AP Biology Summer Assignment 2022

Text: *Biology in Focus*, Third Edition. Campbell, Urry, Cain, Wasserman, Minorsky 2020

Happy summer and welcome to AP Biology! I am looking forward to meeting you all, and am excited to journey through AP Bio with each of you!

AP Biology is a fast-paced course that covers a lot of content. The units are as follows:

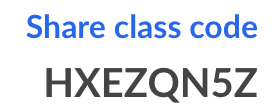
Unit 1: The Chemistry of Life  
Unit 2: Cell Structure and Function  
Unit 3: Cell Energetics  
Unit 4: Cell Communication and Cell Cycle Unit 5: Heredity and Genetics  
Unit 6: Gene Expression and Regulation

Unit7: Natural Selection and Evolution

Unit 8: Ecology

The content as designated for the AP Biology curriculum by the college board is a lot to get through in the course of one academic school year. To ensure that we have enough time to cover all content, and have time to review, by the AP test, your summer assignment will cover units 1 using Khan Academy. Khan Academy is a online platform that offers great content for many subjects. The first thing you will need to do is create an account on the website. The account is free, and gives you access to tons of review material for many subjects. Once you create your account, you will need to join our class. To do this:

1. Click on your name in the top right corner, and select the tab “Learner Home.
2. In the tool bar on the left, select “teachers:
3. It will take you to a page titled “My teachers and tutors”. Click on the tab that says “Enter a class code”, underneath Join a class.
4. Enter the following code:



1. Select to join the class “AP Biology 1”.
2. When you return to your “Learner Home” page, you will be able to see the assignments posted for Unit 1.

The following packet is to be used to fill out the notes as you watch the videos and read the articles. The site takes note of which articles you read and videos you watch. You are required to do all of these in the Unit 1 assignment. Additionally, you must do all of the practice activities, quiz 2 (only 5 questions), and the unit test (only 9 questions). This assignment will be due at midnight on August 29th.

The scoring for the summer work is as follows:

2 points for each task (video/reading): 37 total task: 74 points

3 points for each exercise: 5 total exercises: 15 points

5 points for each quiz: 2 quizzes: 10 points

20 points for unit test

Total points for summer assignment: **120 points**

(yes I know the points only add up to 119 but that annoyed me so I will give everyone a free point to make it 120:)

If you have any questions, feel free to email me! I am so excited to start this school year with you all!!!!

Ms. Grob

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**Chemistry of Life**

**Hydrogen Bonds in Water**

Water owes its unique properties to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of its molecules and, specifically, to their ability to form hydrogen bonds with \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.

A water molecule consists of two \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ bonded to an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ and its overall structure is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Because oxygen is more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -electron greed-, than hydrogen, the O atom \_\_\_\_\_\_\_\_ electrons and keeps them away from H atoms. This gives the oxygen end of water a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_, while the hydrogen end has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.

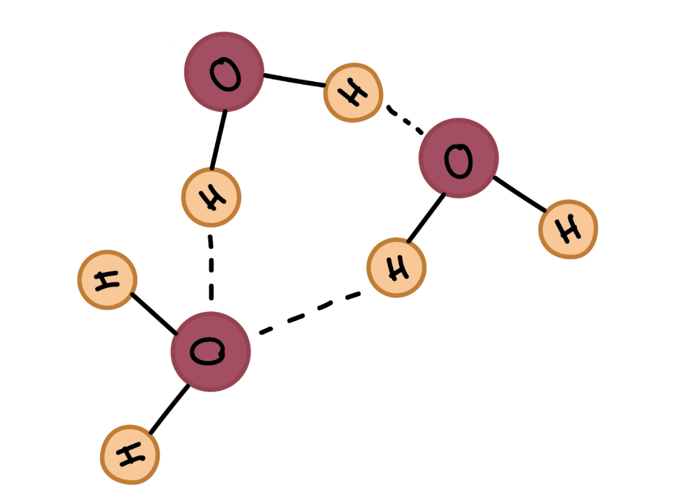
Water is classified as a **polar molecule** because….

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Thanks to their \_\_\_\_\_\_\_\_\_\_\_\_, water molecules happily attract each other.

These attractions are an example of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, weak interactions that form between a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a partial positive charge and a more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atom, such as oxygen.

Label the image below with the following: partial negative charged, partial positive charges, covalent bond, hydrogen bond.



A charged or polar substance that interacts with and dissolves in water is said to be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: hydro means "\_\_\_\_\_\_\_\_\_\_\_," and philic means "\_\_\_\_\_\_\_\_\_\_\_."

In contrast, nonpolar molecules like \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ do not interact well with water. They separate from it rather than dissolve in it and are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: phobic means "\_\_\_\_\_\_\_\_\_\_\_\_."

**Cohesion and adhesion of water**

Explain the following properties of water, and give an example of them occurring in nature (ex: cohesion causes the dome-like shape above the rim of a glass).

Cohesion:

Surface Tension:

Adhesion:

Capillary action (include a drawing of a meniscus):

Density of ice and water (aka why does ice float instead of sink):

High specific heat capacity:

High heat of vaporization:

Evaporative cooling:

**Matter, elements and atoms**

The term **\_\_\_\_\_\_\_\_\_\_\_\_** refers to anything that occupies \_\_\_\_\_\_\_\_\_ and has \_\_\_\_\_\_\_\_\_\_—in other words, the “stuff” that the universe is made of. All matter is made up of substances called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which have specific \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ properties and cannot be broken down into other substances through ordinary chemical reactions.

An atom consists of two regions. The first is the tiny **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, which is in the center of the atom and contains positively charged particles called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and neutral, uncharged, particles called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. The second, much larger, region of the atom is a “cloud” of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, negatively charged particles that orbit around the nucleus. The attraction between the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ holds the atom together. Most atoms contain all three of these types of **\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_**—protons, electrons, and neutrons.

**Carbon and hydrocarbons**

Carbon atoms make up the backbone of many important molecules in your body, including \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_\_\_, and \_\_\_\_\_\_\_.

These complex biological molecules are often called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; they’re also classified as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, which simply means that they contain \_\_\_\_\_\_\_\_\_ atoms.

**The bonding properties of carbon**

Why is carbon so popular for making molecular backbones?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Carbon’s ability to form bonds with four other atoms goes back to its \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_. Carbon has an atomic number of \_\_\_\_ (meaning six protons, and six electrons as well in a neutral atom), so the first two electrons fill the\_\_\_\_\_\_ \_\_\_\_\_ and the remaining four are left in the \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_, which is the \_\_\_\_\_\_\_\_\_\_\_\_\_(outermost) shell. To achieve stability, carbon must find \_\_\_\_\_\_\_\_\_\_\_ more electrons to fill its outer shell, giving a total of eight and satisfying the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ rule. Carbon atoms may thus form bonds to as many as \_\_\_\_\_\_\_ other atoms.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are organic molecules consisting entirely of carbon and hydrogen.

**Functional Groups**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are chemical motifs, or patterns of atoms, that display consistent “\_\_\_\_\_\_\_\_\_\_\_\_” (properties and reactivity) regardless of the exact molecule they are found in.

Fill in the following chart of the functional groups.



**Introduction to Biomacromolecules**

Some atoms become more stable by \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_ an entire electron (or several electrons). When they do so, atoms form **\_\_\_\_\_\_\_\_\_**, or charged particles.

**\_\_\_\_\_\_\_\_\_\_\_\_\_** are positive ions formed by losing electrons.

Example:

Negative ions are formed by electron gain and are called **\_\_\_\_\_\_\_\_\_\_\_.**

**Example:**

When one atom loses an electron and another atom gains that electron, the process is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_** are bonds formed between ions with opposite charges.

Another way atoms can become more stable is by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons (rather than fully gaining or losing them), thus forming **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**.

Draw a picture of atoms showing an ionic bond, and a picture of atoms showing a covalent bond.

There are two basic types of covalent bonds: polar and nonpolar. In a **\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**, the electrons are \_\_\_\_\_\_\_\_\_\_\_\_ shared by the atoms and spend more time close to one atom than the other. Because of the unequal distribution of electrons between the atoms of different elements, slightly \_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_) and slightly \_\_\_\_\_\_\_\_\_ (\_\_\_) charges develop in different parts of the molecule.

**\_\_\_\_\_\_\_\_\_\_\_ covalent bonds** form between two atoms of the same element, or between atoms of different elements that share electrons more or less \_\_\_\_\_\_\_\_\_\_.

**Introduction to macromolecules**

Most large biological molecules are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, long chains made up of repeating molecular subunits, or building blocks, called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Carbohydrates, nucleic acids, and proteins are often found as \_\_\_\_\_\_\_\_\_ polymers in nature. Because of their polymeric nature and their large (sometimes huge!) size, they are classified as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, big (macro-) molecules made through the joining of smaller subunits.

Large biological molecules often assemble via **\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** reactions, in which one monomer forms a covalent bond to another monomer (or growing chain of monomers), releasing a \_\_\_\_\_\_\_\_\_ molecule in the process.

Polymers are broken down into monomers via **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** reactions, in which a bond is broken, or lysed, by addition of a \_\_\_\_\_\_\_\_ molecule.

**Properties, Structure, and function of biomolecules**

On the following page, fill in the table, using the videos and articles about the macromolecules as completely as possible.

