LINEAR INEQUALITIES

Two real numbers or two algebraic expressions related by the symbols $<, >, \leq$ or $\geq$ form an inequality. In this unit we study linear inequalities in one and two variables, their formation and solution graphically.

Linear Inequalities in One Variable

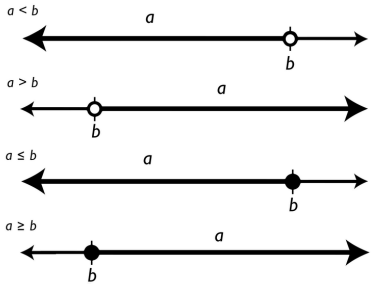
Examples

- $30x < 200$
- $5x - 3 < 3x + 1$
- $\frac{5-2x}{3} < \frac{x}{6} - 5$

The **solution** of an inequality in one variable is a value of the variable x which makes it a true statement.

Rules

1. Equal numbers may be added to (or subtracted from) both sides of an equation.
2. Both sides of an equation may be multiplied (or divided) by the same non-zero number.
3. If we multiply or divide both sides of an inequation by a negative number, the inequality sign will be reversed.
4. To represent $x < a$ (or $x > a$) on a number line, put a circle on the number $'a'$ and a dark line to the left (or right) of the number $'a'$.
5. To represent $x \leq a$ (or $x \geq a$) on a number line, put a dark circle on the number $'a'$ and a dark line to the left (or right) of the number $'a'$.



Graphical Solution of Linear Inequalities in Two Variables

The region containing all the solutions of an inequality is called the **solution region**.

- To find the solution of inequalities ,First we find the line $ax + by = c$
- In order to identify the half-plane represented by inequality, it is just sufficient to take any point (a, b) [say point $(0, 0)$] not on the line and check whether it satisfies the inequality or not. If it satisfies, then the inequality represents the half-plane and shade the region which contains the point, otherwise, the inequality represents that half-plane which does not contain the point within it.
- If the inequality is of the type $ax + by \geq c$ or $ax + by \leq c$, then the point on the line $ax + by = c$ is also included in the solution. So draw a dark line in the solution region.
- If the inequality is of the type $ax + by > c$ or $ax + by < c$, then the point on the line $ax + by = c$ are not to be included in the solution. So draw a broken or dotted line in the solution region.