MATHS

BOOKS - MODERN PUBLISHERS MATHS (HINGLISH)

STRAIGHT LINES

Example

1. Plot the points $(2, 3), (-2, 3), (-2, -3)$ and $(2, -3)$ on graph. Join these points. name the figure so obtained.

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2. If three vertices of a rectangle are $(0, 0)$, $(2, 0)$ and $(0, 3)$`, find the coordinates of the fourth vertex.
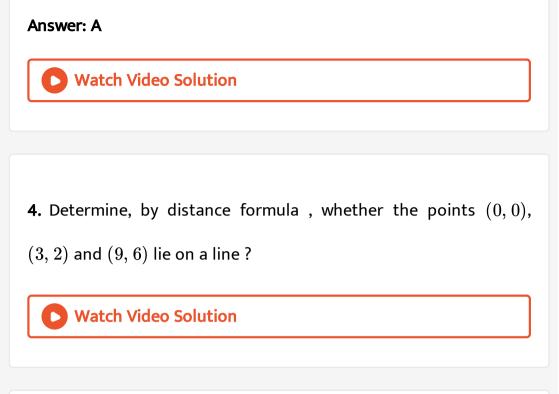
A. $(2, 3)$

B. $(2, 4)$

C. $(3, 3)$

D. None

Answer: A

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3. Find the distance between the pair of points $(5, -12)$ and $(9, -9)$.

A. 5

B. 4

C. 12

D. None

Answer: A

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4. Determine, by distance formula , whether the points $(0, 0)$, $(3, 2)$ and $(9, 6)$ lie on a line ?

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5. The points $(8, 2)$, $(5, -3)$ and $(0, 0)$ are the vertices of a/an

    A. Isosceles Triangle

    B. Equilateral Triangle

    C. Right Angled Triangle

    D. None

Answer: A

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6. The points $(4, 4), (3, 5)$ and $(-1, -1)$ are the vertices of

    A. a right angled triangle.

    B. equilateral triangle.

    C. isosceles triangle

    D. None

Answer: A

7. If two points are $A(x_1, y_1)$ and $B(x_2, y_2)$, then the co-ordinates of the point P, which divides the line segment in the ratio $m_1 : m_2$ (internally), are given by :

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$$

Find the co-ordinates of the point P, which divides

(i) internally

(ii) externally

the line joining $(1, -3)$ and $(-3, 9)$ in the ratio $1 : 3$.

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8. The vertices of a quadrilateral are at $(-2, 4), (1, 5), (4, 3)$ and $(1, 2)$. Show that this quadrilateral is a parallelogram

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9. Find the centroid of the triangle with vertices at $(-1, 0)$, $(5, -2)$ and $(8, 2)$

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10. The incentre of the triangle whose vertices are (-36, 7), (20, 7) and (0, -8) is

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11. Find the area of the triangle whose vertices are (3,8), (-4,2) and (5, -1).

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12. Show that the following triple of points are collinear :

$(2, 4), (0, 1)$ and $(4, 7)$

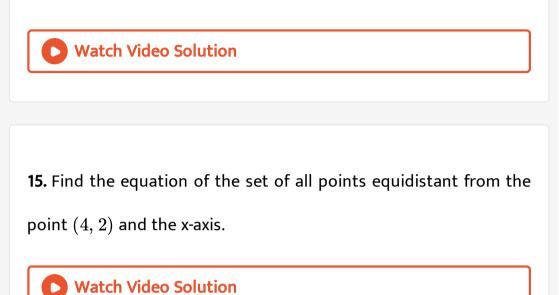**13.** For what value of x will the points $(x, \ -1), \ (2, \ 1)$ and $(4, \ 5)$ lie on a line?

A. 1

B. 2

C. 4

D. 7

Answer: A

14. `Prove that the mid-point of the hypotenuse of a right triangle is equidistant from its vertices.

15. Find the equation of the set of all points equidistant from the point $(4, 2)$ and the x-axis.

16. A point moves so that the sum of its distances from $(ae, 0) and (- ae, 0)$ is $2a,$ prove that the equation to its locus is $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$, where $b^2 = a^2 (1 - e^2).$

17. If $'\alpha'$ is the angle made by the line with positive direction of x-axis , then slope of a line is defined by $m = \tan\alpha$. Based upon this , answer the following :

(i) What acute angle does the line with slope $\dfrac{1}{\sqrt{3}}$ make with the vertical line ?

(ii) what is the inclination of a line whose slope is 1 ?

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18. The slope 'm' of a line is given by : $m = \sqrt{3}$. Find its inclination

A. 0

B. 60

C. 30

D. 45

Answer: B

19. Find the slope of the line passing through the points :

$(3, \ -2)$ and $(7, \ -2)$

A. 0

B. 1

C. 3

D. 4

Answer: A

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

A. 1

B. 2

C. -1

D. 8

Answer: A

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21. State whether the two lines in the following problems are parallel, perpendicular or neither parallel nor perpendicular :

(i) Through $(5, 6)$ and $(2, 3)$, through $(9, -2)$ and $(6, -5)$

(ii) Through $(2, -5)$ and $(-2, 5)$, through $(6, 3)$ and $(1, 1)$.

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

23. 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.

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

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

26. Find the equation of the following lines :

(i) parallel to X-axis and 2 units above it.

(ii) parallel to X-axis and 3 units below it.

(iii) parallel to Y-axis and 6 units left of it.

(i) parallel to Y-axis and 4 units right of it.

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27. Find the equation of the straight line, which is parallel to y-axis and 3 units to the right of it.

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28. Find the equation of the line which is parallel to yl-axis and passes through the point $(3, \, - \, 4)$.

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

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30. 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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31. 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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32. A line passing through the point $A(3, 0)$ makes 30^0 angle with the positive direction of $x - a\xi s$. If this line is rotated through an angle of 15^0 in clockwise direction, find its equation in new position.

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33. $A(-3, -1)$ and $B(2, 2)$ are two adjacent vertices and $O(3, 0)$ is the point of intersection of the diagonals of a parallelogram ABCD. Write down the equations of the four sides of the parallelogram.

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34. Show that points $(1, 4)$, $(3, -2)$ and $(-3, 16)$ are collinear and find the equation of the straight line on which they lie.

35. Find the equation of a line making an angle $2\pi/3$ with positive direction of x-axis and passing through a point $(0, 2)$.

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

B. $\sqrt{3}x - y - 2 = 0$

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

D. None

Answer: A

36. 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.

37. Find the equation of the line for which

$(i) p = 3$ and $\alpha = 45°$ (ii)$p = 5$ and $\alpha = 135°$

(iii)$p = 8\alpha = 150°$ (iv) $p = 3$ and $\alpha = 225°$

(v)$p = 2$ and $\alpha = 300°$ (vi)$p = 4$ and $\alpha = 180°$

38. 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

$$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$$

39. Find the eqution of a line which passes through the point $(-2, 3)$ and makes an angle of 60^0 with thepositive direction of x-axis.

40. Find the distance of the line $4xy = 0$from the point P(4, 1) measured along the line making an angle of $135o$with the positive xaxis.

41. Reduce the equation to $\sqrt{3}x + y + 1 = 0$ to the form $y = mx + c$ and hence , find the slope the inclination to the x-axis and the intercept on the y-axis.

42. Find the slope and y-intercept of the st.line $5x + 6y = 7$.

A. $-\dfrac{5}{6}, \dfrac{7}{6}$

B. $-(5), (7)$

C. $-\dfrac{5}{6}, \dfrac{7}{9}$

D. None

Answer: A

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43. Reduce the equation $2x - 7y + 3 = 0$ to the intercept form and hence find the intercepts on the axes.

A. $-\dfrac{3}{2}, \dfrac{3}{7}$

B. $-\dfrac{3}{2}, \dfrac{2}{7}$

C. $-\dfrac{3}{2}, \dfrac{3}{11}$

D. None

Answer: A

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

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45. Reduce each of the equations to the normal form and find the length of the perpendicular from origin to the line `sqrt(3) +y-8=0

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46. Two lines passing through the point (2, 3) intersects each other at an angle of 60o. If slope of one line is 2, find equation of the other line.

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47. Determine the angle B of the triangle with vertices $A(- 2, 1)$, $B(2, 3)$ and $C(- 2, - 4)$.

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

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49. Find the equation of the st.line through the origin making angle of $60°$ with st. Line $x + \sqrt{3}y + 3\sqrt{3} = 0$.

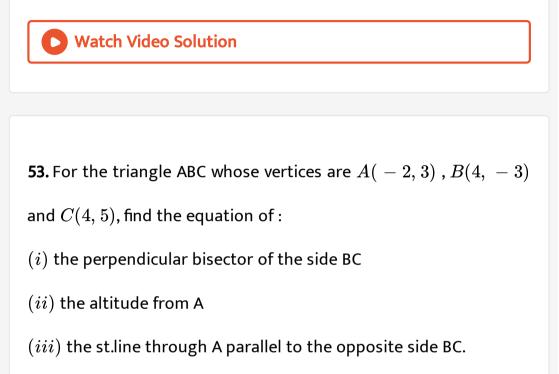**50.** Find the equation of a line passing through the point $(0, 1)$ and parallel to :

$3x - 2y + 5 = 0$

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

52. Assuming that straight lines work as the plane mirror for a point, find the image of the point (1, 2) in the line $x3y + 4 = 0$.

53. For the triangle ABC whose vertices are $A(-2, 3)$, $B(4, -3)$ and $C(4, 5)$, find the equation of :

(i) the perpendicular bisector of the side BC

(ii) the altitude from A

(iii) the st.line through A parallel to the opposite side BC.

54. The sides of a quadrilateral , taken in order, are given by

$3x + 11y - 65 = 0$, $5x + y - 39 = 0$, $-x + 5y + 13 = 0$ and

$11x - 3y + 65 = 0$.

Find the co-ordinates of the vertices of the quadrilateral.

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55. Find the point of intersection of the medians of a triangle whose vertices are :

$(-1, 0)$, $(5, -2)$ and $(8, 2)$.

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

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57. The vertices of a triangle are $(4, -3), (-2, 1)$ and $(2, 3)$. Find the co-ordinates of the circumcentre of the triangle.

[Circumcentre is the point of concurrence of the right-bisectors of the sides of a triangle]

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

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59. Prove that the three st.lines : $2x - 3y = 7$, $3x - 4y = 13$ and $8x - 11y = 33$ meet in a point.

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60. 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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61. Find the slope of the line perpendicular to the line $3x - 5y + 7 = 0$

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62. Find the coordinates of the vertices of a square inscribed in the triangle with vertices $A(0, 0), B(2, 1)$ and $C(3, 0),$ given that two of its vertices are on the side AC`.
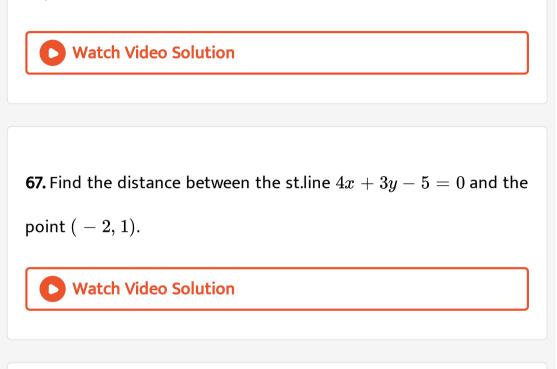
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63. Prove that the line segment joining the mid points of two side of a triangle is parallel to the third side and equal to half of it.

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64. Prove analytically that the diagonals of a rectangle are equal

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65. Using analytical geometry, prove that the diagonals of a rhombus are perpendicular to each other.

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66. The lie segments joining the midpoints of the ajdacent sides of a quadirlateral form

67. Find the distance between the st.line $4x + 3y - 5 = 0$ and the point $(-2, 1)$.

68. The length of the perpendicular form the point (b,a) to the line $\frac{x}{a} - \frac{y}{b} = 1$ is

69. Show that the origin is equidistant from the lines $4x + 3y + 10 = 0$; $5x - 12y + 26 = 0$ and $7x + 24y = 50$.

70. Find the distance between the parallel lines $3x4y + 7 = 0$ and $3x4y + 5 = 0$.

71. Prove that the line $5x - 2y - 1 = 0$ is mid-parallel ot the lines $5x - 2y - 9 = 0$ and $5x - 2y + 7 = 0$.

72. Two sides of a square lie on the lines $x + y = 1 and x + y + 2 = 0.$ What is its area?

73. Prove that the parallelogram formed by the straight lines :

$\frac{x}{a} + \frac{y}{b} = 1, \ \frac{x}{b} + \frac{y}{a} = 1, \ \frac{x}{a} + \frac{y}{b} = 2$ and $\frac{x}{b} + \frac{y}{a} = 2$ is a rhombus.

74. Show that the path of a moving point such that its distances from two lines $3x2y = 5 and \ 3x + 2y = 5$ are equal is a straight line.

75. The equation of the base of an equilateral triangle is $x + y - 2 = 0$ and the opposite vertex his coordinates (2, -1). Find the area of he triangle.

76. Find the equations of the bisectors of the angles formed by the lines :

$3x - 4y + 12 = 0$ and $4x + 3y + 2 = 0$

77. Find the equations of the bisectors of the angles, between the lines through $(0, 0)$ with slopes 1 and 2.

78. Find the equation of the bisectors of the internal angles of the triangle whose sides are :

$$3x + 4y - 6 = 0, 12x - 5y - 3 = 0, 4x - 3y + 12 = 0$$

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79. Find the equations of the bisectors of the interior angles of the triangle whose vertices are $A(0, 0), B(4, 0)$ and $C(0, 3)$ and prove that they are concurrent.

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80. Find the new co-ordinates of the points :

$(i)(1, 1)$ $(ii)(5, 0)$ $(iii)(- 2, 1)$ when the origin is shifted to the point $(- 3, - 2)$ by translation of axes.

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81. Find the transformed equation of the curve :

$x^2 + y^2 + 4x - 6y + 16 = 0$ when the origin is shifted to the point $(-2, 3)$.

82. On shifting the origin to the point $(1, -1)$, the axes remaining parallel to the original axes, the equation of a curve becomes :

$4x^2 + y^2 + 3x - 4y + 2 = 0.$

Find its original equation.

83. Find the point to which the origin should be shifted so that the equation $y^2 - 6y - 4x + 13 = 0$ is transformed to the form $y^2 + Ax = 0$.

84. Prove that the slope of a line is invariant under the translation of the axes.

85. Write the equations for the family of lines (i) with slope 3 (ii) with x-intercept 2 (iii) perpendicular to $2x - 5y - 6 = 0$

86. Find the equation of the line through the point of intersection of $x + 2y = 5$ and x-3y=7 and $pas\sin gthroughthep\oint(i)\,(0,0)$

(ii) $(0, -1)$

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

88. 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 $\backslash\ 4$.
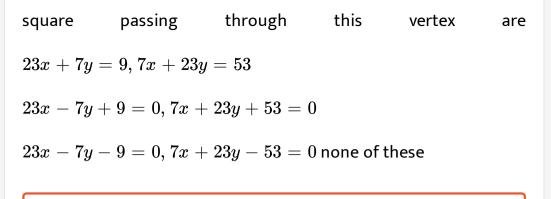
89. Show that the locus of the mid-point of the segment intercepted between the axes of the variable line $x\cos\alpha + y\sin\alpha\pi s \dfrac{1}{x^2} + \dfrac{1}{y^2} = \dfrac{4}{p^2}$, where p is a constant.

90. The line joining two points A(2,0) and B(3,1) is rotated about A in anticlockwise direction through an angle of $15°$. find the equation of line in the new position. If b goes to c in the new position what will be the coordinates of C.

91. One diagonal of a square is along the line $8x - 15y = 0$ and one of its vertex is (1, 2). Then the equations of the sides of the

square   passing   through   this   vertex   are

$23x + 7y = 9,\ 7x + 23y = 53$

$23x - 7y + 9 = 0,\ 7x + 23y + 53 = 0$

$23x - 7y - 9 = 0,\ 7x + 23y - 53 = 0$ none of these

92. A variable line passes through a fixed point P. The algebraic sum of the perpendiculars drawn from the points (2,0), (0,2) and (1,1) on the line is zero. Find the coordinate of the point P.

93. If the sum of the distances of a moving point in a plane from the axes is 1, then find the locus of the point.

94. If p is the length of perpendicular from the origin on the line $\frac{x}{a} + \frac{y}{b} = 1$ and a^2, p^2 and b^2 are in AP, the show that $a^4 + b^4 = 0$.

Exercise 10 A

1. Find the slope of the line through the points

$(i)(1, 2), (4, 2)\ (ii)(0, -4), (-6, 2)$

$(iii)(4, -6), (-2, -5)\ (iv)(4, 6), (2, 12)$

$(v)(3, -2), (3, 4)$

2. Show that the line joining $(2, -3)$ and $(-5, 1)$ is

(i) parallel to the line joining $(7, -1)$ and $(0, 3)$

(ii) perpendicular to the line joining $(4, 5)$ and $(0, -2)$

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

4. Show that the line

(i) through $(0, 0)$ and $(2, 3)$ is parallel to the line through $(2, 2)$ and $(4, 5)$

(ii) through $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through $(8, 12)$ and $(4, 24)$

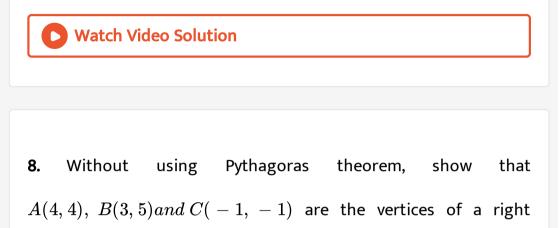(iii) through $(2, -3)$ and $(-1, 2)$ is perpendicular to the line joining $(3, 7)$ and $(-2, 4)$.

5. State whether the two lines in each of the following problems are parallel , perpendicular or neither parallel nor perpendicular :

(i) Through $(8, 2)$ and $(-5, 3)$, through $(16, 6)$ and $(3, 15)$

(ii) Through $(9, 5)$ and $(-1, 1)$, through $(8, -3)$ and $(3, -5)$

(iii) Through $(-2, 6)$ and $(4, 8)$, through $(8, 12)$ and $(4, 24)$.

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6. Find the value of 'k' for which the line : $(k-3)x - 4(4-k^2)y + k^2 - 7k + 6 = 0$ passes through the origin.

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7. 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 $(0, 6)$?

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

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

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

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Exercise 10 B

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

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2. Find the equation of the line, which is parallel to y-axis at a distance of 4 units to the left of it.

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3. Find the equation of the line parallel to x-axis and :

(i) passing through the point $(3, \ -4)$

(ii) passing through the point $(0, 2)$

(iii) has intercept on the y-axis as -2.

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4. Find the equations of the lines parallel to axes and passing through $(2, \quad 3)$.

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5. Find the equation of the line perpendicular to the x-axis and

(i) passing through the origin

(ii) passing through the point $\left(-3, \dfrac{1}{2} \right)$

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6. Find the equation of the straight line perpendicular to y-axis and

(i) passing through the origin

(ii) passing through the point $(-2, -3)$

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

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Exercise 10 C

1. Find the equation of the st.line in each of the following problems

:

Through the point $(-2, 3)$ with slope -4

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2. Find the equation of the line passing through $(2, 2\sqrt{3})$ and inclined with x-axis at an angle of 75^0 .

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3. 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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4. Show that the st.line, which passes through the point $(4, 12)$ and makes an angle $\tan^{-1} 3$ with the x-axis passes through the origin.

5. Find the equation of the straight line passing through the points : $(i)(-1, -2)$ and $(-5, -2)$ $(ii)(0, -3)$ and $(5, 0)$

6. The vertices of a triangle are the points $(2, 1)$, $(-2, 3)$ and $(4, 5)$. Find the equation of its sides.

7. The points $(at_1^2, 2at_1)$, $(at_2^2, 2at_2)$ and $(a, 0)$ will be collinear, if

8. Find the equations of the straight lines which pass through the origin and trisect the portion of the st.line $\dfrac{x}{a} + \dfrac{y}{b} = 1$, which is intercepted between the axes.

9. A line passing through the point $A(3, 0)$ makes 30^0 angle with the positive direction of $x - a\xi s$. If this line is rotated through an angle of 15^0 in clockwise direction, find its equation in new position.

10. The mid-points of the sides of a triangle are $(2, 1), (-5, 7)$ and $(-5, -5)$. Find the equations of the sides of the triangle.

1. Find the equation of the st.line :

(i) with slope 5 and y-intercept $= 5$

(ii) with slope 3 and y-intercept $= -4$

(iii) with slope $\dfrac{1}{2}$ and y-intercept $= -5$

(iv) with slope 3 and y-intercept $= -2$.

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

3. Find the equation of the line, which cuts off intercept 4 on the x-axis and makes an angle $60°$ with positive direction of the x-axis.

4. Find the equation of the st.line which passes through the point $(0, 1)$ and has an inclination of $60°$.

5. Find the equation of the line intersecting x-axis at a distance of 3 units to the left of the origin with slope -2.
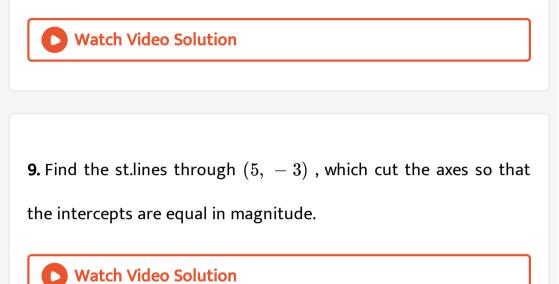
6. Find the equation of the straight line interesting y-axis at a distance of 2 units above the origin and making an angle of 0^0 with the positive direction of the x-axis

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

8. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point $(i)(5, 6)$ (ii) $(2, 3)$.

9. Find the st.lines through $(5, -3)$, which cut the axes so that the intercepts are equal in magnitude.

10. Obtain the perpendicular form of the equation of st.lines from the given values of p and α

$(i)p = 5, \alpha = 30°$

$(ii)p = 1, \alpha = 90°$

$(iii)p = 4, \alpha = 15°$

11. 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
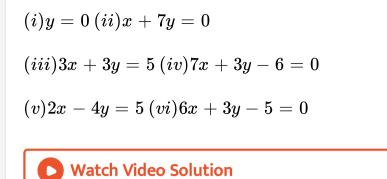
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1. Find the equation of the straight line through two points :

$(i)(0, 2)$ and $(0, 4)$ $(ii)(2, 6)$ and $(2, 5)$

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2. Reduce each of the following into slope-intercept form and find their slopes and y-intercepts :

$(i) y = 0 \ (ii) x + 7y = 0$

$(iii) 3x + 3y = 5 \ (iv) 7x + 3y - 6 = 0$

$(v) 2x - 4y = 5 \ (vi) 6x + 3y - 5 = 0$

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3. Find the slope and y-intercept of the st.line in each of the following :

$(i) x + y = 0 \ (ii) y + 2 = 0$

$(iii) \dfrac{y}{x} = 2 \ (iv) 5x + 6y = 7$

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4. Reduce the following equations into intercept form and find their intercepts on the axes.

$(i) 3x + 2y - 12 = 0$

$(ii) 6x + 3y - 5 = 0$

$(iii) 3y + 2 = 0$

5. Find the inclination to the x-axis of each of the lines :

$(i) \sqrt{3}x - y + 2 = 0 \ (ii) x \cos \alpha + y \sin \alpha = p.$

6. Find the intercepts on the axes made by the straight lines :

$(i) 2x - 3y + 6 = 0$

$(ii) x \cos \alpha + y \sin \alpha = \sin 2\alpha$

7. The condition that the equation $ix + my + n = 0$ represents the equatio of a straight line in the normal form is

8. Find the slope of a straight line, which cuts off from the axes :

(i) equal intercepts

(ii) intercepts equal in magnitude but opposite in sign.

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

10. Reduce the following to the normal form. Find their perpendicular distance from the origin and angle between perpendicular and the positive x-axis
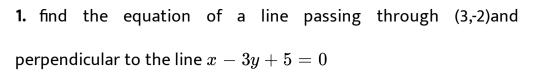
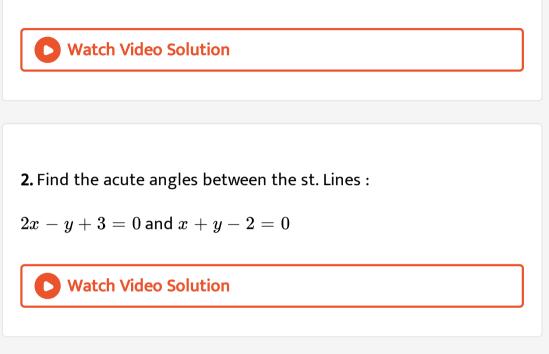$(i)x - y = 4$ $(ii)y - 2 = 0$ $(iii)x - \sqrt{3}y + 8 = 0$

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11. If the area of the triangle formed by a line with coordinates axes $54\sqrt{3}$square units and the perpendicular drawn from the origin to the line makes an angle $60°$ with the x-axis, find the equation of the line.
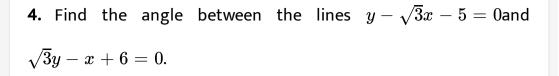
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Exercise 10 F

1. find the equation of a line passing through (3,-2)and perpendicular to the line $x - 3y + 5 = 0$

2. Find the acute angles between the st. Lines :

$2x - y + 3 = 0$ and $x + y - 2 = 0$

3. Find the acute angles between the st. Lines :

$y - 3x - 5 = 0$ and $3y - x + 6 = 0$

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

5. Find the measure of the angle A of the $\triangle ABC$ with vertices $A(2, 3), B(-2, 2)$ and $C(0, 2)$

6. The line through $(4, 3)$ and $(-6, 0)$ intersects the line $5x + y = 0$. Find the angles of intersection.

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

8. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\dfrac{1}{3}$, find the slopes of the lines.

9. 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 $\tan \theta = 2$.

10. Find the equation of the st.line joining the points $(3, -1)$ and $(2, 3)$. Also find the equation of another st.line perpendicular to this st.line and passing through $(5, 2)$.

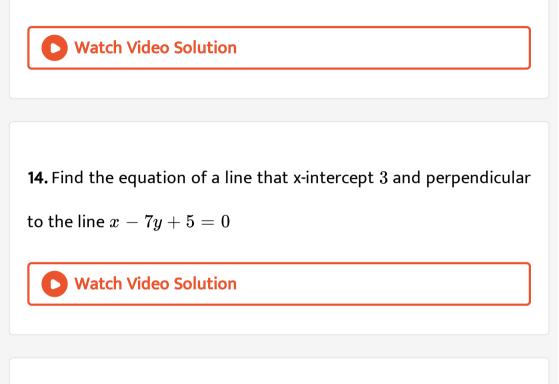**11.** Find the equations of the st.lines which pass through $(4, 5)$ and make angle $45°$ with the st.line $2x + y + 1 = 0$

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

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

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

15. Find the equation of the lines through $(-2, -1)$ and are :

(i) parallel to line $x = 0$

(ii) perpendicular to the line $y = x$.

16. Find the equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2, 5)$.
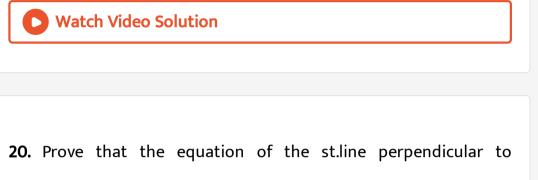
17. Find the equation of a straight line perpendicular to the line $x - 2y + 3 = 0$ and having intercept 3 on x-axis.

18. Find the equation of the line that is parallel to $2x + 5y = 7$ and passes through the mid-point of the line joining $(2, 7)$ and $(-4, 1)$.

19. Find the equation of the perpendicular bisector of the st.line segment whose end points are $(0, 5)$ and $(-4, 1)$.

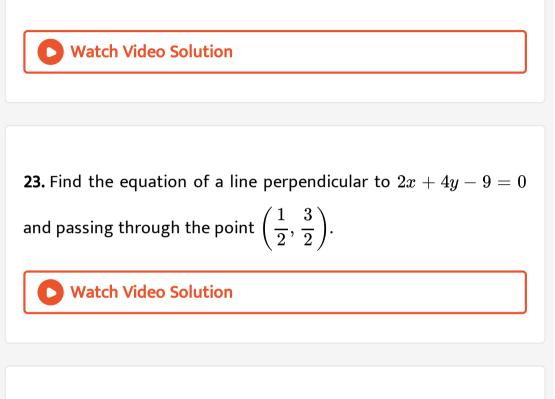**20.** Prove that the equation of the st.line perpendicular to $Ax + By + C = 0$ and passing through (x_1, y_1) is $Bx - Ay = Bx_1 - Ay_1$.

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

22. Find the equation of a line passing through $(4, 5)$ and perpendicular to the line $2x + 3y = 5$.

23. Find the equation of a line perpendicular to $2x + 4y - 9 = 0$ and passing through the point $\left(\dfrac{1}{2}, \dfrac{3}{2}\right)$.

24. Find the equation of the line perpendicular to the line $x - 7y + 5 = 0$ and having x -intercept 4.

25. Find the equation of a line that is perpendicular to $3x + 2y = 8$ and passes through the mid-point of the line segment joining :

$(i)(5, \; -2)$ and $(2, 2)$

$(ii)(2, 7)$ and $(\; -4, 1)$

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26. 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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27. Find the equation of the line passing through (-3,5) and perpendicular to the line through the points (2,50 and (-3,6).

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28. The equation of the line, which is perpendicular to $5x - 2y = 7$ and passes through the midpoint of line segment joining $(2, 7)$ and $(-4, 1)$ is

29. Find the equation of a st.line drawn at right angles to the st.line $\dfrac{x}{a} + \dfrac{y}{b} = 1$ through the point, where it meets the x-axis.

30. The perpendicular from the origin to a line meets it at the point (-2, 9) find the equation of the line.

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

32. Two lines passing through the point $(2, 3)$ intersects each other at an angle of $60o$. If slope of one line is 2, find equation of the other line.

33. Show that the equation of the passing through the origin and making an angle $\theta$with the $y = mx + c$is $\dfrac{y}{x} = \pm \dfrac{m + \tan\theta}{1 - m\tan\theta}$.

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

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

36. What are inclinations to the x-axis of the st.lines :
$y = \dfrac{1}{3}x\sqrt{3} + 3$ and $y = \sqrt{3}x + 3$?

Show that the st.line $y = x + 3$ bisects the angle between them.

37. Prove that the points $(2, -1), (0, 2), (3, 3)$ and $(5, 0)$ are the vertices of a parallelogram .
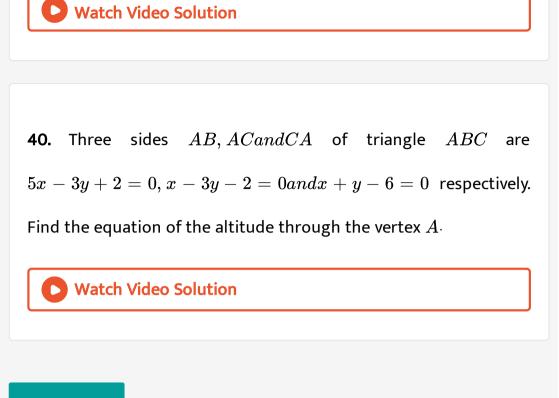
38. Prove that the diagonals of the parallelogram formed by the lines

$\sqrt{3}x + y = 0, \sqrt{3}y + x = 0, \sqrt{3}x + y = 1$ and $\sqrt{3}y + x = 1$

are at right angles.

39. The equations of three lines are given by : $15x - 8y + 1 = 0$, $12x + 5y - 3 = 0$ and $21x - y - 2 = 0$. Show that the third line bisects the angle between the other two lines.

40. Three sides $AB, AC and CA$ of triangle ABC are

$5x - 3y + 2 = 0, x - 3y - 2 = 0 and x + y - 6 = 0$ respectively.

Find the equation of the altitude through the vertex A.

Exercise 10 G

1. Find the point of intersection of the straight lines :

$(i) 2x + 3y - 6 = 0, 3x - 2y - 6 = 0$

$(ii) x = 0, 2x - y + 3 = 0$

$(iii) \dfrac{x}{3} - \dfrac{y}{4} = 0, \dfrac{x}{2} + \dfrac{y}{3} = 1$

2. 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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3. If $ax - 2y - 1 = 0$ and $6x - 4y + b = 0$ represent the same line, find the values of 'a' and 'b'`.

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4. The line $2x - 3y = 4$ is the perpendicular bisector of the line segment AB. If coordinates of A are $(-3, 1)$ find coordinates of B.

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5. Show that the straight lines :

$$x - y - 1 = 0, \quad 4x + 3y = 25 \quad \text{and} \quad 2x - 3y + 1 = 0 \quad \text{are}$$

concurrent.

6. For what value of k are the three st.lines :

$$2x + y - 3 = 0 \ , \quad 5x + ky - 3 = 0 \quad \text{and} \quad 3x - y - 2 = 0 \quad \text{are}$$

concurrent.

7. Find the foot of the perpendicular from the point $(-1, 2)$ on the st. Line $x - y + 5 = 0$.

8. Prove that the diagonals of the parallelogram formed by the four lines :

$$\frac{x}{a} + \frac{y}{b} = 1, \frac{x}{a} + \frac{y}{b} = -1, \frac{x}{a} - \frac{y}{b} = 1, \frac{x}{a} - \frac{y}{b} = -1 \text{ are at}$$

right angles.

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9. Prove that the following lines are concurrent. $(i) 5x - 3y = 1,$

$2x + 3y = 23, 42x + 21y = 257$

$(ii) 2x + 3y - 4 = 0, x - 5y + 7 = 0, 6x - 17y + 24 = 0$

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10. The sides of a triangle are given by

$x - 2y + 9 = 0, 3x + y - 22 = 0$ and $x + 5y + 2 = 0$. Find the vertices of the triangle.

11. Obtain the co-ordinates of the feet of perpendiculars drawn from the origin upon the lines $3x - 5y + 2 = 0$ and $4x - 3y + 5 = 0$ and show that the equation of the st. Line joining these feet is $26x + 53y = 11$.

12. 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].

13. 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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14. Two vertices of a triangle are $(3, \ -1) and(\ - 2, 3)$ and its orthocentre is at the origin,. Find the coordinates of eth third vertex.

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15. Find the co-ordinates of the incentre of the triangle formed by the lines $y - 15 = 0, 12y - 5x = 0$ and $4y + 3x = 0$.

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16. Find the co-ordinates of the circumcentre of the triangle whose vertices are :

$(i)(- 2, 2), (2, - 1)$ and $(4, 0)$

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

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17. The length of the perpendicular from the origin to the line $3x - 4y + 5 = 0$

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18. The coordinates of points A, B and C are $(1, 2), (- 2, 1)$ and $(0, 6)$. Verify that the medians of the triangle ABC are concurrent. Also find the coordinates of the point of concurrence (centroid).
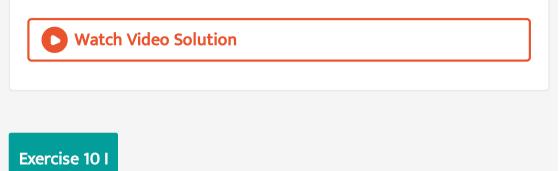
Exercise 10 H

1. Prove that the diagonals of a square are equal.

2. The diagonals of a parallelogram bisect each other.

3. The diagonals of a square are equal and perpendicular to each other.

4. Prove using vectors: If two medians of a triangle are equal, then it is isosceles.

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5. Prove that the medians to the two equal sides of an isosceles triangle are equal.

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6. If the diagonals of a parallelogram are perpendicular; then it is a rhombus.

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7. If the diagonals of a parallelogram are equal, then show that it is a rectangle

Exercise 10 I

1. Classify the following pairs of lines as coincident, parallel, perpendicular or intersecting :

$(i) 6x + 14y - 16 = 0, 12x + 28y - 32 = 0$

$(ii) 3x - 4y = 8, 3x + 4y = 11$

$(iii) 5x - 2y = 7, 2y - 5x = -7$

$(iv) 4x + 7y = 19, 7x - 4y = -2$

$(v) x - 2y = 7, 4y - 2x = 13$

2. Find the distance between the line and the point in each of the following :

$(i) 3x + 4y - 5 = 0, (-3, 4)$

$(ii) 12x - 5y - 7 = 0, (3, -1)$

$(iii) 3x - 4y - 26 = 0, (3, -5)$

$(iv) x + y = 0, (0, 0)$

$(v) y = 4, (2, 3).$

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3. Which of the st.lines $2x - y + 3 = 0$ and $x - 4y - 7 = 0$ is farther from the origin ?

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

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

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

7. If $p \, and \, p'$ be the perpendicular form the origin upon the straight lines $x\sec\theta + y\cos ec\theta = a \, and \, x\cos\theta - ys\int h\eta = a\cos 2\theta.$ Prove that : $4p^2 + p' \,\hat{} \, 2 = a^2$.

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8. Find the length of the perpendicular from the vertex B of $\triangle ABC$ to the median through C if A is $(-10, -13)$, B is $(-2, 3)$ and C is $(2, 1)$.

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

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

11. If sum of the perpendicular distances of a variable point $P(x, y)$ from the lines $x + y5 = 0$ and $3x2y + 7 = 0$ is always 10. Show that P must move on a line.

12. Find equation of the line which is equidistant from parallel lines $9x + 6y 7 = 0$ and $3x + 2y + 6 = 0$.

13. 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 $\dfrac{x}{a}\cos\theta + \dfrac{y}{b}\sin\theta = 1$ is b^2.

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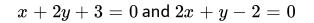**14.** If two sides of a square are along $5x - 12y + 26 = 0$ and $5x - 12y - 65 = 0$ then find its area.

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Exercise 10 J

1. Find the equations of the bisectors of the angles formed by the following pairs of lines

$x + 2y + 3 = 0$ and $2x + y - 2 = 0$

2. Find the equations of the bisectors of the angles formed by the following pairs of lines

$3x + 4y + 13 = 0$ and $12x - 5y + 32 = 0$

3. Find the equations of the bisectors of the angles formed by the following pairs of lines

$x + \sqrt{3}y = 6 + 2\sqrt{3}$ and $x - \sqrt{3}y = 6 - 2\sqrt{3}$

4. Find the equations of the bisectors of the angles formed by the following pairs of lines

$4x + 3y - 5 = 0$ and $5x + 12y - 41 = 0$

5. Find the equations of the straight lines , bisectors of the angles formed by the following pairs of lines

$y - b = \dfrac{2m}{1 - m^2}(x - a)$ and $y - b = \dfrac{2m'}{1 - m'^2}(x - a)$

6. Prove that the bisectors of the angles of a linear pair are at right angle.

7. Find the equations of the bisectors of the internal angles of the triangles, the sides of which have the equations :

$(i) 3x + 5y = 15, x + y = 4$ and $2x + y = 6$

$(ii) 4x - 3y + 12 = 0, 12x - 5y = 3$ and $3x + 4y = 6.$

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8. Find the equations of the straight lines passing through the foot of the perpendicular from the point $(2, 3)$ upon the straight line $4x + 3y + 5 = 0$ and bisecting the angles between the perpendicular and the given straight line.

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Exercise 10 K

1. Find the new coordinates of the points in each of the following cases if the origin is shifted to the point (3, 2) by a translation of axes. (i) (1, 1) (ii) (0, 1) (iii) (5, 0) (iv) (1, 2) (v) (3, 5)

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2. Find the new coordinates of point $(3, \ \ 4)$ if the origin is shifted to (1, 2) by a translation.

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3. 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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4. Prove that the equations of the st.lines $x + y - 1 = 0$ and $x - y - 1 = 0$ can be written as $x + y = 0$ and $x - y = 0$ by shifiting the origin to a suitable point.

5. Find the transformed equations of the following when the origin is shifted to the point $(1, 1)$ by a translation of axes :

$(i) x^2 + xy - 3y^2 - y + 2 = 0$

$(ii) xy - y^2 - x + y = 0$

$(iii) xy - x - y + 1 = 0$

$(iv) x^2 - y^2 - 2x + 2y = 0$

6. 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 terms :

$(i) x^2 + y^2 - 5x + 2y - 5 = 0$

$(ii) x^2 + y^2 - 4x - 8y + 3 = 0$

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7. Find the point so that the equation :

$12x^2 - 10xy + 2y^2 + 11x - 5y + 2 = 0$

referred to parallel axes through it may transform into one from which terms of the first degree in x and y are absent.

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8. Simplify the equation $x^2 + y^2 + 8x - 6y - 25 = 0$ to the form $Ax^2 + By^2 = K$, by shifting the origin to a suitable point.

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9. Verify that the area of the traingle with vertices $(2, 3)$, $(5, 7)$ and $(-3, -1)$ remains invariant under the translation of axes when the origin is shifted to the point $(-1, 3)$.

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Exercise 10 L

1. Find the equation of the family of lines satisfying the following conditions :

(i) passing through the origin

(ii) parallel to the line $3x + 4y + 5 = 0$

(iii) having slope 5

(iv) having y-intercept 4.

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

$(i)(1, 0)$ $(ii)(0, -1)$

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

4. Find the equation of the line passing through the intersection of $3x + 4y = 7$ and $x - y + 2 = 0$.and with slope :

$(i) 5$ $(ii) 3$.

5. Find the equation of the line passing through the intersection of $3x + 4y = 7$ and $x - y + 2 = 0$.and with slope :

$(i) 5$ $(ii) 3$.

6. 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 $\backslash 4$.

7. Find the equation of the line passing through the intersection of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.
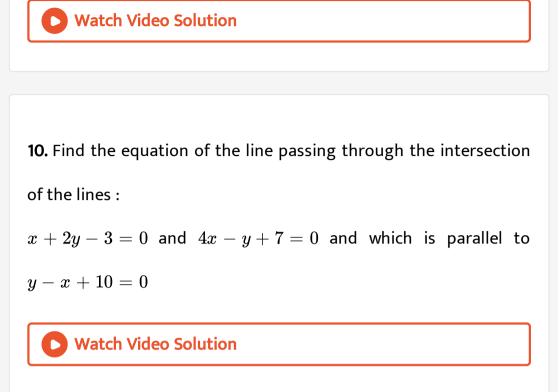
8. Find the equation of the line parallel to y-axis and drawn through the point of intersection of the lines $x - 7y + 5 = 0 \ and \ 3x + y = 0.$

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

10. Find the equation of the line passing through the intersection

of the lines :

$x + 2y - 3 = 0$ and $4x - y + 7 = 0$ and which is parallel to

$y - x + 10 = 0$

11. Find the equation of the lines passing through the point of

intersection of :

$5x - 3y = 1$ and $2x + 3y = 23$ and perpendicular to the line

whose equation is :

$(i)x - 2y = 3 \ (ii)y = 0$

$(iii)x = 0 \ (iv)5x - 3y = 1.$

12. Find the equation of the line perpendicular to the line $2x + y - 1 = 0$ through the intersection of the lines $x + 2y - 1 = 0$ and $y = x$.

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13. Find the equation of a straight line passing through the point of intersection of the lines :

$3x + y - 9 = 0$ and $4x + 3y - 7 = 0$ and perpendicular to the line $5x - 4y + 1 = 0$
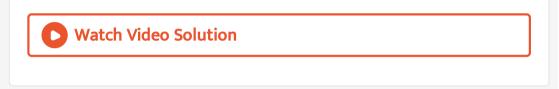
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14. Find the equation of the straight line passing through the intersection of $x + 2y - 3 = 0$ and $3x + 4y - 7 = 0$ and

perpendicular to $x + 3y + 4 = 0$

15. 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.

16. Find the equation of the straight line which passes throughthe point of intersection of the straight lines $3x- 4y + 1 = 0$ and $5x + y - 1 = 0$ and makes equal intercepts upon the co-ordinate axes.

Objective Type Questions A Multiple Choice Uestions

1. The inclination of the line $x - y + 3 = 0$ with the positive direction of x-axis is :

A. $45°$

B. $135°$

C. $-45°$

D. $-135°$

Answer: A

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2. The two lines $ax + by = c$ and $a'x + b'y = c'$ are perpendicular if

A. $aa' + ll = 0$

B. $ab' = ba'$

C. $ab + a'b' = 0$

D. $ab' + ba' = 0$

3. The equation of the line passing through $(1, 2)$ and perpendicular to $x + y + 7 = 0$ is

A. $y - x + 1 = 0$

B. $y - x - 1 = 0$

C. $y - x + 2 = 0$

D. $y - x - 2 = 0$

Answer: B

4. The distance of the point $P(1, \ -3)$ from the line $2y - 3x = 4$ is

   A. 13

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

   C. $\sqrt{13}$

   D. None of these

Answer: C

5. The coordinates of the foot of the perpendicular from the point (2,3) on the line $x + y - 11 = 0$ are

A. $(- 6, 5)$

B. $(5, 6)$

C. $(- 5, 6)$

D. $(6, 5)$

Answer: B

6. The intercept cut off from Y-axis is twice that from X-axis by the line and line passes through $(1, 2),$ then its equation is

A. $2x + y = 4$

B. $2x + y + 4 = 0$

C. $2x - y = 4$

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

Answer: A

---

7. A straight line through $P(1, 2)$ is such that its intercept between the axes is bisected at P its equation :

    A. $x + 2y = 5$

    B. $x - y + 1 = 0$

    C. $x + y - 3 = 0$

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

Answer: D

8. Slope of a line which cuts off intercepts of equal lengths on the axes is

    A. -1

    B. 0

    C. 2

    D. $\sqrt{3}$

Answer: A

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9. A point moves such teat its distance from the point $(4, 0)$ is half that of its distance from the line $x = 16,$ find its locus.

    A. $3x^2 + 4y^2 = 192$

B. $4x^2 + 3y^2 = 192$

C. $x^2 + y^2 = 192$

D. None of these

Answer: A

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10. A line cutting off intercept -3 from the $Y -$ axis and the tangent at angle to the $X -$ axis is $\dfrac{3}{5}$, its equation is

A. $5y - 3x + 15 = 0$

B. $3y - 5x + 15 = 0$

C. $5y - 3x - 15 = 0$

D. None of these

Answer: A

11. Find the tangent of the angel between the lines whose intercepts n the axes are respectively $a, \; -b \; and \; nb, \; -a$.

A. $\dfrac{a^2 - b^2}{ab}$

B. $\dfrac{b^2 - a^2}{2}$

C. $\dfrac{b^2 - a^2}{2ab}$

D. None of these

Answer: C

12. If the line $\dfrac{x}{a} + \dfrac{y}{b} = 1$ passes through the points a $(2, \; -3)$ and $(4, \; -5)$, then $(a, b) =$

A. $(1, 1)$

B. $(-1, 1)$

C. $(1, -1)$

D. $(-1, -1)$

Answer: D

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13. The distance of the point of intersection of the lines

$2x - 3y + 5 = 0$ and $3x + 4y = 0$ from the line $5x - 2y = 0$ is

A. $\dfrac{130}{17\sqrt{29}}$

B. $\dfrac{13}{17\sqrt{29}}$

C. $\dfrac{130}{7}$

D. None of these

14. Show that the equations of eth straight lines passing through the point $(3, -2)$ and inclined at 60^0 to the line $\sqrt{3}x + y = 1 \, arey + 2 = 0 \, and \, y - \sqrt{3}x + 2 + 3\sqrt{3} = 0.$

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

B. $x - 2 = 0, \sqrt{3}x - y + 2 + 3\sqrt{3} = 0$

C. $\sqrt{3}x - y - 2 - 3\sqrt{3} = 0$

D. None of these

Answer: A

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15. Consider the following statements :

1. The distance between the lines

$y = mx + c_1$ and $y = mx + c_2$ is $\dfrac{|c_1 - c_2|}{\sqrt{1 - m^2}}$.

2. The distance between the lines $ax + by + c_1$ and

$ax + by + c_2 = 0$ is $\dfrac{|c_1 - c_2|}{\sqrt{a^2 + b^2}}$.

3. The distance between the lines $x = c$ and $x = c_2$ is $|c_1 - c_2|$.

Which of the above statements are correct ?

A. $\dfrac{c_1 - c_2}{\sqrt{m^2 + 1}}$

B. $\dfrac{|c_1 - c_2|}{1 + \sqrt{m^2}}$

C. $\dfrac{c_1 - c_2}{1 + \sqrt{m^2}}$

D. 0

Answer: B

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16. If the coordinates of the middle point of the portion of a line interceptecd between the coordinate axes is $(3, 2)$, then the equation of the line will be

    A. $2x + 3y = 12$

    B. $3x + 2y = 12$

    C. $4x - 3y = 6$

    D. $5x - 2y = 10$

Answer: A

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17. Equation of the line passing through $(1, 2)$ and parallel to the line $y = 3x - 1$ is

    A. $y + 2 = x + 1$

B. $y + 2 = 3(x + 1)$

C. $y - 2 = 3(x - 1)$

D. $y - 2 = x - 1$

Answer: C

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18. Find the equations of the diagonals of the square formed by the lines $x = o, y = 0, x = 1 and y = 1$.
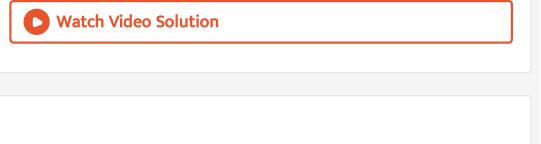
A. $y = x, y + x = 1$

B. $y = x, x + y = 2$

C. $2y = x, y + x = 1/3$

D. $y = 2x, y + 2x = 1$

Answer: A

19. For specifying a straight line, how many geomatrical parameters should be known ?

A. 1

B. 2

C. 4

D. 3

Answer: B

20. Slope of the line joining the points $(3, \ -2)$ and $(7, \ -2)$ is :

A. 0

B. undefined

C. 1

D. 4

Answer: A

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21. Equation of line passing through the point $(1, 2)$ and perpendicular to the line $y = 3x - 1$ is

A. $x - 3y = 0$

B. $x + 3y = 0$

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

D. $x + 3y + 7 = 0$

Answer: C

22. Let d_1 and d_2 be the lengths of the perpendiculars drawn from any point of the line $7x - 9y + 10 = 0$ upon the lines $3x + 4y = 5$ and $12x + 5y = 7$ respectively. Then $(A)d_1 > d_2(B)d_1 = d_2(C)d_1 < d_2(D)d_1 = 2d_2$

A. $d_1 > d_2$

B. $d_1 = d_2$

C. $d_1 < d_2$

D. $d_1 = 2d_2$

Answer: B

23. The equation of the line passing through the point of intersection of the straight lines $\frac{x}{a} + \frac{y}{b} = 1, \frac{x}{b} + \frac{y}{a} = 1$ and having slope zero is

A. $ax + by = 0$

B. $bx + ay = 0$

C. $y - x = 0$

D. $x + y = 0$

Answer: C

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24. The points (2,5) and (5,1) are two opposite vertices of a rectangle. If other two vertices are points on the straight line y =2y + k , then the value of k is

A. 4

B. 3

C. -4

D. -3

Answer: C

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

A. $5a^2$

B. $4a^2$

C. $3a^2$

D. a^2

Answer: D

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Objective Type Questions B Fill In The Blanks

1. The slope of the line joining the points $(3, -2)$ and $(-1, 4)$ is

....

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2. The slope of a line whose inclination is $90°$ is ....

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3. Find the inclination of the lines whose slopes are as follows :
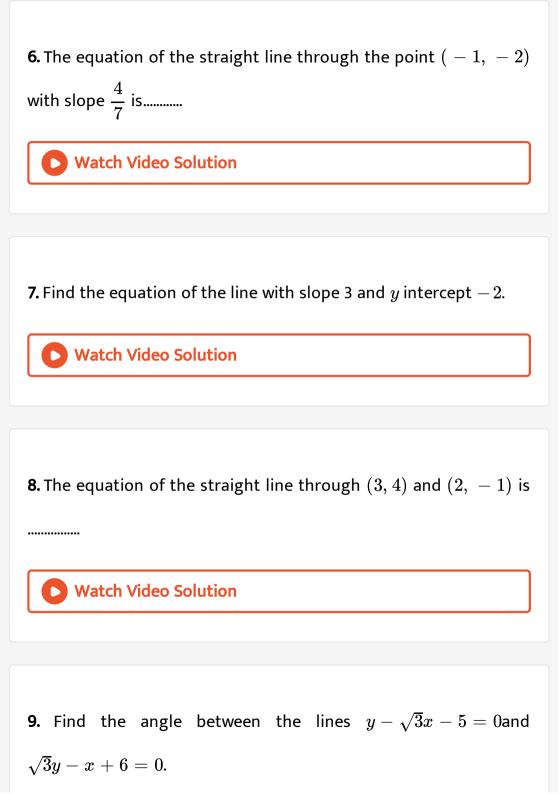
$(i)\sqrt{3}$ $(ii)1$ (iii) $-\dfrac{1}{\sqrt{3}}$

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4. The equation of the line, which is parallel to x-axis at a distance of 4 units above it is ....

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5. The equation of the straight line passing through the points $(0, -4)$ and $(-6, 2)$ is.................

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6. The equation of the straight line through the point $(-1, -2)$ with slope $\dfrac{4}{7}$ is............

7. Find the equation of the line with slope 3 and y intercept -2.

8. The equation of the straight line through $(3, 4)$ and $(2, -1)$ is

....

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

10. The point of intersection of the straight lines :

$x - 4y = 3$ and $6x - y = 11$ is ....

Objective Type Questions C True False Questions

1. The equation of the straight line passing through the point $(4, 3)$ with slope 2 is $2x - y - 5 = 0$.

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

3. Find the acute angle between the lines

$2x - y + 3 = 0 \ and \ x + y + 2 = 0.$

4. The distance of the point $(-3, 4)$ from the line

$3x + 4y - 5 = 0$ is $\dfrac{2}{5}$.

5. The new co-ordinates of the point $(1, 1)$ when the origin is

shifted to the point $(-3, -2)$ by translation of axes are .

1. What is the slope of the line whose inclination is :

$(i) 0°$ $(ii) 60°$ $(iii) 150°$?

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2. Find the inclination of the line whose slope is :
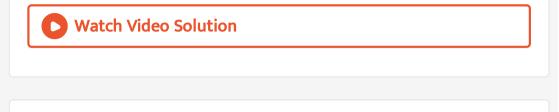
$(i) 0$ $(ii) \dfrac{1}{4}$ $(iii) 3.$

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3. Find the equation of the line, which is parallel to y-axis at a distance of 2 units to the right of it.

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

5. Find the equation of the st.line passing through the points :

$(i)(2, 3)$ and $(5, - 2)$ $(ii)(1, - 1)$ and $(3, 5)$.

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

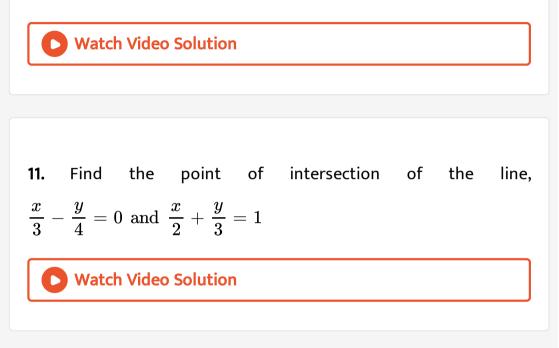**7.** Find the equation of the line passing through the point (2, 2) and inclined to x-axis at 45^0.

8. Find the length of intercepts cuts on axes from the line $x \sin \alpha + y \cos \alpha = \sin 2\alpha$ and the co-ordinates of the mid-point of the line segment lies between the axes.

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

10. If $3x - by + 2 = 0$ and $9x + 3y + a = 0$ represent the same straight line, find the values of 'a' and 'b'.

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

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12. The length of the perpendicular form the point (b,a) to the line $\dfrac{x}{a} - \dfrac{y}{b} = 1$ is
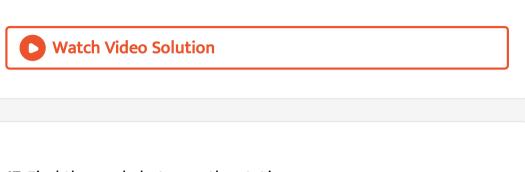
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13. Which of the st.lines $2x - y + 3 = 0$ and $x - 4y - 7 = 0$ is farther from the origin ?

14. Find the transformed equation of the curve $y^2 - 4x + 4y + 8 = 0$ when the origin is shifted to $(1, \ -2)$.

15. Find the equation of the straight lines passing through the origin making an angle α with the straight line $y = mx + c$.

16. What acute angle does a line of slope $-\dfrac{2}{3}$ make with a vertical line ?

17. Find the angle between the st. Lines :

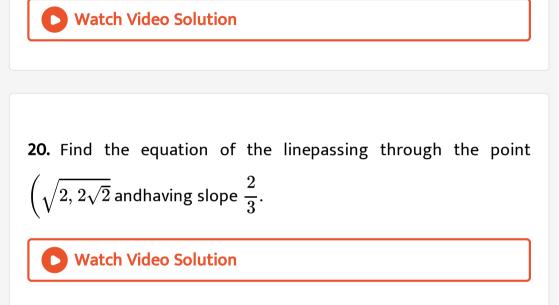$(a + b)x + (a - b)y = 2ab$ and $(a - b)x + (a + b)y = 2ab$

18. State whether the st.lines :

$x - y - 1 = 0,$ $4x + 3y = 25$ and $2x - 3y + 1 = 0$ are concurrent or not ?

19. Statement 1 : The chord of contact of the circle $x^2 + y^2 = 1$ w.r.t. the points (2, 3), (3, 5), and (1, 1) are concurrent. Statement 2 : Points (1, 1), (2, 3), and (3, 5) are collinear.

20. Find the equation of the linepassing through the point $\left(\sqrt{2, 2\sqrt{2}} \right.$ andhaving slope $\dfrac{2}{3}$.

21. Find the equation of the line for which

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

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

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

22. Reduce the equation $x + 2y = 3$ to the intercept form.

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

24. If the lines $p_1 x + q_1 y = 1 + q_2 y = 1$ and $p_3 x + q_3 y = 1$ be concurrent, show that the point (p_1, q_1), (p_2, q_2) and (p_3, q_3) are collinear.

25. Two sides of a square lie on the lines $x + y = 1 and x + y + 2 = 0$. What is its area?

Exercise 10 1

1. Draw a qradrilateral in the cartesian plane, whose vertices are $(- 4, 5)$, $(0, 7)$, $(5, - 5)$,and $(- 4, - 2)$. Also, find its area.
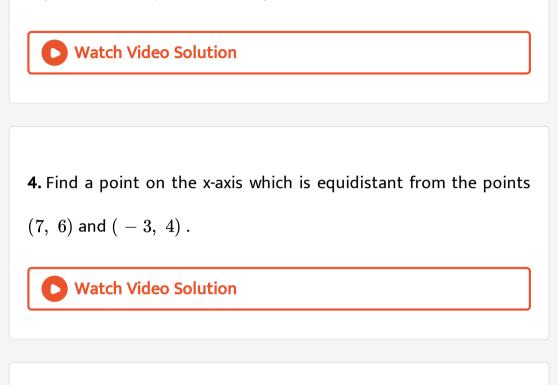
2. The base f an equilateral triangle with side $2a$ lies along the y-axis such that the mid point of the base is at the origin. Find the vertices of the triangle.

3. Find the distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ when: (i) PQ is parallel to the yaxis, (ii) PQ is parallel to the xaxis.

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

5. Find the slope of a line, which passes through the origin, and the midpoint of the line segment joining the points $P(0, 4)$ and $B(8, 0)$.

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

7. Find the slope of the line, which makes an angle of $30o$ with the positive direction of yaxis measured anticlockwise.
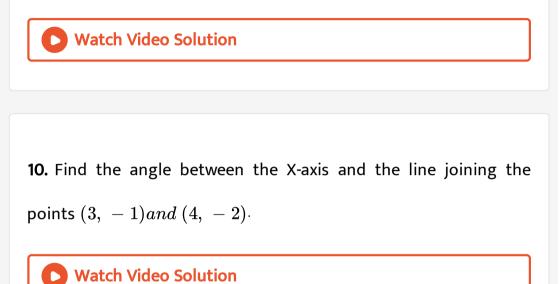
8. Find the value of x for which the points $(x, 1)$, $(2, 1)$ and $(4, 5)$ are collinear.

9. Without using distance formula, show that points $(-2, -1)$, $(4, 0)$, $(3, 3)$, and $(-3, 2)$` are the vertices of a parallelogram.

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

11. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\dfrac{1}{3}$, find the slopes of the lines.

12. A line passes through (x_1, y_1) and (h, k). If slope of the line is m, show that $k - y_1 = m(h - x_1)$.

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13. If three points $A(h, 0), \; P(a, b) \, and \, B(0, k)$ lie on a line, show that: $\dfrac{a}{h} + \dfrac{b}{k} = 1$.

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14. Consider the following population and year graph, find the slope of the line AB and using it, find what will be the population in the year 2010?

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1. Write the equation of x -axis and y-axis .

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

Passing through the point (4, 3) with slope $\dfrac{1}{2}$.

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

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

Passing through $\left(2, 2\sqrt{3}\right)$ and inclined with the xaxis at an angle

of $75o$.

5. Find the equation of the line intersecting x-axis at a distance of

3 units to the left of the origin with slope -2.

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

Intersecting the yaxis at a distance of 2 units above the origin and

making an angle of $30o$ with positive direction of the xaxis.

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

Passing through the point $(1, 1)$ and $(2, 4)$

8. 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 $30o$.

9. The vertices of $\triangle PQR$ are P(2,1),Q(-2,3) and R(4,5). Find the equation of the median through the vertex R.

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

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

12. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point (2, 3).

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

14. Find the equation of the line passing through the point (0,1) making an angle $\dfrac{2\pi}{3}$ with the positive x-axis. Also, find equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.

15. The perpendicular from the origin to a line meets it at the point (-2, 9) find the equation of the line.
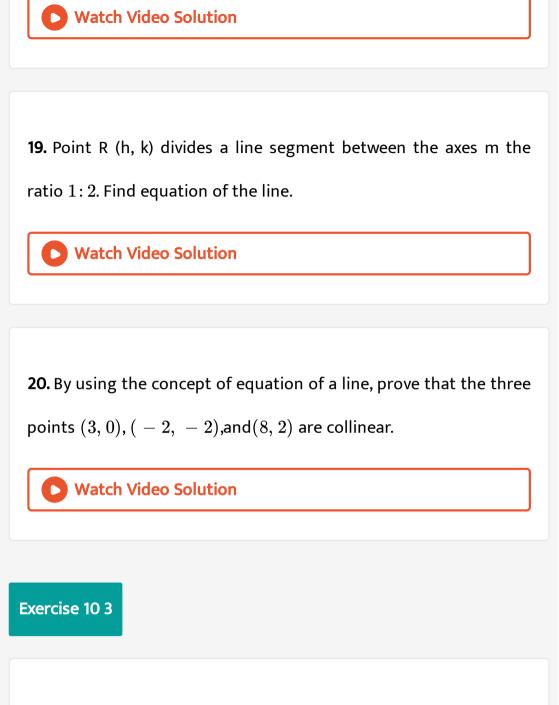
16. The length L (in centimetre) of a copper rod is a linear function of its Celsius temperature C. In an experiment, if $L = 124.942$ when $C = 20$ and $L = 125.134$ when $C = 110$, express L in terms of C.

17. 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 linear relation between selling price and demand, how many litres could he sell weekly at Rs 17/litre?

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

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

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

Exercise 10 3

1. Reduce the following equations into slope-intercept form and find their slopes and the y-intercepts.

$(i) x + 7y = 0, (ii) 6x + 3y - 5 = 0, (iii) y = 0$

2. Reduce the following equations into intercept form and find their intercepts on the axes.(i) $3x + 2y12 = 0$, (ii) $4x3y = 6$, (iii) $3y + 2 = 0$.

3. Reduce the following equations into normal form. Find their perpendicular distances from the origin and angle between perpendicular and the positive xaxis.(i) $x - \sqrt{3}y + 8 = 0$, (ii) $y2 = 0$, (iii) $xy = 4$.

4. Find the distance of the point $(-1, 1)$ from the line $12(x + 6) = 5(y - 2)$.

5. Find the points of the xaxis, whose distances from the line $\frac{x}{3} + \frac{y}{4} = 1$ are 4 unit is.

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

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

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

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

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

11. Prow that the line through the point $(x_1 > y_1)$ and parallel to the line $Ax + By + C = 0$ is $A(x - x_1) + B(y - y_1) = 0$.

12. Two lines passing through the point $(2, 3)$ intersects each other at an angle of $60o$. If slope of one line is 2, find equation of the other line.

13. Find the equation of the right bisector of the line segment joining the points $(3, 4)$ and (-1.2).

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

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

16. If p and q are the lengths of perpendiculars from the origin to the lines $x \cos \theta - y \sin \theta = k \cos 2\theta$ and $x \sec \theta + y \csc \theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.

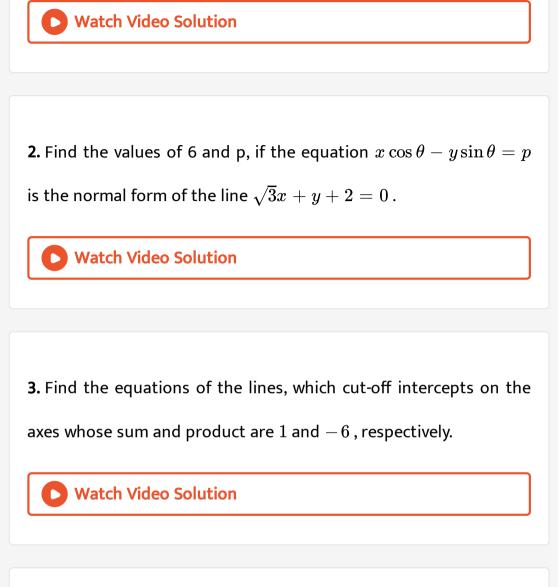**17.** In the triangle ABC with vertices A (2, 3), B (4, 1) and C (1, 2), find the equation and length of altitude from the vertex A.

18. 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

$$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$$

Miscelloneous Exercise

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

2. Find the values of 6 and p, if the equation $x \cos \theta - y \sin \theta = p$ is the normal form of the line $\sqrt{3}x + y + 2 = 0$.

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

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

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

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7. Find the equation of a line drawn perpendicular to the line $\dfrac{x}{4} + \dfrac{y}{6} = 1$ through the point, where it meets the yaxis

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

9. Find the value of p so that the three lines $3x + y2 = 0$, $px + 2y3 = 0$ and $2xy3 = 0$ may intersect at one point.

10. 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 $m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0$.

11. Find the equation of the lines through the point (3, 2) which make an angle of $45o$ with the line $x - 2y = 3$.
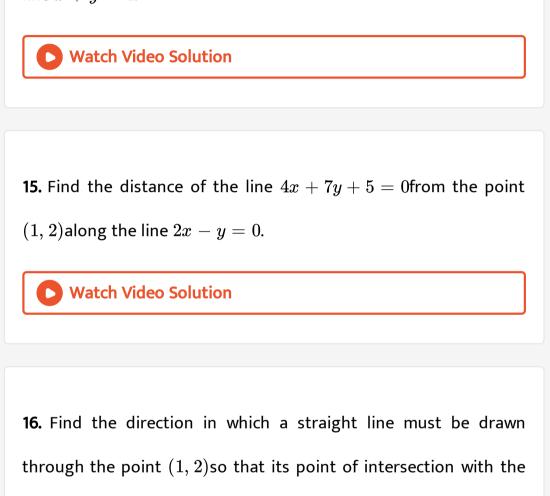
12. Find the equation of the line passing through the point of intersection of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.

13. Show that the equation of the passing through the origin and making an angle θ with the $y = mx + c$ is $\frac{y}{x} = \pm \frac{m + \tan\theta}{1 - m\tan\theta}$.

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

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

16. 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 $x + y4$ may be at a distance of 3 units from this point.

17. 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.
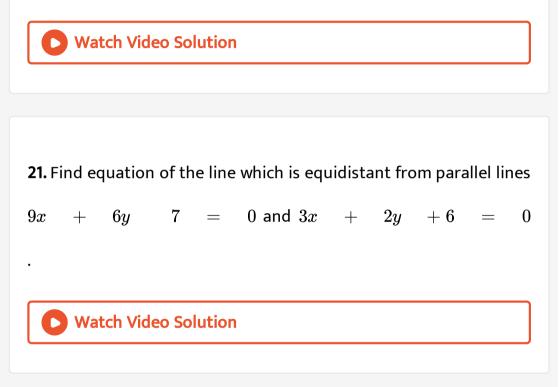
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18. Find the image of the point $(3, 8)$ with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.

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

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20. If sum of the perpendicular distances of a variable point $P(x, y)$ from the lines $x + y5 = 0$ and $3x2y + 7 = 0$ is always 10. Show that P must move on a line.

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21. Find equation of the line which is equidistant from parallel lines $9x + 6y 7 = 0$ and $3x + 2y + 6 = 0$.

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22. A ray of light passing through the point $(1, 2)$ reflects on the $x - a\xi s$ at point A and the reflected ray passes through the point $(5, 3)$. Find the co-ordinates of A.

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23. 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 $\dfrac{x}{a}\cos\theta + \dfrac{y}{b}\sin\theta = 1$ is b^2.
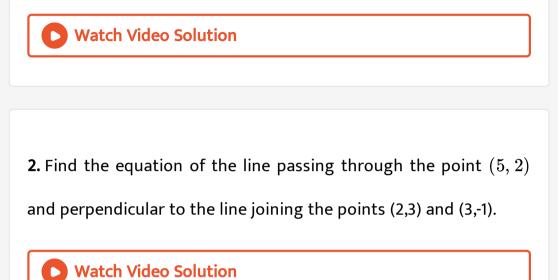
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24. A person standing at a junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ seek to reach the path whose equation is $6x - 7y + 8 = 0$ in the least times. Find the equation of the path that he should follow.

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Exercise

1. Find the equation of the straight line which passes through the point $(1 - 2)$ and cuts off equal intercepts from axes.

2. Find the equation of the line passing through the point $(5, 2)$ and perpendicular to the line joining the points (2,3) and (3,-1).

3. Find the points on the line $x + y = 4$ that lies at a unit distance from the line $4x + 3y = 10$.

4. If the intercept of a line between the coordinate axes is divided by the point $(-5, 4)$ in the ratio $1:2,$ then find the equation of the line.

5. 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.

6. A variable line passes through a fixed point P. The algebraic sum of the perpendiculars drawn from the points (2,0), (0,2) and (1,1) on the line is zero. Find the coordinate of the point P.
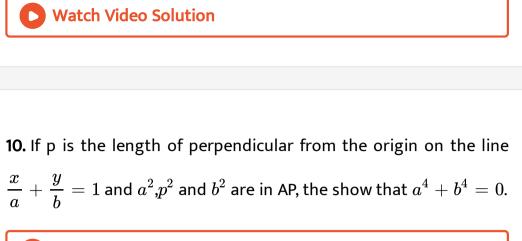
7. Astraight line moves so that the sum of the reciprocals of its intercepts made on axes is constant. Show that the line passes through a fixed point.

8. If the sum of the distances of a moving point in a plane from the axes is $1,$ then find the locus of the point.

9. P_1, P_2 are points on either of the two lines $y - \sqrt{3}|x| = 2$ at a distance of 5 units from the poinfÃ¶f intersection. Find the coordinates of the foot of perpendiculars drawn from P_1, P_2 on the bisector the angle between the given lines.

10. If p is the length of perpendicular from the origin on the line $\frac{x}{a} + \frac{y}{b} = 1$ and $a^2 p^2$ and b^2 are in AP, the show that $a^4 + b^4 = 0$.
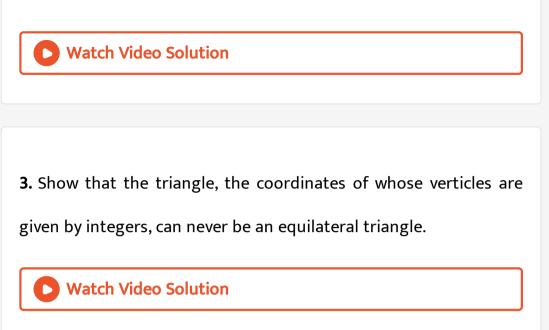
Revision Exercise

1. Two vertices of an equilateral triangle are $(0, 0)$ and $(0, 2\sqrt{3})$. Find the third vertex

2. The coordinatse of two points A and B are $(-1, 4)$ and $(5, 1)$, respectively. Find the coordinates of the point P which lie on

extended line AB such that it is three times as far from B as from A.

3. Show that the triangle, the coordinates of whose verticles are given by integers, can never be an equilateral triangle.

4. If $a \neq b \neq c,$ prove that the points $\left(a, a^2\right), \left(b, b^2\right), \left(c, c^2\right)$ can never be collinear.

5. The vertices of a triangle ABC are $A(3, 0), B(0, 6)$ and $C(6, 9)$. A line DE divides both AB and AC in the ratio $1 : 2$ meeting AB in

D and AC in E. Prove that $\triangle ABC = 9\triangle ADE$.

6. A and A' be the points $(5, 0)$ and $(-5, 0)$ respectively. Find the equation of the set of all points $P(x, y)$ such that $|AP - A'P| = 6$

7. AB is a variable line sliding between the coordinate axes in such a way that A lies on the x-axis and B lies on the y-axis. If P is a variable point on AB such that $PA = b, Pb = a$, and $AB = a + b,$ find the equation of the locus of P.

8. Find the equation of the straight lines joining the points $(a\cos\theta_1,\ a\sin\theta_1)$ and $(a\cos\theta_2,\ a\sin\theta_2)$.

9. The extremities of the base of an isosceles triangle have coordinates (2a , 0) and (0,a) . If the equation of one of the equal sides be x = 2a , find the equation of the other equal side and the area of the triangle .

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

11. Find the distance of the line $4xy = 0$ from the point P(4, 1) measured along the line making an angle of 135° with the positive xaxis.

12. Show that the plane $ax + by + cz + d = 0$ divides the line joining the points $(x_1, y_1, z_1) and (x_2, y_2, z_2)$ in the ratio $\dfrac{ax_1 + by_1 + cz_1 + d}{ax_2 + by_2 + cz_2 + d}$.

13. Prove that $(-1, 4)$ is the orthocentre of the triangle formed by the lines whose equations are :

$x - y + 1 = 0, x - 2y + 4 = 0$ and $9x - 3y + 1 = 0$

14. The equation of the perpendicular bisector of the side AB of a triangle ABC is $x - y + 5 = 0$. If the point A is $(1, 2)$, find the co-ordinates of the point B.

15. The opposite angular points of a square are (3,4) a) and (1,-1). Then the co-ordinates of other two points are() bx + (a) D1, 9 (a) D(1) B(63) 2 2) th 1 9 1 5 2 2) 2 2 (c) D(394 (,) 2' 2 (d) none of these

16. Using the concept of slope, prove that medians of an equilateral triangle are perpendicular to the corresponding sides.
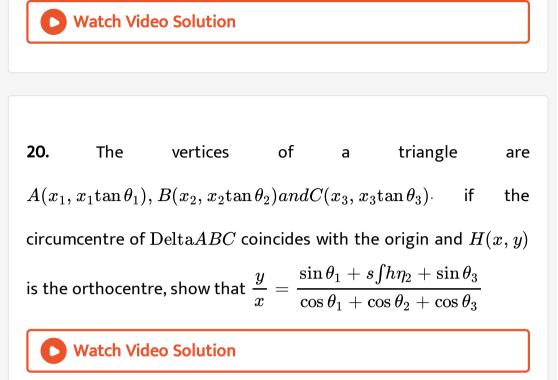
17. Show that the perpendicular drawn from the point $(4, 1)$ on the line segment joining $(6, 5) and (2, -1)$ divides it internally in the ratio $8:5$.

18. A rectangle has two opposite vertices at the points $(1, 2) and (5, 5)$. If the other vertices lie on the line $x = 3$, find the equations of the sides of the rectangle.

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

20. The vertices of a triangle are $A(x_1, x_1\tan\theta_1), B(x_2, x_2\tan\theta_2) and C(x_3, x_3\tan\theta_3).$ if the circumcentre of $\text{Delta}ABC$ coincides with the origin and $H(x, y)$ is the orthocentre, show that $\dfrac{y}{x} = \dfrac{\sin\theta_1 + s\int h\eta_2 + \sin\theta_3}{\cos\theta_1 + \cos\theta_2 + \cos\theta_3}$

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

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

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

24. One side of a square is inclined to the x-axis at an angle α and one of its extremities is at the origin. If the side of the square is 4, find the equations of the diagonals of the square.

25. On the portion of the line $x + 3y - 3 = 0$ 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.

26. 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 $x + y4$ may be at a distance of 3 units from this point.

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

the triangle.
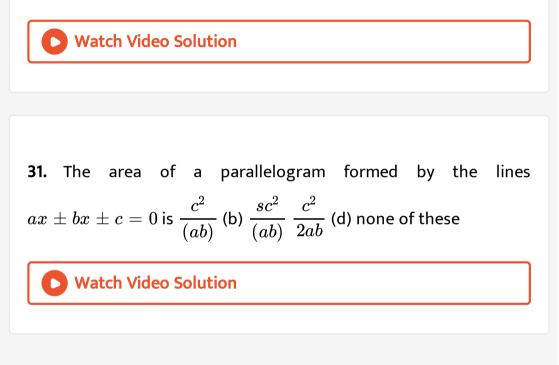
28. A ray of light passing through the point $(1, 2)$ reflects on the $x - a\xi s$ at point A and the reflected ray passes through the point $(5, 3)$. Find the co-ordinates of A.

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

30. 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.

31. The area of a parallelogram formed by the lines $ax \pm bx \pm c = 0$ is $\dfrac{c^2}{(ab)}$ (b) $\dfrac{sc^2}{(ab)}$ $\dfrac{c^2}{2ab}$ (d) none of these

Chapter Test

1. Slope of a line which cuts off intercepts of equal lengths on the axes is

A. -1

B. 0

C. 2

D. $\sqrt{3}$

Answer: A

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2. Find the equations of the diagonals of the square formed by the lines $x = o, y = 0, x = 1 and y = 1$.

A. $y = x, y + x = 1$

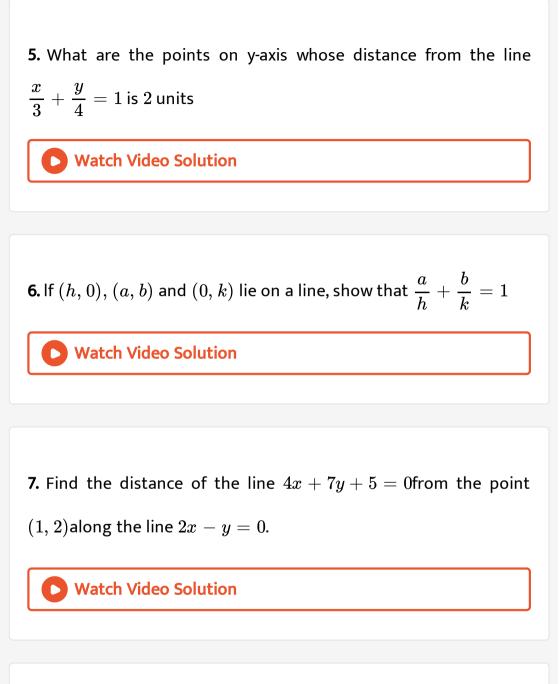B. $y = x, x + y = 2$

C. $2x = x, y + x = 1/3$

D. $y = 2x, y + 2x = 1$

Answer: A

3. Find the equation of the line passing through $(2, 2\sqrt{3})$ and inclined with x-axis at an angle of 75^0 .

4. Find the angle between the st. Lines :

$(a + b)x + (a - b)y = 2ab$ and $(a - b)x + (a + b)y = 2ab$ is

....

5. What are the points on y-axis whose distance from the line $\dfrac{x}{3} + \dfrac{y}{4} = 1$ is 2 units

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

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

8. Assuming that straight lines work as the plane mirror for a point, find the image of the point (1, 2) in the line $x3y + 4 = 0$.

9. 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 $\dfrac{x}{a}\cos\theta + \dfrac{y}{b}\sin\theta = 1$ is b^2.

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

11. Find the equation of the line through the point (0, 2) making an angle $\dfrac{\pi}{6}$ 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.

12. Show that the area of the triangle formed by the straight lines $y = m_1 x + c_1, y = m_2 x + c_2$ and x = 0 is $\dfrac{1}{2} \dfrac{(c_1 - c_2)^2}{|m_1 - m_2|}$ sq . Units

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