## Simultaneous linear equations

When we think about two linear equations in two variables at the same time, they are called simultaneous equations.

Last year we learnt to solve simultaneous equations by eliminating one variable. Let us revise it.

**Ex. (1)** Solve the following simultaneous equations.

(1) $5x - 3y = 8;\ 3x + y = 2$

**Solution :**

**Method I :** $5x - 3y = 8 \ldots$ (I)

$3x + y = 2 \ldots$ (II)

Multiplying both sides of equation (II) by 3.

$9x + 3y = 6 \ldots$ (III)

$5x - 3y = 8 \ldots$ (I)

Now let us add equations (I) and (III)

$$\begin{array}{r} 5x - 3y = 8 \\ +\ 9x + 3y = 6 \\ \hline 14x = 14 \end{array}$$

$\therefore\ x = 1$

substituting $x = 1$ in equation (II)

$3x + y = 2$

$\therefore\ 3 \times 1 + y = 2$

$\therefore\ 3 + y = 2$

$\therefore\ y = -1$

solution is $x = 1,\ y = -1$; it is also written as $(x, y) = (1, -1)$

Method **(II)**

$5x - 3y = 8 \ldots$ (I)

$3x + y = 2 \ldots$ (II)

Let us write value of y in terms of x from equation (II) as

$y = 2 - 3x \ldots$ (III)

Substituting this value of $y$ in equation (I).

$5x - 3y = 8$

$\therefore\ 5x - 3(2 - 3x) = 8$

$\therefore\ 5x - 6 + 9x = 8$

$\therefore\ 14x - 6 = 8$

$\therefore\ 14x = 8 + 6$

$\therefore\ 14x = 14$

$\therefore\ x = 1$

Substituting $x = 1$ in equation (III).

$y = 2 - 3x$

$\therefore\ y = 2 - 3 \times 1$

$\therefore\ y = 2 - 3$

$\therefore\ y = -1$

$x = 1,\ y = -1$ is the solution.