(one symbol)

Essential Questions: How do we solve simple inequalities? How can we describe the solution set to an inequality?

Do Now: Consider the inequality **6 > 4**. Perform the indicated operations stated in the table below.

6 > 4	Is the result true or false?
a) Add 3 to both sides	$6+3>4+3$ $9>7$ True
b) Subtract 3 from both sides	$6-3>4-3$ $3>1$ True
c) Multiply by 2 on both sides	$6(2)>4(2)$ $12>8$ True
d) Divide by 2 on both sides	$6\div2>4\div2$ $3>2$ True
e) Multiply by -2 on both sides	$6(-2)>4(-2)$ $-12>-8$ False
f) Divide by -2 on both sides	$6\div(-2)>4\div(-2)$ $-3>-2$ False

Based on letters (e) and (f), draw a conclusion about multiplying or dividing both sides of an inequality by a negative number.

when multiplying or dividing by a negative number, in an equality, the symbol must reverse ("flip") for the inequality result to be true

Solving Simple Inequalities

Inequalities

> greater than < less than	○
≥ greater than or equal to ≤ less than or equal to	●

An inequality is a statement, using an inequality symbol, that compares two expressions that are **not equal**.

A **solution** to an inequality is any value, when replaced by the variable, makes the inequality true.

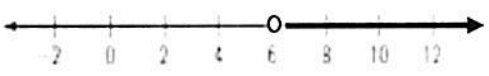
- Use properties of inequality to solve.
- When multiplying or dividing both sides of an inequality by a negative number, "flip" the inequality sign in order to make the statement true.
- Represent the solution set to the inequality on a number line.

$6x-7>2x+17$

$6x>2x+24$

$4x>24$

$x>6$



Determine the solution set to each inequality.

1. $2x + 6 > 20$

$2x > 14$

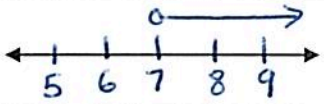
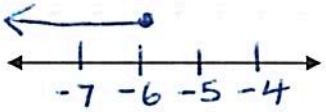
$x > 7$

2. $-4x - 8 \geq 16$

$-4x \geq 24$

$x \leq -6$

Think about this...
Are there other ways to describe the solution set to an inequality?
Let's consider the solution sets from the examples above.

Solution Set	Graph of Solution Set	Interval Notation
$x > 7$		$(7, \infty)$
$x \leq -6$		$(-\infty, -6]$

Interval Notation

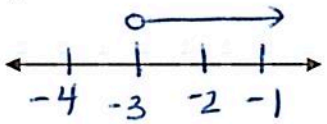
(means "not included" ○

[means "included" ●

Remember: ∞ *and* $-\infty$ always use)

Example: all numbers greater than -3

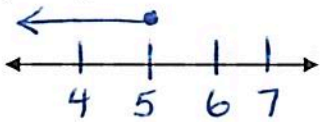
Inequality: $x > -3$

Graph: 

Interval Notation: $(-3, \infty)$

Example: all numbers less than or equal to 5

Inequality: $x \leq 5$

Graph: 

Interval Notation: $(\infty, 5]$

MORE EXAMPLES:

Determine the solution set to the inequality. Represent the solution set on a number line and in interval notation.

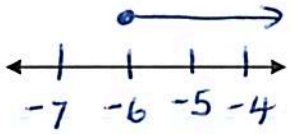
3. $-2(c + 4) - 1 \leq 3$

$-2c - 8 - 1 \leq 3$

$-2c - 9 \leq 3$

$\frac{-2c}{-2} \leq \frac{12}{-2}$

$c \geq -6$



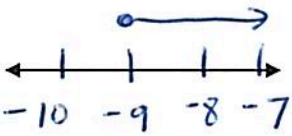
Interval Notation $[-6, \infty)$

4. $6 - a \leq 15$

$-6 \quad -6$

$\frac{-a}{-1} \leq \frac{9}{-1}$

$a \geq -9$



Interval Notation $[-9, \infty)$

5. $3y + 7 > 6(y - 2) + 9$

$3y + 7 > 6y - 12 + 9$

$3y + 7 > 6y - 3$

$-6y \quad -6y$

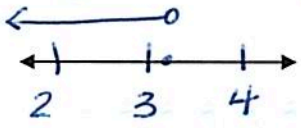
$-3y + 7 > -3$

$-7 \quad -7$

$\frac{-3y}{-3} > \frac{-10}{-3}$

$y < \frac{10}{3}$

$y < 3\frac{1}{3}$



Interval Notation $(-\infty, 3\frac{1}{3})$

6. Solve $7x - 3(4x - 8) \leq 6x + 12 - 9x$ algebraically.
If x is a number in the interval [4, 8], state all integers that satisfy the given inequality.

$7x - 3(4x - 8) \leq 6x + 12 - 9x$

$7x - 12x + 24 \leq -3x + 12$

$-5x + 24 \leq -3x + 12$

$+3x \qquad +3x$

$-2x + 24 \leq 12$

$-24 \quad -24$

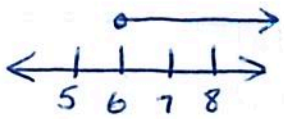
$\frac{-2x}{-2} \leq \frac{-12}{-2}$

$x \geq 6$

[4, 8]

integers in that interval are 4, 5, 6, 7, 8

6, 7, 8



TODAY'S TAKE AWAY….

The solution sets of inequalities can be described using a graph or using interval notation. When solving inequalities, remember to reverse the inequality symbol when multiplying or dividing both sides of the inequality by a negative number.