EXERCISE 10.1 - Question No. 1

Draw a quadrilateral in the Cartesian plane, whose vertices are $(4, 5)$, $(0, 7)$, $(5, 5)$ and $(4, 2)$. Also, find its area.

EXERCISE 10.1 - Question No. 2

The base of an equilateral triangle with side 2a lies along the yaxis such that the midpoint of the base is at the origin. Find vertices of

the triangle.

EXERCISE 10.1 - Question No. 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.

EXERCISE 10.1 - Question No. 4

Find a point on the xaxis, which is equidistant from the points (7, 6) and (3, 4).

EXERCISE 10.1 - Question No. 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 $B(8, 0)$.

EXERCISE 10.1 - Question No. 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.

EXERCISE 10.1 - Question No. 7

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

EXERCISE 10.1 - Question No. 8

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

EXERCISE 10.1 - Question No. 9

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

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EXERCISE 10.1 - Question No. 10

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

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EXERCISE 10.1 - Question No. 11

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

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EXERCISE 10.1 - Question No. 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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EXERCISE 10.1 - Question No. 13

If three points (h, 0), (a, b) and (o, k) lie on a line, show that

$$\frac{a}{h} + \frac{b}{k} = 1 .$$

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EXERCISE 10.1 - Question No. 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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EXERCISE 10.2 - Question No. 1

Write the equations for the xand yaxes.

EXERCISE 10.2 - Question No. 2

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

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

EXERCISE 10.2 - Question No. 3

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

Passing through (0, 0) with slope m.

EXERCISE 10.2 - Question No. 4

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

Passing through $(2, 2\sqrt{3})$ and inclined with the xaxis at an angle of 75 .

EXERCISE 10.2 - Question No. 5

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

Intersecting the xaxis at a distance of 3 units to the left of origin with slope 2 .

EXERCISE 10.2 - Question No. 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 30 with positive direction of the xaxis.

EXERCISE 10.2 - Question No. 7

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

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

EXERCISE 10.2 - Question No. 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 30 .

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EXERCISE 10.2 - Question No. 9

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

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EXERCISE 10.2 - Question No. 10

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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EXERCISE 10.2 - Question No. 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.

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EXERCISE 10.2 - Question No. 12

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

EXERCISE 10.2 - Question No. 13

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

EXERCISE 10.2 - Question No. 14

Find equation of the line through the point $(0, 2)$ making an angle $\frac{2\pi}{3}$ with the positive xaxis. Also, find the equation of line parallel to it and crossing the xaxis at a distance of 2 units below the origin.

EXERCISE 10.2 - Question No. 15

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

EXERCISE 10.2 - Question No. 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.

EXERCISE 10.2 - Question No. 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 a linear relationship between selling price and demand, how many litres could he sell weekly at Rs 17 / litre?

EXERCISE 10.2 - Question No. 18

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

EXERCISE 10.2 - Question No. 19

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

EXERCISE 10.2 - Question No. 20

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

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EXERCISE 10.3 - Question No. 1

Reduce the following equations into slope intercept form and find their slopes and the y intercepts. (i) $x + 7y = 0$, (ii) $6x + 3y5 = 0$, (iii) $y = 0$.

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EXERCISE 10.3 - Question No. 2

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

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EXERCISE 10.3 - Question No. 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) $xy = 4$.

EXERCISE 10.3 - Question No. 4

Find the distance of the point $(1, 1)$ from the line

$12(x + 6) = 5(y2)$.

EXERCISE 10.3 - Question No. 5

Find the points of the xaxis, whose distances from the line

$\frac{x}{3} + \frac{y}{4} = 1$ are 4 unit is.

EXERCISE 10.3 - Question No. 6

Find the distance between parallel lines (i) $15x + 8y34 = 0$ and

$15x + 8y + 31 = 0$ (ii) $l(x + y) + p = 0l(x + y) - r = 0$.

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EXERCISE 10.3 - Question No. 7

Find equation of the line parallel to the line $3x - 4y + 2 = 0$ and

passing through the point $(2, 3)$.

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EXERCISE 10.3 - Question No. 8

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

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EXERCISE 10.3 - Question No. 9

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

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EXERCISE 10.3 - Question No. 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 h.

EXERCISE 10.3 - Question No. 11

Prow that the line through the point (x_1, y_1) and parallel to the line

$Ax + By + C = 0$ is $A(x - x_1) + B(y - y_1) = 0$.

EXERCISE 10.3 - Question No. 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.

EXERCISE 10.3 - Question No. 13

Find the equation of the right bisector of the line segment joining the points (3, 4) and (1, 2).

EXERCISE 10.3 - Question No. 14

Find the coordinates of the foot of perpendicular from the point (1, 3) to the line $3x4y16 = 0$.

EXERCISE 10.3 - Question No. 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.

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EXERCISE 10.3 - Question No. 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 $x\sec\theta + ycosec\theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.

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EXERCISE 10.3 - Question No. 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.

EXERCISE 10.3 - Question No. 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 $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

EXERCISE 10.4 - Question No. 1

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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EXERCISE 10.4 - Question No. 2

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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EXERCISE 10.4 - Question No. 3

Find the equation of the line through the intersection of the lines

$2x + 3y\,4 = 0$ and $x - 5y = 7$ that has its x-intercept equal to

4 .

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EXERCISE 10.4 - Question No. 4

Find the equation of the line through the intersection of

$5x - 3y = 1$ and $2x - 3y - 23 = 0$ and perpendicular to the line

$5x - 3y - 1 = 0$.

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EXERCISE 10.5 - Question No. 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)

EXERCISE 10.5 - Question No. 2

Find what the following equations become when the origin is shifted to the point (1, 1) (i) $x^2 + xy - 3y^2 - y + 2 = 0$ (ii) $xy - y^2 - x + y = 0$ (iii) $xy - x - y + 1 = 0$

MISCELLANEOUS EXERCISE - Question No. 1

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 y axis, (c) Passing through the origin.

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MISCELLANEOUS EXERCISE - Question No. 2

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

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MISCELLANEOUS EXERCISE - Question No. 3

Find the equations of the lines, which cutoff intercepts on the axes whose sum and product are 1 and 6 , respectively.

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MISCELLANEOUS EXERCISE - Question No. 4

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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MISCELLANEOUS EXERCISE - Question No. 5

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

MISCELLANEOUS EXERCISE - Question No. 6

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

MISCELLANEOUS EXERCISE - Question No. 7

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 yaxis

MISCELLANEOUS EXERCISE - Question No. 8

Find the area of the triangle formed by the lines

$y-x=0, x+y=0$ and $x-k=0$.

MISCELLANEOUS EXERCISE - Question No. 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.

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MISCELLANEOUS EXERCISE - Question No. 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

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

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MISCELLANEOUS EXERCISE - Question No. 11

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

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MISCELLANEOUS EXERCISE - Question No. 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.

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MISCELLANEOUS EXERCISE - Question No. 13

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

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MISCELLANEOUS EXERCISE - Question No. 14

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

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MISCELLANEOUS EXERCISE - Question No. 15

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

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MISCELLANEOUS EXERCISE - Question No. 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.

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MISCELLANEOUS EXERCISE - Question No. 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.

MISCELLANEOUS EXERCISE - Question No. 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.

MISCELLANEOUS EXERCISE - Question No. 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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MISCELLANEOUS EXERCISE - Question No. 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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MISCELLANEOUS EXERCISE - Question No. 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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MISCELLANEOUS EXERCISE - Question No. 22

A ray of light passing through the point (1, 2) reflects on the xaxis at point A and the reflected ray passes through the point (5, 3). Find the coordinates of A.

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MISCELLANEOUS EXERCISE - Question No. 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 $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ is b^2 .

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MISCELLANEOUS EXERCISE - Question No. 24

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

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SOLVED EXAMPLES - Question No. 1

Find the slope of the lines: (a) Passing through the points $(3, 2)$ and (1.4) , (b) Passing through the points $(3, 2)$ and $(7, 2)$, (c) Passing through the points $(3, 2)$ and $(3, 4)$, (d) Making inclination of $60o$ with the p

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SOLVED EXAMPLES - Question No. 2

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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SOLVED EXAMPLES - Question No. 3

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.

SOLVED EXAMPLES - Question No. 4

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

SOLVED EXAMPLES - Question No. 5

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.

SOLVED EXAMPLES - Question No. 6

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

SOLVED EXAMPLES - Question No. 7

Find the equation of the line through $(2, 3)$ with slope 4 .

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SOLVED EXAMPLES - Question No. 8

Write the equation of the line through the points $(1, 1)$ and $(3, 5)$.

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SOLVED EXAMPLES - Question No. 9

Write the equation of the line for which $\tan\theta = \frac{1}{2}$, where θ is the inclination of the line and (i) yintercept is $-\frac{3}{2}$ (ii) xintercept is 4.

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SOLVED EXAMPLES - Question No. 10

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

SOLVED EXAMPLES - Question No. 11

Find the equation of the line whose perpendicular distance from the origin is 4 units and the angle which the normal makes with positive direction of xaxis is $15o$.

SOLVED EXAMPLES - Question No. 12

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

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SOLVED EXAMPLES - Question No. 13

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

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SOLVED EXAMPLES - Question No. 14

Reduce the equation $\sqrt{3}x + y - 8 = 0$ into normal form. Find the values of p and ω .

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SOLVED EXAMPLES - Question No. 15

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

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SOLVED EXAMPLES - Question No. 16

Show that two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$

, where $b_1, b_2 \neq 0$ are : (i) Parallel if $\frac{a_1}{b_1} = \frac{a_2}{b_2}$, and (ii)

perpendicular if $a_1a_2 + b_1b_2 = 0$.

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SOLVED EXAMPLES - Question No. 17

Find the equation of a line perpendicular to the line

$x - 2y + 3 = 0$ and passing through the point $(1, 2)$.

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SOLVED EXAMPLES - Question No. 18

Find the distance of the point $(3, -5)$ from the line

$3x - 4y - 26 = 0$.

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SOLVED EXAMPLES - Question No. 19

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

$3x4y + 5 = 0$.

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SOLVED EXAMPLES - Question No. 20

If the lines $2a + y3 = 0$, $5x + ky3 = 0$ and $3xy2 = 0$ are concurrent, find the value of k.

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SOLVED EXAMPLES - Question No. 21

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.

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SOLVED EXAMPLES - Question No. 22

Assuming that straight lines work as the plane mirror for a point,

find the image of the point (1, 2) in the line $x3y + 4 = 0$.

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SOLVED EXAMPLES - Question No. 23

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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SOLVED EXAMPLES - Question No. 24

A line is such that its segment between the lines $5xy + 4 = 0$ and

$3x + 4y4 = 0$ is bisected at the point $(1, 5)$. Obtain its equation.

SOLVED EXAMPLES - Question No. 25

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.

SOLVED EXAMPLES - Question No. 26

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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SOLVED EXAMPLES - Question No. 27

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

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SOLVED EXAMPLES - Question No. 28

Find the transformed equation of the straight line $2x3y + 5 = 0$, when the origin is shifted to the point $(3, -1)$ after translation of axes.