

Day 3 – Solving Multi Step Inequalities – Notes

Solving linear inequalities is very similar to solving equations, but there is one minor difference. See if you can figure it out below:

Experiment

Take the inequality $6 > 3$. Is this true?

1. Add 3 to both sides. What is your new inequality?

$$\begin{aligned} 3 + 6 &> 3 + 3 \\ 9 &> 6 \quad \text{True} \end{aligned}$$

3. Multiply both sides by 3. What is your new inequality?

$$\begin{aligned} 3 \cdot 6 &> 3 \cdot 3 \\ 18 &> 9 \quad \text{True} \end{aligned}$$

3. Multiply both sides by -3. What is your new inequality?

$$\begin{aligned} -3 \cdot 6 &> -3 \cdot 3 \\ -18 &> -9 \quad \text{False!} \end{aligned}$$

2. Subtract 3 from both sides. What is your new inequality?

$$\begin{aligned} 6 - 3 &> 3 - 3 \\ 3 &> 0 \quad \text{True} \end{aligned}$$

4. Divide both sides by 3. What is your new inequality?

$$\begin{aligned} \frac{6}{3} &> \frac{3}{3} \\ 2 &> 1 \quad \text{True} \end{aligned}$$

4. Divide both sides by -3. What is your new inequality?

$$\begin{aligned} \frac{6}{-3} &> \frac{3}{-3} \\ -2 &> -1 \quad \text{False!} \end{aligned}$$

Conclusions

When you multiply or divide by a negative number, you must reverse the inequality symbol.

Practice Solving Inequalities

Directions: Solve and graph.

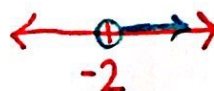
a. $-3x - 4 < 2$

$$\begin{aligned} -3x - 4 &< 2 \\ +4 &+4 \\ \hline -3x &< 6 \\ \frac{-3x}{-3} &< \frac{6}{-3} \quad \div \text{ by } - \\ \boxed{x > -2} \end{aligned}$$



b. $\frac{1}{2}x - 7 > -8$

$$\begin{aligned} \frac{1}{2}x - 7 &> -8 \\ +7 &+7 \\ \hline \frac{1}{2}x &> -1 \cdot 2 \\ \boxed{x > -2} \end{aligned}$$



c. $-2(5x - 3) \geq 14$

$$\begin{aligned} -2(5x - 3) &\geq 14 \\ -10x + 6 &\geq 14 \\ \frac{-10x + 6}{-6} &\geq \frac{14}{-6} \\ \frac{-10x}{-10} &\geq \frac{8}{-10} \quad \div \text{ by } - \\ \boxed{x \leq -\frac{4}{5}} \end{aligned}$$

