

Welcome to AP Biology for the 2019-2020 school year. This course is a college level biology course and requires that certain biology and chemistry topics are already mastered and understood before the course begins. Assuming that is true, the following is a list of topics that you must review and complete over the summer and have submit electronically to the Google Classroom Assignment by **11:59pm on September 5, 2018, the night before the first day of school (regardless if you are in an A or B day class)**. This assignment **WILL NOT** be accepted late and will count as a test grade. All parts of the questions that you cannot answer from memory must be answered through your own research using library books, the Internet, etc. You are not allowed to share your document with anyone else; all work should be your own. **Please cite all resources used on a Works Cited page.**

Each essay should be written separately, **in paragraph form**. Make sure your essay includes the answers to each of the numbered items under each essay description. **NO EXCEPTIONS!!!**

ESSAY #1:

We will be studying Biology this year under an umbrella of four big ideas. They can be grouped as follows:

- I. **The process of evolution drives the diversity and unity of life**
- II. **Biological systems utilize free energy and molecular building blocks to grow, reproduce and to maintain dynamic homeostasis.**
- III. **Living systems store, retrieve, transmit and respond to information essential to life processes.**
- IV. **Biological systems interact, and these systems and their interactions possess complex properties.**

Given the above themes, answer the following:

1. What is meant by emergent properties? Give 3 biological examples. Explain how this leads to life.
2. What do we mean when we say organisms are open systems? Give 3 examples to support your statement.
3. Give 2 examples to support the statement that life has two faces: Diversity and Unity.
4. Why is evolution considered the core theme of biology?
5. Give a current example of why the study of biology is a function of society?

ESSAY #2:

A thorough understanding of Chemistry is essential for success in AP Biology. Answer the following questions in regards to basic chemistry topics.

1. Describe chemical bonding, both ionic and covalent. Also, predict the number of covalent bonds that each of the following atoms will form: C, H, O, N.
2. Describe hydrogen bonds and Van der Waals interactions. Why are they considered to be “weak bonds”?
3. Explain the difference between polar covalent and nonpolar covalent bonds. Give examples and use/insert diagrams wherever necessary to support your answer.
4. Water is essential to all living things. Draw/insert the electron shell diagram of water. Then explain why it is considered to be “polar” and how hydrogen bonding occurs between molecules of water.
 - a. Answer this question with both the sketch/image and written explanation.
 - b. Also answer, which types of bonds are stronger, hydrogen bonds or covalent bonds?
5. Explain the following properties of water and their importance to life on earth. Use a specific example for each.
 - a. Cohesion
 - b. Adhesion
 - c. Surface tension
 - d. High Specific heat
 - e. High Heat of Vaporization
 - f. Density of ice compared to liquid water
6. Explain the difference between hydrophilic and hydrophobic molecules and the differences in how they behave in water.
7. Explain the pH scale. How great a difference is there in the hydrogen ion concentration between a pH of 6 and a pH of 8? Explain why pH is important in biological systems.
8. How does a buffer work? Use the carbonic acid-bicarbonate system as an example. Why is buffering important in biological systems? Use a diagram if necessary.