NAME _____ DATE _____ PERIOD _____

6-1 Solving Inequalities by Addition and Subtraction *(Pages 318–323)*

Addition and Subtraction Properties of Inequalities	For all numbers a, b, and c, the following are true. 1. If $a > b$, then $a + c > b + c$ and $a - c > b - c$. (Also true for $\geq$) 2. If $a < b$, then $a + c < b + c$ and $a - c < b - c$. (Also true for $\leq$)

The solutions of an inequality can be graphed on a number line or written using **set-builder notation**.

Example

Solve $3m - 7 > 4m + 1$. Check your solution, and graph it on a number line.

$$3m - 7 > 4m + 1$$
$$3m - 7 - 3m > 4m + 1 - 3m$$
$$-7 > m + 1$$
$$-7 - 1 > m + 1 - 1$$
$$-8 > m \text{ or } m < -8$$

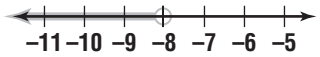
In set builder notation, the solution set is $\{m|m < -8\}$, which is read "the set of all numbers m such that m is less than −8."

Only numbers less than −8 substituted into the original inequality should yield a true statement.

$3(0) - 7 \stackrel{?}{>} 4(0) + 1$ *Let $m = 0$.*
$-7 > 1$ *False*
$3(-9) - 7 \stackrel{?}{>} 4(-9) + 1$ *Let $m = -9$.*
$-34 > -35$ *True*

Since only the number less than −8 yields a true statement, the solution checks.

Graph the point −8 using an open circle, since −8 is not part of the solution. Then draw a heavy arrow to the left to indicate numbers less than −8.



Try These Together

1. Solve and graph $z - 16 < 5$.

2. Solve and graph $j + \frac{1}{2} > 9$.

Practice

Solve each inequality. Then check your solution, and graph it on a number line.

3. $-6 + m > 6$ **4.** $3y \leq 2y + 4$ **5.** $x - 1 < -14$ **6.** $-0.05 \leq v - (-0.06)$

Solve each inequality. Then check your solution.

7. $x + \frac{1}{3} < \frac{1}{6}$ **8.** $-0.8x - 0.7 < 0.3 - 1.8x$ **9.** $5x + 7 \geq 4x + 8$

10. $2h - 5 \leq h + 4$ **11.** $u - 45 \geq 38$ **12.** $2x + \frac{1}{3} \leq 3x + \frac{2}{3}$

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

13. A number decreased by −3 is at least 10.

14. Twice a number is more than the difference of that number and 4.

15. **Standardized Test Practice** Which number is a solution of $2x \leq x + 8$?

A 12 **B** 11 **C** 9 **D** 6

Answers: **1–6.** For graphs, see Answer Key. **1.** $\{z|z < 21\}$ **2.** $\left\{j|j > 8\frac{1}{2}\right\}$ **3.** $\{m|m > 12\}$ **4.** $\{y|y \leq 4\}$ **5.** $\{x|x < -13\}$ **6.** $\{v|v \geq -0.11\}$ **7.** $\left\{x|x < -\frac{1}{6}\right\}$ **8.** $\{x|x < 1\}$ **9.** $\{x|x \geq 1\}$ **10.** $\{h|h \leq 9\}$ **11.** $\{u|u \geq 83\}$ **12.** $\left\{x|x \geq -\frac{1}{3}\right\}$ **13.** $x - (-3) \geq 10$; $\{x|x \geq 7\}$ **14.** $2x > x - 4$; $\{x|x > -4\}$ **15.** D