MATHS

BOOKS - ARIHANT MATHS (ENGLISH)

THE STRAIGHT LINES

Examples

1. Find the inclination of the line whose slope is $-\frac{1}{\sqrt{3}}$

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2. Find the slope of the line through the points $(4, -6)(-2, -5)$

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3. Determine x so that 2 is the slope of the line through (2,5) and $(x, 3)$.

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4. Show that the line joining (2,-3) and (-5,1) is parallel to the line joining (7,-1) and (0,3).

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5. Find whether the points $(-a, -b), [-(s+1)a, -(s+1)b]$ and $[(t-1)a, (t-1)b]$ are collinear?

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6. For what value of k are the points $(k, 2-2k)(-k+1, 2k) and (-4-k, 6, 6-2k)$ are collinear?

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7. Find the angle between the lines joining the point $(0, 0), (2, 3)$ and the points $(2, -2), (3, 5)$.

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8. If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$, find the slope of the other line.

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9. Without using pythagoras theorem, show that the points $A(-1, 3), B(0, 5)$ and $C(3, 1)$ are the vertices of a right angled triangle

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10. A line passes through the points $A(2, -3)$ and $B(6, 3)$. Find the slopes of the lines which are ,

(i) parallel to AB (ii) perpendicular to AB

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11. Show that the triangle which has one of the angles as 60° can not have all verticles with integral coordinates.

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12. Find the equation of the straight line parallel to Y - axis and at a distance (i) 3 units to the right (ii) 2 units to the left

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13. Write down the equation of a line parallel to the x-axis

(i) at a distance of 5 units above the x-axis.

(ii) at a distance of 4 units below the x-axis.

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14. Find the equation of the straight line which passes through the point $(2, -3)$ and is

(i) parallel to the X-axis ,

perpendicular to the X - axis

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15. Find the equation of a line which is equidistant from the lines $x = -\frac{7}{2}$ and $x = \frac{15}{2}$

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16. If the straight line $y = mx + c$ passes through the points (2,4) and $(-3, 6)$, then the value of m and c are

(i) $m = -\frac{2}{5}, c = \frac{24}{5}$

(ii) $m = \frac{2}{5}, c = \frac{24}{5}$

(iii) $m = -\frac{2}{5}, c = -\frac{24}{5}$

(iv) $m = \frac{2}{5}, c = -\frac{24}{5}$

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17. What are the inclination to the X - axis and intercept on Y - axis of the line

$3y = \sqrt{3}x + 6$?

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18. A line cutting off intercept -3 from y axis and tangent of angle to the axis is $\frac{3}{5}$ is

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19. Find the equation to the straight line cutting off an intercept of 5 units on negative direction of Y - axis and being equally inclined to the axes.

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20. Find the equation of the bisectors of the angles between the coordinate axes.

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21. Find the equation of a line which makes an angle of 135° with the x-axis and passes through the point (3,5).

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22. Find the equation of the straight line bisecting the segment joining the points $(5, 3)$ and $(4, 4)$ and making an angle of 45° with the positive direction of X-axis.

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23. Find the eqution of the right bisector of the line segment joining the points (3,4) and (-1,2).

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24. Find the equation of the straight lines passing through the following pair of point: $(at_1, a/t_1)$ and $(at_2, a/t_2)$

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25. If the coordinates of the points A,B,C be $(-1, 5), (0, 0)$ and $(2, 2)$ respectively, and D be the middle point of BC, then the equation of the perpendicular drawn from B to the line AD is

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26. The vertices of a triangle are $A(10, 4), B(-4, 9)$ and $C(-2, -1)$. Find the equation of the altitude through A.

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27. If A(-1, 6), B(-3, -9) and C(5, -8) are the vertices of a $\triangle ABC$, find the equations of its medians.

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28. In what ratio is the line joining the pints $(2, 3) and (4, -5)$ divided by the line passing through the points (6,8) and (-3,-2).

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29. Find the equation of the line through (2,3) so that the segment of the line intercepted between the axes is bisected at this point.

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30. Find the equation of the straight line passing through $(3, 4)$ and has intercepts on the axes (i) equal in magnitude but opposite in sign (ii) such that their sum is 14.

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31. Find the equation of the straight line through the point P(a,b) parallel to the line $\frac{x}{a}+\frac{y}{b}=1$ also find the intercepts made by it on the axes .

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32. The length of perpendicular from the origin to a line is 9 and the line makes an angle of 120° witth the positive direction of Y - axes . Find the equation of the line .

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33. Find the equation of the straight line on which the perpendicular from origin makes an angle 30^{o} with positive x-axis and which foms a triangle of area $\frac{50}{\sqrt{3}}$sq, units with the co-ordinates axis.

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34. Reduce $x + \sqrt{3}y + 4 = 0$ to the : Slope intercepts form and find its slope and y-intercept.

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35. Reduce $x + \sqrt{3}y + 4 = 0$ to the : Slope intercepts form and find its slope and y-intercept.

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36. Reduce $x + \sqrt{3y} + 4 = 0$ to the :

(iii) Normal form and find the values of p and α

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37. Find the measure of the angle of intersection of the lines whose equations are $3x + 4y + 7 = 0$ and $4x - 3y + 5 = 0$

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38. Find the angle between the lines , $\left(a^2-ab\right)y=\left(ab+b^2\right)x+b^3$, and $\left(ab+b^2\right)y=\left(ab-a^2\right)x+a^3$ where $a<b<0$

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40. The slope of a straight line through $A(3,2)is3/4$ Find the coordinates of the points on the line that are $5units$ away from A.

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41. Find the direction in which a straight line must be drawn through the point (1,2) so that its point of intersection with the line $x + y = 4$ may be at a distance $\frac{1}{3}\sqrt{6}$ from this point

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42. A line (2,3) makes an angle $\frac{3\pi}{4}$ with the negative direction of X- axis . Find the length of the line segment cut off between (2,3) and the line $x + y - 7 = 0$

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43. Find the distance of the point (2,3) from the line $2x - 3y + 9 = 0$ measured along the line $2x - 2y + 5 = 0$

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44. If the line $y - \sqrt{3}x + 3 = 0$ cuts the parabola $y^2 = x + 2$ at P and Q then $AP.\ AQ$ is equal to

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46. The center of a square is at the origin and its one vertex is $A(2, 1)$. Find the coordinates of the other vertices of the square.

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47. The experimities of the diagonal of a square are (1,1) ,$(-2, -1)$ .Obtain the other two vertices and the equation of the other diagonal .

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48. Are the points (2,1) and $(-3, 5)$ on the same or opposite side of the line $3x - 2y + 1 = 0$?

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49. Is the point $(2, -7)$ lies on origin side of the line $2x + y + 2 = 0$?

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50. A canal is $4\frac{1}{2}$ kms from a place and the shortest route from this place to the cenal is exactly north-east. A village is 3 kms north and 4 kms east from the place. Does it lie on canal?

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51. The point $P(\alpha, \alpha+1)$ will lie inside the triangle whose vertices are $A(0,3), B(-2,0)$ and $C(6,1)$ if

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52. Find λ if $(\lambda, 2)$ is an interior point of ΔABC formed by $x+y=4, 3x-7y=8$ and $4x-y=31$

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53. If $\left(\alpha, \alpha^2\right)$ lies inside the triangle formed by the lines $2x+3y-1=0, x+2y-3=0, 5x-6y-1=0$, then

$2\alpha+3\alpha^2-1>0$ $\alpha+2\alpha^2-3<0$ $\alpha+2\alpha^2-3<0$ (d) $6\alpha^2-5a+1>0$

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54. Find the general equation of the line which is parallel to $3x - 4y + 5 = 0$. Also find such line through the point $(-1, 2)$

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55. Find the general equation of the line which is perpendicular to $x + y + 4 = 0$. Also find such line through the point $(1, 2)$

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56. The equation to the straight line passing through the point $(a\cos^3\theta, a\sin^3\theta)$ and perpendicular to the line $x\sec\theta + y\operatorname{cosec}\theta = a$ is

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57. The absolute value of the sum of the abscissas of all the points on the line $x + y = 4$ that lie at a unit distance from the line $4x + 3y - 10 = 0$

is_____

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58. If p and q are respectively the perpendiculars from the origin upon the striaght lines, whose equations are $x \sec\theta + y \cos ec\theta = a$ and $x \cos\theta - y \sin\theta = a \cos 2\theta, then 4p^2 + q^2$ is equal to

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59. If p is the length of the perpendicular from the origin to the line $\frac{x}{a} + \frac{y}{b} = 1$, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

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60. Number of lines that can be drawn through the point $(4, -5)$ so that its distance from $(-2, 3)$ will be equal to 12 is equal to

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61. The distance between two parallel lines $5x - 12y + 2 = 0$ and $5x - 12y - 3 = 0$ is given by

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62. The equation ns of the lines parallel to $5x - 12y + 26 = 0$ and at a distance of 4 units from it are: $5x - 12y - 26 = 0$ $5x - 12y + 26 = 0$ $5x - 12y - 78 = 0$ (d) $5x - 12y + 78 = 0$

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63. Show that the area of the parallelogram formed by the lines $2x - 3y + a = 0,\ 3x - 2y - a = 0,\ 2x - 3y + 3a = 0\ and\ 3x - 2y - 2a =$

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64. Prove that the area of the parallelogram formed by the lines $x\cos\alpha + y\sin\alpha = p, x\cos\alpha + ys \in \alpha = q, x\cos\beta + y\sin\beta = randx\cos$

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65. Prove that the parallelogram formed by the lines $\frac{x}{a} + \frac{y}{b} = 1, \frac{x}{b} + \frac{y}{a} = 1, \frac{x}{a} + \frac{y}{b} = 2an\frac{dx}{b} + \frac{y}{a} = 2$ is a rhombus.

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66. Area of the rhombus bounded by the four lines, $ax \pm by \pm c = 0$ is

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67. Show that the lines

$2x + 3y - 8 = 0, x - 5y + 9 = 0$ and $3x + 4y - 11 = 0$ are concurrent.

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68. If the lines $ax + y + 1 = 0, x + by + 1 = 0$ and $x + y + c = 0 (a, b, c$ being distinct and different from $1)$ are concurrent, then prove that $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 1.$

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69. Show that the three straight lines $2x - 3y + 5 = 0, 3x + 4y - 7 = 0$ and $9x - 5y + 8 = 0$ meet in a point

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70. Find the equation of the straight line passing through the point (2,1) and through the point of intersection of the lines $x + 2y = 3$ and $2x - 3y = 4$

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71. The fix point through which the line $x(a+2b)+y(a+3b)=a+b$ always passes for all values of a and b, is-

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72. If $3a+2b+6c=0$ the family of straight lines $ax+by=c=0$ passes through a fixed point . Find the coordinates of fixed point .

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73. Find the equation of the line passing through the point of intersection of the lines $x+5y+7=0$ and $3x+2y-5=0$

(a) parallel to the line $7x+2y-5=0$

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74. Find the equation of the line passing through the point of intersection of the lines $x + 5y + 7 = 0$ and $3x + 2y - 5 = 0$

(b) perpendicular to the line $7x + 2y - 5 = 0$

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75. Find the equation of the line passing through the intersection of the lines $3x - 4y + 1 = 0$ and $5x + y - 1 = 0$ which cuts off equal intercepts on the axes.

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76. If $t_1 and t_2$ are roots of eth equation $t^2 + \lambda t + 1 = 0,$ where λ is an arbitrary constant. Then prove that the line joining the points $(at1, 22at_1) adn (at2, 22at_2)$ always passes through a fixed point. Also, find the point.

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77. A variable straight line is drawn through the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ and meets the coordinate axes at A and B. Show that the locus of the midpoint of AB is the curve $2xy(a+b)=ab(x+y)$

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78. Find the coordinates of the circumcenter of the triangle whose vertices are $(A(5,\ -1), B(\ -1, 5),$ and $C(6, 6)$. Find its radius also.

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

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80. Find the orthocentre of the triangle ABC whose angular points are $A(1, 2), B(2, 3)$ and $C(4, 3)$

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81. The equations of two sides of a triangle are $3x - 2y + 6 = 0$ *and* $4x + 5y - 20$ *and* the orthocentre is (1,1). Find the equation of the third side.

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82. If the otrhocentre of the triangle formed by the lines $2x + 3y - 1 = 0, x + 2y - 1 = 0, ax + by - 1 = 0$ is at the origin then (a,b) is given by.

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83. Find eq^{ns} of lines passing through the point $(2, 3)$ and inclined at an angle $\frac{\pi}{4}$ to the line $2x + 3y = 5$

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84. A vertex of an equilateral triangle is $2, 3$ and the opposite side is $x + y = 2$. Find the equations of other sides.

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86. Find the equation of a straight line passing through the point (4, 5) and equally inclined to the lines $3x = 4y + 7$ and $5y = 12x + 6$.

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88. Find the equation of the bisector of the obtuse angle between the lines $3x - 4y + 7 = 0$ and $12x + 5y - 2 = 0$.

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89. Find the equations of angular bisector bisecting the angle containing the origin and not containing the origin of the lines $4x + 3y - 6 = 0$ and $5x + 12y + 9 = 0$

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90. The equations of the bisector of the agle between the line $2x + y - 6 = 0$ and $2x - 4y + 7 = 0$ which contains the point (1,2) is .

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91. Find the equation of the bisector of the obtuse angle between the lines $3x - 4y + 7 = 0$ and $12x + 5y - 2 = 0$.

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92. Find the bisector of acute angle between the lines $x + y - 3 = 0$ and $7x - y + 5 = 0$

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93. The vertices of ΔABC are $A(0, 6)$, $B(8, 12)$ and $C(8, 0)$. The cordinates of the incentre are:

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94. Find the coordinates of the foot of the perpendicular drawn from the point (2,3) to the line $y = 3x + 4$

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95. The reflection of the point (4,-13) about the line $5x + y + 6 = 0$ is $(-1, -14)$ b. $(3, 4)$ c. $(0, -0)$ d. $(1, 2)$

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96. Find the image of the $(-2, -7)$ under the transformations (x,y) to $(x - 2y, -3x + y)$.

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97. The image of the point A (1,2) by the line mirror y=x is the point B and the image of B by the line mirror y=0 is the point (α, β), then a. $\alpha = 1, \beta = -2$ b. $\alpha = 0, \beta = 0$ c. $\alpha = 2, \beta = -1$ d. none of these

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99. Find the equations of the sides of the triangle having $(3, -1)$ as a vertex, $x - 4y + 10 = 0$ and $6x + 10y - 59 = 0$ being the equations of an angle bisector and a median respectively drawn from different vertices.

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100. If $P = (1, 1), Q = (3, 2)$ and R is a point on x-axis then the value of $PR + RQ$ will be minimum at

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101. Find a point P on the line $3x + 2y + 10 = 0$ such that $|PA - PB|$ is minimum where A is (4,2) and B is (2,4)

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102. A ray of light is sent along the line $x - 2y - 3 = 0$ upon reaching the line $3x - 2y - 5 = 0,$ the ray is reflected from it. Find the equation of the line containing the reflected ray.

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103. A light beam, emanating from the point (3, 10) reflects from the straight line $2x + y - 6 = 0$ and then passes through the point $B(7, 2)$. Find the equations of the incident and reflected beams.

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104. A ray of light is sent along the line $2x - 3y = 5$. After refracting across the line $x + y = 1$ it enters the opposite side after torning by 15^0 away from the line $x + y = 1$. Find the equation of the line along which the refracted ray travels.

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105. If the points, $\left(\frac{a^3}{a-1}, \frac{a^2-3}{a-1}\right), \left(\frac{b^3}{b-1}, \frac{b^2-3}{b-1}\right)$ and $\left(\frac{c^3}{c-1}\frac{c^2-3}{c-1}\right)$ are collinear for three distinct values a, b, c and $a \neq 1, b \neq 1$ and $c \neq 1$, then show that $abc - (bc + ca + ab) + 3(a + b + c) = 0$

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106. A rectangle $ABCD$ has its side AB parallel to line $y = x,$ and vertices $A, BandD$ lie on $y = 1, x = 2,$ and $x = -2,$ respectively. The locus of vertex C is $x = 5$ (b) $x - y = 5$ $y = 5$ (d) $x + y = 5$

A. x=5

B. $x - y = 5$

C. y=5

D. $x + y = 5$

Answer:

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107. The line $(k + 1)x + ky - 2k^2 - 2 = 0$ passes through a point regardless of the value k. Which of the following is the line with slope 2 passing through the point?

A. $y = 2x - 8$

B. $y = 2x - 5$

C. $y = 2x - 4$

D. $y = 2x + 8$

Answer:

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108. A man starts from the point $P(-3, 4)$ and reaches the point $Q(0, 1)$ touching the x-axis at $R(\alpha, 0)$ such that $PR + RQ$ is minimum. Then $5|\alpha| =$ _____

A. $\left(\frac{3}{5}, 0\right)$

B. $\left(-\frac{3}{5}, 0\right)$

C. $\left(-\frac{2}{5}, 0\right)$

D. $(-2, 0)$

Answer:

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109. If the point $P(a, a^2)$ lies completely inside the triangle formed by the lines $x = 0, y = 0,$ and $x + y = 2,$ then find the exhaustive range of values of a.

A. (0,1)

B. $(1, \sqrt{2})$

C. $(\sqrt{2} - 1, 1)$

D. $(\sqrt{2} - 1, 2)$

Answer:

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

A. ,0

B. 20

C. 30

D. None of these

Answer:

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111. If the straight lines. $ax + amy + 1 = 0, bx + (m + 1)by + 1 = 0$ and $cx + (m + 2)cy + 1 = 0, \ m \neq 0$ are concurrent then a,b.c are in: (A) A.P. only for m = 1 (B) A.P. for all m (C) G.P. for all m (D) H.P. for all m

A. AP only for m=1

B. AP for all m

C. GP for all m

D. HP for all m

Answer:

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112. 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:

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113. Through the point $P(\alpha, \beta)$, where $\alpha\beta > 0,$ the straight line $\frac{x}{a} + \frac{y}{b} = 1$ is drawn so as to form a triangle of area S with the axes. If $ab > 0,$ then the least value of S is $\alpha\beta$ (b) $2\alpha\beta$ (c) $3\alpha\beta$ (d) none

A. $\alpha\beta$

B. $2\alpha\beta$

C. $4\alpha\beta$

D. $8\alpha\beta$

Answer:

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114. The coordinates of the point P on the line $2x + 3y + 1 = 0$ 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:

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115. Equation of the straight line which belongs to the system of straight lines $a(2x + y - 3) + b(3x + 2y - 5) = 0$ and is farthest from the pint $(4, -3)$ is

A. $4x + 11y - 15 = 0$

B. $3x - 4y + 1 = 0$

C. $7x + y - 8 = 0$

D. None of these

Answer:

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116. Find the coordinates of the vertices of a square inscribed in the triangle with vertices $A(0,0), B(3,0) and C(2,1);$ given that two of its vertices are on the side AB.

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

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

C. $\left(\frac{9}{4}, \frac{3}{4}\right)$

D. $\left(\frac{9}{4}, 0\right)$

Answer:

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117. Line $\frac{x}{a}+\frac{y}{b}=1$ cuts the coordinate axes at $A(a,0) and B(0,b)$ and the line $\frac{x}{a'}+\frac{y}{b'}=-1$ at $A(-a,)$ and $B'(0,-b')$. If the points A, B, A', B' are concyclic, then the orthocentre of triangle ABA' is $(0,0)$ (b) $(0,b')$ $\left(0, \frac{aa'}{b}\right)$ (d) $\left(0, \frac{\hat{}(')}{a}\right)$

A. $(0, 0)$

B. $(0, b)$

C. $\left(0, \frac{-aa}{b}\right)$

D. $\left(0, \frac{bb'}{a}\right)$

Answer:

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118. Two straight line u=0 and v=0 pass through the origin and the angle between them is $\tan^{-1}(7/9)$. If the ratio of the slope of v=0 and u=0 is 9/2, then their equations are

A. $y = 3x \text{ and } 3y = 2x$

B. $2y = 3x \text{ and } 3y = x$

C. $y + 3x = 0 \text{ and } 3y + 2x = 0$

D. $2y + 3x = 0 \text{ and } 3y + x = 0$

Answer:

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119. A and B are two fixed points whose coordinates $(3, 2)$ and $(5, 4)$ respectively. The coordinates of a poin if ABP is an equilateral triangle, are

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

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

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

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

Answer:

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120. P(x,y) is called a natural point if x,$y \in N$. The total number of points lying inside the quadrilateral formed by the lines $2x + y = 2, x = 0, y = 0$ and $x + y = 5$ is

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121. The distance of the point (x,y) from the origin is defined as d = max . $\{|x|, |y|\}$. Then the distance of the common point for the family of lines $x(1 + \lambda) + \lambda y + 2 + \lambda = 0(\lambda$ being parameter) from the origin is

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122. statement 1: incentre of the triangle formed by the lines whose $3x + 4y = 0, 5x - 12y = 0$ and $y - 15 = 0$ is the point P whose co-ordinates are $(1, 8)$.Statement-2: Point P is equidistant from the 3 lines forming the triangle.

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123. If x coordinates of two points B and C are the roots of equation $x^2 + 4x + 3 = 0$ and their y coordinates are the roots of equation $x^2 - x - 6 = 0$. If x coordinate of B is less than x coordinate of C and y coordinate of B is greater than the y coordinate of C and coordinates of a third point A be (3, -5), find the length of the bisector of the interior angle at A.

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124. The vertices $BandC$ of a triangle ABC lie on the lines $3y = 4xandy = 0$, respectively, and the side BC passes through the point $\left(\frac{2}{3}, \frac{2}{3}\right)$. If $ABOC$ is a rhombus lying in the first quadrant, O being the origin, find the equation of the line BC.

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126. One side of a square makes an angle α with x axis and one vertex of the square is at origin. Prove that the equations of its diagonals are $x(\sin\alpha+\cos\alpha)=y(\cos\alpha-\sin\alpha)$ or $x(\cos\alpha-\sin\alpha)+y(\sin\alpha+\cos\alpha)=a$, where a is the length of the side of the square.

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127. In a ABC, $A\equiv(\alpha,\beta)$, $B\equiv(1,2)$, $C\equiv(2,3)$, point A lies on the line $y=2x+3$, where α,β are integers, and the area of the triangle is S such that $[S]=2$ where $[\ .]$ denotes the greatest integer function. Then the possible coordinates of A can be $(-7,-11)$ $(-6,-9)$ $(2,7)$ $(3,9)$

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128. Find the values of non-negative real number $h_1, h_2, h_3, k_1, k_2, k_3$ such that the algebraic sum of the perpendiculars drawn from the points $(2, k_1), (3, k_2), \cdot 7, k_3), (h_1, 4), (h_2, 5), (h_3, -3)$ on a variable line passing through (2, 1) is zero.

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129. Let (h, k) be a fixed point, where $h > 0, k > 0$. A straight line passing through this point cuts the positive direction of the coordinate axes at the point $PandQ$. Find the minimum area of triangle OPQ, O being the origin.

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130. The distance between the two parallel lines is 1 unit. A pont 'A' is chosen to lie between the lines at a distance 'd' from one of them. Triangle ABC is equilateral with B on one line and C on the other parallel line. The length of the side of the equilateral triangle is

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131. Consider two lines $L_1 and L_2$ given by $x - y = 0$ and $x + y = 0$, respectively, and a moving point $P(x, y)$. Let $d(P, L_1), i = 1, 2,$ represents the distance of point P from the line L_i. If point P moves in a certain region R in such a way that $2 \leq d(P, L_1) + d(P, L_2) \leq 4$, find the area of region R.

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132. 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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133. For points $P \equiv (x_1, y_1)$ and $Q \equiv (x_2, y_2)$ of the coordinate plane, a new distance $d(P, Q) = |x_1 - x_1| + |y_1 - y_2|$. Let $O = (0, 0)$ and

$A = (3, 2)$. Prove that the set of points in the first quadrant which are equidistant (with respect to the new distance) from O and A consists of the union of a line segment of finite length and an infinite ray. Sketch this set in a labelled diagram.

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134. A line through the variable point $A(k + 1, 2k)$ meets the lines $7x + y - 16 = 0, 5x - y - 8 = 0, x - 5y + 8 = 0$ at $B, C, D,$ respectively. Prove that AC, AB, AD are in HP.

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Example

1. If the equations of the sides of a triangle are $a_r x + b_r y = 1, r = 1, 2, 3$ and the orthocentre is the origin then prove that a1a2 +b1b2= a2a3+ b2b3 =a3a1+b3b1

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2. The point $p(3, 4)$ undergoes a reflection in the X-axis followed by a reflection in the y-axis. Show that their combined effect is the same as the single reflection of p(3,4) in the orign.

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3. The base of a triangle passes through a fixed point (f,g) and its sides are respectively bisected at right angles by the lines $y + x = 0$ and $y - 9x = 0$

Determine the locus of its vertex.

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Jee Tyep Solved Examples Paragraph Based Questions

1. Two sides of a rhombus OABC (lying entirely in first quadrant or fourth quadrant) of area equal to 2 sq. units, are $y = \frac{x}{\sqrt{3}}, y = \sqrt{3}x$ Then possible coordinates of B is/are (O being the origin).

A. $(1 + \sqrt{3}, 1\sqrt{3})$

B. $(-1, -\sqrt{3}, -1\sqrt{3})$

C. $(3 + \sqrt{3}, 3 + \sqrt{3})$

D. $(\sqrt{3} - 1, \sqrt{3} - 1)$

Answer:

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2. Calculate the length of the perpendicular from (5, 1) to the straight line 5 x + 12 y − 9 = 0.

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3. If one root of the equation 6x^2 − 2 x + (λ − 5) = 0 be the reciprocal of the other, then λ =

A. $4 - \sqrt{2}$

B. $4 + \sqrt{2}$

C. $4 + 2\sqrt{2}$

D. 10

Answer:

Watch Video Solution

4. Let Δ denote the area of the Δ A B C then what is the area of triangle PQR whose sides are half of it.

A. 2

B. 4

C. 6

D. 8

Answer:

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5. A point P is taken on 'L' such that $\frac{2}{OP} = \frac{1}{OA} + \frac{1}{OB}$, then the locus of P is

A. $3x + 3y - 40 = 0$

B. $3x + 3y + 40 = 0$

C. $3x - 3y - 40 = 0$

D. $3x - 3y + 40 = 0$

Answer:

Watch Video Solution

6. A variable line L drawn through O(0,0) to meet line l1: y-x-10=0 and L2:y-x-20=0 at the point A and B respectively then locus of point p is ' such that $(OP)^2 = OA.OB$,

A. $(y-x)^2 = 25$

B. $(y-x)^2 = 50$

C. $(y-x)^2 = 100$

D. $(y-x)^2 = 200$

Answer:

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7. A point P is taken on 'L' such that $\frac{2}{OP} = \frac{1}{OA} + \frac{1}{OB}$, then the locus of P is

A. $(y-x)^2 = 32$

B. $(y-x)^2 = 64$

C. $(y-x)^2=80$

D. $(y-x)^2=100$

Answer:

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8. The equation of the sides of a triangle are $x+2y+1=0, 2x+y+2=0$ and $px+qy+1=0$ and area of triangle is Δ.

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9. Consider the lines $L_1: \frac{x}{3}+\frac{y}{4}=1, L_2: \frac{x}{4}+\frac{y}{3}=1, L_3: \frac{x}{3}+\frac{y}{4}=2$ and $L_4: \frac{x}{4}+\frac{y}{3}=2$ .Find the relation between these lines.

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10. Let the sides of a parallelogram be U=a, U=b,V=a' and V=b', where U=lx+my+n, V=l'x+m'y+n'. Show that the equation of the diagonal through the point of intersection of

$U = a, V = a'$ and $U = b, V = b'$ is given by $\begin{vmatrix} U & V & 1 \\ a & a' & 1 \\ b & b' & 1 \end{vmatrix} = 0.$

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11. The three sides of a triangle are $L_r + x\cos\theta_r + y\sin\theta_r - p_r = 0$ where r = 1,2,3 . Show that the orthocentre is given by

$L_1 \cos(\theta_2 - \theta_3) = L_2 \cos(\theta_3 - \theta_1) = L_3 \cos(\theta_1 - \theta_2)$.

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12. A ray of light travelling along the line OA (O being origin) is reflected by the line mirror $x - y + 1 = 0$ is the point of incidence being A (1,2) the reflected ray , travelling along AB is again reflected by the line mirror

$x - y = 2$, the point of incidence being B. If this reflected ray moves along BC, find the equation of the lne BC.

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Exercise For Session 1

1. about to only mathematics

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

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

C. $\sqrt{5}$

D. $\sqrt{13}$

Answer: C

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2. 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. $|\alpha - \beta| = \pi/2$

C. $\alpha = \pi/2$

D. $\alpha \pm \beta = \pi/2$

Answer: B

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3. If each of the points $(x_1, 4), (-2, y_1)$ lies on the line joining the points $(2, -1) and (5, -3)$, then the point $P(x_1, y_1)$ lies on the line. (a) $6(x+y) - 25 = 0$ (b) $2x + 6y + 1 = 0$ (c) $2x + 3y - 6 = 0$ (d) $6(x+y) + 25 = 0$

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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4. The equation of the straight line passing through the point $(4.\ 3)$ and making intercepts on the co ordinate axes whose sum is -1, is

A. $\frac{x}{2} + \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

B. $\frac{x}{2} - \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

C. $\frac{x}{2} + \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

D. $\frac{x}{2} - \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

Answer: D

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5. If the straight lines $ax + by + p = 0$ and $x\cos\alpha + y\sin\alpha = c$ enclose an angle $\pi/4$ between them and meet the straight line $x\sin\alpha - y\cos\alpha = 0$ in the same point , then

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

B. $a^2 + b^2 = 2$

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

D. $a^2 + b^2 = 4$

Answer: B

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6. The angle between the straight lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is-

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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7. Find the gradient of a straight line which is passes through the point (-3. 6) and the mid point of (4,-5) and (-2, 9)

A. $\pi / 4$

B. $\pi / 2$

C. $3\pi / 4$

D. π

Answer: C

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8. A square of side a lies above the X- axis and has one vertex at the origin . The side passing through the origin makes an angle $\pi/6$ with the positive direction of X-axis .The equation of its diagonal not passing through the origin is

A. $y(\sqrt{3}-1)-x(1-\sqrt{3})=2a$

B. $y(\sqrt{3}+1)+x(1-\sqrt{3})=2a$

C. $y(\sqrt{3}+1)+x(1+\sqrt{3})=2a$

D. $y(\sqrt{3}+1)+x(\sqrt{3}-1)=2a$

Answer: D

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9. $A(1,3)$ and $C(7,5)$ are two opposite vertices of a square. The equation of a side through A is

A. $x + 2y - 7 = 0$

B. $x - 2y + 5 = 0$

C. $2x + y - 5 = 0$

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

Answer: A::D

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10. Find the equation of a straight line passing through the point (-5,4) and which cuts off an intercept fo $\sqrt{2}$ units between the lines x+y+1=0 and x+y-1=0

A. $x - 2y + 13 = 0$

B. $2x - y + 14 = 0$

C. $x - y + 9 = 0$

D. $x - y + 10 = 0$

Answer: C

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11. 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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12. What is the value of y so that the line through $(3, y) and (2, 7)$ is parallel to the line through $(-1, 4) and (0, 6)$?

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13. A straight line drawn through the point $P(2, 3)$ and is incline at an angle of 30^0 with the x-axis. Find the coordinates of two points on it a distance 4 from P on either side of P.

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14. about to only mathematics

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15. Find the distance of the point $(2, 3)$ from the line $2x - 3y + 9 = 0$ measured along a line $x - y + 1 = 0$.

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16. 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). Obtain its equation.

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17. The sides $ABandAC$ of a triangle ABC are respectively $2x + 3y = 29andx + 2y = 16$ respectively. If the mid-point of $BCis(5, 6)$ then find the equation of BC.

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18. A straight line through $A(- 15 - 10)$ meets the lines $x - y - 1 = 0$, $x + 2y = 5$ and $x + 3y = 7$ respectively at A, B and C. If $\frac{12}{AB} + \frac{40}{AC} = \frac{52}{AD}$ prove that the line passes through the origin.

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Exercise For Session 2

1. The distance between the lines $4x + 3y = 11$ and $8x + 6y = 15$ is

A. $\frac{7}{2}$

B. $\frac{7}{5}$

C. $\frac{7}{10}$

D. $\frac{9}{10}$

Answer: C

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2. Let the algebraic sum of the perpendicular distance from the points (2, 0), (0,2), and (1, 1) to a variable straight line be zero. Then the line passes through a fixed point whose coordinates are___

A. $(1, 1)$

B. $(-1, 1)$

C. $(-1, -1)$

D. $(1, -1)$

Answer: A

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3. If the quadrilateral formed by the lines ax+bc+c=0. a'x+b'y+c=0, ax+by+c'=0, a'x+b'y+c'=0 has perpendicular diagonal, 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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4. Prove that the area of the parallelogram formed by the lines $3x - 4y + a = 0,\ 3x - 4y + 3a = 0,\ 4x - 3y - a = 0\ and\ 4x - 3y - 2a =$

A. $\frac{1}{7}$ squints

B. $\frac{2}{7}$sq units

C. $\frac{3}{7}$ sq units

D. $\frac{4}{7}$ sq units

Answer: B

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5. The area of the parallelogram formed by the lines $y = mx, y = xm + 1, y = nx, andy = nx + 1$ equals. $\frac{|m+n|}{(m-n)^2}$ (b) $\frac{2}{|m+n|}$ $\frac{1}{(|m+n|)}$ (d) $\frac{1}{(|m-n|)}$

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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6. 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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7. A line passes through the point $(2, 2)$ and is perpendicular to the line $3x + y = 3,$ then its y-intercept is

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

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

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

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

Answer: D

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8. If the point (1,2) and (34) were to be on the same side of the line $3x - 5y + a = 0$ then

A. $7 < a < 11$

B. a=7

C. a=11

D. $a < 7$ or $a > 11$

Answer: D

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9. The lines y = mx , $y + 2x = 0, y = 2x + k$ and $y + mx = k$ form a rhombus if m equals

A. -1

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

C. 1

D. 2

Answer: D

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10. What are the pints on X-axis whose perpendicular distance from the straight line $\frac{x}{a}+\frac{y}{b}=1$.

A. $\frac{b}{a}\left(a \pm \sqrt{\left(a^2+b^2\right)}, 0\right)$

B. $\frac{a}{b}\left(b \pm \sqrt{\left(a^2+b^2\right)}, 0\right)$

C. $\frac{b}{a}(a+b, 0)$

D. $\frac{a}{b}\left(a \pm \sqrt{\left(a^2+b^2\right)}, 0\right)$

Answer: B

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11. 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. $a \in \left(2, \frac{10}{3}\right), b \in (-1, 1)$

B. $a \in \left(-2, \frac{10}{3}\right), b \in \left(-1, \frac{9}{2}\right)$

C. $a \in \left(1, \frac{10}{3}\right), b \in (-3, 5)$

D. None of these

Answer: D

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12. Are the points $(3, 4)$ and $(2, -6)$ on the same or opposite sides of the line $3x - 4y = 8$?

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13. If the point as $(4, 7)$ and $(\cos\theta, \sin\theta)$, where `0

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14. Find the equations of lines parallel to $3x - 4y - 5 = 0$ at a unit distance from it.

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15. A line L is a drawn from $P(4, 3)$ to meet the lines $L-1 and L_2$ given by $3x+4y+5=0$ and $3x+4y+15=0$ at points $A and B$, respectively. From A, a line perpendicular to L is drawn meeting the line L_2 at A_1. Similarly, from point B_1. Thus, a parallelogram $\forall_1 BB_1$ is formed. Then the equation of L so that the area of the parallelogram $\forall_1 BB_1$ is the least is (a) $x-7y+17=0$ (b) $7x+y+31=0$ (c) $x-7y-17=0$ (d) $x+7y-31=0$

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16. The vertices of a $\triangle OBC$ are $O(0, 0), B(-3, -1), C(-1, -3)$. Find the equation of the line parallel to BC and intersecting the sides OB and OC and whose perpendicular distance from the origin is $\frac{1}{2}$.

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Exercise For Session 3

1. Locus of the point of intersection of lines $x\cos\alpha + y\sin\alpha = a$ and $x\sin\alpha - y\cos\alpha = b(\alpha \in R)$ is

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

B. $x^2 - y^2 = a^{2-b^2}$

C. $x^2 + y^2 = a^2 + b^2$

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

Answer: C

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2. If $a,\ b, c$ are in A.P., then the line $ax + by + c = 0$ passes through a fixed point. write the coordinates of that point.

A. a straight line

B. a family of concurrent lines

C. a family of parallel lines

D. None of these

Answer: D

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3. If the lines $ax + 12y + 1 = 0,\ bx + 13y + 1 = 0$ and $cx + 14y + 1 = 0$ are concurrent, then a, b, c are in a. H.P. b. G.P. c. A.P. d. none of these

A. AP

B. GP

C. HP

D. AGP

Answer: B

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4. The lines ax + by + c = 0, where 3a + 2b + 4c= 0, are concurrent at the point (a) $\left(\frac{1}{2}, \frac{3}{4}\right)$ (b) $(1, 3)$ (c) $(3, 1)$ (d) $\left(\frac{3}{4}, \frac{1}{2}\right)$

A. $\left(\frac{3}{4}, \frac{1}{2}\right)$

B. $\left(\frac{1}{2}, \frac{3}{4}\right)$

C. $\left(-\frac{3}{4}, -\frac{1}{2}\right)$

D. $\left(-\frac{1}{2}, -\frac{3}{4}\right)$

Answer: B

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5. If the lines ax+y+1=0, x+by+1=0 and x+y+c=0 (a,b and c being distinct and different from 1) are concurrent the value of $\frac{a}{a-1} + \frac{b}{b-1} + \frac{c}{c-1}$ is

A. -2

B. -1

C. 1

D. 2

Answer: C

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6. If $u = a_1x + b_1y + c_1 = 0, v = a_2x + b_2y + c_2 = 0,$ and $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2},$ then the curve $u + kv = 0$ is the same straight line u different straight line not a straight line none of these

A. u = 0

B. a family of concurrent lines

C. a family of parallel lines

D. None of these

Answer: B

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7. The straight lines $x + 2y - 9 = 0, 3x + 5y - 5 = 0$, and $ax + by - 1 = 0$ are concurrent, if the straight line $35x - 22y + 1 = 0$ passes through the point (a, b) (b) (b, a) $(-a, -b)$ (d) none of these

A. (a, b)

B. (b, a)

C. $(a, -b)$

D. $(-a, b)$

Answer: C

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8. If the straight lines $x+y-2=0, 2x-y+1=0$ and $ax+by-c=0$ are concurrent, then the family of lines $2ax+3by+c=0(a, b, c$ are nonzero) is concurrent at (a) $(2, 3)$ (b) $\left(\frac{1}{2}, \frac{1}{3}\right)$ (c) $\left(-\frac{1}{6}, -\frac{5}{9}\right)$ (d) $\left(\frac{2}{3}, -\frac{7}{5}\right)$

A. $\left(-\frac{1}{6}, -\frac{5}{9}\right)$

B. $\left(\frac{1}{2}, \frac{1}{3}\right)$

C. $\left(-\frac{1}{6}, -\frac{5}{9}\right)$

D. $\left(\frac{2}{3}, -\frac{7}{5}\right)$

Answer: A

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9. If the equations of three sides of a triangle are $x+y=1, 3x+5y=2$ and $x-y=0$ then the orthocentre of the triangle lies on the line/lines

A. $5x - 3y = 1$

B. $5y - 3x = 1$

C. $2x - 3y = 1$

D. $5x - 3y = 2$

Answer: A::B

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10. Find the equations of the line through the intersection of $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$and perpendicular to $6x - 7y + c = 0$

A. $119y + 20x = 125$

B. $199y - 120x = 125$

C. $119x + 102y = 125$

D. $119x - 102y = 125$

Answer: C

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11. The locus of point of intersection of the lines $\frac{x}{a} - \frac{y}{b} = m$ and $\frac{x}{a} + \frac{y}{b} = \frac{1}{m}$ (i) a circle (ii) an ellipse (iii) a hyperbola (iv) a parabola

A. a circle

B. an ellipse

C. a hyperbola

D. a parabola

Answer: C

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12. The condition on $aandb$, such that the portion of the line $ax + by - 1 = 0$ intercepted between the lines $ax + y = 0$ and

$x + by = 0$ subtends a right angle at the origin, is $a = b$ (b) $a + b = 0$

$a = 2b$ (d) $2a = b$

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13. If the lines $(a - b - c)x + 2ay + 2a = 0, 2bx + (b - c - a)y + 2b = 0$ and $(2c + 1)x$ are concurrent , then the prove that either $a + b + c = 0$ or $(a + b + c)^2 + 2a = 0$

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14. Prove that the lines $ax + by + c = 0, bx + cy + a = 0$ and $cx + ay + b = 0$ are concurrent if $a + b + c = 0$ or $a + b\omega + c\omega^2 + c\omega = 0$ where ω is a complex cube root of unity .

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15. Find the equation of the straight line which passes through the intersection of the lines $x - y - 1 = 0 \ and \ 2x - 3y + 1 = 0$ and parallel (i) x-axis (ii)y-axis (iii) 3x+4y=14.`

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16. Let $a, \ b, \ c$ be parameters. Then the equation $ax + by + c = 0$ will represent a family of straight lines passikng through a fixed point iff there exists a linear relation between $a, b, \ and \ c$.

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17. Prove that the family of lines represented by $x(1 + \lambda) + y(2 - \lambda) + 5 = 0, \lambda$ being arbitrary, pass through a fixed point. Also find the fixed point.

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18. Prove that $\left(-a, -\frac{a}{2}\right)$ is the orthocentre of the triangle formed by the lines $y = m_i x + \frac{a}{m_i}, I = 1, 2, 3, m_1 m_2 m_3$ being the roots of the equation $x^3 - 3x^2 + 2 = 0$

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Exercise For Session 4

1. Three straight lines $2x + 11y - 5 = 0, 24x + 7y - 20 = 0$ and $4x - 3y - 2 = 0$

A. form a triangle

B. are only concurrent

C. are concurrent with one line bisecting the angle between the other two

D. None of the above

Answer: C

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2. the line $x + 3y - 2 = 0$ bisects the angle between a pair of straight lines of which one has equation $x - 7y + 5 = 0$. The equation of the other line is : (A) $3x + 3y - 1 = 0$ (B) $x - 3y + 2 = 0$ (C) $5x + 5y - 3 = 0$ (D) None of these

A. $3x + 3y - 1 = 0$

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

C. $5x + 5y + 3 = 0$

D. $5x + 5y - 3 = 0$

Answer: D

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3. P is a point on either of the two lines $y - \sqrt{3}|x| = 2$ at a distance 5 units from their point of intersection The coordinates of the foot of the

perpendicular from P on the bisector of the angle between them are

A. $\left(0, \frac{4+5\sqrt{3}}{2}\right)$ or $\left(0, \frac{4-5\sqrt{3}}{2}\right)$ depending on which the point P is taken

B. $\left(0, \frac{4+5\sqrt{3}}{2}\right)$

C. $\left(0, \frac{4-5\sqrt{3}}{2}\right)$

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

Answer: B

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4. In a ΔABC the bisector of angles B and C lie along the lines $x = y$ and $y = 0$. If A is $(1, 2)$, then $\sqrt{10}d(A, BC)$ where d (A, BC)represents distance of point A from side BC

A. $2x + y = 1$

B. $3x - y = 5$

C. $x - 2y = 3$

D. $x + 3y = 1$

Answer: B

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5. In ABC , the coordinates of the vertex A are $(4, -1)$, and lines $x - y - 1 = 0$ and $2x - y = 3$ are the internal bisectors of angles $BandC$. Then, the radius of the encircle of triangle ABC is $\frac{4}{\sqrt{5}}$ (b) $\frac{3}{\sqrt{5}}$ (c) $\frac{6}{\sqrt{5}}$ (d) $\frac{7}{\sqrt{5}}$

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

B. $\frac{3}{\sqrt{5}}$

C. $\frac{6}{\sqrt{5}}$

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

Answer: C

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6. The equation of the straight line which bisects the intercepts between the axes of the lines $x + y = 2$and $2x + 3y = 6$ is

A. $2x = 3$

B. $y = 1$

C. $2y = 3$

D. $x = 1$

Answer: B

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7. The equation of the bisector of the acute angle between the lines $2x - y + 4 = 0$ and $x - 2y = 1$ is $x - y + 5 = 0$ $x - y + 1 = 0$ $x - y = 5$ (d) none of these

A. $x + y + 5 = 0$

B. $x - y + 1 = 0$

C. $x - y = 5$

D. $x - y + 5 = 0$

Answer: C

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8. The equation of the bisector of that angle between the lines x + y = 3 and 2x - y = 2 which contains the point (1,1) is

A. $\left(\sqrt{5} - 2\sqrt{2}\right)x + \left(\sqrt{5} + \sqrt{2}\right)y = 3\sqrt{5} - 2\sqrt{2}$

B. $\left(\sqrt{5} + 2\sqrt{2}\right)x + \left(\sqrt{5} - \sqrt{2}\right)y = 3\sqrt{5} + 2\sqrt{2}$

C. $3x = 10$

D. $3x - 5y + 2 = 0$

Answer: A

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9. Find the equations of the two straight lines through (7,9) and making and angle of 60^0 with the line $x - \sqrt{3}y - 2\sqrt{3} = 0$.

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10. Equation of the base of an equilateral triangle is $3x + 4y = 9$ and its vertex is at point (1,2) .Find the equations of the other sides and the length of each side of the triangle .

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11. Find the coordinates the those point on the line $3x + 2y = 5$ which are equisdistant from the lines $4x + 3y - 7 = 0$ and $2y - 5 = 0$

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12. Two sides of a rhombus ABCD are parallel to the lines y = x + 2 and y = 7x + 3 If the diagonals of the rhombus intersect at the point (1, 2) and the vertex A is on the y-axis, then vertex A can be a. (0,3) b. (0,5/2) c. (0,0) d. (0,6)

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13. The bisector of two lines L and L are given by $3x^2 - 8xy - 3y^2 + 10x + 20y - 25 = 0$. If the line L_1 passes through origin, find the equation of line L_2.

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14. The equation of the bisector of that angle between the lines $x + 2y - 11 = 0, 3x - 6y - 5 = 0$ which contains the point $(1, -3)$ is $(3x = 19$ (b) $3y = 7\ 3x = 19 and 3y = 7$ (d) None of these

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15. Find the equation of thebisector of the angle between the lines $2x - 3y - 5 = 0$ and $6x - 4y + 7 = 0$ which is the supplement of the angle containing the point $(2, -1)$

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Exercise For Session 5

1. The coordinates of the foot of the perpendicular from (2,3) to the line $3x + 4y - 6 = 0$ are

A. $\left(-\frac{14}{25}, -\frac{27}{25}\right)$

B. $\left(\frac{14}{15}, -\frac{17}{25}\right)$

C. $\left(-\frac{14}{25}, \frac{17}{25}\right)$

D. $\left(\frac{14}{25}, \frac{27}{25}\right)$

Answer: D

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2. If the foot of the perpendicular from the origin to a straight line is at $(3, -4)$, then find the equation of the line.

A. $3x - 4y = 25$

B. $3x - 4y + 25 = 0$

C. $4x + 3y - 25 = 0$

D. $4x - 3y + 25 = 0$

Answer: A

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3. The coordinates of the foot of the perpendicular from (a,0) on the line $y = mx + \frac{a}{m}$ are

A. $\left(0, -\frac{1}{a}\right)$

B. $\left(0, \frac{a}{m}\right)$

C. $\left(0, -\frac{a}{m}\right)$

D. $\left(0, \frac{1}{a}\right)$

Answer: B

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4. If the equation of the locus of a point equidistant from the points (a_1, b_1) and (a_2, b_2) is $(a_1 - a_2)x + (b_1 - b_2)y + c = 0$, then the value of c is $aa2 - a22 + b12 - b22$ $\sqrt{a12 + b12 - a22 - b22}$ $\frac{1}{2}(a12 + a22 + b12 + b22)$ $\frac{1}{2}(a22 + b22 - a12 - b12)$

A. $a_1^2 - a_2^2 + b_1^2 - b_2^2$

B. $\sqrt{(a_1^2 + b_1^2 - a_2^2 - b_2^2)}$

C. $\frac{1}{2}(a_1^2 + a_2^2 + b_1^2 + b_2^2)$

D. $\frac{1}{2}(a_2^2 + b_2^2 - a_1^2 - b_1^2)$

Answer: D

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5. Write the coordinates of the image of the point $(3, 8)$ in the lines $x + 3y - 7 = 0$.

A. $(1, 4)$

B. $(3, 4)$

C. $(-1, 4)$

D. $(-4, -1)$

Answer: C

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6. The image of the point $(4, -3)$ with respect to the line $x - y = 0$ is,

A. $(-4, -3)$

B. $(3, 4)$

C. $(-4, 3)$

D. $(-3, 4)$

Answer: D

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7. The coordinates of the image of the origin O with respect to the line $x + y + 1 = 0$ are

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

B. $(-2, -2)$

C. $(1, 1)$

D. $(-1, -1)$

Answer: D

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8. If (-2,6) is the image of the point (4,2) with respect to line L=0, then find the equation of line L.

A. $6x - 4y - 7 = 0$

B. $2x - 3y - 5 = 0$

C. $3x - 2y + 5 = 0$

D. $3x - 2y + 10 = 0$

Answer: C

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9. The image of $P(a, b)$ on the line $y = -x$ is Q and the image of Q on the line $y = x$

A. $(a + b, a + b)$

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

C. $(a - b, b - a)$

D. $(0, 0)$

Answer: D

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10. The nearest point on the line $3x - 4y = 25$ from the origin is

A. $(3, 4)$

B. $(3, -4)$

C. $(3, 5)$

D. $(-3, 5)$

Answer: B

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11. Consider the points $A(0,1) and B(2,0), and P$ be a point on the line $4x+3y+9=0$. The coordinates of P such that $|PA-PB|$ is maximum are (a) $\left(-\frac{24}{5},\frac{17}{5}\right)$ (b) $\left(-\frac{84}{5},\frac{13}{5}\right)$ (c) $\left(\frac{31}{7},\frac{31}{7}\right)$ (d) $(-3,0)$

A. $\left(-\frac{12}{5},\frac{17}{5}\right)$

B. $\left(-\frac{84}{5},\frac{13}{5}\right)$

C. $\left(-\frac{6}{5},\frac{17}{5}\right)$

D. $(0,-3)$

Answer: B

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12. Consider the points A(3,4) and B(7,13). If P is a point on the line y=x such that PA+PB is minimum, then the coordinates of P are

A. $\left(\frac{12}{7},\frac{12}{7}\right)$

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

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

D. $(0, 0)$

Answer: C

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13. the image of the point $A(2, 3)$ by the line mirror y=x is the point B and the image of B by the line mirror y=0 is the point (α, β), find α and β

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14. The equations of perpendicular bisectors o the sides AB and AC of a triangle ABC are $x - y + 5 = 0$ *and* $x + 2y = 0$ respectively. If the point A *is* $(1, -2)$, find the equation of the line BC.

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15. In a triangle, ABC, the equation of the perpendicular bisector of AC is $3x - 2y + 8 = 0$. If the coordinates of the points A and B are $(1, -1) \& (3, 1)$ respectively, then the equation of the line BC & the centre of the circum-circle of the triangle ABC will be

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Exercise For Session 6

1. A ray of light passing through the point (1, 2) reflects on the xaxis at point A and the reflected ray passes through the point (5, 3). Find the coordinates of A.

A. 3

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

C. $\frac{13}{5}$

D. $\frac{13}{4}$

Answer: C

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2. The equation of the line AB is $y = x$. If A and B lie on the same side of the line mirror $2x - y = 1$, then the equation of the image of AB is

A. $x + y = 2$

B. $8x + y = 9$

C. $7x - y = 6$

D. None of these

Answer: C

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3. A ray of light travelling along the line $x + y = 1$ is incident on the X - axis and after refraction the other side of the X - axis by turning $\pi/6$ by

turning away from the X - axis .The equation of the line along which the refracted ray travels is

A. $x + (2 - \sqrt{3})y = 1$

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

C. $(2 - \sqrt{3})x + y = 1$

D. $x + (2 + \sqrt{3})y = (2 + \sqrt{3})$

Answer: A::B

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4. All of the points lying inside thr triangle formed by the points (0,4) (2,5) and (6,2) satisfy

A. $3x + 2y + 8 \geq 0$

B. $2x + y - 10 \geq 0$

C. $2x - 3y - 11 \geq 0$

D. $-2x+y-3 \geq 0$

Answer: A

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5. Let O be the origin. If $A(1,0) and B(0,1) and P(x,y)$ are points such that $xy>0 and x+y<1,$ then P lies either inside the triangle OAB or in the third quadrant. P cannot lie inside the triangle OAB P lies inside the triangle OAB P lies in the first quadrant only

A. P lies either inside in ΔOAB or in third quadrant

B. P cannot be inside in ΔOAB

C. P lies inside the ΔOAB

D. None of these

Answer: A

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6. A light ray coming along the line $3x + 4y = 5$ gets reflected from the line $ax + by = 1$ and goes along the line $5x - 12y = 10$. Then, $a = \frac{64}{115}, b = \frac{112}{15}$ $a = \frac{14}{15}, b = -\frac{8}{115}$ $a = \frac{64}{115}, b = -\frac{8}{115}$ $a = \frac{64}{15}, b = \frac{14}{15}$

A. $a = \frac{64}{115}, b = \frac{112}{15}$

B. $a = -\frac{64}{115}, b = \frac{8}{115}$

C. $a = \frac{64}{115}, b = \frac{8}{115}$

D. $a = -\frac{64}{115}, b = \frac{-8}{115}$

Answer: C

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7. The sides of a triangle have the combined equation $x^2 - 3y^2 - 2xy + 8y - 4 = 0$. The third side, which is variable, always passes through the point $(-5, -1)$. Find the range of values of the

slope of the third line such that the origin is an interior point of the triangle.

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8. Determine the range of values of $0 \in [0, 2\pi]$ for which $(\cos\theta, \sin\theta)$ lies inside the triangle formed by the lines $x + y - 2 = 0, x - y - 1 = 0$ and $6x + 2y - \sqrt{10} = 0$

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9. Let P $(\sin\theta, \cos\theta), (0 \leq \theta \leq 2\pi)$, be apoint in a triangle with vertices (0,0), $\left(\sqrt{3/2}, 0\right)$ and $\left(0, \sqrt{3/2}\right)$. Then ,

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10. Find all the values of θ for which the point $\left(\sin^2\theta, \sin\theta\right)$ lies inside the square formed by the line $xy = 0$ and $4xy - 2x - 2y + 1 = 0$.

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11. determine whether the point (-3, 2) lies inside or outside the triangle whose sides are given by the equations x+y−4=0,3x−7y+8=0,4x−y−31=0

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12. A ray of light is sent along the line $x - 2y + 5 = 0$ upon reaching the line $3x - 2y + 7 = 0$ the ray is reflected from it . Find the equation of the containing the reflected ray .

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Exercise Single Option Correct Type Questions

1. The straight line $y = x - 2$ rotates about a point where it cuts the x-axis and becomes perpendicular to the straight line $ax + by + c = 0$. Then its equation is

A. $ax + by + 2a = 0$

B. $ay - bx + 2b = 0$

C. $ax + by + 2b = 0$

D. None of these

Answer: B

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2. If $\frac{2}{1!3!} + \frac{2}{3!7!} + \frac{1}{3!5!} = \frac{2^m}{m!}$, 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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3. If $f(x+y)=f(x).\ f(y)$ for all x and y. $f(1)=2$, then area enclosed by $3|x|+2|y|\leq 8$ is (A) $f(5)$ sq. units (B) $f(6)$ sq. units (C) $\frac{1}{3}f(6)$ sq. units (D) $f(4)$ sq. units

A. f(4)sq units

B. $\frac{1}{2}$f(6) sq units

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

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

Answer: C

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4. The graph of the function, $\cos x\cos(x+2)-\cos^2(x+1)$ is

A. a straight line passing through $\left(0-\sin^2 1\right)$ with slope 2

B. a straight line passing through (0,0)

C. a parabola with vertex $(1 - \sin^2 1)$

D. a straight line passing through the point $\left(\frac{\pi}{2}, -\sin^2 1\right)$ are parallel to the X-axis

Answer: D

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5. A straight 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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6. The set of values of b for which the origin and the point (1, 1) lie on the same side of the straight line, $a^2x + aby + 1 = 0 \forall a \in R, b > 0$ are(A) $b \in (2, 4)$ (B)$b \in (0, 2)$ (C) $b \in [0, 2]$(D) $(2, \infty)$

A. $b \in (2, 4)$

B. $b \in (0, 2)$

C. $b \in [0, 2]$

D. None of these

Answer: B

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7. Line L has intercepts a and b on the coordinate axes. When the axes are rotated through a 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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8. If the distance of any point (x, y) from origin is defined as $d(x, y) = \max\{|x|, |y|\}$, then the locus of the point (x, y) where $d(x, y) = 1$ is

A. a circle

B. a straight line

C. a square

D. a triangle

Answer: B

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9. If p_1, p_2, p_3 be the length of perpendiculars from the points $(m^2, 2m), (mm', m + m')$ and $(m'^2, 2m')$ respectively on the line $x \cos \alpha + y \sin \alpha + \frac{\sin^2 \alpha}{\cos \alpha} = 0$ then p_1, p_2, p_3 are in:

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10. $ABCD$ is a square whose vertices are $A(0, 0), B(2, 0), C(2, 2),$ and $D(0, 2)$. The square is rotated in the $XY - plane$ through an angle 30^0 in the anticlockwise sense about an axis passing though A perpendicular

to the $XY - plane$. Find the equation of the diagonal BD of this rotated square.

A. $\sqrt{3}x + (1 - \sqrt{3}) = y = \sqrt{3}, x^2 + y^2 = 4$

B. $(1 + \sqrt{3})x - (1 - \sqrt{2})y = 2, x^2 + y^2 = 9$

C. $(2 - \sqrt{3})x + y = 2(\sqrt{3} - 1), x^2 + y^2 - x\sqrt{3} - y = 0$

D. None of the above

Answer: C

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11. The point (4,1) undergoes the following three successive transformations ,

reflection about the line $y = x - 1$

translation through a distance 1 unit along the positive direction

rotation thrpough an angle $\frac{\pi}{4}$ about the origin in the anti - clockwise direction

Then the coordinates of the final point are ,

A. $(4, 3)$

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

C. $(0, 3\sqrt{2})$

D. $(3, 4)$

Answer: C

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12. If the square ABCD, where $A(0, 0), B(2, 0)C(2, 2)$ and $D(0, 2)$ undergoes the following three transformations successively

(i) $f_1(x, y) \to (y, x)$

(ii) $f_2(x, y) \to (x + 3y, y)$

(iii) $f_3(x, y) \to \left(\frac{x - y}{2}, \frac{x + y}{2}\right)$

then the final figure is a

A. square

B. parallelogram

C. rhombus

D. None of these

Answer: B

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13. The line $x + y = p$ meets the x- and y-axes at $AandB$, respectively. A triangle APQ is inscribed in triangle OAB, O being the origin, with right angle at $Q\dot{P}$ and Q lie, respectively, on $OBandAB$. If the area of triangle APQ is $\frac{3}{8}th$ of the are of triangle OAB, the $\frac{AQ}{BQ}$ is equal to 2 (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) 3

A. 1

B. 2

C. 3

D. 4

Answer: C

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14. about to only mathematics

A. a straight line parallel to X -axis

B. a circle through the origin

C. a circle with centre at the origin

D. a straight line parallel to Y-axis

Answer: D

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15. about to only mathematics

A. $\frac{1}{2n}$

B. $\frac{1}{2^n}$

C. $2^n - 1$

D. $2^n + 3$

Answer: B

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16. about to only mathematics

A. $\frac{5}{2}$

B. 3

C. $\frac{7}{2}$

D. 3 or 15

Answer: B

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17. If the straight lines $x + 2y = 9, 3x - 5y = 5$ and $ax + by = 1$ are concurrent , then the straight line $5x + 2y = 1$ passes through the point

A. $(a, -b)$

B. $(-a, b)$

C. (a, b)

D. $(-a, -b)$

Answer: C

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18. If the ends of the base of an isosceles triangle are at (2, 0) and (0, 1), and the equation of one side is $x = 2$, then the orthocenter of the triangle is

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

B. $\left(\frac{5}{4}, 1\right)$

C. $\left(\frac{3}{4}, 1\right)$

D. $\left(\frac{4}{3}, \frac{7}{12}\right)$

Answer: B

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19. Consider a point A(m,n) , where m and n are positve intergers. B is the reflection of A in the line $y = x$, C is the reflaction of B in the y axis, D is the reflection of C in the x axis and E is the reflection of D is the y axis. The area of the pentagon ABCDE is a. $2m(m+n)$ b. $m(m+3n)$ c. $m(2m+3n)$ d. $2m(m+3n)$

A. $2m(m+n)$

B. $m(m+3n)$

C. $m(2m+3n)$

D. $2m(m+3n)$

Answer: B

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20. about to only mathematics

A. 10

B. 18

C. 16

D. 12

Answer: B

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21. If a pair of perpendicular straight lines drawn through the origin forms an isosceles triangle with the line $2x + 3y = 6$, then area of the triangle so formed is 36/13 (b) 12/17 (c) 13/5 (d) 17/14

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

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

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

D. None of these

Answer: C

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22. 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

A. 2

B. 0

C. 4

D. 1

Answer: A

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23. A ray of light passing through the point (1, 2) reflects on the xaxis at point A and the reflected ray passes through the point (5, 3). Find the coordinates of A.

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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24. Consider the family of lines $5x + 3y - 2 + \lambda_1(3x - y - 4) = 0$ and $x - y + 1 + \lambda_2(2x - y - 2) = 0$. Find the equation of a straight line that belongs to both the families.

A. 1

B. 3

C. 5

D. 7

Answer: B

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25. In triangle ABC, the equation of the right bisectors of the sides AB and AC are x+y=0 and y-x=0. respectively.

If $A \equiv (5, 7)$ the find the equation of side BC.

A. $7y = 5x$

B. $5x = y$

C. $5y = 7x$

D. $5y = x$

Answer: A

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26. Two particles start from the point (2,-1), one moves 2 units along the line x+y = 1 and the other moves 5 units along the line x-2y = 4. If the particles move upward w.r.t coordinates axes, then find their new positions.

A. $(2-\sqrt{2}, \sqrt{2}-1), (2\sqrt{5}+2, \sqrt{5}-1)$

B. $(2\sqrt{2}+2, \sqrt{5}-1), (2\sqrt{2}, \sqrt{2}+1)$

C. $(2+\sqrt{2}, \sqrt{2}+1), (2\sqrt{2}+2, \sqrt{5}+1)$

D. $(2-\sqrt{2}\sqrt{5}-1), (\sqrt{2}-1, 2\sqrt{2}+2)$

Answer: A

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27. Let P be (5, 3) and a point R on $y = x$ and Q on the x-axis be such that $PQ + QR + RP$ is minimum. Then the coordinates of Q are $\left(\frac{17}{4}, 0\right)$ (b) $(17, 0)$ $\left(\frac{17}{2}, 0\right)$ (d) none of these

A. $\left(\frac{17}{8}, 0\right)$

B. $\left(\frac{17}{4}, 0\right)$

C. $\left(\frac{17}{2}, 0\right)$

D. $(17, 0)$

Answer: B

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Exercise More Than One Correct Option Type Questions

1. 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. $(lx + my)(a + b) = 2ab$

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

Answer: A::B::D

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2. The area of a triangle is 5 units. Two of its vertices are $(2, 1)$ and $(3, -2)$. The third vertex lies on $y = x + 3$. Find the co-ordinates of the third vertex of the triangle.

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3. The area of a triangle is 5. Two of its vertices are $(2, 1)$ and $(3, -2)$. The third vertex lies on $y = x + 3$. Find the third vertex.

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

B. $\left(\frac{3}{4}, \frac{-3}{2}\right)$

C. $\left(\frac{7}{2}, \frac{13}{2}\right)$

D. $\left(\frac{-1}{4}, \frac{11}{4}\right)$

Answer: A::C

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

A. $(0, a)$

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

C. $(0, -a)$

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

Answer:

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5. $A(1, 3)$ and $C(7, 5)$ are two opposite vertices of a square. The equation of a side through A is

A. $x + 2y - 7 = 0$

B. $x - 2y + 5 = 0$

C. $2x + y - 5 = 0$

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

Answer: A::D

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

A. $(-2, -3)$

B. $(3, -1)$

C. $(2, 3)$

D. $(-3, 1)$

Answer: A::B

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7. Consider the straight lines $x + 2y + 4 = 0$ and $4x + 2y - 1 = 0$. check whether The line $6x + 6y + 7 = 0$ is bisector of above two or not and tell which bisector it is (acute or obtuse)

A. bisector of the angle including origin

B. bisector of acute angle

C. bisector of obtuse angle

D. None of these

Answer: A::B

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8. Two roads are represented by the equations $y - x = 6$ and $x + y = 8$ An inspection bungalow has to be so constructed that it is at a distance of 100 from each of the roads . Possible location of the bungalow is given by

A. $\left(100\sqrt{2} + 1, 7\right)$

B. $\left(1 - 100\sqrt{2}, 7\right)$

C. $\left(1, 7 + 100\sqrt{2}\right)$

D. $\left(1, 7 - 100\sqrt{2}\right)$

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

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9. If (a, b) be an end of a diagonal of a square and the other diagonal has the equation $x - y = a$, then another vertex of the square can be

A. $(a - b, a)$

B. $(a, 0)$

C. $(0, -a)$

D. $(a + b, b)$

Answer: B::D

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10. Consider the equation $y - y_1 = m(x - x_1)$. If $mandx_1$ are fixed and different lines are drawn for different values of y_1, then (a) the lines will pass through a fixed point (b) there will be a set of parallel lines (c) all the lines intersect the line $x = x_1$ (d)all the lines will be parallel to the line $y = x_1$

A. the lines will pass through a fixed point

B. there will be a set of parallel lines

C. all the lines intersect the lines $x = x_1$

D. all the lines will be parallel to the line $y = x_1$

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

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11. Let $L_1 \equiv ax + by + a\sqrt[3]{b} = 0$ and $L_2 \equiv bx - ay + b\sqrt[3]{a} = 0$ be two straight lines . The equations of the bisectors of the angle formed by the foci whose equations are $\lambda_1 L_1 - \lambda_2 L_2 = 0$ and $\lambda_1 l_1 + \lambda_2 = 0, \lambda_1$ and λ_2 being non - zero real numbers ,are given by

A. $L_1 = 0$

B. $L_2 = 0$

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

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

Answer: A::B

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12. The equation of the bisectors of the angles between the two intersecting lines $\frac{x-3}{\cos\theta} = \frac{y+5}{\sin\theta}$ and $\frac{x-3}{\cos\theta} = \frac{y+5}{\sin\theta}$ are $\frac{x-3}{\cos\alpha} = \frac{y+5}{\sin\alpha}$ and $\frac{x-3}{\beta} = \frac{y+5}{\gamma}$, then

A. $\alpha = \frac{\theta+\phi}{2}$

B. $\beta = -\sin\alpha$

C. $\gamma = \cos\alpha$

D. $\beta = \sin\alpha$

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

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Exercise Passage Based Questions

1. For points $P \equiv (x_1, y_1)$ and $Q = (x_2, y_2)$ 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 $O \equiv (0, 0), A \equiv (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

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

A. (a) $x + y = 3$

B. (b) $x + 2y = 3$

C. (c) $2x + y = 3$

D. (d) $2x + 2y = 3$

Answer: D

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2. For points $P \equiv (x_1, y_1)$ and $Q = (x_2, y_2)$ 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 $O \equiv (0, 0), A \equiv (1, 2), B \equiv (2, 3)$ and $C \equiv (4, 3)$ are four fixed points on x-y plane

Let $S(x, y)$ such that S is equidistant from 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) a line segment of infinite length

B. (b) a line of infinite length

C. (c) a ray of finite length

D. (d) a ray of infinite length

Answer: D

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3. For points $P \equiv (x_1, y_1)$ and $Q = (x_2, y_2)$ 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

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

Le T(x,y) such that T is equisdistant from point O and C with respect to new distance and if T lie in first quadrant , then T consists of the union of a line segment of finite length and an infinite ray whose labelled diagram is

A. 

B. 

C. 

D. 

Answer: A

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4. In a triangle ABC , if the equation of sides AB,BC and CA are $2x - y + 4 = 0, x - 2y - 1 = 0$ and $x + 3y - 3 = 0$ respectively

,Tangent of internal angle A

is equal to

A. (a) -7

B. (b) -3

C. (c) $\frac{1}{2}$

D. (d) 7

Answer: A

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5. In a triangle ABC , if the equation of sides AB,BC and CA are $2x - y + 4 = 0, x - 2y - 1 = 0$ and $x + 3y - 3 = 0$ respectively ,

The equation of external bisector of angle B is

A. $x - y - 1 = 0$

B. $x - y + 1 = 0$

C. $x + y - 5 = 0$

D. $x + y + 5 = 0$

Answer: D

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6. In a triangle ABC , if the equation of sides AB,BC and CA are $2x - y + 4 = 0, x - 2y - 1 = 0$ and $x + 3y - 3 = 0$ respectively ,Tangent of internal angle A

is equal to

A. $\left(-\frac{3}{5}, \frac{26}{5} \right)$

B. $\left(-\frac{3}{5}, -\frac{26}{5} \right)$

C. $\left(\frac{3}{5}, -\frac{26}{5} \right)$

D. $\left(\frac{3}{5}, \frac{26}{5} \right)$

Answer: A

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7. A(1,3) and C(-2,/5, -2/5) are the vertices of a triangle ABC and the equation of the internal angle bisector of $\angle ABC$ is $x + y = 2$.

The equation of side BC is

A. $7x + 3y - 4 = 0$

B. $7x + 3y + 4 = 0$

C. $7x - 3y + 4 = 0$

D. $7x - 3y - 4 = 0$

Answer: B

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8. A(1,3) and C(-2,/5, -2/5) are the vertices of a triangle ABC and the equation of the internal angle bisector of $\angle ABC$ is $x + y = 2$.

The coordinates of vertex B are

A. $\left(\frac{3}{10}, \frac{17}{10}\right)$

B. $\left(\frac{17}{10}, \frac{3}{10}\right)$

C. $\left(-\frac{5}{2}, \frac{9}{2}\right)$

D. $\left(\frac{9}{2}, -\frac{5}{2}\right)$

Answer: C

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9. A(1,3) and C(-2,/5, -2/5) are the vertices of a triangle ABC and the equation of the internal angle bisector of $\angle ABC$ is $x + y = 2$.

The coordinates of vertex B are

A. $3x + 7y = 24$

B. $3x + 7y + 24 = 0$

C. $13x + 7y + 8 = 0$

D. $13x - 7y + 8 = 0$

Answer: A

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10. In a ΔABC the equation of the side BC is $2x - y = 3$ and its circumcentre and orthocentre are $(2, 4)$ and $(1, 2)$ respectively.

Circumradius of ΔABC is

A. (a) $\sqrt{\frac{61}{5}}$

B. (b) $\sqrt{\frac{51}{5}}$

C. (c) $\sqrt{\frac{41}{5}}$

D. (d) $\sqrt{\frac{43}{5}}$

Answer: A

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11. In a ΔABC the equation of the side BC is $2x - y = 3$ and its circumcentre and orthocentre are $(2, 4)$ and $(1, 2)$ respetively.

$\sin B. \sin C =$

A. $\frac{9}{2\sqrt{61}}$

B. $\frac{9}{4\sqrt{61}}$

C. $\frac{9}{\sqrt{61}}$

D. $\frac{9}{5\sqrt{61}}$

Answer: A

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12. In a ΔABC the equation of the side BC is $2x - y = 3$ and its circumcentre and orthocentre are $(2, 4)$ and $(1, 2)$ respetively.

The distnce of orthocentre from vertex A is

A. $\frac{1}{\sqrt{5}}$

B. $\frac{6}{\sqrt{5}}$

C. $\frac{3}{\sqrt{5}}$

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

Answer: B

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The Straight Lines Exercise 3 Paragraph Based Questions

1. Let S' be the image or reflection of the curve S = 0 about line mirror L = 0 Suppose P be any point on the curve S = 0 and Q be the image or reflection about the line mirror L = 0 then Q will lie on S' = 0

How to find the image or reflection of a curve ?

Let the given be S : f(x,y) = 0 and the line mirror L : $ax + by + c = 0$ We take point P on the given curve in parametric form . Suppose Q be the image or reflection of point P about line mirror L = 0 which again contains the same parameter L et Q $\equiv (\phi(t), (t)),$ where t is parameter . Now let $x = \phi(t)$ and $y = (t)$

Eliminating t , we get the equation of the reflected curve S'

The image of the circle $x^2 + y^2 = 4$ in the line $x + y = 2$ is

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

B. $x^2 + y^2 - 4x - 4y + 6 = 0$

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

D. $x^2 + y^2 - 4x - 4y + 4 = 0$

Answer: D

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2. Let S' be the image or reflection of the curve S = 0 about line mirror L = 0 Suppose P be any point on the curve S = 0 and Q be the image or reflection about the line mirror L = 0 then Q will lie on S' = 0

How to find the image or reflection of a curve ?

Let the given be S : f(x,y) = 0 and the line mirror L : $ax + by + c = 0$ We take point P on the given curve in parametric form . Suppose Q be the image or reflection of point P about line mirror L = 0 which again contains the same parameter L et Q $\equiv (\phi(t), (t)),$ where t is parameter . Now let

$x = \phi(t)$ and $y = (t)$

Eliminating t , we get the equation of the reflected curve S'

The image of the parabola $x^2 = 4y$ in the line $x + y = a$ is

A. $(x - a)^2 = 4(a - y)$

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

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

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

Answer: B

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Exercise Single Integer Answer Type Questions

1. The number of possible straight lines passing through $(2, 3)$ and forming a triangle with the coordinate axes, whose area is 12 sq. units, is one (b) two (c) three (d) four

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2. The condition on $aandb$, such that the portion of the line $ax + by - 1 = 0$ intercepted between the lines $ax + y = 0$ and $x + by = 0$ subtends a right angle at the origin, is $a = b$ (b) $a + b = 0$ $a = 2b$ (d) $2a = b$

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3. Let ABC be a triangle and $A \equiv (1, 2), y = x$ be the perpendicular bisector of AB and $x - 2y + 1 = 0$ be the perpendicular bisector of $\angle C$. If the equation of BC is given by $ax + by - 5 = 0$ then the value of $a - 2b$ is

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4. A lattice point in a plane is a point for which both coordinates are integers. If n be the number of lattice points inside the triangle whose

sides are $x = 0, y = 0$ and $9x + 223y = 2007$ then tens place digit in n is:

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5. The number of triangles that the four lines y=x+3, y=2x+3, y=3x+2 and y+x=3 form is

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6. about to only mathematics

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7. Given A(0,0) and B(x,y) with x $\in$ (0,1) and y>0. Let the slope of line AB be m_1. Point C lies on line $x = 1$ such that the slope of BC is equal to m_2 where$0 < m_2 < m_1$. If the area of triangle ABC can be expressed as $(m_1 - m_2)f(x)$ then the largest possible value of x is

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8. For all real values of $aandb$, lines $(2a+b)x+(a+3b)y+(b-3a)=0$ and $mx+2y+6=0$ are concurrent. Then $|m|$ is equal to_____

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9. Perpendiculars from the point $P(4,4)$ to the straight lines $3x+4y+5=0$ and $y=mx+7$ meet at Q and R, respectively. If the area of triangle PQR is maximum, then the value of is

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The Straight Lines Exercise 5 Matching Type Questions

1. Let L_1, L_2, L_3 be three straight lines a plane and n be the number of circles touching all the lines . Find the value of n.

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2. Consider the triangle formed by the lines

$y+3x+2=0$, $3y-2x-5=0$, $4y+x-14=0$

Match the following lists:

List I	List II
a. Values of α if $(0, \alpha)$ lies inside the triangle	**p.** $(-\infty, 7/3) \cup (13/4, \infty)$
b. Values of α if $(\alpha, 0)$ lies inside the triangle	**q.** $-4/3 < \alpha < 1/2$
c. Values of α if $(\alpha, 2)$ lies inside the triangle	**r.** No value of α
d. Value of α if $(1, \alpha)$ lies outside the triangle	**s.** $5/3 < \alpha < 7/2$

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3. Match the following

Column I	Column II
(A) For the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ with vertices A and A', tangents drawn at the point P in the first quadrant meets the $y-$axis at Q and the chord $A'P$ meets the y-axis at M. If O is the origin, then OQ^2-MQ^2 is a	(p) Natural number
(B) If $y=x$ and $3y+2x=0$ are the equations of a pair of conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and e be the eccentricity, then $4\,(1+e^2+e^4+\ldots+\infty)$ is a	(q) Composite number
(C) If the variable line $y=kx+2h$ is tangent to an ellipse $2x^2+3y^2=6$, then the locus of $P(h,k)$ is a conic C whose eccentricity is e, thus $3e^2$ is a	(r) Prime number
(D) If extremities of the latusrectum of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, (a>1)$ having positive ordinates lie on the parabola $x^2=-2(y-2)$, then a is a	(s) Perfect number

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Exercise Statement I And Ii Type Questions

1. Statement I : The lines $x(a+2b)+y(a+3b)=a+b$ are concurrent at the point $(2,\ -1)$

Statement II : The lines $x+y-1=0$ and $2x+3y-1=0$ intersect at the point $(2,\ -1)$

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: A

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2. Statement I The points (3,2) and (1,4) lie on opposite side of the line $3x-2y-1=0$

Statement II The algebraic perpendicular distance from the given the point to the line have opposite sign

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: A

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3. Statement I If sum of algebraic distances from points A(1,2),B(2,3),C(6,1) is zero on the line $ax + by + c = 0$ then $2a + 3b + c = 0$,

Statement II The centroid of the triangle is (3,2)

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: D

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4. Statement I Let $A \equiv (0, 1)$ and $B \equiv (2, 0)$ and P be a point on the line $4x + 3y + 9 = 0$ then the co - ordinates of P such that $|PA - PB|$is maximum is $\left(-\frac{12}{5}, \frac{17}{5} \right)$

Statement II $|PA - PB| \leq |AB|$

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: D

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5. Statement 1: The incenter of a triangle formed by the lines $x\cos\left(\frac{\pi}{9}\right)+y\sin\left(\frac{\pi}{9}\right)=\pi, x\cos\left(\frac{8\pi}{9}\right)+y\sin\left(\frac{8\pi}{9}\right)=\pi$ and $x\cos\left(\frac{13\pi}{9}\right)+y\sin\left(\frac{13\pi}{9}\right)=\pi$ is $(0,0)$ Statement 2: Any point equidistant from the given three non-concurrent straight lines in the plane is the incenter of the triangle formed by these lines.

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: C

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6. Statement I Reflection of the point (5,1) in the line $x + y = 0$ is $(-1, -5)$

Statement II Reflection of a point $P(\alpha, \beta)$ in the line $ax + by + c = 0$ is $Q(\alpha', \beta')$ if $\left(\frac{\alpha + \alpha'}{2}, \frac{\beta + \beta'}{2}\right)$ lies on the line .

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: B

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7. Statement 1: The internal angle bisector of angle C of a triangle ABC with sides $AB, AC,$ and BC as $y = 0, 3x + 2y = 0,$ and $2x + 3y + 6 = 0$, respectively, is $5x + 5y + 6 = 0$ Statement 2: The image of point A with respect to 5x+5y+6=0 lies on the side BC of the triangle.

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: B

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8. Statement 1:If the point $(2a-5, a^2)$ is on the same side of the line $x+y-3=0$ as that of the origin, then $a \in (2,4)$ Statement 2: The points $(x_1, y_1) and (x_2, y_2)$ lie on the same or opposite sides of the line $ax+by+c=0,$ as ax_1+by_1+c and ax_2+by_2+c have the same or opposite signs.

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: D

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Exercise Subjective Type Questions

1. Find the coordinates of the point at unit distance from the lines

$3x - 4y + 1 = 0, 8x + 6y + 1 = 0$

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2. A variable line makes intercepts on the coordinate axes the sum of whose squares is constant and is equal to a . Find the locus of the foot of the perpendicular from the origin to this line.

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3. A variable line cuts n given concurrent straight lines at $A_1, A_2 \ldots A_n$ such that $\sum_{i=1}^{n} \frac{1}{OA_i}$ is a constant. Show that it always passes through a fixed point, O being the point of intersection of the lines

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4. Having given the bases and the sum of the areas of a number of triangles which have a common vertex, show that the locus of the vertex is a straight line.

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5. Let $L_1 = 0 and L_2 = 0$ be two fixed lines. A variable line is drawn through the origin to cut the two lines at R and $S\dot{P}$. is a point on the line AB such that $\frac{(m+n)}{OP} = \frac{m}{OR} + \frac{n}{OS}$. Show that the locus of P is a straight line passing through the point of intersection of the given lines R, S, R are on the same side of O).

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6. 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 $B, C and D$ rspectively, 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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7. Find the equation of straight lines passing through point (2,3) and having intersept of length 2 units between (2,3) and having an intercept of length 2 units between the straight lines $2x + y = 3, 2x + y = 5$

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8. Let $O(0, 0), A(2, 0), and B\left(1\frac{1}{\sqrt{3}}\right)$ be the vertices of a triangle. Let R be the region consisting of all those points P inside OAB which satisfy

$d(P, OA) \leq \min [d(p, OB), d(P, AB)]$, where d denotes the distance from the point to the corresponding line. Sketch the region R and find its area.

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The Straight Lines Exercise 7 Subjective Type Questions

1. Given n sraight lines and a fixed point O.A straight line is drawn through O meeting these lines in the points $R_1, R_2, R_3, \ldots\ldots R_n$ and a point R is taken on it such that

$$\frac{n}{OR} = \sum_{r=1}^{n} \frac{1}{OR_r},$$

Prove that the locus of R is a straight line .

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2. Prove that all lines represented by the equation $(2\cos\theta + 3\sin\theta)x + (3\cos\theta - 5\sin\theta)y = 5\cos\theta - 2\sin\theta$ pass

through a fixed point for all θ What are the coordinates of this fixed point ?

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3. A(3,0) and B(6,0) are two fixed points and U (α, β) is a variable point on the plane ,AU and BU meet the y - axis at C and D respectively and Ad meets OU at V. Prove that CV passes through (2,0) for any position of U in the plane .

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4. Two triangles ABC and PQR are such that the perpendiculars from A to QR ,B to RP and C to PQ are concurrent .Show that the perpendicular from P to BC ,Q to CA and R to AB are also concurrent .

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Exercise Questions Asked In Previous 13 Years Exam

1. The line parallel to the x-axis and passing through the intersection of the lines $ax + 2by + 3b = 0$ and $bx - 2y - 3a = 0$, where $(a, b) \neq (0, 0)$, is above the x-axis at a distance of 3/2 units from it above the x-axis at a distance of 2/3 units from it below the x-axis at a distance of 3/2 units from it below the x-axis at a distance of 2/3 units from it

A. below the X - axis at a distance of $\frac{3}{2}$ from it

B. below the X-axis at a distance of $\frac{2}{3}$ from it

C. above the X-axis at a distance of $\frac{3}{2}$ from it

D. above the X - axis at a distance of $\frac{2}{3}$ from it

Answer: A

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2. A straight line through the point A (3,4) is such that its intercept between the axis is bisected at A. Find its equation.

A. $x + y = 7$

B. $3x - 4y + 7 = 0$

C. $4x + 3y = 24$

D. $3x + 4y = 25$

Answer: C

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3. The line $L_1 : y - x = 0$ 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 $PR : RQ$ equals $2\sqrt{2} : \sqrt{5}$ Statement-2 : In any triangle, bisector of an angle divides the triangle into two similar triangles. Statement-1 is true, Statement-2 is true ; Statement-2 is correct explanation for Statement-1 Statement-1 is true, Statement-2 is true ; Statement-2 is not a correct explanation for Statement-1 Statement-1 is true, Statement-2 is false Statement-1 is false, Statement-2 is true

A. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

B. Statement I is true ,statement II is true statement II is not a correct explanation for statement I

C. Statement I is true ,statement II is false

D. Statement I is false ,statement II is true

Answer: C

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4. Let $P \equiv (-1, 0), Q \equiv (0, 0), \text{and } R \equiv \left(3, 3\sqrt{3}\right) \text{ be three points.}$

Then the equation of the bisector of $\angle PQR$ is

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

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

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

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

Answer: C

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5. The perpendicular bisector of the line segment joining P (1, 4) and Q (k, 3) has yintercept -4. Then a possible value of k is (1) 1 (2) 2 (3) -2 (4) -4

A. 1

B. 2

C. -2

D. -4

Answer: A

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6. The lines $p(p^2+1)x - y + q = 0$ and $(p^2+1)^2 x + (p^2+1)y + 2q = 0$ are perpendicular to a common line for

A. exactly one values of p

B. exactly two values of p

C. more than two values of p

D. no values of p

Answer: A

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7. The Line L given by $\frac{x}{5} + \frac{y}{b} = 1$ passes through the point (13, 32). The line K is parallel to L and has the equation $\frac{x}{c} + \frac{y}{c} = 1$. Then the distance between L and K is

A. $\sqrt{17}$

B. $\frac{17}{\sqrt{15}}$

C. $\frac{23}{\sqrt{17}}$

D. $\frac{23}{\sqrt{15}}$

Answer: C

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8. A straight line 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. (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: B

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9. The line $L_1 : y - x = 0$ 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 $PR : RQ$ equals $2\sqrt{2} : \sqrt{5}$ Statement-2 : In any triangle, bisector of an angle divides the triangle into two similar triangles. Statement-1 is true, Statement-2 is true ; Statement-2 is correct explanation for Statement-1 Statement-1 is true, Statement-2 is true ; Statement-2 is not a correct explanation for Statement-1 Statement-1 is true, Statement-2 is false Statement-1 is false, Statement-2 is true

A. Statement I is true ,statement II is true , statement II is a not correct explanation for statement I

B. Statement I is true , statement II is false .

C. Statement I is false ,statement II is true

D. Statement I is true ,statement II is true , statement II is a correct explanation for statement I

Answer: B

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

A. $y = x + \sqrt{5}$

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

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

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

Answer: B

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12. 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 les than $2\sqrt{2}$. Then

A. $a + b - c > 0$

B. $a - b + c < 0$

C. $a - b + c > 0$

D. $a + b - c < 0$

Answer: A

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13. Let PS be the median of the triangle with vertices $P(2, 2), Q(6, -1) and R(7, 3)$ Then equation of the line passing through $(1, -1)$ and parallel to PS is $2x - 9y - 7 = 0$ $2x - 9y - 11 = 0$ $2x + 9y - 11 = 0$ $2x + 9y + 7 = 0$

A. $4x + 7y + 3 = 0$

B. $2x - 9y - 11 = 0$

C. $4x - 7y - 11 = 0$

D. $2x + 9y + 7 = 0$

Answer: D

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14. Let a, b, c and d be non-zero numbers. If the point of intersection of the line 4ax+2ay+c = 0 and 5bx+2by+d=0 lies in the fourth quadrant and

is equidistant from the two axes, then

A. $3bc - 2ad = 0$

B. $3bc + 2ad = 0$

C. $2bc - 3ad = 0$

D. $2bc + 3ad = 0$

Answer: A

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15. For a point P in the plane, let $d_1(P)$ and $d_2(P)$ be the distance of the point P from the lines x-y=0 and x+y=0, respectively. The area of the region R consisting of all points P lying in the first quadrant of the plane and satisfying $2 \leq d_1(P) + d_2(P) \leq 4$, is____.

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

A. 820

B. 780

C. 901

D. 861

Answer: B

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17. Two sides of a rhombus are along the lines x-y+1=0 and 7x-y-5=0. If its diagonals intersect at (-1, -2), then which one of the following is a vertex of this rhombus?

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

B. $\left(-\frac{10}{3}, -\frac{7}{3}\right)$

C. $(-3, -9)$

D. $(-3, -8)$

Answer: A

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