6-2 Solving Inequalities by Multiplication and Division *(Pages 325–331)*

When you multiply or divide each side of an inequality by a negative number, you must reverse the direction of the inequality symbol.

Multiplication and Division Properties for Inequalities	For all numbers a, b, and c, the following are true.
	1. If c is positive and $a < b$, then $ac < bc$ and $\dfrac{a}{c} < \dfrac{b}{c}$, and if c is positive and $a > b$, then $ac > bc$ and $\dfrac{a}{c} > \dfrac{b}{c}$.
	2. If c is negative and $a < b$, then $ac > bc$ and $\dfrac{a}{c} > \dfrac{b}{c}$, and if c is negative and $a > b$, then $ac < bc$ and $\dfrac{a}{c} < \dfrac{b}{c}$.
	These properties also hold true for inequalities involving $\leq$ and $\geq$.

Example

Solve $-5y \leq 12$ and check your solution.

$-5y \leq 12$

$-\dfrac{5y}{-5} \geq \dfrac{12}{-5}$ *Divide each side by -5 and change the $\leq$ to $\geq$.*

$y \geq -2.4$

In set builder notation, the solution set is $\{y \mid y \geq -2.4\}$.

Check: Let y be -2.4 and any number greater than -2.4, such as 0.

$-5(-2.4) \leq 12$ $-5(0) \leq 12$

$\quad\quad 12 \leq 12\ \checkmark$ $\quad 0 \leq 12\ \checkmark$

Try These Together

1. Solve $3a \leq -27$ and check.

2. Solve $-\dfrac{5}{7}s < -\dfrac{5}{14}$ and check.

Practice

Solve each inequality. Then check your solution.

3. $\dfrac{r}{2} < 68$ **4.** $-d \leq 59$ **5.** $-\dfrac{1}{5}u > 20$ **6.** $-14c < -49$ **7.** $\dfrac{n}{-8} \leq 9$

8. $13b > -91$ **9.** $\dfrac{75k}{-4} > \dfrac{5}{16}$ **10.** $8 \geq 0.5g$ **11.** $5 < -t$ **12.** $\dfrac{f}{8} \geq \dfrac{1}{10}$

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

13. 5 times a number is at most 45.

14. 34 is at least one half of a number.

15. One fifth of a number is at most -10.

16. 60 percent of a number is less than 78.

17. Standardized Test Practice   Solve $-\dfrac{1}{2}x \geq \dfrac{1}{2}$.

     A $\{x \mid x \leq -1\}$ **B** $\{x \mid x \geq -1\}$ **C** $\left\{x \mid x \leq -\dfrac{1}{4}\right\}$ **D** $\left\{x \mid x \geq -\dfrac{1}{4}\right\}$

Answers: **1.** $\{a \mid a \leq -9\}$ **2.** $\left\{s \mid s < \dfrac{1}{2}\right\}$ **3.** $\{r \mid r < 136\}$ **4.** $\{d \mid d \geq -59\}$ **5.** $\{u \mid u < -100\}$ **6.** $\{c \mid c > 3.5\}$ **7.** $\{n \mid n \geq -72\}$ **8.** $\{b \mid b > -7\}$ **9.** $\left\{k \mid k < -\dfrac{1}{60}\right\}$ **10.** $\{g \mid g \leq 16\}$ **11.** $\{t \mid t < -5\}$ **12.** $\{f \mid f \geq 0.8\}$ **13.** $5x \leq 45$; $\{x \mid x \leq 9\}$ **14.** $34 \geq \dfrac{1}{2}x$; $\{x \mid x \leq 68\}$ **15.** $\dfrac{1}{5}x \leq -10$; $\{x \mid x \leq -50\}$ **16.** $\dfrac{60}{100}x < 78$; $\{x \mid x < 130\}$ **17.** A

Chapter 6