Solve Linear Inequalities

Linear inequalities have $>$, $<$, $\geq$, or $\leq$ rather than an equal sign.

A. Graphing Linear Inequalities on a Number Line.

1) $>$ or $<$ use an open circle to exclude the number.
2) $\geq$ or $\leq$ use a filled in circle to include the number.

**Example 1** Graph on a number line.

a) $x \leq 5$

b) $x > -3$

B. Solving Linear Inequalities: Multiplying or Dividing by Positive Numbers

1) Add or subtract to isolate variable term on one side of the inequality.
2) Multiply or divide to isolate variable.

**Example 2** Solve the inequality and graph the solution on a number line.

a) $x - 5 > -3$

b) $2x + 6 \leq 4$

C. Solving Linear Inequalities: Multiplying or Dividing by Negative Numbers

Solve as in B except when multiplying or dividing by a negative number, the *direction of the inequality changes*.

**Example 3** Solve the inequality and graph the solution on a number line.

a) $8 < -7 - x$

b) $-3n > 18$

c) $-a + 4 > -6a + 19$

d) $\frac{1}{4}x + \frac{2}{5} \geq \frac{2}{5}x + \frac{1}{2}$
Linear Inequalities that Have All Real Numbers as Their Solution or Have No Solution.

Example 4  Solve the inequality and graph the solution on a number line.

a) \[5(2x - 8) + 1 > 10x + 23\]

b) \[\frac{1}{2}(4x - 5) < 6x - 2(2x - 1)\]

c) \[-6(3 - x) + 15 \leq 4x + 2\left(x - \frac{3}{2}\right)\]