

**Useful Guidelines:** To solve for a linear inequality:

Step 1: Simplify each side by using the distributive property to clear parentheses as needed.

Step 2: Gather all terms with variables on one side of the inequality and all numbers on the other side *6m*

Step 3: Solve for that variable until the coefficient of the variable is one.

**Note:** Remember to reverse the direction of the inequality symbol when you need to multiply or divide each side of an inequality by a negative number.

\* Intersection of A and B:  $A \cap B = \{x | x \text{ is an element of } A \text{ and } x \text{ is an element of } B\}$

\* Union of A and B:  $A \cup B = \{x | x \text{ is an element of } A \text{ or } x \text{ is an element of } B\}$

Solve the following linear inequalities and graph the solution sets:

1. a)  $2x + 30 < 50$  interval notation  $(-\infty, 10)$

$$\frac{2x}{2} = \frac{20}{2}$$

$$x < 10$$

sol set  $\{x | x < 10\}$

b)  $15 + 3y \geq y + 5$  interval notation  $[5, \infty)$

$$2y = -10$$

$$y \geq -5$$

2. a)  $9 - x \geq -4(x - 2) + 1$

$$9 - x = -4x + 8 + 1$$

$$9 - x = -4x + 9$$

$$3x \geq 0$$

$$\frac{0}{3} = 0$$

$$x \geq 0$$

sol set  $\{x | x \geq 0\}$

b)  $\left[ \frac{3}{4}(m+4) \right] > \left[ 2(3-m) + \frac{1}{2} \right] 4$

$$3(m+4) > -8(3-m) + 2$$

$$3m + 12 > -24 + 8m + 2$$

$$3m + 12 > -22 + 8m$$

$$12 > -22 + 5m$$

$$34 > 5m$$

$$\frac{34}{5} > m$$

sol set  $\{m | m < \frac{34}{5}\}$

3. a)  $3 < t + 4 < 9$  interval notation  $(-1, 5)$

$$-4 < t < 5$$

sol set  $\{t | -1 < t < 5\}$

b)  $-3 \leq -6x - 2 \leq 12$  interval notation  $[-\frac{7}{3}, \frac{1}{6}]$

$$-1 \leq -6x \leq 14$$

$$-\frac{1}{6} \leq x \leq -\frac{7}{3}$$

4. For each of the following double inequalities, decide whether intersection or union should be used. Draw a number line graph of each solution. Then give the solution in both solution set and interval notation.

a)  $y - 3 < 15$  and  $y + 2 > 1$  *intersection*

$$y < 18 \cap y > -1$$

sol set  $\{y | y < 18 \text{ and } y > -1\}$

b)  $-2x \leq -4$  or  $-10x \geq 0$  *union*

$$x \geq 2 \cup x \leq 0$$

sol set  $\{x | x \leq 0 \text{ or } x \geq 2\}$