

1.6 SOLVING LINEAR INEQUALITIES

\leq Less than or equal to; **at most**

\geq Greater than or equal to; **at least**

$<$ Less than

$>$ Greater than

If you **multiply or divide both sides by a negative number**,
YOU MUST **FLIP** THE INEQUALITY SIGN!

When graphing inequalities,
make sure the **variable is on the left**.

 *closed circle*



 *open circle*



Graph the following:

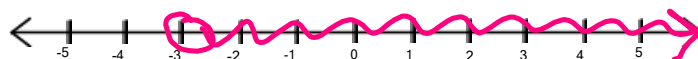
1. $x < 2$



2. $x \geq -1$



3. $-3 < x$ $x > -3$



4. $x \leq 0$

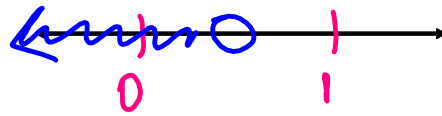


Solve and graph your solution.

$$\begin{array}{r}
 5. \quad -11y - 9 \leq 13 \\
 \quad \quad +9 \quad +9 \\
 \hline
 -11y \leq 22 \\
 \quad \quad -11 \quad -11 \\
 \hline
 y \geq -2
 \end{array}$$



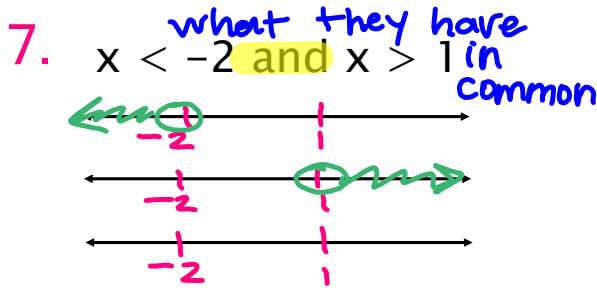
$$\begin{array}{r}
 6. \quad 2x + 1 > 6x - 1 \\
 \quad \quad -2x \quad -2x \\
 \hline
 1 > 4x - 1 \\
 \quad \quad +1 \quad +1 \\
 \hline
 2 > 4x \\
 \quad \quad + \quad + \\
 \frac{2}{4} > \frac{4x}{4} \\
 \frac{1}{2} > x \\
 x < \frac{1}{2}
 \end{array}$$



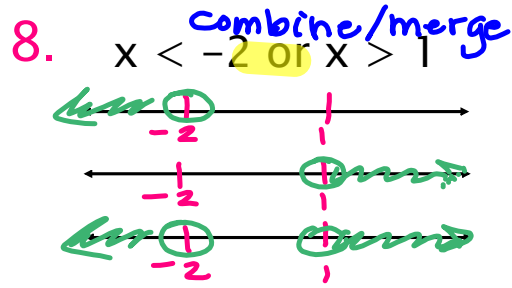
A compound inequality is two inequalities joined by "and" or "or".

and: solutions need to satisfy **both** inequalities (which solutions they have **in common**)

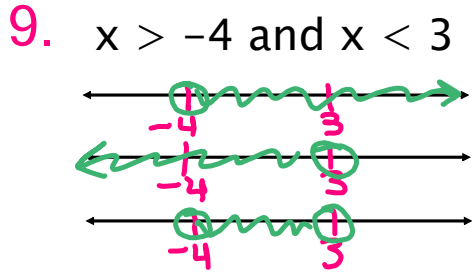
or: solutions need to satisfy **either** inequality (**combination** of the two solutions)



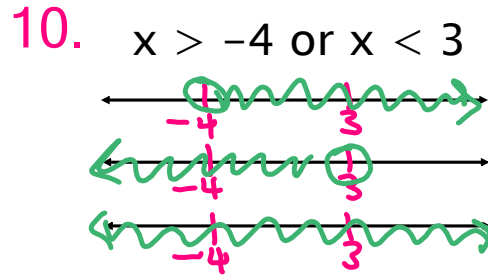
Answer: no solution



Answer: $x < -2$ or $x > 1$



Answer: $-4 < x < 3$



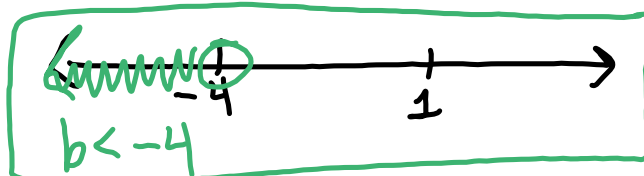
Answer: all real numbers
 \mathbb{R}

11. Solve and graph.

$$\frac{1}{4}b + 3 < 2 \quad \text{and} \quad 8b - 12 < -4$$

$$\frac{1}{4}b < -1 \quad \text{and} \quad 8b < 8$$

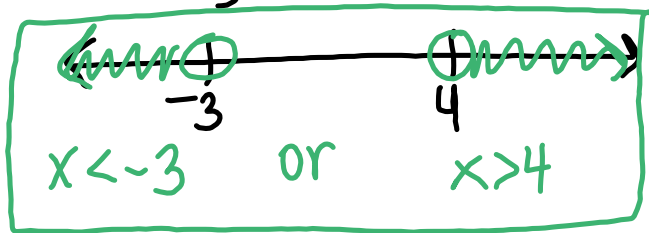
$$\frac{1}{4}b < -4 \quad \text{and} \quad b < 1$$



ANSWER

12. Solve and graph.

$$\begin{array}{r} x + 8 < 5 & \text{or} & x - 1 > 3 \\ \hline x < -3 & \text{OR} & x > 4 \end{array}$$

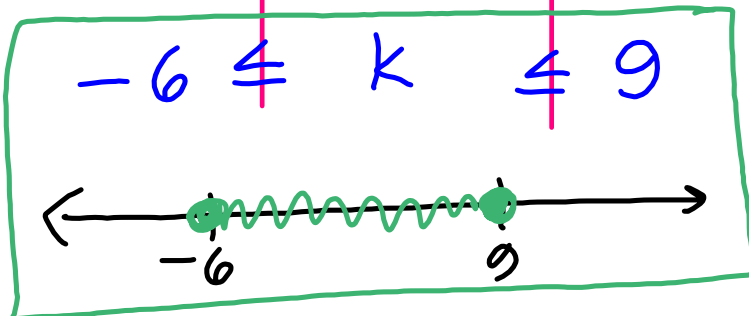


Answer

$$x < -3 \quad \text{or} \quad x > 4$$

13. Solve and graph.

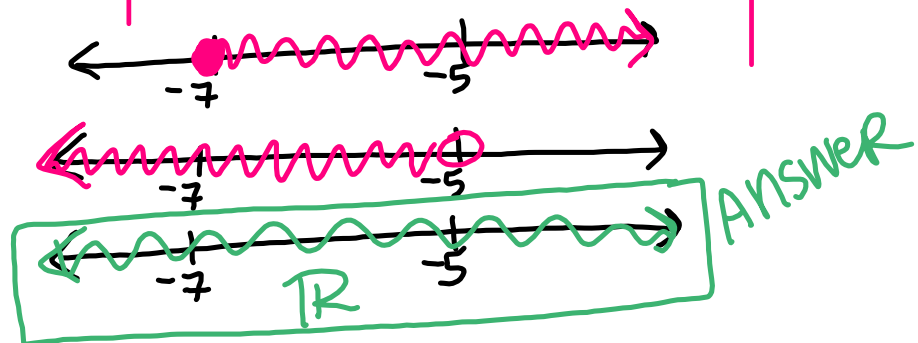
$$\begin{array}{r} -10 \leq \frac{1}{3}k - 8 \leq -5 \\ \hline -2 \leq \frac{1}{3}k \leq 3 \\ \hline -6 \leq k \leq 9 \end{array}$$



Answer

14. Solve and graph.

$$\begin{array}{r}
 -6g - 18 \leq 24 \\
 +18 \quad +18 \\
 \hline
 -6g \leq 42 \\
 \frac{-6g}{-6} \leq \frac{42}{-6} \\
 g \geq -7
 \end{array}
 \quad \text{or} \quad
 \begin{array}{r}
 3(g + 2) < -9 \\
 3g + 6 < -9 \\
 -6 \quad -6 \\
 \hline
 3g < -15 \\
 \frac{3g}{3} < \frac{-15}{3} \\
 g < -5
 \end{array}$$



15. Solve and graph.

$$\begin{array}{r}
 3y - 4 > 20 \\
 +4 \quad +4 \\
 \hline
 3y > 24 \\
 \frac{3y}{3} > \frac{24}{3} \\
 y > 8
 \end{array}
 \quad \text{and} \quad
 \begin{array}{r}
 -2y + 7 > -5 \\
 -7 \quad -7 \\
 \hline
 -2y > -12 \\
 \frac{-2y}{-2} > \frac{-12}{-2} \\
 y < 6
 \end{array}$$

