Exercise 4.1 (Revised) - Chapter 4 - Linear Equations In Two Variables - Ncert Solutions class 9 - Maths

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Chapter 4 - Linear Equations in Two Variables - NCERT Solutions Class 9 Maths

Ex 4.1 Question 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).

Answer.

Let the cost of a notebook be Rs. x.

Let the cost of a pen be R s. 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 $x=2y$.

Ex 4.1 Question 2.

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) $2x+3y=9.3\overline{5}$
(ii) $x-\frac{y}{5}-10=0$
(iii) $-2x+3y=6$
(iv) $x=3y$
(v) $2x=-5y$
(vi) $3x+2=0$
(vii) $y-2=0$
(viii) $5=2x$

Answer.

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

We need to express the linear equation $2x+3y=9.3\overline{5}$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$2x+3y=9.3\overline{5}$ can also be written as $2x+3y-9.3\overline{5}=0$.

We need to compare the equation $2x+3y-9.3\overline{5}=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=2, b=3$ and $c=-9.3\overline{5}$
(ii) $x-\frac{y}{5}-10=0$

We need to express the linear equation $x-\frac{y}{5}-10=0$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$x-\frac{y}{5}-10=0$ can also be written as $1 \cdot x-\frac{y}{5}-10=0$.

We need to compare the equation
$1 \cdot x-\frac{y}{5}-10=0$
with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that
$a=1, b=-\frac{1}{5}$ and $c=-10$
(iii) $-2x+3y=6$

We need to express the linear equation $-2x+3y=6$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$-2x+3y=6$ can also be written as $-2x+3y-6=0$.

We need to compare the equation $-2x+3y-6=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=-2, b=3$ and $c=-6$.
(iv) $x=3y$

We need to express the linear equation $x=3y$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$x=3y$ can also be written as $x-3y+0=0$.

We need to compare the equation $x-3y+0=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=1, b=-3$ and $c=0$.
(v) $2x=-5y$

We need to express the linear equation $2x=-5y$ in the form $ax+by+c=0$ and indicate the values of a,

$2x=-5y$ can also be written as $2x+5y+0=0$.

We need to compare the equation $2x+5y+0=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=2, b=5$ and $c=0$.
(vi) $3x+2=0$

We need to express the linear equation $3x+2=0$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$3x+2=0$ can also be written as $3x+0\cdot y+2=0$.

We need to compare the equation $3x+0\cdot y+2=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=3, b=0$ and $c=2$.
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(vii) $y-2=0$

We need to express the linear equation $y-2=0$ in the form $ax+by+c=0$ and indicate the values of a, b and c.

$y-2=0$ can also be written as $0\cdot x+1\cdot y-2=0$.

We need to compare the equation $0\cdot x+1\cdot y-2=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=0, b=1$ and $c=-2$.
(viii) $5=2x$

We need to express the linear equation $5=2x$ in the form $ax+by+c=0$ and indicate the values of a, b and c.
$5=2x$ can also be written as $-2x+0\cdot y+5=0$.

We need to compare the equation $-2x+0\cdot y+5=0$ with the general equation $ax+by+c=0$, to get the values of a, b and c.

Therefore, we can conclude that $a=-2, b=0$ and $c=5$.

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Ex 4.2 Question 1.

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

Answer.

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 $y=3\times 0+5=5$
If $x=1$ then $y=3\times 1+5=8$

If $x=-2$ then $y=3\times(-2)+5=-1$

Similarly, we can find infinite many solutions by putting the values of x.

Ex 4.2 Question 2.

Write four solutions for each of the following equations:
(i) $2x+y=7$
(ii) $\pi x+y=9$
(iii) $x=4y$

Answer.

$2x+y=7$

We know that any linear equation has infinitely many solutions.

Let us put $x=0$ in the linear equation $2x+y=7$, to get
$2(0)+y=7 \quad \Rightarrow y=7$

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

Let us put $x=2$ in the linear equation $2x+y=7$, to get
$2(2)+y=7 \Rightarrow y+4=7 \Rightarrow y=3$.

Thus, we get second pair of solution as $(2,3)$.
Let us put $x=4$ in the linear equation $2x+y=7$, to get
$2(4)+y=7 \quad \Rightarrow y+8=7 \Rightarrow y=-1$

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

Let us put $x=6$ in the linear equation $2x+y=7$, to get
$2(6)+y=7 \Rightarrow y+12=7 \Rightarrow y=-5$.

Thus, we get fourth pair of solution as $(6,-5)$.
Therefore, we can conclude that four solutions for the linear equation $2x+y=7$ are $(0,7),(2,3),(4,-1)$ and $(6,-5)$.
(ii) $\pi x+y=9$

We know that any linear equation has infinitely many solutions.
Let us put $x=0$ in the linear equation $\pi x+y=9$, to get
$\pi(0)+y=9 \quad \Rightarrow y=9$

Thus, we get first pair of solution as $(0,9)$.
Let us put $y=0$ in the linear equation $\pi x+y=9$, to get
$\pi x+(0)=9 \quad \Rightarrow x=\frac{9}{\pi}$

Thus, we get second pair of solution as $\left(\frac{9}{\pi}, 0\right)$.

Let us put $x=1$ in the linear equation $\pi x+y=9$, to get
$\pi(1)+y=9 \quad \Rightarrow y=\frac{9}{\pi}$

Thus, we get third pair of solution as $\left(1, \frac{9}{\pi}\right)$.
Let us put $y=2$ in the linear equation $\pi x+y=9$, to get
$\pi x+2=9 \quad \Rightarrow \pi x=7 \Rightarrow x=\frac{7}{\pi}$

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

Therefore, we can conclude that four solutions for the linear equation $\pi x+y=9$ are $(0,9),\left(\frac{9}{\pi}, 0\right),\left(1, \frac{9}{\pi}\right)$ and $\left(\frac{7}{\pi}, 2\right)$.
(iii) $x=4y$

We know that any linear equation has infinitely many solutions.

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

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

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

Let us put $y=2$ in the linear equation $x=4y$, to get
$x=4(2) \quad \Rightarrow x=8$

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

Let us put $y=4$ in the linear equation $x=4y$, to get
$x=4(4) \quad \Rightarrow x=16$

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

Let us put $y=6$ in the linear equation $x=4y$, to get
$x=4(6) \quad \Rightarrow x=24$

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

Therefore, we can conclude that four solutions for the linear equation $x=4y$ are $(0,0),(8,2),(16,4)$ and $(24,6)$.

Ex 4.2 Question 3.

Check which of the following are solutions of the equation $x-2y=4$ and which are not:
(i) $(0,2)$
(ii) $(2,0)$
(iii) $(4,0)$
(iv) $(\sqrt{2}, 4\sqrt{2})$
(v) $(1,1)$

Answer.

(i) $(0,2)$
We need to put $x=0$ and $y=2$ in the L.H.S. of linear equation $x-2y=4$, to get
$(0)-2(2)=-4$
$\therefore$ L.H.S. $\neq$ R.H.S.

Therefore, we can conclude that $(0,2)$ is not a solution of the linear equation $x-2y=4$.
(ii) $(2,0)$

We need to put $x=2$ and $y=0$ in the L.H.S. of linear equation $x-2y=4$, to get

$(2)-2(0)=2$
$\therefore$ L.H.S. $\neq$ R.H.S.

Therefore, we can conclude that $(2,0)$ is not a solution of the linear equation $x-2y=4$.
(iii) $(4,0)$

We need to put $x=4$ and $y=0$ in the linear equation $x-2y=4$, to get
(4) $-2(0)=4$
$\therefore$ L.H.S. = R.H.S.

Therefore, we can conclude that $(4,0)$ is a solution of the linear equation $x-2y=4$.
(iv) $(\sqrt{2}, 4\sqrt{2})$

We need to put $x=\sqrt{2}$ and $y=4\sqrt{2}$ in the linear equation $x-2y=4$, to get
$(\sqrt{2})-2(4\sqrt{2})=-7\sqrt{2}$
$\therefore$ L.H.S. $\neq$ R.H.S.

Therefore, we can conclude that $(\sqrt{2}, 4\sqrt{2})$ is not a solution of the linear equation $x-2y=4$.

(v) $(1,1)$

We need to put $x=1$ and $y=1$ in the linear equation $x-2y=4$, to get
(1) $-2(1)=-1$
$\therefore$ L.H.S. $\neq$ R.H.S.

Therefore, we can conclude that $^{(1,1)}$ is not a solution of the linear equation $x-2y=4$.

Ex 4.2 Question 4.

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

Answer.

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

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 .