Foundations of Algebra | Unit 4: Equations & Inequalities | Notes

Day 10 – Solving Multi Step Inequalities

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 $6 > 2$. Is this true? ✓ yes

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

$6 > 2$
$+3 \quad +3$
$9 > 5$ ✓

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

$6 > 2$
$-3 \quad -3$
$3 > -1$ ✓

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

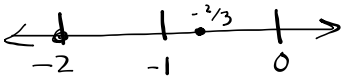
$3 \cdot 6 > 2 \cdot 3$
$18 > 6$

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

$\frac{6}{3} > \frac{2}{3}$
$2 > \frac{2}{3}$

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

$-3 \cdot 6 > 2 \cdot -3$
$-18 < -6$



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

$\frac{6}{-3} > \frac{2}{-3}$
$-2 < -\frac{2}{3}$

Conclusion:

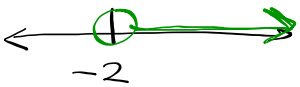
If you multiply or divide by a negative, the sign $>, <, \geq, \leq$ FLIPS

Practice Solving Inequalities

Directions: Solve and graph.

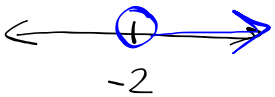
a. $-3x - 4 < 2$

$+4 \quad +4$
$-3x < 6$
$-3 \quad -3$
$x > -2$



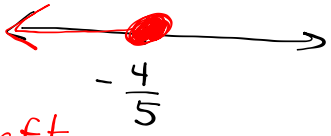
b. $\frac{1}{2}x - 7 > -8$

$+7 \quad +7$
$\frac{1}{2}x > 1$
$2 \cdot \frac{1}{2}x > 1 \cdot 2$
$x > -2$



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

$-10x + 6 \geq 14$
$-6 \quad -6$
$-10x \geq 8$
$-10 \quad -10$
$x \leq -\frac{4}{5}$



Less than = Left

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d. $-x \leq 5$

$\frac{-x}{-1} \leq \frac{5}{-1}$ NEG = FLIP

$x \geq -5$

e. $-7 > x$

$\frac{-7}{-1} < \frac{x}{-1}$

$7 < x$

$x > 7$

f. $12x - 6 \neq 14x - 2$

$-12x \quad -12x$

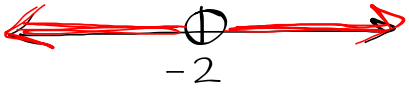
$-6 \neq 2x - 2$

$+2 \quad +2$

$-4 \neq 2x$

$\frac{-4}{2} \neq \frac{2x}{2}$

$-2 \neq x$



g. $11 > 4x + 3$

$11x - 5 \leq 15x + 3$

$-15x \quad -15x$

$-4x - 5 \leq 3$

$+5 \quad +5$

$-4x \leq 8$

$\frac{-4x}{-4} \geq \frac{8}{-4}$

$x \geq -2$

h. $11x - 5 \leq 15x + 3$

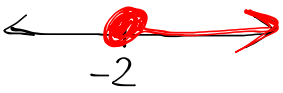
$-11x \quad -11x$

$-5 \leq 4x + 3$

$-3 \quad -3$

$\frac{-8}{4} \leq \frac{4x}{4}$

$-2 \leq x$



j. $\frac{15}{} - \frac{5}{8}x > 10$

$-15 \quad -15$

$-\frac{8}{5}\left(-\frac{5}{8}x\right) < (-5)\cdot\frac{-8}{5}$

$x < \frac{-5 \cdot -8}{5}$

$x < \frac{40}{5}$

$x < 8$