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## MATHS

# BOOKS - KC SINHA MATHS (HINGLISH) 

## STRAIGHT LINES - FOR BOARDS

Solved Examples

1. What can be said regarding a line if its slope is i. positive ii. zero iii negative?

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2. Find the slope of a line whose inclination is $150^{\circ}$
3. Find the inclination of the line having slope (i) -1

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4. Find the inclination of the line having slope (i) - 3

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5. Find the slope of the line joining $(4,-6)$ and $(-2,-5)$.

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

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

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9. Examine whether the line joining $(8,2)$ and $(-5,3)$ is parallel to or perpendicular to or neither parallel nor perpendicular to the line joining $(16,6)$ and $(3,15)$

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10. Without using the Pythagoras theorem, show that the points (4,
,$(3, \quad 5)$ and $(1, \quad 1)$ are the vertices of a right angled triangle.

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11. If points $(a, 0),(0, b)$ and $(x, y)$ are collinear, using the concept of slope prove that $\frac{x}{a}+\frac{y}{b}=1$.

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12. A quadrilateral has the vertices at the points $(-4,2),(2,6),(8,5)$ and $(9,-7)$. Show that the mid points of the sides of this quadrilateral are the vertices of a parallelogram.

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13. Prove that the line joining the middle points of the two sides of a triangle is parallel to the third side.

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14. If $A(2,0), B(0,2)$ and $C(0,7)$ are three vertices, thaken in order, of an isosceles trapezium $A B C D$ in which $A B|\mid D C$. find the coordinates of D.

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15. In Figure, time and distance graph of a linear motion is given. Two positions of time and distance are recorded as, when $\mathrm{T}=0, \mathrm{D}=2$ and when $T=3, D=8$. Using die concept of slope, find law of motion, i.e., how distance depends upon time.

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16. Consider the following population and year graph: find the slope of the line $A B$ and using it find what will be the population in the year 2010.

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17. Find the equation of the line parallel to the $y$-axis and 3 units to the right of it.

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18. Find the equation of the line parallel to $x$-axis and passing through the point $(3,-4)$.

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19. Find the equation of the line perpendicular to $x$-axis and having intercept -2 on x -axis.
20. Find the equation of the line which cuts off an intercept -5 on $y$-axis and has slope $\frac{1}{2}$.

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21. Find the equation of the line intersecting the $y$-axis at a distance 2 units above the origin and making an angle of $30^{\circ}$ with the positive direction of $x$-axis.

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22. Find the equation of the straight line which makes an angle of $15^{\circ}$ with the positive direction of $x$-axis and which cuts and intercept of length 4 on then negative direction of $y$-axis.

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23. Find eqn of line which cut off an intercept of 4 units on the $x$ - axis and makes an angle of $30^{\circ}$ with positive direction of $y$-axis.

## ( Watch Video Solution

24. Find the equation of the line passing through $(-4,3)$ and having slope $\frac{1}{2}$.

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25. Find the equation of the straight line which passes through the point $(1,2)$ and makes an angle $\theta$ with the positive direction of $x$-axis where $\cos \theta=-\frac{1}{3}$.

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26. A line through the point $A(2,0)$ which makes an angle of $30^{0}$ with the positive direction of $x$-axis is rotated about $A$ in clockwise direction
through an angle $15^{0}$. Find the equation of the straight line in the new position.

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27. Find the lines through the point $(0,2)$ making angles $\frac{\pi}{3}$ and $\frac{2 \pi}{3}$ with the $x$-axis. Also, find the lines parallel to the cutting the $y$-axis at a distance of 2 units below the origin.

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28. The mid-points of the sides of a triangle are $(2,1),(-5,7) \operatorname{adn}(-5,-5)$. Find the equations of the sides of the triangle.

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29. If $A(1,4), B(2,-3)$ and $C(-1,-2)$ are the vertices of a $\triangle A B C$. Find (i) the equation of the median through $A$ (ii) the equation of the altitude through A. (iii) the right bisector of the side $B C$.

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30. Find the equation of the perpendicular beisector of the line segment joining the points $(1,1)$ and $(2,3)$.

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31. Show that the perpendicular drawn from the point $(4,1)$ on the line segment joining $(6,5) \operatorname{and}(2,-1)$ divides it internally in the ratio $8: 5$.

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32. One side of a square makes an angle $\alpha$ with x axis and one vertex of the square is at origin. Prote 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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33. Find the equation of the line joining the points $(-1,3)$ and $(4,-2)$.

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34. Find the equations to the diagonals of the rectangle the equations of whose sides are $x=a, x=a^{\prime}, y=b a n d y=b$.

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35. Find the equation of the internal bisector of angle BAC of the triangle ABC whose vertices A, B, C are $(5,2),(2,3)$ and $(6,5)$ respectively

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36. A rectangle has two opposite vertices at the points $(1,2)$ and $(5,5)$. It these vertices lie on the line $x=3$, find the other vertices of the rectangle.

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37. 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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38. The co-ordinates of the vertices $P, Q, R \& S$ of square $P Q R S$ inscribed in the triangle $A B C$ with vertices $A=(0,0), B(3,0) \& C=(2,1)$ given that two of its vertices $\mathrm{P}, \mathrm{Q}$ are on the side $A B$ are respectively :

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39. Find the equation of the straight line which passes through the point $(3,4)$ and whose intercept on $y$-axis is twice that on $x$-axis.

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40. A straight line cuts intercepts from the axes of coordinates the sum of whose reciprocals is a constant. Show that it always passes though as fixed point.

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41. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and -6 , respectively.

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42. Find the equations of the line which passes through the point $(3,4)$ and the sum of its intercepts on the axes is 14 .

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43. A straight line passes through the point $(3,-2)$. Find the locus of the middle point of theportion of the line intercepted between the axes.

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44. Find the equation of the line upon which the length of perpendicular $p$ from origin and the angle apha made by this perpendicular with the positive direction of x -axis are $p=5, \alpha=135^{0}$

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45. Sketch roughly the line satisfying the following conditions and write their equations: Inclination $\theta=150^{\circ}$ and distance from origin $=3$

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46. Find the equation of the straight line upon which the length of perpendicular from origin is $3 \sqrt{2}$ units and this perpendicular makes an angle of $75^{0}$ with the positive direction of $x$-axis.

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47. Find the equation of the straight line upon which the length of the perpendicular from the origin is 2 and the slope of this perpendicular is $\frac{5}{12}$.
48. A canal is $4 \frac{1}{2} \mathrm{kms}$ from a place and the shortest route from this place to the cenal is exactly north-east. A village is 3 kms north and 4 kms east from the place. Does it lie on canal?

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49. Find the equation of the straight line which makes a triangle of area $96 \sqrt{3}$ with the axes and perpendicular from the origin to it makes an angle of $30^{0}$ with $y$-axis.

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50. Find the equation of the line through $(-2,1)$ in symmetric form when the angle made by the line with the positive direction of $x$-axis is $45^{0}$
51. find the equation of the straight line which passes through the point $(3,2)$ and whose gradient is $\frac{3}{4}$.find the co-ordinate of the points on the line that are 5 units away from the point $(3,2)$.

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52. 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 $x \quad+\quad y \quad 4$ may be at a distance of 3 units from this point.

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53. Find the distance of the point $(2,5)$ from the line $3 x+y+4=0$ measured parallel to a line having slope $3 / 4$.

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54. A straight line through $Q(\sqrt{3}, 2)$ makes an angle $\frac{\pi}{6}$ with positive dircction of the $x$ axis. If the straight line intersects $\sqrt{3} x-4 y+8=0 a t P$. Find distance $P Q ?$

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55. Find the coordinatse of the points at a distance $4 \sqrt{2}$ units from the point $(-2,3)$ in the direction making an angle of $45^{0}$ with the positive direction of $x$-axis.

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56. The co-ordinates of the extremities of one diagonal of a square are $(1,1)$ and $(1,-1)$ Find the co-ordinates of its other vertices and the equation of the other diagonal

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57. In the given figure, PQR is an equilateral triangle and OSPT is a square. If $O T=2 \sqrt{2} \quad$ units $\quad$ find $\quad$ the equation of lines $O T, O S, S P, Q R, P R$, and $P Q$.

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58. The length $L$ (in centimetre) of a copper rod is a linear function of its Celsius temperature C. In an experiment, if $L=124.942$ when $C=20$ and $L=125.134$ when $C=110$, express L in terms of C .

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59. The owner of a milk store finds that, he can sell 980 litres of milk each week at Rs $14 /$ litre and 1220 litres of milk each week at Rs 16 / litre. Assuming a linear relationship between selling price and demand, how many litres could he sell weekl
60. Transform equation $\sqrt{3} y-3 x=3$ to the slope intercept form and also find the angle which straight line makes with the $x$-axis.

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

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62. Find the point of intersection of the line, $\frac{x}{3}-\frac{y}{4}=0$ and $\frac{x}{2}+\frac{y}{3}=1$

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63. Find the coordinates of the incentre and centroid of the triangle whose sides have the
equations $3 x-4 y=0,12 y+5 x=0 a d n y-15=0$.

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64. Find the area of the triangle whose sides are: $3 x-2 y+1=0,3 x+y+4=0$ and $3 x-5 y+34=0$

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65. \The equation of the medians of a triangle formed by the lines $x+y-6=0, x-3 y-2=0$ and $5 x-3 y+2=0$ is

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66. Find the coordinates of the circumcentre of the triangle whose vertices are $(5,7),(6,6)$ and $(2,-2)$

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67. Show that the lines $4 x+y-9=0, x-2 y+3=0,5 x-y-6=0$ make equal intercepts on any line of slope 2.

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68. A line is such that its segment between the lines $5 x-y+4=0$ and
$3 x+4 y-4=0$ is bisected at the point (1,5). Obtain its equation.

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69. Find the coordinates of the orthocentre of the triangle whose vertices are $(0,1),(2,-1)$ and $(-1,3)$
70. Two vertices of a triangle are $(3,-1) \operatorname{and}(-2,3)$ and its orthocentre is at the origin,. Find the coordinates of eth third vertex.

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71. Two consecutive sides of a parallelogram are $4 x+5 y=0$ and $7 x+2 y=0$. If the equation of one diagonal is $11 x=7 y=9$, find the equation of the other diagonal.

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72. 

Prove
that
the
lines
$\sqrt{3} x+y=0, \sqrt{3} y+x=0, \sqrt{3} x+y=1$ and $\sqrt{3} y+x=1$ form a rhombus.
73. Prove that the straight lines ${ }^{4} 4 x+7 y=9,5 x-8 y+15=0$ and $9 x-y+6=0$ are concurrent.

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74. Find the value of $p$, so that three lines $3 x+y=2=0, p x+2 y-3=0$ and $2 x-y=3$ are concurrent.

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75. If the lines whose equations are $y=m_{1} x+c_{1}, y=m_{2} x+c_{2}$ and $y=m_{3} x+c_{3}$ meet in a point, then prove that: $m_{1}\left(c_{2}-c_{3}\right)+m_{2}\left(c_{3}-c_{1}\right)+m_{3}\left(c_{1}-c_{2}\right)=0$

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76. If the lines $p_{1} x+q_{1} y=1, p_{2} x+q_{2} y=1$ and $p_{3} x+q_{3} y=1$ be concurrent, show that the points $\left(p_{1}, q_{1}\right),\left(p_{2}, q_{2}\right)$ and $\left(p_{3}, q_{3}\right)$ are colliner.

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77. The lines
$(p-q) x+(q-r) y+(r-p)=0(q-r) x+(r-p) y+(p-q)=0,(x$

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78. Prove that the medians of a triangle are concurrent and find the position vector of the point of concurrency (that is, the centroid of the triangle)

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

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$$
\begin{aligned}
& \text { 80. Find the angle between the lines } \\
& x-2 y+3=0 \text { and } 3 x+y-1=0 \text {. }
\end{aligned}
$$

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81. Find the angle between the lines $3 x=5$ and $3 x+5 y-2=0$

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82. Find the angle between $x+y=3$ and the line joining points ( 1,1 ) and
83. Prove that the points $(2,-1),(0,2),(3,3)$ and $(5,0)$ are vertices of a parallelogram. Also, find angle between its diagonals.

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84. Is the triangle, whose vertices are $(5,-6),(1,2)$ and $(-7,-2)$, a right-angled triangle, an acute-angled triangle or an obtuse-angled triangle?

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85. Prove that that $s$ triangle which has one of the angle as $30^{\circ}$ cannot have all vertices with integral coordinates.

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86. Find the value of $k$ if the straight line $2 x+3 y+4+k(6 x-y+12)=0$ is perpendicular to the line $7 x+5 y-4=0$.

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87. Examine which of the following pair of lines are intersecting, parallel, coincident and perpendicular : $x+y+2=0$ and $2 x+2 y-7=0$

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88. Examine which of the following pair of lines are intersecting, parallel, coincident and perpendicular : $x+y+2=0$ and $2 x-3 y+5=0$

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89. Examine which of the following pair of lines are intersecting, parallel, coincident and perpendicular $x+y+2=0$ and $2 x+2 y+4=0$

## - Watch Video Solution

90. Examine which of the following pair of lines are intersecting, parallel, coincident and perpendicular $2 x+y+2=0$ and $x-2 y+5=0$

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91. If $A(2,0), B(0,2)$ and $C(0,7)$ are three vertices, thaken in order, of an isosceles trapezium $A B C D$ in which $A B|\mid D C$. find the coordinates of D.

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92. . The points $(1,3),(5,1)$ are the opposite vertices of a rectangle. The other two vertices lie on the line $y=2 x+c$. Find c and remaining two vertices.

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93. $\mathrm{A}, \mathrm{B}$ and C are the points $(2,0),(5,0)$ and $(5,3)$ respectively. Find coordinates of $D$ such that $A B C D$ is a square.

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94. 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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95. Find the slope of the lines which make an angle of $45^{\circ}$ with the line $3 x-y+5=0$.

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96. The line $2 x-y=5$ turns about the point on it, whose ordinate and abscissae are through an angle of $45^{\circ}$ in the anti-clockwise direction.

Find the equation of the line in the new position.

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97. Find the equation of the lines through the point $(3,2)$ which make an angle of $45 o$ with the line $x-2 y=3$.

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98. 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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99. On the portion of the line $x+3 y-3=0$ which is intercepted between the coordinate axes, a square is constructed on the side of the line away from the origin. Find the coordinates of the point of intersection of its diagonals. Also, find the equations of its sides.

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100. Theorem : The area of a triangle the coordinates of whose vertices are $\left(x_{1} ; y_{1}\right) ;\left(x_{2} ; y_{2}\right)$ and $\left(x_{3} ; y_{3}\right)$ is $1 / 2 \mid\left(x_{-} 1\left(y_{-} 2-y_{-} 3\right)+x_{-} 2\left(y_{-} 3-y_{-} 1\right)+x_{-} 3\left(y_{-} 1-\right.\right.$ y_2)|'

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101. A line $4 x+y=1$ passes through the point $\mathrm{A}(2,-7)$ and meets line BC at B whose equation is $3 x-4 y+1=0$, the equation of line AC such that $A B=A C$ is (a) $52 \mathrm{x}+89 \mathrm{y}+519=0$ (b) $52 \mathrm{x}+89 \mathrm{y}-519=0$ c) 82 x $+52 y+519=0$ (d) $89 x+52 y-519=0$

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102. The st. lines $3 x+4 y=5$ and $4 x-3 y=15$ interrect at a point $A(3,-1)$. On these linepoints B and C are chosen so that $A B=A C$. Find the possible eqns of the line $B C$ pathrough the point $(1,2)$

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103. A ray of light is sent along the line $x-2 y-3=0$ upon reaching the line $3 x-2 y-5=0$, the ray is reflected from it. Find the equation of the line containing the reflected ray.
104. The equation of the line through $(3,4)$ and parallel to the line $y=3 x+5$ is

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105. Find the equation of the straight line through $(2,3)$ and perpendicular to the line $4 x-3 y=10$

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106. The equation to the straight line passing through the point $\left(a \cos ^{3} \theta, a \sin ^{3} \theta\right)$ and perpendicular to the line $x \sec \theta+y \cos e c \theta=a$ is $\quad x \cos \theta-y \sin \theta=a \cos 2 \theta \quad x \cos \theta+y \sin \theta=a \cos 2 \theta$ $x \sin \theta+y \cos \theta=a \cos 2 \theta$ none of these

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107. Find the equation of a straight line perpendicular to the line $x-2 y+3=0$ and having intercept 3 on x -axis.

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108. Find the equation of the straight line which has $y$-intercept equal to
$4 / 3$ and is perpendicular to $3 x-4 y+11=0$.

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109. Find coordinates of the foot of perpendicular, image and equation of perpendicular drawn from the point $(2,3)$ to the line $y=3 x-4$.

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110. Find the image of the point $(-8,12)$ with respect to line mirror $4 x+7 y+13=0$.
111. The equations of two sides of a triangle are $3 x-2 y+6=0$ and $4 x+5 y-20$ and the orthocentre is (1,1). Find the equation of the third side.

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112. One side of a rectangle lies along the line $4 x+7 y+5=0$. Two of its vertices are $(-3,1)$ and $(1,1)$. Then find the equations of other sides.

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113. The equations of the perpendicular bisectors of the sides $A B a n d A C$ of triangle $A B C$ are $x-y+5=0$ and $x+2 y=0$, respectively. If the point $A$ is $(1,-2)$, then find the equation of the line $B C$.

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114. Find the equation of the straight line which passes through the point $(2,-2)$ and the point of intersection of the lines $5 x-y=9$ and $x+6 y=8$.

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115. Find the equation of the straight line which passes through the intersection of the lines $x-y-1=\operatorname{and} 2 x-3 y+1=0$ and parallel (i) $x-a \xi s(i i) y-a \xi s(i i i) 3 x+4 y=14$.

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116. Find the equation of the straight line which passes through the point of intersection of lines $3 x-4 y-7=0$ and $12 x-5 y-13=0$ and is perpendicular to the line $2 x-3 y+5=0$

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117. Find the equations of the straight lines passing through the point of intersection of the lines $x+3 y+4=0$ and $3 x+y+4=0$ and equally inclined to the axes.

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118. Coordinates of the orthocentre of the triangle whose sides are $3 x-2 y$ $=6,3 x+4 y+12=0$ and $3 x-8 y+12=0$ is

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119. lines $L_{1}: a x+b y+c=0$ and $L_{2}: l x+m y+n=0$ intersect at the point $P$ and make a angle $\theta$ between each other. find the equation of a line $L$ different from $L_{2}$ which passes through $P$ and makes the same angle $\theta$ with $L_{1}$

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120. Show that the straight lines given by $x(a+2 b)+y(a+3 b)=a$ for different values of $a a n d b$ pass through a fixed point.

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121. A straight line cuts intercepts from the axes of coordinates the sum of whose reciprocals is a constant. Show that it always passes though as fixed point.

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122. Find the position of the points $(1,1)$ and $(2,-1)$ with respect to the line $3 x+4 y-6=0$.

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123. The ratio in which the line segment joining $P\left(x_{1}, y_{1}\right)$ and $Q\left(x_{2}, y_{2}\right)$ is divided by x -axis is $y_{1}: y_{2}$ (b) $y_{1}: y_{2}$ (c) $x_{1}: x_{2}$ (d) $x_{1}: x_{2}$

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124. Find the distance of the point $(4,5)$ from the straight line $3 x-5 y+7=0$.

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125. The equation of the base of an equilateral triangle is $x+y=2$ and its vertex is $(2,-1)$. Find the length and equations of its sides.

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126. Find the equation of the straight line which cuts off intercept on $X$ axis which is twice that on $Y$-axis and is at a unit distance from the origin.
127. If $p$ and $q$ are the lengths of perpendiculars from the origin to the lines $x \cos \theta-y \sin \theta=k \cos 2 \theta \quad$ and $\quad x \sec \theta+y \operatorname{cosec} \theta=k \quad$, respectively, prove that $p^{2}+4 q^{2}=k^{2}$.

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128. If $p$ is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b , then show that $\frac{1}{p^{2}}=\frac{1}{a^{2}}+\frac{1}{b^{2}}$.

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129. Line $L$ has intercepts $a a n d b$ on the coordinate axes. When the axes are rotated through a given angle keeping the origin fixed, the same line $L$ has intercepts pandq. Then $a^{2}+b^{2}=p^{2}+q^{2} \frac{1}{a^{2}}+\frac{1}{b^{2}}=\frac{1}{p^{2}}+\frac{1}{q^{2}}$ $a^{2}+p^{2}=b^{2}+q^{2}$ (d) $\frac{1}{a^{2}}+\frac{1}{p^{2}}=\frac{1}{b^{2}}+\frac{1}{q^{2}}$
130. Prove that the length of perpendiculars from points $P\left(m^{2}, 2 m\right) Q(m n, m+n) \operatorname{and} R\left(n^{2}, 2 n\right) \quad$ to the line $x \cos ^{2} \theta+y \sin \theta \cos \theta+\sin ^{2} \theta=0$ are in G.P.

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131. Find the distaance of the point $(1,2)$ from the straight line with slope 5 and passing through the point of intersection of $x+2 y=5$ and $x-3 y=7$.

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132. The vertices of a triangle are $A(-2,1), B(6,-2)$ and $C(4,3)$. Find the equation of the altitudes of the triangle.

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133. Find the distance between the parallel lines $a x+b y+c=0$ and $a x+b y+d=0$

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134. Prove that the line $12 x-5 y-3$ is mid parallel to the lines $12 x-5 y+7=0$ and $12 x-5 y-13=0$

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135. The equations of two sides of a square are $3 x+4 y-5=0$ and $3 x+4 y-15=0$ and $(6,5)$ is a point on the third side. Find the equation of the third side and the remaining side.

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136. The angle between the diagonals of a quadrilateral 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

# 137. <br> Find <br> area <br> parallelogram <br> lines <br> $y=m x, y=m x+1, y=n x$ and $y=n x+1$ equal to: 

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## Exercise

1. What can be said regarding a line if its slope is i. positive ii. zero iii negative?

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2. Find the slope of the line whose inclination is: 0
3. Find the slope of the line whose inclination is : $60^{\circ}$

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4. Find the slope of a line whose inclination is $150^{\circ}$

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5. Find the slope of line whose inclination is $45^{\circ}$

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6. Find the slope of the line through the points: $(6,3)$ and $(9,3)$

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7. Find the slope of the line through the points: $(1,2)$ and $(4,2)$
8. Find the slope of the line through the points: $(0,9)$ and $(-3,0)$

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9. Find the slope of the line through the points: $(0,-4)$ and $(-6,2)$

## - Watch Video Solution

10. Find the slope of the line through the points: $(3,-2)$ and $(3,4)$

## - Watch Video Solution

11. Find the slope of the line through the points: $(3,-2)$ and $(-1,4)$

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12. Find the slope of the line through the points: $(3,-2)$ and $(7,-2)$

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13. Show that the line joining $(5,6)$ and $(2,3)$ is parallel to the line through $(9,-2)$ and $(6,-5)$.

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14. Show that the line through $(2,-5)$ and $(-2,5)$ is perpendicular to the line through $(6,3)$ and $(1,1)$

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15. Examine whether the two lines in each of the parallel, perpendicular or neither parallel nor perpendicular : through $(-2,6)$ and $(4,8)$, through $(8,12)$ and $(4,24$.
16. State whether the tow lines in each of the following are parallel, perpendicular or nether: through (9,5) and ( $-1,1$ ); through ( $3,-5$ ) and ( $8,-3$ )

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17. $A(5,-3), B(8,2), C(0,0)$ are the vertices of a triangle. Show that the median from $A$ is perpendicular to the side $B C$.

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18. 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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19. Line through the points $(-2,6)$ and $(4,80$ is perpendicular to the line through the points $(8,12)$ and $(x, 24)$. Find the value of $x$.

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20. Find the value of $x$ for which the points $(x-1),(2,1)$ and $(4,5)$ are collinear.

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21. Find the slope of the line, which makes an angle of 300 with the positive direction of yaxis measured anticlockwise.

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22. Find the slope of the line which passes through the origin and the mid-point of the line segment joining the points $A(0,-4)$ and $B(8,0)$.
23. Find the angle between the $X$-axis and the line joining the points $(3,-1)$ and $(4,-2)$.

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24. A line passes through $\left(x_{1}, y_{1}\right)$ and $(h, \quad k)$. If slope of the line is $m$, show that $k-y_{1}=m\left(h-x_{1}\right)$.

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25. Using slopes, show that thepoints $(1,1),(2,3)$ and $(3,5)$ are collinear.

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26. $A(3,4), B(-3,0)$ and $C(7,-4)$ are the vertices of a triangle. Show that the line joining the mid-points $D\left(x_{1}, y_{1}\right), E\left(x_{2}, y_{2}\right)$ and $F(x, y)$ are collinear. Prove that $\left(x-x_{1}\right)\left(y_{2}-y_{1}\right)=\left(x_{2}-x_{1}\right)\left(y-y_{1}\right)$

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27. By using the concept of slope, show that $(-2,-1),(4,0),(3,3)$ and $(-3,2)$ are the vertices of a parallelogram.

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28. A quadrilateral has vertices $(4,1),(1,7),(-6,0)$ AND $(-1,-9)$. Show that mid-points of the sides of this quadrilateral form a parallelogram.
29. Prove that a median of an equilateral triangle is perpendicular to the corresponding side.

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30. By using the concept of slope, prove that the diagonals of a rhombus re at right angles.

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31. Find the equation of the line which is parallel to $x$-axis and at a distance of 3 units below the $x$-axis.

## - Watch Video Solution

32. Find the equation of the line perpendicular to $x$-axis and passing through the origin.
33. Find the equation of the straight lines which are : parallel to the $x$-axis at a distance of 5 units from it

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34. Find the equation of the straight lines which are : parallel to the $y$-axis and at a distance of 4 units from it towards negative side of $x$-axis.

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35. Find the equation of the straight lines which pass through $(5,3)$ and are respectively parallel and perpendicular to the $x$-axis.

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36. Find the equation of the line which is parallel to $y l-a x i s ~ a n d ~ p a s s e s ~$ through the point $(3,-4)$.

## - Watch Video Solution

37. Find the equation of the line perpendicular to the $x$-axis and passing through the point $(-1,,-1)$.

## - Watch Video Solution

38. Find the equation of the line parallel to $x$-axis of and having intercept
-2 on $y$-axis.

## - Watch Video Solution

39. Find the equation of the line with slope 3 and $y$ intercept -2 .
40. Find the equation of the line which cuts off an intercept 7 on $y$-axis and has the slope 3 .

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41. Find the equation of the line which makes an angle of $75^{0}$ with $x$-axis and cuts an intercept of length 3 on the positive direction of $y$-axis.

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42. Find the equation of the straight lines which cut off an intercept 4 from the $y$-axis and are equally inclined to the axes.

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43. Find the equation of the straight line which cuts off an intercept-5 from the $y$-axis and makes an angle of $\sin ^{-1}\left(\frac{12}{13}\right)$ with the $x$-axis.

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44. Find the equation of the line which intercepts a length 2 on the positive direction of the $x$-axis and is inclined at an angle of $135^{\circ}$ with the positive direction of y -axis .

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45. Find the equation of a line which cuts off an intercept 4 on the $x$-axis and has the slope 2 .

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46. Find the equation of the line for which $\tan \theta=\frac{1}{2}$, where $\theta$ is the inclination of the line and $i$. $x$-intercept equal to 4 . li. $y$-intercepts is $-\frac{3}{2}$.

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47. The perpendicular from the origin to the line $y=m x+c$ meets it at the point $(-1,2)$. Find the value of $m$ and $c$.

## - Watch Video Solution

48. The line through the points $(h, 3)$ and $(4,1)$ intersects the line $7 x-9 y-19=0$ at right angle. Find the value of A .

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49. Find the values of k for which the line $(k-3) x-\left(4-k^{2}\right)$ $y+k^{2}-7 k+6=0$ is (a) Parallel to the xaxis, (b) Parallel to the vaxis, (c)

Passing through the origin.

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50. Find the equation of a line through the origin which makes an angle of $45^{0}$ with the positive direction of $x$-axis.

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51. Find the equation of the line through the point ( $-1,2$ ) and having slope 4.

## - Watch Video Solution

52. Find the equation of the line throught ( $-2,3$ ) and having slope -4 .

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53. Find the equation of the line passing through ( 0,0 ) with slope $m$.

## - Watch Video Solution

54. Find the equation of the line passing through $(-4,3)$ and having slope $\frac{1}{2}$.

## - Watch Video Solution

55. Find the equation of the line passing through the point $(2,2)$ and inclined to $x$-axis at $45^{0}$.

## - Watch Video Solution

56. Find the eqution of the line passing through the point ( $-1,-2$ ) andhaving slope $\frac{4}{7}$.
57. Find the equation of the linepassing through the point $(\sqrt{2}, 2 \sqrt{2})$ and having slope $\frac{2}{3}$.

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58. Find the equation of the line intersecting $x$-axis at a distance of 3 units to the left of the origin with slope -2 .

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59. Find the eqution of a line which passes through the point $(-2,3)$ and makes an angle of $60^{\circ}$ with thepositive direction of $x$-axis.

## - Watch Video Solution

60. Find the equation of the straight line passing through ( $3,-2$ ) and making an angle of $60^{\circ}$ with the positive direction of $y$-axis.

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61. Find the eqn of lines which pass through the point $(1,2)$ and equally inclined to the co- ordinate axes.

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62. Find the equation of the straight line which passes through the point $(1,2)$ and makes such an angle with the positive direction of $x$-axis whose sine is $\frac{3}{5}$.

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63. Find the slope of the line passing through the points $(3,4)$ and $(1,2)$. Also find its equation.

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64. Find the equation of the line passing through $(-3,5)$ and perpendicular to the line through the points $(2,5)$ and $(-3,6)$.

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65. Find the equation of the right bisector of the line segment joining eth points $A(1,0)$ and $B(2,3)$

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66. Find the equation of the right bisector of the line segment joining the points (3, 4) and (1, 2).
67. The perpendicular from the origin to a line meets it at the point $(-2,9)$ find the equation of the line.

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68. A line perpendicular to the in segment joining the points $(1,0)$ and $(2,3)$ divides it in the ratio $1: n$. Find the equation of the line.

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69. Find the equation of the line through the point $(0,2)$ making an angle $\frac{\pi}{6}$ with the positive $x$-axis. Also find the equation of the line parallel to it and crossing the $y$-axis at a distance of 2 units below the origin.

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70. Find the equation of the linepassing through the point $(2,3)$ and $(5,-2)$.

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71. Find the equation of the line passing through the following pair of points ( $0 .-3$ ) and ( 5,0 )

## - Watch Video Solution

72. Find the equation of the line passing through the pair of points:
$(-1,1)$ and $(2,-4)$

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73. Find the equation of the line passing through the pair of points:
$(1,-1)$ and $(3,5)$
74. Find the equation of the straight line whichpasses throought the two points: $(a, b),(a+r \cos \alpha, b+r \sin \alpha)$

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75. Find the equation of the straight line whichpasses throought the two points: $\left(a t_{1}^{2}, 2 a t_{1}\right),\left(a t_{2}^{2}, 2 a t_{2}\right)$

## - Watch Video Solution

76. Find the equation of the sides of the triangle whose vertices are $(2,1),(-2,3)$ and $(4,5)$

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77. By using the concept of equation of a line, prove that the three points
$(3, \quad 0),(2$,
$2)$ and (8,
2) are collinear.

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78. The vertices of $\mathrm{A} P \mathrm{PQ}$ are $P(2,1), Q(2,3)$ and $R \quad(4, \quad 5)$. Find equation of the median through the vertex $R$.

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79. The Fahrenheit temperature $F$ and absolute temperature $K$ satisfy a linear equation. Given that $K=273$ when $F=32$ and that $K=373$ when $F=212$. Express K in terms of F and find the value of F , when $K=0$.

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80. Find the equation of the line whose intercepts on $x$ and $y$ axes are 2 and -3 respectively.

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81. Find the equation of the line, which makes intercepts -3 , and 2 on the $x$ and $y$-axes respectively.

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82. Find the equation of the straight line whichpasses through the point
$(2,3)$ and cuts off equal intercepts on the axes. (A) `

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83. Find the equation of the straight line which cuts off equal and positive intercepts from the axes andpasses through the point $(3,4)$.
84. Find the equation of the line which cuts off equal and positive intercepts from the axes and passes through the point $(\alpha, \beta)$.

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85. Find the equation of the straight line which passes through the point $(2,3)$ and whose intercept on the $x$-axis is double that on the $y$-axis.

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86. Find the equation of the straight line which passes through the point
$(2,3)$ and whose intercept on the $y$-axis is thrice that on the $x$-axis.

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87. Find the equation of the straight line passing through the point ${ }^{`}(3$, $-4)$ and cutting off intercepts, equal but of opposite signs, from the axis.

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88. A straight line passes through the point $(\alpha, \beta)$ and this point bisects the portion of the line intercepted between the axes. Show that the equation of the straight line is $\frac{x}{2 \alpha}+\frac{y}{2 \beta}=1$.

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89. Find the equation of the straight lines each of which passes through the point $(3,2)$ and cuts off intercepts aandb respectively on xandy - axes such that $a-b=2$.

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90. Find the equations to the straight lines which pass through the point $(-2,3)$ and cut the axes at $A(a, 0)$ and $B(0, b)$ so that $a+b=2$

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91. Find equation of the line passing through the point $(2,2)$ and cutting off intercepts on the axes whose sum is 9 .

## - Watch Video Solution

92. A straight line passes through the point $(3,-2)$ and this point bisects theportion of the line intercepted between the axes, find the equation of the line

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93. Point $R(h, k)$ divides a line segment between the axes $m$ the ratio $1: 2$. Find equation of the line.

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94. Find the equation of the line which passes through $P(1,-7)$ and meets the axes at $A a n d B$ respectively so that $4 A P-3 B P=0$.

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95. Find the equation of straight line which passes through the point $P(2,6)$ and cuts the coordinate axis at the point $A$ and $B$ respectively so that $A P: B P=2: 3$.

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96. For the straight line $\sqrt{3} y-3 x=3$, find the intercepts on the $x$-axis and y -axis.

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97. Find the equation of the straight line whose intercepts on the axes are twice the intercepts of the straight line $3 x+4 y=6$.

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98. find the equation of the straight line passing through $(2,1)$ and bisecting the portion of the straight line $3 x-5 y=15$ lying between the axes.

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99. Find the equations of the straight lines which pass through the origin and trisect the portion of the straight line $2 x+3 y=6$ which is intercepted between the axes.

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100. Prove that the points whose coordinates are respectively (5,1), (1,-1) and $(11,4)$ lie on a straight line and find its intercepts on the axes

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101. find the gradient and intercepts on the axes of the straight line passing through the point $(1,-3)$ and $(4,5)$.

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102. Find the equation of the line where the perpendicular distance $p$ of the line from origin and the angle $\alpha$ made by the perpendicular with $x$ axis are given as: $p=3, \alpha=45^{0}$

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103. Find the equation of the line where the perpendicular distance $p$ of the line from origin and the angle $\alpha$ made by the perpendicular with x axis are given as: $p=1, \alpha 90^{0}$

## - Watch Video Solution

104. Find the equation of the line where the perpendicular distance $p$ of the line from origin and the angle $\alpha$ made by the perpendicular with $x$ axis are given as: $p=1, \alpha=90^{\circ}$

## - Watch Video Solution

105. Find the equation of the line where the perpendicular distance $p$ of the line from origin and the angle $\alpha$ made by the perpendicular with x axis are given as: $p=4, \alpha=15^{0}$

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106. Find the equation of the line which satisfy the given conditions :

Perpendicular distance from the origin is 5 units and the angle made by the perpendicular with the positive xaxis is $30 o$.

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107. the length of the perpendicular from the origin to a line is 7 and a line makes an angle of $150^{\circ}$ with the positive direction of $y$-axis . then the equation of the line is:

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108. Find the equation of the straight line upon which the length of the perpendicular from the origin is 2 and this perpendicular makes an angle of $30^{0}$ with the positive direction of y -axis (in clockwise direction).

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109. Find the equation of the line which is at a distance 5 from the origin and the perpendicular from the origin to the line makes an angle $60^{\circ}$ with thepositive direction of the $x$-axis.

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110. Find the equation of the straight line upon which the length of the perpendicular from the origin is 5and the slope of this perpendicular is $\frac{3}{4}$.

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111. A straight road is at a distance of $5 \sqrt{2} \mathrm{~km}$ from a place. The shortest distance of the road from the place is in the N.E. direction. Do the following villages which (i) is 6 km East and 4 km North from the place lie on the road or no, (ii) is 4 km East and 3 km North from the place, lie on the road or not?

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112. Find the co-ordinates of the point at at a distance 6 units from the point $(1,1)$ in the direction making an angle of $60^{\circ}$ with the positive direction of the $x$ - axis.

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113. 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 of 3 units from this point.
114. Find the distance of the line $2 x+y=3$ from the point ( $-1,3$ ) in the direction whose slope is 1 .

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115. Find the distance of the line $4 x y=0$ from the point $\mathrm{P}(4,1)$ measured along the line making an angle of 135 owith the positive xaxis.

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116. The straight line through $P\left(x_{1}, y_{1}\right)$ inclined at an angle $\theta$ with the x axis meets the line $a x+b y+c=0 \in Q$. Find the length of $P Q$.

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117. a line drawn through $A(4,-1)$ parallel to the line $3 x-4 y+1=0$. Find the coordinates of two points on this line which are at a distance of 5 units from $A$

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118. Find the distance of the point $(3,5)$ from the line $2 x+3 y=14$ measured parallel to the line $x-2 y=1$.

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119. Find the distance of the line $4 x+7 y+5=0$ from the point $(1,2)$ along the line $2 x-y=0$.

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120. The co-ordinates of the extremities of one diagonal of a square are $(1,1)$ and $(1,-1)$ Find the co-ordinates of its other vertices and the equation of the other diagonal

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121. $A B$ is a side of a regular hexagon $A B C D E F$ and is of length $a$ with
$A$ as the origin and $A B$ and $A E$ as the $x$-axis andy-axis respectively. Find the equation of lines $A C, A F$ and $B E$

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122. Reduce each of the following equations into slope-intercept from $7 x+3 y-6=0$

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123. Reduce each of the following equations into slope-intercept from $6 x+3 y-5=0$

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124. Reduce each of the following equations into slope-intercept from (A) $3 X+3 Y=5$

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125. Reduce each of the following equations into slope-intercept from $2 x-4 y=5$

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126. Reduce each of the following equations into slope-intercept from
$y=0$
127. Reduce the following equations into slope intercept form and find their slopes and the y intercepts.(i) $x+7 y=0$, (ii) $6 x+3 y 5=0$, (iii) $y=0$.

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128. Reduce the equations to the intercept form $2 x-3 y=5$

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129. Reduce the equations to the intercept form $3 x-4 y=10$

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130. Reduce the equations to the intercept form $\sqrt{3} y-3 x=3$
131. Reduce the equations to the intercept form $4 x-3 y=6$

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132. Reduce the following equations into intercept form and find their intercepts on the axes.(i) $3 x+2 y 12=0$, (ii) $4 x 3 y=6$, (iii) $3 y+2=0$.

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133. Reduce the following equations into intercept form and find their intercepts on the axes.(i) $3 x+2 y 12=0$, (ii) $4 x 3 y=6$, (iii) $3 y+2=0$.

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134. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $\sqrt{3} x+y-8=0$

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135. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $4 x+3 y-9=0$

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136. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $3 x-4 y+10=0$

## - Watch Video Solution

137. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $x+y-2=0$

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138. Reduce the following equations to the normal form and find $p$ and $\alpha$ in each case: $y-2=0$

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139. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $x-4=0$

## - Watch Video Solution

140. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $x-y=4$

## - Watch Video Solution

141. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $x-\sqrt{3} y+8=0$
142. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line $\sqrt{3} x+y+2=0$

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143. Equation of a line is $3 x-4 y+10=0$. Find its (i) slope, (ii) x and yintercepts.

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144. For the straight line $8 x-15 y+51=0$, find the length of the perpendicular from the origin to this line and the inclination of this perpendicular with the $x$-axis.

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145. Find the equation of the line joining the points $(1,2)$ and $(-3,1)$.

Find its inter-cepts on the axes. If $p$ be the length of the perpendicular from the origin to the line find the value of $p$.

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146. Find the point of intersection of the lines $2 x-3 y+8=0$ and $4 x+5 y=6$

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147. Find the points of intersection of the following pair of lines:
$2 x+3 y-6=0,3 x-2 y-6=0$

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148. Find the points of intersection of the following pair of lines:
$x=0,2 x-y+3=0$

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149. For what value of $m$ the line $m x+2 y+5=0$ will pass through the point of intersection of the lines $x-4 y=3$ and $x+2 y=0$ ?

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150. Find the point of intersection of lines : $y t_{1}=x+a t_{1}^{2}$ and $y t_{2}=x+a t_{2}^{2}$

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151. If the straight line $\frac{x}{a}+\frac{y}{b}=1$ passes through the line point of intersection of the lines $x+y=3 a n d 2 x-3 y=1$ and is parallel to $x-y-6=0$, find $a a n d b$.

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152. Find the vertices and the area of the triangle whose sides are $x=y, y=2 x$ and $y=3 x+4$.

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153. The sides of a triangle are given by
$x-2 y+9=0,3 x+y-22=0$ and $x+5 y+2=0 . \quad$ Find $\quad$ the vertices of the triangle.

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154. Find the vertices of the triangle whose sides are $y+2 x=3,4 y+x=5$ and $5 y+3 x=0$

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155. Find the area of the triangle formed by the lines $y-x=0, x+y=0$ and $x-k=0$.

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156. If $m_{1}$ and $m_{2}$ are the roots of the equation $x^{2}+(\sqrt{3}+2) x+\sqrt{3}-1=0$, then the area of the $\Delta$ formed by lines $y=m_{1} x, y=m_{2} x, y=c$ is: $\mathrm{a} .\left(\frac{\sqrt{33}+\sqrt{11}}{4}\right) c^{2} \mathrm{~b} .\left(\frac{\sqrt{32}+\sqrt{11}}{16}\right) c$ c. $\left(\frac{\sqrt{33}+\sqrt{10}}{4}\right) c^{2}$ d. $\left(\frac{\sqrt{33}+\sqrt{21}}{4}\right) c^{3}$

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157. Three sides $A B, A C a n d C A$ of triangle $A B C$ are $5 x-3 y+2=0, x-3 y-2=0 a n d x+y-6=0$ respectively. Find the equation of the altitude through the vertex $A$.

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158. Find the equation of line parallel to the $y$-axis and drawn through the point of intersection of $x 7 y+5=0$ and $3 x+y 7=0$.

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159. Find the equation of the line parallel to $y$-axis and drawn through the point of intersection of the lines $x-7 y+5=0$ and $3 x+y=0$.

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160. Find the coordinates of the foot of perpendicular from a point $(-1,3)$ to the line $3 x-4 y-16=0$

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161. Two lines cut on the axis of $x$ intercepts 4 and -4 and on the axis of $y$ intercepts 2 and 6 respectively. Find the coordinates of their point of intersection.

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162. Find the coordinates of the orthocentre of a triangle whose vertices are $(-1,3)(2,-1)$ and $(0,0)$. [Orthocentre is the point of concurrency of three altitudes].

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163. Find the coordinates of the incentre and centroid of the triangle

| whosesides <br>  <br> $3 x-4 y=0,12 y+5 x=0 a d n y-15=0$. | the equations |
| :--- | :---: | :--- |
| $3 x=0$ |  |

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164. Find the coordinats of the incentre of the triangle whose sides are $x=3, y=4$ and $4 x+3 y=12$. Also find the centroid.

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165. Find the circumcentre of the triangle whose sides are $3 x-y+3=0,3 x+4 y+3=0$ and $x+3 y+11=0$.

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166. Find the circumcentre of the triangle whose vertices are $(-2,-3),(-1,0),(7,-6)$.

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167. Find the orthocentre of the triangle whose vertices are $(0,0),(6,1)$ and $(2,3)$.

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168. Two vertices of a triangle are $(4,-3) \&(-2,5)$. If the orthocentre of the triangle is at (1, 2), find coordinates of the third vertex.
169. Find the orthocentre of the triangle the equations of whose sides are $x+y=1,2 x+3 y=6 a n d 4 x-y+4=0$.

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170. Find if the following lines are concurrent. $5 x-3 y-4=0, x-5 y+7=0,6 x-17 y+24=0$

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171. Examine whether the following three lines are concurrent or not. If yes, find the point of concurrenty
$2 x+3 y-4=0, x-5 y+7=0,6 x-17 y+24=0$

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172. Find the value of $m$ so that the straight lines $y=x+1, y=2(x+1)$ and $y=m x+3$ are concurrent.

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173. Find the value of $m$ so that the lines $3 x+y+2=0,2 x-y+3=0$ and $x+m y-3=0 \quad$ may be concurrent.

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174. Find the value of $m$ for which the lines
$m x+(2 m+3) y+m+6=0 a n d m x+(2 m+1) x+(m-6) y+9=0$ intersect at a; point on $y-a \xi s$.

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175. Find the value of $m$ so that lines $y=x+1,2 x+y=16$ and $y=m x-4$ may be concurrent.

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176. If the lines $2 a+y 3=0,5 x+k y 3=0$ and $3 x y 2=0$ are concurrent, find the value of $k$.

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177. 

the
three
lines
$a x+a^{2} y+1=0, b x+b^{2} y=1=0$ and $c x+c^{2} y+1=0 \quad$ are concurrent, show that at least two of three constants $a, b, c$ are equal.

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$L_{1}=(b+c) x+a y+1=0, L_{2}=(c+a) x+b y+1=0 n d L_{3}=(a+b$
are concurrent.

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179. Given a tringle with vertices $A(-2,3), B(-4,1)$ and $C(2,5)$.

Find the equations of the medians and show that they meet in one point.

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180. The coordinates of points $A, B$ and $C$ are $(1,2),(-2,1)$ and $(0,6)$. Verify if the medians of the triangle ABC are concurrent..

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181. Show that the perpendicular bisectors of the sides of the triangle with vertices $(7,2),(5,-2)$ and $(-1,0)$ are concurrent. Also find the coordinates of the point of concurrence (circumcentre).

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182. Show that the perpendicular bisectors of the sides of a triangle are concurrent.

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183. Altitudes the perpendiculars drawn from the vertices of a triangle to the opposite side are known as the altitudes of the triangle.

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184. Find the angle between the lines $x+3 y-8=0$ and $2 x-3 y+6=0$.

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185. Find the obtuse angle between the straight lines $9 x+3 y-4=0$ and $2 x+4 y+5=0$.

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186. Find the angle between the lines $x=a$ and $b y+c=0$.

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187. Find the angle between the lines $3 x=5$ and $3 x+5 y-2=0$.

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188. Find angles between the lines $\sqrt{3} x+y=1$ and $x+\sqrt{3} y=1$.

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189. Find the tangent of the angle between the lines which have intercepts 3,4 , and 1,8 on the $x$ and $y$ axes respectively.

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190. Find the tangent of the angle between the lines whose intercepts on the axes are respectively, $p,-q$ and $q,-p$.

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191. Find the angle between the line joining the points $(2,0),(0,3)$ and the line $x+y=1$.
192. The line through $(4,3)$ and $(-6,0)$ intersects the line $5 x+y=0$.

Find the angles of intersection.

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193. Prove that the line $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}-\frac{y}{a}=1$ are perpendicular to each other.

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194. Show that the line joining $(2,-3)$ and $(-1,2)$ is perpendicular to the line joining $(3,7)$ and $(-2,4)$.

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195. A line passing through the points $(a, 2 a)$ and $(-2,3)$ is perpendicular to the line $4 x+3 y+5=0$, find the value of $a$.

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196. If the vertices of a triangle have rational coordinates, then prove that the triangle cannot be equilateral.

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197. Prove that the line $k^{2} x+k y+1=0$ is perpendicular to the line $x-k y=1$ for all real values of $k(\neq 0)$.

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198. For what value of $k$ is the line $x-y+2+k(2 x+3 y)=0$ parallel to the line $3 x+y=0$ ?

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199. 

$2 x-3 y+1=0, x+y=3,2 x-3 y=2$ and $x=4-y \quad$ form $\quad$ a parallelogram.

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200. If $x \cos \theta+y \sin \theta=2$ is perpendicular to the line $x-y=3$ then what is one of the value of $\theta$ ?

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201. If the line $x-3 y+5+k(x+y-3)=0$, is perpendicular to the line $x+y=1$, and $k$.

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202. The line through the points $(h, 3)$ and $(4,1)$ intersects the line $7 x-9 y-19=0$ at right angle. Find the value of A .

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203. Examine which of the pair of lines are intersecting, parallel, perpendicular or coincident : $x-2 y+3=0$ and $2 x-4 y+5=0$

## - Watch Video Solution

204. Examine which of the pair of lines are intersecting, parallel, perpendicular or coincident : $2 x+3 y+5=0$ and $4 x+6 y+10=0$

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205. Examine which of the pair of lines are intersecting, parallel, perpendicular or coincident : $x-y+1=0$ and $x+y+2=0$
206. Examine which of the pair of lines are intersecting, parallel, perpendicular or coincident : $x-y+2=0$ and $2 x-3 y+5=0$

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207. Two lines passing through the point $(2,3)$ make an angle of $45^{0}$. If the slopeof one of the lines is 2 , find the slope of the other

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208. Two lines passing through the point $(2,3)$ intersect each other at an angle $60^{\circ}$. If slope of one lineis 2 , find the equation of the other line.

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209. Find the slope of the lines which makee an angle of $45^{0}$ with the line $x-2 y=3$

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210. Find the equation of the straight lines passing through $(2,-1)$ and making an angle of $45^{0}$ with the line $6 x+5 y=8$.

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211. Find the equation of the legs of a right isosceles triangle if the equation of its hypotenuse is $x-2 y-3=0$ and the vertex of the right angle is at the point $(1,6)$,

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212. The hypotenuse of a right angled triangle has its ends at the points $(1,3)$ and $(4,1)$. Find the equation of the legs (perpendicular sides) of the triangle.

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213. Find the equation of the straight liens passing through the origin making an angle $45^{0}$ with straight line $\sqrt{3} x+y=11$

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214. Find the equation of the two straight lines through $(1,2)$ forming the two sides of a square of which $4 x+7 y=12$ is one diagonal

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215. A line through the point $P(1,2)$ makes an angle of $60^{\circ}$ with the positive direction of $x$-axis and is rotated about $P$ in the clockwise direction through an angle $15^{0}$. Find the equation of the straight line in the new position.

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216. Find the equation of the straight lines passing through the origin making an angle $\alpha$ with the straight line $y=m x+c$.

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217. A line $x-y+1=0$ cuts the $y$-axis at $A$. This line is rotated about $A$ in the clockwise direction through $75^{\circ}$. Find the equation of the line in the new position (A) $\sqrt{y}+x=\sqrt{3}$ (B) $\sqrt{x}+y=\sqrt{3}$ (C) $x+\sqrt{y}=1$
(D) $\sqrt{x}+y=1$
218. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\frac{1}{3}$, find the slopes of the lines.

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219. Find the equations of the lines which pass through the point $(4,5)$ and make equal angles with the lines $5 x-12 y+6=0$ and $3 x=4 y+7$

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220. If the lines $y=3 x+1$ and $2 y=x+3$ are equally inclined to the liney $=m x+4$, find the value of $m$.

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221. A ray of light passing through the point $P(1,2)$ reflects on the $x$-axis at the point $A$ and the reflected ray passes through the point $Q(5,3)$.Find the
coordinates of the point A .

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222. Let $(2,1),(-3,-2)$ and $(a, b)$ form a triangle. Show that the collection of the points $(a, b)$ form a line for which the triangle is isosceles. Find the equation of that line.

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

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224. Find the equation of the line through $(-2,3)$ parallel to the line $3 x-4 y+2=0$
225. Find the equation of the line through $(-2,-1)$ and parallel to line $x=0$.

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226. Find the equation to the straight line parallel to $3 x-4 y+6=0$ and passing through the middle point of the joint of points (2,3), and (4,-1).

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227. Find the equation to the straight line passing through the point $(2,1)$ and parallel to the line joining to point $(2,3)$ and $(3,-1)$

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228. Find the equation of the straight line which passes through the point $(\alpha, \beta)$ and is parallel to the line $l x+m y+n=0$

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229. Find the equaiton of the line that has $y$-intercept 4 and is parallel to the line $2 x-3 y=7$.

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230. Prove that the line through the point $\left.x_{1}, y_{1}\right)$ and parallel to the line $A x+B y+C=0$ is $A\left(x-x_{1}\right)+B\left(y-y_{1}\right)=0$.

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231. Find the equation of a straight line parallel to $2 x+3+11=0$ and which is such that the sum of its intercepts on the axes is 15 .
232. Find the equation of the line through point $(-2,-1)$ and perpendicular to the line $y=x$.

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233. Find the equation of the straight line passing through the point
$(2,5)$ and perpendicular to the line $2 x+5 y=31$.

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234. Find the equation of a line perpendicular to the line $x-2 y+3=0$ and passing through the point $(1,-2)$.

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235. Find equation of the line perpendicular to the line $x \quad 7 y+5=0$ and having x intercept 3.

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236. Find the equation of a line drawn perpendicular to the line $\frac{x}{4}+\frac{y}{6}=1$ through the point where it meets the $y$ axis.

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237. Find the equation of the straightline perpendicular to the line $7 x+2 y+7=0$ and passing through the origin.

## - Watch Video Solution

238. Find the equation of the straight line through the point $(\alpha, \beta)$ and perpendiculasr to the line $l x+m y+n=0$.
239. Find the equation of the straight line through $(a \cos \theta, b \sin \theta)$ perpendicular to the line $\frac{x}{a \cos \theta}+\frac{y}{b \sin \theta}=1$.

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240. Find the equation to the line through the point $(-4,-3)$ and perpendicular to the line joining the points $(1,3)$ and 2,7$)$.

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241. Find the equation of the perpendicular bisector of the line segment joining the origin and the point $(4,6)$.

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242. The line $y=0$ divides the line joining the points $(3,-5)$ and $(-4,7)$ in the ratio :

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243. Find the equation of the straight line perpendicular to $2 x-3 y=5$ and cutting off an intercept 1 on the positives direction of the $x$-axis.

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244. Find the equation of the straight line through $\left(x_{1}, y_{1}\right)$ perpendicular to the line joining $\left(x_{2}, y_{2}\right)$ and $\left(x_{3}, y_{3}\right)$.

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245. Find the equation of the line that has $y$-intercept -3 and is perpendicular to the line $3 x+5 y=4$.
246. Find the equation of a straight line drawn perpendicular to the line $\frac{x}{a}+\frac{y}{b}=1$ through the point where it meets the $y$-axis.

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247. Find the coordinates of the foot of the perpendicular drawn from the point ( $1,-2$ ) on the line $y=2 x+1$.

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248. Find the coordinates of the foot of the perpendicular from the point $(-1,3)$ to the line $3 x-4 y-16=0$.

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249. Find the projection of the point $(1,0)$ on the line joining the points $` \mathrm{P}(-1,2)$ and $\mathrm{Q}(5,4)$.

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250. Find the image of the point $(1,-2)$ with respect to the line mirror $2 x-y+1=0$

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251. Assuming that straight lines work as the plane mirror for a point, find the image of the point $(1,2)$ in the line $x 3 y+4=0$.

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252. Find the image of the point $(3,8)$ with respect to the line $x+3 y=7$ assuming the line to be a plane mirror.
253. If the image of the point $(2,1)$ with respect to a line mirror be $(5,2)$, find the equation of the mirror.

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254. If $(h, r)$ is the foot of the perpendicular from $\left(x_{1}, y_{1}\right)$ to
$l x+m y+n=0$, prove that $: \frac{x_{1}-h}{l},=\frac{y_{1}-r}{m},=\frac{l x_{1}+m y_{1}+n}{l^{2}+m^{2}}$

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255. Find the equation of the straight line passing through the point $(2,-6)$ and the point of intersection of the lines $5 x-2 y+14=0$ and $2 y=8-7 x$.

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256. Find the equation of the straight line whichpasses through the point $(1,1)$ and the point of intersection of the lines $3 x+2 y=0$ and $x-2 y=0$

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257. Find the equation of the line through the point of intersection of $x+2 y=5$ and $x-3 y=7$ and passing through the point $(0,-1)$

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258. Find the equation of the line through the intersection of $5 x-3 y=1$ and $2 x+3 y-23=0$, and perpendicular to the line whose equation is: $x=0$

## - Watch Video Solution

259. Find the equation of the line through the intersection of $5 x-3 y=1$ and $2 x+3 y-23=0$, and perpendicular to the line whose equation is: $y=0$

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260. Find the equation of the line through the intersection of $5 x 3 y=\backslash 1$ and $2 x+\backslash 3 y \backslash 23 \backslash=\backslash 0$ and perpendicular to the line $5 x \backslash 3 y \backslash 1 \backslash=\backslash 0$.

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261. Find the equation of the line through the intersection of lines $x+2 y 3=0$ and $4 x y+7=0$ and which is parallel to $5 x+4 y 20=0$

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262. Find the equation of line parallel to the $y$-axis and drawn through the point of intersection of $x 7 y+5=0$ and $3 x+y 7=0$.

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263. Find the equation to the straight line which passes through the point of intersection of the straight lines $x+2 y=5$ and $3 x+7 y=17$ and is perpendicular to the straight line $3 x+4 y=10$

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264. Find the equation to the straight line drawn through the point of intersection of $x+2 y+3=0$ and $3 x+4 y+7=0$ and perpendicular to $y-x=8$.

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265. A person standing at the junction (crossing) of two straight paths represented by the equations $2 x-3 y+4=0$ and $3 x+4 y-5=0$ wants to reach the path whose equation is $6 x-7 y+8=0$ in the least time. Find equation of the path that he should follow.

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266. Find the equation of the straight line passing through the point of intersection of $2 x+3 y+1=0 \operatorname{and} 3 x-5 y-5=0$ and equally inclined to the axes.

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267. Find the equation of the straight line which passes through the point of intersection of the lines $3 x-y=5$ and $x+3 y=1$ and makes equal and positive intercepts on the axes.
268. The sides $A B$ and $A D$ of a parallelogram $A B C D$ are $2 x-y+1=0$ and $x+3 y-10=0$ respectively and $C$ is the point $(-1,-2)$. Find the equation of the diagonals $A C$ and $B D$.

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269. Find the equation of the line through the intersection of lines $3 x+4 y=7$ and $x-y+2=0$ and whose slope is 5.

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270. Find the equation of the line through the intersection of the lines $2 x+\backslash 3 y \backslash 4 \backslash=\backslash 0$ and $x \backslash 5 y=\backslash 7$ that has its $x$-intercept equal to $\backslash 4$.

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271. Find the equation of the line passing through the intersection of the lines $4 x+7 y-3=0$ and $2 x-3 y+1=0$ that has equal intercepts on the axes.

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

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273. Prove that the line $x(a+2 b)+y(a-3 b)=a-b$ passes through a fixed point for different values of $a$ and $b$. Also find the fixed point.

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274. Prove that the equation represent a family of lines which pass through a fixed point. Also find the fixed point : $(\gamma-1) x+\gamma y=1-3 \gamma$

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275. Prove that the equation represent a family of lines which pass through a fixed point. Also find the fixed point : (ii) $\gamma x+y=4$

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276. prove that all lines represented by the equation : $(2 \cos \theta+3 \sin \theta) x+(3 \cos \theta-5 \sin \theta) y-(5 \cos \theta-2 \sin \theta)=0$ pass through a fixed point for all values of $\theta$. Find the coordinates of that point.

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277. Examine whether the points $(3,-4)$ and $(2,6)$ are on the same or opposite sides of the line $3 x-4 y=9 ?$

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278. Prove that the point $(2,-1)$ and $(1,1)$ are on the opposite sides of the straight line $3 x+4 y-6=0$.

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279. Find the position of the points $(3,4)$ and $(-1,1)$ with respect to the line $6 x+y-1=0$.

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280. Prove that the points of intersection of the line $x-y=2$ with the parallel lines $2 x+y=7$ and $2 x+y=16$ are on the opposite sides of the line $x+y=5$.

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281. Which one of the points $(1,1),(-1,2)$ and $(2,3)$ lies on the side of the line $4 x+3 y-5=0$ on which the origin lies?

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282. Find the length of the perpendicular from the point $(-3,4)$ to theline $3 x+4 y-5=0$

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283. Find the distance of the point $(3,5)$ from the line $3 x \quad 4 y \quad 26=0$.

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284. Find the distance of the point $P$ from the line $l$ in that : $l: 12 x-7=0 \equiv(3,-1)$

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285. Find the distance of the point $P$ from the line $l$ in that :
$l: 12(x+6)=5(y-2)$ and $\mathrm{P}=(-3,-4)^{\prime}$

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286. Find the distance of the point $P$ from the line $l$ in that :
$l: \frac{x}{a}-\frac{y}{b}=1$ and $P \equiv(b, a)$

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287. Find the distance of the point $P$ from the line $l$ in that : $l: 12(x+6)=5(y-2)$ and $P \equiv(-1,1)$
288. Find the distance of the point of intersection of the lines $2 x+3 y=21$ and $3 x-4 y+11=0$ from the line $8 x+6 y+5=0$

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289. In the triangle $A B C$ with vertices $A(2,3), B(4,1)$ and $C(1,2)$, find the equation and length of altitude from the vertex $A$.

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290. What are the points on $x$-axis whose perpendicular distance from the line $4 x+3 y=12$ is 4 ?

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291. What are the points on the yaxis whose distance from the line $\frac{x}{3}+\frac{y}{4}=1$ is 4 units.

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292. Find the points on $y-a \xi s$ whose perpendicular distance from the line $4 x-3 y-12=0$ is 3 .

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293. Find the length of the perpendicular fdrawn from the origin upon the line joining the points ${ }^{( }(\mathrm{a}, \mathrm{b})$ and $(\mathrm{b}, \mathrm{a})$ ?

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294. Find the length of the perpendicular from the point $4,-7$ ) to the line joining the origin and the point of intersection of the lines
$2 x-3 y+14=0$ and $5 x+4 y-7=0$.

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295. Find the equation of two straight lines which are parallel to $x+7 y+2=0$ and at unit distance from the point $(1,-1)$.

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

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297. The equations of two lines through ( $0, a$ ), which are at distance 'a' units from the point (2a, 2a) are
298. Find the equation of the line through the point of intersection of, the lines $x-3 y+1=0$ and $2 x+5 y-9-0$ and whose distance from the origin is $\sqrt{5}$

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299. Find the equation of the straight line passing through the point of intersection of the lines $x-y+1=0$ and $2 x-3 y+5=0$ and at a distance $\frac{7}{5}$ from the point $(3,2)$

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300. If the length of the perpendicular from the point $(1,1)$ to the line $a x-b y+c=0$ be, show that $\frac{1}{c}+\frac{1}{a}-\frac{1}{b}=\frac{c}{2 a b}$

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301. Find perpendicular distance from the origin of the line joining the points $(\cos \theta, \sin \theta)$ and $(\cos \varphi, \sin \varphi)$.

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302. If $p$ and $p_{1}$ be the lengths of the perpendiculars drawn from the origin upon the straight lines $x \sin \theta+y \cos \theta=\frac{1}{2} a \sin 2 \theta$ and $x \cos \theta-y \sin \theta=a \cos 2 \theta, \quad$ prove that $4 p^{2}+p^{2}{ }_{-} 1=a^{2}$.

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303. Prove that the perpendicular distance between the lines $4 x+3 y=11$ and $8 x+6 y=15$ is $\frac{7}{10}$.

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304. Find the distance between the parallel lines $3 x 4 y+7=0$ and $3 x 4 y+5=0$.

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305. If sum of the perpendicular distances of a variable point $P(x, y)$ from the lines $x+y 5=0$ and $3 x 2 y+7=0$ is always 10 . Show that P must move on a line.

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306. Determine the distance between the pair of parallel lines : $4 x-3 y-9=0$ and $4 x-3 y-24=0$

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307. Find the distance between parallel lines (i) $15 x+8 y 34=0$ and $15 x+8 y+31=0$ (ii) $|(x+y)+p=0|(x+y) \quad r=0$.

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308. Find the distance between the parallel lines $3 x 4 y+7=0$ and $3 x 4 y+5=0$.

## - Watch Video Solution

309. Find the distance between parallel lines
$15 x+8 y 34=0$ and $15 x+8 y+31=0$
(ii) $|(x+y)+p=0|(x+y) \quad r=0$.

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310. Prove that the lines $2 x+3 y=19$ and $2 x+3 y+7=0$ are equidistant from the line $2 x+3 y=6$.

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311. Find the equation of the line midway between the parallel lines
$9 x+6 y-7=0$ and $3 \mathrm{x}+2 \mathrm{y}+6=0{ }^{`}$

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312. Find the distance between the lines $y=x m+c$ and $y=m x+d$.

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313. If two sides of a square are along $5 x-12 y+26=0$ and $5 x-12 y-65=0$ then find its area.
314. The equations of two sides of a square whose area is 25 sq.units are $3-4 y=0$ and $4 x+3 y=0$. The equation of the other two sides of the square are

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315. Prove that the diagonals of the parallelogram formed by the lines $\sqrt{3} x+y=0, \sqrt{3} y+x=0, \sqrt{3} x+y=1$ and $\sqrt{3} y+x=1 \quad$ are at right angles.

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316. Prove that the diagonals of the parallelogram formed by the four lines $3 x+y=0,3 y+x=0,3 x+y=4,3 y+x=4$ are at right angles.
317. The equation of one side of a rectangle is $3 x-4 y-10=0$ and the coordinates of two of its vertices are $(-2,1)$ and $(2,4)$. Find the area of the rectangle and the equation of that diagonal of the rectangle which passes through the point $(2,4)$.

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318. Area of the rhombus bounded by the four lines, $a x \pm b y \pm c=0$ is

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319. Prove that the product of the length of the perpendiculars from the points $\left(\sqrt{a^{2}-b^{2}}, 0\right)$ and $\left(-\sqrt{a^{2}-b^{2}}, 0\right)$ to the line $\frac{x}{a} \cos \theta+\frac{y}{a} \cos \theta+\frac{y}{b} \sin \theta=1$ is

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