

# Aptitude - Basic Equations

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## Linear equations in two variables

An equations of the form  $ax + by + c = 0$ , where  $a, b, c \in \mathbb{R}$  and  $a \neq 0$ ,  $b \neq 0$  and  $x, y$  are variables, is called a linear equation in two variables.

**Solution:** Any pair of values of  $x$  and  $y$  which satisfy the equation  $ax + by + c = 0$ , is called its solution.

## Consistent and inconsistent system of linear Equations

A system consisting of two simultaneous linear equations is said to be:

- Consistent, if it has at least one solution.
- Inconsistent, if it has no solution.

## Conditions for Solvability

The system of equation  $a_1x + b_1y + c_1 = 0$ ,  $a_2x + b_2y + c_2 = 0$  has

- A unique solution, if  $a_1/a_2 \neq b_1/b_2$ ;
- An infinite number of solutions, if  $a_1/a_2 = b_1/b_2 = c_1/c_2$ ;
- No solution, if  $a_1/a_2 = b_1/b_2 \neq c_1/c_2$ ;

## Homogeneous system of equations

The system of equations  $a_1x + b_1y = 0$ ;  $a_2x + b_2y = 0$  has

- Only solution  $x = 0$ ,  $y = 0$  when  $a_1/a_2 \neq b_1/b_2$ ;
- An infinite number of solutions when  $a_1/a_2 = b_1/b_2$

## Solved Examples

[Solved Examples](#)