

**AP Biology
Summer 2023
Summer Assignment**

Complete the following assignments. Follow instructions carefully. These assignments are due the first day we meet.

1. Plant Wars: **START THIS RIGHT AWAY!**

- a. See the separate description of this assignment. You will be growing plants from seed so you need to start immediately.
- b. You will need certain materials: seed, soil, pots, composition notebook....
- c. Seeds should be planted and observations underway by JUNE 7.
- d. If you will be gone on vacation, GSP etc, you must find a way to take care of your plants—parent, a neighbor, take them with you? Perhaps this might affect what plant you choose.

2. Biology Text (Biology for the AP Course) **CHECK OUT FROM THE MEDIA CENTER BEFORE YOU LEAVE FOR THE SUMMER!!**

- a. Read Module 0 (p. 1-11,13. You do not have to read “Analyzing Statistics and Data”) AND read Module 1 (p.26-27, 30-39) in the textbook
- b. Answer the following questions on your own paper. You can simply write the letter that matches the correct answer:
 - Review questions #1-7 on p. 15
 - MCQ #1-4 on p. 16
 - Review questions #1-7 on p. 40
 - MCQ #1-4 on p. 41

3. “The Case for a Creator” by Lee Strobel. ISBN 0-310-24050-6

- a. Read Chapters 1-4 and 8-9.
- b. Answer the questions in the packet. These should be answered thoroughly on **separate paper**. You must **handwrite** your answers.

*You may, of course, read all of the chapters in “The Case for a Creator” if you desire....

If you would like to learn more about the creation/evolution debate, I highly recommend watching “Is Genesis History” by Dr. Del Tackett. He interviews many PhD scientists from various fields. This video can be found on Amazon and on YouTube. This video is not required, but summer is a good time to delve into extra subject matter.

If you have any questions, feel free to email me at:
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Experience is a hard teacher because she gives the test first, the lesson afterwards.
-Vernon Saunders Law

PLANT WARS

AP BIOLOGY SUMMER ASSIGNMENT 2023

For this assignment, you need to **START IMMEDIATELY**. You must grow a plant from a seed and take care of it throughout the **ENTIRE** summer. The purpose of this task is to practice skills that will help make you successful in AP Biology next year: observation, data collection, drawing conclusions based on evidence, and data analysis.

Objective 1: To experience that plants are living, growing, responsive creatures that need care in the lab

Objective 2: To experience using research tools available to you and give you practice with documenting steps of your experiments as well as organizing your data.

Student Objectives for AP Biology Labs:

- Choose which variables to investigate (type of soil, amount of sunlight, fertilizer, etc)
- Design and conduct experiments (and to remember control group too!)
- Collect, analyze, interpret, and display data
- Determine how to present conclusions

Materials needed:

1. Composition book for your field notes
2. Seeds for plant of choice
3. Necessary items to grow chosen plant

Assignment:

- Design and conduct an experiment about plants. You may choose to investigate something to do with plant growth, light, fertilizer, root development, pollination, seed germination etc... Any topic about plants is okay. Do NOT use the amount of water as your variable!
 - The type of plant is entirely up to you (it just has to start from a seed).
 - Go online if you need to and search for ideas. Don't stress about this, instead have fun while learning! It is okay if everything doesn't turn out "right". This assignment is supposed to get you to think like a scientist, ask questions, and try to find answers.

Composition book setup:

- Create a front cover page that has the following information:
 - A picture of the plant you have chosen to grow (hand drawn or printed)
 - Your first and last name
 - The words: AP Biology – PLANT WARS

Requirements:

- Begin with writing out the steps of the experimental design (see below for more details)
- **Purpose statement**
- **Background information about your plant**
 - Common and scientific name of the plant
 - Information on your seed/plant of choice
 - Range of natural habitat
 - Nutrition/soil requirements
 - Sunlight requirements
 - Watering requirements
 - Anything else that helps the reader understand your experiment
- **Identify your experimental variables** (see below for more details)
- **Hypothesis for your experiment** (see below for more details)
- **Experimental procedure**
 - Growing plan
 - Type of soil used
 - Size of container –Be sure to use pots that are large enough to get through the Summer and the same size (unless you are testing pot size)
 - Amount of sun and water needed to germinate and grow
 - Any other details that I would need to know in order to replicate your experiment
- **Data collected: THESE ARE THE FIELD NOTES!**
 - **FIELD NOTES REQUIREMENTS:**
 - **You must take A SELFIE with your plants (control and experimental) 1 time per week, at minimum.** If you are not in the picture too, it doesn't count.
 - **You must take field notes with each picture.** Your field notes will be recorded in your composition book and **MUST include:**
 - Photos (color, please)
 - Qualitative Data
 - Observations about your plant using words: color of leaves, overall plant health, etc. These are characteristics that you observe.
 - Quantitative Data
 - These are measurements you take: height, width of stem, number of leaves, length of leaves, number of flowers/fruit (if any), measurements of flowers/fruit, number of days until growth observed, etc.
 - **YOU MUST HAND-WRITE YOUR FIELD NOTES.**
 - **If your plant(s) dies,** you should document that, retain all field notes and photos for the first plant(s), and **begin again.**
 - The biggest thing is to **DOCUMENT EVERYTHING!!!**
- **Conclusion** (see below for more details)

What you will turn in:

- Your composition book with documentation of the steps of the experimental process and your field notes
- You will bring your plant to school during the first week (a specific date will be announced) and we will vote on prizes, such as “Best in Show” and “Most Pitiful Plant”, etc..

Steps for the Plant Experiment:

Step 1: Stating the Purpose/Problem: What do you want to find out? Write a statement that describes what you want to do. It should be as specific as possible. Often, scientists read relevant information pertaining to their experiment beforehand. The purpose/problem will most likely be stated as a question such as: “What are the effects of _____ on _____?”

Step 2: Defining Variables

INDEPENDENT VARIABLE (IV) (also called the manipulated variable) — the variable that is changed on purpose for the experiment; this is what you, the scientist decides to test.

DEPENDENT VARIABLE (DV) (also called the responding variable) — The variable that acts in response to or because of the manipulation of the independent variable.

CONSTANTS (C) — All factors in the experiment that are not allowed to change throughout the entire experiment. Controlling constants is very important to assure that the results are due only to the changes in the independent variable; everything (except the independent variable) must be constant in order to provide accurate results.

CONTROL GROUP - For some experiments (including yours), a control (standard of comparison for checking or verifying the results of an experiment) is necessary. All variables must be held constant in the control group.

EXPERIMENTAL GROUP — The group(s) being tested with the independent variable; each experimental group has only one factor different from each other, everything else must remain constant.

REPEATED TRIALS — The number of times that the experiment is repeated. The more times you repeat the experiment, the more valid your results will be. In this case, you might have several plants growing under each condition rather than just one plant.

Step 3: Forming a Hypothesis. A hypothesis is an inferring statement that can be tested. The hypothesis describes how you think the independent variable will respond to the dependent variable. It is written prior to the experiment...never change your hypothesis. This should be written as an If...then statement. “If this is done then this will happen.” Never use “I” in your hypothesis (i.e. I believe that...) The more specific your hypothesis is the better.

For example: If the temperature of a reaction is increased by 20°C then the rate of the reaction will increase 2 fold.

Step 4: Designing an Experimental Procedure: This should be a numbered list of steps (your methods that you used/followed. It must be written in a way that someone can easily replicate your experiment.

Step 5: Results/Data (These are your field notes - see the requirements above too)
Qualitative Data is comprised of a description of the experimental results (i.e. color, texture....).
Quantitative Data is comprised of numbers results (i.e. 5 cm, 10.4 grams) The results of the experiment will usually be compiled into a **table/chart** for easy interpretation. I expect that you will collect some quantitative data in a clearly labeled table. Be sure title tables and graphs.

At the end of your experiment, you should make a graph using either google sheets or excel. Choose the type of graph that makes the most sense for the type of data you collected. Here is video about types of graphs that you can watch for a refresher.

<https://www.youtube.com/watch?v=9BkbYeTC6Mo&t=6s>

Step 6: Conclusion: Briefly summarize what you did and what you found. Accept or reject your hypothesis. If your data supports your hypothesis, you accept it. If your data does not support your hypothesis, you reject it. You are not proving anything. Stay away from that word.

Step 7: Citations: All sources used for research must be cited using **APA format**

FAQ's:

Q: How do I take care of my plant?

A: Look it up! Be sure to record your sources. Use Citation Machine to put your resources in APA format (simply type "citation machine" into Google).

Q: Do these plants like sun or shade?

A: Look it up! Helpful hint: do not grow outdoor plants inside.

Q: Am I allowed to feed my plants?

A: Yes! You may do anything to help your plants be all they can be! (Just make sure it's constant between all your plants- unless this is your independent variable.)

Q: How should I record my data?

A: You are the scientist so you decide! What do you think will help you clearly see and interpret if your efforts are working? If you are not sure how to make good data tables – look it up! Organized data is easier to understand and use for analysis. Plan your data collection before you begin! This is your first AP Bio grade, so better to have TOO MUCH DATA instead of not enough!

Enjoy and Have Fun!!!

The Case for a Creator
By Lee Strobel

End of Chapter Questions

After reading each of the following chapters, please answer the following questions. Answer in thoughtful, complete sentences. You must handwrite your answers on separate paper.

Chapter 1

1. Have you ever met someone who was as hostile toward Christianity as the author was? Explain as much as you feel comfortable.
2. Is there any part of the author's attitude that you can personally relate to? How so?
3. Do you believe that Christianity is being eclipsed or enhanced by modern science? Why? On what do you base your assessment?

Chapter 2

4. Which "images of evolution" described in the chapter do you believe are the most powerful in shaping our culture's belief in evolution? How so?
5. How do you respond to Harvard geneticist Richard Lewontin's opinion that science should be seen as "the only begetter of truth"? Is that a scientific or a philosophical statement? How much confidence do you put in science?
6. What do you believe are the limits of science? What ways are there to know about something apart from the scientific method?

Chapter 3

7. Which one of biologist Jonathan Wells' disclosures was the most surprising to you? Why?
8. Consider each of the various icons of evolution that Wells discussed. As you evaluate each one, discuss whether you think it provides viable support for Darwinism. What makes you reach that conclusion?
9. In Wells' opinion, the evidence for Darwinism "is not only grossly inadequate, it's systematically distorted," and that in twenty or thirty years "people will look back in amazement and say, 'How could anyone have believed this?'" In your opinion, what would need to happen before most people would reach that conclusion? How likely do you believe it is that this will occur?

Chapter 4

10. Meyer lists 6 ways in which modern science supports belief in God. Which one of these areas is most intriguing to you and why?
11. If Meyer is correct concerning these six categories of evidence, how strong is the case for a Creator? How well do you believe Meyer responded to the objections to intelligent design theory? Which of his answers were the most convincing and why?

Chapter 8

12. Charles Darwin conceded that his theory would “absolutely break down” if it could be shown that any complex organ “could not possibly have been formed by numerous, slight modifications.” Behe claims he has passed this test. Why do you agree or disagree?

13. Which of the biological systems described by Behe—cilia, bacterial flagella, the cellular transport system, or blood-clotting—was the most impressive to you? Explain.

Chapter 9

14. While scientists are virtually unanimous in ruling out random chance for the origin of life, this theory is still prevalent in popular opinion. What’s your assessment of the odds that life could have assembled by chance? Do you agree or disagree with Meyer’s conclusions that believing in chance is like invoking a “naturalistic miracle”?

15. Darwin admitted that the Cambrian explosion was “inexplicable” and a “valid argument” against his theory, but he predicted future fossil discoveries would vindicate macroevolution. Today, do you believe that the direction of the fossil evidence points toward or away from Darwinism? In what ways does Darwinism successfully account for the Cambrian phenomenon? In what ways is the phenomenon consistent with intelligent design?