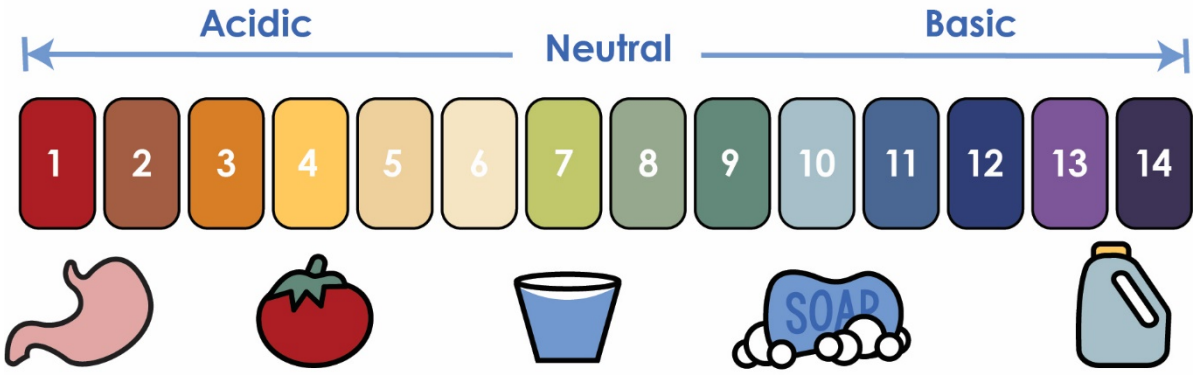
MICRO HYDROPONICS PH MEASUREMENT LAB

UNDERSTANDING pH



pH (Potential of Hydrogen): scale measure of the hydrogen ion concentration in a fluid, from **acidic** to **neutral** (water) to **basic**.

Use the above pH chart to answer the questions:

1. What is the difference between an **Acid** and a **Base**?

   _____

2. If water has a pH of 7, that makes it a(n) _____?

3. Lemon Juice has a pH of 2. That would make it a(n) _____?

4. If a fluid turns **green** after a **universal indicator** is added, then its pH tends _____. If it turns **red**, its pH tends _____.

5. If an acid and a base mix equally, it can produce a(n) _____ fluid.
   HINT: Acids and bases can "cancel" each other out in fluids.

MICRO HYDROPONICS PH MEASUREMENT LAB

MEASURING pH

Indicator Technique:

Use a **pH test kit**. Special **pH indicator paper** is dipped or soaked in the test fluid (such as your **nutrient solution**) and the resulting color can be compared to the standard colors of the **pH chart**.

*This technique is **subjective** (based on tester's opinions) giving it a "higher margin of error" (misreading the pH).*

pH Test Kit

Digital pH Meter & Probe Technique:

Favored by scientists, digital measurement uses a **pH meter** and **pH probe**. The probe is placed in the **test fluid**, and **electrodes** respond to the liquid. The meter shows the difference in **voltage**, determining the pH. *This technique is expensive, but more **accurate** (closer to the true value).*

pH Meter & Probe

Litmus Strip Technique:

Litmus Strips contain either an **acid** (red) or **base** (blue). When dipped or soaked, the red strips turn blue if the **test fluid** is basic, and the blue strips turn red if they interact with an acid. *This technique is cheap and portable, but less **accurate** (closer to the true value).*

Litmus Strips

Which pH technique would be best for your hydroponic system?

MICRO HYDROPONICS PH MEASUREMENT LAB

pH LAB

Objective: Determine the pH of common household fluids.
How accurate will your **hypothesis** (prediction) be?

Procedure:

- Do not swallow or taste any of the test fluids.
- Wash your hands prior to handling pH or Litmus Strips
- You may bring in fluids to test, if the liquids are:
  - Teacher Approved
  - Non-Hazardous (no sharp edges, harmful chemicals, etc.)

Challenge Supplies:

- pH Test Kit or Litmus Strips
- A variety of fluids to test (lemon juice, bleach)
- Container or cup for fluids
- Disposable gloves (optional)

Teacher's Note: *this lab activity can be completed without a pH testing method too! Have students predict whether common household fluids are **acidic**, **basic** or **neutral** and then compare their hypotheses to the scientific standard results (included).*

MICRO HYDROPONICS PH MEASUREMENT LAB

MEASURING pH

Name(s): _____

Set: _____

Record the pH test results for each fluid. Feel free to add your own.

Fluid	Hypothesis	pH Test #1	pH Test #2	pH Test #3	pH Test #4
Distilled Water					
Tap Water					
Lemon Juice					
Liquid Hand Soap					
Vinegar					
Laundry Detergent					
Tomato Juice					
Light Colored Soda					
Coffee					
Bleach					

MICRO HYDROPONICS
PH MEASUREMENT LAB

Fluid	Hypothesis	pH Test #1	pH Test #2	pH Test #3	pH Test #4

MICRO HYDROPONICS
PH MEASUREMENT LAB

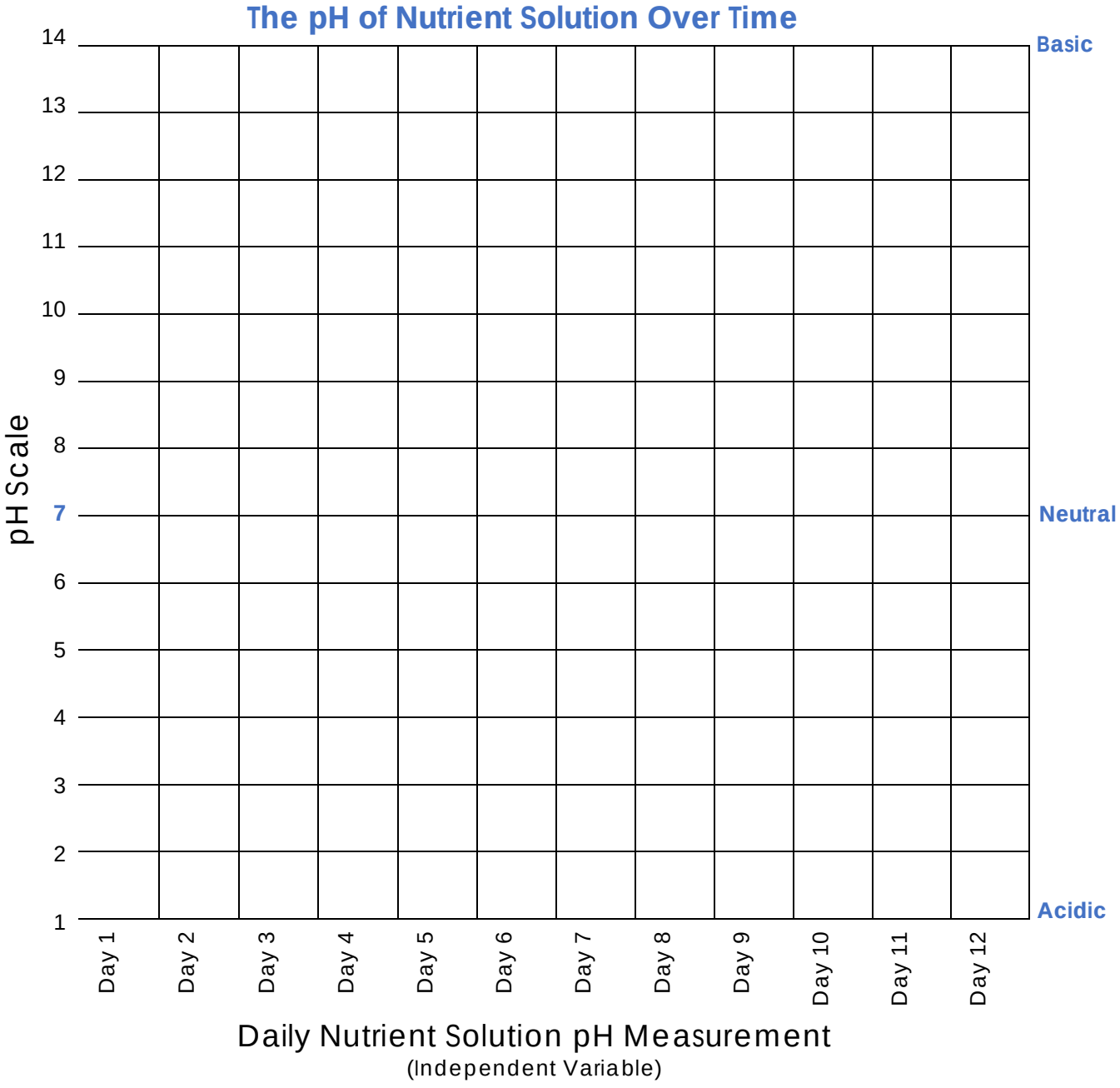
Set: ____

Name(s): _____

MEASURING pH

Record the pH measurement of your **Nutrient Solution**. At the same time, every day (or a similar interval), test the fluid and chart data on the graph below.

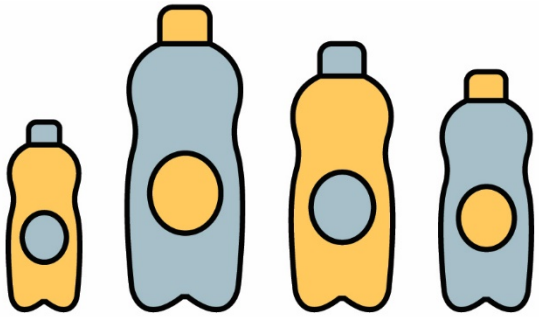
*Did the pH change over time? Stay the same? How did it compare to a **control** (tap water)?*



MICRO HYDROPONICS
PH MEASUREMENT LAB

TeacherGeek

Fluid	Standard pH
Distilled Water	7 (neutral)
Tap Water	Varies (6-8) (neutral)
Lemon Juice	2 (acidic)
Liquid Hand Soap	9-10 (basic)
Vinegar	2 (acidic)
Laundry Detergent	(7-10) (neutral-basic)
Tomato Juice	4 (acidic)
Light Colored Soda	2.5 (acidic)
Coffee	2 (acidic)
Bleach	12.6 (basic)
Milk	6.5 (acidic)



Soda Pop Challenge – Optional

Challenge: Does the brand of soda pop affect its pH measurement?

Constraints:

- Do not swallow or taste the soda pop
- You may bring in soda pop to test, if:
  - Teacher Approved
  - Non-Hazardous

Challenge Supplies:

- pH Test Kit or Litmus Strips
- A variety of soda pop (cola, seltzer)
- Container or cup for fluids

Bonus: After taking pH measurements, drop a tarnished **penny** in each soda sample and wait a week. Observe the penny's changes, and record the pH again.
*Did the soda's color **correlate** (relate) to its pH measurement?*