Name: _____ Date: _____ Period: _____

The Matthews Family- Part I

Directions: Read the story and complete the Cornell Notes.

Sarah Matthews- Another cup, honey?

Tom Matthews- No thanks; more than one seems to bother me these days, especially this late in the evening.

Narrator- Sarah was about to express her concern when their son Paul, a high school junior, burst in to the room.

Paul Matthews- Mom, and Dad! Do you know what the pH is of that coffee you're drinking?

Tom Matthews- What's pH?

Paul Matthews- C'mon Dad, it's a number that indicates the concentration of Hydrogen ions in a solution—and coffee is like a pH of 5!

Tom Matthews- So, what does that mean? Hydrogen ions sound dangerous!

Paul Matthews- Geez Dad, did you even graduate high school? The pH scale ranges from 0 to 14. Solutions with more Hydrogen ions (H+) than Hydroxide ions (OH-) are called acids, and bases are the opposite.

Sarah Matthews- Oh, so a neutral solution, like water, with a pH of 7, has an equal amount of hydrogen ions and hydroxide ions.

Paul Matthews- Yeah, right, Mom. I'm glad someone around here knows what going on.

Tom Matthews- I think I understand. But going back to coffee- if coffee has a pH of 5 and water has a pH of 7, they are pretty similar, right?

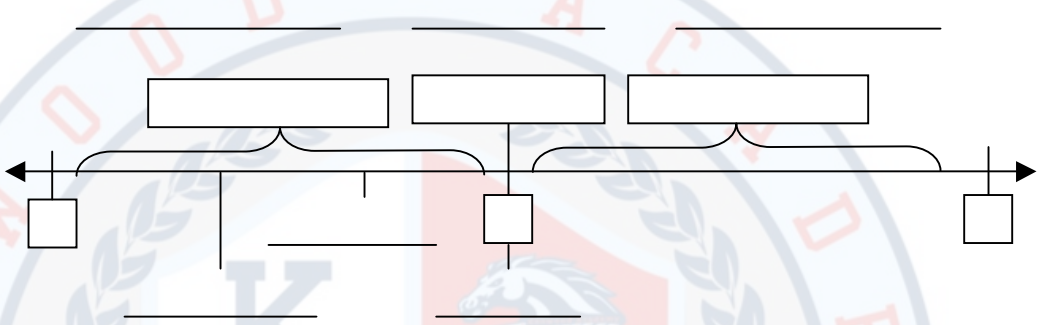
Paul Matthews- No Dad! A pH of 5 is 100 times more acidic than water. Or try that vinegar we put in our salad dressing- it's around pH 3, 100 times more acidic than this coffee!

Tom Matthews- I don't get it. How can only two units, like the difference between 3 and 5, or 5 and 7, give you 100 times as much?

Paul Matthews- Cause, Dad, it's a scale—and the 2 units mean 2 powers of 10, like 10 squared; that's where the 100 comes from!

Sarah Matthews- So you mean if there were 3 pH units difference, that would be 10 cubed, or 1000 times? And if you went from pH 3.7 to pH 6.7, that would also be 1000?

Tom Matthews- Whoa, slow down you two... my head is spinning! Besides, it's getting late and Paul, you have school tomorrow, off to bed!

Question	Description, definition, or example
What does a pH value indicate?	
pH scale *Label the boxes:* *- Neutral* *- Basic* *- Acidic* *- 0* *- 7* *- 14* *Label the lines:* *- More OH^- than H^+* *- Equal OH^- and H^+* *- Less OH^- than H^+* *- water* *- coffee* *- vinegar*	
What is the difference between…	pH of 5 and pH of 7? pH of 3 and pH of 7?
Water and pH *Explain in words* How does this equation explain why water has a pH of 7?	$H_2O \longleftrightarrow H^+ + OH^-$ _____ _____ _____

Check for Understanding

1. Lemon juice is more acidic than tomato juice. Which has a lower pH? _____
2. Bleach has a pH of 12.5. Is this acidic, basic, or neutral? _____
3. Ammonia has a pH of 11.5 but soap has a pH of 10. Which is more basic? _____
4. Oranges have more hydrogen ions than grapes. Which is more acidic? _____
5. Seawater has a pH of 8. What type of ion is more common in seawater? _____