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NAME \_\_\_\_\_ DATE \_\_\_\_\_

# Solving Inequalities by Using Multiplication and Division (Pages 392–398)

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

<b>Multiplication and Division Properties for Inequalities</b>	<p>For all numbers <math>a</math>, <math>b</math>, and <math>c</math>, the following are true.</p> <p>1. If <math>c</math> is positive and <math>a &lt; b</math>, then <math>ac &lt; bc</math> and <math>\frac{a}{c} &lt; \frac{b}{c}</math>, and if <math>c</math> is positive and <math>a &gt; b</math>, then <math>ac &gt; bc</math> and <math>\frac{a}{c} &gt; \frac{b}{c}</math>.</p> <p>2. If <math>c</math> is negative and <math>a &lt; b</math>, then <math>ac &gt; bc</math> and <math>\frac{a}{c} &gt; \frac{b}{c}</math>, and if <math>c</math> is negative and <math>a &gt; b</math>, then <math>ac &lt; bc</math> and <math>\frac{a}{c} &lt; \frac{b}{c}</math>.</p> <p>These properties also hold true for inequalities involving <math>\leq</math> and <math>\geq</math>.</p>
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## EXAMPLE

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

$$-5y \leq 12$$

$$\frac{-5y}{-5} \geq \frac{12}{-5} \quad \text{Divide each side by } -5 \text{ and change the } \leq \text{ to } \geq.$$

$$y \geq -2.4$$

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

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

$$\begin{array}{ll} -5(-2.4) \leq 12 & -5(0) \leq 12 \\ 12 \leq 12 \checkmark & 0 \leq 12 \checkmark \end{array}$$

## Try These Together

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

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

## PRACTICE

Solve each inequality. Then check your solution.

3.  $\frac{r}{2} < 68$

4.  $-d \leq 59$

5.  $-\frac{1}{5}u > 20$

6.  $-14c < -49$

7.  $\frac{n}{-8} \leq 9$

8.  $13b > -91$

9.  $\frac{75k}{-4} > \frac{5}{16}$

10.  $8 \geq 0.5g$

11.  $5 < -t$

12.  $\frac{f}{8} \geq \frac{1}{10}$

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  $-\frac{1}{2}x \geq \frac{1}{2}$ .

A  $\{x | x \leq -1\}$

B  $\{x | x \geq -1\}$

C  $\left\{x \mid x \leq -\frac{1}{4}\right\}$

D  $\left\{x \mid x \geq -\frac{1}{4}\right\}$

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

