PART 2. THE CHEMICAL BUILDING BLOCKS OF LIFE… THE GRAND SCHEME

In part 1 we learned that all matter is composed of atoms and the atoms of organisms are arranged into large, complex macromolecules. Life is built upon these macromolecules. They store energy for later use, form membranes, provide structural support, help control chemical reactions within the organism, and store the hereditary information that is used to direct every aspect of the organism's life and is passed on to the next generation. The four major categories of macromolecules are carbohydrates, lipids, proteins, and nucleic acids.

1. PROTEINS (pg. 71-80) and ENZYMES (pg. 96-100)
   Define what a **protein** is and/or of what it is made.
   (Being in favor of young people is not a valid answer)
   Define all the different **functions** that a protein may have.

   NUCLEIC ACIDS (pg. 80-85)
   Define what a **nucleic acid** is and/or of what it is made. How many different kinds of nucleic acids can you name? (Optional: Talk briefly about which you think came first, DNA or RNA & why?)

   Some **KEY TERMS** in the Chemistry of Life.
   Have one member, each, of your Learning Community, in turn, define one of these terms :
   macromolecules
   polymer
   enzyme
   active site
   peptide
   polypeptide
   cofactor
   amino acid
   peptide bond
   conformation
   primary structure, secondary structure, tertiary structure, quaternary structure,
   disulfide bridges
   enzyme inhibitors
   chaperone proteins (heat shock proteins)
   globular proteins
   allosteric regulation
   fibrous proteins
   nucleotides
   phosphodiester bond
   purines
   pyrimidines
   double helix

2. Match the following numbers with the appropriate statement. A number may be used more

Numbers: 0, 1, 2, 3, 4, 5, 6, 12, 20

Statements:

a. the number _____ of different nitrogenous bases in DNA
b. the number _____ of different chemical classes of amino acids
c. the number _____ of chains of nucleotides in a DNA molecule
d. the number _____ of different nitrogenous bases in RNA
e. the number _____ of different amino acids found in proteins
f. the number _____ of chains of nucleotides in most RNA molecules

A LEARNING CHECKLIST

1. What are the building block unit of proteins? How do these building blocks differ from each other?
2. List three structural differences and one functional difference between DNA and RNA.

PROVIDE THE APPROPRIATE TERM TO COMPLETE EACH STATEMENT.

1. The most abundant protein in your body is collagen which is a type of _____ protein.
2. _____ amino acids have side groups that contain an organic ring structure.
3. _____ refers to a protein losing its three dimensional structure.
4. Hereditary information is stored in macromolecules called _____?

Each Learning Community member, in turn, should briefly answer one of the following questions.

1. The double helix structure of DNA has been compared to a spiral staircase. What makes up the sides of the staircase and what the steps? What holds these parts together?
2. What determines a protein's conformation?
3. Can we use DNA and Proteins to monitor the progress of evolution? If so, How?
4. How does a cell's chemical and physical environment affect enzyme activity?
5. Why would a change in pH cause a protein to denature?
6. A denatured protein may reform to its original functional shape, when returned to its normal environment. What does this indicate about a protein's conformation?
7. Why would transfer to an organic solvent (such as alcohol) cause denaturation of a protein?