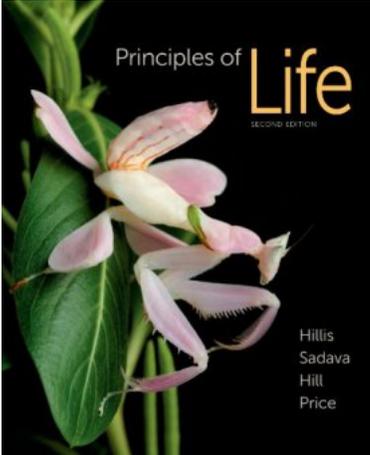


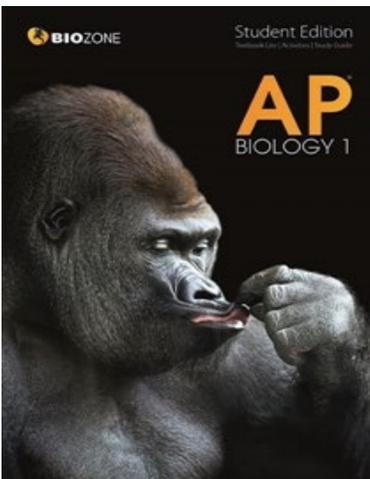
AP Biology Summer Assignment Holy Spirit Prep 2019



Textbook: "Principle of Life" 2nd edition, for the AP course 2018

Chapters 1-3 (pages 1-59)

This summer assignment will cover the introduction to biology, chemistry of life, and essential macromolecules for life. The concepts covered in these chapters are either review from previous classes or relatively easy enough to allow you to work through them on your own. The more complex connections between these chapters will be discussed during the first two weeks of the school year.



**Biozone Workbook: "AP Biology 1" Student edition, 2nd edition 2017
and**

Biozone Workbook: "AP Biology 2" Student edition, 2nd edition 2017

Read each chapter in the text book, answer all the questions listed below, and complete the corresponding pages in the biozone workbooks covering those topics. The answers can be typed or handwritten for the questions below and written in the workbook for the biozone pages listed. Do not tear out the biozone workbook pages. I will check your answers directly from the workbook. **This assignment will be due on Wednesday, Aug 21, 2019.** We will have a test over the material during the second week of the school year.

For questions, contact Mr. Harrison at sharrison@holyspiritprep.org

Chapter 1: Principles of Life

Answer the following:

1. Organisms share many conserved biological, chemical, and structural characteristics. Briefly outline the 8 distinctive characteristics of life shared by all living organisms.
2. How do the shared characteristics on your list (in #1) provide evidence for evolution?
3. There are several competing hypotheses about the evolution of early life on Earth, but as life evolved, all cells clearly had requirements for raw materials and energy transfers. Briefly explain how the earliest living cells obtained raw materials and accomplished energy transfers.

4. Briefly describe and discuss how living organisms have altered the oxygen concentration in the atmosphere over the past three billion years.
5. Dynamic regulation is required for maintaining homeostasis. Explain how a cellular mechanism that regulates the quantity of a biochemical product in a cell resembles the regulation of a heating and cooling system that keeps your room temperature comfortable.
6. Each cell in an individual mouse contains the same genes, but the mouse has many different types of cells: muscle cells, nerve cells, skin cells, etc. Briefly describe how two cells in an embryo can become two different types of cells in an adult, even though both cells have the same DNA and genes.
7. "Theory" is an important term in science. How do scientists define a theory?
8. Explain how evolution is both a fact and a theory.
9. After looking at many types of fish food available at a local store, a friend asks you which would make his fish grow faster, flake fish food or shrimp pellets. Design a controlled experiment to test this question.
10. Using your answer from #9, identify the following from that experiment: 1. the independent variable, 2. the dependent variable, 3. the control, and 4. the constant conditions.

Complete the following pages and sections from the workbooks:

- Workbook 2- "Levels of Organization" page 38 Section 27
- Workbook 2- "Maintaining Homeostasis" page 58-59 Section 40
- Workbook 2- "Negative Feedback" page 60 Section 41
- Workbook 2- "Positive Feedback" page 61 Section 42
- Workbook 2- "Feedback Systems Can Interact" page 62 Section 43

Chapter 2: The Chemistry and Energy of Life

Answer the following:

1. For each of the following (hydrogen-carbon-oxygen-phosphorus), provide the number of electrons, protons, neutrons, and the atomic number in its elemental form. Look for the information in your textbook or on a periodic table of the elements.
2. Arrange the following from strongest to weakest: van der Waals forces, covalent bonds, hydrogen bonds, ionic bonds.
3. Define cation and anion.

4. Using sodium chloride as an example, explain how electron imbalances cause atoms to interact with one another.
5. What can make two chemicals differ in their solubility in water?
6. What are functional groups and how do they interact?
7. Define macromolecules, polymerization, polymers, and monomers.
8. What is the difference between monosaccharides and polysaccharides?
9. What are 4 functional uses of carbohydrates within living organisms?
10. What are 3 functional uses of lipids within living organisms?
11. What is the difference between saturated and unsaturated fatty acids?
12. What prevents lipids from breaking down in water?
13. Steroids and other fatty substances pass readily through most cellular membranes because...
14. "Anabolic steroids" are drugs that are sometimes misused by people who want to increase their athletic prowess. Describe what is meant by "anabolic" in this term.
15. Explain whether or not abiogenesis and biogenesis were demonstrated in the Miller-Urey experiment.
16. Discuss this claim: "The Miller-Urey apparatus proves that life originated in a primordial sea."

Complete the following pages and sections from the workbooks:

- Workbook 1- "The Biochemical Nature of the Cell" page 30 Section 21
- Workbook 1- "The role of Water" page 31 Section 22
- Workbook 1- "The Properties of Water" page 32 Section 23
- Workbook 1- "Organic Molecules" page 33 Section 24
- Workbook 1- "Lipids" page 45-46 Section 34
- Workbook 1- "Phospholipids" page 47 Section 35
- Workbook 1- "Carbohydrate Chemistry" page 48 Section 36
- Workbook 1- "Condensation and Hydrolysis of Sugars" page 49 Section 37
- Workbook 1- "Polysaccharides" page 51-52 Section 39
- Workbook 1- "Cellulose and Starch" page 53 Section 40

Chapter 3: Nucleic Acids, Proteins, and Enzymes

Answer the following:

1. Identify the three major differences between RNA and DNA.
2. Explain the difference between polynucleotide and an oligonucleotide. Give an example of each.
3. Explain how 20 different amino acids permit 75,000 different proteins to be formed in humans.

4. Most proteins have at least four levels of physical structure. Briefly describe each level below, and identify where it is found in a protein molecule. (Primary, Secondary, Tertiary, and Quaternary)
5. Draw structural representations of glutamic acid and lysine. Label all carboxy groups and amino groups.
6. Draw a dipeptide composed of lysine and glutamic acid bound together by a peptide bond. Identify the peptide bond with an arrow.
7. A solution was made of water, salts, and enzymes (functional proteins). After adding a strong acid, the enzymes no longer functioned as reaction catalysts. Explain how adding the strong acid altered the proteins' structure and functions. Be sure to include the following terms in your answer: protons, three-dimensional structure, carboxyl groups, polarity, tertiary structure, and denaturation.
8. Explain how an enzyme can speed up a chemical reaction between two substrate molecules.
9. An "induced fit" occurs when enzymes change their shape as a result of binding to a substrate. Explain how binding to a substrate can cause an enzyme to change its shape.
10. Which of these three molecules - DNA, RNA, and protein - most likely operated prior to the appearance of the other two molecules? Explain how your choice of the earliest "proto-life" chemical can serve more than one function.
11. Explain the difference between cofactors and coenzymes in relation to the different functions of different proteins.
12. Regulation is an important part of homeostasis. What is the benefit of an organism being able to regulate an enzyme's activity, such as the breakdown of glucose?
13. Draw a picture and describe how allosteric regulation works.

Complete the following pages and sections from the workbooks:

- Workbook 1- "Nucleotides" page 36 Section 27
- Workbook 1- "Nucleic Acids" page 37-38 Section 28
- Workbook 1- "Amino Acids" page 39 Section 29
- Workbook 1- "Protein Structure" page 40 Section 30
- Workbook 1- "Protein Shape is Related to Function" page 41 Section 31
- Workbook 2- "Enzymes" page 28 Section 20
- Workbook 2- "Models of Enzyme Activity" page 29 Section 21
- Workbook 2- "How Enzymes Work" page 30 Section 22
- Workbook 2- "Enzyme Cofactors" page 33 Section 24
- Workbook 2- "Enzyme Inhibitors" page 34-35 Section 25