MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

STRAIGHT LINES

Example

1. Find the value of x if the slope of the line passing through (2,5) and $(x, 3)$ is 2.

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2. Find the value of y is the line joinint $(3, y)$ and $(2, 7)$ is parallel to the line joining the points $(-1, 4)$ and $(0, 6)$.

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3. Find the value of k if the straight lines $6x - 10y + 3 = 0$ and $kx - 5y + 8 = 0$ are parallel.

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4. Find the the value of p if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.

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5. Find the value of k if the straight lines $y - kx + 4 = 0, (6k - 3)x - (8k - 1)y - 6 = 0$ are perpendicular.

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6. Find the equation of the straight line passing through A(-1,3) and (i) parallel (ii) perpendicular to the straight line passing through B(2,-5),C(4,6)

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7. Find the equation of the straight line through the point (4,3) and perpendicular to the line passing through the points (1,1),(2,3).

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8. Find the equation of the straight line parallel to the line $2x + 3y + 7 = 0$ and passing through the point $(5, 4)$.

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9. Find the equation of the straight line perpendicular to the line $5x - 3y + 1 = 0$ and passing through the point $(4, -3)$.

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10. Prove that the points $(1, 11), (2, 15), (-3, -5)$ are collinear and find the equation of the straight line containing them.

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11. Prove that the points $(a, b + c), (b, c + a)$ and $(c, a + b)$ are collinear and find the equation of the straight line containing them.

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12. Find the condition for the points $(a, 0), (h, k)$ and$(0, b)$ when $ab \neq 0$ to be collinear.

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13. Write the equations of the straight lines parallel to X-axis and (i) at a distance of 3 units above the X-axis and (ii) at a distance of 4 units below the X-axis.

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14. Write the equations of the straight lines parallel to Y-axis and (i) at a distance of 2 units from the Y-axis to the right of it (ii) at a distance of 5 units from the Y-axis to the left of it.

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15. Find the equation of the straight line, which make 150° with the X-axis in the positive direction and which pass through the point $(-2, -1)$

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16. Find the equation of the straight line, which make 135° with the X-axis in the positive direction and which pass through the point $(3, -2)$.

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17. Find the equation of the straight line, which make $\pi/4$ with the X-axis in the positive direction and which pass through the point $(0, 0)$.

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18. Find the equation of the straight line passing through the origin and making equal angles with the co-ordinate axes.

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19. The angle made by a straight line with the positive X-axis in the positive direction is 150° and Y-intercept cut off by it is 2. Find the equation of the line.

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20. Find the equation of the straight line with inclination $\theta = \tan^{-1}\left(\frac{2}{3}\right)$ and y-intercept 3.

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21. Find the angle made by the straight line $y = -\sqrt{3}x + 3$ with the positive direction of the X-axis measured in the counter -clock wise direction.

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22. Find the angle which the straight line $y = \sqrt{3}x - 4$ makes with the Y-axis.

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23. Find the equation of the straight line passing through $(-4, 5)$ and cutting off equal intercepts on the coordinate axes.

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24. Find the equation of the straight line passing through the point $(2, 3)$ and making intercepts, whose sum is zero.

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25. Find the equation of the straight line passing through the point $(-2, 4)$ and making intercepts whose sum is zero.

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26. If the product of the intercepts make by the straight line $x\tan\alpha + y\sec\alpha = 1, \left(0 \leq \alpha < \frac{\pi}{2}\right)$, on the co-ordinates axes is equal to $\sin\alpha$, find α.

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27. Transform the equation $\sqrt{3}x + y = 4$ into slope intercept form

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28. Transform the equation $\sqrt{3}x + y = 4$ into

intercept form

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29. Transform the equation $\sqrt{3}x + y = 4$ into

Normal form

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30. Transform the equation of $x + y + 1 = 0$ into

slope intercept form

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31. Transform the equation of $x + y + 1 = 0$ into

intercept form

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32. Transform the equation of $x + y + 1 = 0$ into

Normal form

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33. Transform the equation $3x + 4y + 12 = 0$ into

slope intercept form

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34. Transform the equation $3x + 4y + 12 = 0$ into

intercept form

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35. Transform the equation $3x + 4y + 12 = 0$ into

Normal form

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36. Transformation the equation $4x + 3y + 12 = 0$ into

slope intercept form

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37. Transformation the equation $4x + 3y + 12 = 0$ into intercept form

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38. Transformation the equation $4x + 3y + 12 = 0$ into Normal form

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39. Transform the equation $2x - 3y + 6 = 0$ into Normal form

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40. Find the equation of the straight line whose distance from the origin is 4, if the normal ray form the origin to the straight line

makes an angle of 135° with the positive direction of the X-axis.

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41. A straight line whose inclination with the positive direction of the X-axis measured in the anti-clockwise sense is $\pi/3$ makes positive intercept on the Y-axis. If the straight lie is at a distance of 4 from the origin, find its equation.

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42. A straight line through $P(3, 4)$ makes an angle of 60° with the positive direction of the X-axis. Find the coordinates of the points with the line whre are 5 units away from P.

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43. A straight line passing through $A(1, -2)$ makes an angle $\frac{\tan^{-1} 4}{3}$ with the positive direction of the X-axis in the anticlock wise sense. Find the point on the straight line whose distance from A is 5 units.

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44. Find the area of the triangle formed by the line $3x - 4y + 12 = 0$ with the coordinate axes.

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45. Find the area of triangle formed by $x - 4y + 2 = 0$ with the coordinate axes.

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46. Find the value of a it the area of the triangle formed by the liners x=0,y=0,3x+4y=a is 6 sq units.

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47. Find the ratio in which (ii) the Y-axis divide the line segment AB joining the points A (2, -3) and B(3, -6).

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48. Find the ratio in which the straight line $2x + 3y - 5 = 0$ divides the line joining the points (0,0) and (-2,1).

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49. Find the ratio in which the straight line $5x - 6y - 21 = 0$ divides the line joining the points $(4, -1)$ and $(2, 1)$

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50. Find the ratio in which the straight line $2x + 3y - 5 = 0$ divides the line joining the points (0,0) and (-2,1).

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51. State whether the points $A(3, 2), B(-4, -3)$ lie on the same side or opposite sides of the line $2x - 3y + 4 = 0$.

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52. State whether the points $A(2, -1), B(1, 1)$ lie on the same or opposite sides of the line $3x + 4y = 6$.

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53. Find the value of p if the straight lines $x + p = 0, y + 2 = 0, 3x + 2y + 6 = 0$ are concurrent.

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54. Find the point of concurrence of the set of lines

$(2 + 5k)x - 3(1 + 2k)y + (2 - k) = 0$

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55. Find the point of concurrence of the set of lines $(k+1)x+(k+2)y+5=0$

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56. Find the angle between the lines $2x+y+4=0$ and $y-3x=7$

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57. Find the angle between the lines $ax+by=a+b, a(x-y)+b(x+y)=2b$

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58. Find the angle between the lines $\sqrt{3}x + y + 1 = 0$ and $x + 1 = 0$

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59. Find the distance between the parallel lines $5x - 3y - 4 = 0, 10x - 6y - 9 = 0$

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60. Find the distance between the parallel lines $3x + 4y - 3 = 0$ and $6x + 8y - 1 = 0$

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61. If a,b,c are arithmetic progression then show that the equation $ax + by + c = 0$ represents a family of concurrent lines and find the point of concurrency.

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62. Transform the equation $\frac{x}{a} + \frac{y}{b} = 1$ into normal form where $a > 0, b > 0$. If the perpendicular distance of the straight line from the Origin is p then deduce that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

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63. Find the points on the line $3x - 4y - 1 = 0$ which are at a distance of 5 units from the point (3,2).

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64. Find the points on the line $4x - 3y - 10 = 0$ which are at a distance of 5 units from the point $(1, -2)$

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65. A straight line through $Q(\sqrt{3}, 2)$ makes an angle $\pi/6$ with positive direction of the X-axis. If the straight line intersects the line $\sqrt{3}x - 4y + 8 = 0$ at P, find the distance PQ.

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66. A straight line with slope 1 passes through $Q(-3, 5)$ meets the line $x + y - 6 = 0$ at P. Find the distance PQ.

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67. A straight line parallel to the line $y = \sqrt{3}x$ passes through Q(2,3) and cuts the line $2x + 4y - 27 = 0$ at P. Find the lengh of PQ.

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68. Find the value of k if the lines $2x - 3y + k = 0, 3x - 4y - 13 = 0, 8x - 11y - 33 = 0$ are concurrent.

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69. Find the value of p if the lines $3x + 4y = 5, 2x + 3y = 4, px + 4y = 6$ are concurrent.

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70. Find the value of p if the lines $4x - 3y - 8 = 0, 2x + py + 2 = 0, 6x + 6y - 1 = 0$ are concurrent,.

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71. Show that the lines$2x + y - 3 = 0, 3x + 2y - 2 = 0$ and $2x - 3y - 23 = 0$ are concurrent and find the point fo concurrency.

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72. If the straight lines $ax + by + c = 0, bx + cy + a = 0$ and $cx + ay + b = 0$ are concurrent, then prove that $a^3 + b^3 + c^3 = 3abc$

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73. Find the equation of the line passing through the point of intersection of $2x + 3y = 1, 3x + 4y = 6$ and perpendicular to the lines $5x - 2y = 7$

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74. Find the equation of the straight line parallel to $3x + 4y = 7$ and passing through the point of intersection of the lines $x - 2y - 3 = 0$ and $x + 3y - 6 = 0.$

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75. Find the value of k if the angle between the straight lines $4x - y + 7 = 0, kx - 5y - 9 - 0$ is 45°

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76. Find the value of k if the angle between the straight $kx + y + 9 = 0, 3x - y + 4 = 0$ is $\pi/4$

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77. Find the incentre of the triangle whose vertices are $\left(1, \sqrt{3}\right), (2, 0)$ and $(0, 0)$

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78. Find the point on the straight line $3x + y + 4 = 0$ which is equidistant from the points (-5,6) and (3,2).

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79. $(-4, 5)$ is a vertex of a square and one of its diagonals is $7x - y + 8 = 0$. Find the equation of a the other diagonal.

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80. Find the circumcentre of the triangle whose vertices are (1,3) (-3,5) and (5,-1).

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81. Find the circumcentre of the triangle whose vertices are (1,3) (0,-2) and (-3,1).

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82. Find the circumcenter of the triangle whose vertices are (-2,3) , (2 , -1) , (4 , 0) .

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83. Find the circumcentre of the triangle whose vertices are A(1,0),B(-1,2) and C(3,2)

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84. Find the orthocentre of the triangle whose vertices are $(5, -2), (-1, 2), (1, 4).$

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85. Find the orthocentre of the triagle whose vertices are $(-2, -1)(6, -1), (2, 5).$

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86. Find the orthocentre of the triangle whose vertices are $(-5, -7), (13, 2), (-5, 6)$

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87. Find the orthocentre of the triangle whose sides are $7x + y - 10 = 0, x - 2y + 5 = 0, x + y + 2 = 0$

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88. Find the orthocentre of the triangle whose sides are $4x - 7y + 10 = 0, x + y = 6$ and $7x + 4y = 15$

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89. Find the orthocentre of the triangle whose sides are $7x + y - 10 = 0, x - 2y + 5 = 0, x + y + 2 = 0$

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90. Find the orthocentre of the triangle whose sides are $x + 2y = 0, 4x + 3y - 5 = 0, 3x + y = 0$

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91. Find the circumcentre of the triangle whose sides are $3x - y - 5 = 0, x + 2y - 4 = 0$ and $5x + 3y + 1 = 0.$

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92. Find the circumcentre of the triangle whose sides are given by $x + y = 0, 2x + y + 5 = 0$ and $x - y = 0$

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93. If $Q(h, k)$ is the foot of the perpendicular of $P(x_1, y_1)$ on the line $ax + by + c = 0$ then prove that $(h - x_1), a = (k - y_1), b = -(ax_1 + by_1 + c) : (a^2 + b^2)$.

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94. Find the foot of the perpendicular drawn from $(4, 1)$ on the line $3x - 4y + 12 = 0$

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95. Find the foot of the perpendicular drawn from $(-1, 3)$ on the line $5x - y - 18 = 0$

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96. If $Q(h, k)$ is the foot of the perpendicular of $P(x_1, y_1)$ on the line $ax + by + c = 0$ then prove that $(h - x_1), a = (k - y_1), b = -(ax_1 + by_1 + c) : (a^2 + b^2)$.

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97. Find the image of (1,2) in the straight line $3x + 4y - 1 = 0$

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98. Find the equation of the straight lines passing through the point $(1, 2)$ and making an angle of 60° with the line $\sqrt{3}x + y + 2 = 0$

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99. The base of an equilateral triangle x + y = 2 = 0 and opposite vertex is (2 , - 1). Find the equations of the remaining sides .

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100. Find the equation of the straight lines passing through the point $(-3, 2)$ and making an angle 45° with the straight line $3x - y + 4 = 0$

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101. Find the equation of the straight line passing through the points $\left(at_1^2, 2at_1\right), \left(at_2^2, 2at_2\right)$.

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102. Find the sum of the squares of the intercepts of the line 4x-3y=12 on the axes of co-ordinate.

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103. If the portion of a straight line intercepted between the axes of co-ordinates is bisected at $(2p, 2q)$, write the equation of the straight line.

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104. The intercepts of a straight line on the axes of co-ordinates are a and b.

If p is the length of the perpendicular drawn from the origin to this line. Write the value of p in terms of a and b.

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105. Find the equation of the straight line whose distance from the origin is 4, if the normal ray form the origin to the straight line makes an angle of 135° with the positive direction of the X-axis.

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106. Find the equation of the straight line passing through the point of intersection of the lines $x + y + 1 = 0$ and $2x - y + 5 = 0$ and containing the point $(5, -2)$.

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107. If $3a + 2b + 4c = 0$ then show that the equation $ax + by + c = 0$ represents a family of concurrent straight lines and find the point of concurrency.

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108. A straight line meets the coordinate axes in A and B. Find the equation of the straight line when $\overline{AB}$ is divided in the ratio $2:3$ at $(-5, 2)$

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109. Find the equation of the straight line passing through the ponts $(3, -4)$ and making X and Y- intercepts which are in the ratio $2:3$

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110. Find the equation of the straight line passing through the points $(-1, 2)$ and $(5, -1)$ and also find the area of the triangle formed by it with the axes of coordinates.

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111. A triangle of area 24 sq. units is formed by a straight line with the coordinate axes in the first quadrant. Find the equation of the straight line, if it passes through (3,4).

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112. Find the set of values of a if the points $(1, 2)$ and $(3, 4)$ lie to the same side of the straight line $3x - 5y + a = 0$

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113. If $2x - 3y - 5 = 0$ is the perpendicular bisector of the line segment joining $(3, -4)$ and (α, β) then find $\alpha + \beta$.

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114. The line $\frac{x}{a} - \frac{y}{b} = 1$ meets the X-axis at P. Find the equation of the line perpendicular to this line at P.

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115. $A(-1, 1), B(5, 3)$ are opposite vertices of a square in the XY-plane. Find the equation of the other diagonal (not passing through A,B) of the square.

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116. $x - 3y - 5 = 0$ is the perpendicular bisector of the line segment joining the points A,B. If $A = (-1, -3)$, find the co ordinates of B.

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117. Find the perpendicular distance between the point of intersection of $3x + 2y + 4 = 0, 2x + 5y - 1 = 0$ and the line $7x + 24y = 15$.

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118. Find the value of a if the distances of the points $(2, 3)$ and $(-4, a)$ from the straight line $3x + 4y - 8 = 0$ are equal.

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

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120. The hypotenuse of a right angled isosceles triangle has its ends at the points $(1,3)$ and $(-4,1)$. Find the equations of the legs of the triangle.

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121. $A(10,4), B(-4,9)$ and $C(-2,-1)$ are the vertices of a triangle.Find the equations of

$\overline{AB}$

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122. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

the median through a

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123. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

the altitude through B

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124. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of The perpendicular bisector of the side AB

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125. If p and q are the lengths of the perpendiculars from the origin to the straight lines $x \sec \alpha + y \operatorname{cosec} \alpha = a$ and $x \cos \alpha - y \sin \alpha = a \cos 2\alpha$, prove that $4p^2 + q^2 = a^2$

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126. Two adjacent sides of a parallelogram are given by $4x + 5y = 0, 7x + 2y = 0$ and one diagonal is $11x + 7y = 9$. Find the equations of the remaining sides and the other diagonal.

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127. Find the area of the parallelogram whose sides are $3x + 4y + 5 = 0, 3x + 4y - 2 = 0, 2x + 3y + 1 = 0, 2x + 3y - 7 = 0$

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128. Find the equation of the line passing through the point of intersection of $2x - 5y + 1 = 0, x - 3y - 4 = 0$ and making equal interecepts on the axes.

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129. Write the general form of the equation of a line. Write the condition on its coefficients.

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130. Write the equation of normal form of a straight line.

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131. Write the symmetric form of the equation of a line.

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132. Write & Explain the terms of parametric equations of a straight line.

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133. What is the condition for the equation $ax + by + c = 0$ to represent a

vertical line

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134. What is the condition for the equation $ax + by + c = 0$ to represent a

non vertical line

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135. Find the slope of the x + y = 0 and x - y = 0 .

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136. Find the equation of the line containing the points $(1, 2)$ and $(1, -2)$

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137. Write the equation of the reflection of the line $x = 1$ in the Y-axis.

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138. If the linear equations $ax + by + c = 0, (a, b, c \neq 0)$ and $lx + my + n = 0$ represent the same line and $r = \frac{l}{a} = \frac{n}{c}$, write the values of r in the terms m and b.

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139. If the sum of the reciprocals of the intercepts made by a variable straight line on the axes of coordinates is a constant, then prove that the line always passes through a fixed point.

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140. Line L has intercepts a and b on the axes of co ordinates. When the axes are rotated through a givenn angle, keeping the origin fixed, the straight line L has intercpets p and q on the transformed axes. Prove that $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}+\frac{1}{q^2}$.

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141. Show that the straight lines $(a-b)x+(b-c)y=c-a, (b-c)x+(c-a)y=a-b$ and $(c-a)x+(a-b)y=b-c$ are concurrent.

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142. If the four straight lines $ax+by+p=0, ax+by+q=0, cx+dy+r=0$ and $cx+dy+s=0$ form a prallelogram. Show that the area of the

parallelogram so formed is

$$\left|\frac{(p-q)(r-s)}{bc-ad}\right|$$

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143. An equilateral triangle has its incentre at the origin and one side as $x+y-2=0$. Find the vertex opposite to $x+y-2=0$

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144. Find the locus of the foot of the perpendicular from the orign to a variable straighht line which always passes through the fixed point (a, b).

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145. Show that the lines $x - 7y - 22 = 0, 3x + 4y + 9 = 0$ and $7x + y - 54 = 0$ form a right angled isosceles triangle.

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146. Find the angles of the triangle whose sides are $x + y - 4 = 0, 2x + y - 6 = 0, 5x + 3y - 15 = 0$

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147. Prove that the feet of the perpendicular from the origin on the lines $x + y = 4, x + 5y = 26, 15x - 27y = 424$ are collinear.

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148. Each sides of a square is of lemgth 4 units. The centre of the square is $(3, 7)$ and one of its diagonals is parallel to $y = x$. Find the co-ordinates of its vertices.

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149. If $ab > 0$ find th area of the rhombus enclosed by the four straight lines $ax \pm by \pm c = 0$

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150. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making intercept -4 on X-axis.

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151. Find the incentre of the triangle formed by the straight lines $x = 1, y = 1, x + y = 1.$

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152. Find the incenter of the triangle formed by the straight lines $y = \sqrt{3}x, y = -\sqrt{3}x$ and $y = 3$

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153. Find the point of intersection of the straight lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1, (a \neq \pm b)$

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154. If θ is the angle between the lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ find the value of $\sin\theta$.

when $a>b$.

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155. Let PS be the median of the triangle with vertices $P(2,2), Q(6,-1)$ and $R(7,3)$. Find the equation of the straight line passing through (1,-1) and parallel to the median PS.

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