

# Algebra 1 Chapter 3 Notes

Name: \_\_\_\_\_

## Chapter 3: Inequalities

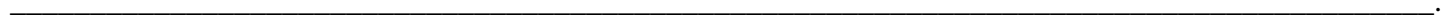
Date: \_\_\_\_\_ Period: \_\_\_\_\_








### 3.1 NOTES PART 1

#### Graphing and Writing Inequalities

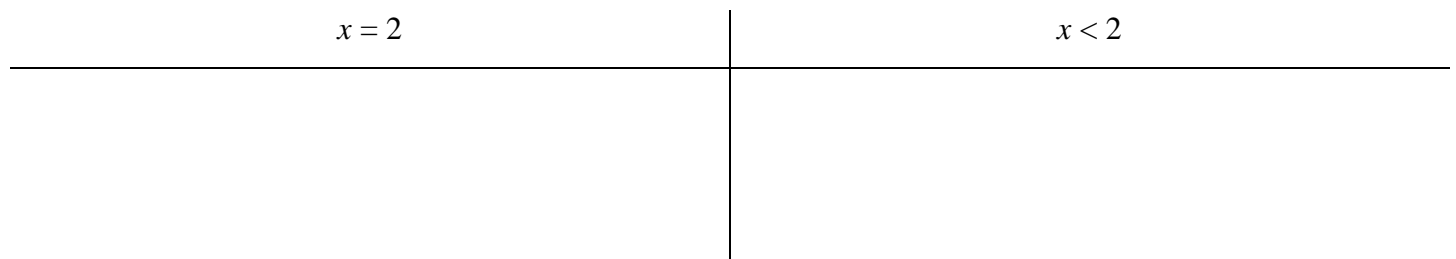
inequality: \_\_\_\_\_



				
$A < B$	$A > B$	$A \leq B$	$A \geq B$	$A \neq B$
A is less than B.	A is greater than B.	A is less than or equal to B.	A is greater than or equal to B.	A is not equal to B.

solution of an inequality: \_\_\_\_\_

How are inequalities different from equations?



### 3.1 NOTES PART 2

#### Example 1: Graphing Inequalities

When graphing inequalities on a NUMBER LINE, there are \_\_\_\_\_ things we must remember.

- Make sure the \_\_\_\_\_ is on the \_\_\_\_\_ side!  
 \*\*\*If it is not, flip the \_\_\_\_\_, and switch the \_\_\_\_\_ and \_\_\_\_\_.

Let's try it! Write the following inequalities with the variable on the left side.

$-13 < y$

$K \geq 8$

$0 > p$

$100 \geq h$

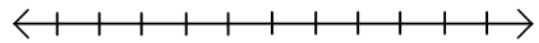
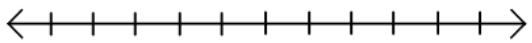
2. If you have \_\_\_\_\_ or \_\_\_\_\_, then use an \_\_\_\_\_ dot at the number.  
 If you have \_\_\_\_\_ or \_\_\_\_\_, then use a \_\_\_\_\_ dot at the number.

3. Start at the number. Draw an arrow in the \_\_\_\_\_ direction the inequality symbol points.

Let's try it! Graph the following inequalities.

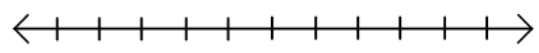
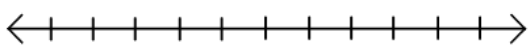
1.  $f \leq -4$

2.  $-1 > t$



3.  $z > 0$

4.  $19 \leq d$



### 3.1 NOTES PART 3

#### Example 2: Writing an Inequality from a Graph

Step 1: Choose any \_\_\_\_\_ you would like and put it on the \_\_\_\_\_ side.

Step 2:

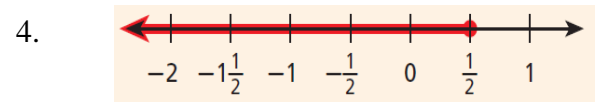
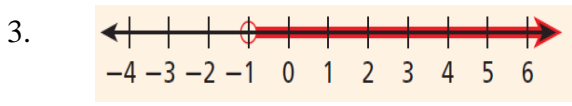
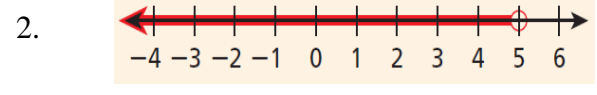
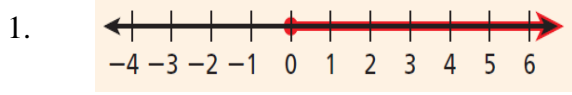
$>$  means

$<$  means

$\geq$  means

$\leq$  means

Let's try it! Write the inequality shown by each graph.



## 3.2 NOTES PART 1

### Solving Inequalities by Adding or Subtracting

Inequalities are a lot like equations. You are allowed to \_\_\_\_\_ the \_\_\_\_\_ number to both sides, and you are allowed to \_\_\_\_\_ the \_\_\_\_\_ number to both sides.

#### Example 1: Using Addition and Subtraction to Solve Inequalities

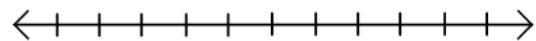
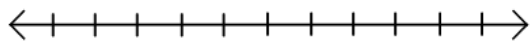
Use the following steps to guide you:

1. Pretend like the inequality is an equation, because it is basically the same process!
2. Look on the side with the \_\_\_\_\_.
3. Use \_\_\_\_\_ on the constant. Perform that operation on BOTH sides.
4. Once you have one term on both sides, make sure the \_\_\_\_\_ is on the \_\_\_\_\_.
5. Simplify and graph the inequality if the problem asks you to.

*Let's try it!* Solve each inequality **AND** graph the solutions.

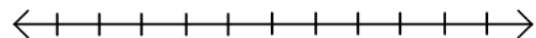
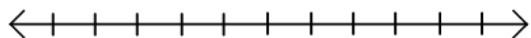
1.  $g - 7.4 \geq -12.1$

2.  $-1 < x + 9$



3.  $-14 + w < 0$

4.  $19 \geq m + 17$



# 3.3 NOTES PART 1

## Solving Inequalities by Multiplying or Dividing

We learned in Section 3.2 that solving inequalities is a lot like solving equations when we are adding or subtracting. The same thing is true for \_\_\_\_\_ and \_\_\_\_\_, with one exception. We need to do something special when we multiply or divide by a \_\_\_\_\_ number.

### Example 1: Multiplying or Dividing by a Positive Number

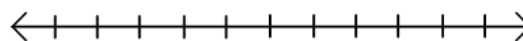
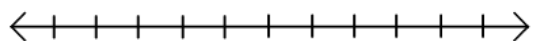
Use the following steps to guide you:

1. Pretend like the inequality is an equation, because it is basically the same process!
2. Look on the side with the \_\_\_\_\_.
3. Use \_\_\_\_\_ . Perform that operation on BOTH sides.
4. Once you have simplified both sides, make sure the \_\_\_\_\_ is on the \_\_\_\_\_.
5. Graph the inequality if the problem asks you to.

Let's try it! Solve each inequality **AND** graph the solutions.

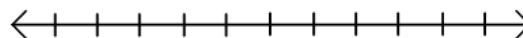
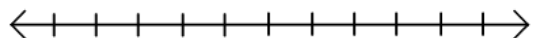
1.  $7n > 35$

2.  $-9 \leq \frac{p}{4}$



3.  $\frac{y}{3} < 6$

4.  $-20 \geq 2x$



## 3.3 NOTES PART 2

### Example 2: Multiplying or Dividing by a Negative Number

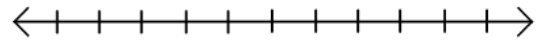
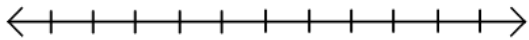
Use the following steps to guide you:

1. Look on the side with the \_\_\_\_\_.
2. Use \_\_\_\_\_. Perform that operation on BOTH sides.
3. Since you multiplied or divided by a NEGATIVE, you must FLIP THE SYMBOL.
4. Once you have simplified both sides, make sure the \_\_\_\_\_ is on the \_\_\_\_\_.
5. Graph the inequality if the problem asks you to.

*Let's try it!* Solve each inequality **AND** graph the solutions.

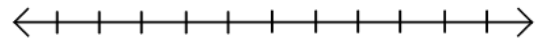
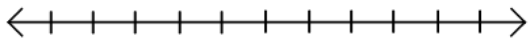
1.  $-7n > 35$

2.  $-9 \leq \frac{p}{-4}$



3.  $\frac{y}{-3} < 6$

4.  $-20 \geq -2x$



## 3.4 NOTES PART 1

### Solving Two-Step and Multi-Step Inequalities

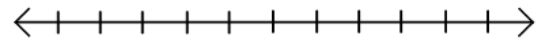
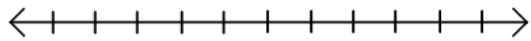
If you know how to solve two-step and multi-step equations, solving two-step and multi-step inequalities should be a breeze! Both are very similar.

### Example 1: Solving Multi-Step Inequalities

Let's try it! Solve each inequality and graph the solution.

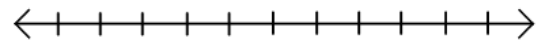
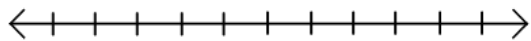
1.  $70 + 5k \geq 25$

2.  $-6 + \frac{p}{-3} > 0$



3.  $-9w + 11 \leq 56$

4.  $9 < 4x - 15$



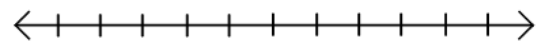
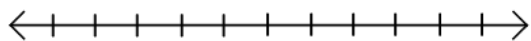
## 3.4 NOTES PART 2

### Example 2: Simplifying Before Solving Inequalities

Let's try it! Solve each inequality and graph the solution

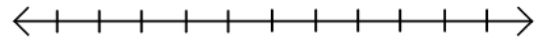
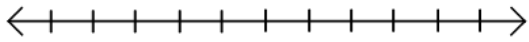
1.  $12m - 7 + 3 \geq 44 - 0$

2.  $52 > 2(5 - y)$



3.  $-5v + 8 \geq 23 - (-15)$

4.  $5(k - 6) < -30$



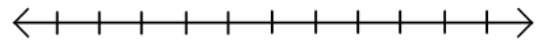
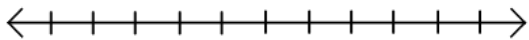
### 3.5 NOTES PART 1

**Example 1: Solving Inequalities with Variables on Both Sides**

*Let's try it!* Solve each inequality and graph the solution.

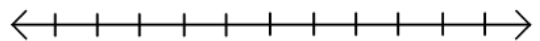
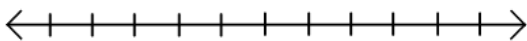
1.  $6g + 4 > -2g + 36$

2.  $\frac{1}{2}d > \frac{5}{2}d - 10$



3.  $4w + 12 \leq 2 - w$

4.  $1 + 4n < 7n$



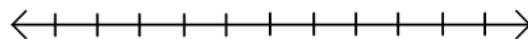
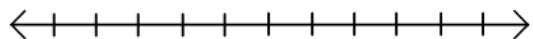
## 3.5 NOTES PART 2

### Example 2: Simplifying Each Side Before Solving

Let's try it! Solve each inequality and graph the solutions.

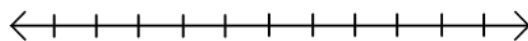
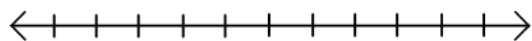
1.  $7(c - 3) < 2(12 + c)$

2.  $x + 5 - 3x < 8x - 15$



3.  $-0.5b + 1.7 - 0.9 \geq 1.1b$

4.  $12(3 - a) \leq -3a$



## 3.6 NOTES PART 1

### Solving Compound Inequalities

compound inequality: \_\_\_\_\_

\_\_\_\_\_



All real numbers = \_\_\_\_\_

<b>Compound Inequalities</b>		
WORDS	ALGEBRA	GRAPH



### 3.6 NOTES PART 2

**Example 1: Solving Compound Inequalities Involving AND**

Notice from the table above that there are two ways to express an inequality involving AND. This means that there are \_\_\_\_\_ methods to solving inequalities with AND.

**Method 1: A Three-Part Inequality**

Goal: To get the variable \_\_\_\_\_ in the \_\_\_\_\_.

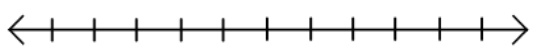
Step1: Look at the area with the variable and clear out all numbers.

How? Use inverse operations on the \_\_\_\_\_, \_\_\_\_\_, AND \_\_\_\_\_.

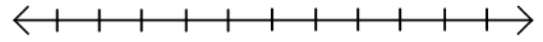
Step 2: Use inverse operations again if necessary, otherwise just \_\_\_\_\_ and \_\_\_\_\_.

*Let's try it!* Solve each compound inequality and graph the solutions.

1.  $-1 \leq x + 5 \leq 8$



2.  $8 < 4y \leq 20$



### 3.6 NOTES PART 3

#### Method 2: Two Separate Inequalities

Goal: To split the original inequality into two inequalities and solve each one separately.

Step 1: Write an inequality using the \_\_\_\_\_ and \_\_\_\_\_ parts of the original problem.

Write an inequality using the \_\_\_\_\_ and \_\_\_\_\_ parts of the original problem.

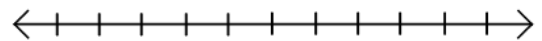
Step 2: Solve both inequalities separately using inverse operations.

Step 3: Use inverse operations again if necessary, otherwise just \_\_\_\_\_ and \_\_\_\_\_.

*Let's try it!* Solve each compound inequality and graph the solutions.

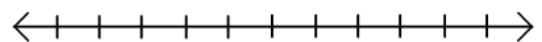
1.  $-1 \leq x + 5 \leq 8$

$-1 \leq x + 5$  AND  $x + 5 \leq 8$



2.  $8 < 4y \leq 20$

$8 < 4y$  AND  $4y \leq 20$



## 3.6 NOTES PART 4

### Example 2: Solving Compound Inequalities Involving OR

When solving compound inequalities that contain the word “or”, there is only one method we can use. It is similar to the second method we learned when we are solving compound inequalities with “and”.

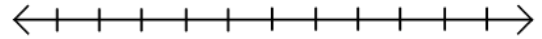
Goal: Solve each inequality separately, then graph. The arrows will go in different directions.

Step 1: Solve both inequalities separately using inverse operations

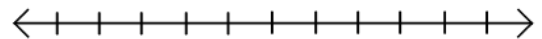
Step 2: Use inverse operations again if necessary, otherwise just \_\_\_\_\_ and \_\_\_\_\_.

*Let's try it!* Solve each compound inequality and graph the solutions.

1.  $5 < a - 6$  OR  $2a \leq 16$



2.  $f - 6 \leq -2$  OR  $-18 \geq -3f$



## 3.6 NOTES PART 5

### Example 3: Writing a Compound Inequality from a Graph

In these problems, you will have to create a compound inequality based on a graph you are given.

Step 1: Decide if the graph is \_\_\_\_\_ or \_\_\_\_\_.

Step 2: Decide which symbols you will use ( Think: \_\_\_\_\_ or \_\_\_\_\_? )

Step 3: Keep in mind the direction of the arrows!!!

Let's try it! Write the compound inequality shown by each graph.

