Photosynthesis Inquiry Lab

Use the model on the demo table to understand each of the steps we are about to talk about 😊.
Why do we have a white board?

- For these steps, it can be easier to discuss and write down ideas on the whiteboard first.
- Once you have a final idea, then everyone can write it down on their page!
Background Information:

Photosynthesis is the process by which plants take carbon dioxide from the atmosphere, add water, and use the energy of sunlight to produce sugar.

The reactions of photosynthesis can be divided into two major types: light-dependent reactions and light-independent reactions.
Background:

The **light-dependent** reactions convert energy from the sun into a form that the chloroplast can then use to make sugar from carbon dioxide, in the process producing oxygen as a waste product.

The **light-independent** reactions use that energy to make glucose from carbon dioxide and water.
What are we doing?

Our PURPOSE is to investigate the rate of photosynthesis.

We will be changing various aspects of the set up (model) to see how those changes affect the rate of photosynthesis.

Video clip: ( min)
Title

Write a title, now that you know the purpose of the lab

I will give you a few minutes to think of a title that is concise, yet descriptive – use the white board. When you think you have a great title, raise your hand and I will come check it.

Also, raise your hand if after a minute, you are still “stuck” on writing a title!
Writing the Question:

The question for an experiment is what you are trying to answer with the hypothesis statement.

Prompting questions - Why are you doing this experiment? What will be learned from doing this experiment?

Work with your partners to write a question now. Use that white board first!
Example Questions:

- How is the rate of photosynthesis calculated?
- What is the best method of testing photosynthesis rate?
- How many bubbles (of oxygen) are made during active photosynthesis?
Variables

IV – change on purpose to then measure the DV, which changes you are going to measure

Example 1: A scientist studies the impact of a drug on cancer. The independent variables are the administration of the drug - the dosage and the timing. The dependent variable is the impact the drug has on cancer.

Example 2: A scientist studies the impact of withholding affection on rats. The independent variable is the amount of affection. The dependent variable is the reaction of the rats.
What are some variables that you could choose from in this lab?

- Change the amount of water in the beaker
- Change the distance of the lamp
- Change the angle of the lamp
- Etc.

Whatever you choose, you MUST be able to measure the changes!!
Hypothesis:

- Remember, in the “If (we do this action), then (this will happen) format!
- NO “I” or “we” statements.
- The more specific you are in this statement, the easier it is to test during the experimental phase.
Hypothesis:

Examples:

If the water faucet is opened, then the amount of water flowing will increase.

If fenders are placed on a bicycle, then the user will stay dry when going through puddles.

If the temperature of a cup of water is increased, then the amount of sugar that can be dissolved in it will be increased.
Try writing a hypothesis now!
Materials – write these on your page:

- test tube,
- Elodea cuttings,
- sodium bicarbonate (baking soda),
- beaker with water,
- Lamp
- Timer or phone to time
- Ruler to measure distance
Experiment - Measurement of Photosynthesis

There are various set-ups that can be used to measure the rate of photosynthesis, each relies on counting the oxygen produced during the reaction.

To improve results, add a pinch of baking soda to the water in the test tube.

Cut elodea stems at an angle and use your fingers to crush the end of the stem.

The water in the beaker is meant to absorb the heat from the light.
Set Ups:

- **Model 1:**
- **Model 2:**
Measuring Variables

- First step – measure the rate of photosynthesis, write down this constant first
- Then decide how you will measure your independent variable
- For example, if you are measuring lam distance. Decide on those 6 trial distances before you start
- Then measure the DV for each trial
- Record all data and units in the table on your page.
Observations

You will be providing qualitative data as well as quantitative.

Describe what happened in the experiment – things that you noticed!
Graphing: Line Chart Example

Category 1  Category 2  Category 3  Category 4

Series 1
Series 2
Series 3
Series 4
Conclusion:

1. Restate the overall purpose of the experiment (include Independent Variable and Dependent Variable in this sentence.)

2. What were the major findings? (Summarize your data and then the graph results and patterns)

3. Was the hypothesis supported by the data? How do you know?

4. What would you improve for next time? What were the sources of error?
Clean Up Expectations

- Rinse all test tubes and place in test tube rack
- Rinse all beakers and place on paper towels (away from the edge of the counter)
- Place the elodea (plant) in the container provided
- Place the tray on the lab counter
- Put lamps where indicated as well
- Wipe off lab desk