MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

CARTESIAN COORDINATES AND STRAIGHT LINE

Question Bank

1. Divide the join of points P(2, 5) and Q(-7, 4) in the ratio 1 : 2 internally

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2. Divide the join of points P(2, 5) and Q(-7, 4) in the ratio 1 : 2 externally

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3. In what ratio does x-axis divide the line segment joining (2, -3) and (5, 6)

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4. Find the area of the pentagon whose vertices are A(1, 1), B(7,21), C(7,-3) D(12, 2) and E(0, -3).

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5. The midpoints of the sides of a triangle are (1,5,-1), (0,4,-2) & (2,3,4). Find its vertices

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6. Prove that the co-ordinates of the vertices of an equilateral triangle can not be rational.

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7. Find the equation of the curve $x^2 + y^2 - 3x + 5y - 8 = 0$ when the origin is shifted to (1, 2) without changing the direction of axes.

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8. Find the angle through which the axis may be turned about origin , so that the equation of curve $4x^2 + 2\sqrt{3}xy + 2y^2 = 1$ must not have term containing 'xy'

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9. Find the locus of a point which moves such that it distances from the point (0, 0) is thrice its distance from the y axis

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10. A ladder of length l rest against the wall of the room, if the ladder begins to slide on floor, find the locus of the point of which divides the ladder in ratio (2 : 1)

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11. A particle is moving in a vertical line whose equation of motion is given by $s = 32 + 46t + 9t^2$ where 's' is measured in meters and 't' is measured in seconds. Find the velocity and acceleration of the particle at t=3 sec.

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12. Find the equation of the line whose perpendicular distance from the origin is 4 units and the angle which the normal makes with positive direction of x-axis is 15°

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13. Equation of a line is $3x - 4y + 10 = 0$

Find its slope

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14. Equation of a line is $3x - 4y + 10 = 0$

Find its x- and y-intercepts

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15. Find the equation of the right bisector of the line joining (1, 1) and (3, 5)

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16. Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$

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17. Find the equation of the line which passes through the point (3, 4) and the sum if their respective intercepts on the axes is 14

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18. A line passes through(2, 3), makes an angle $\left(\frac{\pi}{4}\right)$ with the positive direction of x-axis, find the length of line segment cut off between (2, 3) and the line x + y - 7 = 0

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19. Find the value of a if the points (1, 2) and (3, 4) are of opposite side of the line $3x - 4y + a = 0$

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20. Find the equation of the straight lines passing through the point (2, 3) and inclined at $\frac{\pi}{4}$ radian to the line $2x + 3y - 5 = 0$

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21. Line through the points (-2, 6) and (4, 8) is perpendicular to the line through the points (8, 12) and (x, 24). Find the value of x

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22. Find the distance between the lines $5x - 12y + 2 = 0$ and $-5x + 12y + 3 = 0$

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23. Find the equations of line parallel to $3x + 4y + 2 = 0$, at a distance 4 units from given line.

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24. Find the foot of perpendicular drawn from the point $(2, 2)$ to the line $3x - 4y + 5 = 0$

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25. Find the bisector of the angle containing the point (1,-2) between the lines $3x-4y = 0$ and $5x + 12y +7 = 0$

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26. Find the bisector of the angle containing the point (1,-2) between the lines $3x-4y = 0$ and $5x + 12y +7 = 0$

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27. If $a + 2b + 3c = 0$, the family of straight lines $ax + by + c = 0$ passes through a fixed point, find the co-ordinates of fixed point.

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28. Find the equation of the straight line passing through the point (2,0) and through the point of intersection of the lines x + 2y = 3 and 2x - 3y = 4

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29. The pair of lines joining the origin to the points of intersection of the 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 to one another , if

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30. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, prove that $\frac{a}{h} = \frac{h}{b} = \frac{g}{f}$

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31. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, prove that

The distance between them is $2\sqrt{\frac{g^2 - ac}{a(a+b)}}$

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32. The three points (-2, 2), (8, -2) and (-4,-3) are the vertices of :

A. an isosceles triangle

B. an equilateral triangle

C. a right angled triangle

D. none of these

Answer: C

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33. The distance between the points $\left(3, \frac{\pi}{4}\right) \text{and} \left(7, \frac{5\pi}{4}\right)$ is :

A. 8

B. 10

C. 12

D. 14

Answer: B

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34. Let A(6, -1), B(1, 3) and C(x, 8) be three points such that AB = BC then the value of x are :

A. 3, 5

B. -3, 5

C. 3, -5

D. -3, -5

Answer: B

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35. The points (a + 1, 1), (2a + 1, 3) and (2a + 2, 2a) are collinear, if :

A. $a = -1, 2$

B. $a = \frac{1}{2}, 2$

C. a = 2, 1

D. $a = -\frac{1}{2}, 2$

Answer:

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36. If A = (3, 4) and B is a variable point on the lines |x| = 6 If $AB \leq 4$ then the number of positions of B with integral co-ordinates is :

A. 5

B. 6

C. 10

D. 12

Answer: A

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37. The point of the axis of y which its equidistant from (-1, 2) and (3, 4) is :

A. (0, 3)

B. (0, 4)

C. (0, 5)

D. (0, -8)

Answer: C

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38. The co-ordinates of the middle points of the sides of a triangle are (4, 2), (3, 2) and (2, 2) then co-ordinates of centroid are :

A. (3, 2)

B. (3, 3)

C. (4, 3)

D. (3, 4)

Answer: A

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39. The incentre of the triangle whose vertices are (-36, 7), (20, 7) and (0, -8) is :

A. (0, -1)

B. (-1, 0)

C. (1, 1)

D. (1/2, 1)

Answer: B

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40. If the orthocentre and centroid of a triangle are (-3, 5) and (3, 3) then its circumcentre is :

A. (6, 2)

B. (3, -1)

C. (-3, 5)

D. (-3, 1)

Answer: A

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41. A(a, b), $B(x_1, y_1)$ and $C(x_2, y_2)$ are the vertices of a triangle. If a, x_1, x_2 are in GP with common ratio r and b, y_1, y_2 are in GP with common ratio s, then area of $\triangle ABC$ is :

A. ab(r-1)(s-1)(s-r)

B. 1/2 ab(r+1)(s+1)(s-r)

C. 1/2 ab(r-1)(s-1)(s-r)

D. ab(r+1)(s+1)(r-s)

Answer: C

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42. The equation of the locus of points equidistant from (-1,-1) and (4, 2) is :

A. 3x -5y - 7 =0

B. 5x + 3y -9 = 0

C. 4x + 3y -2 = 0

D. x - 3y + 5 = 0

Answer: B

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43. The equation of the locus of a point which moves so that its distance from the point (ak, 0) is k times its distance from the point $\left(\frac{a}{k}, 0\right), (k \neq 1)$ is :

A. $x^2 - y^2 = a^2$

B. $2x^2 - y^2 = 2a^2$

C. $xy = a^2$

D. $x^2 + y^2 = a^2$

Answer: D

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44. If the co-ordinates of a variable point P be $\left(t + \frac{1}{t}, t - \frac{1}{t}\right)$ where t is the variable quantity, then the locus of P is :

A. xy =8

B. $2x^2 - y^2 = 8$

C. $x^2 - y^2 = 4$

D. $2x^2 + 3y^2 = a^2$

Answer: C

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45. If the co-ordinates of a variable point P be $(\cos\theta + \sin\theta, \sin\theta - \cos\theta)$ where θ is the perimeter, then the locus of P is :

A. $x^2 - y^2 = 4$

B. $x^2 + y^2 = 2$

C. xy = 3

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

Answer: B

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46. Transform the equation $x^2 - 3xy + 11x - 12y + 36 = 0$ to parallel axes through the point (-4, 1) becomes $ax^2 + bxy + 1 = 0$ then $b^2 - a =$

A. 1/4

B. 1/16

C. 1/64

D. 1/256

Answer: C

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47. The distance of the point (3, 5) from the line 2x + 3y - 14 = 0 measured parallel to the line x - 2y = 1 is :

A. $\frac{7}{\sqrt{5}}$

B. $\frac{7}{\sqrt{13}}$

C. $\sqrt{5}$

D. $\sqrt{13}$

Answer: C

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48. The lines $x\cos\alpha + y\sin\alpha = p_1$ and $x\cos\beta + y\sin\beta = p_2$ will be perpendicular, if :

A. $\alpha = \beta$

B. $|\alpha - \beta| = \frac{\pi}{2}$

C. $\alpha = \frac{\pi}{2}$

D. $\alpha \pm \beta = \frac{\pi}{2}$

Answer: B

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49. If each of the points $(x_1, 4), (-2, y_1)$ lies on the line joining the points (2, -1), (5, -3), then the points $P(x_1, y_1)$ lies on the line :

A. 6 (x + y) - 25 = 0

B. 2x + 6y + 1= 0

C. 2x + 3y - 6 = 0

D. 6 (x + y) + 25 = 0

Answer: B

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50. The angle between the lines 2x - y + 3 = 0 and x + 2y + 3 =0

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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51. Equation to the straight line cutting off an intercept 2 from negative direction of the axis of y and inclined at 30° to the positive direction of axis of x is :

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

B. $y - x + 2 = 0$

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

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

Answer: D

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52. The number of lines that are parallel to 2x + 6y -7 = 0 and have an intercept 10 between the co-ordinates axis is :

A. 1

B. 2

C. 4

D. infinitely many

Answer: B

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53. If the quadrilateral formed by the lines ax + by + c = 0, a'x + b'y + c' = 0, ax + by + c' = 0,a'x + b'y + c = 0 have perpendicular diagonals, then :

A. $b^2 + c^2 = b'^2 + c'^2$

B. $c^2 + a^2 = c'^2 + a'^2$

C. $a^2 + b^2 = a'^2 + b'^2$

D. none of these

Answer: C

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54. The co-ordinates of a point on the line y = x where perpendicular distance from the line 3x + 4y = 12 is 4 units, are :

A. $\left(\frac{3}{7}, \frac{5}{7}\right)$

B. $\left(\frac{3}{2}, \frac{3}{2}\right)$

C. $\left(-\frac{8}{7}, \frac{8}{7}\right)$

D. $\left(\frac{32}{7}, \frac{32}{7}\right)$

Answer: C::D

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55. If the points (1,2) and (3, 4) are on the opposite side of the line 3x - 5y + a = 0, then :

A. $7 < a < 11$

B. a = 7

C. a = 11

D. $a < 7 \text{or} a > 1$

Answer: D

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56. If $kx^2 + 10xy + 3y^2 - 15x - 21y + 18 = 0$ represents a pair of straight lines. Then the value of k is :

A. -3

B. 3

C. 4

D. -4

Answer: B

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57. The point of intersection of the straight lines given by the equation $3y^2 - 8xy - 3x^2 - 29x - 3y + 18 = 0$ is :

A. $\left(1, \frac{1}{2}\right)$

B. $\left(1, -\frac{1}{2}\right)$

C. $\left(-\frac{3}{2}, \frac{5}{2}\right)$

D. $\left(-\frac{3}{2}, -\frac{5}{2}\right)$

Answer: D

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58. If the equation $12x^2 + 7xy - py^2 - 18xqy + 6 = 0$ represent two perpendicular lines, then the value of p and q are :

A. 12,1

B. 12,-1

C. $12, \frac{23}{1}$

D. $12, -\frac{23}{2}$

Answer: A::D

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59. If the angle between the two lines represented by $2x^2 + 5xy + 3y^2 + 7y + 4 = 0$ is $\tan^{-1}(m)$. Then 'm' is equal to :

A. -1/5

B. 1/5

C. -3/5

D. 3/5

Answer: B

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60. The equation of second degree $x^2 + 2\sqrt{2}xy + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines, the distance between them is :

A. 2

B. $2\sqrt{3}$

C. 4

D. $4\sqrt{3}$

Answer: A

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61. The point (4,1) undergoes the following transformation successively

(i) Reflection about the line y=x

(ii) Translation through a distance 2 unit along the positive direction (x-axis)

(iii)Rotation through on angle $\pi/4$ about origin in anticlockwise

direction.

Then the co-ordinates of the final points

A. $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

B. $\frac{-1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\Big)$

C. $\frac{-1}{\sqrt{2}}, \frac{-7}{\sqrt{2}}\Big)$

D. none of these

Answer: B

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62. Mixed term xy is to be removed from the general equation of second degree $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$,one should rotate the axes through an angle θgiven by $\tan 2\theta$equal to

A. $\frac{a-b}{2h}$

B. $\frac{2h}{a+b}$

C. $\frac{a+b}{2h}$

D. $\frac{2h}{a-b}$

Answer: D

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63. For points $P=(x_1, y_1)$and $Q=(x_2, y_2)$ of the co-ordinate plane a new distance d(P,Q)=$|x_1-x_2|+|y_1-y_2|$ is defined .Let O(0,0)and A(3,2). The set of points in first quadrant which are equidistant from O and A is

A. Square

B. An infinite ray

C. Union of a line segment and an infinite ray

D. none of these

Answer: C

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64. The orthocentre of the triangle formed by the lines $x + y = 1, 2x + 3y = 6$ and $4x - y + 4 = 0$ lies in

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Answer: A

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65. A straight line L with negative slope passes through the point (8,2) and cuts the positive coordinate axes at points P and Q. As L varies, the absolute minimum value of OP+OQ is (O is origin)

A. 10

B. 18

C. 16

D. 12

Answer: B

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66. The distance between the circumcentre and orthocentre of the triangle whose vertices are (0,0),(6,8)and (-4,3) is

A. $\frac{125}{8}$unit

B. $\frac{\sqrt{5}}{2}$unit

C. $\frac{5\sqrt{5}}{2}$ unit

D. $5\sqrt{5}$ unit

Answer: C

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67. If $P\left(1+\frac{\alpha}{\sqrt{2}}, 2+\frac{\alpha}{\sqrt{2}}\right)$ be any point on a line, then the range of values of α for which the point P lies between the parallel lines x+2y=1 and 2x+4y= 15 is

A. $-4\frac{\sqrt{2}}{3} < \alpha < 5\frac{\sqrt{2}}{6}$

B. $0 < \alpha < 5\frac{\sqrt{2}}{6}$

C. $-4\frac{\sqrt{2}}{3} < \alpha < 0$

D. none of these

Answer: A

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68. If the point (a,a) fall between the lines $|x + y| = 2$,then

A. $|a| = 2$

B. $|a| = 1$

C. $|a| < 1$

D. $|1a| < \frac{1}{2}$

Answer: C

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69. Two fixed point A and B are taken on the cordinate axes such that OA = a and OB = b. Two variable points A' and B' are taken on the same axes such that OA'+OB' = OA + OB. Find the locus of the point of intersection of AB' and A'B.

A. $x+y=a+b$

B. $x+y=0$

C. $x-y=a+b$

D. $x-y=0$

Answer: A

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70. A variable line through the point of intersection of the lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$, meets the co-ordinate axes in A and B, then the locus of mid point of AB is

A. $(x+y)ab=2xy(a+b)$

B. x+y=2xy

C. $(x+y)ab=xy(a+b)$

D. none of these

Answer: A

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71. The equations of the line passing through the point of intersection of the lines $x-3y+1=0$ and $2x+5y-9=0$,

whose distance from the origin is $\sqrt{5}$.

A. 2x-y+5=0

B. 2x+y+5=0

C. 2x+y-5=0

D. none of these

Answer: C

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72. A ray of light travelling along the line $2x - 3y + 5 = 0$,after striking a plane mirror lying along the line $x + y - 2 = 0$ gets reflected then equation of the reflected straight line is

A. 3x-2y+3=0

B. 3x-2y+5=0

C. 2x-3y=3=0

D. none of these

Answer: A

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73. Line L has intercepts a and b on the coordinate axes. When the axes are rotated through given angle, keeping the origin fixed, the same line L has intercepts p and q, then

A. $a^2 + b^2 = p^2 + q^2$

B. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2} + \frac{1}{q^2}$

C. $a^2 + p^2 = b^2 + q^2$

D. $\frac{1}{a^2} + \frac{1}{p^2} = \frac{1}{b^2} + \frac{1}{q^2}$

Answer: B

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74. Consider the point A(3,4) and B(7,13).If P be a point on the line y=x, the co-ordinate of point P if PA+PB is minimum.

A. $\left(\frac{13}{7}\right), \left(\frac{13}{7}\right)$

B. $\left(\frac{22}{7}\right), \left(\frac{23}{7}\right)$

C. $\left(\frac{31}{7}\right), \left(\frac{31}{7}\right)$

D. $\left(\frac{33}{7}\right), \left(\frac{33}{7}\right)$

Answer: C

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75. Consider the point A(3,4) and B(7,13).If P be a point on the line y=x, the co-ordinate of point P if PA+PB is minimum.

A. $\left(\frac{31}{7}\right), \left(\frac{31}{7}\right)$

B. $\left(\frac{11}{5}\right), \left(\frac{11}{5}\right)$

C. $\left(\frac{13}{5}\right), \left(\frac{13}{5}\right)$

D. none of these

Answer: B

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76. The number of integral values of 'm' for which the x coordinate of the point of intersection of the lines 3x+4y=9 and y = mx+1 is also an integer is

A. 2

B. 0

C. 4

D. 1

Answer: A

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77. The diagonals of the parallelogram whose sides are lx+my+n=0,lx+my+n'=0,mx+ly+n=0,mx+ly+n'=0 include an angle

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

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

C. $\tan^{-1}\left(\frac{l^2-m^2}{l^2+m^2}\right)$

D. $\tan^{-1}\left(\frac{2lm}{l^2+m^2}\right)$

Answer: B

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78. Let PQR be a right angled isosceles triangle, right angled at P(2,1). if the equation of the line OR 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. $3x^2 - 3y^2 - 8xy - 10x - 15y - 20 = 0$

Answer: B

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79. The equation of straight line passing through the origin and making an angle α with the straight line x+y=0 is

A. $y = (\tan\alpha)x$

B. $x^2 + y^2 + 2xy\sec 2\alpha = 0$

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

D. none of these

Answer: B

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80. If pairs 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

A. pq=1

B. pq=-1

C. p+q=1

D. p+q=-1

Answer: B

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81. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, then the distance between them is

A. $2\sqrt{\frac{g^2 - ac}{h^2 + a^2}}$

B. $2\sqrt{\frac{g^2 + ac}{h^2 + a^2}}$

C. $3\sqrt{\left(\frac{g^2+ac}{a(a+b)}\right)}$

D. $3\sqrt{\left(\frac{g^2-ac}{a(a+b)}\right)}$

Answer: A

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82. If the angle between the lines represented by $2x^2+5xy+3y^2+7x+13y-3=0$ is $\tan^{-1}(m)$, then m is equal to

A. $\left|\frac{1}{5}\right|$

B. -1

C. $\frac{2}{3}$

D. none of these

Answer: D

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83. The combine equation of the lines passing through the origin and having slpoes $1+\sqrt{3}$ and $1-\sqrt{3}$ is

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84. If $\alpha, \beta > 0$ and $\alpha < \beta$ and $ax^2 + 4\gamma xy + \beta y^2 + 4p(x+y+1) = 0$represent a pair of straight lines, then

A. $\alpha \leq p \leq \beta$

B. $P \leq \alpha$

C. $p \leq \alpha$

D. $p \leq \alpha$ or $p \geq \beta$

Answer: D

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85. The equation of image of pair of lines y = |x-1| in y-axis is

A. $x^2 + y^2 + 2x + 1 = 0$

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

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

D. none of these

Answer: C

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86. For all real values of a and b lines $(2a+b)x+(a+3b)y+(b-3a)=0$ and mx+2y+6=0 are concurrent, then m is equal to

A. -2

B. -3

C. -4

D. -5

Answer: A

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87. If 5a+4b+20c=t,then the value of t for which the line ax+by+c-1=0 always passes through a fixed point is

A. 0

B. 20

C. 30

D. none of these

Answer: B

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88. Find the area of the region bounded by $y^2 + xy + 10|x| - 100 = 0$in x-y plane

A. 100 sq. units

B. 200 sq. units

C. 400 sq. units

D. none of these

Answer: B

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89. Find the incentre of the triangle with vertices (0,0), (0,21) and (21,0) is

A. $(7, 7)$

B. $(3, 9)$

C. $(3, 7)$

D. $(1, 5)$

Answer: A

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90. Area of the parallelogram formed by the lines y=mx,y=mx+1,y=nx and y= nx and y=nx +1 equals

A. $\frac{|m+n|}{(m-n)^2}$

B. $\frac{2}{|m-n|}$

C. $\frac{1}{|m+n|}$

D. $\frac{1}{|m-n|}$

Answer: D

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91. If $\frac{2}{1!9!}+\frac{2}{3!7!}+\frac{1}{5!5!}=\frac{2^m}{n!}$, then orthocentre of the triangle having sides x-y+1=0,x+y+3=0 and 2x+5y-2=0 is

A. (2m-2n, m-n)

B. (2m-2n, n-m)

C. (2m-n, m+n)

D. (2m-n, m-n)

Answer: A

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92. Draw from origin are two mutually perpendicular lines forming an isosceles triangle together with the straight line 2x+y=a, then the area of this triangle is

A. $\frac{a^2}{2}$ sq unit

B. $\frac{a^2}{3}$ sq unit

C. $\frac{a^2}{5}$ sq unit

D. none of these

Answer: C

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93. If the distance of any point (x,y) from origin is defined as $d(x, y) = \max\{|x|, |y|\}$, then the locus d(x,y)=1 is a

A. circle of area π sq unit

B. square of area 1 sq unit

C. square of area 2 sq unit

D. none of these

Answer: C

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94. If f(x+y)=f(x)f(y),forall $x, y, \in R$ and f(1)=2, then area enclosed by $3|x| + 2|y| \leq 8$ is

A. f(4) sq unit

B. (1/2) f(6)sq unit

C. $\frac{1}{3}f(6)$ sq unit

D. $\frac{1}{3}f(5)$ sq unit

Answer: C

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95. If the point $(\cos\theta, \sin\theta)$ does not fall in that angle between the lines y = |x-1| in which the origin lies, then θ belongs to

A. $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

B. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. (0,pi)

D. none of these

Answer: B

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96. The pair of lines joining the origin to the points of intersection of the 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 to one another , if

A. g(a'+b')=g'(a+b)

B. g(a+b)=g'(a'+b')

C. $gg'=(a+b)(a'+b')$

D. none of the above

Answer: A

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97. Given the family of lines, $a(3x+4y+6)+b(x+y+2)=0$. The line of the family situated at the greatest distance from the point P(2,3) has equation

A. $4x+3y+8$

B. $5x+3Y+10=0$

C. $15x+8y+30=0$

D. none of these

Answer: A

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98. A ray of light passing through the point A(1,2) is reflected at a point B on the x-axis and then passes through (5,3). Then the equation of AB is:

A. $5x+4y=13$

B. $5x-4y=-3$

C. $4x+5y=14$

D. $4x-5y=-6$

Answer: A

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99. A ray of light coming from the point (1,2) is reflected at a point A on the x-axis and then passes through the point (5,3). The coordinates of the point A are

A. $\left(\frac{13}{5}, 0\right)$

B. $\left(\frac{5}{13}, 0\right)$

C. (-7,0)

D. none of these

Answer: A

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100. A pair of perpendicular straight lines drawn through the origin from an isosceles triangle with line 2x+3y=6, then area of the triangle so formed is

A. 36/13

B.

C. 13/5

D. 17/13

Answer: A

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101. A line passing through the point (2,2) and the axes enclose an area λ. The intercepts on the axes made by the line are given by the two roots of

A. $x^2 - 2|\lambda|x + |\lambda| = 0$

B. $x^2 + |\lambda|x + 2|\lambda| = 0$

C. $x^2 - |\lambda|x + 2|\lambda| = 0$

D. none of these

Answer: C

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102. The distance of the line 2x-3y=4 from the point (1,1) in the direction of the line x+y=1 is

A. $\sqrt{2}$

B. $5\sqrt{2}$

C. $\frac{1}{\sqrt{2}}$

D. none of these

Answer: A

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103. If one of the pair of lines $ax^2 + 2hxy + by^2 = 0$ bisects the angle between coordinate axes in positive quadrant, then

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

B. $a + b = -2h$

C. $a - b = 2|h|$

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

Answer: B

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104. The limiting position of the point of intersection of the straight lines 3x+5y=1 and $(2 + c)x + 5c^2y = 1$ as c tends to one is:

A. $\left(\frac{2}{5}, -\frac{1}{25}\right)$

B. $\left(\frac{1}{2}, -\frac{1}{10}\right)$

C. $\left(\frac{3}{8}, -\frac{1}{40}\right)$

D. none of these

Answer: A

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105. If in triangle ABC, A=(1, 10), circumcentre=$\left(-\frac{1}{3}, \frac{2}{3}\right)$ and orthocentre=$\left(\frac{11}{3}, \frac{4}{3}\right)$ then the co-ordinates of mid-point of side opposite to A is:

A. $\left(1, -\frac{11}{3}\right)$

B. (1,5)

C. (1,-3)

D. (1, 6)

Answer: A

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106. The points (p+1,1), (2p+1,3) and (2p+2, 2p) are collinear, if

A. p=-1

B. $p = \frac{1}{2}$

C. p=2

D. $p = -\frac{1}{2}$

Answer: C::D

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107. If the coordinates of the vertices of a triangle are rational numbers, then which of the following points of the triangle will always have rational coordinates

A. Centroid

B. incentre

C. circumcentre

D. orthocentre

Answer: A::C::D

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108. If one vertex of an equilateral triangle of side a, lies at the origin and the other lies on the line $x - \sqrt{3}y = 0$, the coordinates of the third vertex are

A. (0,a)

B. $\left(\sqrt{3}\frac{a}{2}, -\frac{a}{2}\right)$

C. (0,-a)

D. $\left(-\sqrt{3}\frac{a}{2}, \frac{a}{2}\right)$

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

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109. Consider the straight lines x+2y+4=0 and 4x+2y-1=0. The line 6x+6y+7=0 is

A. bisector of the angle including origin

B. bisector of acute angle

C. bisector of obtuse angle

D. none of the above

Answer: A::B

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110. If $6a^2 - 3b^2 - c^2 + 7ab - ac + 4bc = 0$, then the family of lines ax+by+c=0 is concurrent at

A. (-2,-3)

B. (3,-1)

C. (2,3)

D. (-3,1)

Answer: A::B

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111. The point of intersection of the lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ lies on

A. x-y=0

B. (x+y)(a+b)=2ab

C. (lx+my)(a+b)=(l+m)ab

D. (lx-my)(a+b)=(l-m)ab

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

Watch Video Solution

112. If the point P(x,y) be equidistant from the points A(a+b,a-b) and B(a-b,a+b), then

A. ax=by

B. bx=ay

C. $x^2 - y^2 = 2(ax + by)$

D. P can be (a,b)

Answer: B::D

Watch Video Solution

113. If the lines ax+by+c=0, bx+cy+a=0 and Cx+ay+b=0 are concurrent $(a + b + c \neq 0)$ then

A. $a^3 + b^3 + c^3 - 3abc = 0$

B. a=b

C. a=b=c

D. $a^2 + b^2 + c^2 - bc - ca - ab = 0$

Answer: A::C::D

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114. Type of quadrilateral formed by the two pairs of lines $6x^2 - 5xy - 6Y^2 = 0$ and $6x^2 - 5xy - 6Y^2 + x + 5y - 1 = 0$ is

A. square

B. rhombus

C. parallelogram

D. rectangle

Answer: A::D

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

A. $2 < a < \frac{10}{3}$

B. $-2 < a < \frac{10}{3}$

C. $-1 < b < \frac{9}{2}$

D. $-1 < b < 1$

Answer: A::D

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116. For points $P \equiv (x_1 y_1)$ and $Q \equiv (x_2, y_2)$ of the coordinate plane, a new distance d(P,Q) is defined by d $(P, Q) = |X_1 - X_2| + |y_1 - y_2|$ Let

$O = (0, 0), A = (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

Answer the following questions based on above passage:

Let R (x,y), such that R is equidistant from the points O and A with respect to new distance and if $0 < x < 1$ and $0 < y < 2$ then R lie on a line segment whose equation is

A. x+y=3

B. x+2y=3

C. 2x+y=3

D. 2x+2y=3

Answer: D

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117. For points $P \equiv (x_1 y_1)$ and $Q \equiv (x_2, y_2)$ of the coordinate plane, a new distance d(P,Q) is defined by d $(P, Q) = |X_1 - X_2| + |y_1 - y_2|$ Let $O = (0, 0), A = (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

Answer the following questions based on above passage:

Let S(x,y), such that S is equidistant from the points O and B with respect to new distance and if $x \geq 2$ and $0 \leq y < 3$, then locus of S is

A. a line segment of finite length

B. a line of infinite length

C. a ray of finite length

D. a ray of infinite length

Answer: D

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118. Let $f_1(x, y) \equiv ax^2 + 2hxy + by^2 = 0$ and let $f_{i+1} = 0$ denotes the equation of the bisectors of $f_i(x, y) = 0$ for all i=1,2,3....

Answer the following question based on above passage:

Equation $f_2(x, y) = 0$ is

A. $hx^2 - (a - b)xy + hy^2 = 0$

B. $hx^2 - (a - b)xy - hy^2 = 0$

C. $hx^2 + (a - b)xy + hy^2 = 0$

D. $hx^2 + (a - b)xy - hy^2 = 0$

Answer: B

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119. Let $f_1(x, y) \equiv ax^2 + 2hxy + by^2 = 0$ and let $f_{i+1} = 0$ denotes the equation of the bisectors of $f_i(x, y) = 0$ for all i=1,2,3....

Answer the following question based on above passage:

Equation $f_3(x, y) = 0$ is

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

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

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

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

Answer: D

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120. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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121. Match the List I with List II and select the correct option.

List I	List II
A Protozoa	*Pennatula*
B Aschelminthes	*Beroe*
C Porifera	*Monocystis*
D Ctenophora	*Wuchereria*
E Cnidaria	*Cliona*

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122. If the lines ax+by+c=0, bx+cy+a=0 and Cx+ay+b=0 are concurrent $(a+b+c \neq 0)$ then

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123. If the lines x-2y-6=0, 3x+y -4=0 and $\lambda x + 4y + \lambda^2 = 0$ and concurrent, and it is given that $\lambda \in R^+$, λ=

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124. Let, ax+by+c=0 be a variable straight line, where, a, b, c are 1^{st}, 3^{rd} and 7^{th} terms of an increasing AP, then the variable straight line always pases through a fixed point, whose abscissa is:

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125. The length of the largest altitude of triangle formed by the straight lines 7x-2y+10=0, 7x+2y-10=0 and 9x+ y+2=0 is

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126. The area of the triangle formed by the axes and the line $e^{-\alpha}x + e^{\alpha}y = 2$ is

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127. The only integral value of α, such that the point $P(\alpha, 2)$ lines inside the triangle formed by the axis, x + y = 4 and x - y = 4 is :

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128. The vertices of a triangle are

$[at_1t_2, a(t_1 + t_2)], [at_2t_3, a(t_2 + t_3)], [at_3t_1, a(t_3 + t_1)]$

Find the orthocentre of the triangle.

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129. One diagonal of a square is the intercept of the line $\frac{x}{a}+\frac{y}{b}=1$ between the axes. Find the coordinates of other two vertices

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130. Find α if $\left(\alpha, \alpha^2\right)$ lies inside the triangle having sides along the lines 2x+3y=1, x+2y-3=0, 6y=5x-1.

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131. If the lines ax+y+1=0, x+by+1=0, x+y+c=0, (a, b, c are distinct and not equal to 1), are concurrent, then find the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$

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132. Prove that all lines represented by the equation $(2\cos\theta + 3\sin\theta)x + (3\cos\theta - 5\sin\theta)y = 5\cos\theta - 2\sin\theta$...(1) pass through a fixed point and its reflection in the line $x + y = \sqrt{2}$? Prove that all lines through reflection point can be represented by the equation

$(2\cos\theta + 3\sin\theta)x + (3\cos\theta - 5\sin\theta)y =$

$\left(\sqrt{2} - 1\right)(5\cos\theta - 2\sin\theta)$....(2)

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133. A line through A(-5,-4) meets the lines x+3y+2=0, 2x+y+4=0 and x-y-5=0 at the points B, C and D respectively. If $\left(\frac{15}{AB}\right)^2 + \left(\frac{10}{AC}\right)^2 = \left(\frac{6}{AD}\right)^2$ find the equation of the line.

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134. Given n straight line and a fixed point O, a straight line is drawn through O meeting these lines in the points $R_1, R_2, R_3 \ldots\ldots R_n$. If R is the point on the line such that $\frac{n}{OR} = \frac{1}{OR_1} + \frac{1}{OR_2} + \ldots. + \frac{1}{OR_n}$, then show that the locus of R is a straight line.

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135. Find the condition that two of the three lines represented by $ax^3 + bx^2y + cxy^2 + dy^3 = 0$ may be at right angle.

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136. If the equation

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

represents a pair of parallel lines, prove that

$h = \sqrt{ab}$ and $g\sqrt{b} = f\sqrt{a}$ or $\left(h = -\sqrt{ab} \text{ and } g\sqrt{b} = -f\sqrt{a}\right)$

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137. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, prove that

The distance between them is $2\sqrt{\frac{g^2 - ac}{a(a+b)}}$

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138. prove that the product of the perpendiculars drawn from the point (x_1, y_1) to the pair of straight lines $ax^2 + 2hxy + by^2 = 0$ is $\left|\frac{ax_1^2 + 2hx_1y_1 + by_1^2}{\sqrt{(a-b)^2 + 4h^2}}\right|$

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139. The orthocentre of a triangle whose vertices are $(0, 0), \left(\sqrt{3}, 0\right)$ and $\left(0, \sqrt{6}\right)$ is

A. (2,1)

B. (3,2)

C. (4,1)

D. none of these

Answer: D

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140. The image of the point (3,8) with respect to the line x+3y=7 is

A. (-1,-4)

B. (-1,4)

C. (1,4)

D. none of these

Answer: A

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141. The equations of the lines representing the sides of a triangle are $3x-4y=0$, $x+y=0$ and $2x-3y=7$. The line $3x+2y=0$ always passes through the

A. Incentre

B. centroid

C. circumcentre

D. orthocentre

Answer: D

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142. The point (4,1) undergoes the following three transformations successively

(a) Reflection about the line y=x

(b)Translation through a distance 2 units along the positive direction of the x-axis

(c) Rotation through an angle $\pi/4$ about the origin in the anti clockwise direction.

The final position of the point is given by the co-ordinates

A. $\left(\frac{4}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B. $\left(-\frac{7}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

C. $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

D. $\left(\frac{3}{\sqrt{2}}, \frac{4}{\sqrt{2}}\right)$

Answer: B

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143. A is (a,0) and B is (-a,0). If P is a point such that $\angle PAB - \angle PBA = 90^\circ$, then the locus of P is

A. $x^2 - 3y^2 = 2ax - a^2 = 0$

B. $2x^2 - y^2 + 3ax - a^2 = 0$

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

D. $x^2 - y^2 = a^2$

Answer: D

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144. The points (-a,-b).(0,0),(a,b) and $\left(a^2, ab\right)$ are

A. collinear

B. vertices of a parallelogram

C. vertices of a rectangle

D. none of these

Answer: A

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145. The medians AD and BE of a triangle ABC with vertices A(0, b), B(0, 0) and C(a, 0) are perpendicular to each other if $a^2 : b^2$ is

A. $2:1$

B. $1:2$

C. $1:3$

D. $1:1$

Answer: A

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146. The vertices of a rhombus taken in order are (2,-1), (3,4), (-2,3), then 4^{th} vertex is

A. $(-3, 2)$

B. $(3, -2)$

C. $(-3, -2)$

D. none of these

Answer: C

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147. The coordinates of the point P on the lines 2x+3y+1=0, such that |PA-PB| is maximum, where A is (2,0) and B is (0,2) is

A. $(5, -3)$

B. $(7, -5)$

C. $(9, -7)$

D. $(11 - 9)$

Answer: B

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148. One vertex of the equilateral triangle with centroid at the origin and one side as x+y-2=0 is

A. (-1,-1)

B. (2,2)

C. (-2,-2)

D. none of these

Answer: C

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149. If t_1, t_2 and t_3 are distinct, the points $\left(t_1, 2at_1 + at_1^3\right), \left(t_2, 2at_2 + at_2^3\right)$ and $\left(t_3, 2at_3 + at_3^3\right)$ are collinear if

A. $t_1t_2t_3 = -1$

B. $t_1 + t_2 + t_3 = t_1t_2t_3$

C. $t_1 + t_2 + t_3 = 0$

D. $t_1 + t_2 + t_3 = -1$

Answer: C

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150. If (-6,-4), (3,5),(-2,1) are the vertices of a parallelogram, then remaining vertex cannot be

A. (0,1)

B. (-1,0)

C. (-11,-8)

D. (7,10)

Answer: A

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151. A line passing through the point P(4,2) meets the x and y-axis at A and B respectively. If O is the origin, then locus of the centre of the circumcircle of $\triangle OAB$ is

A. $x^{-1} + y^{-1} = 2$

B. $2x^{-1} + y^{-1} = 1$

C. $x^{-1} + 2y^{-1} = 1$

D. $2x^{-1} + 2y^{-1} = 1$

Answer: B

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152. If $P \equiv (1, 0), Q \equiv (-1, 0), R \equiv (2, 0)$ are three given points, then the locus of the point S satisfying the condition $SQ^2 + SR^2 = 2SP^2$ is

A. a straight line parallel to the x-axis

B. a circle passing through the origin

C. a circle with centre at origin

D. a straight line parallel to the y-axis

Answer: D

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153. A straight line segment AB of length 'a' moves with its ends on the axes. Then the locus of the point P which divides the line in the ratio 1:2 is

A. $9\left(x^2+y^2\right)=4a^2$

B. $9\left(x^2+4y^2\right)=4a^2$

C. $9\left(y^2+4x^2\right)=4a^2$

D. $9x^2+4y^2=a^2$

Answer: B

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154. Let A be any variable point on the X-axis and B the point (2,3). The perpendicular at A to the line AB meets the Y-axis at C. Then the locus of the mid-point of the segment AC as A moves is given by the equation

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

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

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

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

Answer: A

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155. Let AB be a line segment of length 4 unit with the point A on the line y=2x and B on the line y=x. Then locus of middle point of all such line segment is

A. a parabola

B. an ellipse

C. a hyperbola

D. a circle

Answer: B

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156. The equation of the diagonal, through the origin, of the quadrilateral formed by the lines $x=0$, $y=0$, $x+y=1$ and $6x+y=3$ is given by

A. $3x-y=0$

B. $3x-2y=0$

C. $x-y=0$

D. $3x-4y=0$

Answer: B

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157. The number of integral values of 'm' for which the x coordinate of the point of intersection of the lines 3x+4y=9 and y = mx+1 is also an integer is

A. 2

B. 0

C. 4

D. 1

Answer: A

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158. Let 2x-3y=0 be a given line and $P(\sin\theta, 0)$ and $Q(0, \cos\theta)$ be the two points. Then P and Q lie on the same side of the given line, if θ lies in

A. 1^{st} or 4^{th} quadrant

B. 2^{nd} or 4^{th} quadrant

C. 1^{st} or 2^{nd} quadrant

D. 2^{nd} or 3^{rd} quadrant

Answer: B

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159. The equations of the lines through (-1,-1) and making angle 45° with the line x+y=0 are given by

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

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

C. xy+x+y=0

D. xy+x+y+1=0

Answer: D

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160. The equations of the lines through the point (1,2) whose distance from the point (3,1) has the highest possible value is

A. $y=x$

B. $y=2x$

C. $y=-2x$

D. $y=-x$

Answer: B

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161. The line segment joining the points (1,2) and (-2, 1) is divided by the line 3x+4y=7 in the ratio

A. $3:4$

B. $4:3$

C. $9:4$

D. $4:9$

Answer: D

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162. If a ray travelling the line x=1 gets reflected the line x+y=1, then the equation of the line along which the reflected ray travels is

A. y=0

B. x-y=1

C. x=0

D. none of these

Answer: A

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163. The value of λ so that the equation $\lambda x^2 + 2xy + \lambda y^2 + 4x + 4y + 3 = 0$ represent a pair of straight lines is

A. $\frac{5}{3}$

B. $\frac{5}{31}$

C. 1

D. none of these

Answer: C

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164. If pairs 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

A. mn+1=0

B. mn-1=0

C. $\frac{1}{m} + \frac{1}{nb} = 0$

D. $\frac{1}{m} + \frac{1}{n} = 0$

Answer: A

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165. The equation $\sqrt{\left\{(x-2)^2+y^2\right\}}+\sqrt{\left\{(x+2)^2+y^2\right\}}=4$ represents

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166. If the lines represented by $x^2-2pxy-y^2=0$ are rotated about the origin through an angle θ, one clockwise direction and other in anti-clockwise direction, then the equation of the bisectors of the angle between the lines in the new position is

A. $px^2+2pxy-py^2=0$

B. $px^2-2xy+py^2=0$

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

D. none of these

Answer: A

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167. Product of the perpendiculars from (α, β) to the lines $ax^2 + 2hxy + by^2 = 0$ is

A. $\frac{|a\alpha^2 - 2h\alpha\beta + b\beta^2|}{\sqrt{\left\{4h^2 + (a+b)^2\right\}}}$

B. $\frac{|a\alpha^2 - 2h\alpha\beta + b\beta^2|}{\sqrt{\left\{4h^2 - (a-b)^2\right\}}}$

C. $\frac{|a\alpha^2 - 2h\alpha\beta + b\beta^2|}{\sqrt{\left\{4h^2 - (a+b)^2\right\}}}$

D. none of these

Answer: D

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168. The gradient of one of the lines $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, then

A. $h^2 = ab$

B. $h = a + b$

C. $8h^2 = 9ab$

D. $ah^2 = 4ab$

Answer: C

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169. If pairs 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

A. mn+1=0

B. mn-1=0

C. $\frac{1}{m}+\frac{1}{n}=0$

D. $\frac{1}{m}-\frac{1}{n}=0$

Answer: A

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170. If one of the pair of lines $ax^2+2hxy+by^2=0$ bisects the angle between positive directions of the axes, a, b, h satisfy the relation

A. a+b=2|h|

B. a+b=-2h

C. a-b=2|h|

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

Answer: B

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171. If the quadratic equation $ax^2 + bx + c = 0$ has -2 as one of its roots, then ax+by+c=0 represents

A. a family of concurrent lines

B. a family of parallel lines

C. a line parallel to x-axis

D. a line perpendicular to x-axis

Answer: A

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172. The lines 2x-y-1=0, ax+3y-3=0 and 3x+2y-2=0 are concurrent for

A. all $a \in R$

B. a=4 only

C. $-1 \leq a \leq 3$

D. $a > 0$ only

Answer: A

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173. Given the family of lines, a(3x+4y+6) +b(x+y+2)=0. The line of the family situated at the greatest distance from the point P(2,3) has equation

A. 15x+8y+30=0

B. 4x+3y+8=0

C. 5x+3y+6=0

D. 5x+3y+10=0

Answer: B

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174. If 3a+2b+6c=0, the family of straight lines ax+by+c=0 passes through a fixed point whose coordinates are given by

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

B. (2,3)

C. (3,2)

D. `(1//3, 1//2)

Answer: A

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175. Consider the family of lines $(x+y-1)+\lambda(2x+3y-5)=0$ and (3x+2y-4)+ $\mu(x+2y-6)=0$, equation of a straight line that belongs to both the families is

A. x-2y-8=0

B. x-2y+8=0

C. 2x+y-8=0

D. 2x-y-8=0

Answer: B

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176. P(3,1), Q(6,5) and R(x,y) are three points such that the angle PRQ is a right angle and the area of $\triangle RPQ = 7$. Then the number of such points R is

A. 0

B. 1

C. 2

D. infinity

Answer: A

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177. The area of the triangle having vertices (-2,1), (2,1) and $\left(\lim_{m \to \infty} \lim_{n \to \infty} \cos^{2m}(n!\pi x) \right)$, x is rational

$\lim_{m \to \infty} \lim_{n \to \infty} \cos^{2m}(n!\pi x)$, where x is irrational) is

A. 2

B. 3

C. 4

D. none of these

Answer: A

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178. If f(x+y)=f(x)f(y),forall $x, y, \in R$ and f(1)=2, then area enclosed by $3|x| + 2|y| \leq 8$ is

A. f(4) sq. unit

B. $(1/2) f$ (6) sq unit

C. 1/3 f (6) sq unit

D. 1/3 f (5) sq unit

Answer: C

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179. The difference of the tangents of the angles which the lines $x^2\left(\sec^2\theta - \sin^2\theta\right) - 2xy\tan\theta + y^2\sin^2\theta = 0$ makes with the x-axis is

A. $2\tan\theta$

B. 2

C. $2\cot\theta$

D. $\sin 2\theta$

Answer: B

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180. Mixed term xy is to be removed from the general equation of second degree $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$,one should rotate the axes through an angle θgiven by tan2θequal to

A. $\frac{a-b}{2h}$

B. $\frac{2h}{a+b}$

C. $\frac{a+b}{2h}$

D. $2\frac{h}{a-b}$

Answer: D

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181. Two of the straight lines given $3x^3 + 3x^2y - 3xy^2 + dy^3 = 0$ are at right angles, if

A. $d = -1/3$

B. $d = 1/3$

C. d=-3

D. d=3

Answer: C

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182. The vertices of a triangle are $A(x_1, x_1 \tan\alpha), (Bx_2, x_2 \tan\beta)$ and $C(x_3, x_3 \tan\gamma)$. If the

circumcentre of $\triangle ABC$ coincides with the origin and H(a,b) be its orthocentre, then a/b is equal to

A. $\frac{\cos\alpha+\cos\beta+\cos\gamma}{\cos\alpha\cos\beta\cos\gamma}$

B. $\frac{\sin\alpha+\sin\beta+\sin\gamma}{\sin\alpha\sin\beta\sin\gamma}$

C. $\frac{\tan\alpha+\tan\beta+\tan\gamma}{\tan\alpha\tan\beta\tan\gamma}$

D. $\frac{\cos\alpha+\cos\beta+\cos\gamma}{\sin\alpha+\sin\beta+\sin\gamma}$

Answer: D

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183. If the distance of any point (x,y) from origin is defined as $d(x,y)=\max\{|x|,|y|\}$, then the locus d(x,y)=1 is a

A. circle of area π sq unit

B. square of area 1 sq unit

C. square of area 2 sq unit

D. none of these

Answer: C

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184. For all real values of a and b lines $(2a+b)x+(a+3b)y+(b-3a)=0$ and mx+2y+6=0 are concurrent, then m is equal to

A. -2

B. -3

C. -4

D. -5

Answer: A

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185. A man starts from the point P(-3, 4) and reaches point Q (0,1) touching x axis at R such that PR+RQ is minimum, then the point R is

A. (3/5,0)

B. (-3/5,0)

C. (-2/5,0)

D. (-2,0)

Answer: B

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186. A beam light is sent along the line x-y=1, which after refraction from the x-axis enters the opposite side by turning through 30° towards the normal at the point of incidence on the x-axis. Then the equation of the refracted ray is

A. $\left(2-\sqrt{3}\right)x+y=2+\sqrt{3}$

B. $\left(2+\sqrt{3}\right)x-y=2+\sqrt{3}$

C. $\left(2-\sqrt{3}\right)x+y=\left(2+\sqrt{3}\right)$

D. none of these

Answer: B

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187. Area of the parallelogram formed by the lines y=mx,y=mx+1,y=nx and y= nx and y=nx +1 equals

A. $\frac{|m+n|}{(m+n)^2}$

B. $\frac{2}{|m+n|}$

C. $\frac{1}{|m+n|}$

D. $\frac{1}{|m-n|}$

Answer: D

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188. Given a family of lines (2x+y+4)+k(x-2y-3)=0, the number of lines belonging to the family at a distance $\sqrt{10}$from P(2, -3) is

A. 0

B. 1

C. 2

D. 4

Answer: B

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189. All points lying inside the triangle formed by the points $(1, 3), (5, 0)$ and $(-1, 2)$ satisfy

A. $3x + 2y \geq 0$

B. $2x + y - 13 \geq 0$

C. $2x - 3y - 12 \leq 0$

D. $-2x + y \geq 0$

Answer: A::C

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190. Let $S_1, S_2, ,,,,$ be squares such that for each $n \geq 1$ the length of a side of S_n equals the length of a diagonal of S_{n+1}. If the length of a sides of S_1 is 10 cm, then for which of the following values of n in the ares of S_n less than 1 sq. cm ?

A. 7

B. 8

C. 9

D. 10

Answer: B::C::D

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191. Let L_1 be a straight line passing through the origin and L_2 be the straight line $x + y = 1$. If the intercepts made by the circle $x^2 + y^2 - x + 3y = 0$ on L_1 and L_2 are equal then which of the following equations can represent L_1 ?

A. $x + y = 0$

B. $x - y = 0$

C. $x - b + a = 0$

D. $y - a + b = 0$

Answer: B::C

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192. Two sides of a triangle are the lines $(a + b)x + (a - b)y - 2ab = 0$ and

$(a-b)x+(a+b)y-2ab=0$. If the triangle is isosceles and the third side passes through point `(b-a,a-b) then the equation of third side can be :

A. $x+y=0$

B. $x=y+2(b-a)$

C. $x-b+a=0$

D. $y-a+b=0$

Answer: A::B

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193. A and B are two fixed points whose co-ordinates are $(3,2)$ and $(5,4)$ respectively. The co-ordinates of a point P if ABP is an equilateral triangle , are :

A. $(4-\sqrt{3}, 3+\sqrt{3})$

B. $(4+\sqrt{3}, 3-\sqrt{3})$

C. $(3-\sqrt{3}, 4-\sqrt{3})$

D. $(3+\sqrt{3}, 4-\sqrt{3})$

Answer: A::B

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194. If one diagonal of square is the portion of the line $\frac{x}{a}+\frac{y}{b}=1$intercepted by the axes, then the extremities of the other diagonal of the square are :

A. $\left(\frac{a+b}{2}, \frac{a+b}{2}\right)$

B. $\left(\frac{a-b}{2}, \frac{a+b}{2}\right)$

C. ((a-b)/2,(b-a)/2)`

D. $\left(\frac{a+b}{2}, \frac{b-a}{2}\right)$

Answer: A::C

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195. Two lines are given by $(x-2y)^2 + k(x-2y) = 0$. The value of k so that the distance between them is 3, is

A. k=0

B. $k = 3\sqrt{5}$

C. $k = -3\sqrt{5}$

D. k=3

Answer: B::C

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196. Let $L_1 \equiv ax + by + a\sqrt[3]{b} = 0$ and $L_2 \equiv bx + ay + a\sqrt[3]{a} = 0$ be two straight lines. The equations of the bisectors of the angle formed by the lines whose equations are $\lambda_1 L_1 - \lambda_2 L_2 = 0$ and $\lambda_1 L_1 + \lambda_2 L_2 = 0$ and λ_1 and λ_2 being non zero real numbers, are given by

A. $L_1 = 0$

B. $L_2 = 0$

C. $\lambda_2 L_1 + \lambda_1 L_2 = 0$

D. $\lambda_2 L_1 - \lambda_1 L_2 = 0$

Answer: A::B

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197. A vector $\vec{a}$ has components 2p and 1 with respect to a rectangular Cartesian system, this system is rotated through a certain clockwise sense, if we write the new system $\vec{a}$ has components (p+1) and 1 then

A. p=0

B. p=1

C. p=-1/3

D. p=-1

Answer: B::C

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198. If $a^2 - b^2 - c^2 - 2ab = 0$, then the family of lines ax+by+c=0 are concurrent at the points

A. (1,-1)

B. (-1,1)

C. (1,1)

D. (-1,-1)

Answer: B::C

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199. $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are the vertices of a triangle ABC. lx+my+n=0 is an equation of the line L.

Answer the following questions based on above passage :

If L intersects the sides BC, CA and AB of the triangle ABC at P, Q, R respectively then $\frac{BP}{PC} \times \frac{CQ}{QA} \times \frac{AR}{RB}$ is equal to

A. -1

B. $-1/2$

C. `1//2

D. 1

Answer: A

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200. $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are the vertices of a triangle ABC. lx+my+n=0 is an equation of the line L.

Answer the following questions based on above passage :

If the centroid of the triangle ABC is at the origin and algebraic sum of the length of the perpendiculars from the vertices of the triangle ABC on the line L is equal to 1 then sum of the squares of the intercepts made by L on the coordinate axes is equal to

A. 0

B. 4

C. 9

D. 16

Answer: C

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201. Let $f_1(x, y) \equiv ax^2 + 2hxy + by^2 = 0$ and let $f_{i+1} = 0$ denotes the equation of the bisectors of $f_i(x, y) = 0$ for all i=1,2,3....

Answer the following question based on above passage:

Equation $f_2(x, y) = 0$ is

A. $hx^2 - (a - b)xy + hy^2 = 0$

B. $hx^2 - (a - b)xy - hy^2 = 0$

C. $hx^2 + (a-b)xy + hy^2 = 0$

D. $hx^2 + (a-b)xy - hy^2 = 0$

Answer: B

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202. Let $f_1(x, y) \equiv ax^2 + 2hxy + by^2 = 0$ and let $f_{i+1} = 0$ denotes the equation of the bisectors of $f_i(x, y) = 0$ for all i=1,2,3....

Answer the following question based on above passage:

Equation $f_3(x, y) = 0$ is

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

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

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

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

Answer: D

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203. For points $P \equiv (x_1 y_1)$ and $Q \equiv (x_2, y_2)$ of the coordinate plane, a new distance d(P,Q) is defined by d $(P, Q) = |X_1 - X_2| + |y_1 - y_2|$ Let $O = (0, 0), A = (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

Answer the following questions based on above passage:

Let R (x,y), such that R is equidistant from the points O and A with respect to new distance and if $0 < x < 1$ and $0 < y < 2$ then R lie on a line segment whose equation is

A. x+y=3

B. x+2y=3

C. 2x+y=3

D. 2x+2y=3

Answer: D

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204. For points $P \equiv (x_1 y_1)$ and $Q \equiv (x_2, y_2)$ of the coordinate plane, a new distance d(P,Q) is defined by d $(P, Q) = |X_1 - X_2| + |y_1 - y_2|$ Let $O = (0, 0), A = (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

Answer the following questions based on above passage:

Let S(x,y), such that S is equidistant from the points O and B

with respect to new distance and if $x \geq 2$ and $0 \leq y < 3$, then locus of S is

A. a line segment of finite length

B. a line of infinite length

C. a ray of finite length

D. a ray of infinite length

Answer: D

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205. If $\triangle$ denotes the area of the triangle with vertices (p+1, 1), (2p+1, 3) and (2p+2, 2p)

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206. Match List - I with List-II

Let the functions defined in List - I have domain $(-\pi/2, \pi/2)$

List - I		List - II	
(1)	$x + \sin x$	(P)	increasing
(2)	$\sec x$	(Q)	decreasing
(3)	e^{-x}	(R)	neither increasing nor decreasing

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207. Match List - I with List-II

Let the functions defined in List - I have domain $(-\pi/2, \pi/2)$

List - I	List - II
(1) $x + \sin x$	(P) increasing
(2) $\sec x$	(Q) decreasing
(3) e^{-x}	(R) neither increasing nor decreasing

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208. Given that shortest distance of the bisector of xy = 0 from the point (3 , 0) is $\frac{3}{2}\sqrt{k}$ Then , the value of k is :

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209. If the point $P[X_1 + t(X_2 - X_1), y_1 + t(y_2 - y_1]$ divides AB internally where (X_1, Y_1) and B B(X_2, Y_2) then, if $t \in (0, k)$, find k

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210. A line is such that its segment between the lines 5x-y-4=0 and 3x+4y-4=0 is bisected at the point (1,5). If the slope of the straight line is m, then [m] = [.] is G.I.F

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211. Point A is symmetric to B(4,-1) with respect to the bisector of the 1st quadrant Then [length of AB] is [.] is G.I.F

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212. If 'k' is the ordinate of the point P on the line 3x+2y+10=0 such that | PA-PB |is maximum , where A is (4,2) and B is (2,4), then [K/4] is is [.] G.I.F

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213. The equation of second degree $x^2 + 2\sqrt{2}xy + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines, the distance between them is :

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214. If $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$,represent a pair of straight lines, then the value of λ is

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215. The equation $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ where λ is a real number, represents a pair of straight lines If θ is the

angle between the line , then $\frac{\cos ec^2\theta}{2}$ is

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216. The pair of straight lines joining the origin to the points of intersection of $X^2 + Y^2 = 4$ and y=3X +c are perpendicular, if $\frac{c^2}{4} =$

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217. If the angle between the pair of straight lines represented by the equation $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ is $\tan^{-1}(1/3)$ where $\lambda \geq 0$, then λ is

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218. A rectangle PQRS has its side PQ parallel to the line y= mx and vertices P,Q and S on the lines y = a, x= b and x = -b respectively, Find the locus of the vertex R.

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219. A straight lines L through the origin meets the lines x+y=1 and x+y=3 at P and Q respectively. Through P and Q two straight lines L_1 and L_2 are drawn, parallel to 2x-y=5 and 3x+y=5 respectively. Line L_1 and L_2 intersect at R. Show that the locus of R as L varies is a straight line.

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220. A variable line is at constant distance p from the origin and meets the co-ordinate axes in A, B. Show that the locus of the centroid of the $\triangle OAB$ is $x^{-2} + y^{-2} = 9p^{-2}$

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221. The line segment joining A(3,0) and B(5,2) is rotated about A is the anticlockwise direction through and angle of 45° so that B goes to C. If D is the reflection of C in y-axis , find the co-ordinates of D.

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222. A straight line L with negative slope passes through the point (8,2) and cuts the positive coordinate axes at points P and

Q. As L varies, the absolute minimum value of OP+OQ is (O is origin)

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223. Find the condition in a,b such that the portion of the line ax+by=1, intercepted between the lines ax+y=0 and x + by=0 sustains a right angle at origin.

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224. Find the set of values of λ, for which the point $\left(\sqrt{4-\lambda^2}, \lambda\right)$ lies outside the triangle formed by the lines $(y-3)^2 = 3x^2$ and $y + \sqrt{3} = 0$

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225. Prove that two of the four lines represented by the joint equation

$ax^4 + bx^3y + cx^2y^2 + dxy^3 + ay^4 = 0$

will bisect the angles between the other two if c+6a=0 and b+d=0

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226. A variable line makes intercepts on the co-ordinate axes , the sum of whose squares is constant and equal to k^2. Show that the locus of the foot of the perpendicular from the origin to this line is $\left(x^2 + y^2\right)^2 \left(x^{-2} + y^{-2}\right) = k^2$.

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227. The pair of lines joining the origin to the points of intersection of the 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 to one another , if

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228. The number of points, having both co-ordinates as integers, that lie in the interior of triangle with vertices (0,0) , (0,41), and (41,0) is :

A. 861

B. 820

C. 780

D. 901

Answer: C

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229. Locus of the image of the point (2,3) in the line $(2x - 3y + 4) + k(x - 2y + 3) = 0, k \in R$, is a

A. straight lines parallel to y-axis.

B. circle of radius $\sqrt{2}$

C. circle of radius $\sqrt{3}$

D. straight lines parallel to x-axis

Answer: B

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230. The least positive value of t so that the lines $x = t + \alpha, y + 16 = 0$ and $y = \alpha x$ are concurrent is

A. 2

B. 4

C. 16

D. 8

Answer: D

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231. If the point $(2\cos\theta, 2\sin\theta)$, for $\theta \in (0, 2\pi)$ lies in the region between the lines x+y=2 and x-y=2 containing origin, then θ lies in

A. $\left(0, \frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2}, 2\pi\right)$

B. $[0, \pi]$

C. $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

D. $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

Answer: C

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232. Number of points having distance $\sqrt{5}$ from the straight line x-2y+1 = 0 and a distance $\sqrt{13}$ from the line 2x+3y-1 = 0 is

A. 1

B. 2

C. 4

D. 5

Answer: C

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233. For $a > b > c > 0$, the distance between (1 ,1) and the point of intersection of the lines ax + by + c = 0 and bx + ay +c = 0 is less than $2\sqrt{2}$, then

A. $a + b - c > 0$

B. $a - b + c < 0$

C. a-b+cgt0

D. $a + b - c < 0$

Answer: A

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234. A ray light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching the x-axis, the equation of the reflected ray is

A. $\sqrt{3}y = x - 1$

B. $y = \sqrt{3}x - \sqrt{3}$

C. $\sqrt{3}y = x - \sqrt{3}$

D. $y = x + \sqrt{3}$

Answer: C

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235. The x co -ordinate of the incentre of the triangle that has the coordinates of mid - points of its sides as (0 , 1) , (1 ,1) and (1 ,0) is 'a/(2+sqrt2)'. Find a.

A. $2-\sqrt{2}$

B. $1+\sqrt{2}$

C. $1-\sqrt{2}$

D. $2+\sqrt{2}$

Answer: A

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236. The equation $2x^2+5xy-12y^2=0$ represents a

A. circle

B. pair of non- perpendicular intersecting straight lines

C. pair of perpendicular straight lines

D. hyperbola

Answer: B

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237. The number of lines which pass through the point (2 , -3) and are the distance 8 from the point (-1 ,2) is

A. infinite

B. 4

C. 2

D. 0

Answer: D

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238. If the line 2x + y = k passes through the point which divides the line segment joining the points (1 , 1) and (2 ,4) in the ratio 3:2, then k equals

A. $\frac{29}{5}$

B. 5

C. 6

D. $\frac{11}{5}$

Answer: C

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239. A line is drawn through the point (1, 2) to meet the coordinate axes at P and Q such that it forms a triangle OPQ,

where O is the origin. If the area of the triangle OPQ is least, then the slope of the line PQ is

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

B. -4

C. -2

D. $-\frac{1}{2}$

Answer: C

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240. Let P(2 ,3), Q (-2 ,1) be the vertices of the triangle PQR .If the centroid of $\triangle PQR$ lies on the line 2x + 3y =1 , them locus of R is

A. 2x+3y+9=0

B. $2x-3y=9$

C. $3x+2y=5$

D. $3x-2y=5$

Answer: A

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241. The number of integral values of 'm' for which the x coordinate of the point of intersection of the lines $3x+4y=9$ and $y = mx+1$ is also an integer is

A. 0

B. 2

C. 4

D. 1

Answer: B

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242. If a straight line passes through the point (α, β) and the portion of the line intercepted between the axes is divided equally at that point, them $\frac{x}{\alpha} + \frac{y}{\beta}$ is

A. 0

B. 1

C. 2

D. 4

Answer: C

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243. The line joining A $(b\cos\alpha, b\sin\alpha)$ and B $(a\cos\beta, a\sin\beta)$, where $a \neq b$, is produced to the point M(x,y) so that AM :MB = b :a Then $x\cos\frac{\alpha+\beta}{2} + y\sin\frac{\alpha+\beta}{2}$

A. 0

B. 1

C. -1

D. $a^2 + b^2$

Answer: A

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244. A straight line through the point of intersection of the lines x+2y = 4 and 2x +y =4 meets the coordinates axes at A and B. The locus of the midpoint of AB is

A. 3(x+y)=2xy

B. 2(x+y)=3xy

C. 2(x+y)=xy

D. x+y=3xy

Answer: B

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245. A straight lines L through the point (3, 2) is inclined at an angle 60° to the line $\sqrt{3}x + y = 1$. If L also intersects the x-axis, then the equation of L is

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

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

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

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

Answer: A

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246. The lines L_1:y-x =0 and L_2: 2x+y =0 intersect the line L_3 : y+2 =0 at P and Q respectively. The bisector of the acute angle between L_1 and L_2 intersects L_3 at R

Statement - 1 : The ratio PR : PQ equals $2\sqrt{2}$: $\sqrt{5}$

Statement - 2 : In any triangle , bisector of an angle divides the triangle into two similar triangle

A. statement - 1 is true, Statement - 2 is true :

Statement -2 is not correct explanation for statement -1

B. Statement -1 is true , Statement -2 is false

C. Statement -1 is false, statement -2 is true

D. Statement -1 is true statement -2 is true , Statement-2 is a correct explanation for Statement -1

Answer: B

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247. The coordinates of the two points lying on $x + y = 4$ and at a unit distance from the straight line $4x + 3y = 10$ are

A. (-3,1), (7,11)

B. (3,1),(-7,11)

C. (3,1),(7,11)

D. (5,3),(-1,2)

Answer: B

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248. If the three points A (1, 6), B(3,-4) and C(x,y) are collinear then the equation satisfying by x and y is

A. $5x+y-11=0$

B. $5x+13y+5=0$

C. $5x-13y+5=0$

D. $13x-5y+5=0$

Answer: A

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249. Find the image of the point (-8,12) which respect to the line

$4x + 7y + 13 = 0$


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