AP Biology Summer Assignment Packet 2018-1029

Summer Checklist 2018-2019

Assignment	Due Date	
#1 Letter of Introduction	Before the first day of class.	25 points
#2 Supplies	Before the first day of class. (Bring your supplies on the first day of class)	
#3 Video Notes	Due on the first day of class.	50 points (Test Grade)
#4 Graphing Practice	Due on the first day of class.	50 points (Test Grade)

Google Classroom Code: 6hdoap4

E-mail: BrandyNT@leeschools.net

Pointers on graphing and graphs:

- ✓ Use graph paper if you can (graphs should be free of mistakes)
- ✓ If you do not have graph paper then you are to draw your own graph by hand.
- ✓ Hand drawn graphs should be neat and free of mistakes (take your time). Use a ruler!
- ✓ Make sure all graphs have units associated with them and a legend for more than one data point on the same graph.

AP Biology Summer Assignment 2018-2019

Welcome to AP Biology! This class is designed to be the equivalent of a two-semester introductory biology course usually taken in the first year of college. Throughout the course, you will become familiar with major recurring ideas that persist throughout the four "Big Ideas" that this course centers around.

The AP Biology course shifts from a traditional "content coverage" model of instruction to one that focuses on enduring conceptual understandings and the content that supports them. Please be aware that part of taking this class is a commitment to being on time, on task, and hard working. There are 4 tasks that I would like you to complete before the first day of school. I look forward to working with each of you next year!

Due BEFORE the first day of class.

#1 Letter of Introduction

Your first grade in AP Biology (Pretty easy, right?)

Please e-mail the following information to me BEFORE the first day of class at BrandyNT@leeschools.net

Subject Line—AP Biology 18/19

1. **Full name (& nickname if you have one)**
2. **What do you like to do? (Hobbies, sports, interests)**
3. **Do you have a job? Do you plan on getting a job during the school year? If so, where?**
4. **What are your personal strengths when it comes to learning new material?**
5. **What causes you to struggle in a course?**
6. **What is the most effective way for you to prepare for a test?**
7. **Have you or will you be taking Anatomy & Physiology?**
8. **What are your plans after high school? (You don't have to have everything figured out right now; however I just want a general idea of your interests/plans/career path beyond high school.)**

#2 AP Biology Supply List

Please have all supplies on the first day of class!

1. **Sturdy 5-Subject Notebook**
2. **Tape**
3. **Pens/Pencils**
4. **Red Pens**
5. **Highlighters (a few different colors)**
6. **Colored Pencils**
7. **5 packs of notecards with notecard ring**
8. **1 ½ " or 2" Binder with 10 dividers**
9. **Graph Paper**
10. **Calculator (Scientific or Graphing)**

Due ON the first day of class—Assignments 3&4 are worth a 100 point test grade!

#3 Video Notes

This assignment is designed to get you acquainted with the Science Practices that you'll be learning about this year in AP Biology. You will watch the videos listed below and take **hand-written** notes on each of them. The notes should be your **original work**. Each note sheet will be scored 0-5 based on completeness and thoroughness as shown in the rubric below. ***Pages will not be accepted typed!**

#	Video Content	Links
1	The Nature of Science	https://youtu.be/77TFiYWPxoQ
2	The Scientific Method	https://youtu.be/SMGRe824kak
3	CER (Claim-Evidence-Reasoning)	https://youtu.be/5KKsLuRPsvU
4	AP Biology Science Part 1 Models & Representations	https://youtu.be/v5Nemz_cVew
5	AP Biology Science Part 2 Using Mathematics Appropriately	https://youtu.be/jgqYlSKoXak
6	AP Biology Science Practice 3 Formulate Questions	https://youtu.be/2zB272Ak63A
7	AP Biology Science Practice 4 Data Collection Strategies	https://youtu.be/AzTXnne40wU
8	AP Biology Science Practice 5 Analyze Data and Evaluate Evidence	https://youtu.be/0JqukouOtZA
9	AP Biology Science Practice 6 Scientific Explanations and Theories	https://youtu.be/3gK1xWNM7kk
10	AP Biology Science Practice 7 Connecting Knowledge	https://youtu.be/7l4bcs49JP8

0 No Credit	2 Below Expectations	3-4 Complete	5 Exceeds Expectations
No notes OR copied from a peer.	Several criteria are missing from entry.	All criteria are met, but there's room for improvement OR one criterion is missing.	All criteria listed below are met or have been exceeded for each entry.

What does work that "exceeds expectations" have?

- Each video's notes are on a different page.
- The video's title is written as it appears in the video on the top line of the paper.
- The notes are legibly written.
- Highlighting is used to emphasize key points, new vocabulary, and/or important concepts.
- Examples are documented in some way when given in the video.
- Pictures, charts, or graphs are used to display details provided in the video.
- A summary of the video content is provided at the end of the notes. Please emphasize the summary in some way (title it, star it, highlight it, etc…)

#4 Graphing & Data Skills Assignment (Pgs 4-12)

Complete the data analysis packet attached and have it ready to turn in on the first day of class. The new AP Biology curriculum stresses the importance of being able to analyze and graph data. So we will begin with data analysis graphing and statistical analysis that we will use throughout the year.

Graphing & Data Skills Assignment

Research the answer to the following questions

1. **In designing an experiment or other scientific study, why do scientists need to sample from a population rather than using an entire population?**

2. **Suppose you are designing an experiment to test the effects of nicotine on the heart rate of rats. What are the disadvantages of having too small a sample size (i.e., testing on too few rats)? What are the disadvantages of having too large a sample size (i.e., testing on too many rats)?**

3. **Explain the difference between discrete variables and continuous variables. Give an example of each.**

4. **Explain the difference between quantitative and categorical variables. Give an example of each.**

5. **What is a null hypothesis?**

6. **Explain the difference between a Type I error and a Type II error.**

7. **What are some steps that scientists can take in designing an experiment to avoid false negatives?**

Graphing Practice

INTRODUCTION

Graphing is an important procedure used by scientists to display the data that is collected during a controlled experiment. Line graphs must be constructed correctly to accurately portray the data collected. Many times the wrong construction of a graph detracts from the acceptance of an individual's hypothesis

A graph contains five major parts:

a. Title
b. The independent variable
c. The dependent variable
d. The scales for each variable
e. A legend

- The TITLE: depicts what the graph is about. By reading the title, the reader should get an idea about the graph. It should be a concise statement placed above the graph.
- The INDEPENDENT VARIABLE: is the variable that can be controlled by the experimenter. It usually includes time (dates, minutes, hours, etc.), depth (feet, meters), and temperature (Celsius). This variable is placed on the X axis (horizontal axis). Also called the Manipulated Variable (MV)
- The DEPENDENT VARIABLE: is the variable that is directly affected by the independent variable. It is the result of what happens because of the independent variable. Example: How many oxygen bubbles are produced by a plant located five meters below the surface of the water? The oxygen bubbles are dependent on the depth of the water. This variable is placed on the Y-axis or vertical axis. Also called the Responding Variable (RV)
- The SCALES for each Variable: In constructing a graph one needs to know where to plot the points representing the data. In order to do this a scale must be employed to include all the data points. This must also take up a conservative amount of space. It is not suggested to have a run on scale making the graph too hard to manage. The scales should start with 0 and climb based on intervals such as:
  multiples of 2, 5, 10, 20, 25, 50, or 100. The scale of numbers will be dictated by your data values.
- The LEGEND: is a short descriptive narrative concerning the graph's data. It should be short and concise and placed under the graph.
- The MEAN for a group of variables: To determine the mean for a group of variables, divide the sum of the variables by the total number of variables to get an average.
- The MEDIAN for a group of variables: To determine median or "middle" for an even number of values, put the values in ascending order and take the average of the two middle values. e.g. 2, 3, 4, 5, 9, 10 Add 4+5 (2 middle values) and divide by 2 to get 4.5
- The MODE for a group of variables: The mode for a group of values is the number that occurs most frequently. e.g. 2, 5, 8, 2, 6, 11 The number 2 is the mode because it occurred most often (twice)

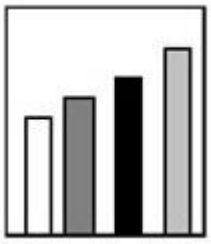
How do I know which type of graph to use? Follow this key…

1. Is the data a percent that sums to 100% or a total amount of time?
   a. If yes .....Pie chart
   b. If no.....Go to #2

2. Are <u>both</u> your manipulated and responding variables quantitative?
   a. If no..... Bar graph
   b. If yes ..... Go to #3

3. Is your manipulated variable levels <u>continuous</u> (i.e. time in years) or <u>clumped</u> into groups (i.e. 0-5 years, 6-10 years)?
   a. Continuous..... Scatter plot/Line
   b. Clumped ..... Histogram

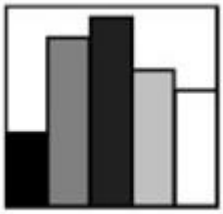
Bar Graph



Designed to make comparisons of data. The data represented in bar graphs are not necessarily dependent on any other variables and the groupings are usually *qualitative* (i.e. grouped into categories, like blood types or color). The bars do NOT touch.

Ex: Comparison of the mean reaction rate for five different enzymes

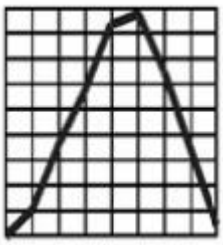
Histogram



Histograms are similar to bar graphs except the data represented in histogram is usually in groups of continuous numerical (*quantitative*) data. In this case, the bars do touch. Histograms are often used to show frequency data.

Ex: Minimum Decibels (dBA) of sound heard by 20 people

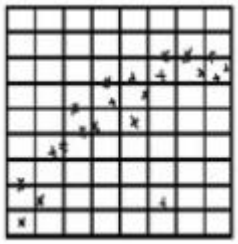
Line Graph



A line graph consists of a series of points plotted on the grid and then connected together point to point by a line. Line graphs are only used when both variables are quantitative. Line graphs show trends, such as how things change over time.

Ex: Average mean temperature between the years 1900 and 2000

Scatter Plot



The points are plotted on the grid, but they are not joined point to point. A best fit line may be added to a scatter plot to show a trend. Line graphs are only used when both variables are quantitative. These graphs are useful for showing if a correlation exists between two variables, especially when it is not possible to alter either of the variables (i.e. in descriptive studies).

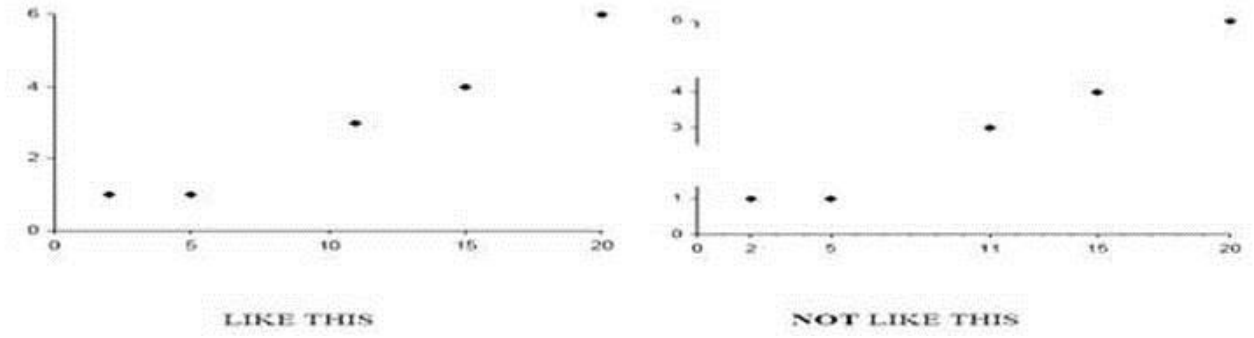
Ex: Reaction rate at various enzyme concentrations

How to Graph:

- **Determine the manipulated and responding variables.** In an experiment the experimenter will set up a set of conditions, it may be a range of temperatures or pH values, or, more common, the experimenter may choose to observe the experiment proceeding at set intervals of time (seconds, days or even years). These are the manipulated variables and always go on the horizontal axis (x—axis). The effect of the experimenter varying the manipulated variable is measured as the responding variable (the part of the experiment under observation), this is always plotted on the vertical axis (y—axis or ordinate).

- **Note the units of measurement for each of the variables.** Non- metric units such as Fahrenheit (°F) should be avoided in science. It is important to indicate to your audience in what unit you are actually measuring your variables. The units of measurement are presented behind the label of the axis, e.g. Temperature (°C)

- **Mark the quantities on both axes and number them at regular intervals.** Your axis intervals do not have to be the same on the x and y axis and they do not have to always start at the origin with a value of 0.



- **Giving the graph a title.** The graph must have a title which should contain a brief description of what is being investigated.

- **Plotting more than one graph on a set of axes.** Sometimes two or three sets of data (though rarely more) are plotted within the same set of axes. You must distinguish between them by using different symbols (X, O, □, ∇ etc) or lines (....., _____, ----------, etc).
  Use a **key** by the side of the graph which explains the symbols or lines. **Do not** write on the graph itself though labels and arrows may be useful.

Problem A

A researcher interested in the disappearance of fallen leaves in a deciduous forest carried out a field experiment that lasted nearly a year. She collected all the leaves from 100 plots scattered throughout the forest. She measured the amount of leaves present in November, May, and August. The percentages reflect the number of leaves found, using the November values as 100 percent.

Collection Date	Ash	Beech	Elm	Hazel	Oak	Willow
November	4271g 100%	3220g 100%	3481 100%	1723g 100%	5317g 100%	3430g 100%
May	2431g 57%	3190g 91%	1739g %	501g %	4401g %	1201g %
August	1376g 32%	2285g 71%	35g %	62g %	1759g 33%	4g 0.1%

Complete the table by calculating the missing percentages.

Construct a graph that compares the values of each type of leaf in May.

1. **What is the dependent variable and why?**

2. **What is the independent variable and why?**

Problem B

Using the following data, answer the questions below and then construct a graph.

Depth in Meters	Number of Bubbles / minute Plant A	Number of Bubbles / minute Plant B
2	29	21
5	36	27
10	45	40
16	32	50
25	20	34
30	10	20

1. **What is the dependent variable and why?**

2. **What is the independent variable and why?**

3. **What are the mean, median, and mode of all 3 columns of data?**

   a). Depth : Mean_____Median_____Mode_____

   b). Bubble Plant A.: Mean _____Median_____Mode_____

   c). Bubbles Plant B: Mean _____Median_____Mode_____

Problem C:

Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not brought under control, can lead to severe complications and even death.

Answer the following questions concerning the data below and then graph it (on the same graph)

Time After Eating (Hours)	Glucose ml / Liter of Blood Person A	Glucose ml / Liter of Blood Person B
0.5	170	180
1	155	195
1.5	140	230
2	135	245
2.5	140	235
3	135	225
4	130	200

1. **What is the dependent variable and why?**

2. **What is the independent variable and why?**

3. **What title would you give the graph?**

4. **Which, if any, of the above individuals (A or B) has diabetes?**

5. **What data do you have to support your hypothesis (question number 4)?**

6. **If the time period were extended to 6 hours, what would the expected blood glucose level for Person B?**

Problem D

In an AP Biology Lab investigation, you explore artificial selection with plant trichomes. The following table lists the trichome count of 30 different plants you worked with in the investigation.

Use the data to create a histogram of the data that indicates the number of plants grouped by trichome counts between 1&5, 6&10, 11&15, etc…

Plant #	Trichome Count	Plant #	Trichome Count	Plant #	Trichome Count
1	5	**11**	11	**21**	24
2	27	**12**	21	**22**	27
3	30	**13**	26	**23**	5
4	12	**14**	23	**24**	21
5	47	**15**	62	**25**	16
6	58	**16**	13	**26**	41
7	63	**17**	7	**27**	28
8	14	**18**	9	**28**	40
9	3	**19**	35	**29**	10
10	14	**20**	54	**30**	19

1. **What is the dependent variable and why?**

2. **What is the independent variable and why?**

3. **What information could you infer from looking at this graph?**

Problem E

In an AP Biology Lab investigation, you examine onion root tip cells undergoing mitosis. You are curious if the lab temperature affects the number of cells undergoing mitosis. With your lab partner you collect the following data over several days with many different onion root tips.

Use the data to create a scatter plot with a best fit line to show the proportion of mitotic cells versus the temperature.

Temperature (C^o)	23	21	23	25	21	25	23	21	25
Proportion of Mitotic Cells	0.43	0.36	0.25	0.5	0.31	0.37	0.36	0.28	0.44

1. **What is the dependent variable and why?**

2. **What is the independent variable and why?**

3. **Why use a scatterplot instead of a line graph?**

4. **Does the graph you created suggest there might be a relationship between temperature and mitotic rates? Why or why not?**