1.3 – Worksheet
pH – pOH – [H^+] – [^-OH]

1. What is the concentration of [H^+] in a solution whose pH = 4.3?

2. What is the pH of a solution that has a Hydronium concentration of 3.4×10^{-3}?

3. What is the pOH of a solution that has a pH of 6.8?

4. What is the concentration of Hydroxide Ions in a solution that has a pOH of 2.9?

5. What is the pOH of a solution that has a [^-OH] of 5.7×10^{-5}?

6. A solution has a pH of 6.1. What is the concentration of Hydroxide Ions?

7. A solution has a concentration of Hydrogen Ions of 2.8×10^{-6}. What is the pOH of this solution?

8. A solution has a [^-OH] of 5.8×10^{-7}. What is the pH of this solution?

9. A 450 mL beaker is 0.00045 M HCl. What is the pH of this solution?

10. A 320 mL beaker contains 2.30 mg of NaOH. What is the pH of this solution?

Please complete the following table

pH	[H^+]	[–OH]	pOH
3.5			
	5.8×10^{-4}		
		4.2×10^{-2}	
			8.2
	4.2×10^{-5}		
			2.4
5.1			
		7.2×10^{-3}	

1.3 – Worksheet – KEY
pH – pOH – $[H^+]$ – $[^-OH]$

1. What is the concentration of $[H^+]$ in a solution whose pH = 4.3?

$10^{-pH} = [H^+]$ $[H^+] = 10^{-4.3}$

$[H^+] = 5.0 \times 10^{-5}$

2. What is the pH of a solution that has a Hydronium concentration of 3.4×10^{-3}?

$pH = -\log[H_3O^+]$ $pH = -\log(3.4 \times 10^{-3})$

Note: $H_3O^+ = H^+$ **pH = 2.5**

3. What is the pOH of a solution that has a pH of 6.8?

$pH + pOH = 14$ $6.8 + pOH = 14$

pOH = 7.2

4. What is the concentration of Hydroxide Ions in a solution a pOH of 2.9?

$10^{-pOH} = [^-OH]$ $10^{-2.9} = [^-OH]$

$.0013 = 1.3 \times 10^{-2} = [^-OH]$

5. What is the pOH of a solution that has a $[^-OH]$ of 5.7×10^{-5}?

$pOH = -\log[^-OH]$ $pOH = -\log(5.7 \times 10^{-5})$

pOH = 4.24

6. A solution has a pH of 6.1. What is the concentration of Hydroxide Ions?

$14 = pH + pOH$ $14 - 6.1 = pOH$

$7.9 = pOH$

$10^{-pOH} = [^-OH]$ $10^{-7.9} = [^-OH]$

$1.2 \times 10^{-8} = [^-OH]$

7. A solution has a concentration of Hydrogen Ions of 2.8×10^{-6}. What is the pOH of this solution?

$-\log(2.8 \times 10^{-6}) = pH$

$-\log[H^+] = pH$ $5.6 = pH$

$14 = pH + pOH$ $14 - 5.6 = pOH$

8.4 = pOH

8. A solution has a $[^-OH]$ of 5.8×10^{-7}. What is the pH of this solution?

$-\log(5.8 \times 10^{-7}) = pOH$

$-\log[^-OH] = pOH$ $6.2 = pOH$

$14 = pH + pOH$ $14 - 6.2 = pH$

7.8 = pH

9. A 450 mL beaker is 0.00045 M HCl. What is the pH of this solution?

Because this is a strong acid the molarity = the $[H^+]$ $-\log(.00045) = pH$

Also, volume is not important here **3.3 = pH**

10. A 320 mL solution contains 2.30 mg of NaOH. What is the pH of this solution?

$2.30 \text{ mg NaOH} \cdot \frac{1 \text{ g}}{1000 \text{ mg}} = 0.0023 \text{ g NaOH}$

$.0023 \text{ g NaOH} \cdot \frac{1 \text{ mol NaOH}}{40 \text{ g NaOH}} = .000058 \text{ mol NaOH}$

$\text{Concentration (M)} = \frac{\text{mol}}{\text{L}}$

$\text{M NaOH} = \frac{.000058 \text{ mol NaOH}}{.320 \text{ L}} = .00018 \text{ M NaOH} = [^-OH]$

$-\log[^-OH] = pOH \rightarrow -\log(.00018) = 3.7$

$14 - pOH = pH \rightarrow 14 - 3.7 = 10.3 \rightarrow$ **pH = 10.3**

Please complete the following table

pH	$[H^+]$	$[^-OH]$	pOH
3.5	**3.2×10^{-4}**	**3.2×10^{-11}**	**10.5**
3.2	5.8×10^{-4}	**1.7×10^{-11}**	**10.5**
12.6	**2.4×10^{-13}**	4.2×10^{-2}	**1.4**
5.8	**1.6×10^{-6}**	**6.3×10^{-9}**	8.2
4.4	4.2×10^{-5}	**2.5×10^{-10}**	**9.6**
11.6	**2.5×10^{-12}**	**4.0×10^{-3}**	2.4
10.1	**7.9×10^{-11}**	**1.3×10^{-4}**	**3.9**
11.9	**1.3×10^{-12}**	7.2×10^{-3}	**2.1**