AP Biology Summer Assignment 2025-26
Mrs. Anderson

Hello and 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. Throughout the course, you will become familiar with major recurring themes that persist throughout all topics and material. The major themes are:
I. Science as a Process
II. Evolution
III. Energy Transfer
IV. Continuity and Change
V. Relationship of Structure and Function
VI. Regulation
VII. Interdependence in Nature
VIII. Science, Technology and Society

To successfully complete the course and meet all of the required objectives, you are required to do independent work both during the summer and throughout the school year. The major themes will be reviewed in Chapter 1 of your text. I also chose Chemistry for you to cover over the summer because it will serve as a review of what you should know from having already taken Chemistry, and will allow us to get right into Biological Processes at the beginning of the year. For your summer assignment, as well as for the year, you will be using the 10th edition of *Biology* by Campbell and Reece.

Please let me know if you have ***any*** questions regarding any part of the summer assignment, do not hesitate to e-mail me. My e-mail is aanderson@oxfordasd.org.

There are three parts to this summer assignment:
1. Fill out the second page of this packet and email it to me. This is a general survey for me to learn a little about you.

2. Chapters 1- 5 will be due **the first day of class.**

Expect a test on this material within the first week of school!

Part 1- Student Information Sheet

Name: _____

Grade (for the 2025-26 school year): _____

E-mail: _____

1. Why did you sign up to take AP Biology?

2. What are your personal strengths when it comes to learning new material?

3. What causes you to struggle in a course?

4. What is the most effective way for you to prepare for a test?

5. What do plan to major in when you get to college?

6. Do you plan on taking the AP exam (**highly recommended**)?

7. How many AP courses are you enrolled in? (Please list).

Part 2
Chapter 1- Evolution, the Themes of Biology, and Scientific Inquiry

Essential Vocabulary

1. Read the chapter thoroughly, and then define the ten most important bold face words in the chapter IN YOUR OWN WORDS.

2. Fill out the following chart to summarize the seven major themes identified by the textbook:

Theme	Description
Organization	
Information	
Energy and Matter	
Interactions	
Evolution	

3. What are the three domains of life? What characteristics separate each domain?

4. In your own words, describe the three observations Darwin made to support his Theory of Natural Selection.

Scientific Inquiry.

5. Describe the difference between *inductive* and *deductive* reasoning. Why are hypotheses *only* used in deductive reasoning?

6. In the mouse camouflage experiment, what is the independent variable? The dependent variable? Explain.

7. Scientific Skills Exercise (p.22)
   Interpret the Data - Answer questions 1 and 7

Chapter 2- The Chemical Context of Life

1. Read the chapter thoroughly, and then use the following terms to create a concept map (a.k.a. mind map). Use these resources to help you create the map online (https://creately.com/lp/concept-map-maker/) or by hand.

Essential Vocabulary

Anion
Atom
Cation
Chemical Bond
Chemical Reaction
Compound
Covalent Bond (Non-polar/Polar)
Double Bond
Electron (e^-)
Electronegativity
Element
Energy
Hydrogen Bond
Ion
Ionic Bond
Isotope
Matter
Molecule
Potential Energy
Product
Proton (H^+)
Reactant
Structural/Molecular Formula
Valence Electron/Shell
van der Waals Interactions

2. Name the four most abundant elements found in living things. What are trace elements and why are they important?

3. Scientific Skills Exercise (p. 33)
   Interpret the data – explain what the graph is showing in your own words.

4. Explain electronegativity in terms of its importance in biology.

5. What are valence electrons? What is their role in forming compounds?

6. What are radioactive isotopes? Name two ways they can be used in biology.

7. Fill in the following chart with information on different bond types:

Bond Type	Description	Example of a molecule with this bond type
Covalent		
-Non polar Covalent		
-Polar Covalent		
Ionic		
Hydrogen		
van der Waals		

8. What is the relationship between molecular structure (shape) and function?

9. What is a *molecular mimic*? (Review Figure 2.16 for the example of endorphin and morphine).

10. Describe what a chemical reaction is in terms of reactants, products and equilibrium.

Chapter 3 - Water and the Life

1. Read the chapter thoroughly, and then use the following terms to create a concept map.

Essential Vocabulary

Acid	Evaporative Cooling	pH
Adhesion	Heat of Vaporization	Polarity
Aqueous Solution	Hydrogen Ion	Solution (Solute/Solvent)
Base	Hydrophilic	Specific Heat
Buffer	Hydrophobic	Surface tension
Cohesion	Hydroxide Ion	

2. Draw 4 water molecules. Label their charges and show how they would connect through hydrogen bonding.

3. Fill out the following chart with information regarding water's emergent properties:

Emergent Property	Description – Why does this property occur?	Example and Importance to Living Organisms
Cohesion Properties • Cohesion • Adhesion • Surface Tension		
Moderation of Temperature • Specific Heat • Heat of vaporization • Evaporative Cooling		
Universal Solvent		

4. Define pH. Draw the pH scale and label: strong and weak acids AND strong and weak bases.

5. Describe what a buffer is and give an example (not from the book) of how they are important for the survival of certain organisms.

4. What is ocean acidification and what causes it? How does it affect the environment?

5. Scientific Skills Exercise (p. 54)
   Interpret the data – Answer question 1

Chapter 4- Carbon and the Molecular Diversity of Life

1. Read the chapter thoroughly, and define the following vocabulary IN YOUR OWN WORDS.

Essential Vocabulary

Cis-trans isomer	Geometric Isomer	Organic Chemistry
Enantiomer	Hydrocarbon	Structural Isomer
Functional Group	Isomer	

2. Explain the significance of the Miller-Urey experiment (Figure 4.2).

3. What makes a molecule organic?

4. Explain how carbon is able to form large, complex molecules.

5. Compare and contrast structural isomers, cis-trans isomers and enantiomers. Give an example of each.

6. What are functional groups, and why are they important?

7. Fill in the following chart with information on the functional groups:

Functional Group	Formula/Structure	Compounds they are contained in	Properties
Hydroxyl			
Carbonyl			
Carboxyl			
Amino			
Sulfhydryl			
Phosphate			
Methyl			

8. Which functional group do you think is most important for life? Explain why.

9. Explain how and why ATP is converted to ADP in cells.

Chapter 5- The Structure and Function of Large Biological Molecules

1. Read the chapter thoroughly, and then use the following terms to create a concept map.

Essential Vocabulary

Amino Acid
Antiparallel (DNA)
Carbohydrate
Catalyst
Cellulose
Chitin
Cholesterol
Dehydration Reaction
Dissacharide
DNA
Double Helix
Enzyme
Fatty Acid (Un/saturated)
Gene
Hydrolysis
Insulin
Lipid
Monomer
Monosaccharide
Nucleic Acid
Nucleotide
Phospholipid
Polymer
Polypeptide
Polysaccharide
Protein Structure
Purine
Pyrimidine
RNA
Starch
Steroid

2. Describe figure 5.2, using the terms: monomer, polymer, dehydration reaction and hydrolysis.

3. What is the importance of enzymes?

4. Carbohydrates:
Name and give the formula for the most common monosaccharide.

What is the function of a monosaccharide?

Draw it – Referring to Figures 5.3 and 5.4, number (1-6) the carbons in one maltose molecule.

5. Lipids
Compare the structure of the different types of fatty acids (saturated and unsaturated).

Draw a phospholipid and describe how it helps make up a cell membrane.

Explain cholesterol and why it is crucial molecule in animals.

6. Proteins
What are the building blocks of proteins?

Name 8 protein types and briefly describe their functions.

7. Nucleic Acids
What are the building blocks of nucleic acids? Draw it below

Why is it (in DNA) that A MUST always pair with T, and G always pairs with C?

Describe the structure of DNA using the terms: antiparallel, 3' (prime), 5', double helix, and complimentary.

Name 4 differences between DNA and RNA.

8. Scientific Skills Exercise (p. 89)
Interpret the Data – Briefly describe what the table is showing and its importance