

Algebra I

2.4 - Compound Inequalities

Solve each inequality and graph its solution.

1) $k + 24 \geq 44$

$k \geq 20$:

$$\begin{array}{r} k + 24 \geq 44 \\ -24 \quad -24 \\ \hline k \geq 20 \end{array}$$

3) $-2x + 4 \leq 30$

$x \geq -13$:

$$\begin{array}{r} -2x + 4 \leq 30 \\ -4 \quad -4 \\ \hline -2x \leq 26 \\ -2 \quad -2 \quad \text{Flip!} \\ \hline x \geq -13 \end{array}$$

5) $2(4x + 4) + 2 > 42$

$x > 4$:

$$\begin{array}{r} 8x + 8 + 2 > 42 \\ 8x + 10 > 42 \\ -10 \quad -10 \\ \hline 8x > 32 \\ > \\ \hline x > 4 \end{array}$$

Solve each compound inequality and graph its solution.

7) $-10x + 10 \geq -50$ or $-1 + 8x \geq -1$

{ All real numbers. }:

$$\begin{array}{r} -10x + 10 \geq -50 \\ -10 \quad -10 \quad -10 \\ \hline -10x \geq -60 \\ -10 \quad -10 \\ \hline x \leq 6 \quad \text{Flip!} \end{array} \quad \begin{array}{r} -1 + 8x \geq -1 \\ +1 \quad +1 \\ \hline 8x \geq 0 \\ \geq \\ \hline x \geq 0 \end{array}$$

2) $\frac{x}{10} \leq -12$

$x \leq -120$:

$$\begin{array}{r} \frac{x}{10} \leq -12 \\ (10)x \leq -12(10) \\ \hline x \leq -120 \end{array}$$

4) $\frac{n}{2} - 5 > -14$

$n > -18$:

$$\begin{array}{r} \frac{n}{2} - 5 > -14 \\ +5 \quad +5 \\ \hline \frac{n}{2} > -9 \\ 2\left(\frac{n}{2}\right) > -9(2) \\ \hline n > -18 \end{array}$$

6) $-3(2 - 4x) < -42$

$x < -3$:

$$\begin{array}{r} -6 + 12x < -42 \\ +6 \quad +6 \\ \hline 12x < -36 \\ \frac{12x}{12} < \frac{-36}{12} \\ \hline x < -3 \end{array}$$

8) $-8 < 3k - 2 < -29$

No solution.:

$$\begin{array}{r} -8 < 3k - 2 < -29 \\ +2 \quad +2 \quad +2 \\ \hline -6 < 3k < -27 \\ \frac{-6}{3} < \frac{3k}{3} < \frac{-27}{3} \\ \hline -2 < k < -9 \end{array}$$

9) $-18 < 2 - 2x < 8$

$-3 < x < 10$:

$$\begin{array}{r} -18 < 2 - 2x < 8 \\ -2 \quad -2 \quad -2 \\ \hline -20 < -2x < 6 \\ -2 \quad -2 \quad -2 \quad \text{Flip!} \\ \hline 10 > x > -3 \quad \text{Double flip!} \\ \hline -3 < x < 10 \end{array}$$

10) $7x - 9 < -16$ or $7 + 2x < 23$

$x < 8$:

$$\begin{array}{r} 7x - 9 < -16 \\ +9 \quad +9 \\ \hline 7x < -7 \\ \frac{7x}{7} < \frac{-7}{7} \\ \hline x < -1 \end{array} \quad \begin{array}{r} 7 + 2x < 23 \\ -7 \quad -7 \\ \hline 2x < 16 \\ \frac{2x}{2} < \frac{16}{2} \\ \hline x < 8 \end{array}$$