)$ from a rectangle (b) rhombus trapezium (d)





2. Prove that the equation m $\left(x^3-3xy^2
ight)+y^3-3x^2y=0$ represents

three straight lines equally inclined to each other.

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3. Show that straight lines $(A^2 - 3b^2)x^2 + 8ABxy(b^2 - 3A^2)y^2 = 0$ form with the line Ax + By + C = 0 an equilateral triangle of area $\frac{C^2}{\sqrt{3(A^2 + B^2)}}$.

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4. Find the equations of the diagonals of the parallelogram formed by the

lines

 $L^2 - aL = 0$ and $L'^2 - aL' = 0$, where

$$L = x \cos \theta + y \sin \theta - p$$
 and $L' = \cos \theta' + y \sin \theta' - p'$

5. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ and $ax^2 + 2hxy + by^2 - 2gx - 2fy + c = 0$ each represents a pair of lines , then prove that the area of the parallelogram enclosed by them is $\frac{2|c|}{\sqrt{h^2 - ab}}$. View Text Solution

6. Prove that lines $ax^2+2hxy+by^2+2gx+2fy+c=0$ are equidistant from the origin , if

 $f^4-g^4=cig(bf^2-ag^2ig)$. Also , find the product of their distances from the origin .

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7. If two of the lines represented by $ax^4 + bx^3y + cx^2y^2 + dxy^3 + ay^4 = 0$ bisects the angle between the other two, then

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Exercise Questions Asked In Previous 13 Years Exam

1. If the pair of lines $ax^2 + 2(a + b)xy + by^2 = 0$ lie along diameters of a circle and divide the circle into four sectors such that the area of one of the sectors is thrice the area of another sector then

A.
$$3a^2+2ab+3b^2=0$$

$$\mathsf{B}.\, 3a^2 + 10ab + 3b^2 = 0$$

$$\mathsf{C.}\, 3a^2 - 2ab + 3b^2 = 0$$

D.
$$3a^2 - 10ab + 3b^2 = 0$$

Answer: A

2. If one of the lines of $my^2 + ig(1-m^2ig)xy - mx^2 = 0$ is a bisector of

the angle between the lines xy = 0, then m is

A. $-\frac{1}{2}$ B. -2

C. 1

D. 2

Answer: C

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