ALGEBRA A
UNIT 4: SOLVING AND GRAPHING INEQUALITIES

NAME:

HOUR:

Date	Section	Homework
Tuesday December 4, 2018	Inequalities and Their Graphs p. 1 - 3	Homework 1: Inequalities and Their Graphs
Wednesday December 5, 2018	Solve Inequalities using Addition and Subtraction p. 4 - 5	Homework 2: Solving Inequalities using Addition and Subtraction
Thursday December 6, 2018	Solving Inequalities using Multiplication and Division p. 6 - 7	Homework 3: Solving Inequalities using Multiplication and Division
Friday December 7, 2018	Solve Multi-Step Inequalities p. 8 - 9	Homework 4: Solving Multi-Step Inequalities
Monday December 10, 2018	Review	Homework 5: Solving Inequalities Review
Tuesday December 11, 2018 **QUIZ**	Solve Compound Inequalities p. 10 - 11	Homework 6: Solving Compound Inequalities
Wednesday December 12, 2018	Solve Absolute Value Equations and Inequalities p. 12 - 13	Homework 7: Solving Absolute Value Equations and Inequalities
Thursday December 13, 2018	Review	Homework 8: Solving Compound & Absolute Value Equations and Inequalities Review
Friday December 14, 2018 **QUIZ**	Graphing Linear Inequalities p. 14 - 15	Homework 9: Graphing Linear Inequalities
Monday December 17, 2018	Review	Solving and Graphing Inequalities Unit Review
Tuesday December 18, 2018	Practice Test	Study for Unit 1 TEST!
Wednesday December 19, 2018	Khan Academy	Study for Unit 1 TEST!
Thursday December 20, 2018	**TEST**	

Inequalities and their graphs

Content Objective: I can write, graph, and identify solutions of inequalities.
Language Objective: I can use mathematical vocabulary to explain the process of writing, graphing, and identifying solutions of inequalities.

Essential Understanding:
An inequality is a mathematical sentence that uses an inequality symbol to compare the values of two expressions.

You can use a _____ _____ to visually represent the values that satisfy an inequality.

Key Words and Ideas ✎

Greater than	Less Than	Greater than or equal to	Less than or equal to

Open ◯	Closed ●

Right →	Left ←

WRITING INEQUALITIES What inequality represents the verbal expression?

I Do	We Do	You Do
All real numbers x less than or equal to -7	v is greater than or equal to 5	b is less than 4
6 less than a number k is greater than 13	The sum of t and 7 Is less than -3	The quotient of k and 9 is greater than $\frac{1}{3}$

IDENTIFYING SOLUTIONS BY EVALUATING

A SOLUTION OF AN INEQUALITY IS ANY NUMBER THAT MAKES THE INEQUALITY _____

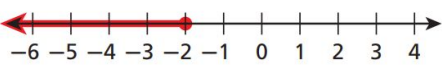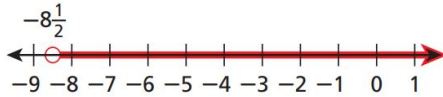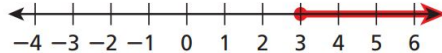**Is the number a solution of** $2x + 1 > -3$ **?**
(HINT: Use what you know about evaluating functions!)

-3	-1

2

GRAPHING INEQUALITIES Graph each inequality.

I Do	We Do	You Do
$2 \geq a$	$x > -4$	$c < 0$

WRITING AN INEQUALITY FROM A GRAPH What inequality represents the graph?

I Do	We Do	You Do
	$-8\frac{1}{2}$	

WRITING REAL-WORLD INEQUALITIES What inequality describes the situation?
Be sure to define the variable.

I Do	We Do	You Do
The restaurant can seat at most 172 people.	A person must be at least 35 years old to be elected President of the United States.	A law clerk has earned more than $20,000 since being hired.

Solving inequalities using addition and subtraction

Content Objective: I can use addition or subtraction to solve inequalities.

Language Objective: I can use mathematical vocabulary to explain the process of solving inequalities using addition or subtraction.

ESSENTIAL UNDERSTANDING:
Just as you used properties of equality to solve equations, you can use properties of inequality to solve inequalities!

Properties of Inequality
Addition and Subtraction

WORDS	NUMBERS	ALGEBRA
Addition You can add the same number to both sides of an inequality, and the statement will still be true.	$3 < 8$ $3 + 2 < 8 + 2$ $5 < 10$	$a < b$ $a + c < b + c$
Subtraction You can subtract the same number from both sides of an inequality, and the statement will still be true.	$9 < 12$ $9 - 5 < 12 - 5$ $4 < 7$	$a < b$ $a - c < b - c$

These properties are also true for inequalities that use the symbols $>$, $\geq$, and $\leq$.

USING THE ADDITION PROPERTY OF INEQUALITY
Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$x - 15 > -12$	$-6 > c - 2$	$t - 4 \geq -7$

USING THE SUBTRACTION PROPERTY OF INEQUALITY
Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$t + 6 > -4$	$x + 5 \leq 10$	$-1 \geq 5 + b$

WRITING AND SOLVING AN INEQUALITY

Josh can bench press 220 pounds. He wants to bench press at least 250 pounds. Write and solve an inequality to determine how many more pounds Josh must lift to reach his goal.	Your goal is to take at least 10,000 steps per day. According to your pedometer, you have walked 5,274 steps per day. Write and solve an inequality to find the possible numbers of steps you can take to reach your goal.

Solving inequalities using multiplication and division

Content Objective: I can use multiplication or division to solve inequalities.

Language Objective: I can use mathematical vocabulary to explain the process of using multiplication or division to solve inequalities.

Essential understanding:

Just as you used multiplication and division to solve equations, you can use multiplication and division to solve inequalities.

Positive Numbers	Negative Numbers
Properties of Inequality Multiplication and Division by Positive Numbers	**Properties of Inequality** Multiplication and Division by Negative Numbers

Positive Numbers — Properties of Inequality

Multiplication and Division by Positive Numbers

WORDS	NUMBERS	ALGEBRA
Multiplication You can multiply both sides of an inequality by the same *positive* number, and the statement will still be true.	$7 < 12$ $7(3) < 12(3)$ $21 < 36$	If $a < b$ and $c > 0$, then $ac < bc$.
Division You can divide both sides of an inequality by the same *positive* number, and the statement will still be true.	$15 < 35$ $\frac{15}{5} < \frac{35}{5}$ $3 < 7$	If $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$.

These properties are also true for inequalities that use the symbols $>$, $\geq$, and $\leq$.

Negative Numbers — Properties of Inequality

Multiplication and Division by Negative Numbers

WORDS	NUMBERS	ALGEBRA
Multiplication If you multiply both sides of an inequality by the same *negative* number, you must reverse the inequality symbol for the statement to still be true.	$8 > 4$ $8(-2) < 4(-2)$ $-16 < -8$	If $a > b$ and $c < 0$, then $ac < bc$.
Division If you divide both sides of an inequality by the same *negative* number, you must reverse the inequality symbol for the statement to still be true.	$12 > 4$ $\frac{12}{-4} < \frac{4}{-4}$ $-3 < -1$	If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.

These properties are also true for inequalities that use the symbols $<$, $\geq$, and $\leq$.

Recall ✎

Reciprocal	

MULTIPLYING AND DIVIDING BY A POSITIVE NUMBER

Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$\frac{x}{3} < -2$	$3m \geq 6$	$8 > \frac{2}{3}k$

MULTIPLYING AND DIVIDING BY A NEGATIVE NUMBER
Solve each inequality. Graph your solutions.

I Do	We Do	You Do
Multiplying by a Negative Number $-\frac{w}{4} \geq 3$	$-\frac{3}{2}b < 6$	$0 \leq -\frac{3}{11}m$
Dividing by a Negative Number $-5h < 65$	$-30 > -5c$	$-12x > 132$

WRITING AND SOLVING AN INEQUALITY

You walk dogs in your neighborhood after school. You earn $4.50 per dog. How many dogs do you need to walk to earn at least $75?	Text messages cost $.15 each. You can spend no more than $10. How many text messages can you send?

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SOLVING MULTI-STEP INEQUALITIES

Content Objective: I can solve multi-step inequalities.
Language Objective: I can use mathematical vocabulary to explain the process of solving multi-step inequalities.

ESSENTIAL UNDERSTANDING:

You solve a multi-step inequality the same way you solve a one-step inequality.

You use the properties of inequality to transform the original inequality into a series of simpler, equivalent inequalities.

USING MORE THAN ONE STEP

Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$9 + 4t > 21$	$-4 < 5 - 3n$	$50 > 0.8x + 30$

USING THE DISTRIBUTIVE PROPERTY

Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$3(t + 1) - 4t \geq -5$	$15 \leq 5 - 2(4m + 7)$	$2(t - 1) + 3t < 2$

SOLVING AN INEQUALITY WITH VARIABLES ON BOTH SIDES
Solve each inequality. Graph your solutions.

I Do	We Do	You Do
$6n - 1 > 3n + 8$	$3b + 12 > 27 - 2b$	$18x - 5 \leq 3(6x - 2)$

INEQUALITIES WITH SPECIAL SOLUTIONS

WHEN THE INEQUALITY IS **TRUE**, THE SOLUTION TO THE INEQUALITY ARE _____

WHEN THE INEQUALITY IS **FALSE**, THE INEQUALITY HAS _____

What are the solutions of $10 - 8a \geq 2(5 - 4a)$?	What are the solutions of $6m - 5 > 7m + 7 - m$?

COMPOUND INEQUALITIES

Content Objective: I can solve and graph inequalities containing the word *and*

I can solve and graph inequalities containing the word *or*

Language Objective: I can use mathematical vocabulary to explain the process of solving compound inequalities.

Key Terms ✎

Compound Inequality	

Compound Inequalities

WORDS	ALGEBRA	GRAPH
All real numbers greater than 2 AND less than 6	$x > 2$ AND $x < 6$ $2 < x < 6$	
All real numbers greater than or equal to 2 AND less than or equal to 6	$x \geq 2$ AND $x \leq 6$ $2 \leq x \leq 6$	
All real numbers less than 2 OR greater than 6	$x < 2$ OR $x > 6$	
All real numbers less than or equal to 2 OR greater than or equal to 6	$x \leq 2$ OR $x \geq 6$	

WRITING A COMPOUND INEQUALITY

What compound inequality represents the phrase? Graph the solutions.

I Do	We Do	You Do
All real numbers that are greater than -2 and less than 6	All real numbers that are less than 0 or greater than or equal to 5	All real numbers that are greater than or equal to -4 and less than 6

SOLVING A COMPOUND INEQUALITY INVOLVING "AND"
Find and graph the solutions.

I Do	We Do	You Do
$-3 \leq m - 4 < -1$	$-2 < 3y - 4 < 14$	$-3 < \frac{6-q}{9} \leq 3$

SOLVING A COMPOUND INEQUALITY INVOLVING "OR"
Find and graph the solutions.

I Do	We Do	You Do
$-3 \leq m - 4 < -1$	$-2 < 3y - 4 < 14$	$-3 < \frac{6-q}{9} \leq 3$

ABSOLUTE VALUE EQUATIONS AND INEQUALITIES

Content Objective: I can solve equations and inequalities involving absolute value.

Language Objective: I can use mathematical vocabulary to explain the process of solving equations and inequalities involving absolute value.

ESSENTIAL UNDERSTANDING:

You can solve absolute value equations and inequalities by first isolating the absolute value expression, if necessary. Then write an equivalent pair of linear equations or inequalities.

SOLVING AN ABSOLUTE VALUE EQUATION

Solve each equation. Graph your solutions.

I Do	We Do	You Do
$|x| + 2 = 9$	$-3|m| = -9$	$4 = |y|$

SOLVING AN ABSOLUTE VALUE EQUATION WITH NO SOLUTION

Solve each equation. If there is no solution, write "not solution".

I Do	We Do	You Do
$3|2z + 9| + 12 = 10$	$|3x - 6| - 5 = -7$	$-4|k| = 12$

Absolute Value Inequalities Involving $>$	Absolute Value Inequalities Involving $<$

Absolute-Value Inequalities Involving $>$

WORDS	NUMBERS
The inequality $|x| > a$ (when $a > 0$) asks, "What values of x have an absolute value greater than a?" The solutions are numbers less than $-a$ or greater than a.	$|x| > 5$ $x < -5$ OR $x > 5$

GRAPH	ALGEBRA
$\leftarrow$ a units $\rightarrow$$\leftarrow$ a units $\rightarrow$ $-a$ 0 a	$|x| > a$ (when $a > 0$) $x < -a$ OR $x > a$

The same properties are true for inequalities that use the symbol $\geq$.

Absolute-Value Inequalities Involving $<$

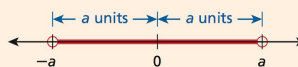| WORDS	NUMBERS
The inequality $|x| < a$ (when $a > 0$) asks, "What values of x have an absolute value less than a?" The solutions are numbers between $-a$ and a.	$|x| < 5$ $-5 < x < 5$ $x > -5$ AND $x < 5$

GRAPH	ALGEBRA
$\leftarrow$ a units $\rightarrow$$\leftarrow$ a units $\rightarrow$ $-a$ 0 a	$|x| < a$ (when $a > 0$) $-a < x < a$ $x > -a$ AND $x < a$

The same properties are true for inequalities that use the symbol $\leq$.

SOLVING ABSOLUTE INEQUALITIES
Solve each equation. Graph your solutions.

$|8n| \geq 24$	$|w - 13| < 5$	$|2c - 5| < 9$
$|3t + 1| > 8$	$|-3d| \geq 6.3$	$|2f + 9| \leq 13$

Graphing Linear inequalities

Content Objective: I can graph linear equations in two variables.

Language Objective: I can use mathematical vocabulary to explain the process of graphing linear equations in two variables.
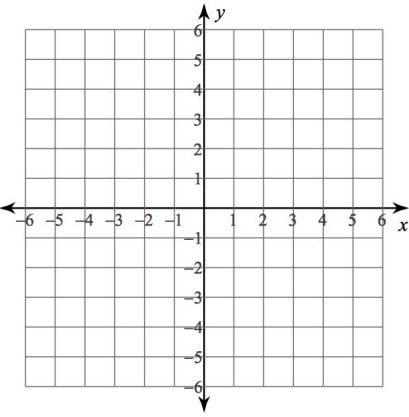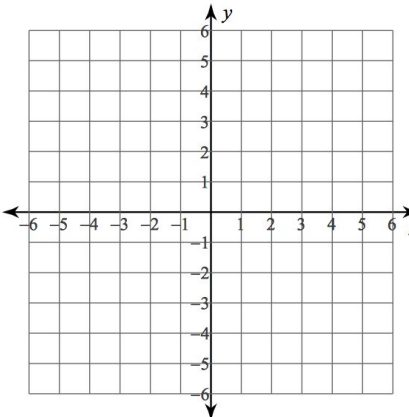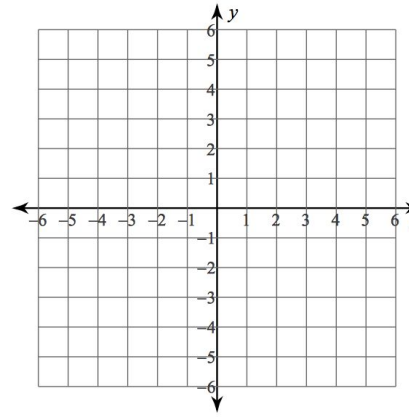
ESSENTIAL UNDERSTANDING:

A linear inequality in two variables has an infinite number of solutions. These solutions can be represented in the coordinate plane as the set of all points on one side of the boundary line.

Main Idea ✎

$>$	$\geq$	$<$	$\leq$

GRAPHING A LINEAR INEQUALITY IN TWO VARIABLES

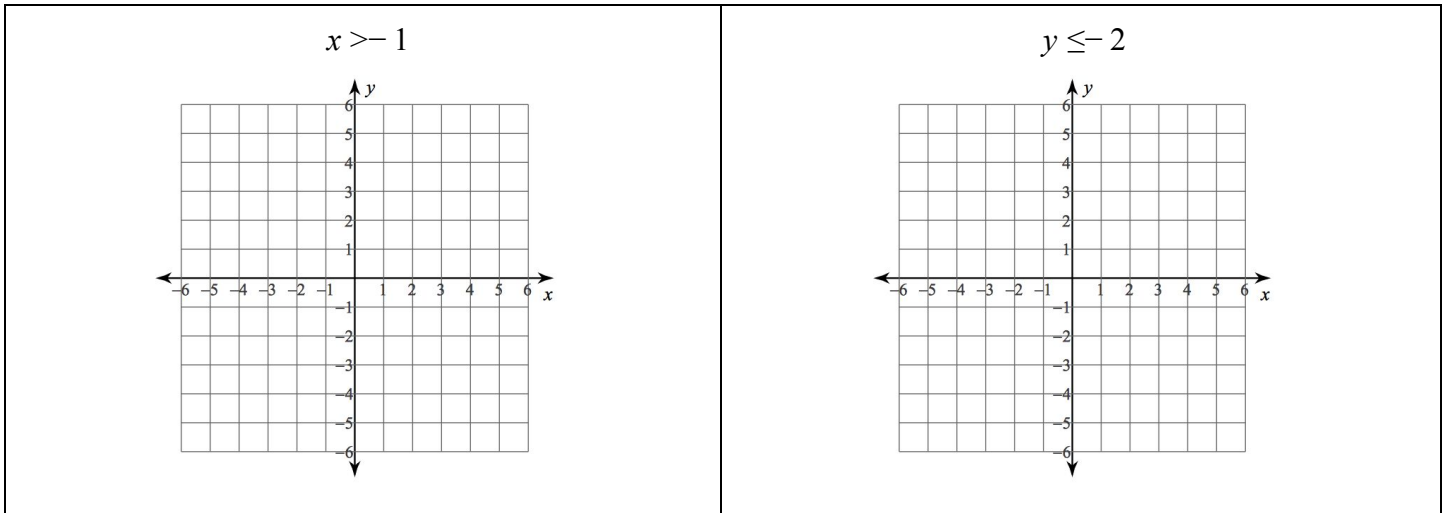Graph each inequality in the coordinate plane.

I Do	We Do	You Do
$y > x - 2$	$5x - 3y \leq -15$	$y \geq -x$

GRAPHING A LINEAR INEQUALITY IN ONE VARIABLE
Graph each inequality in the coordinate plane.

AN INEQUALITY IN ONE VARIABLE CAN BE GRAPHED ON A
NUMBER LINE OR IN THE COORDINATE PLANE.

THE BOUNDARY LINE WILL BE A _____ OR _____ LINE.

$x > -1$

$y \leq -2$

WRITING AN INEQUALITY FROM A GRAPH
Write a linear inequality that represents each graph.

I Do	We Do	You Do