

Assume the universe of real numbers.

Symbol/Expression	Mathematical Meaning	English Meaning
\neq	not equal to	different from
\geq	greater than or equal to	at least, no less than, minimum of
\leq	less than or equal to	at most, maximum of, no more than, not exceeding
$>$	greater than	more than,
$<$	less than	less than, smaller than, fewer than
$-5 \leq x \leq 5$	x is a number between -5 and 5 including -5 and 5	
$-2 < x < 10$	x is a number between -2 and 10 not including -2 and 10	
$x \neq 7$	x is a number not equal to 7	x is any number except 7
$x \leq 4$ and $x > 7$	x is a number that is either less than or equal to four or a number greater than seven	

- **A strict inequality:** $>$ and $<$
- **When solving inequalities** one has to flip the inequality sign whenever multiplying or dividing by a negative number.
- **When graphing inequalities** one has to use an empty circle to indicate that the given value is not part of the solution and a solid (shaded) circle to indicate that the given value is part of the solution.
- If all variables cancel out when solving inequalities, there are either infinitely many solutions to the inequality or no real solutions to the inequality. This depends on whether the final statement is true (infinitely many solutions) or false (no real solutions).

Ex. 1: Solve $3x + 5 \leq 10 + 3x$

$$3x - 3x \leq 10 - 5$$

$$0x \leq 5$$

$$0 \leq 5, \text{ True}$$

∴ There are infinitely many solutions

Ex.2: Solve $x + 1.5 - 2x > 4.2 - x$

$$x - 2x + x > 4.2 - 1.5$$

$$0x > 2.7$$

$$0 > 2.7 \times \text{False}$$

∴ There are no \mathbb{R} solutions.

Graphing inequalities using a number line

$\frac{2x}{2} > \frac{14}{2}$ $\boxed{x > 7}$	
$\frac{-3x}{-3} \neq \frac{42}{-3}$ $\boxed{x \neq -14}$	
$x > 3 \text{ OR } x \leq -12$	
$\frac{0.5x}{-0.5} \geq \frac{-3}{-0.5}$ $\boxed{x \leq 6}$	
$\frac{8}{2} \leq \frac{2x}{2} < \frac{15}{2}$ $\boxed{4 \leq x < 7.5}$	
$\frac{-x}{-1} > \frac{-4}{-1}$ $\boxed{x < 4}$	
$\frac{x}{4} \leq 5$ $x \leq 20$	
$-3x - 1 + x \leq -2x + 4$ $-2x + 2x \leq 4 + 1$ $0x \leq 5$ $\boxed{0 \leq 5} \text{ true}$	