

# Linear Inequalities

Ms. Duffy



What is an algebraic equation?

What is an algebraic **in**equality?

An **equation** shows values that are equal but may look different.

**Ex.  $\frac{1}{2} = 0.5 \rightarrow$  SPECIFIC**

(constant value; no variable)

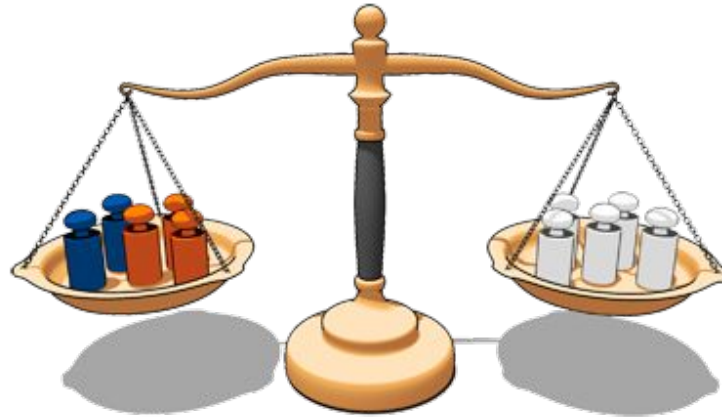
**Ex.  $x+5 = 10 \rightarrow$  IN GENERAL**

(variable; used to find an unknown value; true when x is 5)



## Equation

Both sides are Equal



$$3 + 2 = 5$$

An **inequality** is a way of representing expressions or numbers that are less than **OR** greater than **OR** equal to one another.



TAKE THIS  
DOWN!

# Phrases We Say When Talking About Inequalities

**'Greater than'** ..... 10 is 'greater than' 5 ...  $10 > 5$

**'Less than'** .... 5 is 'less than' 10 ....  $5 < 10$

**'Less than'** .... 7 is 'less than' 10 ....  $7 < 10$

**'Greater than'** .... 10 is 'greater than' 7 ....  $10 > 7$

# Phrases We Say When Talking About Inequalities

'Greater than' ..... 10 is 'greater than' ~~5~~ ... ~~10~~  5

'Less than' .... 5 is 'less than' 10 .... 5 

'Less than' .... 7 is 'less than' 10 .... 7 

'Greater than' .... 10 is 'greater than' ~~7~~ .... ~~10~~  7



If you make an arrow out of the inequality sign it ALWAYS points to the smaller number.



$$X < 5 \quad x \in R$$

**Translates to 'x is less than 5'**

**X can be anything LESS than 5**

**X is an element of the real numbers**

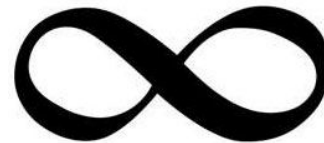
$$X > 11.7 \quad x \in R$$

Translates to 'x is greater than 11.7'

X can be any number greater than 11.7

X is an element of the real numbers

The solution set for x is  
{11.71, 11.72, 11.73, 11.74...}



TAKE THIS  
DOWN!

$$X > 11.7 \quad x \in N$$

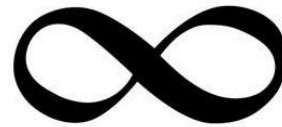
Translates to 'x is greater than 11.7'

X can be any **WHOLE** number greater than 11.7

X is an element of the natural numbers

Natural numbers = positive whole numbers

The solution set for x is  
{12, 13, 14, 15...}



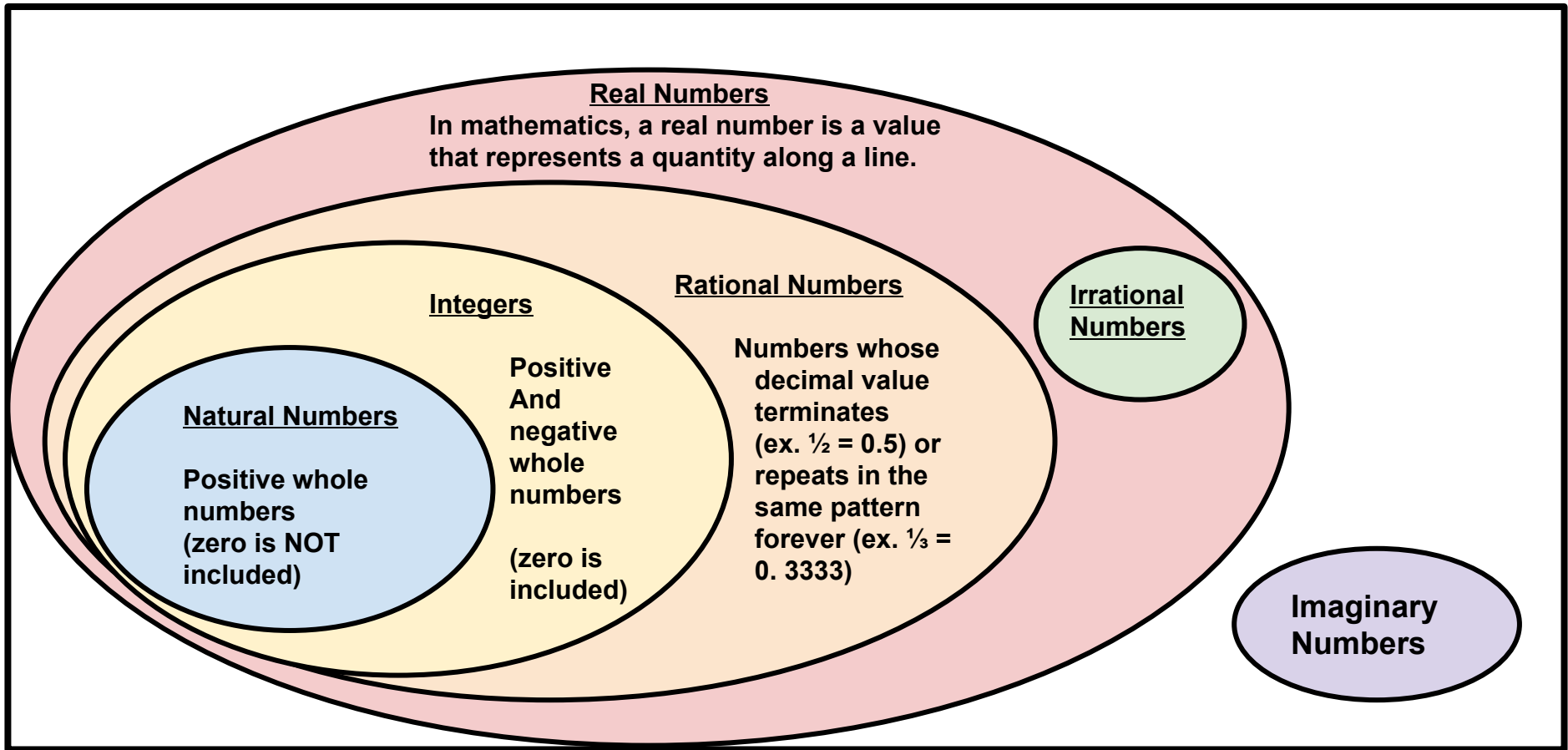
TAKE THIS  
DOWN!

Why does it matter if  $x$  is an element of  
 $\mathbb{N}$ ,  $\mathbb{Z}$  or  $\mathbb{R}$ ?

**RE-CAP (and some new info)**

**Number Systems**

# Number Systems



## Real Numbers

In mathematics, a real number is a value that represents a quantity along a line.

## Integers

Positive  
And  
negative  
whole  
numbers  
  
(zero is  
included)

## Rational Numbers

Numbers whose  
decimal value  
terminates  
(ex.  $\frac{1}{2} = 0.5$ ) or  
repeats in the  
same pattern  
forever (ex.  $\frac{1}{3} =$   
 $0.3333$ )

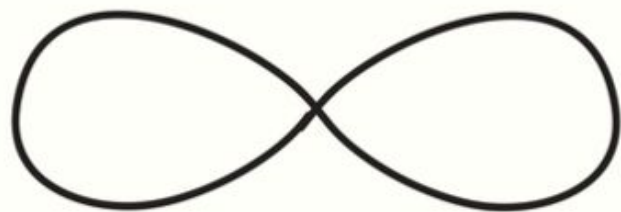
## Irrational Numbers

## Natural Numbers

Positive whole  
numbers  
(zero is NOT  
included)

## Imaginary Numbers

SOME  
INFINITIES



ARE BIGGER THAN  
OTHER INFINITIES.

JOHN GREEN

Solve the equation  
 $x+5 = 10$

Solve the equation  
 $x+5 = 10$   
 $-5 = -5$   
 $x = 5$

\* only ONE solution \*

Solve the inequality  
 $x+5 > 10$

$x + 5 > 10$   
 $-5 > -5$   
 $x > 5$



TAKE THIS  
DOWN!

For the left side of this inequality to always be larger than 10, x must be any value larger than 5.

\* infinite solutions\*



You always solve inequalities the same way as equations with

**ONE BIG EXCEPTION**



Look what happens when you multiply both sides of an inequality by a negative.

$$5 < 8$$

$$(5 < 8) \cdot -1$$

$$-5 < -8$$

**Is that true?**



Any time you multiply or divide both sides of an inequality by a negative you must 'flip' the inequality sign to keep the statement true.

$$5 < 8$$

$$(-5 < -8) \cdot -1$$

**FLIP**

$$-5 > -8$$



# Worksheet

(Solutions also on  
Geogebra Worksheet)

Homework:

Write out neat notes in your copy of the lesson we did today.

Link to the powerpoint is below.

There is a cloud on each slide that you should copy fully..... If you feel like it will help though, copy as much as you'd like.

Note taking tip: Try to explain the notes to yourself as if you were the teacher... Talking the notes out helps you understand the concepts!

<https://www.geogebra.org/m/Ye9CFFWH>