Name: KEY Class Period:

First Semester Day 3 Review: Inequalities

Guided Notes

Inequality Symbols

There are 4 inequality symbols:

Name	Symbol
"Less than"	$<$
"Less than or equal to"	$\leq$
"Greater than"	$>$
"Greater than or equal to"	$\geq$

Solving Inequalities

Definition

A solution of an inequality is any number that makes the inequality true.

One solution to $x > 6$ is 8. Another solution is 14.

A solution to $x \leq -2$ is -2. Another solution is -3.

Example 1

Solve $7 + 6a > 19$.

Original Inequality	$7 + 6a > 19$
Subtract 7 from each side	$7 + 6a - 7 > 19 - 7$
Simplify	$6a > 12$
Divide each side by 6	$\frac{6a}{6} > \frac{12}{6}$
Simplify	$a > 2$

Property

Whenever an inequality is multiplied or divided by a negative number, the inequality symbol reverses direction.

Example 2

Solve $-3(4 - m) \geq 2(4m - 14)$.

Original Inequality	$-3(4 - m) \geq 2(4m - 14)$
Use the Distributive Property	$-12 + 3m \geq 8m - 28$
Subtract $8m$ from each side	$-12 + 3m - 8m \geq 8m - 28 - 8m$
Combine like terms	$-12 - 5m \geq -28$
Add 12 to each side	$-12 - 5m + 12 \geq -28 + 12$

Simplify	$-5m \geq -16$
Divide each side by -5 and reverse the inequality symbol	$\frac{-5m}{-5} \leq \frac{-16}{-5}$
Simplify	$m \leq 3\frac{1}{5}$

Compound Inequalities

Definitions

Two inequalities that are joined by the word "and" or the word "or" form a compound inequality.

Example 3

Solve $-4 < r - 5 \leq -1$.

Solution	Split original	Solve each	Simplify
	$-4 < r - 5$ and $r - 5 \leq -1$		
	$-4 + 5 < r - 5 + 5$ and $r - 5 + 5 \leq -1 + 5$		
	$1 < r$ and $r \leq 4$		
$1 < r \leq 4$			

Example 4

Solve $4v + 3 < -5$ or $-2v + 7 < 1$.

$4v + 3 < -5$	or	$-2v + 7 < 1$
$4v + 3 - \underline{3} < -5 - \underline{3}$	or	$-2v + 7 - \underline{7} < 1 - \underline{7}$
$4v < \underline{-8}$	or	$-2v < \underline{-6}$
$\frac{4v}{4} < \frac{-8}{4}$	or	$\frac{-2v}{-2} < \frac{-6}{-2}$
$v < \underline{-2}$	or	$v > \underline{3}$

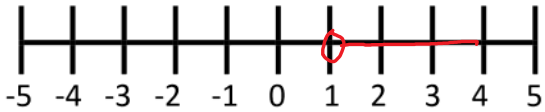
Graphing Inequality

Example 5

Graph $m \leq 3\frac{1}{5}$.

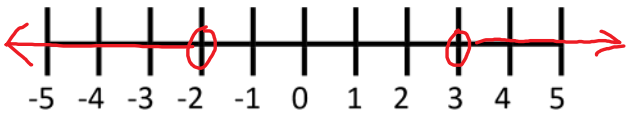
Example 6

Graph $-4 < r - 5 \leq -1$.



Example 7

Graph $v < -2$ or $v > 3$.



Classwork

Problem 1

Solve $-3x - 4 \leq 14$.

$-3x - 4 \leq 14$

$+4 \quad +4$

$\frac{-3x}{-3} \leq \frac{18}{-3}$

$x \geq -6$

Problem 2

Solve $-6(x - 4) \leq 7(2x - 3)$.

$-6(x-4) \leq 7(2x-3)$

$-6x + 24 \leq 14x - 21$

$+6x \quad +6x$

$24 \leq 20x - 21$

$+21 \quad +21$

$\frac{45}{20} \leq \frac{20x}{20}$

$\frac{45}{20} \leq x$

$\frac{9}{4} \leq x$

$2\frac{1}{4} \leq x$

Problem 3

Solve $7 < -3n + 1 \leq 13$.

$7 \leq -3n+1$ and $-3n+1 \leq 13$

$-1 \quad -1$ $\quad -1 \quad -1$

$6 \leq -3n$ $\quad -3n \leq 12$

$\frac{6}{-3} \leq \frac{-3n}{-3}$ $\quad \frac{-3n}{-3} \leq \frac{12}{-3}$

$-2 \geq n$ and $n \geq -4$

$-4 \leq n \leq -2$

Problem 4

Solve $-2x + 7 > 3$ or $3x - 4 \geq 5$.

$-2x+7>3$ or $3x-4 \geq 5$

$-7 \quad -7$ $\quad +4 \quad +4$

$-2x > -4$ $\quad 3x \geq 9$

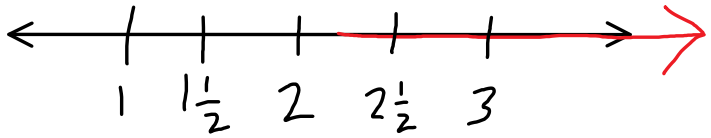
$\frac{-2x}{-2} < \frac{-4}{-2}$ $\quad \frac{3x}{3} \geq \frac{9}{3}$

$x < 2$ or $x \geq 3$

Problem 5

Graph $-6(x-4) \leq 7(2x-3)$.

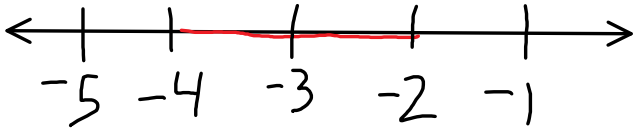
$x \geq 2\frac{1}{4}$



Problem 6

Graph $7 < -3n + 1 \leq 13$.

$-4 \leq n < -2$



Problem 7

Graph $-2x + 7 > 3$ or $3x - 4 \geq 5$.

$x < 2$
or
$x \geq 3$