

Lesson 11.2:

Solving Inequalities Using Addition or Subtraction

Essential Question

How can you use addition or subtraction to solve an inequality?

Key Ideas

Addition Property of Inequality

Words When you add the same number to each side of an inequality, the inequality remains true.

Numbers	$-4 < 3$	Algebra	If $a < b$, then $a + c < b + c$.
	$\begin{array}{r} +2 \\ -4 < 3 \\ \hline -2 < 5 \end{array}$		If $a > b$, then $a + c > b + c$.

Subtraction Property of Inequality

Words When you subtract the same number from each side of an inequality, the inequality remains true.

Numbers	$-2 < 2$	Algebra	If $a < b$, then $a - c < b - c$.
	$\begin{array}{r} -3 \\ -2 < 2 \\ \hline -5 < -1 \end{array}$		If $a > b$, then $a - c > b - c$.

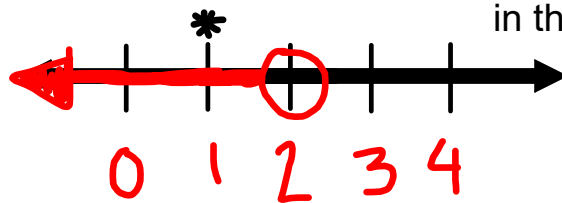
These properties are also true for \leq and \geq .

Solve $x - 5 < -3$. Graph the solution.

$$\begin{array}{r} +5 \quad +5 \\ \hline x < 2 \end{array}$$

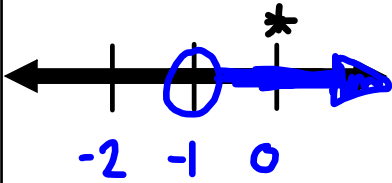
$$\begin{array}{l} 1 - 5 < -3 \\ -4 < -3 \checkmark \end{array}$$

Check with a value in the shaded area.



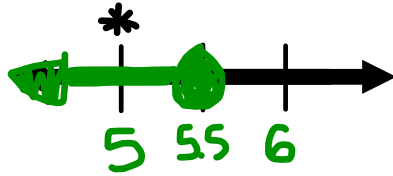
Solve the inequality. Graph the solution.

$$1. \begin{array}{r|l} y - 6 > -7 \\ +6 & +6 \\ \hline y > -1 \end{array}$$



$$\begin{aligned} 0 - 6 &> -7 \\ -6 &> -7 \checkmark \end{aligned}$$

$$2. \begin{array}{r|l} b - 3.8 \leq 1.7 \\ +3.8 & +3.8 \\ \hline b \leq 5.5 \end{array}$$

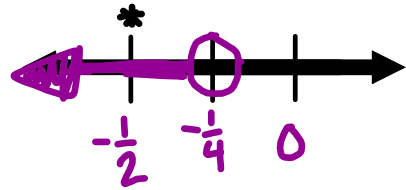


$$\begin{aligned} 5 - 3.8 &\leq 1.7 \\ 1.2 &\leq 1.7 \checkmark \end{aligned}$$

$$3. \begin{array}{r|l} -\frac{1}{2} > z - \frac{1}{4} \\ +\frac{1}{4} & +\frac{1}{4} \\ \hline -\frac{1}{4} > z \end{array}$$

Put the variable on the left

$$z < -\frac{1}{4}$$



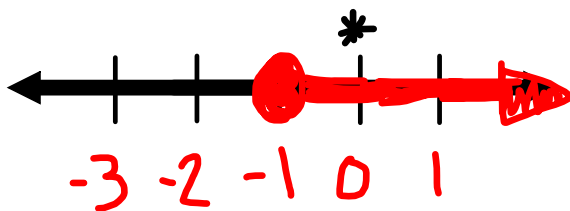
$$\begin{aligned} -\frac{1}{2} &> -\frac{1}{2} - \frac{1}{4} \\ -\frac{1}{2} &> -\frac{3}{4} \checkmark \end{aligned}$$

Solve $13 \leq x + 14$. Graph the solution.

$$\begin{array}{r|l} -14 & -14 \\ \hline -1 & \leq x \\ x & \geq -1 \end{array}$$

$$13 \leq 0 + 14$$

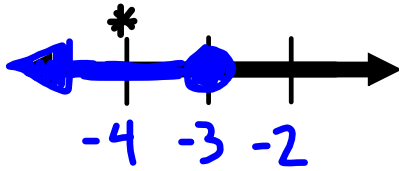
$$13 \leq 14 \checkmark$$



Solve the inequality. Graph the solution.

4. $w - 7 \leq -10$

$$\begin{array}{r} +7 \quad +7 \\ \hline w \leq -3 \end{array}$$

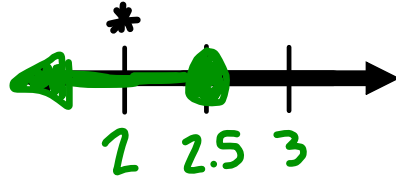


$$-4 - 7 \leq -10$$

$$-11 \leq -10 \checkmark$$

5. $-7.5 \geq d - 10$

$$\begin{array}{r} +10 \quad +10 \\ \hline 2.5 \geq d \\ d \leq 2.5 \end{array}$$

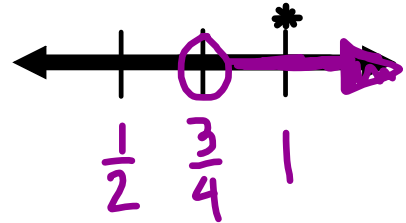


$$-7.5 \geq 2 - 10$$

$$-7.5 \geq -8 \checkmark$$

6.

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



$$1 + \frac{3}{4} > 1\frac{1}{2}$$

$$1\frac{3}{4} > 1\frac{1}{2} \checkmark$$

A person can be no taller \leq than 6.25 feet to become an astronaut pilot for NASA. Your friend is 5 feet 9 inches tall. Write and solve an inequality that represents how much your friend can grow and still meet the requirement.

$$h \leq 6.25$$

$$5'9'' + g \leq 6.25$$

$$\frac{9}{12} = .75$$

$$5.75 + g \leq 6.25$$

$$\begin{array}{r} -5.75 \quad -5.75 \\ \hline \end{array}$$

$$g \leq 0.50 \rightarrow 6''$$

7. Your cousin is 5 feet 3 inches tall. Write and solve an inequality that represents how much your cousin can grow and still meet the requirement.

$$\begin{array}{r|l} 5.25 + g & \leq 6.25 \\ -5.25 & -5.25 \\ \hline g & \leq 1 \rightarrow 1' \end{array}$$