



## MATHS

### BOOKS - SAI MATHS (TELUGU ENGLISH)

#### PAIR OF STRAIGHT LINES

##### Problem

1. The combined equation of the straight lines passing through the point  $(4,3)$  and each line making intercepts on the coordinate axes whose sum is  $-1$  is

A.  $(3x - 2y - 6)(x - 2y + 2) = 0$

B.  $(3x - 2y + 6)(x - 2y + 2) = 0$

C.  $(3x - 2y - 6)(x - 2y - 2) = 0$

D.  $(3x - 2y + 6)(x - 2y - 2) = 0$

**Answer: A**



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2. The line  $x + y = k$  meets the pair of straight lines  $x^2 + y^2 - 2x - 4y + 2 = 0$  in two points of

A and B . If O is the origin and  $\angle AOB = 90^\circ$  then the value of  $k > 1$  is ,

A. 5

B. 4

C. 3

D. 2

**Answer: D**



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3. Two pairs of straight lines with combined equations  $xy + 4x - 3y - 12 = 0$  and  $xy - 3x + 4y - 12 = 0$  form a square. Then the combined equation of its diagonals is

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

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

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

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

**Answer: C**



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4. The angle between the straight lines represented by

$$(x^2 + y^2) \sin^2 \alpha = (x \cos \alpha - y \sin \alpha)^2 \text{ is}$$

A.  $\frac{\alpha}{2}$

B.  $\alpha$

C.  $2\alpha$

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

**Answer: C**



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5. If the slope of one of the lines represented by  $ax^2 - 6xy + y^2 = 0$  is the square of the other , then the value of a is

A.  $-24$  or  $8$

B.  $-3$  or  $2$

C.  $-64$  or  $27$

D.  $-4$  or  $3$

**Answer: A**



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6. The area (in sq. units ) of the triangle formed by the lines  $x^2 - 3xy + y^2 = 0$  and  $x + y + 1 = 0$ , is

A.  $\frac{2}{\sqrt{3}}$

B.  $\frac{\sqrt{3}}{2}$

C.  $5\sqrt{2}$

D.  $\frac{1}{2\sqrt{5}}$

**Answer: D**



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7. If  $x^2 + \alpha y^2 + By = a^2$  represents a pair of perpendicular lines, then  $\beta$  equals to,

A.  $4a$

B.  $a$

C.  $2a$

D.  $3a$

**Answer: B**



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8. The equation of the pair of lines passing through the origin whose sum and product of slopes are respectively the arithmetic mean and geometric mean of 4 and 9 is

A.  $12x^2 - 13xy + 2y^2 = 0$

B.  $12x^2 + 13xy + 2y^2 = 0$

C.  $12x^2 - 15xy + 2y^2 = 0$

D.  $12x^2 + 15xy - 2y^2 = 0$

**Answer: A**



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9. The equation

$x^2 - 5xy + py^2 + 3x - 8y + 2 = 0$  represents a

pair of straight lines . If  $\theta$  is the angle between

them , then  $\sin \theta$  is equal to

A.  $\frac{1}{\sqrt{50}}$

B.  $\frac{1}{7}$

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

D.  $\frac{1}{\sqrt{10}}$

**Answer: A**



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10. If the equation

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

represents a pair of straight lines, then the square of the distance of their point of intersection from the origin is

A.  $\frac{c(a + b) - af^2 - bg^2}{ab - h^2}$

B.  $\frac{c(a + b) + f^2 + g^2}{ab - h^2}$

C.  $\frac{c(a + b) - f^2 - g^2}{ab - h^2}$

D.  $\frac{c(a + b) - f^2 - g^2}{(ab - h^2)^2}$

**Answer: C**



11. The distance between the parallel lines given by  $(x + 7y)^2 + 4\sqrt{2}(x + 7y) - 42 = 0$  is

A.  $\frac{4}{5}$

B.  $4\sqrt{2}$

C. 2

D.  $10\sqrt{2}$

**Answer: C**

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12. If the area of the triangle formed by the pair of lines  $8x^2 - 6xy + y^2 = 0$  and the line  $2x + 3y = a$  is 7, then  $a$  is equal to

A. 14

B.  $14\sqrt{2}$

C.  $28\sqrt{2}$

D. 28

**Answer: D**



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13. If the pair of lines given by  $(x^2 + y^2) \cos^2 \theta = (x \cos \theta + y \sin \theta)^2$  are perpendicular to each other, then  $\theta$  is equal to

A. 0

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

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

D.  $\frac{3\pi}{4}$

**Answer: B**



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14. If one of the lines in the pair of straight lines given by  $4x^2 + 6xy + ky^2 = 0$  bisects the angle between the coordinate axes, then  $k \in$

A.  $\{-2, -10\}$

B.  $\{-2, 10\}$

C.  $\{-10, 2\}$

D.  $\{2, 10\}$

**Answer: C**



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

$\sqrt{\frac{g^2 - ac}{f^2 - bc}}$ , is equal to

A.  $\frac{a}{b}$

B.  $\sqrt{\frac{a}{b}}$

C.  $\sqrt{\frac{b}{a}}$

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

**Answer: B**



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16. If  $s$  and  $p$  are respectively the sum and the product of the slopes of the lines  $3x^2 - 2xy - 15y^2 = 0$  then  $s : p$  is equal to

A. 4 : 3

B. 2 : 3

C. 3 : 5

D. 3 : 4

**Answer: B**



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17. The distance between the two lines represented by

$$8x^2 - 24xy + 18y^2 - 6x + 9y - 5 = 0 \text{ is}$$

A. 0

B.  $\frac{3}{4\sqrt{13}}$

C.  $\frac{6}{\sqrt{13}}$

D.  $\frac{7}{2\sqrt{13}}$

**Answer: C**



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18. A pair of perpendicular lines passes through the origin and also through the points of intersection of the curve  $x^2 + y^2 = 4$  with  $x + y = a$ , where  $a > 0$ . Then  $a$  is equal to

A. 2

B. 3

C. 4

D. 5

**Answer: A**



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19. If  $3x^2 - 11xy + 10y^2 - 7x + 13y + k = 0$

denotes a pair of straight lines, then the point of intersection of the lines is

A.  $(1, 3)$

B.  $(3, 1)$

C.  $(-3, 1)$

D.  $(1, -3)$

**Answer: B**



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20. If  $m_1$  and  $m_2$  are the roots of the equation  $x^2 + (\sqrt{3} + 2)x + (\sqrt{3} - 1) = 0$  then the area of the triangle formed by the lines  $x = m_1x$ ,  $y = m_2x$  and  $y = c$ , is

A.  $\left( \frac{\sqrt{33} - \sqrt{11}}{4} \right) c^2$

B.  $\left( \frac{\sqrt{33} + \sqrt{11}}{4} \right) c^2$

C.  $\left( \frac{\sqrt{11} - \sqrt{33}}{2} \right) c^2$

D.  $\frac{\sqrt{33}}{2} c^2$

**Answer: B**



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21. The value of  $\lambda$  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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22. The area (in square unit) of the triangle formed by  $x + y + 1 = 0$  and the pair of straight lines  $x^2 - 3xy + 2y^2 = 0$  is

A.  $\frac{7}{12}$

B.  $\frac{5}{12}$

C.  $\frac{1}{12}$

D.  $\frac{1}{6}$

**Answer: C**



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23. The pairs of straight line  $x^2 - 3xy + 2y^2 = 0$

and  $x^2 - 3xy + 2y^2 + x - 2 = 0$  form a

- A. square but not rhombus
- B. rhombus
- C. parallelogram
- D. rectangle but not a square

**Answer: C**



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24. The value of  $\lambda$  such that

$$\lambda x^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$$

represents a pair of straight lines, is

A. 1

B. -1

C. 2

D. -2

**Answer: C**



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25. A pair of perpendicular straight lines passes through the origin and also through the point of intersection of the curve  $x^2 + y^2 = 4$  and  $x + y = a$ . The set containing the value of  $a$  is

A.  $\{-2, 2\}$

B.  $\{-3, 3\}$

C.  $\{-4, 4\}$

D.  $\{-5, 5\}$

**Answer: A**



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**26.** In order to eliminate the first degree terms from the equation

$$2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$$

The point to which origin is to be shifted is

A.  $(1, -3)$

B.  $(2, 3)$

C.  $(-2, 3)$

D.  $(1, 3)$

**Answer: C**



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27. 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. 20

B. 13

C.  $1/5$

D. 5

**Answer: A**



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28. If the lines

$$x^2 + 2xy - 35y^2 - 4x + 44y - 12 = 0 \quad \text{and}$$

$5x + \lambda y - 8 = 0$  are concurrent, then the value

of  $\lambda$  is,

A. 0

B. 1

C. -1

D. 2

**Answer: D**



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29. The lines represented by the equation

$$x^2 - y^2 - x + 3y - 2 = 0 \text{ are}$$

A.  $x + y = 1 = 0, x - y + 2 = 0$

B.  $x - y - 2 = 0, x + y + 1 = 0$

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

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

**Answer: D**



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30. The centroid of the triangle formed by the pair of straight lines  $12x^2 - 20xy + 7y^2 = 0$  and the line  $2x - 3y + 4 = 0$ , is

A.  $\left(-\frac{7}{3}, \frac{7}{3}\right)$

B.  $\left(-\frac{8}{3}, \frac{8}{3}\right)$

C.  $\left(\frac{8}{3}, \frac{8}{3}\right)$

D.  $\left(\frac{4}{3}, \frac{4}{3}\right)$

**Answer: C**



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31. If the bisectors of the angles of the lines represented by  $3x^2 - 4xy + 5y^2 = 0$  and  $5x^2 + 4xy + 3y^2 = 0$  are same, then the angle made by the lines represented by first with the second, is

A.  $30^\circ$

B.  $60^\circ$

C.  $45^\circ$

D.  $90^\circ$

**Answer: D**



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32. The product of the perpendicular distances from the origin on the pair of straight lines  $12x^2 + 25xy + 12y^2 + 10x + 11y + 2 = 0$ , is

A.  $\frac{1}{25}$

B.  $\frac{2}{25}$

C.  $\frac{3}{25}$

D.  $\frac{4}{25}$

**Answer: B**



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33. The angle between the lines represented by

$$y^2 \sin^2 \theta - xy \sin^2 \theta + x^2 (\cos^2 \theta - 1) = 0, \text{ is}$$

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

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

C.  $\frac{\pi}{6}$

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

**Answer: D**



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34. Area of the triangle formed by the lines

$$3x^2 - 4xy + y^2 = 0, 2x - y = 6 \text{ is ,}$$

A. 16 sq unit

B. 25 sq unit

C. 36 sq unit

D. 49 sq unit

**Answer: C**



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35. If the pair of straight lines given by  $Ax^2 + 2Hxy + By^2 = 0$  ( $H^2 > AB$ ) forms an equilateral triangle with line  $ax + by + c = 0$  then  $(A + 3B)(3A + B)$  is equal to

A.  $H^2$

B.  $-H^2$

C.  $2H^2$

D.  $4H^2$

**Answer: D**



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36. The area (in square units) of the quadrilateral formed by two pairs of lines

$$\lambda^2 x^2 - m^2 y^2 - n(\lambda x + my) = 0 \quad \text{and}$$

$$\lambda^2 x^2 - m^2 y^2 + n(\lambda x + my) = 0, \text{ is}$$

A.  $\frac{n^2}{2|\lambda m|}$

B.  $\frac{n^2}{|\lambda m|}$

C.  $\frac{n}{2|\lambda m|}$

D.  $\frac{n^2}{4|\lambda m|}$

**Answer: A**



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37. If the coordinate axes are the bisectors of the angle between the pairs of lines  $ax^2 + 2hxy + by^2 = 0$  , where  $h^2 > ab$  and  $a \neq b$  , then

A.  $a + b = 0$

B.  $h = 0$

C.  $h \neq 0, a + b = 0$

D.  $a + b \neq 0$

**Answer: B**



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38. If the angle  $2\theta$  is acute then the acute angle between the pair of straight lines

$$x^2(\cos \theta - \sin \theta) + 2xy \cos \theta + y^2(\cos \theta + \sin \theta) = 0$$

is

A.  $2\theta$

B.  $\frac{\theta}{2}$

C.  $\frac{\theta}{3}$

D.  $\theta$

**Answer: D**



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39. If the pair of straight lines  $xy - y - y + 1 = 0$  and the line  $ax + 2y - 3a = 0$  are concurrent, then  $a$  equal to

A. 0

B. 1

C. -1

D. 3

**Answer: B**



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40. The orthocentre of triangle formed by the lines  $x + 3y = 10$  and  $6x^2 + xy - y^2 = 0$  is

A.  $(1, 3)$

B.  $(3, 1)$

C.  $(-1, 3)$

D.  $(1, -3)$

**Answer: A**



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41. If one of the lines of pair of straight lines  $ax^2 + 2hxy + by^2 = 0$  bisects the angle between the coordinate axes , then

A.  $a^2 + b^2 = h^2$

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

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

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

**Answer: B**



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42. If the slope of one line is twice the slope of other in the pair of straight lines  $ax^2 + 2hxy + by^2 = 0$  then  $8h^2$  is equal to

A.  $-9ab$

B.  $9ab$

C.  $-7ab$

D.  $7a b$

**Answer: B**



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