pHooey!

Name: _____

Period: _____ Date:_____

Purpose: You will explore the relationship between pH, pOH, [H+], and [OH-].

Part I: Discovering the math behind pH

Directions: The following data table contains some of the data you collected in the first lesson. Additional information, the concentration of H+, has been included. Complete the following table:

Substance	Acidic or Basic?	pH	$[H^+]$ (in decimal)	[H+] (in scientific notation)
1 M HCl				
Stomach acid (0.1 M HCl)	Acidic		0.1 M	1.0×10^{-1} M
Clear Soda		3	0.001 M	
Rain Water	Acidic			1.0×10^{-6} M
Distilled Water		7	0.0000001M	
Alcohol	Neutral			
Salt Water			0.0000001 M	
Washing Soda	Basic	8		1.0×10^{-8} M
Ammonia			0.0000000001 M	1.0×10^{-10} M
Drain Cleaner (0.1 M NaOH)		13		
1 M NaOH				1.0×10^{-14} M

Answer the following questions:

1. If you know the concentration of [H+] of a solution in decimal form, explain how you can figure out its pH.

2. If you know the concentration of [H+] of a solution in scientific notation, explain how you can determine its pH.

3. As the value of the pH increases, what happens to the concentration of H+?

4. As the value of the pH decreases, what happens to the concentration of H+?

5. Solution A has a pH of 5. Solution B has a pH of 9.
   a) What is the [H+] of both solutions?
   b) Identify the solutions as acidic or basic.
   c) Which solution has the greatest concentration of H+? How many times greater is the concentration?

Part II: Looking at OH-

Procedure: Imagine the following table contains results of a series of dilutions of HCl and NaOH. Additional information about the solutions (the pOH) is included. Complete the table.

	Well	pH	[H+]	[OH-]	pOH
HCl	A	1	1.0×10^{-1} M		13
	B	2	1.0×10^{-2} M	1.0×10^{-12} M	12
	C	3	1.0×10^{-3} M		
	D	4	1.0×10^{-4} M	1.0×10^{-10} M	10
	E	5	1.0×10^{-5} M		
	F	6	1.0×10^{-6} M		
	G	7	1.0×10^{-7} M		
	H	7	1.0×10^{-7} M	1.0×10^{-7} M	7
	I	7	1.0×10^{-7} M		7
NaOH	R	7	1.0×10^{-7} M	1.0×10^{-7} M	7
	Q	7	1.0×10^{-7} M		7
	P	7	1.0×10^{-7} M		
	O	8	1.0×10^{-8} M		
	N	9	1.0×10^{-9} M	1.0×10^{-5} M	5
	M	10	1.0×10^{-10} M		
	L	11	1.0×10^{-11} M		3
	K	12	1.0×10^{-12} M	1.0×10^{-2} M	
	J	13	1.0×10^{-13} M	1.0×10^{-1} M	1

Answer the following questions:

1. What does [OH-] stand for?

2. What can you say about the concentration of OH- in solutions with high acidity?

3. How is the value of the pH related to the value of the pOH for each concentration?

4. If you know the value of the pH, how can you determine the value of the pOH for that same solution?

5. If you know the value of the pOH for a solution, how can you figure out the value of the pH for that solution?

Making Sense:
How are pH and pOH related to each other mathematically?

If you finish early:
How are [H+] and [OH-] related to each other mathematically?