

# AP Biology Summer Assignment, 2022-2023 Name: \_\_\_\_\_

Welcome to AP Biology ☺ We have a great year of learning ahead! This summer assignment is designed to help you introduce yourself and review how to analyze scientific data in order to best start the year with common understanding. Have fun, and please don't stress about this; the idea is for you to enjoy your summers (you deserve it!) and have a little background/review before we return!

I'm looking forward to a great year ahead! Please don't hesitate to contact me with any questions, and I'll try to get back to you in a timely fashion! ☺ – Mrs. McCune ([amccune@troy.k12.mi.us](mailto:amccune@troy.k12.mi.us))

## 3 Steps to completing your summer assignment:

### 1. Introductory Survey – due prior to the start of school

Use your Troy Schools login to access our class survey: <https://tinyurl.com/McCuneSurvey2022>

### 2. Introductory Videos – due prior to the start of school

Use your Troy Schools (Microsoft 365) login to access Flipgrid: <https://flipgrid.com/21062597>

a. There are 2 videos to upload. You can access them by:

i. Logging into the course page, submitting the first topic video, then selecting the dropdown menu (2 topics) to see the other topic, or

ii. Accessing the topics directly: <https://flipgrid.com/a4352907> AND <https://flipgrid.com/f5934412>

b. When you are finished, build classroom community by “Liking” or commenting on classmates’ videos. Note: if you submit early in the summer, stop back again to do this – it’s a fun way to learn about your classmates! :)

### 3. Stats and Graphing Practice – see below – due before Thursday, 9/8

a. Create an account on [edpuzzle.com](https://edpuzzle.com) (use an email address that you can check after you set up your account) - <https://edpuzzle.com/join/eluzokj> - if you already have an account, join our class at the link above. Note: McCune will be able to see once you've viewed each video.

b. Complete the following notes and practice problems. Use the provided resources to supplement your learning and come to class with any questions, ready to submit on Thursday, September 8<sup>th</sup>. (Note: Even though it's due after school starts, it's a good idea to work on this before that time so you can ask questions before it's due!)

## Stats and Graphing Practice - Due Thursday, September 8<sup>th</sup>

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.

Take the time to complete this packet this summer and give yourself a chance to review the material before we meet as a class in August. I have provided many additional resources to help you further refine your understanding, but feel free to use trusted sources other than the ones listed to help you. Complete the attached guide and notes and bring to class to discuss on the first full day.

For some, this may be a simple task. For others, this may take some more concentration – coming together with this common understanding in the Fall will help us dive into fun biological content together. Looking forward to seeing you then! ☺

**Review of (or Intro to) Statistics Notes**

1. Complete “A Beginner’s Guide to Graphing Data” video by Mr. Paul Andersen of Bozeman Science on our EdPuzzle page. (<https://edpuzzle.com/assignments/62a38e3173b7f2413bb95e1b/watch> ) Take notes while you watch. Attach those notes as a pdf file when submitting for credit.
  - a. Rewatch the video and refine your notes as many times as needed before you feel you can fully complete the tasks outlined at the beginning and end of the video.
  - b. If you’d like more practice, go to <http://www.bozemanscience.com/statistics-graphing> and watch Graphing Data by Hand and/or Graphing Data by Spreadsheet.
  
2. Back in our edpuzzle.com page, complete the “Statistics for Science” video, also by Mr. Anderson. (<https://edpuzzle.com/assignments/5ee291c581aa943e96d7455a/watch>) Take notes while you watch, attaching them after your notes for Part 1.
  - a. Rewatch the video and refine your notes as many times as needed before you feel you can fully complete the tasks outlined at the beginning and end of the video.
  - b. If you’d like further information to help with understanding, go to <https://www.nature.com/collections/gghqgm> and explore the content of the collection.
  
3. Once again back in our edpuzzle.com page, complete the “Standard Deviation” (<https://edpuzzle.com/assignments/5ee2ae960a261f3eecf6a6c8/watch>) and “Standard Error” (<https://edpuzzle.com/assignments/5ee2b0c0e83eed3f216ce4aa/watch>) videos. Take notes as you watch, attaching them after your notes for Part 2.
  - a. Rewatch the video and refine your notes as many times as needed before you feel you can fully complete the tasks outlined at the beginning and end of the video.
  - b. Add to your notes the following information regarding error bar interpretation:

**How do we interpret error bars?** When we compare two different populations and want to make a statement that they differ or do not differ in their means, error bars come in handy. Pay attention, as you will be expected to interpret experimental results based on error bars.

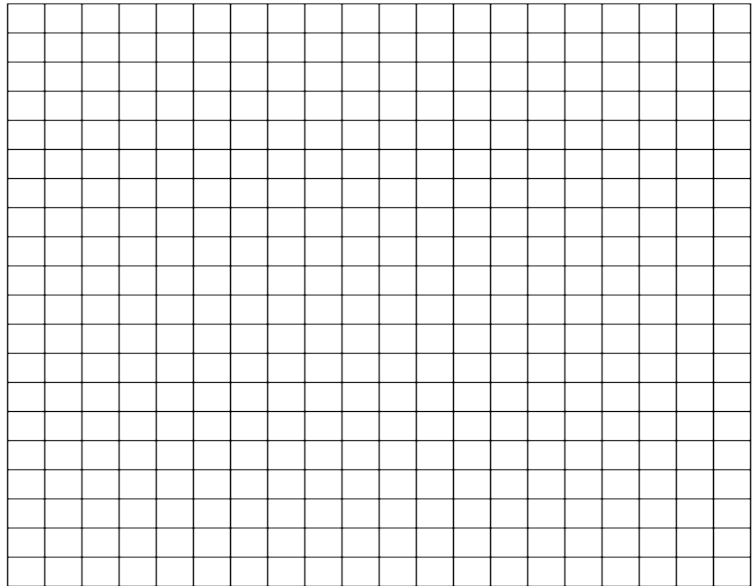
1. The means of the two populations are different and their error bars (2xSEM or 95% CI) do not overlap, nor do they overlap the mean, this is pretty strong evidence that there is a difference between the populations.
  2. If the error bars overlap just a little bit, but do not overlap the means, you do not have strong evidence either way. If only this type of data is presented, you can say that the data is inconclusive.
  3. When the error bars overlap both each other and the means, then most likely there is no difference between the populations.
- c. If you’d like further information to help with understanding, watch the following video by Kevin Piers: Standard Deviation & Standard Error of the Mean (<https://youtu.be/3UPYpOLeRjg>). In addition, there are several good sites that can help you to work through practice problems further, one good site to use is [www.mathisfun.com](http://www.mathisfun.com).

**Graphing Practice Problems**

Solve the following problems. **You must show all work.** Make sure graphs have *titles* and are *properly labeled with units*. Also, take time to check for *consistent scale that maximizes the graphing space* provided.

- Choose the appropriate type of graph to represent 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



- Calculate the mean and standard deviation for the data set of annual monthly rainfall. Show all work.
  - Use the data to sketch the appropriate type of graph. Add error bars to reflect +/- 1 SD.

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

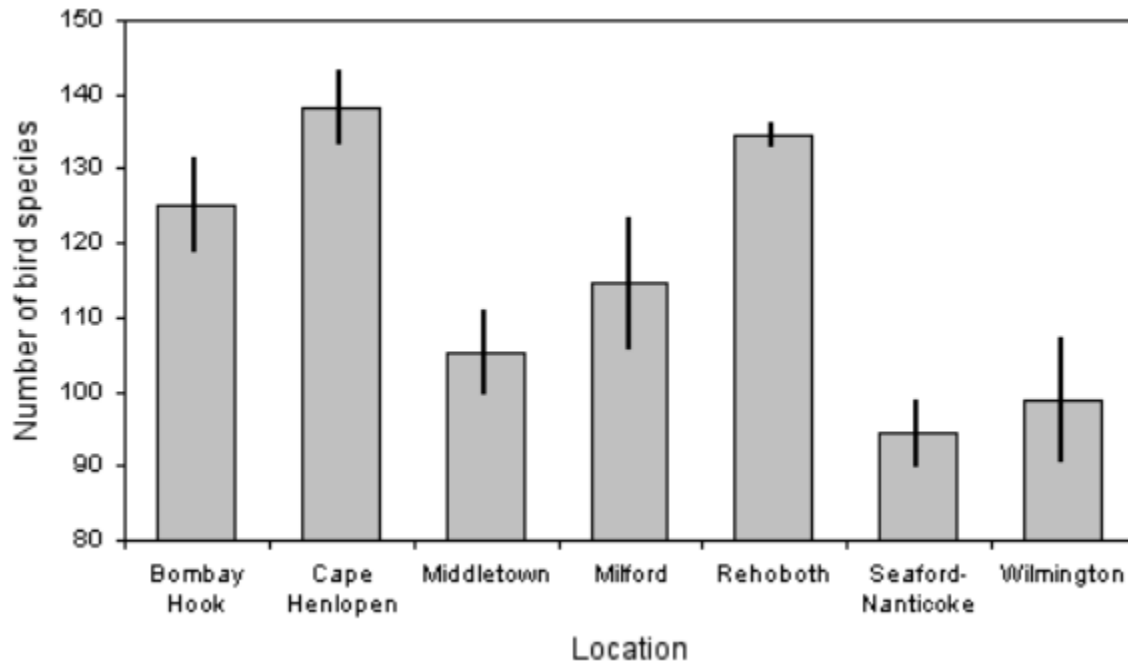


Mean =

Standard Deviation =

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3. Analyze the following graph of bird species diversity at different locations and provide answers for the questions below. The error bars shown represent  $\pm 2$ SEM.



- a. Compare the locations to one another in pairs (e.g., Bombay Hook vs. Cape Henlopen, Middletown vs. Milford). Given the bars and error bars shown, name at least 2 pairs that you can state show a strong evidence that there is a difference between the populations. Explain why you chose those 2 or more pairs. (Hint: look back at your notes for help)
- b. Given the error bars shown, name a pair that you can state show most likely there is no difference between the populations. Explain why you chose that pair. (Hint: Look back at your notes)

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4. A student noticed that the ivy leaves growing on the shady side of a building were larger than ivy leaves growing on the sunny side of the same building. The student identified the ivy to be of the same species, and collected and measured the maximum width (in cm) of 30 leaves from each habitat.

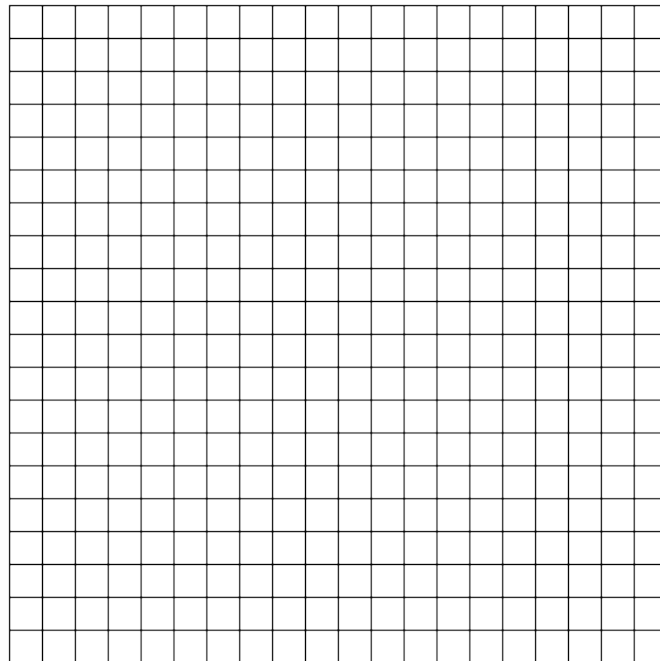
Use statistical analysis to determine if it's likely that there is a significant difference in leaf size between the shady and sunny ivy plants with 95% confidence ( $\pm 2 \text{ SE}$ ).

Graph the data and indicate error bars ( $\pm 2 \text{ SE}$ ).

**\*Careful:** The data table shows 1 standard error. Not all data in the table will be used in the graph.

**Calculated Results (from collected data):**

	Shady Leaves	Sunny Leaves
Mean	7.43	5.88
Standard Deviation	1.63	1.32
<i>N</i>	30	30
Standard Error	0.30	0.24



Using the data given and constructed graph, **identify** the likely amount of significance between the two samples.

Using your knowledge of Biology (hint: think about why plants need sunlight for growth), **explain** why there would (or would not) be a likely difference between leaf size of ivy in sunny vs. shady environments.