Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_

**Unit 1 Review Packet: Introduction to AP Biology and Biochemistry**

**Textbook Chapters:** 2 (Chemistry of Life), 3 (Properties of Water), 4 (Carbon Chemistry), and 5 (Macromolecules)

**Standards and Measures of Success:** see Unit 1 Objectives list distributed mid-unit

**Review Resources:** Notes, Reading Guides, Macromolecule Modeling Worksheet, Ch. 2 and 3 Quiz

**Test Format:** 36 multiple choice questions and three short answer questions (you should be able to answer these in approximately 4-6 sentences)

**Key Vocabulary:**

|  |  |  |
| --- | --- | --- |
| Atom  Proton/Neutron/Electron  Electronegativity  Ion  Isomer  Valence Electrons  Polar  Hydrophilic / Hydrophobic Hydrogen bond Covalent bond  Ionic Bond Van der Waals Attraction Cohesion/Adhesion  Surface tension | Capillary Action/Transpiration Specific heat Heat of vaporization Evaporative cooling Solvent Carbon skeleton  Isomers (know all types) Functional groups (know all types) pH Acid/Base Buffer  Homeostasis Polymer/Dehydration reaction | Hydrolysis Mono/Di/Polysaccharide Starch/Glycogen/Cellulose Glycerol/Fatty Acids  Triglyceride Saturated/Unsaturated Phospholipid  Steroid Amino acid Primary/Secondary/Tertiary/  Quaternary Protein structure  Denaturation Nucleotide |

**Sample Questions:** For this unit, I will be giving you sample questions for each topic. In the future, we will write these questions as a class.

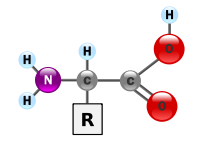
1. Which bonds are found within/inside a single molecule, and which are found between molecules?
2. Explain how the polarity of a covalent bond has to do with the electronegativity of the two atoms involved in that bond.
3. Do carbon and hydrogen atoms form polar covalent or nonpolar covalent bonds? How do you know?
4. Explain the process involved in the formation of van der Waals attractions. Are they strong or weak bonds?
5. How does an ionic bond differ from a covalent bond?
6. How is pH related to hydrogen ion concentrations? When the pH value goes up by one, what happens to the hydrogen ion concentration?
7. What is a buffer, and how does it help to regulate pH values? Provide an example of a buffer in a living organism.
8. Describe how the polarity of a water molecule (regions of positive and negative charge) allows hydrogen bonding between different water molecules.
9. Explain how polarity and hydrogen bonding enable the following properties of water.
10. Cohesion
11. Adhesion:
12. Surface Tension:
13. High Specific Heat
14. High Heat of Vaporization
15. Low Density as a Solid
16. Which type of substance—polar or nonpolar—is most soluble in water (dissolves in water)?
17. What types of bonds are found between hydrogen and oxygen atoms in a water molecule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What types of bonds are found between hydrogen and oxygen atoms of TWO DIFFERENT water molecules? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain how the addition of a hydroxyl group (OH) to a hydrocarbon chain makes the molecule more soluble in water?
2. Draw a picture of the dissociation of NaCl (an ionic compound) in water. To help you out, I’ve gotten you started by breaking NaCl into its component ions—Na+ and Cl-. Show how water molecules surround each of the ions.

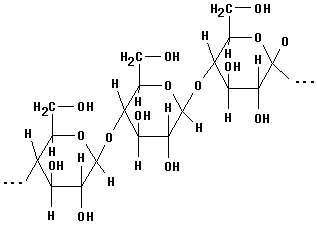
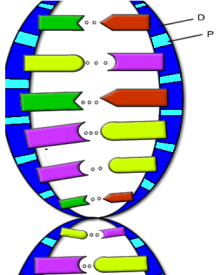
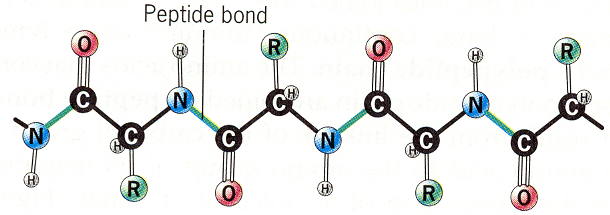
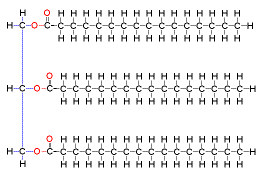
**Cl-**

**Na+**

1. Explain how carbon’s electron configuration makes it an ideal atom for creating long chains, such as we see in a fatty acid.
2. Provide an example of the following types of isomers: geometric, structural, and enantiomers. Are the different structures of isomers biologically significant?
3. Hexose sugars have \_\_\_\_(#) carbons. Glucose, an example of a hexose sugar is a monosaccharide / disaccharide / polysaccharide (circle one).
4. Explain the **structural** AND **functional** differences between the following types of polysaccharide – cellulose, starch, and glycogen.
5.  Identify each part of the amino acid pictured to the right.
6. Explain the process of polymerization / dehydration synthesis, making sure to describe the role of water molecules in the process.
7. Explain the process of hydrolysis, making sure to describe the role of water molecules in the process.
8. Identify the locations and types of bonds involved in each of the four levels of protein structure.

|  |  |
| --- | --- |
| **Level** | **Locations and Types of Bonds** |
| Primary |  |
| Secondary |  |
| Tertiary |  |
| Quaternary |  |

1. Identify each of the following molecules as a carbohydrate, lipid, nucleic acid, or protein.

1. Explain the meaning of the following statement with regard to the four macromolecules: **structure determines function.**
2. What happens to a protein molecule when it denatures? How does this affect the protein’s ability to perform its specific function?