

11th Standard -Mathematics

Linear Inequalities

Inequation

A statement involving variables and the sign of inequality viz. $>$, $<$, \geq or \leq is called an inequation or an inequality.

Numerical Inequalities

Inequalities which do not contain any variable is called numerical inequalities, e.g. $3 < 7$, $2 \geq -1$, etc. Literal Inequalities Inequalities which contains variables are called literal inequalities e.g. $x - y > 0$, $x > 5$, etc.

Linear Inequation of One Variable

Let a be non-zero real number and x be a variable. Then, inequalities of the form $ax + b > 0$, $ax + b < 0$, $ax + b \geq 0$ and $ax + b \leq 0$ are known as linear inequalities in one variable.

Linear Inequation of Two Variables

Let a , b be non-zero real numbers and x , y be variables. Then, inequation of the form $ax + by < c$, $ax + by > c$, $ax + by \leq c$ and $ax + by \geq c$ are known as linear inequalities in two variables x and y .

Solution of an Inequality

The value(s) of the variable(s) which makes the inequality a true statement is called its solutions. The set of all solutions of an inequality is called the solution set of the inequality.

Solving Linear Inequations in One Variable

Same number may be added (or subtracted) to both sides of an inequation without changing the sign of inequality.

Both sides of an inequation can be multiplied (or divided) by the same positive real number without changing the sign of inequality. However, the sign of inequality is reversed when both sides of an inequation are multiplied or divided by a negative number.

Representation of Solution of Linear Inequality in One Variable on a Number Line

To represent the solution of a linear inequality in one variable on a number line. We use the following algorithm.

If the inequality involves ' $>$ ' or ' $<$ ' we draw an open circle (O) on the number line, which indicates that the number corresponding to the open circle is not included in the solution set.

If the inequality involves ' \geq ' or ' \leq ' we draw a dark circle (\bullet) on the number line, which indicates the number corresponding to the dark circle is included in the solution set.

Graphical Representation of the Solution of Linear Inequality in One or Two Variables

To represent the solution of linear inequality in one or two variables graphically in a plane, we use the following algorithm.

If the inequality involves ' $<$ ' or ' $>$ ', we draw the graph of the line as dotted line to indicate that the points on the line are not included from the solution sets.

If the inequality involves ' \geq ' or ' \leq ', we draw the graph of the line as a dark line to indicate the points on the line is included from the solution sets.

Solution of a linear inequality in one variable can be represented on number line as well as in the plane but the solution of a linear inequality in two variables of the type $ax + by > c$, $ax + by \geq c$, $ax + by < c$ or $ax + by \leq c$ ($a \neq 0$, $b \neq 0$) can be represented in the plane only.

Two or more inequalities taken together comprise a system of inequalities and the solution of the system of inequalities are the solution common to all the inequalities comprising the system.