Algebra 2 Notes Unit 0 0.3 **Name** Key

1.5 Solve Linear Inequalities

To Solve an Inequality:

1. Solve using the same process we used to solve linear equations.

2. **REMEMBER**: If you multiply or divide both sides of an inequality by a negative number, then you must reverse the inequality symbol!!!!

3. Graph the solution on a number line. **Open Circle** $<$ $>$

Closed Circle $\leq$ $\geq$

EXAMPLES:

1. $4x + 3 > 11$

$-3 \quad -3$

$\frac{4x}{4} > \frac{8}{4}$

$x > 2$

2. $15 - 3x \geq 3$

$-15 \quad -15$

$\frac{-3x}{-3} \geq \frac{-12}{-3}$

$x \leq -4$

3. $-6(5x - 7) \geq 102$

$-30x + 42 \geq 102$

$-42 \quad -42$

$\frac{-30x}{-30} \geq \frac{60}{-30}$

$x \leq -2$

4. $14\left(\frac{x}{7} - \frac{1}{2}\right) < 2(x + 5) - 17$

$2x - 7 < 2x + 10 - 17$

$2x - 7 < 2x - 7$

$0 < 0$

$\emptyset$

no solution

5. What if #4 was changed to $\geq$?

$0 \geq 0$

true

all real numbers

identity

Algebra 2 Notes **Name** Key

1.6 Solve Linear Inequalities-*Part 2*

or do not have to overlap!

COMPOUND INEQUALITIES consist of 2 inequalities joined by the word **AND** or by the word **OR**. and must overlap!

SOLUTIONS to compound inequalities containing the word OR must be values that make **EITHER** inequality **TRUE**. In other words, the solution is the **combination** of both graphs. This is known as the **union** of the graphs.

EXAMPLES: Solve and Graph the solutions to each of the following.

1. $3x \geq x + 4$ *or* $-2x > x + 6$

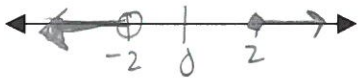
$-x \quad -x$ $\quad -x$

$2x \geq 4$ $\quad -3x > 6$

$\frac{2x}{2} \geq \frac{4}{2}$ $\quad \frac{-3x}{-3} < \frac{6}{-3}$

$\boxed{x \geq 2}$ $\quad \boxed{x < -2}$

1. $x < -2$ or $x \geq 2$



2. $x + 7 > -2$ *or* $x - 4 < 8$

$x > -9$ $\quad x < 12$

2. all real #'s

overlaps both ways

3. $5(x - 2) < 3x$ *or* $3x + 4 < -5$

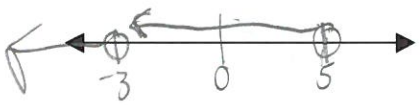
$5x - 10 < 3x$ $\quad 3x < -9$

$-3x \quad -3x$ $\quad x < -3$

$2x < 10$

$x < 5$

3. $x < 5$



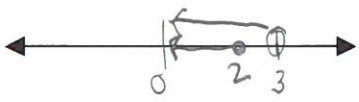
4. $\frac{2}{3}(12 + 3x) \geq 6x$ *or* $\frac{5}{2}\left(4 - \frac{4}{5}x\right) > 4$

$8 + 2x \geq 6x$ $\quad 10 - 2x > 4$

$8 \geq 4x$ $\quad -2x > -6$

$2 \geq x$ $\quad x < 3$

4. $x < 3$



SOLUTIONS to compound inequalities containing the word **AND** must be values that make **BOTH** inequalities **TRUE** simultaneously. In other words, the solution must appear on both individual graphs. This is known as the **intersection** of the graphs. must intersect or no solution!

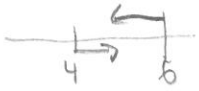
EXAMPLES: Solve and Graph the solutions to each of the following.

5. $\frac{3}{2}x - 2 < 7$ *and* $x + 10 > 14$

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

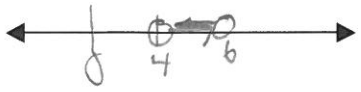
$3x < 18$

$x < 6$



write solution as in between two values

1. $4 < x < 6$



6. $-2 < 2x - 4 \leq 6$

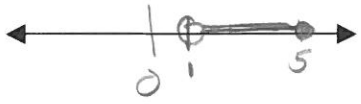
$-2 < 2x - 4$ and $2x - 4 \leq 6$

$+4 \quad +4$ $\quad 2x \leq 10$

$2 < 2x$ $\quad x \leq 5$

$1 < x$

2. $1 < x \leq 5$



7. $2(x + 7) \geq 4$ *and* $-4(x + 1) \geq -5\left(x + \frac{1}{5}\right)$

$2x + 14 \geq 4$ $\quad -4x - 4 \geq -5x - 1$

$2x \geq -10$ $\quad x \geq 3$

$x \geq -5$

overlap

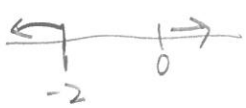
3. $x \geq 3$

8. $8 \leq -2x + 4 \leq 4$

$8 \leq -2x + 4$ $\quad -2x + 4 < 4$

$4 \leq -2x$ $\quad -2x < 0$

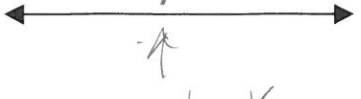
$-2 \geq x$ $\quad x > 0$



no solution
no intersection

4. no solution

$\emptyset$



blank line

WUP

1. $8w + 4 - 2w = wt$

$6w$

$5w = -3$ $\boxed{w = -3/5}$

2. $4 - x + 2 = 8$

$6 - x = 8$

$-x = 2$

$\boxed{x = -2}$

3. $8\frac{7}{8}x + 8\frac{3}{4} = 8\frac{1}{2}x + 8\frac{3}{2}$

$7x + 6 = 4x + 12$

$3x = 6$

$\boxed{x = 2}$

4. $24 + 6y - 3 = 4y - 12 + 2y$

$21 + 6y = 2y - 12$

ϕ

5. $a(y+1) = b$

$ay + a = b$

$ay = b - a$

$\boxed{y = \frac{b}{a} - 1}$

WUP

$7x - 4 < 5x + 2$

$2x < 6$

$x < 3$

$-12 < 3x - 3 < 15$

$-9 < 3x < 18$

$-3 < x < 6$

$6x < -6$ $\quad$ $3x > 21$

$x < -1$ $\quad$ $x > 7$