MATHS

BOOKS - BHARATI BHAWAN MATHS (HINGLISH)

Pair of Straight Lines and Transformation of Axes

Example

1. 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

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2. 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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3. If the equation

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

represents two straights lines, then the product of the perpendicular from the origin on these straight lines, is

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4. The pair of lines joining origin to the points of intersection of, the two curves $ax^2 + 2hxy + by^2 + 2gx = 0$ and $a'x^2 + 2h'xy + b'y^2 + 2g'x = 0$ will be at right angles, if

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5. 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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6. The changed equation of locus $x^2 + 6xy + y^2 = 1$ when the lines x + y = 0 and x-y + 1 = 0 are taken as the new x and y axis respectively is given by

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Exercise

1. 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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2. If the pairs of lines $ax^2 + 2hxy + by^2 = 0$ and $a'x^2 + 2h'xy + b'y^2 = 0$ have one line in common, then $(ab' - a'b)^2$ is equal to

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3. Find the condition that the one of the lines given by

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

may be perpendicular to one of the lines given by

$a'x^2 + 2h'xy + b'y^2 = 0$

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4. Show that the area of the triangle formed by the lines

$ax^2 + 2hxy + by^2 = 0$ and lx+my+n=0

is $\frac{n^2\sqrt{(h^2 - ab)}}{|(am^2 - 2hlm + bl^2)|}$

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5. A pair of perpendicular straight lines is drawn through the origin forming with the line $2x + 3y = 6$ an isosceles triangle

right-angled at the origin. The equation to the line pair is

$5x^2 - 24xy - 5y^2 = 0$ $5x^2 - 26xy - 5y^2 = 0$

$5x^2 + 24xy - 5y^2 = 0$ $5x^2 + 26xy - 5y^2 = 0$

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6. Show that the centroid $(x', y') of the \triangle with sides$ 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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7. 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).

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8. The straight lines represented by $(y-mx)^2=a^2\left(1+m^2\right)$ and $(y-nx)^2=a^2\left(1+n^2\right)$ from a rectangle (b) rhombus trapezium (d) none of these

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9. 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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10. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ resents a pair of parallel lines then prove that

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11. If the pair of straight lines $ax^2 + 2hxy + by^2 = 0$ is rotated about the origin through 90^0 , then find the equations in the new position.

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12. The new equation of the curve $4(x - 2y + 1)^2 + 9(2x + y + 2)^2 = 25,$ if the lines $2x + y + 2 = 0$ and $x - 2y + 1 = 0$ are taken as the new x and y axes respectively is

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13. The acute angle between the lines given by $x^2 + 2(\cos ec\theta)xy + y^2 = 0$ is

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14. The difference of the slopes of the lines given by the equation $x^2\left(\sec^2\theta - \sin^2\theta\right) - 2xy\tan\theta + y^2\sin^2\theta = 0$ is.

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15. If the pair of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then

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16. The equation $12x^2 + 7xy - 12y^2 - 18x + y + 6 = 0$ represents

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17. The number of values of λ for which the bisectors of the angle between the lines $ax^2 + 2hxy + by^2 + \lambda(x^2 + y^2) = 0$ are the same as those of $ax^2 + 2hxy + by^2 = 0$ is

A. two

B. one

C. zero

D. infinite

Answer:

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18. If one of the lines of $ax^2 + 2hxy + by^2 = 0$ bisects the angle between the axes, in the first quadrant, then

A. $(a-b)^2 = 4h^2$

B. $(a+b)^2 + 4h^2 = 0$

C. $(a+b)^2 = 4h^2$

D. $(a-b)^2 + 4h^2 = 0$

Answer:

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19. The equation $(x+y+1)^2+k(x^2+y^2+1)=0$ represents two straight lines then one of the possible values of k is

A. k=0

B. k=3

C. k=0 or -3

D. none of these

Answer:

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20. The equation $4x^2-24xy+11y^2=0$ represents

A. two parallel lines

B. a circle

C. two perpendicular lines

D. two lines throught the origin

Answer:

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21. The value of c^2 for which the lines joining the origin to the points of intersection of the line $y = \sqrt{3}x + c$ and the circle $x^2 + y^2 = 2$ are perpendicular to each other is

A. 1

B. 0

C. -2

D. 2

Answer:

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22. If pairs of opposite sides of a quadrilateral are $x^2 - 7x + 6 = 0$ and $y^2 - 14y + 40 = 0$ then equations of its diagonals are

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