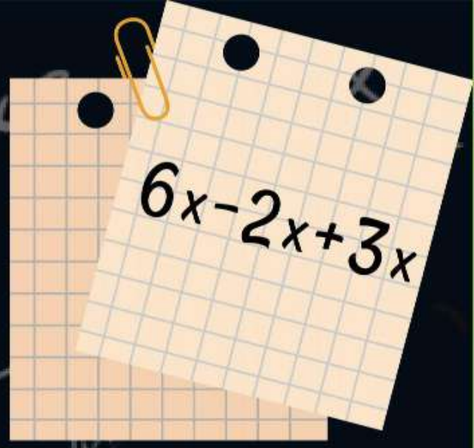


LINEAR EQUATIONS IN TWO VARIABLES

CLASS – IX

$ax + by = c$

$y = mx + b$

Linear Equations in One Variable

$2x^{1} - 3 = 0$

$x + 2 = 3$

Linear Equations in Two Variables

An equation of the form ax + by + c = 0, where a, b, c are real numbers, a ≠ 0, b ≠ 0 and x, y are variables, is called a linear equation in two variables.

→ $x^2 + y^2 = 2$

$2x - y = 3$

$-5x + 5y - 7 = 0$

$-2x - 6y \quad = 0$

$a = -2,\ b = -6,\ c = 6$

$\frac{5}{2}x + 7y = 9$.

General Form :-

$ax + by + cx^0 = 0$

$a, b, c \in R$

$a, b \neq 0$ (at the same time)

$x = 2$

two variables.

$x + 0y - 2 = 0$

$a = 1$

$b = 0$

$c = -2$

Write each of the following equations in the form of ax + by + c = 0 and indicate the values of a, b and c in each case.

1. $3x + 2y = 2.5$

$3x+2y-2.5=0$

$a=3,\ b=2,\ c=-2.5$

2. $7x - 5 = 2y$

$7x-2y-5=0$

$a=7,\ b=-2,\ c=-5$

3. $x = 2y$

$x-2y=0$

$x-2y+0=0$

$a=1,\ b=-2,\ c=0$

4. $\frac{x}{2} - \frac{y}{3} = 5$

$\frac{1}{2}x - \frac{1}{3}y - 5 = 0$

a, b, c

5. $2y - 3 = \sqrt{2}x$

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

Remark

The representation of a linear equation in two variables in the form ax + by + c = 0 is not unique.

For example: 2x – 3y = 6 can be written as 2x – 3y = 6 can be written as 2x – 3y – 6 = 0 or –2x + 3y + 6 = 0. So, the values of a, b and c are not unique.

$10x - 15y = 30$

$5(2x - 3y) = 5(6)$

Write each of the following as an equation in 2 variables x and y:

1. $x = -3$

$x + 0y + 3 = 0$

2. $y = 4$

$0x + y - 4 = 0$

3. $3x = 2$

$3x + 0y - 2 = 0$

4. $7y = 3$

$0x + 7y - 3 = 0$

The cost of a ball pen is ₹5 less than half of the cost of fountain pen. Write this statement as a linear equation in 2 variables.

Let the cost of a ball pen = 'x' Rs.

" " " " " " fountain pen = 'y' Rs.

$$x = \frac{1}{2}y - 5$$ //

The cost of a notebook is twice the cost of a pen. Write a linear equation in 2 variables to represent this statement.

x

y

$x = 2y$ //

The cost of 5 Pencils is equal to the cost of 2 ball point pens. Write a linear equation in two variables.

let, cost of a pencil = 'x' Rs.

" " " ball point pen = 'y' Rs.

$$5x = 2y$$

The sum of a two-digit number and the number obtained by reversing the order of its digits is 121. If unit's and ten's digits of the number are x and y respectively, then write the linear equation representing the above statement.

Unit's digit = x

ten's digit = y.

Two digit no. = $10y + x$

Reversed no. = $10x + y$

$$10y + x + 10x + y = 121$$

$$11y + 11x = 121$$

$56 = 5 \times 10 + 6 \times 1$

ten's digit (place).

unit's place (digit)

$65 = 6 \times 10 + 5 \times 1$

$92 = 9 \times 10 + 2 \times 1$

$yx = y \times 10 + x \times 1$

$= 10y + x$

‘Five years ago, Nuri was thrice as old as Sonu.’
Express this information in linear equation.

Let Nuri's present age = 'x' years.
Sonu's " " = 'y' years.

	Pa.	Pr	Fu.
Nuri	x-5	x	
Sonu	y-5	y	

"ATTO"

$x-5 = 3(y-5)$

$x-5 = 3y-15$

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

$\boxed{x-3y+10=0}$ //

If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. Form a linear equation for this information.

Let, $N = x$ $\quad N' = x+1$

$D = y$ $\quad D' = y-1$

$F = \frac{x}{y}$ $\quad F' = \frac{x+1}{y-1}$

"ATTO"

$$\frac{x+1}{y-1} = 1$$

$x+1 = 1(y-1)$

$x+1 = y-1$

$x - y + 1 + 1 = 0$

$$x - y + 2 = 0$$

From a bus stand in Delhi, if we buy 2 tickets to Agra and 3 tickets to Mathura, the total cost is ₹ 440. Express this situation in linear equation.

Let, Cost of '1' ticket to Agra = 'x' Rs.

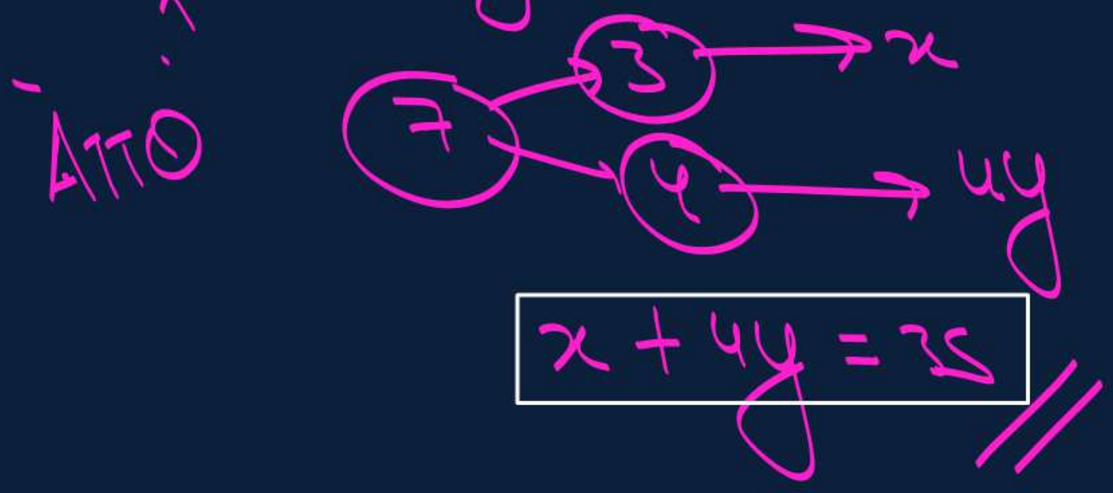
" " " " " Mathura = 'y' Rs.

ATQ $\boxed{2x + 3y = 440}$

A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Roshni paid ₹35 for a book kept for seven days. Write a linear equation which satisfies this data.

Let, Fixed charge for First '3' days = 'x' Rs.

Cost for each day after '3' days = 'y' Rs.



$$x + 4y = 35$$

The monthly hostel charges for Apeksha comprises ₹ 1000 per month as fixed boarding charges and remaining charges at the rate of ₹ 50 per day (for the number, for which the food has been availed by Apeksha).

(i) Form a linear equation in two variables to represent the above situation.

(ii) Find two solutions possible for equation formed.

#GPK [comment]

Solution of a Linear Equation in Two Variables

$x + y = 2$

- $(1, 1)$
- $(5, -3)$
- $(100, -98)$
- $(-98, 100)$
- $(0, 2)$
- $(2, 0)$

Solutions

Infinite Many Solutions

Solution

↓

Variable ki value

eqn satisfy

L.H.S = R.H.S

Find any four solutions of the equation 4x + 3y = 12.

$4x + 3y = 12$

Ans

x	0	1	3	9/2
y	4	8/3	0	-2

$x = 0$

$4(0) + 3y = 12$

$3y = 12$

$y = 12/3$

$y = 4$

$x = 1$

$4(1) + 3y = 12$

$4 + 3y = 12$

$3y = 12 - 4$

$3y = 8$

$y = 8/3$

$y = -2$

$4x + 3(-2) = 12$

$4x - 6 = 12$

$4x = 12 + 6$

$4x = 18$

$x = 18/4$

$x = 9/2$

$y = 0$

$4x = 12$

$x = 3$

Write two solutions for each of the following equations:

1 $x + \pi y = 4$

$x = 0$

$0 + \pi y = 4$

$\pi y = 4$

$y = 4/\pi$

$y = 0$

$x + \pi(0) = 4$

$x = 4$

Ans $= (0, \frac{4}{\pi}), (4, 0)$

2 $x = 6y$

$x = 0$

$0 = 6y$

$0 = y$

$y = 100$

$x = 6(100)$

$x = 600$

Ans: $(0, 0), (600, 100)$

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

$2x + 3y = k$

$x = 1$
$y = 1$

$2(1) + 3(1) = k$

$2 + 3 = k$

$5 = k$ //

Find two solutions of x = 2

#or

$x + 0y = 2$

x	2	2	2	2	2	2	2	...
y	0	1	-1	5	100	...		

Ans : (2, 0), (2, 1)

Find two solutions of y = -3

$0x + y = -3$

x	1	2	100	...	...
y	-3	-3	-3	-3	-3

If a linear equation has solutions (–2, 2), (0, 0) and (2, –2), then it is of the form

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

The linear equation $5x = 2y$ has

1. A unique solution
2. No solution
3. Two solutions
4. Infinitely many solutions

Thank You

$6x-2x+3x$

$ax+by=c$

$y=mx+b$