

Solving Multiplication and Division Inequalities

(Pages 514–518)

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	<p>For all numbers a, b, and c, the following are true.</p> <ol style="list-style-type: none"> If c is positive and $a < b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$, and if c is positive and $a > b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. If c is negative and $a < b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$, and if c is negative and $a > b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$. <p>These properties also hold true for inequalities involving \leq and \geq.</p>
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EXAMPLE

Solve $-5y \leq 15$ and check your solution.

$$\begin{aligned} -5y &\leq 15 \\ \frac{-5y}{-5} &\geq \frac{15}{-5} && \text{Divide each side by } -5 \text{ and change} \\ &\geq -3 && \text{to } \geq. \\ y &\geq -3 \end{aligned}$$

In set-builder notation, the solution set is $\{y|y \geq -3\}$.

Check: Let y be -3 and any number greater than -3 , such as 0 .

$$\begin{aligned} -5(-3) &\leq 15 && -5(0) \leq 15 \\ 15 &\leq 15 \checkmark && 0 \leq 15 \checkmark \end{aligned}$$

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. Check your solution.

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

4. $-d \leq 59$

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

6. $-14c < -42$

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

13. $34 \geq \frac{1}{2}x$

14. $\frac{1}{5}x \leq -10$

15. **Time** Corey can jog a 5-mile trail in 45 minutes at the most. How much time does it take Corey on average to jog a mile? Express your answer as an inequality.



16. **Standardized Test Practice** Solve $-\frac{1}{2}x \geq \frac{1}{2}$.

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

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

C $\{x|x \leq -\frac{1}{4}\}$

D $\{x|x \geq -\frac{1}{4}\}$

Answers: 1. $\{a|a \leq -9\}$ 2. $\{s|s < \frac{2}{7}\}$ 3. $\{r|r < 136\}$ 4. $\{d|d \geq -59\}$ 5. $\{u|u < -100\}$ 6. $\{c|c > 3\}$ 7. $\{n|n \geq -72\}$ 8. $\{b|b > -7\}$ 9. $\{k|k < -\frac{60}{17}\}$ 10. $\{g|g \leq 16\}$ 11. $\{t|t < -5\}$ 12. $\{f|f \geq 0.8\}$ 13. $\{x|x \leq 68\}$ 14. $\{x|x \leq -50\}$ 15. no more than 9 minutes ($x \leq 9$) 16. A