MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

PAIR OF STRAIGHT LINES

Examples

1. Find the lines whose combined equation is $6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$

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2. Find the distance between the pair of parallel lines

$x^2 + 4xy + 4y^2 + 3x + 6y - 4 = 0$

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3. Find the value of λ if $2x^2 + 7xy + 3y^2 + 8x + 14t + \lambda = 0$ represents a pair of straight lines

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4. Does equation $x^2 + 2y^2 - 2\sqrt{3}x - 4y + 5 = 0$ satisfies the condition

$abc + 2gh - af^2 - bg^2 - ch^2 = 0$? Does it represent a pair of straight lines?

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5. If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on the y-axis, then prove that $2fgh = bg^2 + ch^2$

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6. Find the coordinates of points where pair of lines given by equation

$2x^2 - 6y^2 + xy - 2x + 17y - 12 = 0$ intersect line $x = 1$.

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7. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ respresent the pair of parallel straight lines , then prove that $h^2 = ab$ and $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$.

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8. Find the equation of component lines whose combined equation is

$6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$ without solving for xor y.

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9. If the component lines whose combined equation is $px^2 - qxy - y^2 = 0$ make the angles α and β with x-axis , then find the value of tan $(\alpha + \beta)$.

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10. Find the joint equation of the pair of lines which pass through the origin and are perpendicular to the

lines represented the equation

$y^2 + 3xy - 6x + 5y - 14 = 0$

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11. 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_____

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12. 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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13. Find acute and obtuse angle between companent lines whose combined equation is $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0.$

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14. Find the value of a for which the lines represented by $ax^2 + 5xy + 2y^2 = 0$ are mutually perpendicular.

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15. If the pair of straight lines $ax^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ are such that each pair bisects the angle between the other pair , then prove that $pq = -1$.

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16. Prove that the straight lines joining the origin to the points of intersection of the straight line $hx + ky = 2hk$ and the curve $(x-k)^2 + (y-h)^2 = c^2$ are at right angle if $h^2 + k^2 = c^2$.

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17. Find the angle between the lines joining the origin to the points of intersection of the straight line $y = 3x + 2$ with the curve $x^2 + 2xy + 3y^2 + 4x + 8y = 11 = 0.$

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18. 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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19. Prove that the product of the perpendiculars from (α, β) to the pair of lines $ax^2 + 2hxy + by^2 = 0$ is $\frac{a\alpha^2 - 2h\alpha\beta + \eta^2}{\sqrt{(a-b)^2 + 4h^2}}$

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20. If the distance of a point (x_1, y_1) from each of the two straight lines, which pass through the origin of coordinates, is δ, then the two lines are given by

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21. 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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22. All chords of the curve $3x^2 - y^2 - 2x + 4y = 0$ which subtend a right angle at the origin, pass through the fixed point

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Exercise 3 1

1. Find the combined equation of the pair of lines through the point (1, 0) and parallel to the lines represented by $2x^2 - xy - y^2 = 0$

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2. Prove that the equation $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0$ represents a pair of straight lines. Find the coordinates of their point of intersection and also the angle between them.

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3. If one of the lines of the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between the positive direction of the axes. Then find the relation for $a, b, and h.$

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4. 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.

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5. If the equation $2x^2 + kxy + 2y^2 = 0$ represents a pair of real and distinct lines, then find the values of k.

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6. Find the point of intersection of the pair of straight lines represented by the equation $6x^2 + 5xy - 21y^2 + 13x + 38y - 5 = 0$.

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Exercise 3 2

1. If the slope of one line is double the slope of another line and the combined equation of the pair of lines is $\left(\frac{x^2}{a}\right)+\left(\frac{2xy}{h}\right)+\left(\frac{y^2}{b}\right)=0$, then find the ratio $ab:h^2$.

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2. Find the angle between the lines represented by $x^2+2xy\sec\theta+y^2=0$

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

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4. If θ is the angle between the lines given by the equation $6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$, then find the equation of the line passing through the point of intersection of these lines and making an angle θ with the positive x-axis.

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5. 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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6. Find the equation of the bisectors of the angles between the lines joining the origin to the point of intersection of the straight line $x - y = 2$ with the curve $5x^2 + 11xy = 8y^2 + 8x - 4y + 12 = 0$

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7. Show that the pairs of straight lines $2x^2 + 6xy + y^2 = 0$ and $4x^2 + 18xy + y^2 = 0$ have the same set of angular bisector.

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Exercise Single

1. The angle between the pair of lines whose equation is $4x^2 + 10xy + my^2 + 5x + 10y = 0$, is

A. $\tan^{-1}(3/8)$

B. $\tan^{-1}(3/4)$

C. $\tan^{-1}\left\{2\sqrt{25-4m/(m+4)}\right\}, m \in R$

D. None of these

Answer: 2

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2. The two lines represented by $3ax^2 + 5xt + \left(a^2 - 2\right)y^2 = 0$ are perpendicular to each other for

A. two values of a

B. a

C. for one value of a

D. for no value of a

Answer: 1

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3. The distance between the two lines represented by the sides of an equilateral triangle a right-angled triangle an isosceles triangle none of these

A. $8/5$

B. $6/5$

C. $11/5$

D. None of these

Answer: 1

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4. The equation $x - y = 4$ and $x^2 + 4xy + y^2 = 0$ represent the sides of

A. an equilateral triangle

B. a right - angled triangle

C. an isosceles triangle

D. None of these

Answer: A

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5. The straight lines represented by $(y-mx)^2=a^2(1+m^2)$ and $(y-nx)^2=a^2(1+n^2)$ form a

A. rectangle

B. rhombus

C. trepezium

D. None of these

Answer: 2

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6. 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

A. $3x^2 + 8xy - 3y^2 = 0$

B. $3x^2 + 10xy + 3y^2 = 0$

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

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

Answer: B

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7. The condition that one of the straight lines given by the equation $ax^2 + 2hxy + by^2 = 0$ may coincide with one of those given by the equation $a'x^2 + 2h'xy + b'y^2 = 0$ is

A. $(ab' - a'b)^2 = 4(ha' - h'a)(bh' - b'h)$

B. $(ab' = a'b)^2 = (ha' - h'a)(bh' - b'h)$

C. $(ha' - h'a) = 4(ab' - a'b)(bh' - b'h)$

D. $(bh' - b'h)^2 = 4(ab' - a'b)(ha' - h'a)$

Answer: 1

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8. If the represented by the equation $3y^2 - x^2 + 2\sqrt{3}x - 3 = 0$ are rotated about the point $(\sqrt{3}, 0)$ through an angle of 15^0 , on in clockwise direction and the other in anticlockwise direction, so that they become perpendicular, then the equation of the pair of lines in the new position is

$y^2 - x^2 + 2\sqrt{3}x + 3 = 0 \quad y^2 - x^2 + 2\sqrt{3}x - 3 = 0$

$y^2 - x^2 - 2\sqrt{3}x + 3 = 0 \, y^2 - x^2 + 3 = 0$

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

B. $y^2 - x^2 + 2\sqrt{3}x - 3 = 0$

C. $y^2 - x^2 - 2\sqrt{3}x + 3 = 0$

D. $y^2 - x^2 + 3 = 0$

Answer: 2

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9. The equations of a line which is parallel to the line common to the pair of lines given by $6x^2 - xy - 12y^2 = 0$ and $15x^2 + 14xy - 8y^2 = 0$ and at a distance of 7 units from it ios

A. $3x - 4y = -35$

B. $5x - 2y = 7$

C. $3x + 4y = 35$

D. $2x - 3y = 7$

Answer: 3

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10. The equation $x^2y^2 - 9y^2 + 6x^2y + 54y = 0$ represents

A. a pair of straight lines and a circle

B. a pair of straight lines and a parabola

C. a set of four straight lines forming a square

D. None of these

Answer: 3

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11. The equation $a^2x^2 + 2h(a+b)xy + b^2y^2 = 0$ and $ax^2 + 2hxy + by^2 = 0$ represent two pairs of perpendicular straight lines two pairs of parallel straight lines two pairs of straight lines which are equally inclined to each other none of these

A. two pair of perpendicular straight lines

B. two pairs of parallel straight lines

C. two pairs of straight lines which are equally inclined to each other

D. None of these

Answer: 3

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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) $a+2$ $2(a+2)$ (d) $\frac{2}{a}$

A. $a-2$

B. $a+2$

C. $2/(a+2)$

D. $2/a$

Answer: 3

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13. If two lines represented by $x^4+x^3y+cx^2y^2-xy^3+y^4=-$ bisector of the angle between the other two, then the value of c is 0 (b) -1 (c) 1 (d) -6

A. 0

B. -1

C. 1

D. -6

Answer: 4

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14. Through a point A on the x-axis, a straight line is drawn parallel to the y-axis so as to meet the pair of straight lines $ax^2 + 2hxy + by^2 = 0$ at B and C. If $AB = BC$, then $h^2 = 4ab$ (b) $8h^2 = 9ab$ $9h^2 = 8ab$ (d) $4h^2 = ab$

A. $h^2 = 4ab$

B. $8h^2 = 9ab$

C. $9h^2 = 8ab$

D. $4h^2 = ab$

Answer: 2

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15. 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: 4

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16. The straight lines represented by the equation $135x^2 - 136xy + 33y^2 = 0$ are equally inclined to the line $x - 2y = 7$ (b) x+2y=7 $x - 2y = 4$ (d) $3x + 2y = 4$

A. $x - 2y = 7$

B. $x + 2y = 7$

C. $x - 2y = 4$

D. $3x + 2y = 4$

Answer: 2

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17. If the slope of one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ is the square of the other , then $\frac{a+b}{h} + \frac{8h^2}{ab} =$

A. 4

B. 6

C. 8

D. None of these

Answer: 2

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18. $x + y = 7$ and $ax^2 + 2hxy + ay^2 = 0, (a \neq 0)$, are three real distinct lines forming a triangle. Then the triangle is isosceles (b) scalene equilateral (d) right angled

A. isosceles

B. scalene

C. equilateral

D. right - angled

Answer: 1

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19. 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. Both the statements are true but statement 2 is the correct explanation of statement 1.

B. Both the statements are true but statement 2 is not the correct explanation of statement 1.

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

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

Answer: 2

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20. The orthocenter of the triangle formed by the lines $xy = 0$ and $x + y = 1$ is

A. $(1/2, 1/2)$

B. $(1/3, 1/3)$

C. $(0, 0)$

D. $(1/4, 1/4)$

Answer: 3

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21. Let PQR be a right - angled isosceles triangle , right angled at P(2,1). If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is

A. $3x^2 - 3y^2 + 8xy + 20x + 10y + 25 = 0$

B. $3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$

C. $3x^2 - 3y^2 + 8xy + 10x + 15y + 20 = 0$

D. $3x^2 - 3y^2 - 8xy - 15y - 20 = 0$

Answer: B

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22. Area of the triangle formed by the line $x + y = 3$ and the angle bisectors of the pairs of straight lines $x^2 - y^2 + 2y = 1$ is

A. 2 sq . Units

B. 4 sq . Units

C. 6 sq. units

D. 8 sq. units

Answer: A

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23. The orthocentre of the triangle formed by the lines $2x^2 + 3xy - 2y^2 - 9x + 7y - 5 = 0$ with $4x + 5y - 3 = 0$ is

A. $(3/5, 11/5)$

B. $(6/5, 11/5)$

C. $(5/6, 11/5)$

D. $(3/5, 6/5)$

Answer: 1

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Exercise Multiple

1. The equation $x^3 + x^2y - xy^2 = y^3$ represents

A. three real straight lines

B. lines in which two of them are perpendicular to each other

C. lines in which two of them are coincident

D. None of these

Answer: 1 , 2 , 3

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2. The straight lines represented by $x^2 + mxy - 2y^2 + 3y - 1 = 0$ meet at $\left(-\frac{1}{3}, \frac{2}{3}\right)$ (b) $\left(-\frac{1}{3}, -\frac{2}{3}\right)$ $\left(\frac{1}{3}, \frac{2}{3}\right)$ (d) none of these

A. $(-1/3, 2/3)$

B. $(-1/3, -2/3)$

C. $(-1/3, -2/3)$

D. None of these

Answer: 1, 3

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

A. 1

B. 2

C. $-1/2$

D. -1

Answer: 1, 4

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4. If $x^2 + 2hxy + y^2 = 0$ represents the equation of the straight lines through the origin which make an angle α with the straight line $y + x = 0$ $sec2\alpha = h$ $\cos\alpha = \sqrt{\frac{(1+h)}{(2h)}}$ $2\sin\alpha = \sqrt{\frac{(1+h)}{h}}$ (d) $\cot\alpha = \sqrt{\frac{(1+h)}{(h-1)}}$

A. $\sec 2\alpha = h$

B. $\cos\alpha = \sqrt{(1+h)/(2h)}$

C. $2\sin\alpha = \sqrt{(1+h)/h}$

D. $\cot\alpha = \sqrt{(h+1)/(h-1)}$

Answer: 1,2,4

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5. The combined equation of three sides of a triangle is $(x^2 - y^2)(2x + 3y - 6) = 0$. If $(-2, a)$ is an interior point and $(b, 1)$ is an exterior point of the triangle, then `2

A. $2 < a < 10/3$

B. $-2 < a < 10/3$

C. $-1 < b < 9/2$

D. $-1 < b < 1$

Answer: 1,4

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6. If one of the lines given by the equation $2x^2 + pxy + 3y^2 = 0$ coincide with one of those given by $2x^2 + qxy - 3y^2 = 0$ and the other lines represented by them are perpendicular , then value of $p + q$is

A. 6

B. -6

C. -7

D. 7

Answer: 1 ,2

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7. 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. 4

C. 7

D. 3

Answer: 1,2,3,4

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8. If the equatoin $ax^2 - y^2 + bx + cy + d = 0$ represents a pair of lines whose slopes are m and m^2, then value (s) of a is /are

A. $a = -8$

B. $a = 8$

C. $a = 27$

D. $a = -27$

Answer: 2, 4

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9. Two pairs of straight lines have the equations $y^2 + xy - 12x^2 = 0$ and $ax^2 + 2hxy + by^2 = 0$.

One line will be common among them if

A. $a + 8h - 16b = 0$

B. $a - 8h + 16b = 0$

C. $a - 6h + 9b = 0$

D. $a + 6h + 9b = 0$

Answer: 2,4

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Exercise Comprehension

1. If $\lambda x^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$, represents a pair of straight lines, then the value of λ is

A. 1

B. 2

C. $3/2$

D. 3

Answer: 2

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2. Consider the equation of a pair of straight lines as $\lambda x^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$. The point of intersection of lines is (α, β). Then the value of $\alpha\beta$ is

A. 35

B. 45

C. 20

D. 15

Answer: 1

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3. Consider the equation of a pair of straight lines as $\lambda x^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$. The angles between the lines is θ. Then the value of $\tan\theta$ is

A. $1/5$

B. $2/9$

C. $1/7$

D. $3/4$

Answer: 3

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4. Consider a pair of perpendicular straight lines $ax^2 + 3xy - 2y^2 - 5x + 5y + c = 0.$

The value of a is

A. 1

B. 3

C. 2

D. -2

Answer: 3

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5. Consider a pair of perpendicular straight lines $ax^2 + 3xy - 2y^2 - 5x + 5y + c = 0.$

The value of c is

A. -3

B. 3

C. -1

D. 1

Answer: 1

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6. Consider a pair of perpendicular straight lines $ax^2 + 3xy - 2y^2 - 5x + 5y + c = 0.$

Distance between the orthocenter and the circumcenter of triangle ABC is

A. 4

B. $9/2$

C. $8/3$

D. $7/4$

Answer: 4

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Exercise Numerical

1. The distance between the lines $(x+7y)^2+4\sqrt{2}(x+7y)-42=0$ is_____

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2. Area of the triangle formed by the lines $y^2-9xy+18x^2=0 and y=6$ is___

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3. The value k for which $4x^2 + 8xy + ky^2 = 9$ is the equation of a pair of straight lines is_____

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4. If the gradient of one of the lines $x^2 + hxy + 2y^2 = 0$ twice that of the other , then sum of possible values of h _____.

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5. One of the bisector of the angle between the lines $a(x-1)^2 + 2h(x-1)(y-2) + b(y-2)^2 = 0$ is

$x + 2y - 5 = 0$. Then other bisector is

(A) $2x - y = 0$

(B) $2x + y = 0$

(C) $2x + y - 4 = 0$

(D) $x - 2y + 3 = 0$

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Single Correct Answer Type

1. A circle rolls between pair of lines $9x^2 + 24xy + 16y^2 - 25 = 0$ touching both of them. Then its area is

A. 4π sq. units

B. 8π sq. units

C. 12π sq. units

D. π sq. units

Answer: D

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2. The value of λ with $|\lambda| < 16$ such that $2x^2 - 10xy + 12y^2 + 5x + \lambda y - 3 = 0$ represents a pair of straight lines is

A. -10

B. -9

C. 10

D. 9

Answer: B

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3. If the equation $2x^2 + 2hxy + 6y^2 - 4x + 5y - 6 = 0$ represents a pair of straight lines, then the length of intercept on the x-axis cut by the lines is equal to

A. 2

B. 4

C. $\sqrt{7}$

D. 0

Answer: B

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4. The joint equation of pair of lines which passes through origin and are perpendicular to the lines represented the equation $y^2 + 3xy - 6x + 5y - 14 = 0$ will be

A. $y^2 - 3xy = 0$

B. $3y^2 - xy = 0$

C. $x^2 - 3xy = 0$

D. $3x^2 - xy = 0$

Answer: C

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5. If the equation $4y^3 - 8a^2yx^2 - 3ay^2x + 8x^3 = 0$ represents three straight lines, two of them are perpendicular, then sum of all possible values of a is equal to

A. $\frac{3}{8}$

B. $\frac{-3}{4}$

C. $\frac{1}{4}$

D. -2

Answer: B

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6. If the lines $3x^2 - 4xy + y^2 + 8x - 2y - 3 = 0$ and $2x - 3y + \lambda = 0$ are concurrent, then the value of λ is

A. $4\pi - 11$

B. -11

C. $\frac{1}{11}$

D. 11

Answer: D

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7. A line passes through (2,0). Then which of the following is not the slope of the line, for which its intercept between $y = x - 1$ and $y = -x + 1$ subtends a right angle at the origin?

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

B. $-\sqrt{3}$

C. $\frac{1}{\sqrt{3}}$

D. None of these

Answer: B

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8. If the line passing through $P(1, 2)$ making an angle 45° with the x-axis in the positive direction meets the pair of lines $x^2 + 4xy + y^2 = 0$ at A and B then $PA.\, PB =$

A. $13/3$

B. $13/6$

C. $11/6$

D. $11/3$

Answer: A

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9. Let $y = x$ line is median of the triangle OAB where O is origin. Equation $ax^2 + 2hxy + by^2 = 0, a, h, b \in N,$ represents combined equation of OA and OB. A and B lie on the ordinate $x = 3$. If slope of OA is twice the slope of OB, then greatest possible value of $a + 2h + b$ is

A. 0

B. -2

C. -1

D. Does not exist

Answer: C

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

A. $h\left(1 + m^2\right) = m(a + b)$

B. $h\left(1-m^2\right)=m(a-b)$

C. $h\left(1+m^2\right)=m(a-b)$

D. None of these

Answer: B

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11. $x+y=7$ and $ax^2+2hxy+ay^2=0,(a\neq 0)$, are three real distinct lines forming a triangle. Then the triangle is isosceles (b) scalene equilateral (d) right angled

A. isosceles

B. scalene

C. equilateral

D. right angled triangle

Answer: A

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Multiple Correct Answers Type

1. If $x^2 + 2hxy + y^2 = 0$ represents the equation of the straight lines through the origin which make an angle α with the straight line $y + x = 0$ $sec2\alpha = h$

$\cos\alpha = \sqrt{\frac{(1+h)}{(2h)}}$ $2\sin\alpha = \sqrt{\frac{(1+h)}{h}}$ (d) $\cot\alpha = \sqrt{\frac{(1+h)}{(h-1)}}$

A. $\sec 2\alpha = h$

B. $\cos\alpha = \sqrt{\frac{1+h}{2h}}$

C. $m_1 + m_2 = -2\sec 2\alpha$

D. $\cot\alpha = \sqrt{\frac{h+1}{h-1}}$

Answer: A::B::C::D

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2. Let $o < p < q$ and $a \neq 0$ such that the equation $px^2 + 4\lambda xy + qy^2 + 4a(x + y + 1) = 0$ represents a pair of straight lines, then a can lie in the interval

A. $(-\infty, \infty)$

B. $(-\infty, p]$

C. $[p, q]$

D. $[q, \infty)$

Answer: B::D

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3. $9x^2 + 2hxy + 4y^2 + 6x + 2fy - 3 = 0$ represents two parallel lines. Then

A. $h = 6, f = 2$

B. $h = -6, f = 2$

C. $h = 6, f = -2$

D. $h = -6, f = -2$

Answer: A::D

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4. Given pair of lines $2x^2 + 5xy + 2y^2 + 4x + 5y + a = 0$ and the line $L: bx + y + 5 = 0$. Then

A. $a = 2$

B. $a = -2$

C. There exists no circle which touches the pair of lines and the line L if $b = 5$.

D. There exists no circle which touches the pair of lines and the line L if $b = -5$

Answer: A::C

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5. Equation $x^2 + k_1 y^2 + 2k_2 y = a^2$ represents a pair of perpendicular straight lines if

A. $k_1 = 1, k_2 = a$

B. $k_1 = 1, k_2 = -a$

C. $k_1 = -1, k_2 = -a$

D. $k_1 = -1, k_2 = a$

Answer: C::D

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6. The equation of the diagonal of the square formed by the pairs of lines $xy + 4x - 3y - 12 = 0$ and $xy - 3x + 4y - 12 = 0$ is

A. $x - y = 0$

B. $x + y + 1 = 0$

C. $x + y = 0$

D. $x - y + 1 = 0$

Answer: A::B

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