

## Advanced Placement Biology Prep

Ms. Cline

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### 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. I am looking forward to working with you during the 2017-2018 academic year.....Ms. Cline

### The 4 Big Ideas of AP Biology

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.

### Due Date Assignment Description

Objective How will this assignment be graded Complete

7/31/2017 \*submit online

### Biological Collection Photo Album

SW review terms learned in previous Biology courses and also identify some terms that will be used throughout this course.

The Biological Collection Photo Album will be scored as a major grade using the rubric included in that section of this packet.

8/9/2017 Word roots (define and learn by making note cards)

SW understand how the word roots can help them know the meaning of terms in biology.

The word roots component will be assessed through a test (major grade) on the second day of school.

8/11/2017 Guided Reading Notes for Chapters 1-3; 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.

Chapters 1-3 will be assessed through a test (major grade) in the first week of school. Students will also receive a minor grade for completing the guided reading notes.

### Assignment #1 – Biology Photo Album

For this part of your summer assignment, you will be familiarizing yourself with science terms that we will be using at different point throughout this year. On the next page is the list of terms.

☑ Select and photograph 20 words/terms. o You should collect each item that you select by taking a photograph of that item. You should create a unique way to present your “collection”, along with corresponding explanations/definitions. You can do this in PowerPoint, Microsoft Word, or Google Slides. Images should be organized in alphabetical order as they are found on the list. o You do not need to find the exact item on the list, for example, if it is an internal part to an organism, but you must apply the term to the specimen you find and explain in your finished project how this specimen represents the term. ☑ Example: If you choose “phloem,” you could submit a photograph you have taken of a plant leaf or a plant stem and then explain in your project what phloem is and specifically where phloem is in your specimen. ☑ Original photos only. o You cannot use an image from any publication or the Web. You must have taken the photograph yourself and prove this by including yourself (like a selfie) or by placing an item (stuffed animal, a button, small toy, etc.) in all of your photographs. ☑ Natural items only. o Specimens may be used for only one item/word, and all must be from something that you have found in nature. Take a walk around your yard, neighborhood, and town. DON'T SPEND ANY MONEY! Research what the term means and in what organisms it can be found...and then go out and find one. Be careful and respectful. Do not remove any organisms from the natural environment. ☑ Label and define your specimens. o With each image, you should include the term that goes with your photograph and define the term. If further explanation is needed as to how this term goes with your image, you may include that also. ☑ Team Work allowed, but this is an individual project. o You may work with other students in the class to brainstorm, discuss or even go on adventures together, but each student must turn in his or her own project with a unique set of terms chosen. Rubric for Biology Photo Album

Points Biology Photo Album Entry 1 each Original picture that includes your specimen and yourself or other proof object 1 each Biological term/concept identified 1 each Biological term/concept defined in own words 1 each Biological term/concept and photo relationship fully explained 10 total Each biological term/concept listed alphabetically 10 total Album is easily to follow and neatly presented

Biological Collection List

(Choose 20 to photograph and define)

1. Adaptation of a plant 2. Adaptation of an animal 3. Altruistic behavior 4. Amniotic egg 5. Analogous structures 6. Animal that has a segmented body 7. Anther and filament of stamen 8. Archaeobacterial 9. Asexual reproduction 10. ATP 11. Autotroph 12. Auxin producing area of a plant 13. Basidiomycete 14. Batesian mimicry 15. Bilateral symmetry 16. Biological magnification 17. C3 Plant 18. C4 Plant 19. Calvin Cycle 20. CAM Plant 21. Cambium 22. Cellular respiration 23. Coevolution 24. Commensalism 25. Connective tissue 26. Cuticle layer of a plant 27. Detritivore 28. Dominant vs. recessive phenotype 29. Ectotherm 30. Endosperm 31. Endotherm 32. Enzyme 33. Epithelial tissue 34. Ethylene

35. Eubacteria 36. Eukaryote 37. Exoskeleton 38. Fermentation 39. Flower ovary 40. Frond 41. Gametophyte 42. Genetic variation within a population 43. Genetically modified organism 44. Gibberellins 45. Glycogen 46. Gymnosperm cone – male or female 47. Gymnosperm leaf 48. Hermaphrodite 49. Heterotrophy 50. Homeostasis 51. Homologous structures 52. Hydrophilic 53. Hydrophobic 54. Introduced species 55. Keystone species 56. Krebs cycle 57. Lichen 58. Lipid used for energy storage 59. Littoral zone organism 60. Long-day plant Meristem 61. Mullerian mimicry 62. Mutualism 63. Mycelium 64. Mycorrhizae 65. Niche 66. Parasitism 67. Parenchyma cells 68. Phloem

69. Pollen 70. Pollinator 71. Population 72. Predation 73. Prokaryote 74. Radial symmetry (animal) 75. Redox reaction 76. Rhizome 77. Seed dispersal (animal, wind, water) 78. Spore 79. Sporophyte 80. Stigma and style of carpel 81. Taxis 82. Territorial behavior 83. Tropism 84. Unicellular organism 85. Vestigial structures 86. Xylem

## Assignment #2 – Word roots

Scientific vocabulary is a mix of small words that are linked together to have different meanings. If you learn the meanings of the roots of the words, you'll find scientific vocabulary much easier to understand. This assignment will help you tremendously with all the terminology you'll be learning in AP Biology this year and while completing your summer assignment. On the second day of class, you will have a test on the words roots listed below. Study them however you best learn. You can make flashcards, add them to a virtual study site, like Quizlet, rewrite them, or draw pictures. It is highly recommended that you break up the list and study throughout the summer, rather than cramming them in at the last minute.

A-, an-

Amph-; amb-

Anti-

Aqu-

Arthro-

Auto -

Bi-; di-

Bio-; bi-

Cell-

Cephal-

Chlor-

Chrom-; -chrome

-cide

Cyt-; -cyte

Derm-

Ect-; ex-

En-

Epi-

Gastro-

-gene; Gene-

Gymno-

Haem-; hem-

Herb-

Hetero-

Homo-

Hydr-

Hypo-

Hyper-

Inter-

Intra-

-it is

Lat-

Leuc-

-logy

-lysis; lyte; -lyst

Macr-

Mes-

-meter; metry

Micro-

Mono-

Morph-

Myc-

Multi-; poly-

Neur-; nerv-

Ov-

Path-; -pathy

Phag-

Phil-

Photo-

Proto-

Pseud-

Saccharo-

Sub-

Sperm-

Sym-; Syn-

-taxis

Therm-

Tri-

Troph-

Zo-; -zoa

Below is an example of how you will be assessed on the knowledge of the above word roots. In the space next to each word, write the definition of the term.

1. Hydrology \_\_\_\_\_

2. Cytolysis \_\_\_\_\_

3. Protozoa \_\_\_\_\_

4. Epidermis \_\_\_\_\_

5. Spermatogenesis \_\_\_\_\_

6. Pathogen \_\_\_\_\_

7. Hemophilia \_\_\_\_\_

8. Herbicide \_\_\_\_\_

9. Autotroph \_\_\_\_\_

10. Monosaccharide \_\_\_\_\_

### Assignment #3 – Guided Reading Notes for Chapters 1-3

For this final assignment, you will need to read Chapters 1-3 of the AP Biology: 8th edition textbook. These pages of the text have been uploaded to the website for you to read. You will need to complete the guided reading notes as you read. You will be tested on Chapters 1-3 on Friday, August 11, 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 2 hours of reading and note-taking for each chapter. Print these out and bring your completed notes to the first day of class.

To assist you with your review, I am offering an AP Prep course **Tuesday and Wednesday, July 11th & 12th from 10:00 am-2pm**. While this summer session is optional, it is highly recommended that you attend at least one day. I will have a review lesson prepared and will answer questions from the summer assignment. I also recommend the following online resources:

☐ Bozeman Science: <http://www.bozemanscience.com/ap-biology> ☐ HHMI: <https://wwwl.hhmi.org> & <https://www.hhmi.org/biointeractive> o 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.  
☐ Learn Genetics: <http://learn.genetics.utah.edu/>

AP Biology Reading Guide Chapter 1: Introduction: Themes in the Study of Life Fred and Theresa Holtzclaw

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Name \_\_\_\_\_ Period \_\_\_\_\_

#### 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

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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 at the end of the chapter for a concise look at the themes.)

Theme 1 Example

Theme 2:

Theme 3:

Theme 4:

Theme 5:

Theme 6:

Theme 7: (Find it in 1.2.)

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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 each 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.

- 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.

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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 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.

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, 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

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. 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?

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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.

1.

2.

3.

Testing Your Knowledge: Self-Quiz Answers Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7.  
\_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_

AP Biology Reading Guide Chapter 2: The Chemical Context of Life Fred and Theresa Holtzclaw

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- 1

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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 do 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? \_\_\_\_\_ Its atomic mass? \_\_\_\_\_

6. Here are some more terms that you should firmly grasp. Define each term. neutron

proton

electron

atomic number

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- 2

atomic mass

isotope

electron shells

energy

7. Consider this entry in the periodic table for carbon.

What is the atomic mass? \_\_\_\_\_ atomic number? \_\_\_\_\_

How many electrons does carbon have? \_\_\_\_\_ neutrons? \_\_\_\_\_

6

C

12

8. Which is the only subatomic particle that is directly involved in the chemical reactions between atoms?

9. What is potential energy?

10. Explain which has more potential energy in each pair:

a. boy at the top of a slide/boy at the bottom

b. electron in the first energy shell/electron in the third energy shell    c. water/glucose

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- 3

11. What determines the chemical behavior of an atom?

12. Here is an electron distribution diagram for sodium:    a. How many valence electrons does it have?  
\_\_\_\_\_ Circle the valence electron(s).

b. How many protons does it have? \_\_\_\_\_

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

13. Define molecule.

14. 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 <sub>2</sub>						

15. What type of bond is seen in O<sub>2</sub>? Explain what this means.

16. What is meant by electronegativity?

17. Explain the difference between a nonpolar covalent bond and a polar covalent bond.

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- 4

18. 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!)

19. Another bond type is the ionic bond. Explain what is happening in the figure below (2.14):

20. What two elements are involved above?

21. Define anion and cation. In the preceding example, which is the anion?

22. What is a hydrogen bond? Indicate where the hydrogen bond occurs in this figure.

23. Explain van der Waals interactions. Though they represent very weak attractions, when these interactions are numerous they can stick a gecko to the ceiling!

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- 5

24. 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

25. 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

26. Write the chemical shorthand equation for photosynthesis. Label the reactants and the products.

27. For the equation you just wrote, how many molecules of carbon dioxide are there? \_\_\_\_\_

How many molecules of glucose? \_\_\_\_\_ How many elements in glucose? \_\_\_\_\_

28. What is meant by dynamic equilibrium? Does this imply equal concentrations of each reactant and product?

Testing Your Knowledge: Self-Quiz Answers Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_

AP Biology Reading Guide Chapter 3: Water and the Fitness of the Environment Fred and Theresa Holtzclaw

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Chapter 3: Water and the Fitness of the Environment

Concept 3.1 The polarity of water molecules results in hydrogen bonding

1. Study the water molecules at the right. On the central molecule, label oxygen (O) and hydrogen (H).
2. What is a polar molecule? Why is water considered polar?
3. Now, add + and – signs to indicate the charged regions of each molecule. Then, indicate the hydrogen bonds.
4. Explain hydrogen bonding. How many hydrogen bonds can a single water molecule form?

Concept 3.2 Four emergent properties of water contribute to Earth's fitness for life

Hydrogen bonding accounts for the unique properties of water. Let's look at several.

## Cohesion

5. Distinguish between cohesion and adhesion.
6. What is demonstrated when you see beads of water on a waxed car hood?
7. Which property explains the ability of a water strider to walk on water?

## Moderation of Temperature

8. The calorie is a unit of heat. Define calorie.
9. Water has high specific heat. What does this mean? How does water's specific heat compare to alcohol's?
10. Explain how hydrogen bonding contributes to water's high specific heat.

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11. Summarize how water's high specific heat contributes to the moderation of temperature. How is this property important to life?

12. Define evaporation. What is heat of vaporization? Explain at least three effects of this property on living organisms.

#### Expansion upon Freezing

13. Ice floats! So what? Consider what would happen if ponds and other bodies of water accumulated ice at the bottom. Describe why this property of water is important.

14. Now, explain why ice floats. Why is 4°C the critical temperature in this story?

#### Solvent of Life

15. Review and define these terms: solvent

solution

solute

16. Consider coffee to which you have added sugar. Which is the solvent? The solute?

17. Explain why water is such a fine solvent.

18. Define hydrophobic and hydrophilic.

19. You already know that some materials, such as olive oil, will not dissolve in water. In fact, oil will float on top of water. Explain this property in terms of hydrogen bonding.

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20. Now, let's do a little work that will enable you to prepare solutions. Read the section on solute concentrations carefully, and show the calculations here for preparing a 1-molar solution of sucrose. Steps to help you do this follow. The first step is done for you. Fill in the rest.

Steps to prepare a solution:

a. Write the molecular formula.  $C_{12}H_{22}O_{11}$

b. Use your periodic table to calculate the mass of each element. Multiply by the number of atoms of the element. (For example, O has a mass of 16. Therefore one mole of O has a mass of  $16 \times 11 = 176$  g/mole.)

c. Add the masses of each element in the molecule.

d. Add this mass of the compound to water to bring it to a volume of 1 liter. This makes 1 liter of a 1-M (1 molar) solution.

21. Can you prepare 1 liter of a 0.5-molar glucose solution? Show your work here.

22. Define molarity.

Concept 3.3 Acidic and basic conditions affect living organisms

23. What two ions form when water dissociates?

You should have answered “hydronium ( $\text{H}_3\text{O}^+$ ) and hydroxide ions ( $\text{OH}^-$ )” in the preceding question. However, by convention, we will represent the hydronium ion as  $\text{H}^+$ .

24. What is the concentration of each ion in pure water at 25°C?

25. Water has a pH of 7. pH is defined as the negative log of the hydrogen ion concentration  $[\text{H}^+]$ . Can you now see how water is assigned a pH of 7?

26. To go a step further, the product of  $\text{H}^+$  and  $\text{OH}^-$  concentrations is constant at  $10^{-14}$ .

$[\text{H}^+][\text{OH}^-] = 10^{-14}$ .

