

# SOLVING LINEAR INEQUALITIES

## SOLVING INEQUALITIES

Solve inequalities just like how we solve equations.

\*\*\* CAUTION\*\*\*: When **multiplying** or **dividing** both sides of an inequality by a **negative number**, **flip** the inequality symbol!

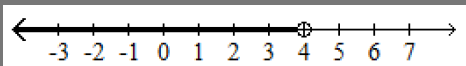
**Example:** Solve  $8x - 5 < 6x + 3$

$$\begin{array}{r} 8x - 5 < 6x + 3 \\ -6x \quad -6x \end{array}$$

$$\begin{array}{r} 2x - 5 < 3 \\ +5 \quad +5 \end{array}$$

$$\frac{2x}{2} < \frac{8}{2}$$

$$x < 4$$



Interval notation:  $(-\infty, 4)$

Set-builder notation:  $\{x \mid x < 4\}$

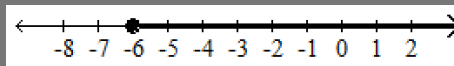
**Example:** Solve  $-3t + 1 \leq 19$

$$\begin{array}{r} -3t + 1 \leq 19 \\ -1 \quad -1 \end{array}$$

$$-3t \leq 18$$

$$\frac{-3t}{-3} \geq \frac{18}{-3}$$

$$t \geq -6$$



Interval notation:  $[-6, \infty)$

Set-builder notation:  $\{t \mid t \geq -6\}$

Flip

**EXERCISE:** Solve. **Graph** and write the solution in both **interval notation** and **set-builder notation**.

(1)  $4 + 5n \leq 4n - 1$

(2)  $3(x - 2) - 10 < 5(x + 3) - 9$

(3)  $-8x < 24$

(4)  $8 - 2t \geq 9$

(5)  $4x - 7 < 31$

(6)  $5 - 9x \geq 19 + 5x$

(7)  $12 - y < 3$

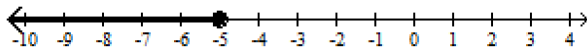
(8)  $-\frac{3}{4}x \leq 6$

(9)  $\frac{1}{4}x + \frac{4}{3} > \frac{2}{3}x - \frac{3}{4}$

(10)  $2(7y - 3) + 6y \geq 4 + 9y - 10$

## Answers

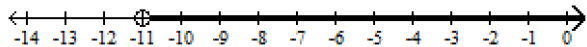
1.  $n \leq -5$



Interval notation:  $(-\infty, -5]$

Set-builder notation:  $\{n \mid n \leq -5\}$

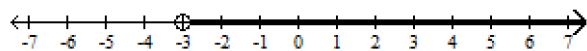
2.  $x > -11$



Interval notation:  $(-11, \infty)$

Set-builder notation:  $\{x \mid x > -11\}$

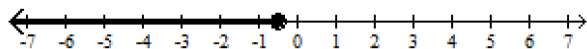
3.  $x > -3$



Interval notation:  $(-3, \infty)$

Set-builder notation:  $\{x \mid x > -3\}$

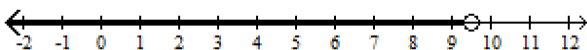
4.  $t \leq -\frac{1}{2}$



Interval notation:  $(-\infty, -\frac{1}{2}]$

Set-builder notation:  $\{t \mid t \leq -\frac{1}{2}\}$

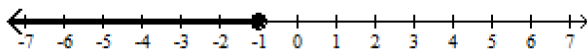
5.  $x < \frac{19}{2}$



Interval notation:  $(-\infty, \frac{19}{2})$

Set-builder notation:  $\{x \mid x < \frac{19}{2}\}$

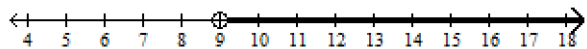
6.  $x \leq -1$



Interval notation:  $(-\infty, -1]$

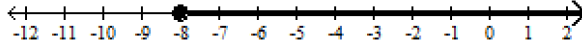
Set-builder notation:  $\{x \mid x \leq -1\}$

7.  $y > 9$



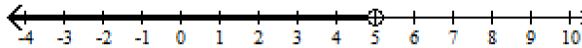
Interval notation:  $(9, \infty)$   
Set-builder notation:  $\{y \mid y > 9\}$

8.  $x \geq -8$



Interval notation:  $[-8, \infty)$   
Set-builder notation:  $\{x \mid x \geq -8\}$

9.  $x < 5$



Interval notation:  $(-\infty, 5)$   
Set-builder notation:  $\{x \mid x < 5\}$

10.  $y \geq 0$



Interval notation:  $[0, \infty)$   
Set-builder notation:  $\{y \mid y \geq 0\}$