AP BIOLOGY SUMMER ASSIGNMENT  
Mrs. Stacey Finnerty (2015-2016)

*This is NOT a group assignment.  All work must be completed individually!!

1. **Expectations**- This course is designed to be the equivalent of a college biology course. The level of expectation is **very high** so you must be committed to this course. You are expected to read the textbook every night, take notes from the textbook and in class, complete homework assignments, design, conduct and present data from lab investigations, and complete unit exams consisting of multiple choice, short answer and free response essay questions. You must be truly committed and the course is designed to prepare you for your college level coursework and take pass the AP Biology Exam.

2. **Obtain a textbook!**

   **Biology, 8th Edition, Campbell/Reece, Publisher: Benjamin Cummings**
   AP Biology textbooks are usually available at the SCHS library for summer checkout the first week of summer vacation. Please check with the library to obtain the exact times and dates. The Campbell Biology text is excellently written, thorough, and up-to-date. SCHS uses the 8th edition, which is available through used book sites on the Internet (i.e. Amazon) for extremely reasonable prices, especially if you purchase a used copy (without the CD, which you do not need). I have the 6th edition class sets in my room as well. Purchasing your own text allows you to highlight and annotate it, as you will find your reading notes to be invaluable throughout your college and professional life.

3. **Additional Resources:**
   
   - Mrs. Finnerty’s School Loop Webpage has Prezi’s presentations, Bozeman podcasts, and Power Points.  
     [https://sctritons.schoolloop.com/cms/page_view?d=x&pid=&vpid=1211910103039&group_id=1211910103013&no_controls=t](https://sctritons.schoolloop.com/cms/page_view?d=x&pid=&vpid=1211910103039&group_id=1211910103013&no_controls=t)
   
   - OPEN STAX Biology Textbook- Free Textbook online  
     [http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd@9.85:1/Biology](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd@9.85:1/Biology)  
     [https://openstaxcollege.org/textbooks/biology/pdf](https://openstaxcollege.org/textbooks/biology/pdf)
   
   - Mr. Anderson’s Videos  

4. **BIOCHEMISTRY UNIT assignment:** Complete the attached assignment using your textbook and/or any of the resources above to complete the attached Pre-Discussion Questions – PDQ’s. It is due on the first day of school and we will be testing on this material within the first two weeks. This assignment should be review for the most part, and will give us a huge jump on the course curriculum when we start in August.

5. **RELAX AND ENJOY YOUR SUMMER!** Get prepared for an intense, challenging, exciting and rewarding year in AP Biology! I promise that if you put in the necessary time, success will be yours!! **If you have questions over summer contact me at e-mail at slfim8@gmail.com!!!!**
AP Biology PDQ (Pre-Discussion Questions): BIOCHEMISTRY

PDQ Instructions

- Interact with the PREZI presentations listed under each topic below.
- Use the presentation and your textbook to handwrite on your own paper the answers the listed “Questions to answer”.
- Sketch any figures listed on plain white paper with clear title, labels and description.
- Make sure you understand the “Things you should make sure you understand”.
- Use supplemental resources listed to help answer questions.
- Write down any questions that you have about the material for class discussion in class.
- All links can be found on my school loop web page and assignment.

Textbook Reading: CH 2-5, and 8

Supplementary Resources:

Videos by Paul Anderson: http://www.bozemanscience.com/ap-biology/
014-environmental-matter-exchange 048 - Enzymes
042 - Biological Molecules Water: A Polar Molecule

Crash Course: Biological Molecules - You Are What You Eat: Crash Course Biology #3

I. TOPIC: CHEMISTRY, WATER, CARBON


Part 1: Chemistry

Questions to answer:
1. How common are the elements that living systems are made out of?
2. Explain the relationship between matter and energy.
3. Why do atoms bond?
4. What is the cause of molecular polarity?
5. How does the type of bonds present in a substance influence the chemical and physical properties of that substance?
6. If the breaking of bonds requires an input of energy (which it always does), how is it possible that some chemical reactions (like the burning of gasoline, for instance) can release energy into the environment?
7. How do the properties of a compound like H2O or NaCl illustrate the concept of emergent properties?
8. Why are radioactive elements useful for the study of biological systems?

Things you should make sure you understand:
- The biological utility of S,P,O,N,C,H, along with Ca, K, Na, & Cl.
- How energy interacts with atoms.
- The differences between ionic and covalent bonds.
- How to identify if a substance is covalent (molecular) or ionic.
- Basic differences between covalent and ionic substances.
- How to identify if a molecule is polar or non-polar.
- How to determine the intermolecular forces that will exist in a substance.
- The cause of radioactivity.

Part 2: Water

Questions to answer:
1. Why are living things mostly made of water?
2. Draw a water molecule and indicate its polarity.
3. Explain how the structure of water molecules account for each of the following properties:
   a. Cohesion
   b. Adhesion
   c. High Specific Heat
   d. Floating Ice
   e. Good Solvent Properties
   f. Dissociation of water molecules

4. Explain 1 way that each of the above properties are useful for living systems.

5. Explain the relationship between the dissociation of water and the pH of a particular aqueous solution.

Things you should make sure you understand:
- The absolute need for water in terrestrial living systems.
- How the properties of water demonstrate the concept of emergence.
- How to determine the pH of a solution if given the concentration of hydronium or hydroxide ions.

Part 3: Carbon

Questions to answer:
1. Why is carbon central to the structure of all biological molecules?
2. Explain the concept of an isomer. As the number of carbon atoms in a molecule increases, what happens to the number of possible isomers of that molecule?
3. Why is it significant that all biological systems use L-amino acids and D-sugars?
4. Why are molecules that contain carboxyl groups acidic?
5. Why are molecules that contain amino groups basic?
6. How large a change to the structure of an organic molecule has to be made for that molecule to have a major difference in its effect on a living system?
7. How do Carbon, Nitrogen, Phosphorous and Sulfur cycle through the ecosystem? Include which element it is found in.

Things you should make sure you understand:
- Why carbon is such a versatile atom.
- The different types of isomers that can exist.
- The properties of all of the functional groups in question #4.

II. TOPIC: MACROMOLECULES
Prezi: https://prezi.com/-r8c-fscmffx/ap-bio-matter-2-macromolecules/

Part 1: Background, Carbohydrates, & Lipids

Questions to answer:
1. How are macromolecule polymers assembled from monomers? How are they broken down?
2. How can you tell a biological molecule is a carbohydrate?
3. Explain the relationship between monosaccharides, disaccharides, and polysaccharides.
4. Why are starch and glycogen useful as energy storage molecules, while cellulose is useful for structure and support? Why isn’t cellulose easily broken down?
5. How do herbivores solve the problem of cellulose digestion?
6. How can you tell a biological molecule is a lipid? Where are they found in an living organism?
7. Chemically, what is the difference between a saturated fat and an unsaturated fat? How does this difference affect the properties of the molecules?
8. How are triglycerides, phospholipids, and steroids similar? How do they differ?

Things you should make sure you understand:
- The chemical differences between the carbohydrates and lipids described in this presentation.
- The roles played by carbohydrates and lipids in biological systems.
Part 2: Proteins & Nucleic Acids

Questions to answer:
1. Why are proteins the most complex biological molecules?
2. Draw the structure of a general amino acid. Label the carboxyl group, the amino group, and the variable (‘R’) group.
3. Draw the formation of a peptide bond between two amino acids.
4. How does the structure of the ‘R’ group affect the properties of a particular amino acid?
5. Sketch (p 82-83, fig. 5.28) and describe each of the following levels of protein structure. Include the bonds that contribute to them:
   a. Primary
   b. Secondary
   c. Tertiary
   d. Quaternary
6. How can the structure of a protein be changed (“denatured”)?
7. Draw a nucleotide. Label the phosphate, sugar, and nitrogenous base.
8. Explain the three major structural differences between RNA and DNA.
9. List 4 people that discovered the structure of DNA.

Things you should make sure you understand:
- How the structure of proteins and nucleic acids allow for their biological functions.
- How both protein structure and nucleic acid structure illustrate the concepts of emergence and combinatorial complexity.
- Why directionality and sequence are crucial for the structure and function of proteins and nucleic acids.
- How nucleic acids and proteins function in storage and expression of biological information.

III. TOPIC: ENZYMES
Prezi: https://prezi.com/eev4gdo5qeeq/ap-bio-energy-3-cellular-energetic-practice/

Questions to answer:
1. How do enzymes catalyze chemical reactions (don’t just say “they lower the activation energy”, give me specific mechanisms).
2. Sketch and Label the Energy Reaction Graph (p153, fig. 8.15)
3. Explain the significance of reaction coupling in living systems. How is it used, and what does it allow living systems to do that they would not be able to do otherwise?
4. Why does the activation energy of many reactions in living systems need to be reduced for living systems to function?
5. Compare the “lock-and-key” model of enzyme function with the “induced fit” model of enzyme function.
6. Explain how each of the following affect enzyme structure and function:
   Include a graph of substrate, temp and pH (p155, fig. 8.18)
   a. Substrate concentration
   b. temperature
   c. pH
   d. salt concentration
   e. cofactors and coenzymes
7. Explain the difference between a competitive inhibitor and a non-competitive inhibitor.
8. How is feedback regulation of enzyme reaction related to allosteric regulation of enzyme function?

Things You Should Make Sure You Understand:
- Why enzymes are classified as catalysts.
- Specific examples of enzymes used in all major metabolic pathways in living systems, and the reactions that they catalyze.