MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

PAIR OF LINES

Laq

1. If the equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of lines then prove that the equation of the pair of angular bisection is $h\left(x^2 - y^2\right) = (a - b)xy = 0.$

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2. Prove that the aea of the triangle formed by $y = x + c$ and the pair of lines $ax^2 + 2hxy = by^2 = 0$ is $\frac{e^2\sqrt{h^2 - ab}}{|a + b + 2h|}$ sq. units.

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3. Show that the product of the perpendicular from (alpha,beta) to the pair of lines $S \equiv ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ is $\frac{|a\alpha^2 + 2h\alpha\beta + 2g\alpha + 2f\beta + c|}{\sqrt{(a-b)^2 + 4h^2}}$ Hence or otherwise find the product of the perpendicular from the origin

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4. Show that product of the perpendicular distances from origin to pair of lines represented by $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ is $\frac{|c|}{\sqrt{(a-b)^2 + 4h^2}}$

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5. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of lines then prove that

$\triangle = abc + 2fgh - af^2 - bg^2 - ch^2 = 0.$

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6. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of lines then prove that

$h^2 \geq ab,\ f^2 \geq bc,\ g^2 \geq ac.$

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7. Prove that the equation $3x^2 + 7xy + 2y^2 + 5x + 5y + 2 = 0$ represents a pair of straight lines. Find the point of intersection. Also find the angle between them.

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8. S.T the equation $2x^2 - 13xy - 7y^2 + x + 23y - 6 = 0$ represents a pair of straight lines. Also find the angle between

them and the coordinates of the point of intersection of the lines.

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9. Find k, if the equation $2x^2 + kxy - 6y^2 + 3x + y + 1 = 0$ represents a pair of lines. Find the point of intersection of the lines and angle between the lines for this value of k.

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10. Find the centroid and area of triangle formed by the lines $3x^2 - 4xy + y^2 = 0, 2x - y = 6.$

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11. Find the centroid and the area of the triangle formed by the lines $2y^2 - xy - 6x^2 = 0, x + y + 4 = 0$

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12. Find the centroid and the area of the triangle formed by the lines $12x^2 - 20xy + 7y^2 = 0, 2x - 3y + 4 = 0$

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13. Prove that the line $lx + my + n = 0$ and the pair of lines $(lx + my)^2 - 3(mx - ly)^2 = 0$ form an equilateral triangle and its area is $\frac{n^2}{\sqrt{3}(l^2 + m^2)}$

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14. Find the area of the triangle formed by the lines $x^2 - 4xy + y^2 = 0$ and $x + y = 1$

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15. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents two parallel lines then prove that $h^2 = ab$.

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16. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents two parallel lines then prove that $af^2 = bg^2$.

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17. If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents two parallel lines then prove that the distance between the parallel lines is $2\sqrt{\frac{g^2 - ac}{a(a+b)}}$ or $2\sqrt{\frac{f^2 - bc}{b(a+b)}}$.

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18. Show that the following equations represents a pair of parallel lines and also find the distance between them.

Show that the equation $8x^2 - 24xy + 18y^2 - 6x + 9y - 5 = 0$ represents a pair of parallel lines and find the distance between them.

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19. If the pair of lines

$6x^2 - 5xy - 6y^2 = 0, 6x^2 - 5xy - 6y^2 + x + 5y - 1 = 0$

form a square then area of square is

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20. Show that two pairs of lines

$3x^2 + 8xy - 3y^2 = 0$ and $3x^2 + 8xy - 3y^2 + 2x - 4y - 1 = 0$

forms a square.

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21. If the pair of lines

$ax^2 + 2hxy + by^2 = 0, ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

form a rhombus then prove that $(a-b)fg+h(f^2-g^2)=0.$

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22. Find the angle between the lines joining the origin to the points of intersection of the curve $x^2+2xy+y^2+2x+2y-5=0$ and the line 3x-y+1=0.

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23. Find the value if k , if the lines joining the origin with the points of intersection of the curve $2x^2-2xy+3y^2+2x-y-1=0$ and the x + 2y = k are mutually perpendicular .

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24. If the straight lines joining the origion with the points of intersection of the curve $3x^2 - xy + 3y^2 + 2x - 3y + 4 = 0$ & the line $2x + 3y = k$ are perpendicular then prove that $6k^2 - 5k + 52 = 0$.

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25. Show that the lines joining the origin with the points of intersection of the curve $7x^2 - 4xy + 8y^2 + 2x - 4y - 8 = 0$ with the line $3x - y = 2$ are mutually perpendicular.

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26. Show that the lines joining the origin to the points of intersection of the curve $x^2 + xy + y^2 + 3x + 3y - 2 = 0$ and the straight line $x - y - \sqrt{2} = 0$are mutually perpendicular .

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27. Find the condition for the chord lx + my=1 of the circle $x^2 + y^2 = a^2$ to subtend a right angle at the origin.

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28. Find the condition for the lines joining the origin to the points of intersection of the circle $x^2 + y^2 = a^2$ and the line lx+my=1 to coincide.

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29. Write down the equation of the pair of straight lines joining the origin to the points of intersection of the $6x - y + 8 = 0$ with the pair of straight lines $3x^2 + 4xy - 4y^2 - 11x + 2y + 6 = 0$. Show that the lines so obtained make equal angles with the coordinates axes.

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30. 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 $(a - b)(x^2 - y^2) + 4hxy = 0$

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31. If one jine of the pair of lines $ax^2 + 2hxy + by^2 = 0$ bisects the angle between the coordinate axes, then prove that $(a+b)^2 = 4h^2$.

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32. Show that the lines $(x+2a)^2 - 3y^2 = 0, x = a$ form an equilateral triangle.

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33. Show that the straight lines represented by $3x^2 + 48xy + 23y^2 = 0, 3x - 2y + 13 = 0$ form an equilateral triangle of area $\frac{13}{\sqrt{3}}$ sq. units

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34. Show that the line $x^2 + 2xy - 35y^2 - 4x + 44y - 12 = 0$ and $5x + 2y - 8 = 0$ are concurrent.

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35. Find the equation of the bisector of the acute angle between the lines $3x - 4y + 7 = 0, 12x + 5y - 2 = 0$

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36. Show that the straight line $y^2 - 4y + 3 = 0$ and $x^2 + 4xy + 4y^2 + 5x + 10y + 4 = 0$ form a parallelogram and find the length of its sides.

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Miscellaneous

1. If two of the sides of a parallelogram are represented by $ax^2 + 2hxy + by^2 = 0$ and $pq + qy = 1$ is one of its diagonals, prove that the other diagonal is $y(bp - hq) = x(aq - hp)$.

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2. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of lines, then show that the square of the distance of their point of intersection from the origin is

$\frac{c(a+b)-f^2-g^2}{ab-h^2}$. Also show that the square of this distance is $\frac{f^2+g^2}{h^2+b^2}$ if the given lines are perpendicular.

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