Section 9.3
Solving Multi-Step Inequalities

Learning Targets:

1. Apply strategies for solving 2-step equations to solving 2-step inequalities.

2. Recognizing when the inequality symbol needs to be changed.

3. Verifying solutions to inequalities.

Examples:

Solve and verify the solutions for the following inequalities

1) $\frac{x}{4} + 3 > 8$

$-3 \quad -3$

$(4)\left(\frac{x}{4}\right) > (5)(4)$

$x > 20$

Verify:

Boundary $x = 20$

$\frac{20}{4} + 3 = 8$

$5 + 3 = 8$

$8 = 8$ ✓

Inequality $x = 24$

$\frac{24}{4} + 3 > 8$

$6 + 3 > 8$

$9 > 8$ ✓

2) $-5x - 16 < 4$

$+16 \quad +16$

$\frac{-5x}{-5} < \frac{20}{-5}$

flip

$x > -4$

Verify:

Boundary $x = -4$

$-5(-4) - 16 = 4$

$20 - 16 = 4$

$4 = 4$ ✓

Inequality $x = -2$

$-5(-2) - 16 < 4$

$10 - 16 < 4$

$-6 < 4$ ✓

3) $(15)\left(\frac{6+x}{15}\right) \geq (-3)(15)$

$6 + x \geq -45$

$-6 \qquad -6$

$\boxed{x \geq -51}$

Verify:

Boundary $x = -51$

$\frac{6+(-51)}{15} = -3$

$-\frac{45}{15} = -3$

$-3 = -3$ ✓

Inequality $x = 9$

$\frac{6+9}{15} \geq -3$

$1 \geq -3$ ✓

You Try:

Solve and verify the following inequalities:

$4 - 2x \leq 14$

$\frac{5+x}{2} > 6$

You Try:

Solve and verify the following inequalities:

$4 - 2x \leq 14$

$x \geq -5$

$\frac{5+x}{2} > 6$

$x > 7$

4) $6x - 20 \geq 4x$

$-6x \qquad -6x$

$-20 \geq -2x$

$\frac{-20}{-2} \quad \frac{\geq}{\text{flip}} \quad \frac{-2x}{-2}$

$10 \leq x$

Verify:

Boundary $x = 10$

$6(10) - 20 = 4(10)$

$60 - 20 = 40$

$40 = 40$ ✓

Inequality $x = 11$

$6(11) - 20 \geq 4(11)$

$66 - 20 \geq 44$

$46 \geq 44$ ✓

5) $-3x - 15 \leq -6x$

$+3x \qquad +3x$

$-15 \leq -3x$

$\frac{-15}{-3} \leq \frac{-3x}{-3}$ flip

$5 \geq x$

Verify:

Boundary $x = 5$

$-3(5) - 15 = -6(5)$

$-15 - 15 = -30$

$-30 = -30$ ✓

Inequality $x = -10$

$-3(-10) - 15 \leq -6(-10)$

$30 - 15 \leq 60$

$15 \leq 60$ ✓

You Try:

Solve and verify the following inequality:

$$4x - 13 \leq -9x$$

You Try:

Solve and verify the following inequality:

$$4x - 13 \leq -9x$$

$1 \geq x$

or

$x \leq 1$

Check your understanding:

Worksheet #1: Solving 2-Step Inequalities
#1 - 12

Worksheet #2: Solve and Graph 2-Step Inequalities
#1 - 8

Practice verifying solutions on every odd-numbered question on these worksheets.