MATHS

BOOKS - ARIHANT MATHS

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. Show that the points $(3, 4), (8, -6)$ and (13, 9) 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 vertices 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 equation 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 circle passing through (0,0) and making intercepts 'a' and 'b' on the coordinate axes.

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

(i) slope - intercept 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 , $(a^2 - ab)y = (ab + b^2)x + b^3$, and $(ab + b^2)y = (ab - a^2)x + a^3$ where $a < b < 0$

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39. Find the derivative of y=sinxcosx.

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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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45. Find the derivative of log(sinx).

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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 canal 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 (α, α^2) lies inside the triangle formed by the lines $2x + 3y - 1 = 0, x + 2y - 3 = 0, 5x - 6y - 1 = 0$, then

A. (a) $2\alpha + 3\alpha^2 - 1 > 0$

B. (b) $\alpha + 2\alpha^2 - 3 > 0$

C. (c) $\alpha + 2\alpha^2 - 3 < 0$

D. (c) $6\alpha + 5\alpha^2 + 1 > 0$

Answer:

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54. Find the general equation of the line which is parallel to $3x - 4y + 5 = 0$. And such that line passes 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 $\frac{x}{a} + \frac{y}{b} = 1, \text{then prove that } \frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

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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:

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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 $3x - 2y - 2a = 0\ is \frac{2a^2}{5}$ sq units

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64. Prove that the area of the parallelogram formed by the lines

$x \cos \alpha + y \sin \alpha = p, x \cos \alpha + y \sin \alpha = q$,

$x \cos \beta + y \sin \beta = r$ and $x \cos \beta + y \sin \beta = s$ is

$\pm (p - q)(r - s) \cos ec(\alpha - \beta)$.

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65. Prove that the parallelogram formed by the lines $\frac{x}{a} + \frac{y}{b} = 1, \frac{x}{b} + \frac{y}{a} = 1, \frac{x}{a} + \frac{y}{b} = 2$ and $\frac{x}{b} + \frac{y}{a} = 2$ 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 and c being distinct and different from 1) are concurrent the value of $\frac{1}{a-1} + \frac{1}{b-1} + \frac{1}{c-1}$ is

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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 (2,3) and through the point of intersection of the lines $2x - 3y + 7 = 0$ and $7x + 4y + 2 = 0$

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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. If $4a^2 + 9b^2 - c^2 + 12ab = 0$ then the family of straight lines $ax + by + c = 0$ is concurrent at :

(A) $(-3, 2)$ or $(2, 3)$

(B) $(-2, 3)$ or $(2, -3)$

(C) $(3, 2)$ or $(-3, -2)$

(D) $(2, 3)$ or $(-2, -3)$

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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 $3x + 2y - 5 = 0$

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

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75. 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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76. 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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77. 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 $(at1^2, 2at_1)adn(at2^2, 2at_2)$ always passes through a fixed point. Also, find the point.

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78. 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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79. 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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80. The orthocenter of the triangle formed by the lines $xy=0$ and $x+y=1$ is

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81. Find the centroid and incentre of the triangle whose vertices are (1, 2), (2, 3) and (3, 4).

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82. 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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83. 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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84. 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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85. 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 derivative of sinx+2cos2y=1.

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87. 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 derivative of y=3sin4x.

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

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91. 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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92. 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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93. Find the bisector of acute angle between the lines $x+y-3=0$ and $7x-y+5=0$

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94. 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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95. 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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96. The reflection of the point (4,-13) about the line $5x + y + 6 = 0$ is

A. a $(-1, -14)$

B. b. $(3, 4)$

C. c. $(0, -0)$

D. d. $(1, 2)$

Answer:

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

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98. 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. a. $\alpha = 1, \beta = -2$

B. b. $\alpha = 0, \beta = 0$

C. c. $\alpha = 2, \beta = -1$

D. d. none of these

Answer:

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99. If $f(x) = \prod_{n=1}^{100} (x-n)^{n(101-n)}$ then find $\frac{f(101)}{f,(101)}$

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100. 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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101. 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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102. 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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103. A ray of light is sent along the line $x - 2y - 3 = 0$ upon reaching the line $3x - 2y + 7 = 0,$ the ray is reflected from it.

Find the equation of the line containing the reflected ray.

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104. A light beam, emanating from the point A (3, 10) reflects from the straight line $2x + y - 6 = 0$ and then passes through the point $B(4, 3)$.

Find the equations of the reflected beams.

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105. 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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106. 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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107. 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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108. 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) $y=2x+8$

A. $y=2x-8$

B. $y=2x-5$

C. $y=2x-4$

D. $y=2x+8$

Answer:

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109. A man starts from the point $P(-3,4)$ and reaches at point $Q(0,1)$ touches x-axis at point R such that $PR+RQ$ is least then position of point R is

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

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

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

(d) $(-2, 0)$

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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110. If (α, α^2) lies inside the triangle formed by the lines $2x+3y-1=0, x+2y-3=0, 5x-6y-1=0$, then

A. (0,1)

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

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

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

Answer:

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111. 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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112. 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) $A.\,P.\,onlyf$ or $m = 1$ (B) $A.\,P.\,f$ or $allm$ (C) $G.\,P.\,f$ or $allm$ (D) $H.\,P.\,f$ or $allm$

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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113. 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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114. 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

A. $\alpha\beta$

B. $2\alpha\beta$

C. $4\alpha\beta$

D. $8\alpha\beta$

Answer:

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115. 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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116. 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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117. 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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118. 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) $\left(0,\frac{bb'}{a}\right)$

A. $(0,0)$

B. $(0,b)$

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

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

Answer:

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119. 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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120. 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. $(4 - \sqrt{3}, 3 + \sqrt{3})$

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

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

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

Answer:

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121. 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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122. 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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123. 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.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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124. 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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125. 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. If $f(x)=\prod_{n=1}^{100}(x-n)^{n(101-n)}$ then find $\frac{f(101)}{f,(101)}$

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127. 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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128. 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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129. 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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130. 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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131. The distance between the two parallel lines is 1 unit.

A point '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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132. Solve the following system of inequalities graphically :

$5x + 10y \geq 10, 3x + 2y \leq 6$

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133. 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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134. 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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135. 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

$a_1 a_2 + b_1 b_2 = a_2 a_3 + b_2 b_3 = a_3 a_1 + b_3 b_1$

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

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

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

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

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 $6x^2 - 2x + (\lambda - 5) = 0$ 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:

Watch Video Solution

5. A point P is taken on 'L' such that $\frac{1}{(OP)^2} = \frac{1}{(OA)^2} + \frac{1}{(OB)^2}$ then 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:

Watch Video Solution

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. Solve the given inequality $-5 < \frac{x-2}{5} \leq 0$

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9. 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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10. 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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11. 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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12. 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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13. Solve the given inequality $-7 \leq \frac{-7x}{2} \leq 14$

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Exercise For Session 1

1. Find the solution of the given inequality $14 \leq (3x + 11) \leq 22$

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

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 $ax + by + c = 0$ 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

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

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

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

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

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 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. Find the solution of the given inequality $7 \geq 5x - 8 \geq 2$

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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 number of lines that are parallel to $2x + 6y - 7 = 0$ and have an intercept 10 between the coordinate axes is

A. 1

B. 2

C. 4

D. infinitely many

Answer: B

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2. 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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3. 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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4. If the quadrilateral formed by the lines ax+by+c=0. a'x+b'y+c=0, ax+by+c'=0, a'x+b'y+c'=0 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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5. Prove that the area of the parallelogram formed by the lines $3x - 4y + a = 0,\ 3x - 4y + 3a = 0,\ 4x - 3y - a = 0$ and $4x - 3y - 2a = 0$ is $\frac{2a^2}{7}$ sq. units

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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6. The area of the parallelogram formed by the lines $y = mx, y = xm + 1, y = nx, andy = nx + 1$ equals.

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

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

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

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

Answer: D

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7. 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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8. 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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9. 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. $a < 7 \text{ or } a > 11$

Answer: D

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

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

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

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

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

Answer: B

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

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

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

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14. If the point as $(4, 7)$ and $(\cos\theta, \sin\theta)$, where $0 < \theta < \pi$, lie on the same side of the line x+y-1=0, then prove that θ lies in the first quadrant.

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

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16. If 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 = 0 is 10 square units , then a =

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17. 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,a line perpendicular to L is drawn meeting the line L_1 at B_1 Thus, a parallelogram AA_1BB_1 is formed. Then the equation of L so that the area of the parallelogram AA_1BB_1 is formed. Then the equation of L so that the area of the parallelogram AA 1 BB 1 is least is

A. (a) $x - 7y + 17 = 0$

B. (b) $7x + y + 31 = 0$

C. (c) $x - 7y - 17 = 0$

D. (d) $x + 7y - 31 = 0$

Answer: $7x + y - 31 = 0$

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18. 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. $2(x^2 + y^2) = a^2 + b^2$

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.

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

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 $\frac{1}{a-1}+\frac{1}{b-1}+\frac{1}{c-1}$ 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. The straight line through the point of intersection of $ax+by+c=0$ and $a'x+b'y+c'=0$ are parallel to the y-axis has the equation

A. $x(ab'-a'b)+(cb'-c'b)=0$

B. $x(ab'+a'b)+(cb'+c'b)=0$

C. $y(ab'-a'b)+(c'a-ca')=0$

D. $y(b' + a'b) + (c'a + ca') = 0$

Answer: A

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10. 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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11. 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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12. 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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13. The condition on a and b , 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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14. If the lines $(a-b-c)x+2ay+2a=0$,

$2bx+(b-c-a)y+2b=0$ and

$(2c+1)x+2cy+c-a-b=0$ are concurrent , then

prove that either $a+b+c=0$ or $(a+b+c)^2+2a=0$

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15. If the lines $ax+by+c=0, bx+cy+a=0$ and $cx+ay+b=0(a, b, c$ being distinct) are concurrent, then

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

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18. 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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19. 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. $5x + 5y - 3 = 0$

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

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

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

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

Answer: B

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4. Solve -4x < 20 , when x is a natural number .

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

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

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 of 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. Solve the given inequality graphically in two dimensional plane

12x + 24y > 36

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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) $3y=7$ $3x=19and3y=7$ (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 $y = x$ is R . then the midpoint of PR is

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

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

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

D. $(0, -3)$

Answer: B

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12. Solve 5x < 30 when x is a natural number

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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. Solve 12x < 80, when x is a natural number.

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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 will be

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16. Is there a real value of λ for which the image of the point $(\lambda, \lambda - 1)$ by the line mirror $3x + y = 6\lambda$ is the point $(\lambda^2 + 1, \lambda)$ If so find λ. ,

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Exercise For Session 6

1. A ray of light passes through the point (1, 2) reflects on the x-axis at a 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 the 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 a point in a triangle with vertices (0,0), $\left(\sqrt{\frac{3}{2}}, 0\right)$ and $\left(0, \sqrt{\frac{3}{2}}\right)$. Then ,

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

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11. Solve the following system of inequalities graphically : $2x + y \geq 4, 3x + 2y \leq 6$

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

Find the equation of the line 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 $\frac{2}{1!3!} + \frac{2}{3!7!} + \frac{1}{3!5!} = \frac{2^m}{n!}$, then orthocentre of the triangle having sides $x - y + 1 = 0, x + y + 3 = 0 \text{ and } 2x + 5y - 2 = 0$ 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 $x \text{ and } y.\ f(1) = 2$, then area enclosed by $3|x| + 2|y| \leq 8$ is

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 $(0 - \sin^2 1)$ 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 $x\cos\alpha + y\sin\alpha + \dfrac{\sin^2\alpha}{\cos\alpha} = 0$ 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. f is a function defined by f(x) = |x - 1| + 3. Find f(-9).

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

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. If $A\left(\frac{\sin\alpha}{3}-1, \frac{\cos\alpha}{2}-1\right)$ and B(1,1) $\alpha \in [-\pi, \pi]$ are two points on the same side of the line $3x-2y+1=0$ then α belongs to the interval

A. $\left(-\pi, -\frac{3\pi}{4}\right) \cup \left(\frac{\pi}{4}, \pi\right)$

B. $[-\pi, \pi]$

C. ϕ

D. None of these

Answer: A

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16. The line $x+y=1$ meets X - axis at A and Y - axis at B,P is the mid point of AB P_1 is the foot of the perpendicular from p to OA, M_1 is that of P_1 is that of $M_!$ from OA , M_2 is that of P_2 from OP , P_3 is that of M_2

from OA and so on . IF P_n denotes the nth foot of the perpendicular on OA form M_{n-1}, then OP_n is equal to

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

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

C. $2^n - 1$

D. $2^n + 3$

Answer: B

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17. Solve the following system of inequalities graphically : $4x + 6y \leq 24, x \geq 1, y \geq 2$

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18. The straight lines $x+2y-9=0, 3x+5y-5=0$ and $ax+by-1=0$ are concurrent, then the family of lines $2ax+3by+c=0$ (a,b,c are non zero) is concurrent at

A. $(a, -b)$

B. $(-a, b)$

C. (a, b)

D. $(-a, -b)$

Answer: C

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19. 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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20. 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. $2m(m+3n)$

Answer: B

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

A. 10

B. 18

C. 16

D. 12

Answer: B

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22. 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

A. $(a)\frac{36}{13}$

B. $(b)\frac{12}{17}$

C. $(c)\frac{13}{5}$

D. $(d)\frac{17}{14}$

Answer: C

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23. 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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24. A ray of light passes through the point (1, 2) reflects on the x-axis at a 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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25. 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.

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26. 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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27. 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. $\left(2-\sqrt{2}, \sqrt{2}-1\right), \left(2\sqrt{5}+2, \sqrt{5}-1\right)$

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

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

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

Answer: A

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28. 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

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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The Straight Lines Exercise 1 Single Option Correct Type Questions

1. Suppose that a ray of light leaves the point (3,4) reflects off the Y -axis towards the x-axis reflects fro m the X - axis and finally arrives at the point (8,2) .The value of x is

A. $4\frac{1}{2}$

B. $4\frac{1}{3}$

C. $4\frac{2}{3}$

D. $5\frac{1}{3}$

Answer: B

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The Straight Lines Exercise 2 More Than One Correct Option Correct Type Questions

1. Find the derivative of $(ax+b)^m(cx+d)^n$, where a,b,c and d are constants and m,n are integers .

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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 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.

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 the lines $x - 2y - 6 = 0, 3x + y - 4$ and $\lambda x + 4y + \lambda^2 = 0$ are concurrent , then

A. $\lambda = 2$

B. $\lambda = 2$

C. $\lambda = 4$

D. $\lambda = -4$

Answer: A::D

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5. Equation of a straight line passing through the point of intersection of $x - y + 1 = 0$ and $3x + y - 5 = 0$ are perpendicular to one of them is

A. $x + y + 3 = 0$

B. $x + y - 3 = 0$

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

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

Answer: B::D

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

C. $(0, -a)$

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

Answer:

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7. If the lines $ax + by + c = 0$, $bx + cy + a = 0$ and $cx + ay + b = 0$ $(a, b, c$ being distinct) are concurrent, then

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

B. $a = b$

C. $a = b = c$

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

Answer: A::C::D

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8. $A(1, 3)$ 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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9. 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

A. $(-2, -3)$

B. $(3, -1)$

C. $(2, 3)$

D. $(-3, 1)$

Answer: A::B

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

A. bisector of the angle including origin

B. bisector of acute angle

C. bisector of obtuse angle

D. None of these

Answer: A::B

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11. 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. $(100\sqrt{2} + 1, 7)$

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

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

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

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

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12. 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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13. Consider the equation $y - y_1 = m(x - x_1)$. If $m and x_1$ 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 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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14. 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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15. 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. Solve the following system of inequalities graphically : $x \geq 5, y \geq 4$

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

,Tangent of internal angle A

is equal to

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

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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 distance 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. Solve the following system of inequalities graphically

$4x + 4y \geq 16, 4x - 4y > 0$

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2. Solve the given inequality graphically in two - dimensional plane

2x + 5y > 10

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3. Solve the given inequality graphically in two - dimensional plane

$6x + 9y \geq 18$

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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

A. one

B. two

C. three

D. four

Answer: 3

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2. The condition on a and b , 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) $2a = b$

A. a=b

B. a+b=0

C. a=2b

D. 2a=b

Answer: 6

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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. Determine graphically the coordinates of the vertices of the triangle, the equations of whose sides are x + y - 1 = 0, x - y - 1 =0 and x = 0.

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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. Solve the given inequality graphically in two dimensional plane

2y + 6 > 3x

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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. Find λ if $(\lambda, \lambda + 1)$ is an interior point of ΔABC where, $A \equiv (0, 3), B \equiv (- 2, 0)$ and $C \equiv (5, 1)$.

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

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10. Find the derivative of function $(- x)^{-1}$ from first principle .

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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. Solve the given inequality graphically in two dimensional plane

4x - 8y > 16

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3. Solve the given inequality graphically in two dimensional plane

$5x + 15y \leq 30$

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4. Solve the given inequality graphically in two dimensional plane

$x > -3$

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5. Evaluate the given limit : $\lim_{x \to 1} \frac{2x+3}{2x-1}$

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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. $Statement1$: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 $a \in (2, 4)$

$Statement2$: 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. If $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are the vertices of the triangle then find area of triangle

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2. Find the coordinates of the point at unit distance from the lines $3x - 4y + 1 = 0, 8x + 6y + 1 = 0$

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

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4. 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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5. P is any point on the $x - a = 0$. If $A = (a, 0)$and PQ , the bisector of $\angle OPA$ meets the x-axis in Q prove that the locus of the foot of prependicular from Q on OP is $(x - a)^2(x^2 + y^2) = a^2y^2$

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6. 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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7. 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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8. 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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9. Two fixed straight lines X - axis and y = mx are cut by a variable line in the points A(a,0) and B(b,mb) respectively .P and Q are the feet of the perpendiculars drawn from A and B upon the lines y = mx and X - axis ,Show that ,if AB passes through a fixed point (h,k) then PQ will also pass through a fixed point .

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10. Find the equation of straight lines passing through point (2,3) and having intersept of length 2 units between the straight lines $2x + y = 3, 2x + y = 5$

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11. Let O(0, 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 ΔOAB satisfying. $d(P, OA) lr$ min $\{d(P, OB), d(P, AB)\}$, where d denotes the distance from the point P to the corresponding line. Let M be peak of region R. The perimeter of region R is equal to

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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 (x_1, y_1) 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

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. If (a, a^2) falls inside the angle made by the lines $y = \frac{x}{2}, x > 0$ and $y = 3x, x > 0$, then a belongs to the interval

A. $\left(0, \frac{1}{2}\right)$

B. $(2, \infty)$

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

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

Answer: C

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4. 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.

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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5. Let $P \equiv (-1, 0), Q \equiv (0, 0), \text{ and } R \equiv (3, 3\sqrt{3})$ 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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6. 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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7. 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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8. 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 $\frac{x}{c} + \frac{y}{3} = 1$. 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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9. 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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10. 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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11. 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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12. 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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13. 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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14. 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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15. 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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16. 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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17. 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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18. 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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The Straight Lines Exercise 8 Questions Asked In Previous 13 Years Exams

1. Solve the following system of inequalities graphically

$x+5y \leq 25, 2x+2y \geq 2, 2x-2y \leq 0, x \geq 0, y \geq 0$

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