

AP Biology Summer Assignment

eBook Registration

You will need an access code and instructions to use the electronic book. Email Mr. Dang (mdang@https.us) using your HTTPS email account to obtain information about the etext.

The assignment should be done prior to the start of school in September and turned in hard copy form on the FIRST DAY of school. You may expect a test (50 pts) covering the first five chapters of the AP Biology textbook within the first week of school. All prospective students will be expected to score at least an 80 on this test as a condition to remain in AP Biology.

Assignment

- a. Read Chapters 2 through 5. For each chapter, provide a typed outline of the concepts.
- b. Provide typed answers to the following questions for each chapter:

CHAPTERS 2: The Chemical Context of Life

1. What are radioisotopes and explain why they are important to biologists?
2. Explain why water is polar, while methane (CH_4) is not, given that they are both formed through covalent bonding of hydrogen to another atom.
3. Distinguish among nonpolar covalent, polar covalent, and ionic bonds.
4. Explain why weak bonds are important to living organisms. Describe and compare hydrogen bonds and van der Waals interactions.
5. Explain how a molecule's shape influences its biological function. Provide a specific example.
6. Describe the structure and geometry of a water molecule, and explain the relationship between the polar nature of water and its ability to form hydrogen bonds.
7. Explain how water's high specific heat, high heat of vaporization, and expansion upon freezing affect both aquatic and terrestrial ecosystems.
8. Distinguish between hydrophilic and hydrophobic substances.
9. Explain how acids and bases directly or indirectly affect the hydrogen ion concentration of a solution.

CHAPTERS 3: Carbon and the Molecular Diversity of Life

10. Describe how carbon skeletons may vary, and explain how this variation contributes to the diversity and complexity of organic molecules.
11. Construct and complete a table of macromolecules as shown below:

	Role	Building Block (subunit)	Chemical Properties
Carbohydrate			
Lipid			
Protein			
Nucleic Acid			

12. Explain what distinguishes lipids from the other major classes of macromolecules.
13. Describe the unique properties, building-block molecules, and biological importance of the three important groups of lipids: fats, phospholipids, and steroids.
14. List and describe the four major components of an amino acid. Explain how amino acids may be grouped according to the physical and chemical properties of the side chains.
15. Explain what determines protein conformation and why it is important.
16. Describe the primary structure of a protein.
17. Describe the two types of secondary protein structure. Explain the role of hydrogen bonds in maintaining the structure.
18. Explain how weak interactions and disulfide bridges contribute to tertiary protein structure.
19. Using collagen and hemoglobin as examples, describe quaternary protein structure. Define denaturation and explain how proteins may be denatured.

CHAPTERS 4: A Tour of the Cell

20. What are the main differences between prokaryotic and eukaryotic cells?
21. Compare and contrast the structural and functional properties of animal and plant cells. Be sure to name and describe the common and unique structures (including organelles) in the two cell types.
22. Study Figures on pages 96 and 98. You are responsible for understanding all the structures described.

CHAPTER 5: Cellular Membranes (only pages 100 – 113)

- 23.** Describe the dual chemical nature of phospholipid molecules, and explain how this leads to the bilayer structure and selectively permeable nature of cellular membranes.
- 24.** Why would Na^+ and K^+ need transport proteins to move rapidly and in large quantity across a membrane?
- 25.** A potato cube is placed in an unknown solution and weighs significantly more when removed and weighed after one hour. Is the unknown solution hypertonic, isotonic, or hypotonic? Explain your answer.