Pair of Straight Lines

Choose the most appropriate option (a, b, c or d).

Q 1.   The equation $4x^2 + mxy - 3y^2 = 0$ represents a pair of real and distinct lines if

(a) $m \in R$ (b) $m \in (3, 4)$ (c) $m \in (-3, 4)$ (d) $m > 4$

Q 2.   If $2x^2 + 3xy + my^2 = 0$ represents two real and mutually perpendicular lines then m is

(a) any negative real number   (b) any positive real number

(c) -2   (d) none of these

Q 3.   The equation $kx^2 + 4xy + 5y^2 = 0$ represents two lines inclined at an angle π if k is

(a) $\dfrac{5}{4}$ (b) $\dfrac{4}{5}$ (c) $-\dfrac{4}{5}$ (d) none of these

Q 4.   The equation $x^3 + y^3 = 0$ represents

(a) three real straight lines   (b) three points

(c) the combined equation of a straight line and a circle   (d) none of these

Q 5.   The angle between the pair of lines $y^2 - 2xy \cosec \theta + x^2 = 0, 0 \le \theta \le \dfrac{\pi}{2}$, is

(a) $\dfrac{\pi}{2}$ (b) θ (c) $\dfrac{\pi}{2} - \theta$ (d) none of these

Q 6.   If the slope of one line is double the slope of another line and the combined equation of the pair of lines is $\dfrac{x^2}{a} + \dfrac{2xy}{h} + \dfrac{y^2}{b} = 0$ then $ab : h^2$ is

(a) 9 : 8   (b) 3 : 2   (c) 8 : 3   (d) none of these

Q 7.   The triangle formed by the lines whose combined equation is $(y^2 - 4xy - x^2)(x + y - 1) = 0$ is

(a) equilateral   (b) right angled   (c) isosceles   (d) obtuse angled

Q 8.   The three lies whose combined equation is $y^3 - 4x^2y = 0$ form a triangle which is

(a) isosceles   (b) equilateral   (c) right angled   (d) none of these

Q 9.   The combined equation of the lines l_1, l_2 is $2x^2 + 6xy + y^2 = 0$ and that of the lines m_1, m_2 is $4x^2 + 18xy + y^2 = 0$. If the angle between l_1 and m_2 be α

(a) $\dfrac{\pi}{2} - \alpha$ (b) 2α (c) $\dfrac{\pi}{4} + \alpha$ (d) α

Q 10. The lines represented by $x^2 + 2\lambda xy + 2y^2 = 0$ and the lines represented $(1 + \lambda)x^2 - 8xy + y^2 = 0$ are $(1 + \lambda)x^2 - 8xy + y^2 = 0$ are equally inclined then λ is

(a) any real number   (b) greater than 2   (c) ± 2 (d) less than -2

Q 11. The area of the triangle formed by two rays whose combined equation is $y = |x|$ and the line $x + 2y = 2$ is

(a) $\dfrac{8}{3}$ unit^2 (b) $\dfrac{4}{3}$ unit^2 (c) 4 unit^2 (d) $\dfrac{16}{3}$ unit^2

Q 12. The centroid of the triangle whose three sides are given by the combined equation $(x^2 + 7xy + 2y^2)(y - 1) = 0$

(a) $\left(\dfrac{2}{3}, 0\right)$ (b) $\left(\dfrac{7}{3}, \dfrac{2}{3}\right)$ (c) $\left(-\dfrac{7}{3}, \dfrac{2}{3}\right)$ (d) none of these

Q 13. The orthocenter of the triangle formed by the pair of lines $2x^2 - xy - y^2 + x + 2y - 1 = 0$ and the line $x + y + 1 = 0$ is

(a) (-1, 0)   (b) (0, 1)   (c) (-1, 1)   (d) none of these

Q 14. The angle between the pair of lines whose equation is $4x^2 + 10xy + my^2 + 5x + 10y = 0$ is

(a) $\tan^{-1}\dfrac{3}{8}$ (b) $\tan^{-1}\dfrac{3}{4}$ (c) $\tan^{-1}\dfrac{2\sqrt{25-4m}}{m+4}$, $m \in R$ (d) none of these

Q 15. The combined equation of the pair of lines through the point (1, 0) and parallel to the lines represented by $2x^2 - xy - y^2 = 0$ is

(a) $2x^2 - xy - 2y^2 + 4x - y = 6$ (b) $2x^2 - xy - y^2 - 4x - y + 2 = 0$

(c) $2x^2 - xy - y^2 - 4x + y + 2 = 0$ (d) none of these

Q 16. The equation $x^2 + (\lambda + \mu)xy + \lambda\mu y^2 + x + \mu y = 0$ represents two parallel straight lines if

(a) $\lambda + \mu = 0$ (b) $\lambda = 4\mu$ (c) $\lambda = \mu$ (d) none of these

Q 17. The product of perpendiculars drawn from the point (1, 2) to the pair of lines $x^2 + 4xy + y^2 = 0$ is

(a) $\dfrac{9}{4}$ (b) $\dfrac{3}{4}$ (c) $\dfrac{9}{16}$ (d) none of these

Q 18. If pair of lines represented by $ax^2 + 2hxy + by^2 = 0$, $b \neq 0$, are such that the sum of the slopes of the lines is three the product of their slopes then

(a) $3b + 2h = 0$ (b) $3a + 2h = 0$ (c) $3h + 2a = 0$ (d) none of these

Q 19. The pair of lines $\sqrt{3}x^2 - 4xy + \sqrt{3}y^2 = 0$ are rotated about the origin by $\dfrac{\pi}{6}$ in the anticlockwise sense. The equation of the pair in the new position is

(a) $\sqrt{3}x^2 - xy = 0$ (b) $x^2 - \sqrt{3}xy = 0$ (c) $xy - \sqrt{3}y^2 = 0$ (d) none of these

Q 20.   The equation of the image of the pair of rays y = |x| by the line x = 1 is

(a) |y| = x + 2   (b) |y| + 2 = x   (c) y = |x − 2| (d) none of these

Q 21.   Two lines represented by the equation $x^2 - y^2 - 2x + 1 = 0$ are rotated about the point (1, 0), the line making the bigger angle with the positive direction of the x-axis being turned by 45° in the clockwise sense and the other line being turned by 15° in the anticlockwise sense. The combined equation of the pair of lines in their new positions is

(a) $\sqrt{3}x^2 - xy + 2\sqrt{3}x - y + \sqrt{3} = 0$ (b) $\sqrt{3}x^2 - xy - 2\sqrt{3}x + y + \sqrt{3} = 0$

(c) $\sqrt{3}x^2 - xy - 2\sqrt{3}x + \sqrt{3} = 0$ (d) none of these

Choose the correct options. One or more options may be correct.

Q 22.   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

Q 23.   The combined equation of two sides of an equilateral triangle is $x^2 - 3y^2 - 2x + 1 = 0$. If the length of a side of the triangle is 4 then the equation of the third side is

(a) $x = 2\sqrt{3} + 1$ (b) $y = 2\sqrt{3} + 1$ (c) $x + 2\sqrt{3} = 1$ (d) $x = 2\sqrt{3}$

Q 24.   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 = -3(2h + 3b)   (b) a = 8(h − 2b)   (c) a = 2(b + h)   (d) a = -3(b + h)

Q 25.   If one of the lines of $my^2 + (1 - m^2)xy - mx^2 = 0$ is a bisector of the angle between the lines xy = 0 then m is

(a) 1   (b) 2   (c) $-\dfrac{1}{2}$ (d) -1

Q 26.   The straight lines represented by $x^2 + mxy - 2y + 3y - 1 = 0$ meet at

(a) $\left(-\dfrac{1}{3}, \dfrac{2}{3}\right)$ (b) $\left(-\dfrac{1}{3}, -\dfrac{2}{3}\right)$ (c) $\left(\dfrac{1}{3}, \dfrac{2}{3}\right)$ (d) none of these

Q 27.   If the chord y = mx + 1 of the circle $x^2 + y^2 = 1$ subtends an angle of measure 45° at the major segment of the circle then the value of m is

(a) 2   (b) 1   (c) -1   (d) none of these

Q 28. The equation $2x^2 - 3xy - py^2 + x + qy - 1 = 0$ represents two mutually perpendicular lines if

(a) p = 3, q = 2   (b) p = 2, q = 3   (c) p = -2, q = 3   (d) p = 2, q = $-\dfrac{9}{2}$

Q 29. The diagonals of a square are along the pair of lines whose equation is $2x^2 - 3xy - 2y^2 = 0$. If (2, 1) is a vertex of the square then another vertex consecutive to it can be

(a) (1, -2)   (b) (1, 4)   (c) (-1, 2)   (d) (-1, -4)

Q 30. There is a pair of points, one on each of the lines whose combined equation is $(4x - 3y + 5)(6x + 8y + 5) = 0$. If they are such that the distance of the point on one line is 2 units from the other line then the points are

(a) $\left(\dfrac{1}{10}, \dfrac{9}{5}\right)$ and $\left(\dfrac{1}{2}, -1\right)$ (b) $\left(\dfrac{1}{2}, -1\right)$ and $\left(-\dfrac{23}{10}, -\dfrac{7}{3}\right)$ (c) $\left(\dfrac{1}{10}, \dfrac{9}{5}\right)$ and $\left(-\dfrac{23}{10}, -\dfrac{7}{5}\right)$ (d) none of these

Q 31. The pairs of straight lines $ax^2 + 2hxy - ay^2 = 0$ and $hx^2 - 2axy - hy^2 = 0$ are such that

(a) one pair bisects the angles between the other pair

(b) the lines of one pair are equally inclined to the lines of the other pair

(c) the lines of one pair are perpendicular to the lines of the other pair

(d) none of these

Q 32. If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on the y-axis then

(a) $2fgh = bg^2 + ch^2$ (b) $bg^2 = ch^2$ (c) abc = 2fgh   (d) none of these

Q 33. 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

(a) $2 < a < \dfrac{10}{3}$ (b) $-2 < a < \dfrac{10}{3}$ (c) $-1 < b < \dfrac{9}{3}$ (d) $-1 < b < 1$

1a	2c	3b	4d	5c	6a	7b	8d	9d	10c
11b	12c	13a	14b	15c	16c	17a	18b	19a	20c
21b	22abc	23ac	24ab	25ad	26ac	27bc	28bd	29ac	30ab
31ab	32ab	33ad							