LINEAR EQUATIONS IN TWO VARIABLES

➢ LINEAR EQUATIONS IN ONE VARIABLE

A statement of equality of two algebraic expressions, which involve one or more unknown quantities is known as an equation.

A linear equation is an equation which involves linear polynomials.

A value of the variable which makes the two sides of the equation equal is called the solution of the equation.

Same quantity can be added/subtracted to/from both the sides of an equation without changing the equality.

Both the sides of an equation can be multiplied/divided by the same non-zero number without changing the equality.

➢ GENERAL FORM OF LINEAR EQUATION IN TWO VARIABLES

$ax + by + c = 0$, $a \neq 0$, $b \neq 0$ or any one from a & b can zero.

❖ EXAMPLES ❖

Ex.1 Express the following linear equations in general form and identify coefficients of x, y and constant term.

Sol.

S.No.	Equation	General form	Coeff. of x, y, constant
(1)	$3x - 2y = 5$	$3x - 2y - 5 = 0$	$3, -2, -5$
(2)	$\frac{3}{7}x - 2 + y = 0$	$\frac{3}{7}x + y - 2 = 0$	$\frac{3}{7}, 1, -2$
(3)	$5y = 2x + 7$	$2x - 5y + 7 = 0$	$2, -5, 7$
(4)	$18y - 72x = 8$	$72x - 18y + 8 = 0$	$72, -18, 8$
(5)	$3.\overline{7}x - y - \frac{1}{7} = 0$	$3.\overline{7}x - y - \frac{1}{7} = 0$	$3.\overline{7}, -1, -\frac{1}{7}$
(6)	$y = 5$	$0x + y - 5 = 0$	$0, 1, -5$
(7)	$\frac{x}{7} = 5$	$\frac{x}{7} + 0.y - 5 = 0$	$\frac{1}{7}, 0, -5$
(8)	$2x + 3 = 0$	$2x + 0y + 3 = 0$	$2, 0, 3$

Ex.2 Make linear equation by the following statements :

(1) The cost of 2kg of apples and 1 kg of grapes on a day was found to be ₹ 160. After a month, the cost of 4 kg of apples and 2 kg of grapes is ₹ 300. Represent the situation algebraically.

Sol. Let cost of per kg apples & grapes are x & y respectively then by Ist condition :

$$2x + y = 160 \quad \text{.....(i)}$$

& by IInd condition : $4x + 2y = 300$ …..(ii)

(2) The coach of a cricket team buys 3 bats and 6 balls for ₹ 3900. Later, she buys another bat and 3 more balls of the same kind for ₹ 1300. Represent this situation algebraically.

Sol. Let cost of a bat and a ball are ₹ x & ₹ y respectively. According to questions

$3x + 6y = 3900$ .....(i)

& $x + 3y = 1300$ .....(ii)

(3) 10 students of class IX took part in a Mathematics quiz. If the number of girls is 4 more than the number of boys.

Sol. Let no. of boys and girls are x & y then according to question

$x + y = 10$ ……(i)

& $y = x + 4$ ……(ii)

(4) Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m.

Sol. Let length & breadth are x m and y m.

$\therefore$ according to question $\frac{1}{2}$ perimeter = 36

$$\frac{1}{2}\,[2(\ell + b)] = 36$$

$\Rightarrow$ $x + y = 36$ .....(i)

also length = 4 + breadth

$x = 4 + y$ .....(ii)

(5) The difference between two numbers is 26 and one number is three times the other.

Sol. Let the numbers are x and y & x > y

$\therefore$ $x - y = 26$ ……(i)

and $x = 3y$ ……(ii)

(6) The larger of two supplementary angles exceeds the smaller by 18 degrees.

Sol. Let the two supplementary angles are x and y & x > y

Then $x + y = 180°$ ……(i)

and $x = y + 18°$ .....(ii)

(7) A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If, 3 is added to both the numerator and the denominator it becomes $\frac{5}{6}$.

Sol. Let fraction is $\frac{x}{y}$

Now according to question $\frac{x+2}{y+2} = \frac{9}{11}$

$\Rightarrow 11x + 22 = 9y + 18$

$\Rightarrow 11x - 9y = -4$ .....(i)

and $\frac{x+3}{y+3} = \frac{5}{6} \Rightarrow 6x + 18 = 5y + 15$

$\Rightarrow 6x - 5y = -3$ ….(ii)

(8) Five years hence, the age of Sachin will be three times that of his son. Five years ago, Sachin's age was seven times that of his son.

Sol. Let present ages of Sachin & his son are x years and y years.