

## NUTRIENT SOLUTIONS

**Macronutrients:** plants need a balanced **NPK Ratio** to thrive.

### Nitrogen (N)

- leaf growth
- leaf color
- chlorophyll synthesis



### Phosphorus (P)

- stems
- roots
- flowers



### Potassium (K)

- amino acids
- carbohydrates



**Micronutrients:** plants also require other nutrients, including:  
calcium (Ca), magnesium (Mg), and sulfur (S)  
boron (B), zinc (Zn), copper (Cu), and iron (Fe.)

### Feed Me, Seymour!

Nutrients in soil are easily exhausted. **Hydroponic Systems**, however, have the benefit of “feeding” plants directly. This reduces waste, **concentrating** nutrients for specific purposes, such as added Phosphorus for brighter blooms.

1. What macronutrient would you add to the **NPK ratio** to maximize leaf growth? \_\_\_\_\_
2. How quickly your plants flower? \_\_\_\_\_
3. How strong your roots grow? \_\_\_\_\_



## NUTRIENT LAB

Using **commercial solutions** (FloraMicro, FloraGro) or your own mixes, determine the **NPK Ratio** of the solution. Certain brands contain more of one element; note this and develop a **formula** (independent variable) to best aid an aspect of the **plant's growth** (dependent variable).

**Example:** A formula with more **Nitrogen** (N) will cause my plant to grow more leaves than the **control** (water-only formula).

Record your ratio percentages, pH levels and observations. Then, plot your plant's progress graphically to observe changes over time.

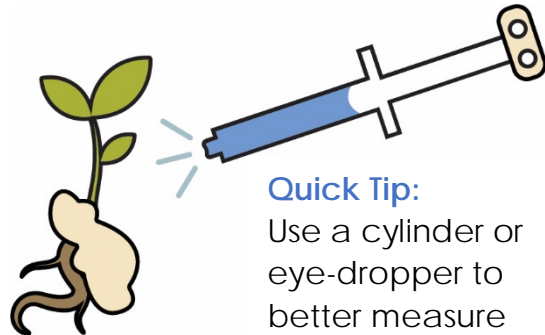


**Note:** *Experimenting with DIY Nutrient Solutions, such as used tea bags or recycled fish tank water, is encouraged, but be warned! Adding your own substances could potentially hurt the plant.*



### Lab Supplies:

- Micro Hydroponic System
- Planted seedling in growing medium
- Nutrient Solution(s)
- pH Test Kit or Litmus Strips – optional
- Container or cup for fluids
- Disposable gloves - optional



#### Quick Tip:

Use a cylinder or eye-dropper to better measure out the solution.

# MICRO HYDROPONICS NUTRIENT SOLUTION LAB



Name(s): \_\_\_\_\_

Set: \_\_\_\_\_ Record the height, pH and growth observations each day,  
along with the NPK Ratio percentage in the nutrient solution.

Day	NPK Ratio	Height	pH	Leaf & Flower Growth	Observations
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

# MICRO HYDROPONICS NUTRIENT SOLUTION LAB



Set: \_\_\_\_\_

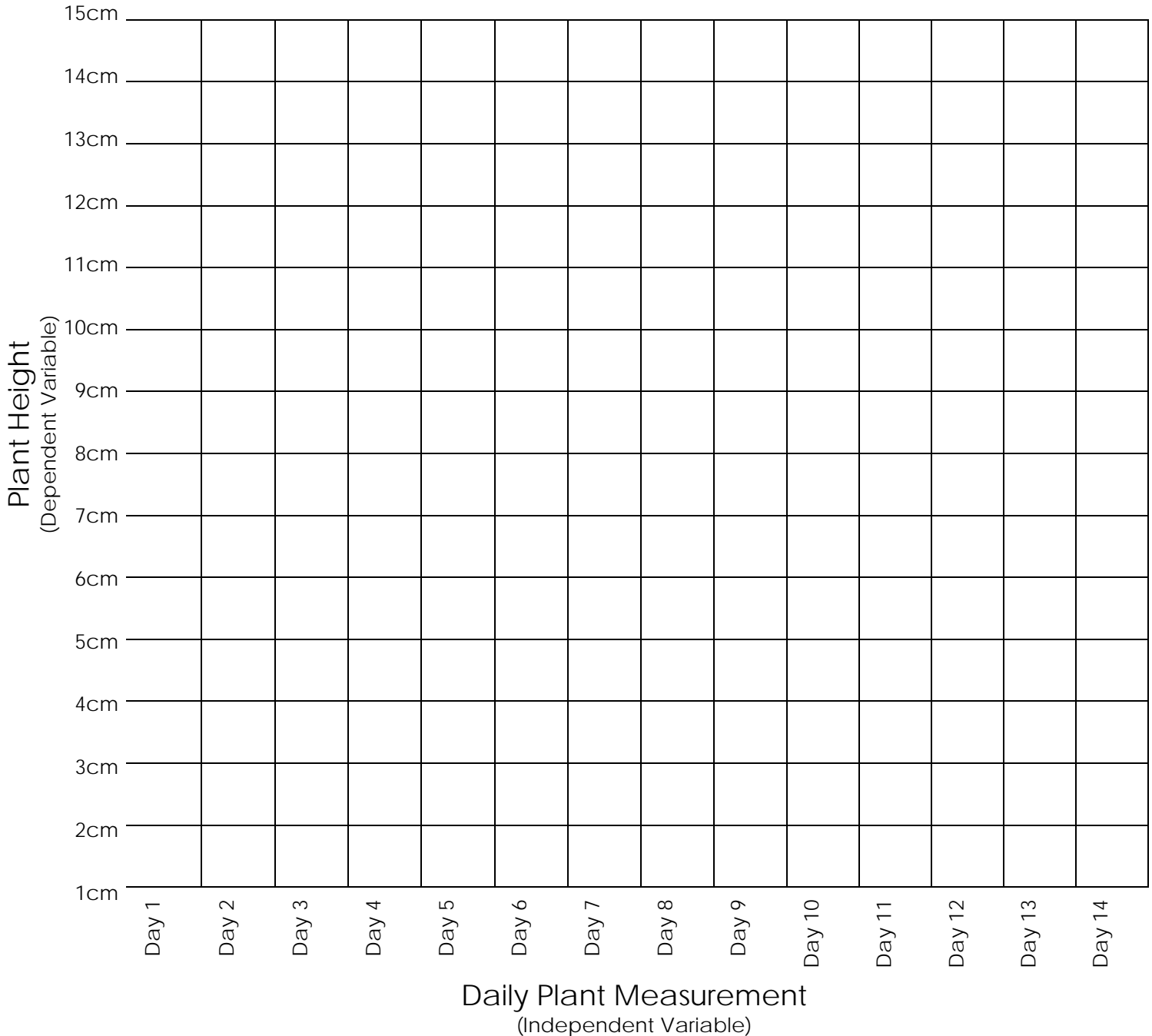
Name(s): \_\_\_\_\_

## GROWTH CHART

Plot the height of your plant on the graph below.

NPK Ratio %: \_\_\_\_\_

### The Effect of Nutrient Solution on Plant Height Over Time



# MICRO HYDROPONICS NUTRIENT SOLUTION LAB



Name(s): \_\_\_\_\_

Draw and Record your Growth Observations below.

Add to your *Engineering Notebook*.

*How many leaves grew on the stem? What was the width of the flowers?  
Did they all bloom the same color?*