

AA – Section 3.3 – Solving Inequalities Using Multiplication and Division

Objective: To use multiplication and division to solve inequalities.

Essential Understanding: Just as we used the multiplication and division to solve equations; you can use multiplication and division to solve inequalities.

Multiplication Property of Inequality:

Let a , b , and c be real numbers with $c > 0$.

If $a > b$, then $ac > bc$.

If $a < b$, then $ac < bc$.

Let a , b , and c be real numbers with $c < 0$.

If $a > b$, then $ac < bc$.

If $a < b$, then $ac > bc$.

*****Anytime you multiply or divide by a negative number, you flip (or reverse) the inequality sign.**

Examples –

Solve the inequalities and graph the solution.

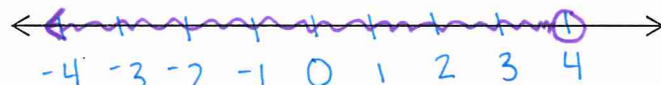
$$1. 6 \cdot \frac{x}{6} < 1 \cdot 6$$

$$x < 6$$



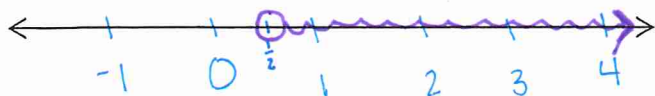
$$2. -4 \cdot -\frac{x}{4} > -1 \cdot -4$$

$$x < 4$$



$$3. -1 \cdot -x < -\frac{1}{2} \cdot -1$$

$$x > \frac{1}{2}$$



$$4. \frac{3}{2} - \frac{2}{3} < \frac{2}{3}x \cdot \frac{3}{2}$$

$$-\frac{2}{3} < x$$

$$x > -\frac{2}{3}$$



Division Property of Inequality:

Let a , b , and c be real numbers with $c > 0$.

$$\text{If } a > b, \text{ then } \frac{a}{c} > \frac{b}{c}.$$

$$\text{If } a < b, \text{ then } \frac{a}{c} < \frac{b}{c}.$$

Let a , b , and c be real numbers with $c < 0$.

$$\text{If } a > b, \text{ then } \frac{a}{c} < \frac{b}{c}.$$

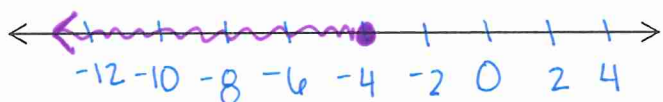
$$\text{If } a < b, \text{ then } \frac{a}{c} > \frac{b}{c}.$$

***Anytime you multiply or divide by a negative number, you flip (or reverse) the inequality sign.

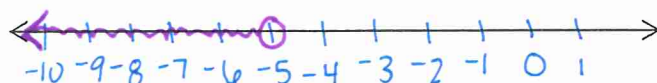
Examples –

Solve the inequalities and graph the solution.

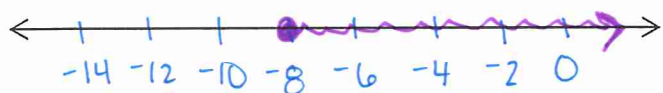
5.
$$\frac{-3x}{-3} \geq \frac{12}{-3}$$
$$x \leq -4$$



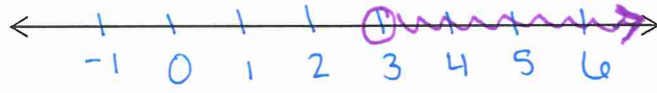
6.
$$\frac{20}{-4} > \frac{-4x}{-4}$$
$$-5 > x$$
$$x < -5$$



7.
$$\frac{-16}{2} \leq \frac{2x}{2}$$
$$-8 \leq x$$
$$x \geq -8$$



8.
$$\frac{-0.2x}{-0.2} < \frac{0.6}{-0.2}$$
$$x > 3$$



Write and solve an inequality.

9. A student club plans to buy food for a soup kitchen. A case of vegetables costs \$10.68. The club can spend at most \$50 for the project. What are the possible numbers of cases the club can buy?

x : cases of vegetables

$$\frac{10.68x}{10.68} \leq \frac{50}{10.68}$$
$$x \leq 4.7$$

The club can buy at most 4 cases of vegetables.