**Directions:** Get into groups of 2-4. Have one person get a green tray from the back and another person put all of your group member’s names on the lab handout. Read and discuss the background.

**Background:** Living things require energy and matter to maintain order, to grow and to reproduce. Not having enough energy can obviously be very bad for individual organisms, but it can also cause disruptions at the population and ecosystem levels as well.

Organisms employ various strategies that have been used through evolution to capture, use, and store energy. Autotrophic organisms, such as plants, capture free energy from the environment through photosynthesis whereas heterotrophic organisms get their energy from other organisms.

In multicellular plants, photosynthesis occurs in the chloroplasts within the cells. The chloroplasts capture the energy from the sun and use it turn Carbon Dioxide (CO2)and Water (H2O) into glucose (sugar) and O2 (Oxygen)

The formula for Photosynthesis is:

6H2O + 6CO2 + Sunlight 🡪 C6H12O6 + 6O2

**Objective:** In this lab we are going to observe photosynthesis.

**Materials:**

* 1 cup water
* 1 cup of baking soda solution
* 1 Syringe
* 10 Spinach Leaf Circles
* Timer (use your phone)
* Video (Use your phone – optional)

**Procedure**

1. Put 10 Spinach leaf circles into your syringe. Be careful not to squish them.
2. Return the plunger into the syringe and push upwards until it is almost completely pushed in. Be careful not to crush your spinach leaf cut outs.
3. Fill your syringe with your baking soda solution.
4. Remove any air bubbles
5. Place your finger over the top of the syringe and pull back on the plunger while shaking the syringe gently. Then let go.
	1. This creates a vacuum that sucks out any gasses within the spinach leaf circles and fills them with your baking soda solution. If done properly your leaf cut outs should sink to the bottom of the syringe. You now have 2 of the 3 ingredients needed for photosynthesis. Carbon Dioxide (from the baking soda) and water. Now all you need is some light!
6. Pull out the plunger and empty the contents of the syringe into the baking soda solution cup.
7. Repeat steps 1-6 but use the plain water instead of the baking soda solution.
8. Take your cups and put them underneath one of the lamps.
9. Set your phone to take a video and prepare to begin your close read.
10. After you are done with your close read, observe your spinach leaf circles.

**Post Lab Questions:** Answer the following questions.

1. Describe the process of the lab. What did you do?
2. Why did we need to use a syringe?
3. What three things are needed for photosynthesis to occur?
4. The water in the cup and the light form the lamp provided the spinach cut outs with water and light, but because they are submerged in water they are unable to get the Carbon Dioxide (CO2) from the air. What did we use instead?
5. What two things are created from photosynthesis?
6. Which one could you see and what did it look like?
7. Why did the spinach leaf circles not float in the cup with just water?
8. How long did it take for your spinach leaf circles in the baking soda solution to float?
9. What are some variables that we could control that affect the rate of photosynthesis occurring?
10. Design an experiment to test the rate of photosynthesis. Make sure to include an independent variable, a dependent variable, controlled variables, a control group and an experimental group.