**AP Biology Summer Assignment**

Welcome to AP Bio! AP Bio is an introductory college-level course designed to have students engage in investigations encompassing evolution, cellular processes (communication and energy), genetics, information transfer, ecology, and interactions. This course promotes complex thinking and reasoning skills essential for in-depth study at the college level. The AP Biology Curriculum focuses on the four Big Ideas which cut across traditional boundaries and provide a broad way of thinking about biological systems. The Big Ideas are:

1. The process of evolution explains the diversity and unity of life.
2. Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.
3. Living systems store, retrieve, transmit, and respond to information essential to life processes.
4. Biological systems interact, and these systems and their interactions possess complex properties.

**What you need to do before the first day of school:**

* Visit the College Board website to get a better understanding of the course and the AP exam:
	+ <https://apstudent.collegeboard.org/apcourse/ap-biology>
* The AP Biology course covers a large amount of information. In order for us to cover all of the material necessary for the AP Exam, you are responsible for reviewing the Chemistry section on your own. You will need to:
	+ Complete the Chemistry worksheet. As an AP student, the expectation is that if you don’t know, find out. Use your resources. This should be a review from your Honors Chemistry course.
	+ Complete the Biology prefixes and suffixes worksheet. You should be familiar with many of these terms from your completion of Honors Biology. This course is very heavy on vocabulary, therefore it will help you to know the Latin/Greek roots that form many scientific terms.
* Be prepared for a test during the first few days of school.

I am very excited to work with each one of you next year! Have a wonderful summer!

Mrs. Barnhart

**AP Biology Essential Chemistry**

1. Differentiate between the term element and compound.
2. Know the symbols of the following elements and their charge:
	1. Carbon
	2. Hydrogen
	3. Oxygen
	4. Nitrogen
	5. Phosphorus
	6. Sulfur
3. Contrast the terms atomic mass and atomic number.
4. What is an isotope? What is a radioactive isotope?
5. Why are valence electrons important?
6. Define the following terms:
	1. Chemical bond
	2. Covalent bond
	3. Single bond
	4. Double bond
	5. Electronegativity
	6. Nonpolar covalent bond
	7. Polar covalent bond
7. What is the difference between a structural and molecular formula?
8. Know both the molecular and structural formula for the following compounds.
	1. Oxygen gas
	2. Carbon dioxide
	3. Glucose
	4. Phosphate
	5. Ammonia
	6. Water (you would be surprised at how many people missed this!!!)
9. How do ionic bonds compare with covalent bonds?
10. Compare and contrast hydrogen bonds and van der Waals interactions.
11. Define a dynamic chemical equilibrium in terms of quantities of reactants and products. This is a critical concept!
12. Why is water considered a polar molecule?
13. For each of the below listed properties of water – briefly define the property and then explain how water’s polar nature and polar covalent bonds contribute to the water special property.
	1. Cohesion
	2. Adhesion
	3. Surface tension
	4. High specific heat
	5. Heat of vaporization
	6. Evaporative cooling
14. What is special about water and density?
15. Explain how these properties of water are related to the phenomena described in the statements below. More than one property may be used to explain a given phenomenon.
	1. During the winter, air temperatures in the northern United States can remain below 0°C for months; however, the fish and other animals living in the lakes survive.
	2. Many substances—for example, salt (NaCl) and sucrose—dissolve quickly in water.
	3. When you pour water into a 25-ml graduated cylinder, a meniscus forms at the top of the water column.
	4. Sweating and the evaporation of sweat from the body surface help reduce a human’s body temperature.
	5. Water drops that fall on a surface tend to form rounded drops or beads.
	6. Water drops that fall on your car tend to bead or round up more after you polish (or wax) the car than before you polished it.
	7. If you touch the edge of a paper towel to a drop of colored water, the water will move up into (or be absorbed by) the towel.
16. Define the following terms:
	1. Solute
	2. Solvent
	3. Aqueous solution
	4. Hydrophilic
	5. Hydrophobic
	6. Molarity
17. Label the diagram below to demonstrate the dissociation of the water molecule and then relate this diagram to the term pH.

18. What defines an acid and a base?
19. Why are small changes in pH so important in biology?
20. What is a buffer? Give an example on how they would work in a living organism.
21. What is acid precipitation and why is it important to living organisms?
22. Why is organic chemistry so important in the study of biology?
23. What is special about carbon that makes it the central atom in the chemistry of life?
24. Describe and contrast the three types of isomers. Draw a sketch of each
	1. Structural –
	2. Geometric –
	3. Enantiomers –

1. Be familiar with each of the following functional groups – know it’s chemical formula and the functional properties
	1. Hydroxyl

* 1. Carbonyl
	2. Carboxyl
	3. Amino
	4. Sulfhydryl
	5. Phosphate

**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.

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| 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 |  |
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| kary |  |
| neuro |  |
| soma |  |
| saccharo |  |
| primi / archea |  |
| phyll |  |

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

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Once you have completed the above table, use it to develop a 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. Endocystosis \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. herbicide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. Anaerobic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. Bilateral \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. autotroph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. Monosaccharide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. Arthropod \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18. polymorphic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. Hypothermia \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

20. Biogenesis \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_