

6.3

Solve Multi-Step Inequalities

Goal • Solve multi-step inequalities.

Your Notes

Example 1 Solve a two-step inequality

Solve $4x + 6 \geq 54$. Graph your solution.

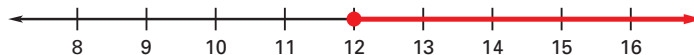
Solution

$$4x + 6 \geq 54 \quad \text{Write original inequality.}$$

$$4x \geq 48 \quad \text{Subtract } \underline{6} \text{ from each side.}$$

$$\underline{x \geq 12} \quad \text{Divide each side by } \underline{4}.$$

The solutions are all real numbers greater than or equal to 12.



Example 2 Solve a multi-step inequality

Solve $-\frac{1}{3}(x + 21) < 2$.

Solution

$$-\frac{1}{3}(x + 21) < 2 \quad \text{Write original inequality.}$$

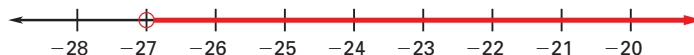
$$-\frac{1}{3}x - \underline{7} < 2 \quad \text{Distributive property}$$

$$-\frac{1}{3}x < \underline{9} \quad \text{Add } \underline{7} \text{ to each side.}$$

$$\underline{x > -27} \quad \text{Multiply each side by } \underline{-3} \text{.}$$

Reverse the inequality symbol.

The solutions are all real numbers greater than -27.

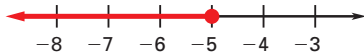


Your Notes

✓ Checkpoint Solve the inequality. Graph your solution.

1. $-5w - 2 \geq 23$

$w \leq -5$



2. $2(y - 2.2) > 0$

$y > 2.2$



Example 3 Identify the number of solutions of an inequality

Solve the inequality, if possible.

a. $8x + 3 > 2(4x + 1)$

b. $3(8b - 1) \leq 24b - 4$

Solution

a. $8x + 3 > 2(4x + 1)$

Write original inequality.

$8x + 3 > \underline{8x + 2}$

Distributive property

$\underline{3 > 2}$

Subtract $8x$ from each side.

All real numbers are solutions because $\underline{3 > 2}$ is true.

b. $3(8b - 1) \leq 24b - 4$

Write original inequality.

$\underline{24b - 3} \leq 24b - 4$

Distributive property

$\underline{-3 \leq -4}$

Subtract $24b$ from each side.

There are no solutions because $\underline{-3 \leq -4}$ is false.

Your Notes

✔ **Checkpoint** Solve the inequality, if possible.

3. $18 + 4w \geq \frac{1}{2}(8w + 36)$

All real numbers are solutions.

4. $-2(3z - 1) < 1 - 6z$

No solution

Example 4 Solve a multi-step problem

Cell Phone Your cell phone plan is \$35 a month for 1000 minutes. You are charged \$.25 per minute for any additional minutes. What are the possible numbers of additional minutes you can use if you want to spend no more than \$50 on your monthly cell phone bill?

Solution

The amount spent on the monthly plan plus additional minutes must be less than or equal to your monthly budget. Let m be the number of additional minutes that you use.

Price per minute (dollars/min)	•	Number of minutes (minutes)	+	Monthly fee (dollars)	≤	Monthly budget (dollars)
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$$\underline{0.25} \cdot m + \underline{35} \leq \underline{50}$$

$$\underline{0.25 \cdot m + 35} \leq \underline{50}$$

Write inequality.

$$\underline{0.25} m \leq \underline{15}$$

Subtract 35 from each side.

$$m \leq \underline{60}$$

Divide each side by 0.25.

You can use an additional 60 minutes or fewer per month to keep within your monthly cell phone budget.

Homework