

Solving Linear Inequalities: Follow the exact same steps as when solving equations with one exception:

**When multiply or divide by a NEGATIVE number,
you MUST flip the inequality symbol**

TWO-STEP INEQUALITIES

a. $3x - 7 < 8$

$$\begin{array}{r} 3x - 7 < 8 \\ +7 \quad +7 \\ \hline 3x < 15 \\ \frac{3x}{3} < \frac{15}{3} \\ \hline x < 5 \end{array}$$

e. $-5y + 2 \geq -13$

$$\begin{array}{r} -5y + 2 \geq -13 \\ -2 \quad -2 \\ \hline -5y \geq -15 \\ \frac{-5y}{-5} \geq \frac{-15}{-5} \\ \hline y \leq 3 \end{array}$$

b. $5 + \frac{x}{4} < -3$

$$\begin{array}{r} 5 + \frac{x}{4} < -3 \\ -5 \quad -5 \\ \hline \frac{x}{4} < -8 \\ 4 \cdot \frac{x}{4} < -8 \cdot 4 \\ \hline x < -32 \end{array}$$

f. $10 > \frac{5 - 3x}{2}$

$$\begin{array}{r} 10 > \frac{5 - 3x}{2} \\ \cdot 2 \quad \cdot 2 \\ \hline 20 > 5 - 3x \\ -5 \quad -5 \\ \hline 15 > -3x \\ \frac{15}{-3} > \frac{-3x}{-3} \\ \hline -5 < x \text{ rewrite } x > -5 \end{array}$$

c. $\frac{2}{3}x - 5 > 7$

$$\begin{array}{r} \frac{2}{3}x - 5 > 7 \\ +5 \quad +5 \\ \hline \frac{2}{3}x > 12 \\ \frac{3}{2} \cdot \frac{2}{3}x > 12 \cdot \frac{3}{2} \\ \hline x > 18 \end{array}$$

g. $2 - 7x < -5$

$$\begin{array}{r} 2 - 7x < -5 \\ -2 \quad -2 \\ \hline -7x < -7 \\ \frac{-7x}{-7} < \frac{-7}{-7} \\ \hline x > 1 \end{array}$$

d. $\frac{1}{6} - \frac{2}{3}x \geq \frac{1}{4}$

$$\begin{array}{r} \frac{1}{6} - \frac{2}{3}x \geq \frac{1}{4} \\ -\frac{1}{6} \quad -\frac{1}{6} \\ \hline -\frac{2}{3}x \geq \frac{1}{12} \\ \frac{-3}{2} \cdot \frac{-2}{3}x \geq \frac{1}{12} \cdot \frac{-3}{2} \\ \hline x \leq -\frac{1}{8} \end{array}$$

h. $\frac{4}{5}x + \frac{1}{2} > \frac{3}{5}$

$$\begin{array}{r} \frac{4}{5}x + \frac{1}{2} > \frac{3}{5} \\ \frac{1}{2} \quad -\frac{1}{2} \\ \hline \frac{4}{5}x > \frac{1}{10} \\ \frac{5}{4} \cdot \frac{4}{5}x > \frac{1}{10} \cdot \frac{5}{4} \\ \hline x > \frac{1}{8} \end{array}$$

MULTI-STEP INEQUALITIES

a. $-2(s+4) \leq 16$

$$\begin{array}{r} -2s - 8 \leq 16 \\ +8 \quad +8 \\ \hline -2s \leq 24 \\ \frac{-2s}{-2} \leq \frac{24}{-2} \end{array} \quad \boxed{s \geq -12}$$



b. $\frac{1}{3}(3x+6) \geq -1$

$$\begin{array}{r} x + 2 \geq -1 \\ -2 \quad -2 \\ \hline x \geq -3 \end{array}$$



Classwork: Complete the following problems. Be sure to show it to one of the teachers BEFORE YOU LEAVE CLASS in order to earn your participation points.

1. $2x - 5 \leq 23$

$$\begin{array}{r} 2x - 5 \leq 23 \\ +5 \quad +5 \\ \hline 2x \leq 28 \\ \frac{2x}{2} \leq \frac{28}{2} \\ \boxed{x \leq 14} \end{array}$$



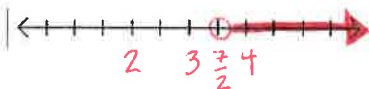
4. $-7(r-3) \geq -14$

$$\begin{array}{r} -7r + 21 \geq -14 \\ -21 \quad -21 \\ \hline -7r \geq -35 \\ \frac{-7r}{-7} \geq \frac{-35}{-7} \\ \boxed{r \leq 5} \end{array}$$



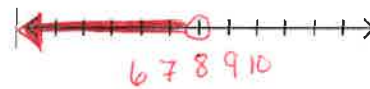
2. $-6y + 5 < -16$

$$\begin{array}{r} -6y + 5 < -16 \\ -5 \quad -5 \\ \hline -6y < -21 \\ \frac{-6y}{-6} < \frac{-21}{-6} \\ \boxed{y > \frac{7}{2}} \end{array}$$



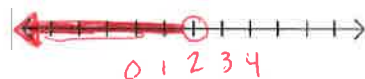
5. $\frac{2-x}{3} > -2$

$$\begin{array}{r} 2-x > -6 \\ -2 \quad -2 \\ \hline -x > -8 \\ \frac{-x}{-1} > \frac{-8}{-1} \\ \boxed{x < 8} \end{array}$$



3. $4(x-3) < -4$

$$\begin{array}{r} 4x - 12 < -4 \\ +12 \quad +12 \\ \hline 4x < 8 \\ \frac{4x}{4} < \frac{8}{4} \\ \boxed{x < 2} \end{array}$$



6. $\frac{1}{2} - \frac{2}{3}x > \frac{1}{3}$

$$\begin{array}{r} \frac{1}{2} - \frac{2}{3}x > \frac{1}{3} \\ -\frac{1}{2} \quad -\frac{1}{2} \\ \hline -\frac{2}{3}x > -\frac{1}{6} \\ \frac{-2}{3} \cdot \frac{-3}{2}x > \frac{-1}{6} \cdot \frac{-3}{2} \\ \boxed{x < \frac{1}{4}} \end{array}$$

