

**Variables
on one side**

**Variables
on both sides**

**Fractional
Inequalities**

**Special
Cases**

Solving Multi-Step Inequalities

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Example 1:

$$7(x-3)+9 \geq 37$$

$$7x-21+9 \geq 37$$

$$7x-12 \geq 37$$

$$\begin{array}{r|l} +12 & +12 \\ \hline 7x & \geq 49 \end{array}$$

$$\frac{7x}{7} \geq \frac{49}{7}$$

$$x \geq 7$$



Example 2:

$$2(-x+4)-3x < 43$$

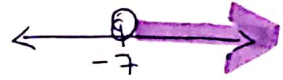
$$-2x+8-3x < 43$$

$$-5x+8 < 43$$

$$\begin{array}{r|l} -8 & -8 \\ \hline -5x & < 35 \end{array}$$

$$\frac{-5x}{-5} < \frac{35}{-5}$$

$$x > -7$$



Example 3:

$$-5x-7-x > -2x+17$$

$$-6x-7 > -2x+17$$

$$\begin{array}{r|l} +6x & +6x \\ \hline -7 & > 4x+17 \\ -17 & -17 \end{array}$$

$$\frac{-24}{4} > \frac{4x}{4}$$

$$-6 > x$$

$$x < -6$$



Example 4:

$$5x-8x-4 \leq -4+3x$$

$$-3x-4 \leq -4+3x$$

$$\begin{array}{r|l} +3x & +3x \\ \hline -4 & \leq -4+6x \\ +4 & +4 \end{array}$$

$$\frac{0}{6} \leq \frac{6x}{6}$$

$$0 \leq x$$

$$x \geq 0$$



Example 5:

$$6\left(\frac{5x}{6} + \frac{1}{2}\right) \geq 4 + \frac{2x}{3}$$

$$5x+3 \geq 24+4x$$

$$\begin{array}{r|l} -4x & -4x \\ \hline x+3 & \geq 24 \\ -3 & -3 \end{array}$$

$$x \geq 21$$



Example 6: $CD=14$

$$14\left(\frac{3}{7} + \frac{9x}{14}\right) < \frac{1}{14} + x$$

$$6+9x < 1+14x$$

$$\begin{array}{r|l} -9x & -9x \\ \hline 6 & < 1+5x \\ -1 & -1 \end{array}$$

$$\frac{5}{5} < \frac{5x}{5}$$

$$1 < x$$

$$x > 1$$



Example 7:

$$6(x+3) < 5x+17+x$$

$$6x+18 < 6x+17$$

$$\begin{array}{r|l} -6x & -6x \\ \hline 18 & < 17 \end{array}$$

Not true!

No Solution

Example 8:

$$3(3x+2) \geq 4+9x-3$$

$$9x+6 \geq 9x+1$$

$$\begin{array}{r|l} -9x & -9x \\ \hline 6 & \geq 1 \end{array}$$

True!

All real Numbers

