AP Biology Summer Assignment - 26-27

Name:

Directions: Welcome to AP Biology! This packet will include all the work that you need to learn and complete for the Summer Assignment.

If you have not already, join the AP Biology Summer Google Classroom using the Join Code: **gciggl3y**

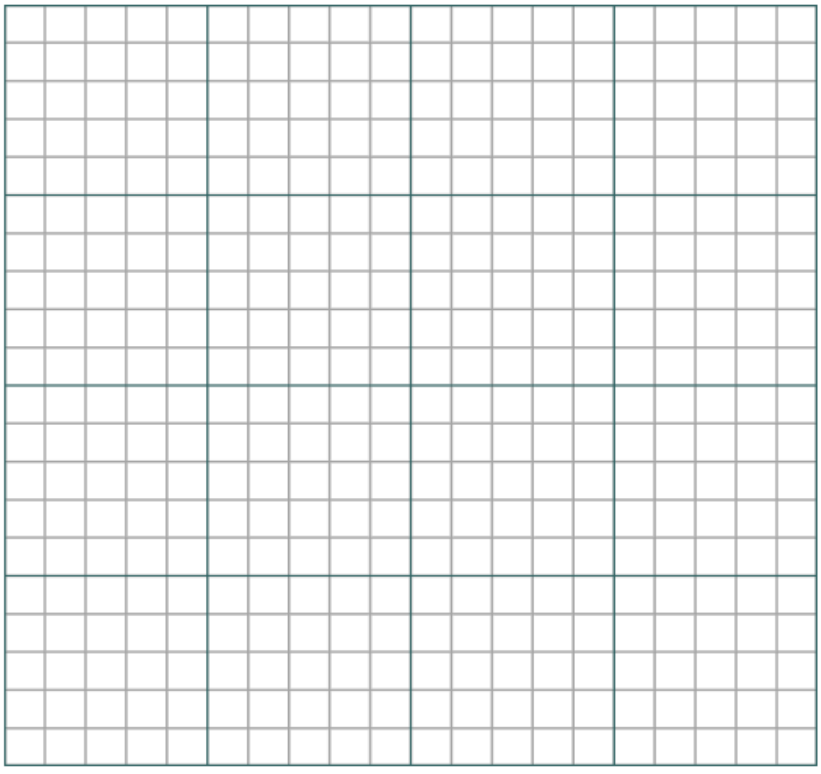
To get full credit, all work must be handwritten. Print out this packet and complete it before the 1st day of school (Tuesday 9/2). Use complete sentences when answering the questions.

ASSIGNMENT #1 GRAPHING: Make sure graphs have titles and are properly labeled with units.

Watch this Video: https://youtu.be/GUYRMdcEs00?si=TdY47NrTWIac74HK

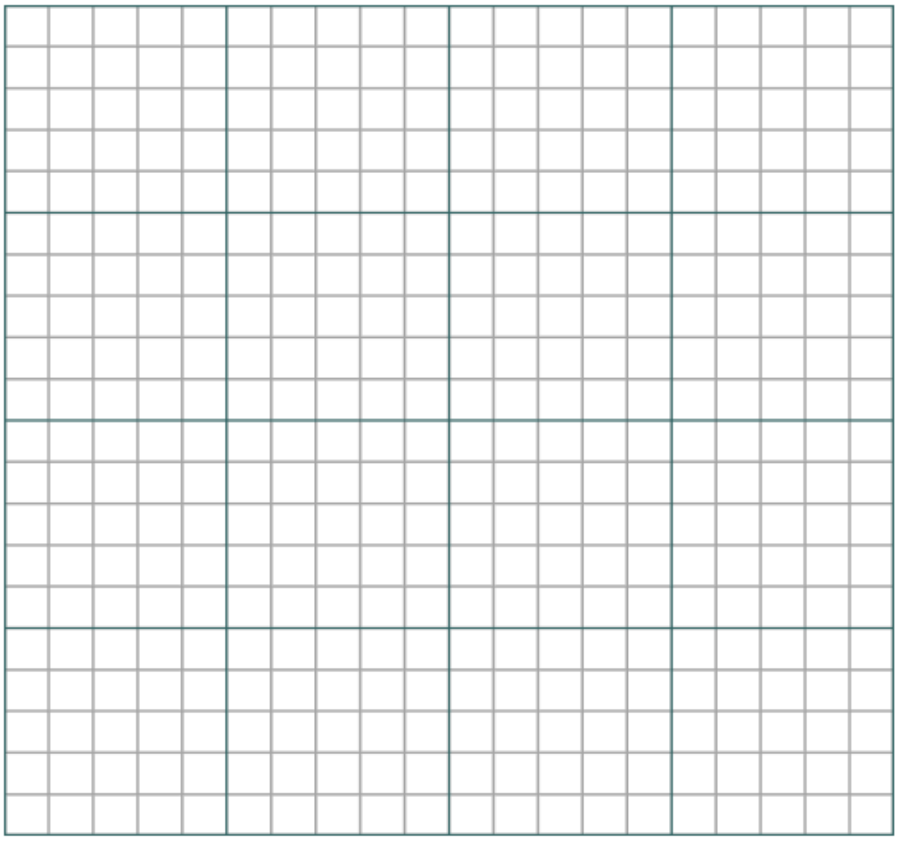
Create a line graph of the following sample data set showing the number of leaf disks that rise in a solution over time as photosynthesis occurs. Remember to include all of the elements that should be included in a graph.

Time (min)	Number of Disks Floating
1	0
2	0
3	0
4	0
5	0
6	0
7	1
8	1
9	1
10	2
11	5
12	8
13	10
14	14
15	14



Now use the data to sketch a bar graph of monthly rainfall. Remember to include all graph elements like the one above.

Month	Rainfall (cm)
January	2.0
February	1.8
March	1.2
April	5.7
May	6.2
June	5.9
July	1.0
August	1.1
September	1.1
October	2.3
November	2.7
December	2.5



ASSIGNMENT #2 FOUNDATIONS OF BIOLOGY: Using outside sources and the video linked below, fill in the note chart and complete the short answer question below.

Watch this Video: https://youtu.be/JD7fwanufcc?si=ekRwnouHWQshYOhy

1. What are the 5 unifying themes in Biology?

Theme:	Explain:

2. Write a brief definition of each level of organization below.

Level of Organization:	**Definition and/or Examples:**
Biosphere	
Ecosystem	
Communities	
Populations	
Organisms	
Organs	
Tissues	
Cells	
Organelles	
Molecules	

ASSIGNMENT #3 DESIGNING AN EXPERIMENT: You may be required to come up with your own experimental design for some laboratory investigations in AP Biology this year. Before you can do that, you must first understand how to set up a controlled experiment.

Complete the following reading and questions to learn how. Be prepared to create your own experiment within the first few weeks of school.

A **controlled experiment** is one in which you only change one variable across various experimental groups. The variable that you change in an experiment is called your independent variable (or manipulated variable). The variables that you keep the same (i.e. most variables in an experiment) are called your controlled variables or constants. The variable that you are measuring or collecting is called your dependent variable. The dependent variable is essentially your data (*notice that both start with "d").

Oftentimes in a controlled experiment, you also need a control group (otherwise known as a control) – not to be confused with controlled variables/constants. This is like a non-manipulated experimental group, which will serve as a "baseline" to which you can compare your experimental groups.

As an example, suppose a scientist is conducting an experiment that will test the effectiveness of various types of fertilizers. More specifically, the scientist wants to know which of three fertilizers (F1, F2, and F3) will help his broccoli plants grow at the fastest rate. For this experiment, these would be the notable variables/groups:

- **Independent Variable:** the type of fertilizer
- **Dependent Variable:** the rate at which the plant grows or the height of the plant
- **Constants:** type of plant, type of soil, amount of soil, amount of sunlight, amount of fertilizer, etc.
- **Experimental Groups:** broccoli plant with F1, broccoli plant with F2, and broccoli plant with F3
- **Control:** broccoli plant with no fertilizer

Note that our control is a broccoli plant without any type of fertilizer. This group, in essence, is a non-manipulated group that we can use as a baseline to which we can compare our experimental group results.

As a final note for this section, there are two general types of controls with which you should be familiar: negative controls and positive controls. A **negative control** is one that lacks the independent variable, or at least is minimally affected by the independent variable. This would be like the broccoli plant without any type of fertilizer since the fertilizer is our independent variable. A **positive control** is one that almost has the independent variable "in full," so to speak. For our broccoli experiment, this could be a broccoli plant treated with a fourth type of fertilizer that has already been proven to be an effective fertilizer. The key to remember here is that controls, whether negative or positive, are used for comparison purposes to get a better gauge on how the independent variable has influenced your other experimental groups

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Now use the following hypothetical experiments to answer the questions below:

A scientist wants to study the effect of different types of music on the behavior of fruit flies (Drosophila melanogaster). To test this, the scientist sets up an experiment with four isolated fruit fly populations, each consisting of 100 flies (50 males and 50 females). The first population is observed under the effects of rock music, the second under the effects of classical music, the third under the effects of techno music, and the fourth under the effects of no music. For each trial and for each genre, the music was played for 5 minutes.

Each population was observed in an airtight glass container with a controlled amount of atmospheric gases like oxygen, carbon dioxide, and nitrogen. No food was provided to any of the flies during the trials.

1. What is the independent variable in this experiment?

2. What is the dependent variable(s) in this experiment?

3. Name 3 constants in this experiment.

4. What are the experimental groups in this experiment?

5. What is the control in this experiment?

6. What is one way that you would have improved this experimental setup?

7. Suppose that you were to synthesize a new drug that is supposed to relieve pain in patients. To test its effectiveness, you set up a double-blind study where one group of 100 individuals gets the drug in pill form, one group of 100 individuals gets a placebo pill (a pill that does nothing), and one group of 100 individuals gets an Advil® pill that's known to be effective. Identify the negative and positive controls of this experiment.

8. Now that you understand how to set up a controlled experiment, you can apply your knowledge to designing your own hypothetical experiment. In the space provided below, you will need to design your own step-by-step procedure for an experiment that would test the effect of pH on the growth of the plant, Arabidopsis thaliana (or A. thaliana). Recall that the pH scale ranges from 0 to 14. A substance with a pH of 0 is a very strong acid, a substance with a pH of 14 is a very strong base, and a substance with a pH of 7 is neutral.

For starters, identify the following variables:

a. Independent Variable:

b. Dependent Variable:

c. Controlled Variables (name at least 5):

d. List your materials, and briefly describe your procedure. Be specific & detailed!