NAME:_____ Math 7.1

Mr. Rogove Date:_____

LEARNING OBJECTIVE: We will show the properties of inequalities using symbols $<$ (less than), $\leq$ (less than or equal to), $>$ (greater than), and $\geq$ (greater than or equal to). (G7M3L10)

EXPLORATION:

Exploration #1: Add or subtract a number to both sides of the inequality

Die 1	Inequality	Die 2	Operation	New Inequality	Inequality symbol preserved or reversed?
3	$<$	4	Add 2	$5 < 6$	preserved
4	$>$	1	Add -3	$1 > -2$	preserved
5	$<$	6	Subtract 2	$3 < 4$	preserved
2	$>$	1	Subtract -1	$3 > 2$	preserved
3	$<$	4	Add 1	$4 < 5$	preserved

What do you notice? Inequality symbol stays the same.

Exploration #2: Multiply both sides of the inequality by -1.

Die 1	Inequality	Die 2	Operation	New Inequality	Inequality symbol preserved or reversed?
6	$>$	1	Multiply by -1	$-6 < -1$	reversed
6	$>$	5	Multiply by -1	$-6 < -5$	reversed
2	$<$	3	Multiply by -1	$-2 > -3$	reversed
4	$>$	2	Multiply by -1	$-4 < -2$	reversed
6	$>$	2	Multiply by -1	$-6 < -2$	reversed

What do you notice?

Multiplying by -1 reverses the inequality symbol

NAME:_____ Math 7.1

Mr. Rogove Date:_____

Exploration #3: Multiply or divide both sides of the inequality by a positive number.

Die 1	Inequality	Die 2	Operation	New Inequality	Inequality symbol preserved or reversed?
-2	$>$	-4	Multiply by $\frac{1}{2}$	$(-2)\left(\frac{1}{2}\right) > (-4)\left(\frac{1}{2}\right)$ $-1 > -2$	Preserved
1	$<$	6	Multiply by 2	$2 < 12$	preserved
1	$<$	5	Divide by 2	$\frac{1}{2} < 2\frac{1}{2}$	preserved
4	$>$	1	Divide by $\frac{1}{2}$	$8 > 2$	preserved
2	$<$	3	Multiply by 3	$6 < 9$	preserved

What do you notice? Inequality is preserved.

Exploration #4: Multiply or divide both sides of the inequality by a negative number.

Die 1	Inequality	Die 2	Operation	New Inequality	Inequality symbol preserved or reversed?
3	$>$	-2	Multiply by -2	$3(-2) > (-2)(-2)$ $-6 > 4$ $-6 < 4$	Reversed
6	$>$	2	Multiply by -3	$-18 < -6$	Reversed.
3	$>$	1	Divide by -2	$-\frac{3}{2} < -\frac{1}{2}$	Reversed
4	$>$	1	Divide by $-\frac{1}{2}$	$-8 < -2$	Reversed
6	$>$	5	Multiply by $-\frac{1}{2}$	$-3 < -2\frac{1}{2}$	Reversed

What do you notice? All inequalities are reversed when multiplying by negative #'s.

NAME:_____ Math 7.1

Mr. Rogove Date:_____

Concept Development:

Symbol	Example	In words
$<$	$-10 < -2$	-10 is less than -2
$\leq$	$6 \leq 9$	6 is less than or equal to 9
$>$	$1 > -4$	1 is greater than -4
$\geq$	$-14 \geq -18$	-14 is greater than or equal to -18

When both sides of the inequality are added or subtracted by a number, the inequality symbol stays the same→ the inequality symbol is preserved.

EXPLORATION #1

When both sides of the inequality are multiplied or divided by a **positive** number, the inequality symbol stays the same→ the inequality symbol is preserved.

EXPLORATION #3

When both sides of the inequality are multiplied or divided by a **negative** number, the inequality switches from $<$ to $>$ or from $>$ to $<$. The inequality is reversed.

EXPLORATION #2 & #4

Guided Practice:

Steps to Writing Inequalities that Preserve and Reverse the Inequality Symbol

1. Study the given inequality.
2. Determine and perform an operation that preserves the inequality symbol.
3. Determine and perform an operation that reverses the inequality symbol.
4. Justify your answers.

Inequality	Operation that preserves the inequality	Operation that reverses the inequality
$2 < 5$	Subtract 1 $1 < 4$	Multiply by -2 $-4 > -10$
$-4 > -6$	Multiply by 3 $-12 > -18$	Divide by -2 $2 < 3$
$-1 \leq 2$	Divide by $\frac{3}{3}$ $-\frac{3}{2} \leq 3$	Multiply by $\frac{-3}{1}$ $3 \geq -6$
$-2 + (-3) < -3 - 1$ $-5 < -4$	Add 6 $1 < 2$	Divide by -1 $5 > 4$

NAME:_____ Math 7.1

Mr. Rogove Date:_____

Independent Practice:

For each inequality, determine and perform operations that preserve and reverse the inequality symbol.

Inequality	Operation that preserves the inequality	Operation that reverses the inequality
$\mathbf{4 > -5}$	Add _____	Multiply by _____
$\mathbf{-5 \geq -6}$	Subtract _____	Divide by _____
$\mathbf{-1 \leq 1}$	Multiply by _____	Divide by _____
$\mathbf{-2 + (-1) > -5 + 1}$	Subtract _____	Divide by _____
$\mathbf{3 + \frac{1}{2} > (-4)\left(\frac{1}{2}\right)}$	Add _____	Multiply by _____
$\mathbf{-3 \geq (-2)\left(\frac{3}{2}\right)}$ What's special about this??	Divide by _____	Multiply by _____

NAME:_____ Math 7.1

Mr. Rogove Date:_____

Activating Prior Knowledge:

NO APK—do sprint!

Closure:

Given the initial inequality $-4 < 7$, state possible values for c that would satisfy the following inequalities:

a. $c(-4) < c(7)$

$-4 < 7$

b. $c(-4) > c(7)$

$4 > -7$

$\neq$

c. $c(-4) = c(7)$

$0 = 0$

Teacher Notes:

-Inequality reversing when multiply by a negative number
-Do Sprint on solving equations!!