

# WESTLAKE HIGH SCHOOL

## Summer Assignment IB Biology Year 2 (Internal Assessment)

**Due Date: August 8<sup>th</sup>, 2022**

The purpose of this summer assignment is to begin work on the internal assessment. You will be designing and conducting your own lab using the topic you selected before class

You have selected a topic to conduct your IA experiment. The information below is a guide for you to write up an experimental design and submit on the first day of class. Remember to write up the IA as complete as possible to save you time on rewrites. **Everyone should already have a topic selected.**

1. **Research Question:** Research questions are typically written in the form: What is the effect of \_\_IV\_\_ (5 specific increments of IV) on \_\_DV\_\_? State the scientific name of the organism used and use the correct format for typing scientific names.

**See example:**

### **An investigation of the effect of light intensity on oxygen levels produced by *Elodea canadensis***

2. **Introduction/Background Information:** 2 paragraphs or more; this is where you find information that will support your hypothesis and explain why the experiment is conducted and why you are personally interested in it - (this is the one place where it is okay to use first person). At least 2 reputable sources must be used and cited in parenthetical citations (Juergens, 2019). All sources will be listed on a Works Cited page in MLA format. Keep in mind that Wikipedia.com, Google.com, and Ask.com are NOT reputable/citable sources. Information from a scientific journal, .gov, and .edu sites are reputable. All information must be in your own words and information that is not your original thought must be cited or else it is plagiarism and will result in a zero.
3. **Aim**----**See Example** (The aim of this biology experiment is to investigate which level of relative humidity flowering plants transpire the most. In the following lab, five relative humidity levels will be tested to determine which level causes the plant to lose the most water, measured through its change in mass.
4. **Research Investigation**-----**See Example** (What are the effects of relative humidity levels at a constant temperature on the rate of transpiration of *Fragaria x ananassa* measured through change in mass per day?

5. **Hypothesis:** the hypothesis is where you state what you think will happen in the experiment. Make an educated guess based on the background research you have included. The hypothesis should be a short paragraph. You must explain and support your hypothesis with citations as well. How do you know this will happen..... provide a source.

**See Example:**

Photosynthesis is the production of carbon compounds and oxygen in cells using light energy. Organisms that use the process of photosynthesis are usually in areas where light from the sun can reach their pigments, thus allowing them to absorb light energy. There are also many factors that can change the rate of photosynthesis such as light intensity, temperature, and CO<sub>2</sub> concentration. Light intensity required for photosynthetic organisms to receive light energy, produce chemical energies, and release oxygen. Essentially, without an adequate amount of light, the rate of photosynthesis is severely diminished, and that means less chemical energy for photosynthetic producers and a decrease in oxygen production. Hence, higher light intensities yield more light energy, which in turn produces more chemical energy and oxygen (Pearson, 2014).

6. **Variables:** you will need to have an independent variable, dependent variable, and controlled variables. In experiments, only one independent variable is allowed, but you will need 5 increments, if possible. This is the variable that is being manipulated while the dependent variable is the one that is being measured. This is the portion of the experiment that is being affected by the independent variable. Controlled variables are the portions that must remain the same and cannot be altered throughout the experiment. You will list variables, state WHY they need to be controlled, and outline HOW you will **control them (MUST BE IN A CHART)**.

**See example**

**3.3 Variables**

Table 2: Variables Selected for This Experiment

Variable	Significance of the Variable
Independent: Light Intensity	Light intensities that plants are exposed to will affect their rate of photosynthesis. The rate of photosynthesis will be measured by the percentage of dissolved oxygen present in 1L of water.
Dependent: Rate of Photosynthesis	The rate of photosynthesis is affected by multiple factors in the environment, and by measuring the percentage value of dissolved oxygen in the water, light intensity's role in photosynthesis can be analyzed and explored.

Table 3: Identification of Controlled Variables

Control Variable	Significance of the Control Variable	How Variable will be Controlled
Temperature	Temperature does affect the rate of photosynthesis, so it is important for temperature to stay constant to avoid inaccuracies.	<i>Elodea canadensis</i> plants will remain at a constant temperature of 18°C.
CO <sub>2</sub> Levels	CO <sub>2</sub> levels affect the rate of photosynthesis, thus, exposure to this gas should be limited.	<i>Elodea canadensis</i> will be sealed in their respective bottles and when it is time to record data the top can only be off for 30-60 seconds.
Plant Species	To remain coherent the same type of plant species will be used to avoid differences in optimal environments. With different species being used data can be flawed	The same plant species of <i>Elodea canadensis</i> will be used for each examination.
Testing Location	Maintaining a consistent testing location allows for a more secure environment for generating data and observation. Staying in the original location for each test will provide the best results.	The experiment will take place in the same location to avoid any possible faults.
Time Elapsed	To prevent inconsistency with the rate of photosynthesis, percentage of dissolved oxygen should always be measured after the same amount of time has elapsed.	The dissolved oxygen in the bottles of water will be measured every 24 hours.
Distance Between Bottles and Lamps	Having high wattage bulbs can create heat which also affects temperature, so with measuring different light intensities it is important to make sure the lights don't interfere with other bottles. This can create inaccuracy within the data.	Make sure there are at least 30-60 cm between the different wattages of light bulbs and their bottles.

7. **Materials:** Make a bulleted list of materials needed for your experiment. This should be specific and include units. (e.g. don't just list "beaker", list "500 ml beaker"; don't just list "water", list "100 ml of distilled water"). Units need to be METRIC/S.I. units!

See example

### 3.1 Apparatus

Table 1: Listing of Apparatus

Name of Apparatus	Quantity	Uncertainty
<i>Elodea canadensis</i> (10.16 cm)	15	$\pm 1.5\text{cm}$
Plastic Bottles (1L)	5	-
Tap Water	5L	$\pm 10\text{ mL}$
Lamps	3	-
120W Light Bulb	1	-
75W Light Bulb	1	-
60W Light Bulb	1	-
Dissolved Oxygen Meter	1	$\pm 1\%$
Paper Towels	10	-
Garbage Bag	10	-

8. **Safety, Environmental, and Ethical Considerations:** this is where safety, environmental, and ethical concerns are stated. If you use people, animals, bacteria, or any chemicals then you will need to write something in this section. Please see example papers

See example

### 3.4 Risk Assessment

**Safety Issues:** With using lamps and water, there is a possibility that the water could encounter the circuitry of the lamps. Therefore, it is very important to handle the bottles with care, and make sure no water spills or spreads to any device that conducts electricity. Try to limit the amount of water that gets on the dissolved oxygen meter to prevent any technical malfunctions. Also, lamps create heat, so flammable objects should be removed from the area to prevent any burning or fires. Paper towels should be placed underneath bottles to further help with possible water spread.

**Ethical Issues:** There are no ethical issues to be concerned with.

**Environmental Issues:** Be sure to thoroughly clean and recycle all plastic bottles after use. If possible, try to plant the *Elodea canadensis* in an aquarium since the species can be invasive. Otherwise, seal the plants in a plastic bag, freeze the bag, and discard the bag leaving it unopened. Lastly, reuse lightbulbs elsewhere until they need to be replaced. Once replacement is necessary, dispose respectfully.

## STOP HERE

**Raw Data: (OPTIONAL)** – you may collect data over the summer if you wish to free up some time once school starts. Otherwise you will be collecting data starting in August. Once your research question is approved, if you have materials you can collect data. Any student working with bacteria or chemicals will need to conduct their experiment in a lab setting when school reopens in August. **You can wait to do this section in August. Conduct your research on how this experiment will be fully carried out.**

You will submit everything above on a Word Doc through TEAMS, under the assignment “IA Summer Assignment” due date is the first day of class. Reminder submit the following sections on the first day of class---**title, background, aim, research question, hypothesis, variables, materials, safety, environmental and ethical considerations.**

HAVE A GREAT SUMMER 😊 (You can reach me via remind 101 over the summer or email)

Thank you

Mrs. Johny

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