

Section 1.6 Linear Inequalities in One Variable

An **inequality** is an expression that suggests that a given expression is smaller than, larger than, smaller than or equal to, larger than or equal to other expressions.

An **inequality** is an expression that contains one or more of the following symbols $<$, $>$, \leq , \geq .

The **solution set** to a given inequality is the set of all values that when substituted for the unknowns of the inequality result in an inequality that is true.

Simplifications That May be Helpful When Solving Inequalities:

The following operations can be used to simplify an inequality and will not change the solution of the inequality:

1. Add or subtract the same quantity from both sides.
2. Multiply or divide both sides of the inequality by a positive number.
3. Multiply or divide both sides of the inequality by a negative number and change the direction of the inequality.

Solve the inequality $3 - 4x > x - 1$

Review of Interval Notation:

The notation (a, b) is used to describe the set of all real numbers that are greater than a and less than b .

$$(a, b) =$$



The notation $[a, b]$ is used to describe the set of all real numbers that are greater than or equal to a and less than or equal to b .

$$[a, b] =$$



The notation $[a, b)$ is used to describe the set of all real numbers that are greater than or equal to a and less than b .

$$[a, b) =$$



The notation $(-\infty, b)$ is used to describe the set of all real numbers that are less than b .

$$(-\infty, b) =$$



The notation $[a, \infty)$ is used to describe the set of all real numbers that are greater than or equal to a .

$$[a, \infty) =$$



Solve the inequality $-2(3t - 2) + 4t - 1 \leq 10t - 6$

$$-6t + 4 + 4t - 1 \leq 10t - 6$$

$$-2t + 3 \leq 10t - 6$$

$$-12t \leq -9$$

$$t \geq \frac{-9}{-12}$$

$$t \geq \frac{3}{4}$$

Solve the inequality $\frac{2}{3}x - \frac{5}{6} < \frac{1}{2}(3x - 1)$

*Multiply both
sides by 6*

$$4x - 5 < 3(3x - 1)$$

$$4x - 5 < 9x - 3$$

$$-5x < 2$$

$$x > \frac{2}{5}$$

Solve the inequality $\frac{2x}{3} \geq \frac{x+2}{4} + \frac{1}{2}$

multiply both
sides by 12

$$8x \geq 3(x+2) + 6$$

$$8x \geq 3x + 6 + 6$$

$$5x \geq 12$$

$$x \geq \frac{12}{5}$$

Solve the inequality $-3 \leq \frac{5}{4}(4-2x) < 2$

multiply both
sides by 4

$$-12 \leq 5(4-2x) < 8$$

$$-12 \leq 20 - 10x < 8$$

$$-32 \leq -10x < -12$$

$$\frac{-32}{-10} \geq x \quad \text{and} \quad x > \frac{-12}{-10}$$

$$x \leq \frac{16}{5} \quad \text{and} \quad x > \frac{6}{5}, \quad \left(\frac{6}{5}, \frac{16}{5}\right]$$

Siera runs the 100 meter race on her track team. In her first race her time was 11.12 seconds. In her second race her time was 10.95 seconds. To qualify for nationals she needs to run an average time of 11.00 seconds for the three races she runs in this tournament. What is the time she will need to get in her third race in order to qualify for nationals?

$$\frac{11.12 + 10.95 + t}{3} \leq 11.00$$

$$\frac{22.07 + t}{3} \leq 11$$

$$22.07 + t \leq 33$$

$$t \leq 10.93 \text{ seconds}$$