

5-1 Study Guide and Intervention**Solving Inequalities by Addition and Subtraction**

Solve Inequalities by Addition Addition can be used to solve inequalities. If any number is added to each side of a true inequality, the resulting inequality is also true.

Addition Property of Inequalities

For all numbers a , b , and c , if $a > b$, then $a + c > b + c$,
and if $a < b$, then $a + c < b + c$.

The property is also true when $>$ and $<$ are replaced with \geq and \leq .

Example 1 Solve $x - 8 \leq -6$.

Then graph the solution.

$$\begin{array}{ll} x - 8 \leq -6 & \text{Original inequality} \\ x - 8 + 8 \leq -6 + 8 & \text{Add 8 to each side.} \\ x \leq 2 & \text{Simplify.} \end{array}$$

The solution in set-builder notation is $\{x | x \leq 2\}$.

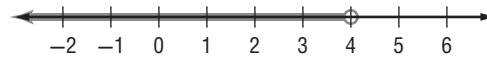
Number line graph:

**Example 2** Solve $4 - 2a > -a$. Then graph the solution.

$$\begin{array}{ll} 4 - 2a > -a & \text{Original inequality} \\ 4 - 2a + 2a > -a + 2a & \text{Add 2a to each side.} \\ 4 > a & \text{Simplify.} \\ a < 4 & 4 > a \text{ is the same as } a < 4. \end{array}$$

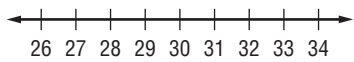
The solution in set-builder notation is $\{a | a < 4\}$.

Number line graph:

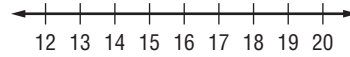
**Exercises**

Solve each inequality. Check your solution, and then graph it on a number line.

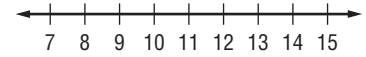
1. $t - 12 \geq 16$



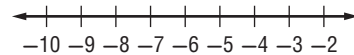
2. $n - 12 < 6$



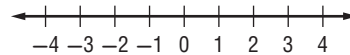
3. $6 \leq g - 3$



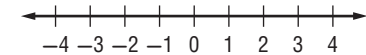
4. $n - 8 < -13$



5. $-12 > -12 + y$



6. $-6 > m - 8$



Solve each inequality. Check your solution.

7. $-3x \leq 8 - 4x$

8. $0.6n \geq 12 - 0.4n$

9. $-8k - 12 < -9k$

10. $-y - 10 > 15 - 2y$

11. $z - \frac{1}{3} \leq \frac{4}{3}$

12. $-2b > -4 - 3b$

Define a variable, write an inequality, and solve each problem. Check your solution.

13. A number decreased by 4 is less than 14.

14. The difference of two numbers is more than 12, and one of the numbers is 3.

15. Forty is no greater than the difference of a number and 2.

5-1**Study Guide and Intervention***(continued)***Solving Inequalities by Addition and Subtraction**

Solve Inequalities by Subtraction Subtraction can be used to solve inequalities. If any number is subtracted from each side of a true inequality, the resulting inequality is also true.

Subtraction Property of Inequalities

For all numbers a , b , and c , if $a > b$, then $a - c > b - c$,
and if $a < b$, then $a - c < b - c$.

The property is also true when $>$ and $<$ are replaced with \geq and \leq .

Example

Solve $3a + 5 > 4 + 2a$. Then graph it on a number line.

$$3a + 5 > 4 + 2a$$

Original inequality

$$3a + 5 - 2a > 4 + 2a - 2a$$

Subtract $2a$ from each side.

$$a + 5 > 4$$

Simplify.

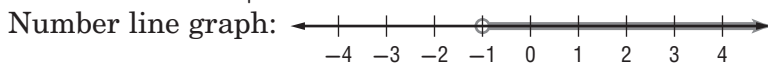
$$a + 5 - 5 > 4 - 5$$

Subtract 5 from each side.

$$a > -1$$

Simplify.

The solution is $\{a | a > -1\}$.

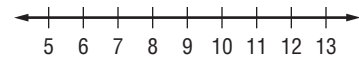
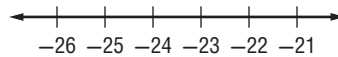
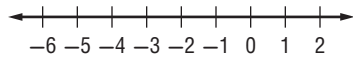
**Exercises**

Solve each inequality. Check your solution, and then graph it on a number line.

1. $t + 12 \geq 8$

2. $n + 12 > -12$

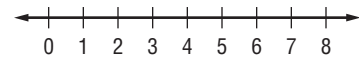
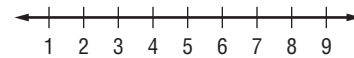
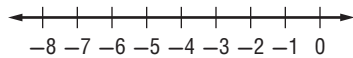
3. $16 \leq h + 9$



4. $y + 4 > -2$

5. $3r + 6 > 4r$

6. $\frac{3}{2}q - 5 \geq \frac{1}{2}q$



Solve each inequality. Check your solution.

7. $4p \geq 3p + 0.7$

8. $r + \frac{1}{4} > \frac{3}{8}$

9. $9k + 12 > 8k$

10. $-1.2 > 2.4 + y$

11. $4y < 5y + 14$

12. $3n + 17 < 4n$

Define a variable, write an inequality, and solve each problem. Check your solution.

13. The sum of a number and 8 is less than 12.

14. The sum of two numbers is at most 6, and one of the numbers is -2 .

15. The sum of a number and 6 is greater than or equal to -4 .