

Lesson 6-1

Example 1 Solve by Adding

Solve $a - 4.2 > -6.4$. Then check your solution.

$$\begin{array}{ll} a - 4.2 > -6.4 & \text{Original inequality} \\ a - 4.2 + 4.2 > -6.4 + 4.2 & \text{Add 4.2 to each side.} \\ a > -2.2 & \text{This means all numbers greater than } -2.2. \end{array}$$

Check: Substitute -2.2 , a number less than -2.2 , and a number greater than -2.2 .

Let $a = -2.2$

$$\begin{array}{l} -2.2 - 4.2 \stackrel{?}{>} -6.4 \\ -6.4 \not> -6.4 \end{array}$$

Let $a = -3$

$$\begin{array}{l} -3 - 4.2 \stackrel{?}{>} -6.4 \\ -7.2 \not> -6.4 \end{array}$$

Let $a = -2$

$$\begin{array}{l} -2 - 4.2 \stackrel{?}{>} -6.4 \\ -6.2 > -6.4 \end{array}$$

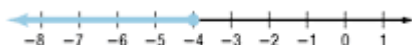
The solution is the set {all numbers greater than -2.2 }.

Example 2 Graph the Solution

Solve $z - 6 \leq -10$. Then graph it on a number line.

$$\begin{array}{ll} z - 6 \leq -10 & \text{Original inequality} \\ z - 6 + 6 \leq -10 + 6 & \text{Add 6 to each side.} \\ z \leq -4 & \text{Simplify.} \end{array}$$

The solution set is $\{z \mid z \leq -4\}$.



The dot at -4 shows that -4 is included in the inequality.

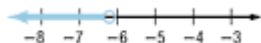
The heavy arrow pointing to the left shows that the inequality includes all numbers less than -4 .

Example 3 Solve by Subtracting

Solve $-4.1 > p + 2.3$. Then graph the solution.

$$\begin{array}{ll} -4.1 > p + 2.3 & \text{Original inequality} \\ -4.1 - 2.3 > p + 2.3 - 2.3 & \text{Subtract 2.3 from each side.} \\ -6.4 > p & \text{Simplify.} \end{array}$$

Since $-6.4 > p$ is the same as $p < -6.4$, the solution set is $\{p \mid p < -6.4\}$.



Example 4 Variables on Both Sides

Solve $7m - 8 \leq 8m$. Then graph the solution.

$$\begin{array}{ll} 7m - 8 \leq 8m & \text{Original inequality} \\ 7m - 8 - 7m \leq 8m - 7m & \text{Subtract 7m from each side.} \\ -8 \leq m & \text{Simplify.} \end{array}$$

Since $-8 \leq m$ is the same as $m \geq -8$, the solution set is $\{m \mid m \geq -8\}$.



Example 5 Write and Solve an Inequality

Write an inequality for the sentence below. Then solve the inequality.

A number minus six is at least two times that number.

$$\underbrace{\text{a number}}_n \quad \underbrace{\text{minus}}_- \quad \underbrace{\text{six}}_6 \quad \underbrace{\text{is at least}}_{\geq} \quad \underbrace{\text{two times that number}}_{2n}$$

$$\begin{aligned} n - 6 &\geq 2n && \text{Original inequality} \\ n - 6 - n &\geq 2n - n && \text{Subtract } n \text{ from each side.} \\ -6 &\geq n && \text{Simplify.} \end{aligned}$$

Since $-6 \geq n$ is the same as $n \leq -6$, the solution set is $\{n \mid n \leq -6\}$.

Example 6 Write an Inequality to Solve a Problem

Ellen has \$150 to spend at the mall. She purchases a CD for \$16.99, a shirt for \$41.99, and lunch for \$5.25. She still wants to purchase a pair of shoes. What amount can she spend on the shoes?

Words	She must spend less than or equal to \$150.		
Variable	Let a = the amount she can spend on shoes.		
Inequality	$\underbrace{\text{total spent}}$	$\underbrace{\text{is less than or equal to}}$	$\underbrace{150}$
	$16.99 + 41.99 + 5.25 + a$	\leq	150

Solve the inequality.

$$\begin{aligned} 16.99 + 41.99 + 5.25 + a &\leq 150 && \text{Original inequality} \\ 64.23 + a &\leq 150 && \text{Simplify.} \\ 64.23 + a - 64.23 &\leq 150 - 64.23 && \text{Subtract } 64.23 \text{ from each side.} \\ a &\leq 85.77 && \text{Simplify.} \end{aligned}$$

Ellen can spend \$85.77 or less on shoes.