

Learning Target: I can construct arguments supported by evidence to relate the structure of macromolecule (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes.

Biology Milestones Review – Macromolecules part 1



Instructions: Research and use your notes to fill in the information about each of the following macromolecules.

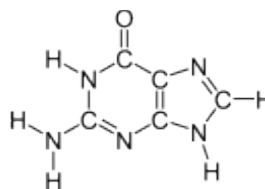
Carbohydrates A carbohydrate is a simple _____ or a molecule composed of two or more simple sugars. In general, the ratio of _____ atoms is _____ in a _____ molecule. There are three classes of carbohydrates: monosaccharides, oligosaccharides, and _____. Glucose, sucrose, glycogen, and _____ are examples of carbohydrates. In all living organisms, carbohydrates are broken down to provide usable chemical _____ for cells. In plants, the carbohydrate _____ is used for structural support in making _____.

Mono means “_____.” _____ means “sugar.” Put the two together and you have _____ unit. Oligo means “few.” An _____ is a short chain of two or more covalently bonded sugar units. Poly means “_____.” A polysaccharide is a straight or branched chain of sugar units in which there may be _____ of the same kind or different kinds of sugars bonded to one another.

Lipids are organic compounds that have more _____ (C-H) bonds and fewer _____ atoms than carbohydrates. They are extremely important for the proper functioning of organisms. Lipids are commonly called _____. They are insoluble in _____ because of the _____ of the molecules. Lipids are used by cells for _____ storage. Lipids are also a major component of _____. Waxes are long chain _____ attached to an alcohol. An example is cutin in plants. It helps the plants retain water. Have you ever tried to put oil in water? They don't _____. Oil is a type of _____.

Lipids are molecules such as _____. The most common _____ in your diet are probably fats and oils. Fats are _____ at room temperature, whereas oils are _____ at room temperature. Animals use fats for _____ storage and to keep _____. Plants use oils for long-term energy storage. When preparing food, we often use animal fats, such as butter, or plant oils, such as olive oil or canola oil. There are many more type of lipids that are important to life. One of the most important are the _____ that make up the protective outer membrane of all cells. These lipid membranes are impermeable to most _____ soluble compounds.

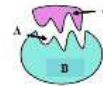
Proteins belong to the most diverse group. They are large, complex _____ essential to all life. They are composed of chains of _____. These amino acids are made of _____ and sometimes sulfur. _____ are important in muscle contraction, transporting oxygen in the blood, and the immune system. Proteins, like lipids, are an important component of cell membranes. Collagen, enzymes, hemoglobin, insulin, and antibodies are examples of _____. Proteins are molecules that have many different functions in living things. All proteins are made of monomers called _____ that connect together like beads on a necklace. There are only 20 common _____ needed to build _____. These amino acids form in _____.



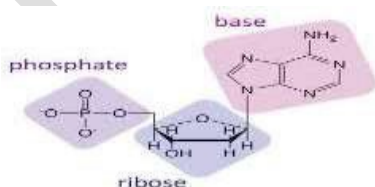
thousands of different combinations, making about 100,000 or more unique proteins in humans. Proteins can differ in both the number and order of _____. It is the number and order of amino acids that determines the shape of the protein, and it is the shape (structure) of the protein that determines the unique _____ of the protein. Small proteins have just a few hundred amino acids. The largest proteins have more than 25,000 _____. It's important for you and other animals to eat food with protein, because we cannot make certain _____ on our own. You can get proteins from plant sources, such as beans, and from animal sources, like milk or _____. When you eat food with protein, your body breaks the proteins down into individual _____ and uses them to build new _____. You really are what you eat!

Enzymes are the biological substance (_____) that act as _____ and help complex reactions occur everywhere in life. A catalyst is a substance that _____ the rate of a chemical reaction by _____ the amount of energy needed to start that reaction. This is called lowering the _____ energy. **ACTIVATION ENERGY** can be thought of as a hill that must be gotten over. When a catalyst acts, it _____ the energy required to get over the HILL and the reaction can proceed. An _____ is an organic catalyst meaning that it is a protein that catalyzes reactions in living organisms. Enzymes _____ chemical reactions in the body. Most reactions in the body require _____.

Enzymes can malfunction or become _____ for two main reasons. #1 _____: Raising temperature generally _____ a reaction, and _____ temperature slows down a reaction. However, extremely _____ temperatures can cause an **enzyme** to lose its shape (____) and stop working. #2 pH: Each **enzyme** has an optimum pH range. Changing the _____ outside of this range will _____ **enzyme** activity because the enzymes structure will begin to break apart and _____. The enzyme will no longer function properly because it has lost its _____.



Nucleic acids are long chains of _____. Nucleotides are made of a sugar, a nitrogen-containing **base**, and a _____. _____ (**DNA**) and _____ (**RNA**) are the two main _____. DNA is a _____ nucleic acid. DNA is the molecule that stores our _____. The single-stranded RNA is involved in making _____. _____ (**adenosine triphosphate**), known as the "energy currency" of the cell, is also a nucleic acid. Nucleic acids are complex macromolecules that _____ in cells in the form of a code. To form nucleic acids, four different kinds of _____ are strung together. A nucleotide is a small organic compound that consists of a five-carbon sugar, a _____-containing base, and a phosphate group. Nucleotides are the structural units of adenosine phosphates (____), nucleotide coenzymes, and nucleic acids. Examples of nucleotides include ATP, NAD⁺, and NADP⁺, and examples of nucleic acids include _____.



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