

ST. PATRICK CATHOLIC HIGH SCHOOL

AP Biology Summer Assignment

Welcome to AP Biology! This course is designed to be the equivalent of a two-semester introductory biology course usually taken in the first year of college. In other words, while it will be a rewarding experience, it will also be very challenging. Throughout the course, you will become familiar with major recurring ideas that persist throughout all topics and material.

Before we begin in the fall, I recommend purchasing Pearson Education Test Prep Series for AP Biology. You will also need a **graph ruled composition notebook** which will become your lab manual. Bring your lab manual to the first day of class.

I also recommend the following online resources as you work through your summer assignment and prepare for your first test:

- Bozeman Science: <http://www.bozemanscience.com/ap-biology>
- HHMI: <https://wwwl.hhmi.org> & <https://www.hhmi.org/biointeractive>
 - Search: The Origin of Species: The Beak of the Finch; We will refer to this video throughout the year and it will help you to better understand concepts in Chapter 1.

The 4 Big Ideas of AP Biology
<p>Big Idea 1: The process of evolution drives the diversity and unity of life.</p> <p>Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.</p> <p>Big Idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes.</p> <p>Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.</p>

Due Date	Assignment Description	Objective	How will this assignment be graded	Complete
7/31/2018 *submit online	Summer Assignments (Part 1 & 2) (pages 10-18) *must be <u>hand written</u> and scanned	SWBAT use data to create graphs and analyze the graph and SW understand basic chemistry concepts.	Packets will be graded for accuracy and given a major grade. <i>Students who do not submit by the deadline will be dropped from the course.</i>	
8/7/2018	Assignment #2 - Guided Reading Notes for Chapter 1; Print these out and bring a copy to the first day of class	SWBAT explain the scientific method, address the complexity of interactions within biological systems and between organisms and their environment, and understand the emphasis on maintaining homeostasis.	Chapter 1 will be assessed through a test (major grade) in the first week of school. Students will also receive a minor grade for completing the questions on the Chapter 1 reading guide.	
8/9/2018	Test 1: material in Chapter 1 and information covered in summer assignments	SW discover the themes that connect the concepts of biology.	Test 1 will be graded as a major test grade.	

Summer Assignment Part 1 – Graphing



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).
- 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)

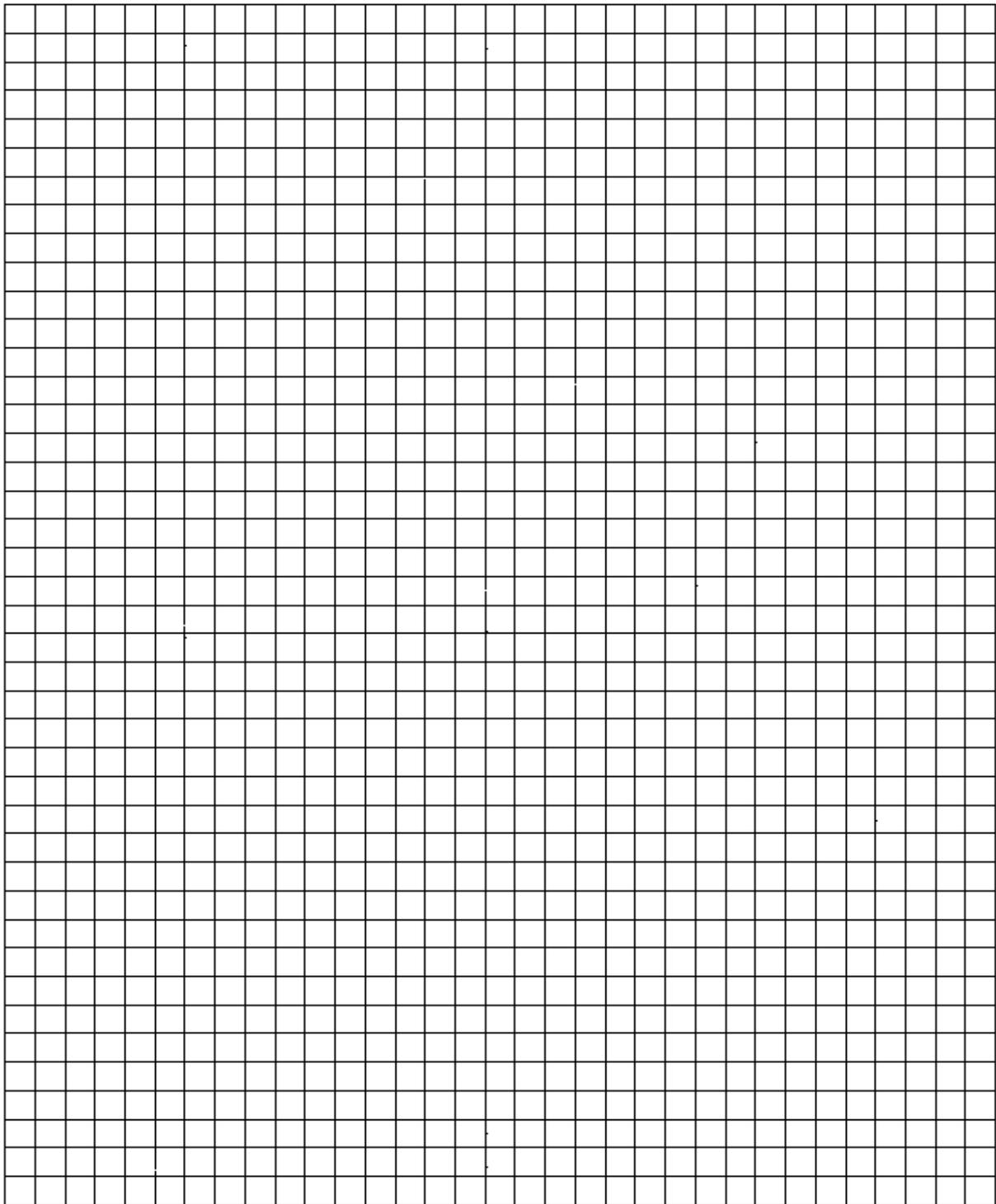
Problem A:

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

Problem B:

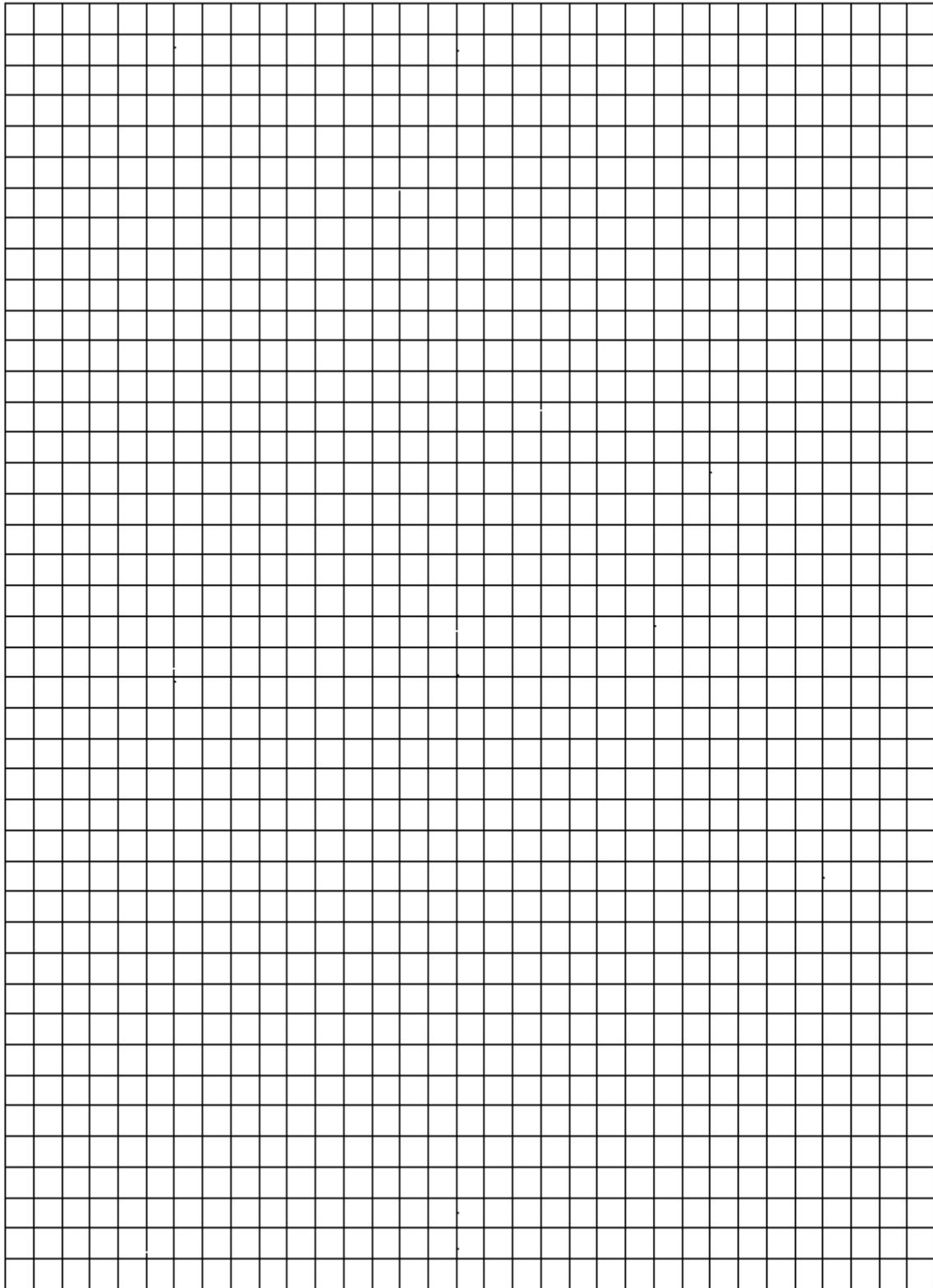
Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not 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	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?
6. If the time period were extended to 6 hours, what would the expected blood glucose level for Person B?

Title: _____



LEGEND:

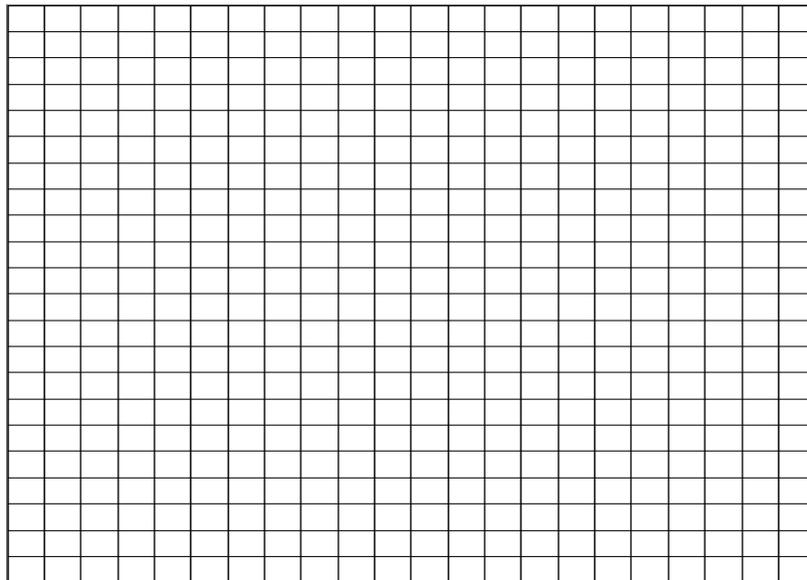
Problem C

Temperatures were obtained in November in a fairly arid area of Nevada. At two different sites, temperature readings were taken at a number of heights above and below the soil surface. One site was shaded by a juniper (a plant) whereas the other was not.

Table 1

Condition	Height in cm from soil surface	Temp. in Co - Beneath Forest Cover	Temp in Co – Unshaded Field
Air	150	18	20
Air	90	18	21
Air	60	18	20
Air	30	18	21
Soil surface	0	16	33
Humus	-6	12	19
Mineral	-15	9	15
Mineral	-30	7	12

Construct a line graph and plot the data



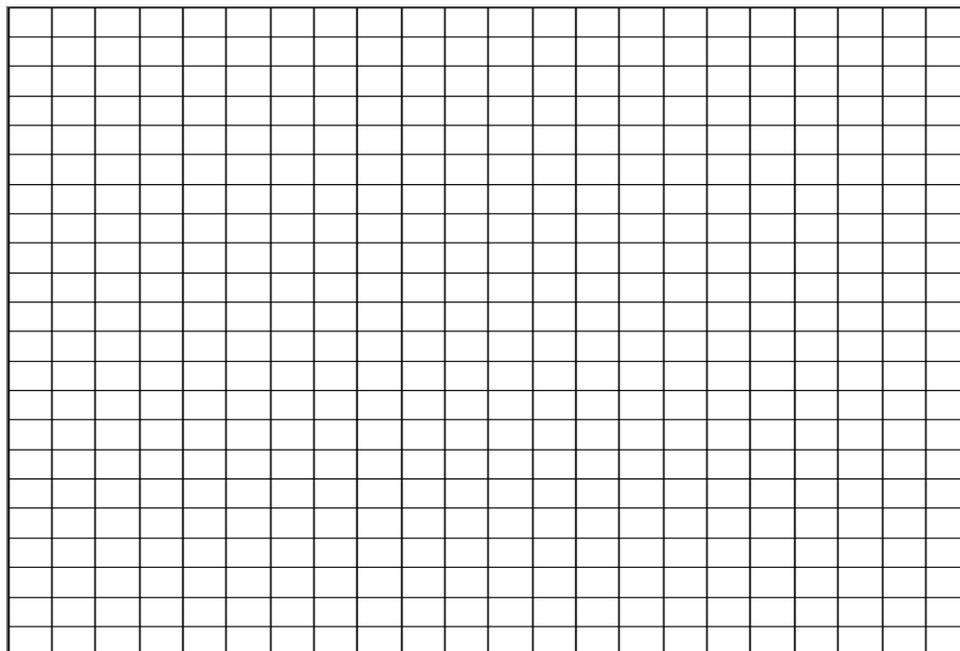
Problem D

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.

Table 2

Collection Date	Ash	Beech	Elm	Hazel	Oak	Willow
November	4271g 100%	3220g 100%	3481g 100%	1723g 100%	5317g 100%	3430g 100%
May	2431g 57%	3190g 91%	1739g %	501g %	4401g 83%	1201g 35%
August	1376g 32%	2285g 71%	35g %	62g %	1759g 33%	4g 0.1%

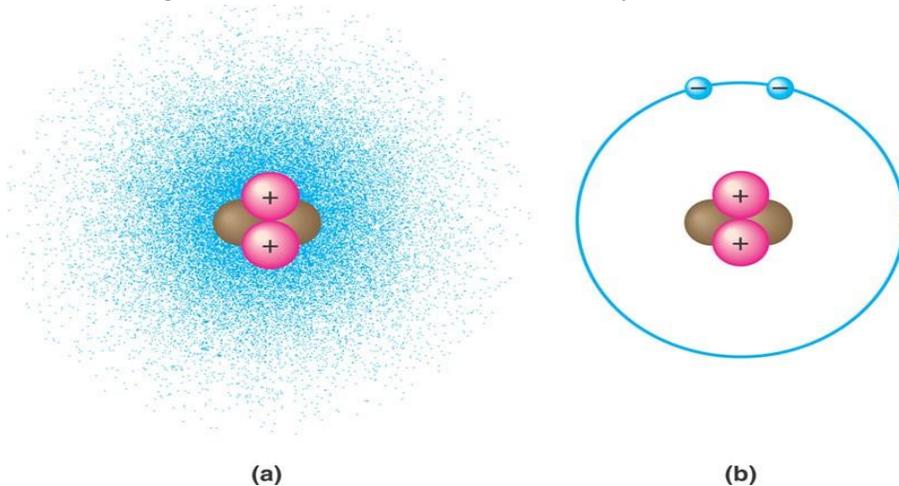
Complete the table by calculating the missing percentages Construct a line graph for the ash and elm leaves



Summer Assignment Part 2 – Basic Chemistry

This is a review of basic chemistry – we will not spend any class time on these concepts as they should have been learned in previous science classes. Please make sure that you know them and if not, be sure to study through them. Chapter 2 of the AP Biology textbook is included with the online assignments and may be a good reference.

1. 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 diagram below and define the terms that you label.



4. Contrast the terms atomic mass and atomic number.
5. What is the difference between the terms atomic mass and atomic weight?
6. What is an isotope and what is “special” about radioactive isotopes?

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

8. Define the following terms:
 - a. Chemical bond

 - b. Covalent bond

 - c. Single bond

 - d. Double bond

 - e. Electronegativity

 - f. Nonpolar covalent bond

 - g. Polar covalent bond

9. What is the difference between a structural and molecular formula?

10. Know both the molecular and structural formula for the following compounds.
 - a. Oxygen gas

 - b. Carbon dioxide

 - c. Glucose

 - d. Phosphate

 - e. Ammonia

 - f. Water

Assignment #2 – Guided Reading Notes for Chapter 1

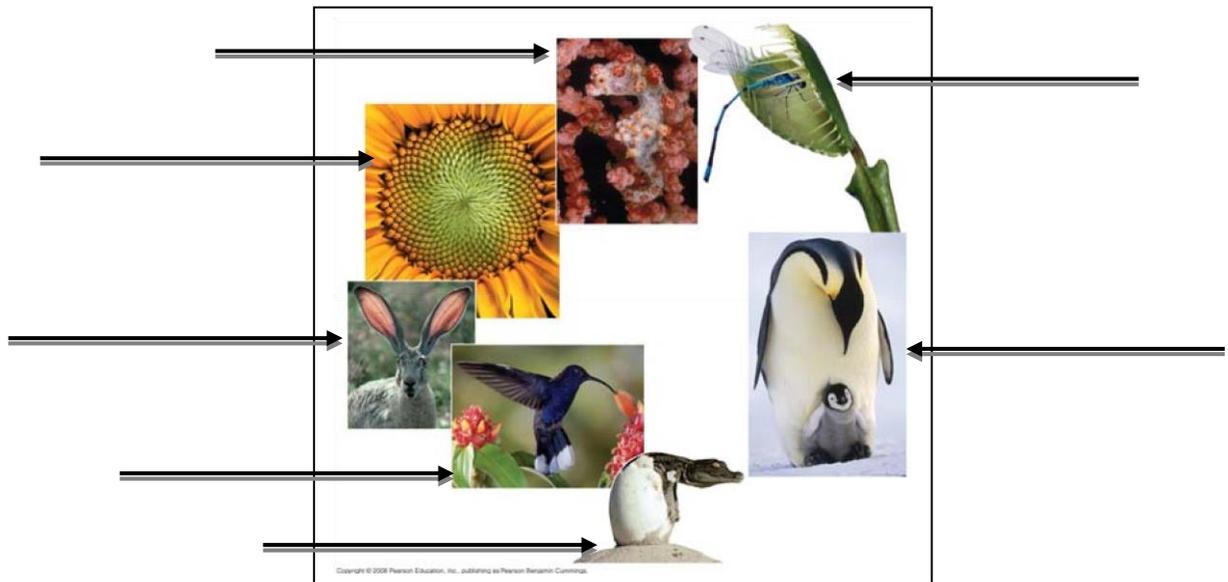
(Due Tuesday, August 7 in class)

For this final assignment, you will need to read Chapter 1 of the AP Biology: 8th edition textbook. These pages of the text have been uploaded to the website for you to read, as well as the next two chapters if needed for reference. You will need to complete the guided reading notes as you read. You will be tested on Chapter 1 on **Thursday, August 9**, the first week that we return to school. While these notes will be very helpful in learning the material, you will be responsible to quiz yourself as you go to make sure you understand the material. These chapters are meant to be a review. You should plan for about 30 minutes of reading and note-taking for this chapter. Print these out and bring your completed notes to the first day of class.

Chapter 1: Introduction: Themes in the Study of Life

Begin your study of biology this year by reading Chapter 1. It will serve as a reminder about biological concepts that you may have learned in an earlier course and give you an overview of what you will study this year.

1. In the overview, Figure 1.3 recalls many of the properties of life. Label the seven properties illustrated here, and give a *different* example of each.



Concept 1.1 Themes connect the concepts of biology

2. What are **emergent properties**? Give two examples.

3. Life is organized on many scales. Figure 1.4 zooms you in from viewing Earth from space all the way to the level of molecules. As you study this figure, write in a brief definition of each level.

Biosphere

Ecosystem

Community

Population

Organism

organs/organ systems

tissues

cells

organelles

molecules



4. As you read this section, you will be reminded of things you may have studied in an earlier course. Since this material will be presented in detail in future chapters, you will come back to these ideas, so don't fret if some of the concepts presented are unfamiliar. However, to guide your study, define each of the terms in bold as you come to them.

eukaryotic cell

prokaryotic cell

DNA

genes genome negative

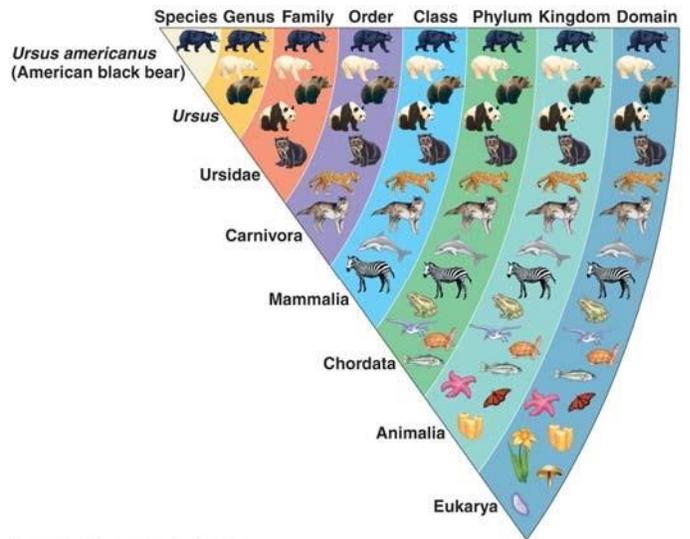
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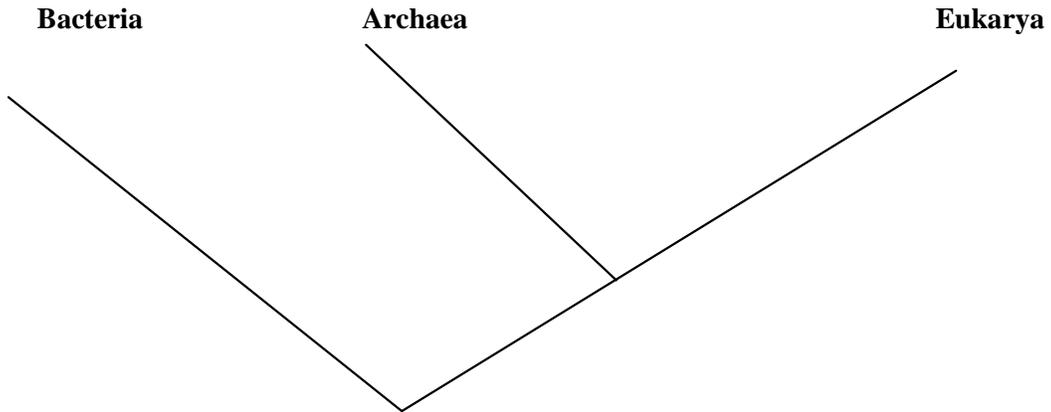
Concept 1.2 The Core Theme: Evolution accounts for the unity and diversity of life

5. Life is organized into groups. Study Figure 1.14.

- Which level contains the greatest diversity of organism?
- The least?
- Write out the levels of organization in order.
- Most people use a mnemonic device to remember these levels. If you have one, write it here.



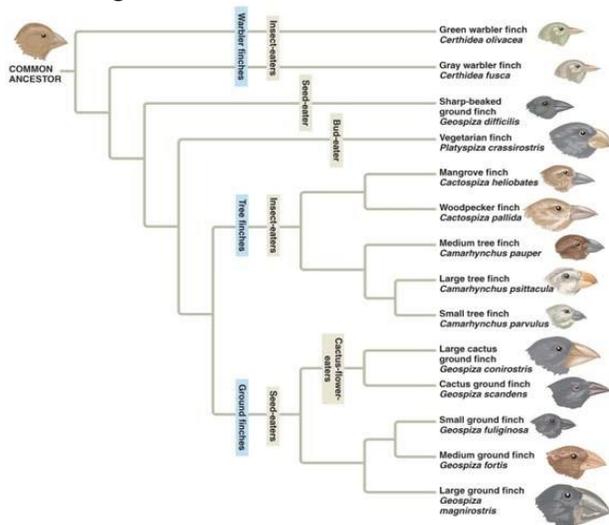
6. Taxonomy is the branch of biology that names and classifies organisms. Because of new molecular information, there have been many changes in placement of certain groups in recent years. Notice that all life is now organized in your text into 3 domains rather than the 5 kingdoms you may have learned earlier. Put the kingdoms mentioned in the text in the space above the proper domain names shown here.



7. What two main points were articulated in Darwin's *The Origin of Species*?

8. What did Darwin propose as the mechanism of evolution? Summarize this mechanism.

9. Study Figure 1.22, which shows an evolutionary "tree." What is indicated by each twig? What do the branch points represent? Where did the "common ancestor" of the Galápagos finches originate?



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Concept 1.3 Scientists use two main forms of inquiry in their study of nature

10. What are the two main types of scientific inquiry? Give an example of each.

11. What is *data*?

12. Distinguish between quantitative and qualitative data. Which type would be presented in a data chart and could be graphed? Which type is found in the field sketches made by Jane Goodall?

13. In science, how do we define *hypothesis*?

14. A scientific hypothesis has two important qualities. The first is that it is *testable*. What is the second?

15. Are scientific hypotheses proved? Explain your answer!

16. Look at Figure 1.24. Use it to write a hypothesis using the “If . . . then . . .” format.

17. What is a *controlled experiment*?

18. The text points out a common misconception about the term “controlled experiment”. In the snake mimicry experiment, what factors were held *constant*?

19. Why are supernatural explanations outside the bounds of science?

20. Explain what is meant by a scientific *theory* by giving the three ways your text separates a theory from a hypothesis or mere speculation.

1.

2.

3.