

2020 Summer Assignment: IB Biology HL II

Directions: **All students need to complete parts 2 and 3 of the summer assignment.** You are only responsible for part 1 of the assignment if your proposal was approved with modifications or your proposal was not approved. Please make sure to submit part 1 for grading to Mrs. Achatz before you move on to part 2. All work will be submitted to Google Classroom (class code → ssaa4mm)

PART 1: IA PROPOSAL CORRECTIONS

Due date part 1: July 19th, 11:59pm via Google Classroom. Reuse original Google Form for Proposal. Includes Research Question, IV, Levels of IV, DV, Control Group, & Possible Qualitative Data.

Mrs. Achatz's email for questions/concerns: abachatz@fcps.edu

Research Question: you will need to come up with a research question. First choose an independent variable and dependent variable and use these to write the question. Research questions are typically written in the form: **What is the effect of IV on DV?**

Variables: **you will need to have an independent variable, levels of independent variable, dependent variable, and a control group.** In experiments, only one independent variable is allowed. 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. The control group is the group of the experiment that does not receive the IV treatment. It is used as a comparison for the levels of the IV to determine how much of an effect the IV levels have on the DV. It is sometimes acceptable to have an experiment without a control group. If this is the case, you will need 6 levels of IV to investigate. If a control group is possible, you will need 5 additional levels of IV.

PART 2: IA DRAFT

Due date part 2: September 13th, 11:59pm via Google Classroom. You will turn in a Google Doc that will be VERY organized (refer to sample or use the sample) and include all appropriate headings. Includes all information from part I (proposal) and will also include Personal Engagement, Background Information, Hypothesis, Controlled Variables, Materials, Procedures, Safety Paragraph, and a brief description of Statistical Testing.

Personal Engagement: **Write a 1-2 paragraph statement indicating your connection to the topic and why you decided to investigate this.** This is where you will sell your IA. Don't fluff and don't lie. It will be obvious. Just speak/type from your heart!

Background Information: **Find information that will support your hypothesis and explain why the experiment is conducted in 2-3 paragraphs.** At least 3 reputable sources must be used and cited in parenthetical citations (Achatz, 2020). 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 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. Include information about your IV and the reason why you chose the levels you did. Explain why you chose the DV and how you decided to go about measuring it. Lastly, include an overview of the testing process that will be used.

Hypothesis: The hypothesis is where you state what you think will happen in the experiment. Make an educated prediction based on the background research you have done. The hypothesis should be a short paragraph and include a mathematical relationship whenever possible. They are typically written in an **if...then...because... statement.**

For example: If (IV is increased/decreased) then the DV will increase/decrease/stay the same) because.....(in-text citation).

Controlled Variables/Constants: Controlled variables allow an experiment to be valid. These are the constants that are necessary for you to collect accurate data and to determine if your IV levels actually influence your DV. **You will need to identify a minimum of 5 controlled variables within your experiment.** You should select the 5 most significant constants. If you feel that there are additional significant constants, then by all means, include them. But do not go under 5. Put this information into a table like this:

Controlled Variable	Significance	Explanation
Identify the constant and be specific (don't just say water - include what is being controlled about the water - like the amount, the pH, the temperature, etc.)	Explain the significance of this constant - why does it make a difference in your experiment?	Describe how you will ensure that this constant will be maintained throughout experimentation? Be specific! Don't just say "keep amount constant." Indicate what amount you will use and how you will measure that amount.

Materials: Make a **bulleted list of materials** needed for your experiment. This should be specific and include units. Include equipment with sizes, chemicals with amounts.

Procedure: **Write a numbered procedure that includes all steps from beginning to end.** Make sure your procedure is replicable yet clear and concise. Be sure to indicate how all levels of IV (and control group) will be manipulated and how you will specifically measure the DV. Indicate how many trials will be conducted.

**Make note of when/how you will photograph your experiment. If there is a set-up, consider taking a picture or drawing a diagram. You should include pictures of your data collection. (Pictures of your materials are not appropriate)*

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. Consider how you will be safe during experimentation, and keep those around you safe. How will you dispose of any chemicals? Are there any environmental implications with disposal or with any seeds or plants you might have used. Be sure to use the scientific name of any organism being used. Address all 3 areas in the heading. If there are no concerns for one or more, indicate this by stating, “there are no xxxx concerns for this investigation.” **BE THOROUGH!**

IB Experimentation Policy

- *involving live animals:*

Any planned and actual experimentation involving live animals must be subject to approval by the teacher following a discussion between teacher and student based on the IB guidelines. This discussion should look at the 3Rs principle and the decision justified. The principles are: Replacement, Refinement, and Reduction.

If the animal is essential to the investigation refinements to the investigation to alleviate any distress to the animal and a reduction in the numbers of animals involved should be made. Experiments involving animals must be based on observing and measuring aspects of natural animal behaviour. Any experimentation should not result in any cruelty to any animals, vertebrate or invertebrate. Therefore experiments that administer drugs or medicines or manipulate the environment or diet beyond that which can be regarded as humane is unacceptable in IB schools.

- *involving human subjects:*

Any experimentation involving human subjects must be with their direct, legally obtained written permission and must follow the above guidelines. In addition, the investigation must not use human subjects under the age of 16 without the written consent of the parents or guardians. Subjects must provide written consent; the results of the investigation must be anonymous; subjects must participate of their own free will; and subjects have the right to withdraw from the investigation at any time. Investigations involving any body fluids must not be performed due to the risk of the transmission of blood-borne pathogens

Data Collection: Start to think about what your data collection will look like. Feel free to start creating your data tables (titles, headings, units) so that you will be able to easily record your data. **This is NOT required for the summer assignment but not a bad idea to start at least thinking about it.**

Processed Data and Statistical Analysis: Once you have completed data collection in a 5x5 format (5 levels of IV x 5 trials each, minimum), you will need to process and analyze your data. This includes at a minimum, calculating the mean, range, and standard deviations for your data. You might also need to include other calculations such as percent change, etc. **Explain why you will calculate the standard deviation and what information the standard deviation values provide to your data analysis.**

You are also expected to include another complex statistical analysis calculation, such as T-tests, chi-square, Pearson's coefficient, ANOVA test, etc. **For the summer assignment, please indicate which additional statistical test(s) you will use and explain the reasoning behind this choice.**

Works Cited page: includes all sources used, in MLA format, in alphabetical order, and has a hanging indent.

PART 3: IB Biology Review Notebook

You will make sure that your IB Biology Review Notebook is completely up to date from all information from the first year of the course, including the information taught during Distance Learning. Your notebook should have all objectives for each topic. Refer to the topic overviews to ensure that all Understandings, Applications, and Skills are included and numbered properly.

Year 1 Topics:

1.1-1.6

2.1-2.6

8.1

7.1 (only DNA structure, not replication)

2.8-2.9

8.2-8.3

3.1-3.3

10.1

6.3

11.1