

AP Bio: Intro to Statistics & Ch 1-4 Review
Summer Assignment

Name _____
Block _____

The following assignments are due the FIRST DAY of the semester. There will be a quiz over these concepts during the first few days of class. **If you have a hard copy of this assignment and can't access the below links, you can find everything on my blog: www.phillipsscientificmethods.weebly.com.*

INTRO TO STATISTICS:

A. Watch the following videos. Take notes in your composition notebook and answer the following questions directly on this sheet. You must be able to APPLY and/or ANALYZE data on most EVERY assignment throughout this course based on these principles, concepts and practices:

1. Bozeman- [Types of Graphs](#) (**MUST know when to use each type appropriately!*)
 - a. What type of graph uses a 'best fit' line?
 - b. Explain the difference in a bar graph and a histogram.

 - c. What type of graph shows a change over time?
 - d. What type of graph displays a correlation of variables?
 1. Distinguish between the independent variable and dependent variable and where they are placed 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 graph should be used and give (draw) any example.

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

i. Watch 'Graphing Data by Spreadsheet'. Bookmark it and take notes in your notebook for reference. Also, watch 'Graphing Data by Hand', if needed.

2. Bozeman- [Statistics for Science](#)

- a. What is n ?
- b. What is \bar{x} ?
- c. What is M ?
- d. What was the range of the sample he gave?
- e. Explain 'Degrees of Freedom' (with any example) and why the formula is $n-1$.

3. Bozeman- [Standard Deviation](#)

- 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. 1 SD means _____% of the population falls within this range; while 2 SD means _____% falls in this range.
- e. Pause the video and calculate the SD from the 2nd set of data given BY HAND. Show your work.

f. Take notes as to how to solve for SD using Excel. You may want to bookmark the video for quick reference for labs we will be doing throughout the course. *Note- The AP Bio

*Exam only allows you to use a **BASIC** 4 function (with square root) calculator, so make sure you learn to solve it by hand!*

3. Bozeman- [Standard Error](#) and Kevin Piers [Standard Deviation & Standard Error of Mean](#)

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

b. From Piers:

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

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

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

c. From Bozeman-As stated earlier, make notes (notebook) for calculating & using Excel.
Use the example he gave and try it yourself!

4. Go to www.Bozemanscience.com/ap-biology/. Watch the videos on [AP Biology Practices](#).
TAKE NOTES IN YOUR COMPOSITION NOTEBOOK!

B. [Go over this Power Point](#). Make sure you can work all examples on your own (use your notebook)

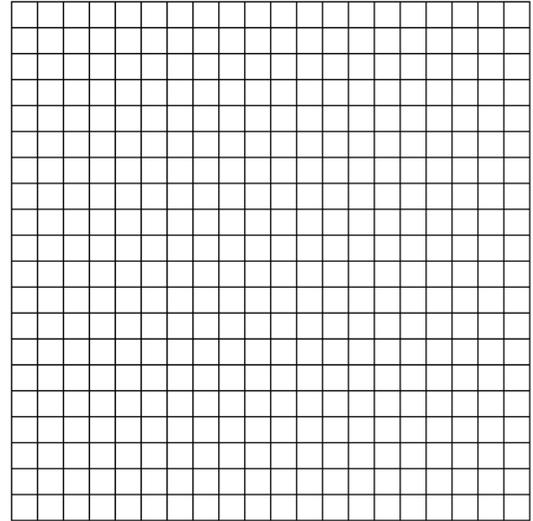
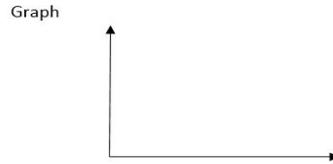
C. **If additional review is needed, there are some other recommended sites on my blog.* One good site is www.mathisfun.com.

*SEE NEXT PAGE FOR PROBLEMS TO SOLVE

D. Solve the following problems IN PENCIL. You must show ALL WORK. Make sure graphs have Titles and are properly labeled WITH UNITS: (Click [here](#) for AP Bio Formulas Sheet)

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

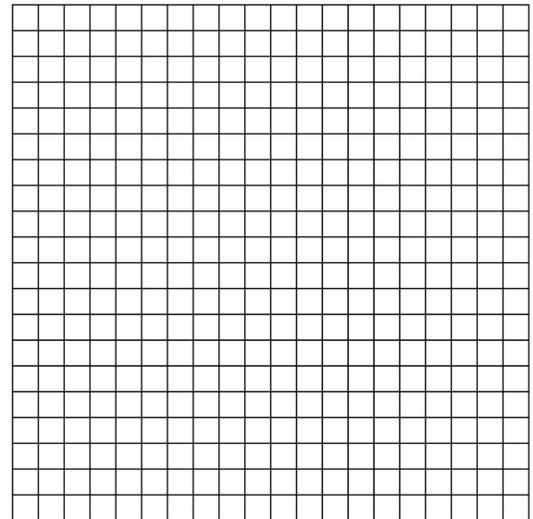
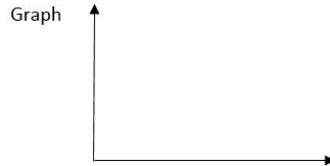
Time (min)	Number of Disks Floating
1	0
2	0
3	0
4	0
5	0
6	0
7	1
8	1
9	1
10	2
11	5
12	8
13	10
14	14
15	14
16	15
17	20
18	20
19	20
20	18



2. A- Calculate the mean and standard deviation for the data set of annual monthly rainfall. B- Use the data to sketch the appropriate type of graph.

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 =



3. Below are 2 samples of data that were collected (*we will ignore Units & Graph Title for this one):

Sample A: 12, 13, 14, 15, 16, 17, 18

Sample B: 10, 15, 20

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Calculate the mean for Sample A _____

Calculate the mean for Sample B _____

Are the calculated means sufficient in explaining the data? Why or why not? (**Be specific!*)

Calculate:

SD for Sample A _____

SD for Sample B _____

Explain the significance of the results.

Calculate the Standard Error of Mean for Sample A _____

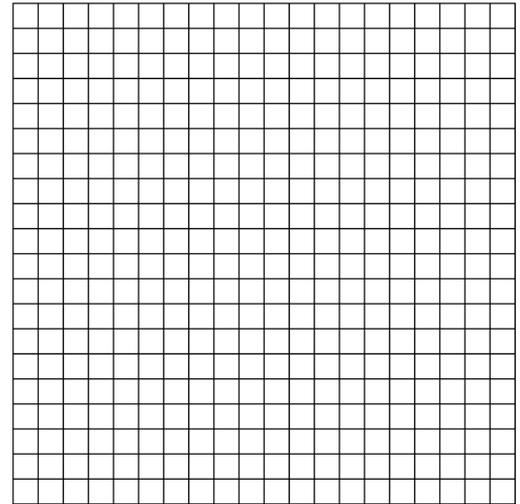
Calculate the SEM for Sample B _____

Graph your results, showing error bars for each.

Do the bars overlap?

Do the means overlap?

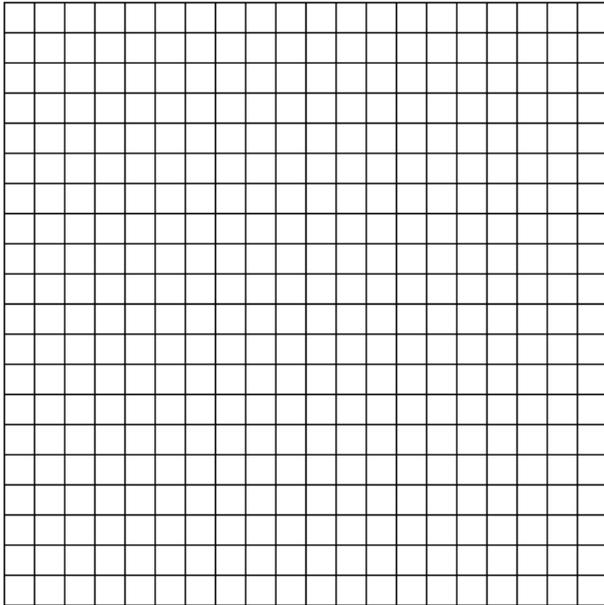
Explain whether or not there are 'significant' differences between the 2 populations.



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 collected and measured the maximum width, in centimeters, 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 (± 2 SE). Graph the data and indicate error bars. (**see next page*)

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, justify the significance between the two samples.

CHAPTERS 1-4 (Campbell Text) QUESTIONS: **If you haven't emailed me requesting the access code for the Pearson (publisher) website, take a break and do it now! You may answer these either directly on this document or on a separate sheet of paper and staple to the back. Answers **MUST** be handwritten, or **NO CREDIT GIVEN!** Pay attention to what the prompt asks you to do (ex-describe). Prompt words have been underlined for many questions, below.*

1. Compare and contrast a prokaryotic and eukaryotic cell.
2. Define the term 'genome'.
3. Distinguish between positive and negative feedback, including an example of each. **Relate these concepts to homeostasis.*
3. Identify the core theme of biology that accounts for the unity and diversity of life.
4. Compare/Contrast the 3 Domains of life.
5. Explain the process of natural selection, including the term adaptation in the response.
6. State what Darwin meant by "descent with modification"?
7. Differentiate: inductive reasoning vs deductive reasoning. Give an example of each.
8. Differentiate: invalid hypothesis vs falsified hypothesis.

D- If glucose ($C_6H_{12}O_6$) was the solute, would it disassociate in water? Explain (and include if disassociation means the same as solubility).

18. Does a valence e- in Carbon have higher or lower chemical (potential) bond energy than a val e- of Sulfur?
19. Distinguish between a polar and nonpolar covalent bond. BE SPECIFIC! Give an example of each.
20. Diagram 2 water molecules and indicate the Hydrogen bond(s) with labeled dashed lines.
21. Give an example of any BIOLOGICAL (organic) molecule that forms H bonds with water. Diagram your example, showing the positive and negative attractions, as were done above. Predict at least one 'consequence' if the bond was either covalent or ionic.
22. Does a chemical reaction in dynamic equilibrium mean that the concentration of reactants and products is equal? Explain.
23. Take the self-quiz at the end of Ch 2
24. A- Define what is meant by pH.

B-Describe how the pH scale works (in terms of H^+ and OH^-)

C- Explain how buffers resist changes in pH (refer to carbonic acid/bicarbonate for an example)

25. Water is essential for life on earth.

A- List at least 5 properties of water.

B- Explain why water is a good solvent (include the terms polar and hydrophilic)

C- Explain how the high surface tension of water affects evaporation.

D- Compare & contrast cohesion and adhesion. Give an example of each as it relates to a living organism (ex- root uptake of a tree)

E- Explain water in terms of specific heat. Compare with a substance that has a 'contrasting' specific heat, such as a metal.

26. A- Describe an example of how acid precipitation affects life on earth.

B- CO₂ is the main product of fossil fuel combustion. Although the majority stays in the atmosphere, contributing to the greenhouse effect, about 30% is absorbed in the oceans. Explain what happens when CO₂ dissolves in seawater.

27. *Review: Molarity/Concentration from chemistry. You must apply the formula $C_1V_1 = C_2V_2$ (or $M_1V_1 = M_2V_2$). *Refer to AP Bio Formula Sheet. Given: Your teacher tells you to prepare 0.5L of 1X TAE solution for an electrophoresis experiment, but s/he gives you a bottle of 50X TAE. Describe the procedure for doing this (*include showing your work, using the equation).

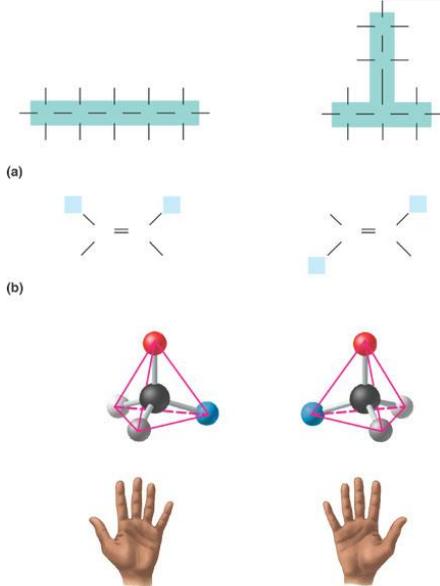
28. Do the self-quiz at the end of Ch 3.

29. Why is organic chemistry so important in the study of biology?

30. Why was the Urey-Miller experiment so important?

31. What is unique about carbon that makes it the central atom in the chemistry of life?

32. Use the diagram below and label the three types of isomers (**both exp from 'c' are same type*)



33. Be very familiar with the following functional groups, as their properties are most important in the processes of life. Create a table (*below or on a separate sheet*): after each functional group, draw the structure, name the compound, state an example & note the functional properties of each

a. Hydroxyl

b. Carbonyl- aldehyde

c. Carbonyl- ketone

d. Carboxyl

e. Amino

f. Sulfhydryl

g- Methyl

h. Phosphate

34. Take the self-quiz at end of Ch 4