AP Biology Summer Work

Welcome to AP Biology!

The two main goals of AP Biology are to help you develop a conceptual framework for modern biology and to gain a deeper appreciation of science as a process (as opposed to an accumulation of facts- though memorizing facts will also be a big part of the class)

Because of the rapid pace of discovery in the life sciences our primary emphasis is on developing an understanding of unifying concepts that connect the major topics of biology. The AP Biology Curriculum centers around the four Big Ideas and you will need to not only know these but also understand how they all relate:

-Big Idea 1: The process of evolution drives the diversity and unity of life.

-**Big Idea 2:** Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.

-**Big Idea 3:** Living systems store, retrieve, transmit and respond to information essential to life processes.

-**Big Idea 4:** Biological systems interact, and these systems and their interactions possess complex properties.

AP Biology was designed by a select group of college professors and high school science teachers to be equivalent to an introductory college biology course. Visit the below College Board site to explore what an AP Biology course is like:

https://apstudent.collegeboard.org/apcourse/ap-biology

It goes without saying that AP courses are designed to be stand-ins for a two semester college course. **As such, college level discipline will be required to be successful**. That includes homework and reading outside of class, being fully engaged while in class, coming after school for extra help when needed, completing assignments on time, and doing test prep on your own free time.

I designed this summer assignment to be as beneficial as possible to your first couple of weeks in class

Please see next page for breakdown of summer assignment and why it is being assigned (and any assessments that will go with it)

The chart below is a snap shot of the five assignments and approx. time. How you will be assessed on them is also included. These assignments can be done in any orde\

Assignment	WHY?	Approx. Time	How It Will Be Assessed
Introductory Email	We will start working in the intro unit of AP Biology as soon as day 1, this email helps me get to know you before that	5-10 min	Just have to do it!
Biology Prefixes/Suffixes	It is REALLY helpful to know these prefixes when decoding biology vocabulary you don't know or forgotten	Varies- just have to memorize - you can probably wait until school starts to do this	Quiz Week 1 or 2 of school
Statistics Introduction	This is not a statistics class, but over 90% of the data we analyze and create in class have a statistics component. You need to know these basic statistics concepts to be able to graph in AP Biology **We WILL review this in class but it is helpful if you spent time with the concepts before that**	1-2 hours *This one will take the longest*	We will review the practice graphs and concepts in class, do a hands on lab and then take a quiz within the first two weeks of school

Summer Assignment

Part 1: Introductory Letter

We will start learning content first day of school, so this puts me at a disadvantage to getting to know my students personally with an "introductory day." The email helps me get a feel for my students before they enter the classroom!

Please write an email letter of introduction to Mrs. Roach at jroach@monmouthregional.net. Please remember you're likely writing a letter that's making your first impression on a new teacher, so check for grammar/spelling and appropriate phrasing before sending

Please include the following:

Subject Line: AP Biology 2023-2024 and your name (example: AP Biology 2023-2024: Joe Smith)

Body: Greeting (Hello Mrs. Roach, etc.)

1. Introduce yourself:

a. what's your name? Do you have a nickname that you go by?
b. What grade are you in?
c. What are your preferred pronouns?
d. What do you like to do (hobbies, sports, music, shows, movies, interests, etc.)?
e. Do you have a job or plan on getting a job next year? (This helps me with planning homework)

2. Courses:

a. What science classes have you taken so far, and who was your teacher for them?
b. For Freshman- are you also taking AP World this year?
c. For Juniors/Seniors- How many AP classes have you taken before this year? What was your impression of them?
d. What subject area(s) are you most interested in continuing in college?
e. Is there anything that you've especially liked or disliked about your earlier science classes?

3. Learning:

a. What are your personal strengths when it comes to learning new material?
b. What causes you to struggle in a course? How do you address that challenge?
c. What is the most effective way you've found to study for a test?
d. How would you describe yourself as a learner?
e. How would you describe yourself as a team or group member?

4. AP Bio:

a. What are you looking forward to most in AP Biology?
b. Do you have any concerns coming into AP Biology this year?
c. Why are you taking AP Biology? What do you hope to accomplish/gain from this course?

Closing, your name

Part 2: Biology Prefixes and Suffixes- Learn them, memorize them.

Knowing these will help you decode terms and concepts you are unfamiliar with.

Prefix	Meaning	Suffix	Meaning
Arth-	*Joint*	**-able**	Capable of
Auto-	*Self*	**-ase**	Enzyme/Protein
Chloro-	*Green*	**-carn**	Meat or flesh
Chrom-	*Color*	**-cellular**	Related to Cells
Cyto-	*Cell*	**-chem**	Dealing with chemicals
Glyco-	*Sugar*	**-chrom(e)**	Color
Herb-	*Grass, Plants*	**-in**	Protein
Hetero-	*Different (2+)*	**-cyte**	Cell
Homo-	*Same (1)*	**-itis**	Disease
Hydro-	*Water*	**-kinesis**	Movement, motion
Macro-	*Big*	**-logy**	Study of
Meso-	*Middle*	**-lysis**	Dissolving, Destruction
Micro-	*Small*	**-ose**	Sugar
Mono-	*One*	**-philic**	Love
Multi-	*Many*	**-phobic**	Hate
Phago-	*Eating*	**-phyll**	Leaf
Poly-	*Many*	**-phyte**	Plant
Sacchar-	*Sugar*	**-plasm**	Material forming cells
Therm-	*Heat*	**-plast**	Organized living material
Uni-	*One*	**-sis**	Condition, state
Zoo-	*Related to Animals*	**-synthesis**	To put together
Phyto/Photo-	Sun/Light	**-troph**	Food

Graphing and Stats Practice: Due the First Day of Class

You may be thinking, "Stats??? I thought this was AP Bio!" You're totally right, it is! There will be many opportunities this year to analyze authentic data; having a strong understanding of what graph to use to display information and the skills needed to interpret those results will help you become an even stronger scientist as we're learning content.

Completing this with fidelity will GREATLY help you (and me) the first few weeks of AP Bio as statistical analysis will be required in our first lab (and the rest of the year)

Feel free to use sources other than the ones listed if needed to help you refine your understanding.

Review of (or Intro to) Statistics

A. Go to **http://bozemanscience.com/statistics-graphing** Mr. Andersen (formerly of Bozeman, MT) has created many online lectures to help explain topics in science that are a great resource to use throughout the year. We'll use them now to help review stats. Take notes below (or use a separate piece of paper) to help you answer the following questions.

1. Beginner's Guide to Graphing Data: (from site above, or https://tinyurl.com/GuidetoGraphing)
    a. What type of a graph uses a "best fit" line?

    b. Explain the difference between a bar graph and a histogram.

    c. Which type of graph shows a change over time?

    d. Which type of graph displays a correlation of variables?

    - Distinguish between the independent variable and dependent variable in an experiment, and where their axes are on a graph.

    e. Which type of graph is best for comparing 2 or more different groups?

    f. Which type of graph is better for showing distribution of data?

    g. Explain when a pie chart/graph should be used and give (draw, label) any example.

    h. State at least 5 elements that any graph should always display.

2. Bonus information: Watch Graphing Data by Spreadsheet. Take notes for reference. If needed, watch Graphing Data by Hand. **Both videos are found at the main website listed in part A.**

3. Watch Bozeman: Statistics for Science (http://www.bozemanscience.com/statistics-for-science) and take notes:
   a. What is n?

   b. What is x?

   C. What is M?

   d. What was the range of the sample in his video?

   e. Explain "degrees of freedom" (with any example) and why the formula for it is n-1.

4. Watch Bozeman: Standard Deviation {https://tinyurl.com/y6ffcvtt) and take notes:
   a. What is meant by normal distribution?

   b. What does standard deviation (SD) measure?

   c. Can 2 sets of data have the same mean but a different SD? _____ Explain

   d. Compare 1 SD and 2 SD- what does each mean?

   e. Pause the video and calculate the SD from the 2 nd set of data given by hand. Show your work.

5. Watch Bozeman: Standard Error (https://tinyurl.com/y4ltazk3) and Kevin Piers: Standard Deviation & Standard Error of the Mean (https://youtu.be/3UPYpOLeRJg)

a. From Bozeman: Explain the significance of the standard error among 2 different sets of data with different sample sizes that have the same mean (in terms of precision).

b. From Piers:

- What do SEM bars that have overlapping means on a graph indicate?

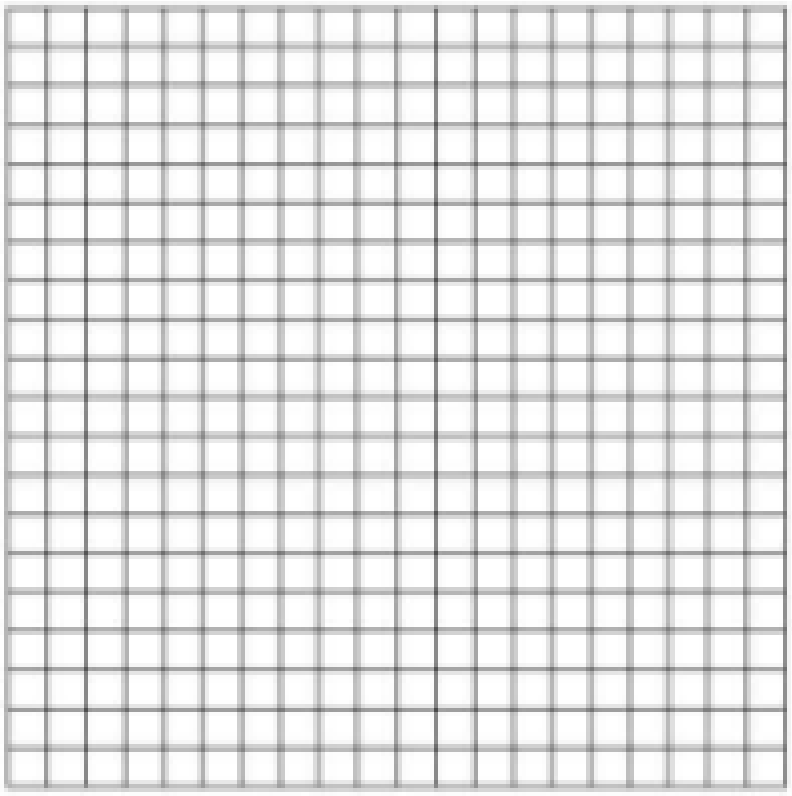
- Explain the significance if SEM bars overlap, but the means do not overlap.

- Explain the significance if there is no overlap between SEM bars.

B. Solve the following problems in pencil. You must show all work. Make sure graphs have titles and are properly labeled with units.

1. Graph the following sample data set showing the number of leaf disks that rise in a solution over time as photosynthesis occurs.

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
16	15
17	20
18	20
19	20
20	18



2. A. Calculate the mean and standard deviation for the data set of annual monthly rainfall.

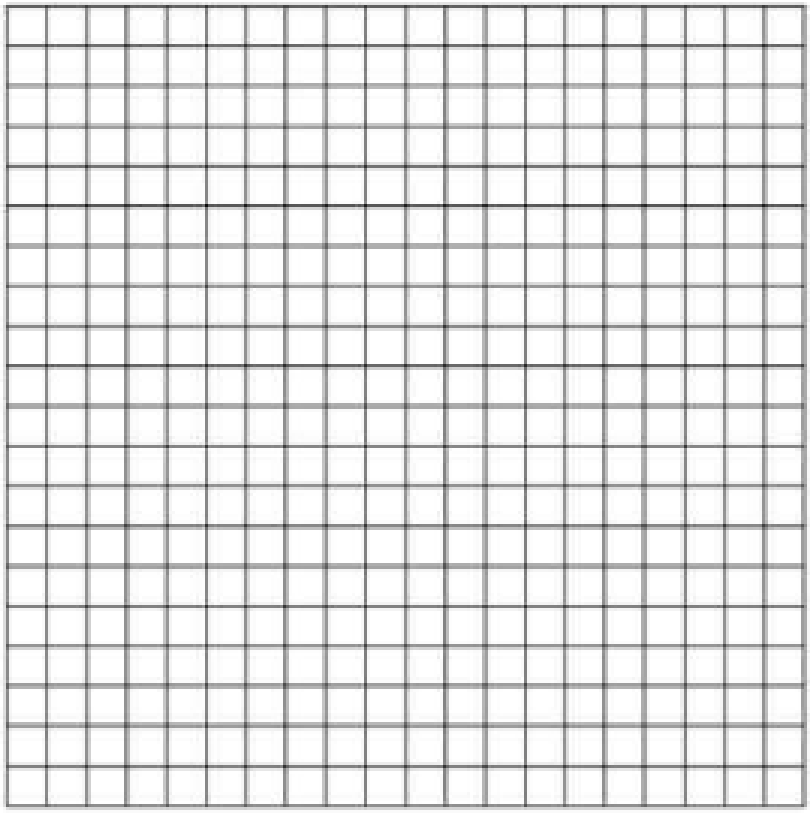
Month	Rainfall (cm)
Jan	2.0
Feb	1.8
Mar	1.2
Apr	5.7
May	6.2
Jun	5.9
Jul	1.0
Aug	1.1
Sep	1.1
Oct	2.3
Nov	2.7
Dec	2.5

Mean =

Standard Deviation =

Graph

SHOW MATH WORK



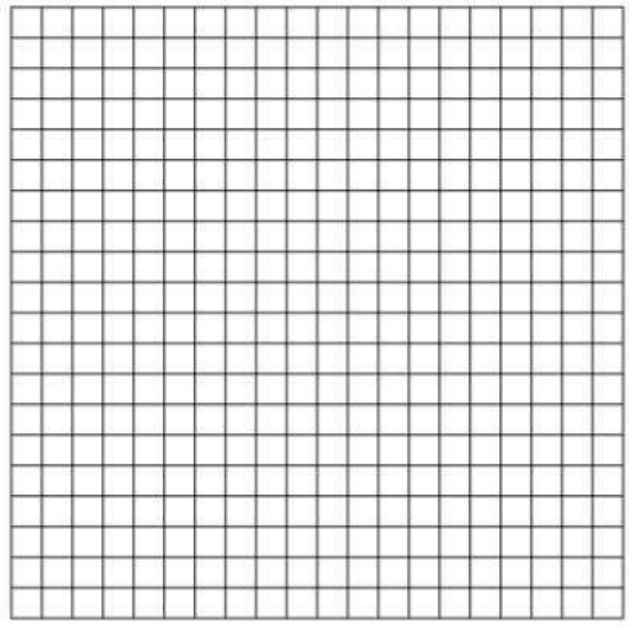
1. What does the SD deviation calculation tell us about the data?

Use the data to sketch the appropriate type of graph.
Below are 2 samples of data that were collected (note: ignore labeling units and a title on this graph)

Sample A: 12, 13, 14, 15, 16, 17, 18 Sample **B:** 10, 15, 20

Calculate the mean for Sample A: **Calculate the mean f**or Sample **B:**

1. Are the calculated means sufficient in explaining the data? Why or why not? (give specific evidence for your reasoning!)



A. Calculate SD for Sample A:
B. Calculate SD for Sample **B:**

1. **Explain the significance of the results**

C. Calculate SEM for Sample A

D. Calculate SEM for Sample B:

E. Graph your results, showing error bars for each.

SD for Sample A	SD For Sample B
SEM For Sample A	SEM for Sample B

2. **Do the bars overlap**

3. **Do the means overlap?**

4. **Explain whether there are "significant" differences between the two populations or not**