

Welcome to Advanced Placement Biology 2016 – 2017

Ms. Dill

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Chapters 1 and 2 Due Date: August 15th, 2016
(first day of school)

Completed work may be submitted anytime during the summer once completed. Scan or take a picture and email them to me.

Summer Assignment:

Part One:

- Read and study chapters 1 and 2 in the AP Biology textbook (Campbell *Biology* 9th ed.)
<https://www.dropbox.com/s/jdehoo7y71a3n1l/Campbell%20Biology%209th%20Edition%EF%BB%BF.pdf?dl=0> This is a .pdf link to the entire book.
- Complete activities listed and be ready to design and conduct an experiment the first week of school (specifics as follows)

Chapter 1: Themes in the Study of Life

- Read and study chapter 1 in the Campbell text (learn how to read and study your text this summer – A LOT depends on your ability to be an independent learner!)
- Complete the AP Biology Reading Guide provided.
- Read the concept check questions in the text (pgs. 11, 18, 23, 25) and after you try answering them, check answers provided in the answer section in the answer section found in the appendix of the text. **Write and explain in your own words! Do not copy from the text!**

Chapter 2: Chemical Context of Life

- Read and study chapter 2 in the Campbell text (learn how to read and study your text this summer – A LOT depends on your ability to be an independent learner!)
- Complete the AP Biology Reading Guide for Chapter 2 provided.
- Read all of the concept check questions after each section, and after you try to answer them, check the answers provided in the answer section in the appendix of the text. **Write and explain in your own words! Do not copy from the text!**
- Have all chapter work ready by the first day of school.

Continued...

Part Two:

Getting ready for inquiry:

Use any available resources to develop notes as you:

- * Observe and describe isopods (watch the two videos below)
- * Explain the concepts of “kinesis” and “taxis”

<https://www.youtube.com/watch?v=DWW8Caur8Co>

https://www.youtube.com/watch?v=s6fjGv_J34I

Go to The Lab Bench at

http://www.phschool.com/science/biology_place/labbench/index.html

Review all of these parts of this laboratory:

[Concept 2: Observing Behaviors: Pillbug Behavior](#)

[Concept 3: Scientific Sketching](#)

[Concept 4: Response to the Environment](#)

[Analysis of Results](#)

[Design of the Experiment](#)

[The Controls](#)

[Sample Size, Results, and Replication](#)

[Other Considerations](#)

[Lab Quiz](#)

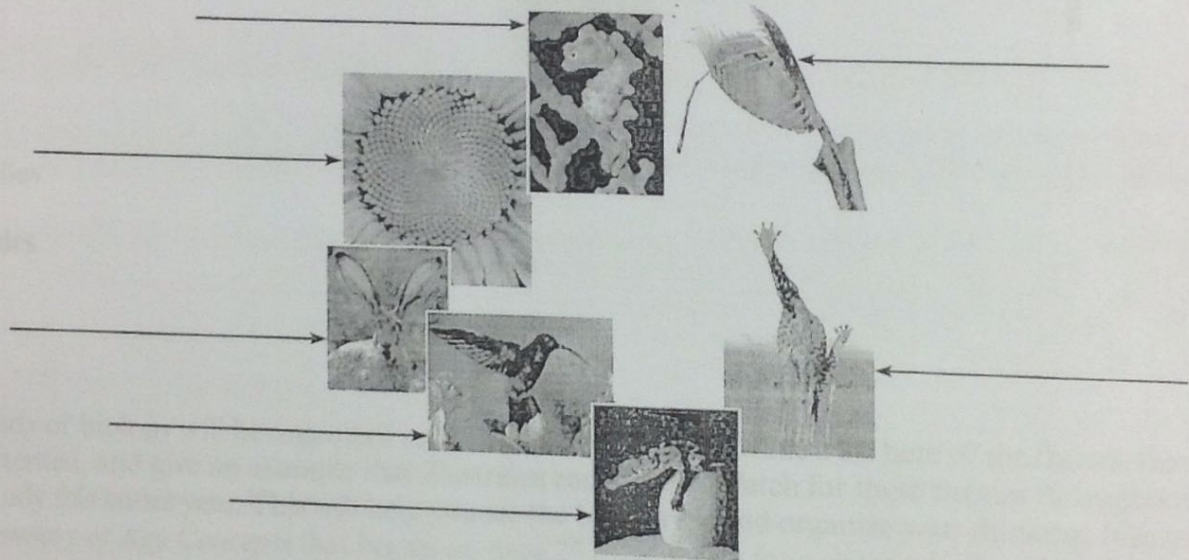
Complete a rough draft of PART 1 of the ATTACHED experimental design so that we can complete an experiment to test your research question on pillbug behavior.

Name _____ Period _____

Chapter 1: Introduction: Themes in the Study of Life

Begin your study of biology this year by reading Chapter 1 in your text. 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 in your text, Figure 1.3 recalls many of the properties of life. Label the seven properties illustrated in the following figure, and give a *different* example of each.



Concept 1.1 The themes of this book make connections across different areas of biology

2. What are emergent properties? Give two examples.

3. Life is organized on many scales. Figure 1.4 in your text 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. Our study of biology will be organized around recurring themes. Make a list here of the themes that are presented, and give an example that illustrates each theme. Watch for these themes throughout your study this entire year. This will help you see the big picture and organize your thinking. (Go to the *Summary of Key Concepts* that begins on page 25 of your text for a concise look at the themes.)

<i>Theme 1:</i>	<i>Example</i>
<i>Theme 2:</i>	
<i>Theme 3:</i>	
<i>Theme 4:</i>	
<i>Theme 5:</i>	
<i>Theme 6:</i>	
<i>Theme 7: (Find it in 1.2.)</i>	

5. 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 all of the terms in bold as you come to them.

eukaryotic cell

prokaryotic cell

DNA

genes

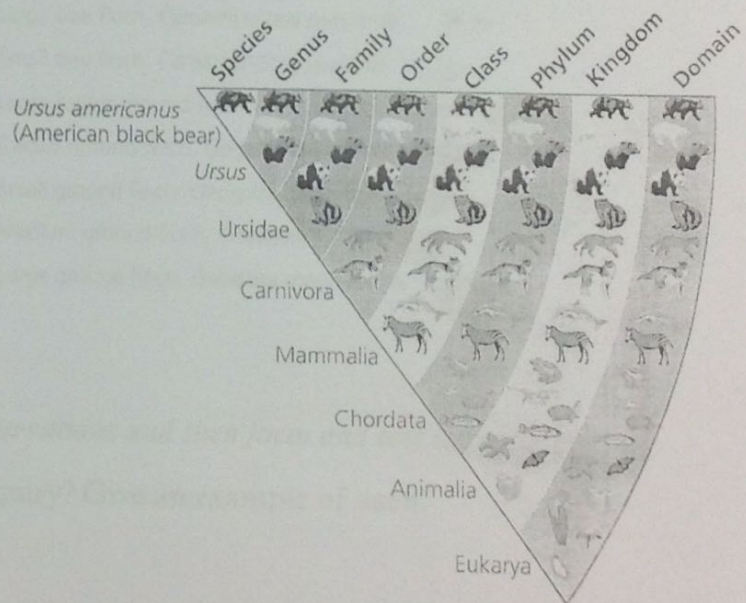
genome

negative feedback/positive feedback

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

6. Life is organized into groups. Study Figure 1.14 in your text.

- Which level contains the greatest diversity of organisms?
- Which level contains the least diversity of organisms?
- 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.



7. Taxonomy is the branch of biology that names and classifies organisms.

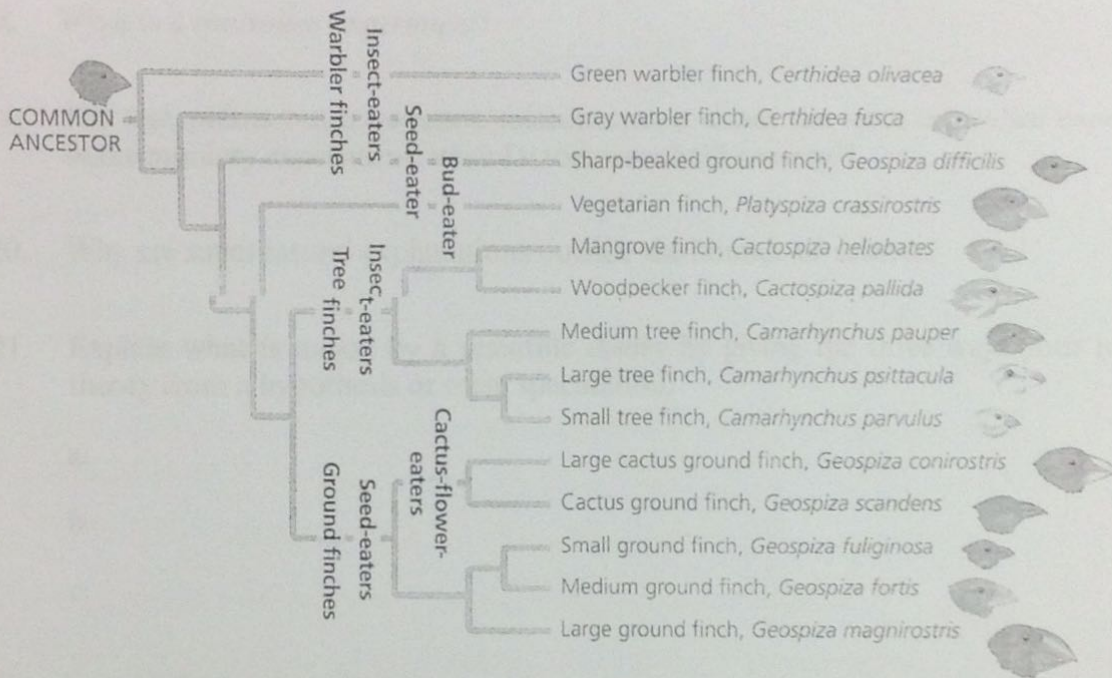
Because of new molecular information, there have been many changes in placement of certain groups in recent years. Notice that all life is now organized in your text into three domains rather than the five kingdoms you may have learned earlier. List the kingdoms mentioned in the text in the space next to the proper domain names shown here.

Bacteria

Archaea

Eukarya

8. What two main points were articulated in Darwin's *The Origin of Species*?
9. What did Darwin propose as the mechanism of evolution? Summarize this mechanism.
10. Study Figure 1.22 in your text, 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?



Concept 1.3 In studying nature, scientists make observations and then form and test hypotheses

11. What are the two main types of scientific inquiry? Give an example of each.
12. What is *data*?
13. 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?
14. In science, how do we define *hypothesis*?

15. A scientific hypothesis has two important qualities. The first is that it is *testable*. What is the second?
16. Are scientific hypotheses proved? Explain your answer!
17. Look at Figure 1.24 in your book. Use it to write a hypothesis using the "If . . . then . . ." format.
18. What is a *controlled experiment*?
19. The text points out a common misconception about the term *controlled experiment*. In the snake mimicry experiment, what factors were held *constant*?
20. Why are supernatural explanations outside the bounds of science?
21. Explain what is meant by a scientific *theory* by giving the three ways your text separates a theory from a hypothesis or mere speculation.
 - a.
 - b.
 - c.

Test Your Understanding Answers

Now you should be ready to test your knowledge. Place your answers here:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____ 10. _____

Name _____ Period _____

Chapter 2: The Chemical Context of Life

This chapter covers the basics that you may have learned in your chemistry class. Whether your teacher goes over this chapter or assigns it for you to review on your own, the questions that follow should help you focus on the most important points.

Concept 2.1 Matter consists of chemical elements in pure form and in combinations called compounds

1. Define and give an example of the following terms:

matter

element

compound

2. What four elements make up 96% of all living matter?
3. What is the difference between an *essential element* and a *trace element*?

essential element

trace element

Concept 2.2 An element's properties depend on the structure of its atoms

4. Sketch a model of an atom of helium, showing the electrons, protons, neutrons, and atomic nucleus.
5. What is the atomic number of helium? _____ What is the atomic mass? _____
6. Here are some more terms that you should firmly grasp. Define each term.

neutron

proton

electron

atomic number

atomic mass

isotope

electron shells

energy

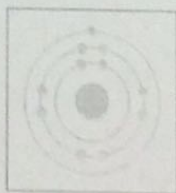
7. Consider the entry in the periodic table for carbon, shown below.

What is the atomic mass? _____ What is the atomic number? _____

How many electrons does carbon have? _____ How many neutrons? _____

6
C
12

8. What are *isotopes*? Use carbon as an example in your explanation.
9. Explain radioactive isotopes and one medical application that uses them.
10. What is the only subatomic particle that is directly involved in the chemical reactions between atoms?
11. What is *potential energy*?
12. Explain which has more potential energy in each pair:
- boy at the top of a slide/boy at the bottom
 - electron in the first energy shell/electron in the third energy shell
 - water/glucose
13. What determines the chemical behavior of an atom?
14. Here is an electron distribution diagram for sodium:



- How many valence electrons does it have? _____ Circle the valence electron(s).
- How many protons does it have? _____

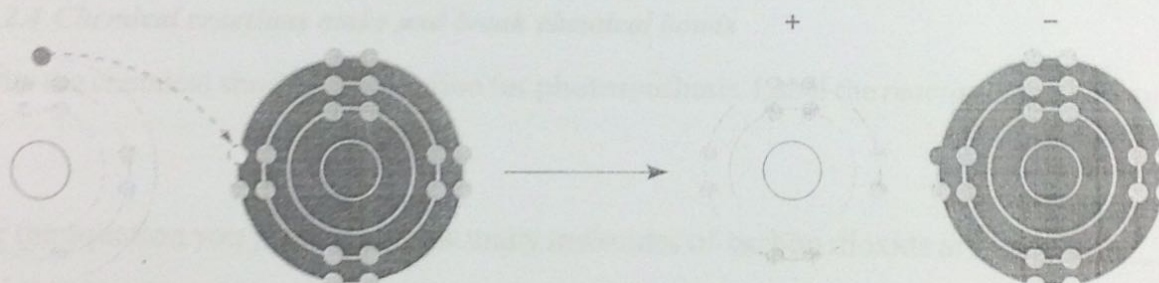
Concept 2.3 The formation and function of molecules depend on chemical bonding between atoms

15. Define *molecule*.

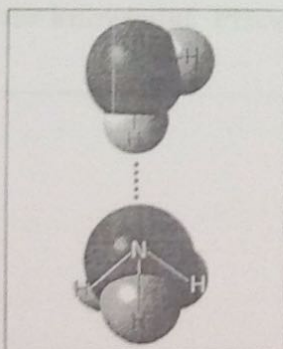
16. Now, refer back to your definition of a *compound* and fill in the following chart:

	Molecule? (y/n)	Compound? (y/n)	Molecular Formula	Structural Formula
Water				
Carbon dioxide				
Methane				
O ₂			O ₂	

17. What type of bond is seen in O₂? Explain what this means.
18. What is meant by *electronegativity*?
19. Explain the difference between a *nonpolar covalent bond* and a *polar covalent bond*.
20. Make an electron distribution diagram of water. Which element is most electronegative? Why is water considered a *polar molecule*? Label the regions that are more positive or more negative. (This is a very important concept. Spend some time with this one!)
21. Another bond type is the *ionic bond*. Explain what is happening in the following figure (Figure 2.14 in your text):



22. What two elements are involved in the previous figure?
23. Define *anion* and *cation*. In the preceding example, which is the anion?
24. What is a *hydrogen bond*? Indicate where the hydrogen bond occurs in the following figure.



25. Explain *van der Waals interactions*. Though they represent very weak attractions, when these interactions are numerous they can stick a gecko to the ceiling!
26. Here is a list of the types of bonds and interactions discussed in this section. Place them in order from the strongest to the weakest: hydrogen bonds, van der Waals interactions, covalent bonds, ionic bonds.

STRONG



WEAK

27. Use morphine and endorphins as examples to explain why molecular shape is crucial in biology.

Concept 2.4 Chemical reactions make and break chemical bonds

28. Write the chemical shorthand equation for photosynthesis. Label the *reactants* and the *products*.
29. For the equation you just wrote, how many molecules of carbon dioxide are there? _____
How many molecules of glucose? _____ How many elements in glucose? _____
30. What is meant by *dynamic equilibrium*? Does this imply equal concentrations of each reactant and product?

Test Your Understanding Answers

Now you should be ready to test your knowledge. Place your answers here:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
7. _____ 8. _____

EXPERIMENTAL DESIGN TEMPLATE QUESTIONS TO GUIDE YOUR EXPERIMENTAL DESIGN

As you think about the parts of a scientific investigation that you are going to do, answer the following questions. These questions will help you design your experiment.

PART 1: To be completed and approved prior to beginning the experiment/investigation

1. What question will be explored?
2. What will be the independent variable?
3. What will be the dependent variable?
4. What will be the control group(s)?
5. What variables will need to be controlled or held constant?
6. Based on your experience in previous labs, background knowledge, and research, what hypothesis will be tested?
7. What equipment and materials will be needed to carry out your investigation? (List items and quantities)
8. What procedure (step-by-step) will be followed? (This should be written so that someone else can do the same procedure by using the steps you write.)
9. What safety equipment or precautions will be needed to carry out your investigation?
10. How will data be collected?
11. How will data be presented?
12. How will data be analyzed?

Teacher approval to begin your experiment/investigation

Date _____

Name: _____ Period: _____ Date: _____

PART 2: To be completed during or after your experiment/investigation

1. What changes or modifications to the procedure and/or data collection have been during the course of the investigation?
2. What were the results of your experiment/investigation?
3. Do your data support your hypothesis? Provide an explanation of your answer.
4. a. Based on your results, was the hypothesis accepted or rejected?
b. If you can do a statistical analysis (chi square, mean, etc), do it here and discuss
5. What conclusions can be drawn based on the data analysis?
6. What sources of error may have existed in your experiment/investigation?
7. What are some limitations of the experiment/investigation that you performed?
8. What additional questions arose from the experiment/investigation?
9. As a result of this experiment/investigation, what modifications or changes could be made to improve the procedure?