

Solving Inequalities using Multiplication and Division
2.3

Multiplying and Dividing by POSITIVE numbers:

Multiplying or dividing each side of an inequality by the same *positive* number produces an equivalent inequality.

$$\begin{aligned} -6 < 8 \\ 2(-6) < 2(8) \\ -12 < 16 \end{aligned}$$

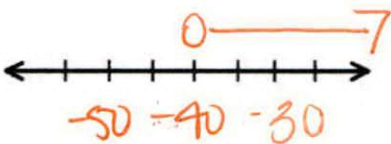
$$\begin{aligned} 6 > -8 \\ \frac{6}{2} > \frac{-8}{2} \\ 3 > -4 \end{aligned}$$

If $a > b$ and $c > 0$, then $ac > bc$. $a > b$ and $c > 0$, then $\frac{a}{c} > \frac{b}{c}$.
If $a < b$ and $c < 0$, then $ac < bc$. $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$.
These properties are also true for \leq and \geq .

Example 1: Solve each inequality then graph the solution.

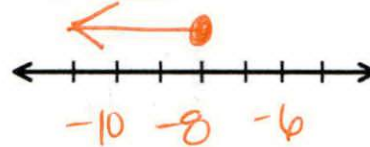
a. $\frac{x}{8} > -5$

$$\begin{aligned} 8\left(\frac{x}{8}\right) &> (-5)8 \\ |x > -40| \end{aligned}$$



b. $-24 \geq 3x$

$$\begin{aligned} \frac{-24}{3} &\geq \frac{3x}{3} \\ -8 &\geq x \\ |x \leq -8| \end{aligned}$$



Multiplying and Dividing by NEGATIVE numbers:

When multiplying or dividing each side of an inequality by the same *negative* number, the direction of the inequality sign must be reversed to produce an equivalent inequality.

$$\begin{aligned} -6 < 8 \\ -2(-6) &\leq 8 \cdot (-2) \\ 12 &\leq -16 \end{aligned}$$

$$\begin{aligned} 6 > -8 \\ -2(6) &> -2(-8) \\ -12 &> 16 \end{aligned}$$

If $a > b$ and $c < 0$, then $ac < bc$. $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.
If $a < b$ and $c < 0$, then $ac > bc$. $a < b$ and $c < 0$, then $\frac{a}{c} > \frac{b}{c}$.
These properties are also true for \leq and \geq .

* If you multiply OR divide by a -# FLIP the sign

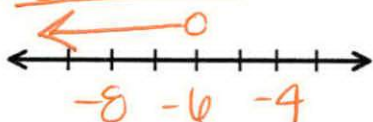


Example 2: Solve each inequality then graph the solution.

a. $2 \leq \frac{y}{-3} < 3$

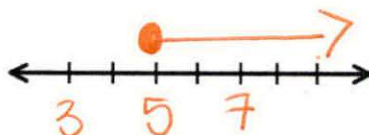
$-6 > y$

$y < -6$



b. $-7y \leq -35$

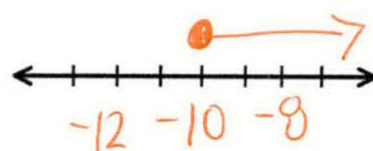
$y \geq 5$



c. $1 \geq -\frac{1}{10}z$

$-10 \leq z$

$z \geq -10$



$\frac{1}{1} \cdot \frac{-10}{1}$

Solving Real-Life Problems

Example 3: You earn \$9.50 per hour at your summer job. Write an inequality that represents the number of hours you need to work to buy a digital camera that costs \$247.

26 hours or more

$$\frac{9.50x \geq 247}{9.50 \quad 9.50}$$

$$x \geq 26$$

you need to make at least 247
so = or more

Example 4: You run for 2 hours at a speed no faster than 6.3 miles per hour.

a. Write and solve an inequality that represents the possible numbers of miles you run.

$x \leq 6.3(2)$

$x \leq 12.6$

slower or equal to

*remember $d = Rt$

b. A marathon is approximately 26.2 miles. Your friend says that if you continue to run at this speed, you will not be able to complete a marathon in less than 4 hours. Is your friend correct?

2 hours is at most 12.6 miles
4 hours would be at most 25.2
yes the friend is correct

