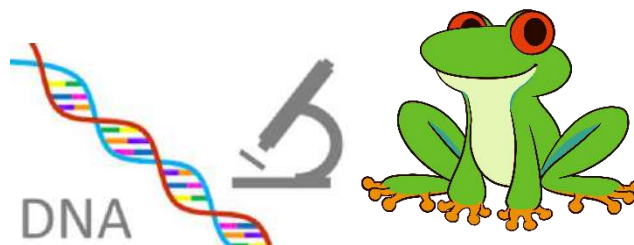


Welcome to AP Biology!



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. The AP Biology Curriculum centers around four Big Ideas and how they relate to one another. The are:

- **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.

For more details what AP Biology looks like, go to the following AP Central site:

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

Please have the following items completed as you walk into class on the first day of school.

1. Science Skills Review Packet
2. Biology Prefixes and Suffixes
3. Graphing Practice

I am so excited to meet all of you! We will have an awesome year 😊

Feel free to email with questions,

Mrs. Kovatch

Science Skills Review Packet

This is a review of basic science skills, including graphing, chemistry and biology- we will not spend much class time on all these concepts, as they should have been learned already. Please make sure that you know them and if not, be sure to study through them. *Please hand write in pencil or pen.*

Chemistry Review:

1. Compare and contrast the term element with compound.

2. Know the symbols of the following elements and their charge:

a. Carbon:

b. Hydrogen:

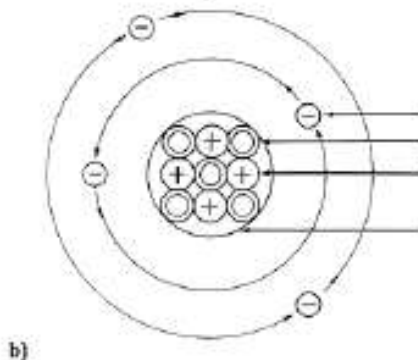
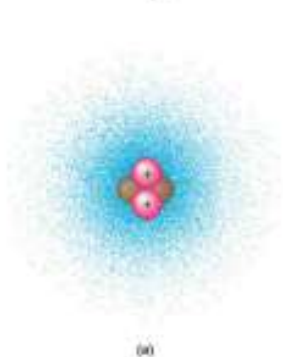
c. Oxygen:

d. Nitrogen:

e. Phosphorus:

f. Sulfur:

3. Label the diagrams below and define the terms that you label. What atom is a? _____ b? _____



4. Contrast the terms atomic mass and atomic number.

5. What determines interactions between atoms? Why are valence electrons important?

6. Define the following terms:

a. Chemical bond

b. Covalent bond

c. Nonpolar covalent bond

d. Polar covalent bond

7. Know both the molecular formula for the following compounds.

a. Oxygen gas

b. Carbon dioxide

- c. Glucose
- d. Nitrogen gas
- e. Ammonia
- f. Water (you would be surprised at how many people missed this!!!)

8. How do ionic bonds compare with covalent bonds?

9. What are hydrogen bonds

10. Define the following terms:

- a. Solute
- b. Solvent
- c. Aqueous solution
- d. Hydrophilic
- e. Hydrophobic
- f. Molarity

11. What defines an acid and a base?

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

Biology Review:

13. Define the following:

- a. Biology:
- b. Hypothesis:
- c. Observation:
- d. Homeostasis:

14. What are the main characteristics of life (minimum of 5)?

15. Scientists are testing a new pain reducing drug in a trial with 50 patients. Group A gets the drug while group B gets a placebo pill. Level of pain is being recorded for each patient.

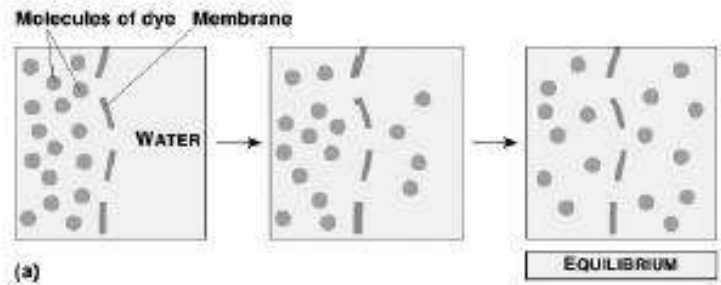
- a. What is the control group:

- b. Experimental group:
- c. Independent variable:
- d. Dependent variable:

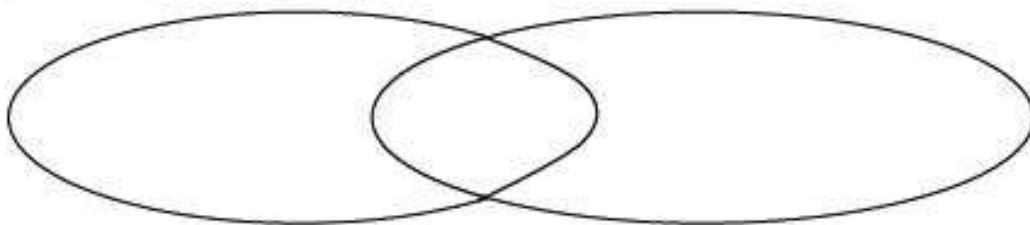
16. Using the picture to the right:

a. Explain *equilibrium*:

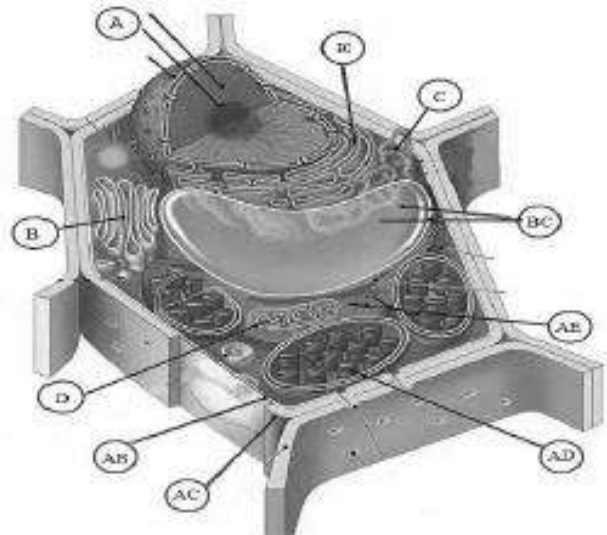
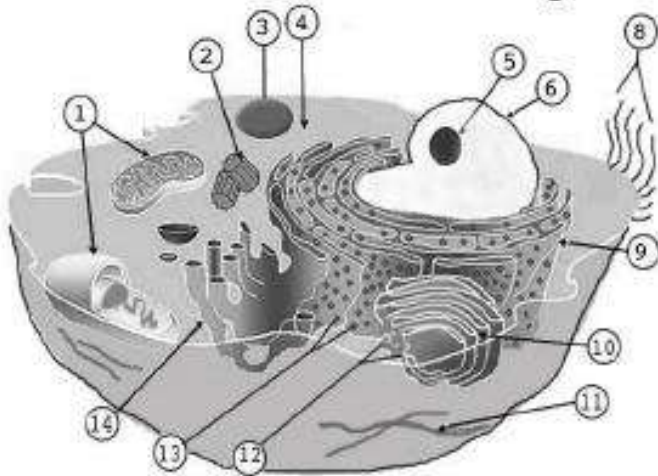
b. Label the most concentrated side of the membrane in the first picture.



17. Complete the diagram comparing DNA and RNA:



18. Label each number on the following



pictures:

- | | |
|-------|-----|
| 1. | 8. |
| 2. | 9. |
| 3. | 10. |
| 4. | 11. |
| 5. | 12. |
| 6. | 13. |
| 7. NA | 14. |

- | | |
|----|-----|
| A. | AB. |
| B. | AC. |
| C. | AD. |
| D. | AE. |
| E. | BC. |

19. The tall allele, *T*, is dominant to the short allele, *t*, in Mendel's pea plants. You examine a pea plant that has a *phenotype* of short. What is its *genotype*? _____

20. If two plants with the genes *Tt* and *Tt* breed, what are the possible genes of their children? (Hint: create a punnett square)

Biology Prefixes and Suffixes-The Language of Science

The main reason students find it difficult to understand science is because of all the hard to write, spell and read words. Actually, scientific vocabulary is a mix of small words that are linked together to have different meanings. If you learn the meanings of the little words, you'll find scientific vocabulary much easier to understand. Find the mean to the following Greek/Latin root words.

Word	Meaning
a / an	
meso	
leuco	
aero	
anti	
amphi	
aqua / hydro	
arthro	
auto	
bi / di	
bio	
cephal	
chloro	
chromo	
cide	
cyto	
derm	
haplo	
ecto (exo)	
endo	
epi	
gastro	
genesis	
herba	
hetero	
homo	
ov	
kary	
neuro	
soma	
saccharo	
primi / archea	
phyll	

Word	Meaning
hemo	
hyper	
hypo	
intra	
-itis	
lateral	
-logy	
-lysis	
-meter	
mono	
morph	
micro	
macro	
multi / poly	
pod	
-phobia	
-philia	
proto	
photo	
psuedo	
synthesis	
sub	
troph	
therm	
tri	
zoo, zoa	
-tropism	
-taxis	
-stasis	
zyg / zygous	
phago	
path / pathy	
sym / syn	

Once you have completed the above table, use it to develop a simple, short definition, in your own words, for each of the following terms.

1. Hydrology _____
2. Cytolysis _____
3. Protozoa _____
4. Epidermis _____
5. Spermatogenesis _____
6. exoskeleton _____
7. Abiotic _____
8. Pathogen _____
9. pseudopod _____
10. Hemophilia _____
11. Endocytosis _____
12. herbicide _____
13. Anaerobic _____
14. Bilateral _____
15. autotroph _____
16. Monosaccharide _____
17. Arthropod _____
18. polymorphic _____
19. Hypothermia _____
20. Biogenesis _____
21. Heterotroph _____
22. Homozygous _____
23. Phototropism _____
24. Chlorophyll _____
25. Polymorphism _____

Graphing Practice

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:

- Title
 - The independent variable
 - The dependent variable
 - The scales for each variable
 - 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).
 - 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.
 - 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)

Rules and Tips for Graphing:

- Always use a pencil to draw your graph. It's easier to fix mistakes (Or use Excel!).
- Always draw lines with a ruler. Do not freehand. Use at least half of your paper for the graph.
- Make sure Independent Variable is on the X-axis and Dependent Variable is on the Yaxis.
- Include all parts: Title, Axis Labels WITH Units, Legend
- If you are graphing multiple subjects, use different colored or patterned lines and explain what they are in the legend.
- Choose an appropriate graph to explain your data. Examples:
 - LINE: Measuring a change in something over time
 - BAR: Comparing individuals to each other with only one data point.
 - PIE: Show percentages that add up to 100%.

PROCEDURE 1: Using the following data, answer the questions below and then construct a line 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?

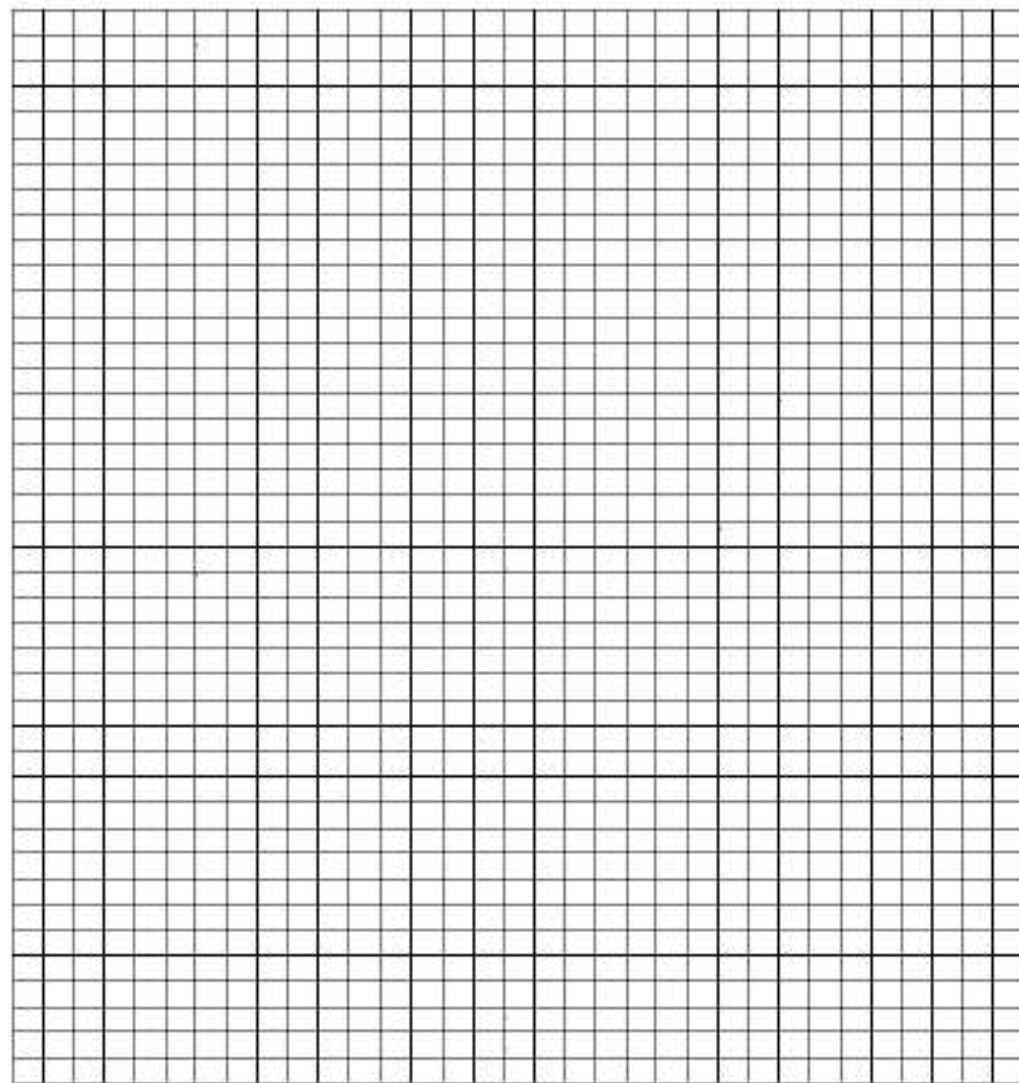
4. What are the mean, median, and mode of all 3 columns of data?

a). Depth : Mean _____ Median _____ Mode _____

b). Bubble Plant A.: Mean _____ Median _____ Mode _____

c). Bubbles Plant B: Mean _____ Median _____ Mode _____

Title: _____



LEGEND:

5. Come up with an explanation for the data in this graph, including the varying rates in plant A and B.
(This is an explanation or hypothesis of why the data is the way it is)

PROCEDURE 2:

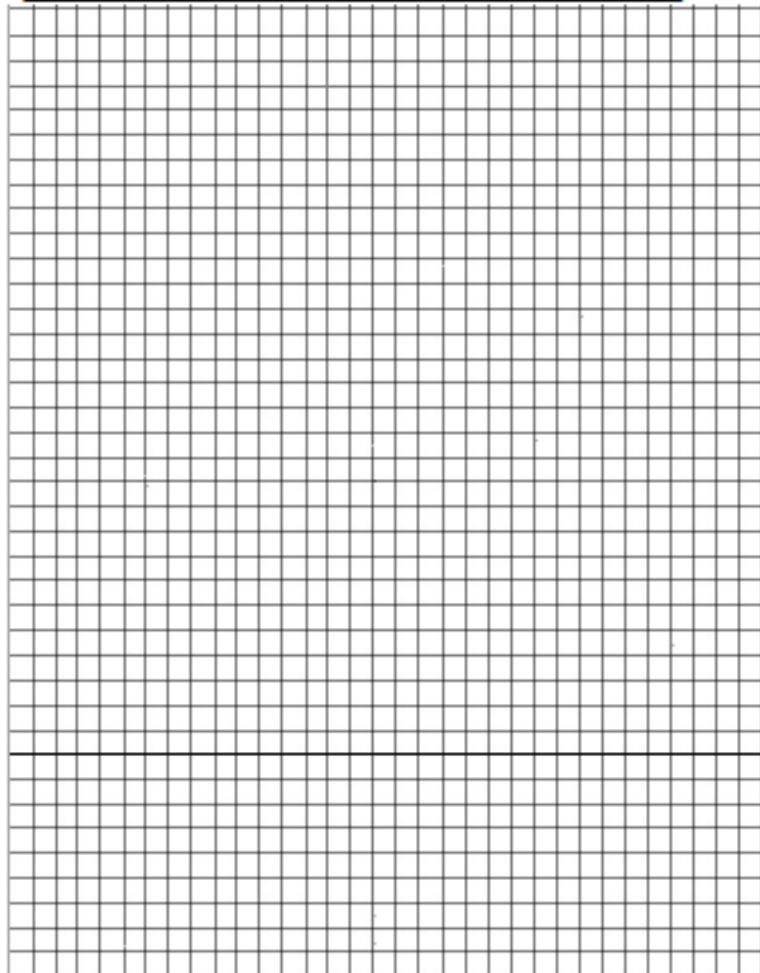
Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not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

Answer the following questions concerning the data below and then graph it.

Time After Eating hours	Glucose ml / Liter of Blood Person A	Glucose ml / Liter of Blood Person B
0.5	170	180
1	165	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? _____
4. Which, if any, of the above individuals (A or B) has diabetes? _____
5. What data do you have to support your hypothesis? _____
6. If the time period were extended to 6 hours, what would the expected blood glucose level for Person B? _____

Title: _____



LEGEND:

7. What conclusions can be determined from the data in graph 2?

PROCEDURE 3:

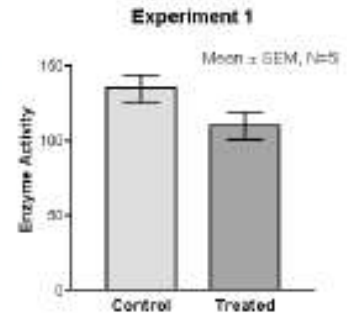
The chart to the right is the raw data of the ml of water expelled by the contractile vacuole of a bacteria in different types of solutions.

This data was then summarized using averages in the table below.

Group	Baseline	Saline	Deionized
1	11.67	6.33	24.33
2	12.14	7.55	22.12
3	15.23	4.56	27.89
4	16.89	3.49	30.17
5	21.72	8.43	34.44
6	11.38	9.12	22.49
7	8.49	3.48	21.16
8	25.29	4.21	30.26
9	24.41	7.56	28.16
10	13.66	11.16	24.59
11	24.88	15.19	29.62
12	11.1	6.49	15.19

Solution	Baseline	Saline	Deionized
Average (in mL)	16.4	7.30	25.87
Standard deviation (error)	6.10	3.43	5.23

1. Construct a bar graph of the amount of water expelled for each solution type.
2. Each group has an error value or "standard deviation". Show this on your graph using lines above and below each bar. Use the example to the right of "Experiment 1" as a guide.



LEGEND:

1. Why are averages used to construct graphs?
2. What does "standard deviation" mean?
3. Come up with a possible hypothesis to explain the data.