

## AP Biology Summer Assignment

### GENERAL DIRECTIONS:

- You may use the internet, library, previous biology course notes, and/or textbooks to find answers to the following questions. Please include a list of at least five resources you used to complete this assignment and attach it to the end of your essays. For all websites, include the full addresses and date(s) on which they were accessed.
- ***Please be aware that any form of plagiarism will result in penalties consistent with the CCPS Academic Dishonesty Policy.***
- Pace yourself – if you wait until the week before school opens, your answers will most likely be incomplete. Try to spend at least two hours a week working through this information.
- **MINIMUM REQUIREMENTS:** This is a college level course, and college level writing is required.
- ***WRITE YOUR ANSWERS IN PENCIL***

### Part 1: Short Answer/Essay Questions

*After outlining your thoughts, compose detailed answers for the following unless otherwise noted. All answers must be neatly hand-written and numbered, with the question restated, on separate sheets of paper:*

- 1.) Explain water's functionality by describing the following **properties**:
  - a. Adhesion
  - b. Cohesion
  - c. Surface tension
  - d. Capillary action
  - e. Polarity
  - f. pH
- 2.) Describe how the above properties work together to make water an excellent **solvent**.
- 3.) Explain how **covalent bonds**, **ionic bonds**, and **hydrogen bonds** differ. Next, explain how they are similar. Use diagrams as part of your answers and cite examples of each type of bond in a real substance.
- 4.) Complete the attached chart on **macromolecules and their monomers**. (This is not an essay question – just complete the chart.)
- 5.) Explain the functions of the following molecules:

**Carbohydrates**

- a. Glucose
- b. Glycogen
- c. Cellulose
- d. Chitin
- e. starch

**Lipids**

- a. phospholipids
- b. fats
- c. steroids
- d. oils

**Nucleic Acids**

- a. DNA
- b. RNA

6.) Explain **at least four functions of proteins** and give an example of each within your body.

7.) Write the **chemical formulas** for the following: (This is not an essay question)

Glucose	
Cellulose	
Any amino acid	
Lipid	
Phospholipids	
Nucleotide	

8.) Write the chemical formulas for the following **functional groups**: (This is not an essay question)

Hydroxyl	
Amino	
Carbonyl	
Carboxyl	

9.) Describe the role of **enzymes** in chemical reactions. In your answer, include:

- Definition of a biological enzyme
- Structure and function of an active site
- Enzyme's role in activation energy
- At least three factors that affect enzyme function

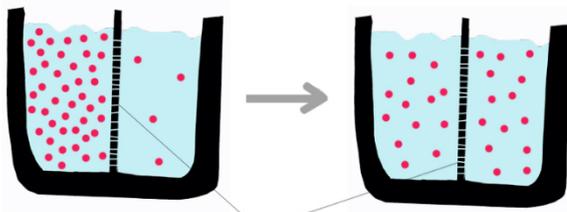
10.) Complete the attached chart on **cell organelles**. (This is not an essay question.)

11.) Draw detailed diagrams for the following cell types. Using the diagrams to enhance your essay, **explain differences** between these pairs of cells:

- How do prokaryotes and eukaryotes differ structurally?
- How do plant and animal cells differ structurally?

12.) First, draw and label a diagram of the **cell membrane**. Next, in essay form, explain the function of each molecule within the membrane.

13.) Define and explain the following transport processes. For processes c-h, be sure to include if each is an **active** or **passive** process:



- Active Transport (basic definition)
- Passive Transport (basic definition)
- Osmosis
- Diffusion
- Endocytosis
- Exocytosis
- Pinocytosis
- Phagocytosis

14.) Explain the differences between **mitosis and meiosis**. You may use diagrams as part of your essay explanation.

- 15.) Draw a diagram of mitosis and a diagram of meiosis. In your own words, explain what happens in **each phase of nuclear division** (prophase, metaphase, anaphase, and telophase). Explain **similarities** between the stages of mitosis and meiosis as well as unique **differences**.
- 16.) Explain how **cytokinesis and telophase** differ in their functions.
- 17.) The cell cycle encompasses more than mitosis or meiosis. Describe all **five stages** of the cell cycle and explain the role of each stage in cellular development and function.
- 18.) A. Cellular respiration includes the stages of glycolysis, the Krebs Cycle, and the electron transport chain. Complete the following chart. (This is not an essay question.)

Stage Name	Reactants	Products
Glycolysis		
Krebs Cycle		
Electron Transport Chain		

B. For each stage listed above, list the number of **ATP, NADH, CO<sub>2</sub>, H<sub>2</sub>O, and/or FADH created**. (Not every molecule is created in each stage)

- 19.) Explain the **two steps of photosynthesis**. Include the reactants and products of each step. (This is not an essay question – use the chart below to answer.)

Stage Name	Reactants	Products
Light-Dependent		
Calvin Cycle		

- 20.) What **role** does **water** play in the light-dependent reactions of photosynthesis?
- 21.) What **role** does **light energy** play in photosynthesis?
- 22.) What is **carbon fixation**? Where does it occur, and why?
- 23.) Using a comparison chart or Venn diagram, explain the **similarities and differences** between photosynthesis and cellular respiration.
- 24.) Draw and label **DNA**. (You may not copy this diagram directly from a source to get credit.)
- 25.) Describe how **DNA replication** occurs. After describing the process, explain how DNA replication differs from protein synthesis.

- 26.) Define the following **genetic terms**:
- Dominant trait
  - Recessive trait
  - Sex-linked inheritance
  - Pedigree chart
  - Punnett Square
  - Nondisjunction
  - Mutation
  - Multiple Alleles
  - Codominance
  - Incomplete Dominance
  - Crossing-over
- 27.) List and describe at least four different types of **mutations**.
- 28.) Explain at least **four human disorders** that result from each of the following:
- Chromosomal structural alteration (explain 4)
  - Chromosomal number alteration (explain 4)
- 29.) Explain how **natural selection**, the major mechanism for evolution, occurs. Cite an example of a **modern organism** whose current traits can be tracked through natural selection over many eras.
- 30.) Describe at least **four evidences for evolution** used by modern scientists.
- 31.) Name all of the **biomes** found on Earth. Briefly describe the unique characteristics of each.
- 32.) **Define** the following terms:
- Ecology
  - Ecosystem
  - Producers
  - Consumers
  - Decomposers
  - Population
  - Community
  - Trophic Levels
  - Energy Pyramid
  - Abiotic Factors
  - Biotic Factors
- 33.) List the **major organ systems** of the human body. Describe the function of each organ system. Include the major organs of each system in your essay and how their functions help the system work as a whole.

**Part 2: Corresponding Charts**

*Use these diagrams to answer questions 4 and 10.*

Organelle Chart for Question #10

Cell Part Name	Location	Function	Unique Properties	Found in Plant/Animal Cell, or Both?
Cell Membrane				
Nucleus				
Nucleolus				
Chromatin				
Chromosomes				
Endoplasmic Reticulum				
Ribosomes				
Plastids				
Chloroplasts				

Leucoplasts				
<b>Flagella</b>				
<b>Cilia</b>				

(Keep going →)

Macromolecule chart for question #4

<u>Molecule Category</u>	<u>Elements</u>	<u>Organic or Inorganic?</u>	<u>Building Blocks</u>	<u>At least 2 examples</u>	<u>At least 2 functions</u>
					<ol style="list-style-type: none"> <li>1. Form cell membranes</li> <li>2. Long term energy storage</li> <li>3. Protection and Insulation</li> </ol>
				<ol style="list-style-type: none"> <li>1. Enzymes</li> <li>2. Collagen</li> <li>3. Insulin</li> <li>4. Antibodies</li> </ol>	
Nucleic Acids					
			Monosaccharides (simple sugars)		
	Hydrogen and oxygen		N/A	N/A	
	<u>Must have</u>		N/A	Vitamins A, C, D, and K	
Minerals	Almost any		N/A		
					<ol style="list-style-type: none"> <li>1. Speed up chemical reactions</li> <li>2. Lower activation energy</li> </ol>