Important Questions Class 9 Maths Chapter 4 – Linear Equations in Two Variables

2 Marks Questions

1. The cost of a notebook is twice the cost of a pen. Write a linear equation in two variables to represent this statement.

(Take the cost of a notebook to be Rs *x* and that of a pen to be Rs *y*).

Ans. Let the cost of a notebook be RS. X.
Let the cost of a pen be Rs y.
We need to write a linear equation in two variables to represent the statement, “Cost of a notebook is twice the cost of a pen”.
Therefore, we can conclude that the required statement will be x=2y.

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2. Find the value of *k*, if *x* = 2, *y* = 1 is a solution of the equation 2x + 3y =k.

Ans. We know that, if x=2 and y=1 is a solution of the linear equation 2x + 3y=k, then on substituting the respective values of *x* and *y* in the linear equation 2x + 3y =k, the LHS and RHS of the given linear equation will not be effected.

2(2)+3(1)=k ⇒ k=4+3 ⇒ k=7$2(2)+3(1)=k \Rightarrow k=4+3 \Rightarrow k=7$

Therefore, we can conclude that the value of *k*, for which the linear equation 2x + 3y =k has x = 2 and y=1 as one of its solutions is 7.

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3. Give the equations of two lines passing through (2, 14). How many more such lines are there, and why?

Ans. We need to give the two equations of the line that passes through the point (2,14).

We know that infinite number of lines can pass through any given point.

We can consider the linear equations 7x – y=0 and 2x + y=18.

We can conclude that on putting the values x=2 and y=14 in the above mentioned linear equations, we get LHS=RHS.

Therefore, we can conclude that the line of the linear equations 7x – y =0 and 28x -4y =0 will pass through the point (2, 14).

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4. If the point (3, 4) lies on the graph of the equation 3y = ax + 7, find the value of *a*.

Ans. We know that if any point lie on the graph of any linear equation, then that point is the solution of that linear equation.

We can conclude that (3,4) is a solution of the linear equation 3y = ax + 7.

We need to substitute x=3 and y=4 in the linear equation 3y=ax + 7, to get

$$3(4) = a(3) + 7$$

$$\Rightarrow 12 = 3a + 7$$

3(4)=a(3)+7 ⇒ 12=3a+7⇒ 3a=12−7 ⇒ 3a=5 ⇒ a=53 $\Rightarrow 3a = 12 - 7 \Rightarrow 3a = 5$

$$\Rightarrow a = \frac{5}{3}$$

Therefore, we can conclude that the value of *a* will be 53$\frac{5}{3}$.

5. Which one of the following options is true, and why?
y=3x+5 has
(i) a unique solution, (ii) only two solutions, (iii) infinitely many solutions

Ans. We need to the number of solutions of the linear equation y=3x+5.
We know that any linear equation has infinitely many solutions.
Justification:
If x=0 then y=3 X 0 + 5 =5.
If x=1then y= 3 X 1+ 5 =8.
If x=-2then y=3 X (-2) +5= -1.
Similarly we can find infinite many solutions by putting the values of x.

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3 Marks Questions

1. Write four solutions for each of the following equations:

(i)2x+y=7$2x + y = 7$

(ii)πx+y=9$\pi x + y = 9$

(iii)x=4y$x = 4y$

Ans.(i)2x+y=7$2x + y = 7$

We know that any linear equation has infinitely many solutions.

Let us putx=0$x = 0$

in the linear equation2x+y=7$2x + y = 7$, to get

2(0)+y=7 ⇒ y=7.$2(0) + y = 7 \Rightarrow y = 7$.

Thus, we get first pair of solution as(0,7) $(0, 7)$.

Let us putx=2$x = 2$

in the linear equation2x+y=7$2x + y = 7$, to get

2(2)+y=7 ⇒ y+4=7 ⇒ y=3.$2(2) + y = 7 \Rightarrow y + 4 = 7 \Rightarrow y = 3$.

Thus, we get second pair of solution as(2,3) $(2, 3)$.

Let us putx=4$x = 4$in the linear equation

2x+y=7$2x + y = 7$, to get

2(4)+y=7 ⇒ y+8=7 ⇒ y=−1.$2(4) + y = 7 \Rightarrow y + 8 = 7 \Rightarrow y = -1$.

Thus, we get third pair of solution as(4,−1) $(4, -1)$.

Let us putx=6$x = 6$in the linear equation

2x+y=7$2x + y = 7$, to get

2(6)+y=7 ⇒ y+12=7 ⇒ y=−5.$2(6) + y = 7 \Rightarrow y + 12 = 7 \Rightarrow y = -5$.

Thus, we get fourth pair of solution as(6,−5) $(6, -5)$.

Therefore, we can conclude that four solutions for the linear equation

2x+y=7$2x + y = 7$are

(0,7),(2,3),(4,−1) and (6,−5) $(0, 7), (2, 3), (4, -1) \text{ and } (6, -5)$.

(ii)πx+y=9$\pi x + y = 9$

We know that any linear equation has infinitely many solutions.

Let us putx=0$x = 0$

in the linear equation πx+y=9 $\pi x + y = 9$, to get

π(0)+y=9 ⇒ y=9 $\pi(0) + y = 9 \Rightarrow y = 9$

Thus, we get first pair of solution as (0,9) $(0, 9)$.

Let us put y=0 $y = 0$ in the linear equation

πx+y=9 $\pi x + y = 9$, to get

πx+(0)=9 ⇒ x=9π. $\pi x + (0) = 9 \Rightarrow x = \frac{9}{\pi}$.

Thus, we get second pair of solution as

(9π,0) $(\frac{9}{\pi}, 0)$.

Let us put x=1 $x = 1$

in the linear equation πx+y=9 $\pi x + y = 9$, to get

π(1)+y=9 ⇒ y=9π $\pi(1) + y = 9 \Rightarrow y = \frac{9}{\pi}$

Thus, we get third pair of solution as (1,9π) $(1, \frac{9}{\pi})$.

Let us put y=2 $y = 2$ in the linear equation

πx+y=9 $\pi x + y = 9$, to get

πx+2=9 ⇒ πx=7 ⇒ x=7π $\pi x + 2 = 9 \Rightarrow \pi x = 7 \Rightarrow x = \frac{7}{\pi}$

Thus, we get fourth pair of solution as (7π,2) $(\frac{7}{\pi}, 2)$.

Therefore, we can conclude that four solutions for the linear equation

πx+y=9 $\pi x + y = 9$ are

(0,9),(9π,0),(1,9π) and (7π,2) $(0, 9), (\frac{9}{\pi}, 0), (1, \frac{9}{\pi}) \text{ and } (\frac{7}{\pi}, 2)$.

(iii) x=4y $x = 4y$

We know that any linear equation has infinitely many solutions.

Let us put y=0 $y = 0$ in the linear equation x=4y$x = 4y$, to get

x=4(0) ⇒ x=0$x = 4(0) \Rightarrow x = 0$

Thus, we get first pair of solution as(0,0) $(0, 0)$.

Let us puty=2$y = 2$in the linear equation

x=4y$x = 4y$, to get

x=4(2) ⇒ x=8$x = 4(2) \Rightarrow x = 8$

Thus, we get second pair of solution as(8,2) $(8, 2)$.

Let us puty=4$y = 4$in the linear equation

x=4y$x = 4y$, to get

x=4(4) ⇒ x=16$x = 4(4) \Rightarrow x = 16$

Thus, we get third pair of solution as(16,4) $(16, 4)$.

Let us puty=6$y = 6$in the linear equation

x=4y$x = 4y$, to get

x=4(6) ⇒ x=24$x = 4(6) \Rightarrow x = 24$

Thus, we get fourth pair of solution as(24,6) $(24, 6)$.

Therefore, we can conclude that four solutions for the linear equation

x=4y$x = 4y$are

(0,0),(8,2),(16,4) and (24,6) $(0, 0), (8, 2), (16, 4) \text{ and } (24, 6)$

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2. Check which of the following are solutions of the equationx−2y=4$x - 2y = 4$and which are not:

(i)(0,2) $(0, 2)$

(ii)(2,0) $(2, 0)$

(iii)(4,0) $(4, 0)$

(iv)(2–√,42–√) $(\sqrt{2}, 4\sqrt{2})$

(v)(1,1) $(1, 1)$

Ans. (i)(0,2) $(0, 2)$

We need to putx=0 and y=2$x = 0 \text{ and } y = 2$

in the L.H.S. of linear equation

x−2y=4$x - 2y = 4$, to get

(0)−2(2)=−4 $(0) - 2(2) = -4$

∴ ∴ L.H.S. ≠ ≠ R.H.S.

Therefore, we can conclude that(0,2) $(0, 2)$

is not a solution of the linear equationx−2y=4$x - 2y = 4$.

(ii) (2,0) $(2, 0)$

We need to putx=2 and y=0$x = 2 \text{ and } y = 0$

in the L.H.S. of linear equation

x−2y=4$x - 2y = 4$, to get

(2)−2(0)=2 $(2) - 2(0) = 2$

∴ ∴ L.H.S. ≠ ≠ R.H.S.

Therefore, we can conclude that(2,0) $(2, 0)$

is not a solution of the linear equationx−2y=4$x - 2y = 4$.

(iii)(4,0) $(4, 0)$

We need to putx=4 and y=0$x = 4 \text{ and } y = 0$

in the linear equationx−2y=4$x - 2y = 4$, to get

(4)−2(0)=4 $(4) - 2(0) = 4$

∴ ∴ L.H.S. = = R.H.S.

Therefore, we can conclude that(4,0) $(4, 0)$

is a solution of the linear equationx−2y=4$x - 2y = 4$.

(iv) (2–√,42–√) $(\sqrt{2}, 4\sqrt{2})$

We need to putx=2–√ and y=42–√$x = \sqrt{2}$ and $y = 4\sqrt{2}$

in the linear equationx−2y=4$x - 2y = 4$, to get

(2–√)−2(42–√)=−72–√ $(\sqrt{2}) - 2(4\sqrt{2}) = -7\sqrt{2}$

∴ ∴ L.H.S. ≠ ≠ R.H.S.

Therefore, we can conclude that(2–√,42–√) $(\sqrt{2}, 4\sqrt{2})$

is not a solution of the linear equationx−2y=4$x - 2y = 4$.

(v) (1,1) $(1, 1)$

We need to putx=1 and y=1$x = 1$ and $y = 1$

in the linear equationx−2y=4$x - 2y = 4$, to get

(1)−2(1)=−1 $(1) - 2(1) = -1$

∴ ∴ L.H.S. ≠ ≠ R.H.S.

Therefore, we can conclude that(1,1) $(1, 1)$

is not a solution of the linear equationx−2y=4$x - 2y = 4$.

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3. Draw the graph of each of the following line a equations in two variables:

(i)x+y=4$x + y = 4$

(ii)x−y=2$x - y = 2$

(iii)y=3x$y = 3x$

(iv)3=2x+y$3 = 2x + y$

Ans. (i)x+y=4$x + y = 4$

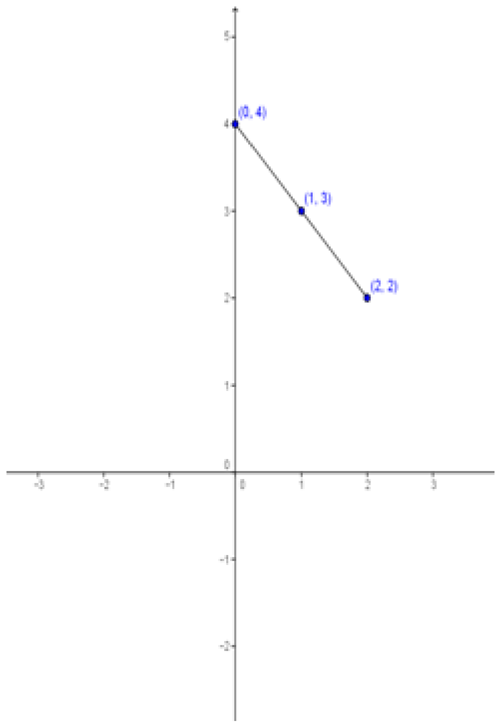
We can conclude thatx=0,y=4;x=1,y=3 and x=2,y=2
$x = 0, y = 4; x = 1, y = 3$ and $x = 2, y = 2$

are the solutions of the linear equationx+y=4$x + y = 4$.

We can optionally consider the given below table for plotting the linear equation

x+y=4$x + y = 4$on the graph.

X	0	1	2
y	4	3	2



(ii) x−y=2$x - y = 2$

We can conclude thatx=0,y=−2;x=1,y=−1 and x=2,y=0
$x = 0 , y = -2 ; x = 1 , y = -1$ and $x = 2 , y = 0$

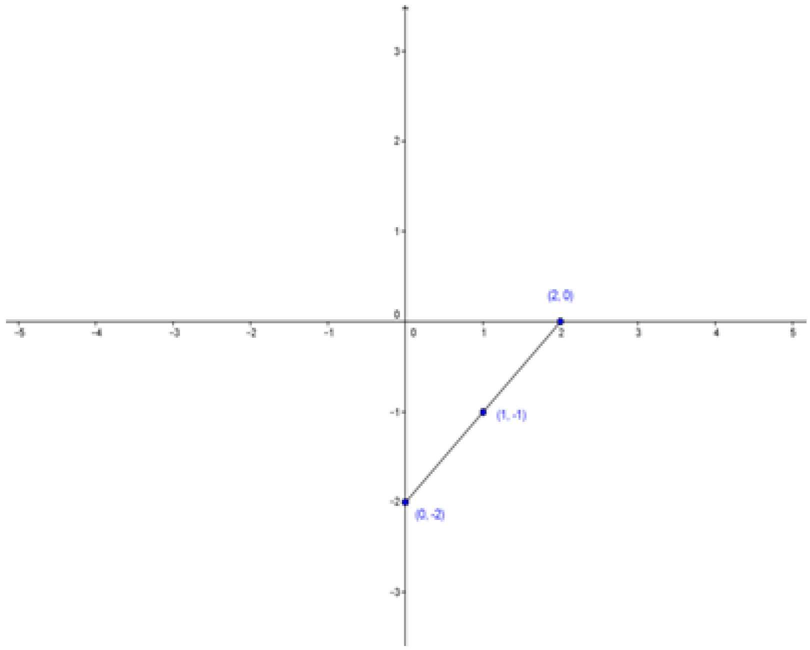
are the solutions of the linear equationx−y=2$x - y = 2$.

We can optionally consider the given below table for plotting the linear equation

x−y=2$x - y = 2$on the graph.

X	0	1	2

y	-2	-1	0



(iii) y=3x$y = 3x$

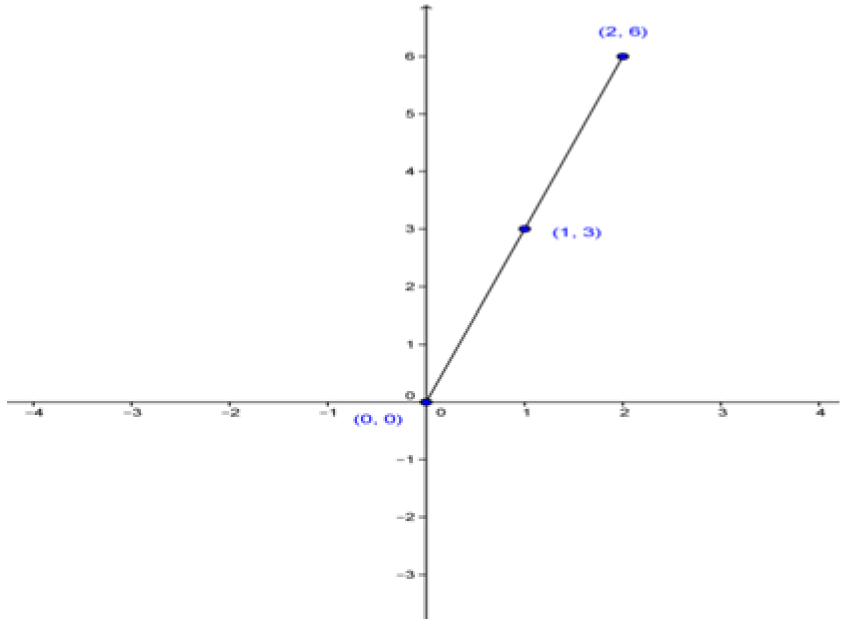
We can conclude thatx=0,y=0;x=1,y=3 and x=2,y=6
$x = 0$, $y = 0$; $x = 1$, $y = 3$ and $x = 2$, $y = 6$

are the solutions of the linear equationy=3x$y = 3x$.

We can optionally consider the given below table for plotting the linear equation

y=3x$y = 3x$on the graph.

X	0	1	2
y	0	3	6



(iv) 3=2x+y$3 = 2x + y$

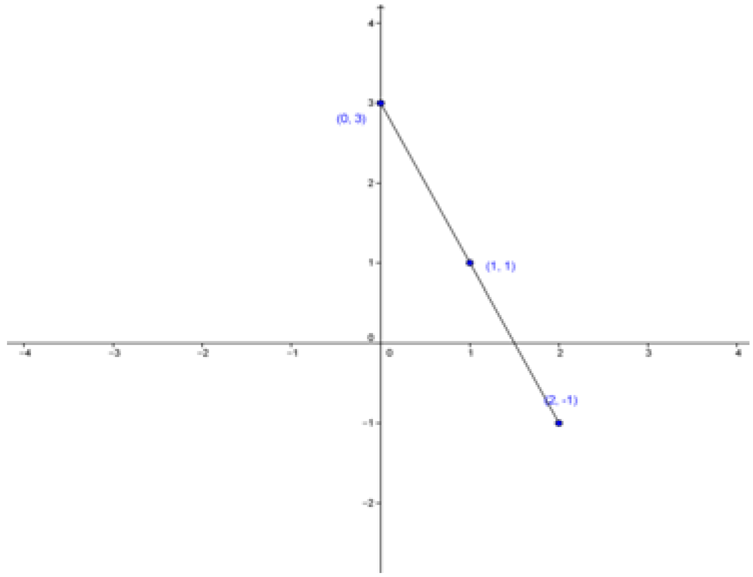
We can conclude thatx=0,y=3;x=1,y=1 and x=2,y=−1
$x = 0 , y = 3 ; x = 1 , y = 1$ and $x = 2 , y = -1$

are the solutions of the linear equation3=2x+y$3 = 2x + y$.

We can optionally consider the given below table for plotting the linear equation

3=2x+y$3 = 2x + y$on the graph.

X	0	1	2
y	3	1	-1



4. The taxi fare in a city is as follows: For the first kilometre, the fare is Rs 8 and for the subsequent distance it is Rs 5 per km. Taking the distance covered as *x* km and total fare as Rs*y*, write a linear equation for this information, and draw its graph.

Ans. From the given situation, we can conclude that the distance covered at the rate Rs 5 perkm will be

(x−1) $(x-1)$, as first kilometer is charged at Rs 8 per km.

We can conclude that the linear equation for the given situation will be:

8+5(x−1)=y ⇒ 8+5x−5=y ⇒ 3+5x=y.$8+5(x-1)=y \Rightarrow 8+5x-5=y \Rightarrow 3+5x=y$.

We need to draw the graph of the linear equation3+5x=y$3+5x=y$.

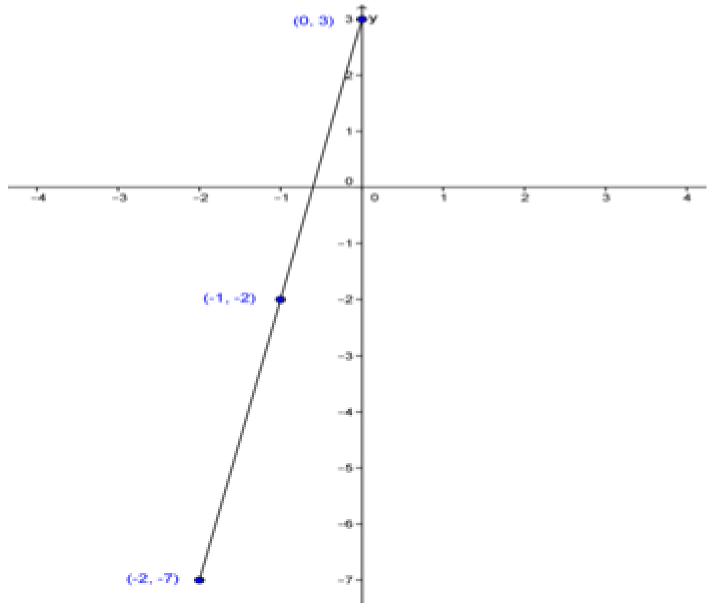
We can conclude thatx=0,y=3;x=1,y=1 and x=2,y=−1
$x=0, y=3; x=1, y=1$ and $x=2, y=-1$

are the solutions of the linear equation3+5x=y$3+5x=y$.

We can optionally consider the given below table for plotting the linear equation

3+5x=y$3+5x=y$on the graph.

X	0	-1	-2
y	3	-2	-7



5. Give the geometric representation ofy=3$y = 3$asanequation

(i) In one variable,

(ii) In two variables

Ans. We need to represent the linear equationy=3$y = 3$geometrically in one variable.

(i) We can conclude that in one variable, the geometric representation of the linear equationy=3$y = 3$

will be same as representing the number 3 on a number line.

Given below is the representation of number 3 on the number line.

We need to represent the linear equationy=3$y = 3$

geometrically in two variables.

We know that the linear equationy=3$y = 3$

can also be written as0·x+y=3$0 \cdot x + y = 3$.

(ii) We can conclude that in two variables, the geometric representation of the linear equationy=3$y = 3$

will be same as representing the graph of linear equation0·x+y=3$0 \cdot x + y = 3$.

Given below is the representation of the linear equation0·x+y=3$0 \cdot x + y = 3$on a graph.

We can optionally consider the given below table for plotting the linear equation

0·x+y=3$0 \cdot x + y = 3$on the graph.

X	1	0
y	3	3

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6. Give the geometricrepresentations of2x+9=0$2x + 9 = 0$as an equation

(i) In one variable

(ii) In two variables

Ans. We need to represent the linear equation2x+9=0$2x + 9 = 0$geometrically in one variable.

We know that the linear equation2x+9=0$2x + 9 = 0$can also be written as

x=−92 or x=−4.5$x = -\frac{9}{2} \text{ or } x = -4.5.$

(i) We can conclude that in one variable, the geometric representation of the linear equation

2x+9=0$2x + 9 = 0$will be same as representing the number−4.5-4.5on a number line.

Given below is the representation of number 3 on the number line.

We need to represent the linear equation2x+9=0$2x + 9 = 0$geometrically in two variables.

We know that the linear equation2x+9=0$2x + 9 = 0$can also be written as2x+0·y=9
$2x + 0 \cdot y = 9.$

(ii) We can conclude that in two variables, the geometric representation of the linear equation

2x+9=0$2x + 9 = 0$will be same as representing the graph of linear equation2x+0·y=9
$2x + 0 \cdot y = 9.$

Given below is the representation of the linear equation2x+0·y=9$2x + 0 \cdot y = 9$on a graph.

We can optionally consider the given below table for plotting the linear equation2x+0·y=9 $2x + 0 \cdot y = 9$on the graph.

X	1	0
y	4.5	4.5

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4 Marks Questions

1. Express the following linear equations in the form *ax* + *by* + *c* = 0 and indicate the values of *a*, *b* and *c* in each case:

(i) 2x+3y=9.35‾‾‾ $2x + 3y = 9.3\overline{5}$

(ii) x−y5−10=0$x - \frac{y}{5} - 10 = 0$

(iii) −2x+3y=6 $-2x + 3y = 6$

(iv) x=3y$x = 3y$

(v) 2x=−5y$2x = -5y$

(vi) 3x+2=0$3x + 2 = 0$

(vii) y−2=0$y - 2 = 0$

(viii) 5=2x$5 = 2x$

Ans.(i)2x+3y=9.35‾‾‾ $2x + 3y = 9.3\overline{5}$

We need to express the linear equationin the form *ax* + *by* + *c* = 0 and indicate the values of *a*, *b* and *c.*

2x+3y=9.35‾‾‾ can also be written as 2x+3y−9.35‾‾‾=0.

$2x + 3y = 9.3\overline{5}$ can also be written as $2x + 3y - 9.3\overline{5} = 0$.

We need to compare the equation2x+3y−9.35‾‾‾‾=0 $2x + 3y - \sqrt{9.35} = 0$

with the general equation *ax* + *by* + *c* = 0, to get the values of *a*, *b* and *c*.

Therefore, we can conclude thata=2,b=3 and c=−9.35‾‾‾‾ $a = 2$, $b = 3$ and $c = -\sqrt{9.35}$

(ii)x−y5−10=0