MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

STRAIGHT LINES

Solved Example

1. Find the distance the points, $(2, -3)$ and $(-6, 3)$

A. 15 units

B. 5 units

C. 10 units

D. 9 units

Answer: C

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2. Using the distance formula, prove that the points $A(-2, 3), B(1, 2)$ and $C(7, 0)$ are collinear.

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3. Prove that the points (0,5), (-2,-2),(5,0) and (7,7) are the vertices of a rhombus

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4. Find the area of the triangle whose vertices are $A(4, 4), B(3, -16)$ and $C(3, -2)$

A. $9 sq.\ units$

B. $7 sq.\ units$

C. $5 sq.\ units$

D. $4sq.\ units$

Answer: B

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5. Find the coordinates of the point which divides the line segment joining the points $A(5, -2)$ and $B(9, 6)$ in the ratio $3:1$

A. $(8, 4)$

B. $(2, 4)$

C. $(7, -4)$

D. $(7, 5)$

Answer: A

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6. Find the coordinates of the midpoint of the ilne segment joining the points, $A(-2, -5)$ and $B(3, -1)$

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7. In what ratio, the line joining $(-1, 1) and (5, 7)$ is divided by the line $x + y = 4$?

A. $2:7$

B. $1:3$

C. $1:2$

D. $3:2$

Answer: C

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8. Reduce the equation $\sqrt{3}y + y + 2 = 0$ to

(i) slope-intercept form and final the slope and y-intercept.

(ii) intercepts form and find the intercepts on the axes.

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9. Reduce the equation $3x - 2y + 4 = 0$ to intercepts form and find the length of the segment intercept the axes.

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10. Reduce the equation $\sqrt{3} + y + 2 = 0$ to the normal form $x\cos\alpha + y\sin\alpha = p$, and hence find the value of α and p.

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11. Reduce the equation $\sqrt{3}+y+2=0$ to the normal form $x\cos\alpha+y\sin\alpha=p$, and hence find the value of α and p.

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12. Reduce the equation y+4=0 to the normal form $x\cos alhpha+y\sin\alpha=p$ and hence find the values of α and p.

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13. Find the distance of the point (4,1) from the line $3x-4y+12=0$

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14. Find the distance of the point (-1,1) and the given line is $12x-5y+82=0$

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15. Find the length of the perpendicular from the point (a,b) to the line $\frac{x}{a}+\frac{y}{b}=1$

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16. Find the length of the perpendicular from the origin to the line 4x+3y-2=0

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17. 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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18. Find the perpendicular distance of line joining the points $A(\cos\theta, \sin\theta) B(\cos\phi, \sin\phi)$ from the origin

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19. If p_1 and p_2 are the lengths of the perpendicular form the orgin to the line $x\sec\theta + y\cos ec\theta = a$ and $x\cos\theta - y\sin\theta = a\cos 2\theta$ respectively then prove that $4p_1^2 + p_2^2 = a^2$

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20. What are the points on the y-axis whose perpendicular distance from the line $\frac{x}{3} - \frac{y}{4} = 1$ is 3 units

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21. Find the distance between the parallel line 15x+8y-34=0 and 15x+8y+31=0.

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22. Find the distance between the line $3x - 4y + 9 = 0$ and $6x - 8y - 17 = 0$

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23. Prove that the line 5x-2y-1=0 is midpoint to the line $5x - 2y - 9 = 0$ and $5x - 2y + 7 = 0$

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24. Find the equation of the line midway between the parallel lines $9x + 6y - 7 = 0$ and 3x+2y+6=0`

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25. Find the coordinates of a point on $x + y + 3 = 0$, whose distance from $x + 2y + 2 = 0$ is $\sqrt{5}$.

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26. If the given be shifted to the point (2,-3) by a translation of coordinate axes, find the new coordinates of the point (4,7).

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27. If the origin is shifted to the point (2,3) the coordinates of a point become (5,-4). Find the original coordinates, which the axes are parallel.

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28. The coordinates of the point $(4, 5)$ in the new system, when its origin is shifted to $(3, 7)$ are

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29. Find the transformed equation of the straight line $2x\ 3y + \ 5\ = \ 0$, when the origin is shifted to the point $(3, \ 1)$ after translation of axes.

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30. Find the point to which the origin should be shifted after a translation of axes so that the following equations will have no first degree term: $y^2 + x^2 - 4x - 8y + 3 = 0$

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31. Find the equation of the line drawn through the point interseciton of the line 4x-3y+7=0 and 2x+3y+5=0 and passing through the point (-4,5).

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

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33. Find the equation of the line through the intersection of lines $x + 2y\,3 = 0$and $4xy + 7 = 0$ and which is parallel to $5x + 4y20 = 0$

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34. Find the equation of the line through the intersection of the lines 3x+y-9=0 and 4x+3y-7=0 and which is perpendicular to the line 5x-4y+1=0.

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

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

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Example

1. Find the slope of the lines whose iclination is given :

$(i)45^\circ \ (ii)60^\circ \ (iii)120^\circ$

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2. What is the inclination of a line whose slope is

A. zero

B. positive

C. negative?

D. not defined?

Answer: D

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3. Find the slope of the line passing through the points

$(i)(-2, 3)$ and $(8, -5)$ $(ii)(4, -3)$ and $(6, -3)$ $(ii)(3, -1)$ and

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4. If the slope of the line passing through the points (2,5) and (x,3) is 2. find the value of x.

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5. Find the value of x so that the inclination of the line joining the points $(x, -3)$ and $(2, 5)$ is 135°

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6. Find the angle between the X-axis and the line joining the points $(3, -1) and (4, -2)$.

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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 joining (2,-5) and (-2, 5) is perpendicular to the line joining (6,3) and (1,1).

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9. 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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10. Without using Pythagoras theorem, show that $A(4, 4),\ B(3, 5) and\ C(-1, -1)$ are the vertices of a right angled

triangle.

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11. Prove that the points $(5, 1), (1, -1) and (11, 4)$ are collinear. Also find the equation of the straight line on which these points lie.

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

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13. If $(h, 0), (a, b)$ and $(0, k)$ lie on a line, show that $\frac{a}{h} + \frac{b}{k} = 1$

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14. By using the concept of slope, show that the points (-2,-10, (4,0), (3,3) and (-3,2) are the vertices f a parallelogram.

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15. 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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16. Find the angle between the lines whose slope are $\frac{1}{2}$ and 3.

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17. If A(-2,1),B(2,3) and C(-2,-4) be the vertices of a $\triangle ABC$, show that $\tan B = \frac{2}{3}$

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18. 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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19. Write down the equation of the following lines: $x - a\xi s$

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

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

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

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21. Write down the equation of a line parallel to the y-axis

(i) at a distance of 7 units on left-hand side of the y=-axis

(ii) at a distance of 3 on right-hand side of the y-axis.

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22. Find the equations of a line parallel to the axes and passing through the point (-3,5).

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

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24. Find the equations of aline which is equidistant from the liines x=-3 and x=5.

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25. Find the equation of a line passing through the point (4,-3) and having slope 2.

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

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27. Find the equation of a line passsing through the point (3,-4) and parallel to the x-axis.

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28. Find the equation of a line passing through the points (-1,1) and (2,-4)

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

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

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

D. $5x + 6y + 2 = 0$

Answer: C

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29. Show that the three points (3,0),(-2,-2) and (8,2) are collinear. Also, find the equation of the straight line on which these points lie.

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30. Show that the points (a,0),(0,b) and (3a,-2b) are collinear. Also, find the equation of line containing them.

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31. find the equations of the sides of the triangle whose vertices are $(-1, 8), (4, 2)$ and $(-5, -3)$. Also find the equation the median through $(-1, -8)$

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32. Find the equation of the medians of the triangle ABC whose vertices are $A(2, 5) B(-4, 9) and\ C(-2, -1)$.

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33. Find the equation of the perpendicular bisector of the line segment joining the points $A(2, 3)$ and $B(6, -5)$

A. $x - 2y - 6 = 0$

B. $3x - 2y - 6 = 0$

C. $x + 2y + 6 = 0$

D. $x + 2y - 6 = 0$

Answer: A

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34. A(2,3) , B(-2,1) and C(4,-3) are the vertices of ΔABC. Find the slope of (i) side AB (ii) altitude through A (iii) median through A (iv) perpendicular bisector of AB.

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35. Find the equation of the bisector of $\angle Aof \triangle ABC$, whose vertices are $A(-2,4), B(5,5)$ and $C(4,-2)$.

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36. Find the equation of a line whose slope is $\frac{1}{2}$ and y-intercept equal to $\frac{-5}{4}$

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37. Find the equation of the line which intersects the y-axis at a distance of 2 units above the origin and makes an angle of 30^0 with the positive direction of the x-axis.

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38. Find the equation of a straight line which cuts off an intercept of 5 units on negative direction of y-axis and makes an angle 120^0 with the positive direction of x-axis.

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39. Find the equation of a line for which $\tan\theta = \frac{1}{3}$ and x-intercept equal to 5 units.

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40. Find the equation of a straight line: with slope -2 and intersecting the x-axis at a distance of 3 units to the left of origin.

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41. Reduce the equation $6x + 3y - 5 = 0$ to the slope-intercept form and find its slope and y-intercept.

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42. Prove that the line $x + 2y - 9 = 0$ and $2x + 4y + 5 = 0$ are parallel.

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43. Show that the line $27x - 18y + 25 = 0$ and $2x + 3y + 7 = 0$ are perpendicular to each other.

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44. Find the angle made by the line $x + \sqrt{3}y - 6 = 0$ with the positive direction of the x-axis.

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45. Find the angle made by the line $x \cos 30^\circ + y \sin 30^\circ + \sin 120^\circ = 0$ with the positive direction of the x-axis.

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

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47. Show that the lines $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$, where $b_1, b_2 \neq 0$ are (i) paralle

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48. Find the equation of the line passing through the point (2,-5) and parallel to the line 2x-3y=7.

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49. Find the tion of the line passing through the point $(-2, -4)$and perpendicular to the line $3x - y + 5 = 0$

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50. Find the equation of the line y-intercept is -3 and which is perpendicular to the line $3x - 2y + 5 = 0$

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

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

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53. Find the equation of a line which is at a distance of 5 units from origin and the perpendicular from origin to this line makes an angle of 30° from the positive direction of X-axis.

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54. Find the equation of the line whose perpendicular distance from the origin is 3 units and the angle between the positive direction of x-axis and the perpendicular is 15°.

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55. Find the equation of a line whose perpendicular disatnce from the origin is $\sqrt{8}$ units and the angle between the positive direction of the x-axis and the perpendicular is 135° .

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56. Find the equation of a line whose perpendicular distance from the origin is 2 units and the angle between the perpendicular segment and the positive of the x-axis is 240°.

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Solved Example

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

A. $3x - 2y - 12 = 0$

B. $5x - y - 6 = 0$

C. $5x - 2y - 6 = 0$

D. $2x + 3y - 6 = 0$

Answer: D

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2. 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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3. 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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4. P (a, b) is the midpoint of a line segment between axes. Show that equation of the line is $\frac{x}{a}+\frac{y}{b}=2$.

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5. Find the equation of a line which passes through the point (-3,7) and makes intercepts on the axes, equal in magnitude but opposite in sign.

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6. Find the intercepts cut off the line $2x-y+16=0$ on the coordintate axes.

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

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8. Find the equation of the line so that the segment intercept between the axes is divided by the point P(5,-4) in the ratio 1:2

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

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11. Find the area of triangle formed by the line $ax + by = 2ab$ and the co-ordinate axes.

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12. The area of the triangle formed by the coordinates axes and a line is 6 $square$ units and the length of the hypotenuse is $5units$. Find the equation of the line.

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Miscellaneous Problems

1. Find the point of intersection of the line $5x + 7y = 3$ and $2x - 3y = 7$

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2. Find the equation of the line parallel to the y-axis and drawn through the point of intersection of the lines $x - 7y + 15 = 0$ and $2x + y = 0$.

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3. Find the equation of the line passing through the intersection of the lines $x + 2y + 3 = 0$ and $3x + 4y + 7 = 0$, and parallel to the lie y-x=8

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4. Find the value of k for which the lines $3x + y = 2, kx + 2y = 3$ and $2x - y = 3$ may interested at a point.

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5. Show that the lines x-y=6, 4x-4y=20 and 6x+5y+8=0 are concurrent. Also find the point of intersection.

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6. If three lines whose equations are $y = m_1x + c_1, y = m_2x + c_2$and $y = m_3x + c_3$are concurrent, then show that $m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0.$

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

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8. Show that the area of the triangle formed by the lines $y = m_1x + c_1, y = m_2x + c_2$and $x = 0$is $\frac{(c_1 - c_2)^2}{2|m_1 - m_2|}$

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9. Find the image of the point $(3, 8)$with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.

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Exercise 20 A

1. Find the distance between the points $(0, -3)$ and $(3, 0)$

A. A(2,-3) and B(-6,3)

B. C(-1,1) and D(8,11)

C. P(-8,-3) and Q(-2,-5)

D. R(a+,a-b) and S(a-b,a+b)

Answer: A::B

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2. Find the distance of the point $(6, -6)$ from the origin

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3. If a point $P(x, y)$ is equidistant from the points $A(6. -1)$ and $B(2, 3)$ relation between x and y.

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4. Find a point on the x-axis which is equidistant from the points $(7, 6)$ and $(-3, 4)$.

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5. Find the distance between $P(x_1, y_1) and\, Q(x_2, y_2)$ when i. PQ is parallel to the y-axis ii. PQ is parallel to the x-axis.

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6. A is a point on the x-axis with abscissa -8 and B is a point on the y-axis with ordinate 15. Find the distance AB.

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7. Find a point on the y-axis which is equidistant from A(-4, 3) and B(5, 2).

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8. Using the distance formula, show that the points A(3, -2), B(5, 2) and C(8, 8) are collinear.

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9. Show that the points A(7, 10), B(-2, 5) and C(3, -4) are the vertices of an isosceles right-angled triangle.

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10. Show that the points A(1, 1), B(-1, -1) and $C\left(-\sqrt{3}, \sqrt{3}\right)$ are the vertices of an equilateral triangle each of whose sides is $2\sqrt{2}$ units.

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11. Show that the points A(2,-2), B(8, 4), C(5,7) and D(-1, 1) are the angular points of a rectangle.

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12. Show that A(3, 2), B(0, 5), C(-3, 2) and D(0, -1) are the vertices of a square.

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13. Show that the points $A(1, -2)$, $B(3, 6)$, $C(5, 10)$ and $D(3, 2)$ are the vertices of a parallelogram.

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14. Show that the points A(2, -1), B(3, 4), C(-2, 3) and D(-3, -2) are the vertices of a rhombus.

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15. If the points $(-2, -1)$, $(1, 0)$, $(x, 3)$ and $(1, y)$ form a parallelogram, find the values of x and y.

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16. Find the area of $\triangle ABC$ whose vertices are A(-3, -5), B(5,2) and C(-9,-3).

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17. Show that the points A(-5, 1), B(5, 5) and C(10, 7) are collinear.

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18. Find the value of k for which the points A(-2, 3), B(1, 2) and C(k, 0) are collinear.

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19. Find the area of the quadrilateral whose vertices are A(-4,5), B(0,7), C(5,-5) and D(-4,-2).

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20. Find the area of $\triangle ABC$, the midpoints of whose sides AB, BC and CA are D(3,-1), E(5, 3) and F(1,-3) respectively.

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21. Find the coordinates of the point which divides the join of A(-5,11) and B(4,-7) in the ratio 2:7.

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22. Find the ratio in which the x-axis cuts the join of the points A(4,5) and B(-10,-2). Also, find the point of intersection.

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23. In what ratio is the line segment joining the points A(-4,2) and B(8,3) divided by the y-axis? Also, find the point of intersection.

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Exercise 20 B

1. Find the angle of inclination of the line whose slope is $(i)\frac{1}{\sqrt{3}}$, $(ii)-\sqrt{3}$.

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2. Find the slope of the lines whose iclination is given :

$(i)45^\circ\ (ii)60^\circ\ (iii)120^\circ$

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3. Find the slope of a line which passes through the points

(i)(0,0)and (4,-2) (ii)(0,-3) and (2,1)

(iii)(2,5)and (-4,-4) (iv)(-2,3)and (4,-6)

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4. If the slope of the line joining the points A(x,2) and B(6,-8) is find the value of x.

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

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6. 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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7. Show that the line through the points (-2, 6) and (4, 8) is perpendicular to the line through the points (3,-3) and (5,-9).

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8. If A(2, -5), B(-2, 5), C(x, 3) and D(1, 1) be four points such that AB and CD are perpendicular to each other, find the value of x.

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9. Without using Pythagoras's theorem, show that the points A(1, 2), B(4, 5) and C(6, 3) are the vertices of a right-angled triangle.

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10. Using slopes, show that the points A(6, -1), B(5, 0) and C(2, 3) are collinear.

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11. Using slopes, find the value of x for which the points A(5, 1), B(1,-1) and C(x-4) are collinear.

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12. Show that the points $(-4, -1)$, $(-2, -4)$, $(4, 0)$ and $(2, 3)$ are the vertices points of a rectangle.

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13. Prove that the points $(-2, -1), (1, 0), (4, 3),$ and (1,2) are the vertices of a parallelogram. Is it a rectangle?

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14. Three points $P(h, k), Q(x_1, y_1)$and $R(x_2, y_2)$lie on a line. Show that $(h - x_1)(y_2 - y_1) = (k - y_1)(x_2 - x_1)$.

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15. 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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16. A line passes through the points A(4, -6) and B(-2,-5). Show that the line AB makes an obtuse angle with the x-axis.

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17. The vertices of a quadrilateral are A(-4, 2), B(2, 6), C(8, 5) and D(9,-7). Using slopes, show that the midpoints of the sides of the quad. ABCD

form a parallelogram.

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18. Find the slope of the line, which makes an angle of $30o$ with the positive direction of yaxis measured anticlockwise.

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19. Find the angle between the lines whose slopes are $\sqrt{3}$ and $\frac{1}{\sqrt{3}}$.

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20. Find the angle between the lines whose slopes are $(2-\sqrt{3})$ and $(2+\sqrt{3})$.

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21. If A(1, 2), B(-3, 2) and C(3, -2) be the vertices of a A ABC, show that

$\tan A = 2 \quad \tan B = \frac{2}{3} \quad (iii)\tan C = \frac{4}{7}$

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22. If θ is the angle between the lines joining the points A(0, 0) and B(2, 3), and the points C(2,-2) and D(3,5), show that $\tan\theta = \frac{11}{23}$

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23. If θ is the angle between the diagonals of a parallelogram $ABCD$ whose vertices are $A(0, 2), B(2, -1), C(4, 0)$ and $D(2, 3)$. Show that $\tan\theta = 2.$

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24. Show that the points A(0, 6), B(2, 1) and C(7, 3) are three corners of a square ABCD. Find (i) the slope of the diagonal BD and (i) the coordinates of the fourth vertex D.

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25. A(1, 1), B(7, 3) and C(3, 6) are the vertices of a $\triangle ABC$. If D is the midpoint of BC and AL BC, find the slopes of (i) AD and (ii) AL.

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Exercise 20 C

1. Find the equation of a line parallel to the x-axis ata distance of

(i) 4 units above it (ii) 5 units below it.

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2. Find the equation of a line parallel to the y-axis at a distance of

(i)6 units to its right (ii) 3 units to its left.

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3. Find the equation of a line parallel to the x-axis and having intercept-3

on the y-axis

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4. Find the equation of a horizontal line passing through the point (4,-2).

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5. Find the equation of a vertical line passing through the point (-5,6).

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6. Find the equation of a line which is equidistant from the lines x=-2 and x=6.

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7. Find the equation of a line which is equidistant from the lines y=8 and y=-2

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8. Find the equation of a line

(i) whose slope is 4 and which passes through the point (5, -7),

(ii) whose slope is -3 and which passes through the point (-2, 3),

(iii) which makes an angle of $\left(\frac{2\pi}{3}\right)$ with the positive direction of the x-axis and passes through the point (0, 2).

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9. Find the equation of a line whose inclination with the x-axis is 30° and which passes through the point (0, 5).

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10. Find the equation of a line whose inclination with the x-axis is 150° and which passes through the point (3, -5).

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11. Find the equation of a line passing through the origin and making an angle of 120° with the positive direction of the x-axis.

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12. Find the equation of a line which cuts off intercept 5 on the x-axis and makes an angle of 60° with the positive direction of the x-axis.

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13. Find the equation of the line passing through the point P(4, -5) and parallel to the line joining the points A(3, 7) and B(-2, 4).

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14. Find the equation of the line passing through the point P(-3,5) and perpendicular to the line passing through the points A(2, 5) and B(-3, 6).

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15. Find the slope and the equation of the line passing through the points:

(i)(3,-2) and (-5,-7) (ii)(-1,1) and (2,-4)

(5,3) and (-5,-3) (iv) (a,b) and (-a,b)

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16. Find the angle which the line joining the points $(1, \sqrt{3})$ and $(\sqrt{2}, \sqrt{6})$ makes with the x-axis.

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17. Prove that the points A(1, 4), B(3, -2) and C(4, -5) are collinear. Also find the equation of the line on which these points lie.

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18. If A(0, 0), B(2, 4) and C(6, 4) are the vertices of a $\triangle ABC$, find the equations of its sides.

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

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20. Find the equation of the perpendicular bisector of the line segment whose end points are A(10, 4) and B(-4,9)

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21. Find the equations of the altitudes of a $\triangle ABC$, whose vertices are A(2,-2), B(1,1) and C(-1,0).

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22. If A(4, 3), B(0, 0) and C(2, 3) are the vertices of a $\triangle ABC$, find the equation of the bisector of $\angle A$.

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23. The midpoints of the sides BC, CA and AB of a $\triangle ABC$ are D(2,1), E(-5,7)and F-5, -5) respectively. Find the equations of the sides of $\triangle ABC$.

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24. If A(1, 4), B(2, 3) and C(-1,-2) are the vertices of a $\triangle ABC$, find the equation of

(i) the median through A

(ii) the altitude through A

(iii) the perpendicular bisector of BC.

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Exercise 20 D

1. Find the equation of the line whose

(i) slope=3 and y-intercept=5

(ii) slope=-1 and y-intercept=4

(iii) slope $=-\frac{2}{5}$ and y-intercept=-3

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2. Find eqn of line which cut off an intercept of 4 units on the x- axis and makes an angle of 30° with positive direction of y- axis.

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3. Find the equation of the line whose inclination is $\frac{5\pi}{6}$ and which makes an intercept of 6 units on the negative direction of the y-axis.

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4. Find the equation of the line cutting off an intercept-2 from the y-axis and equally inclined to the axes.

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

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6. Find the equation of the line through the point (-1,5) and making an intercept of -2 on the y-axis.

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7. Find the equation of the line which is parallel to the line 2x-3y=8 and whose y-intercpt is 5 units.

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8. Find the equation of the line passing through the point (0, 3) and perpendicular to the line x-2y+5=0.

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9. Find the equation of the line passing through the point (2, 3) and perpendicular to the line 4x+3y=10.

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10. Find the equation of the line passing through the point (2, 4) and perpendicular to the x-axis.

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11. Find the equation of the line that has x-intercept-3 and which is perpendicular to the line 3x+5y=4

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12. Find the equation of the line which is perpendicular to the line $3x+2y=8$ (4,-2) and passes through the midpoint of the line joining the points (6,4) and (4,-2)

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13. Find the equation of the line whose y-intercept is -3 and which is perpendicular to the line joining the points (-2,3) and (4,-5).

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

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Exercise 20 E

1. Find the equation of the line which cuts off intercepts-3 and 5 on the x-axis and y-axis respectively.

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2. Find the equation of the line which cuts off intercepts 4 and -6 on the x-axis and y-axis respectively.

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3. Find the equation of the line that cuts off equal intercepts on the coordinate axes and passes through the point (4,7).

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4. Find the equation of the line which passes through the point (3, -5) and cuts off intercepts on the axes which are equal in magnitude but opposite in sign.

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

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6. Find the equation of the line which passes through the point (22,-6) and whose intercept on the x-axis exceeds the intercept on the y-axis by 5.

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7. Find the equation of the line whose portion intercepted between the axes is bisected at the point (3,-2)

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8. Find the equation of the line whose portion intercepted between the coordinate axes is divided at the point (5, 6) in the ratio 3:1.

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9. A straight line passes through the point (-5,2) and the portion of the line intercepted between the axes is divided at this point in the ratio 2:3.

Find the equation of the line.

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10. If the straight line $\frac{x}{a}+\frac{y}{b}=1$ passes through the points (8,9) and (12,-15) find the values of a and b.

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Exercise 20 F

1. Find the equation of the line for which

$(i) p=3$ and $\alpha=45^{\circ}$ (ii) $p=5$ and $\alpha=135^{\circ}$

(iii) $p=8 \alpha=150^{\circ}$ (iv) $p=3$ and $\alpha=225^{\circ}$

(v) $p=2$ and $\alpha=300^{\circ}$ (vi) $p=4$ and $\alpha=180^{\circ}$

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2. The length of the perpendicular segment from the origin to a line is 2 units and the inclination of this perpendicular is α such that $\sin \alpha = \frac{1}{3}$ and α is acute. Find the equation of the line.

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3. Find the equation of the line which is ata distance of 3 units from the origin such that $\tan \alpha = \frac{5}{12}$, where α is the acute angle which this perpendicular makes with the positive direction of the x-axis.

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Exercise 20 G

1. Reduce the equation 2x-3y-5=0 to slope-intercept form, and find from it the slope and y-intercept

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2. Reduce the equation $5x+7y-35=0$ to slope-intercept form, and hence find the slope and the y-intercept of the line

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3. Reduce the equation $y+5=0$ to slope-intercept form, and hence find the slope and the y-intercept of the line.

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4. Reduce the equation $3x-4y+12=0$ to intercepts form. Hence, find the length of the portion of the line intercepted between the axes.

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5. Reduce the equation $5x-12y=60$ to intercepts form. Hence, find the length of the portion of the line intercepted between the axes.

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6. Find the inclination of the line (i)$x + \sqrt{3}y + 6 = 0$ (ii) $3x + 3y + 8 = 0$ (iii)$\sqrt{3}x - y - 4 = 0$

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7. Reduce the equation $x + y - \sqrt{2} = 0$ to the normal form $x\cos\alpha + y\sin\alpha = p$, and hence find the values of α and p.

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8. Reduce the equation $x + \sqrt{3}y - 4 = 0$ to the normal form $x\cos\alpha + y\sin\alpha = p$, and hence find the values of α and p.

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9. Reduce each of the followringequations to normal form:

(i)x+y-2=0 (ii) $x + y + \sqrt{2} = 0$ (iii)x+5=0 (iv)2y-3=0 (v)4x+3y-9=0

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Exercise 20 H

1. Find the distance of the point (3,-5) from the line 3x-4y=27.

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2. Find the distance of the point (-2,3) from the line 12x=5y+13.

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3. Find the distance of the point (-4,3) from the line 4(x+5)=3(y-6)

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4. Find the distance of the point (2, 3) from the line y=4.

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5. Find the distance of the point (4, 2) from the line joining the points (4, 1) and (2,3).

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6. Find the length of perpendicular from the origin to each of the following (i)7x+24y=50 (ii)4x+3y=9 (iii)x=4

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7. Prove that the product of the lengths of the perpendiculars drawn from the points $\left(\sqrt{a^2-b^2}, 0\right)$ and $\left(-\sqrt{a^2-b^2}, 0\right)$ to the line $\frac{x}{a}\cos\theta+\frac{y}{b}$

$\sin\theta = 1$is b^2.

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8. Find the values of k for which the length of perpendicular from the point (4,1) on the line 3x-4y+ k=0 is 2 units

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9. Show that the length of perpendicular from the point (7, 0) to the line 5x+12y-9=0is double the length of perpendicular to it from the point (2,1).

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10. The points A(2,3), B(4,-1) and C(-1,2) are the vertices of A ABC. Find the length of perpendicular from C on AB and hence find the area of $\triangle ABC$.

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11. 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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12. The points on $x+y=4$ that lie at a unit distance from the line $4x+3y-10=$ are

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13. A vertex of a square is at the origin and its one side lies along the line 3x-4y-10=0. Find the area of the square.

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14. Find the distance between the parallel lines 4x-3y+5=0 and 4x-3y=0

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15. Pind the distance between the parallel lines $8x+15y-36=0$ and $8x+15y+32=0$.

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16. Find the distance between the parallel lines $y=mx+c$ and $y=mx+d$.

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17. Find the distance between the parallel lines $p(x+y)+g=0$ and $p(x+y)-r=0$.

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

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19. The perpendicular distance of a line from the origin is 5 units and its slope is -1. Find the equation of the line.

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Exercise 20 I

1. Find the points of interesting of the lines `4x+3y=5 and x=2y-7

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2. Show that the lines x+7y=23 and 5x+2y=16 interest at the point (2,3)

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3. Show that the lines 3x-4y+5=0,7x-8y+5=0 and 4x+5y=45 are concurrent. Also find their point of intersection.

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4. Find the value of k so that the lines 3x-y-2=0, 5x+ky-3=0 and 2x+y-3=0 are concurrent.

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5. Find the image of the point P(1, 2) in the line x-3y+4=0

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6. Find the area of triangle formed by the lines : $x + y - 6 = 0,\ x - 3y - 2 = 0\ and\ 5x - 3y + 2 = 0$

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7. Find the area of the triangle formed by the lines $x=0$, $y=1$ and $2x+y=2$.

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8. Find the area of the triangle, the equations of whose sides are $y=x$, $y=2x$ and $y-3x=4$.

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9. Find the equation of the perpendicular drawn from the origin to the line $4x-3y+5=0$. Also, find the coordinates of the foot of the perpendicular.

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10. Find the equation of the perpendicular drawn from the point $P(-2,3)$ to the line $x-4y+7=0$. Also, find the coordinates of the foot of the

perpendicular.

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11. Find the equations of the medians of a triangle, the equations of whose sides are:

$3x + 2y + 6 = 0,\ 2x - 5y + 4 = 0\ and\ x - 3y - 6 = 0$

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Exercise 20 J

1. If the origin is shifted to the point (1, 2) by a translation of the axes, find the new coordinates of the point (3,-4)

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2. If the origin is shifted to the point (-3,-2) by a translation of the axes, find the new coordinates of the point (3,-5).

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3. If the origin is shifted to the point (0,-2) by a translation of the axes, the coordinates of a point become (3, 2). Find the original coordinates of the point.

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4. If the origin is shifted to the point (2,-1) by a translation of the axes, the coordinates of a point become (-3,5). Find the original coordinates of the point.

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5. At what point must the origin be shifted, if the coordinates of a point (4, 2) become (3,-2)?

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6. The equation $x^2 + xy - 3x - y + 2 = 0$ beome when the origin is shifted to the point $(1, 1)$ is

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7. Find what the following equation become when the origin is shifted to the point (1,1): $xy - y^2 - x + y = 0$

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8. Find what the following equation become when the origin is shifted to the point (1,1): $x^2 - y^2 - 2x + 2y = 0$

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9. Find what the following equation become when the origin is shifted to the point (1,1): $xy - x - y + 1 = 0$

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10. Transform the equation $2x^2 + y^2 - 4x + 4y = 0$ to parallel axes when the origin is shifted to the point (1,-2)

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Exercise 20 K

1. Find the equation of the line drawn through the point of intersection of the lines $x - 2y + 3 = 0$ and $2x - 3y + 4 = 0$ and passing through the point (4,-5).

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2. Find the equation of the line drawn through the point of intersection of the lines $x - y = 7$ and $2x + y = 2$ and passing through the origin.

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3. Find the equation of the line drawn through the point of intersection of the lines x+y=9 and 2x-3y+7=0 and whose slope is $\frac{-2}{3}$

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4. Find the equation of the line drawn through the point of intersection of the lines x-y=1 and 2x-3y+1=0 and which is parallel to the line 3x+4y=12

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5. Find the equation of the line through the intersection of the lines $5x-3y=1$ and $2x+3y=23$ and which is perpendicular to the line $5x-3y=1$

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6. Find the equation of the line through the intersection of the lines $2x-3y=0$ and $4x-5y=2$ and which is perpendicular to the line $x+2y+1=0$.

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

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8. Find the equation of the line through the intersection of the lines $2x-3y+1=0$ and $x+y-2=0$ and drawn parallel to y-axis.

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9. Find the equation of the line through the intersection of the lines $2x+3y-2=0$ and $x-2y+1=0$ and having x-intercept equal to 3.

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

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