

Welcome to AP Biology!

You have chosen to begin an adventure that is both fascinating and rewarding. You are studying biology at a time of many scientific advances. Perhaps more knowledge is being realized today in biology than in any other area of science. AP Biology is an intensive and comprehensive survey course that follows a strict outline and schedule. It was designed by a group of college professors and high school science teachers to be equivalent to an introductory college biology course. You can download a complete description of the course that the College Board endorses at this

website: http://www.collegeboard.com/student/testing/ap/sub_bio.html?biology

This course will be taught using lectures, discussions, and laboratory investigations. It will be rigorous, demanding and require a significant portion of your time beginning this summer.

AP Biology entails a lot of reading, identification of terminology, memorization, understanding of difficult concepts, and (most of all) personal motivation for scientific knowledge and inquiry. You must be able to follow a rigorous schedule, work independently, and in groups, have a good grasp of general biology, possess good writing skills, be able to think critically, and genuinely enjoy science.

We use a college text, college labs, and a comprehensive college curriculum. Therefore, the pace of this class will be rapid; at times it will boggle your mind how quickly we will move. It is vitally important that you consistently keep up to date with the text reading, class work, lab assignments, etc. Much study and review will have to be done on your own - outside of class!

Class attendance is extremely important in AP Biology. Material is covered quickly and in much greater depth and detail than your previous biology course. We will discuss in class what is important. Obviously, the tests will reflect those discussions. Tests will be constructed in the format of the AP exam meaning, they will include both Multiple Choice and Free-Response Questions. Expect to take around 15 tests during the school year!

Excessive absences FOR WHATEVER REASON - illness, athletic competitions, doctor's appointments, etc. - will jeopardize your chances of success in the course. Material missed as a result of absences will be very difficult (IF NOT IMPOSSIBLE) to make up. As you will be aware of scheduled lab days, every effort should be made to be present on those days.

In September you will receive a detailed calendar that will include all assignments, tests, and labs. You MUST NOT fall behind. It is strongly recommended that you purchase an AP BIOLOGY EXAM REVIEW BOOK right NOW! That way you can begin preparing for the exam as soon as possible.

Everyone enrolled in AP classes at Lenape Valley Regional is EXPECTED to sit for the AP exam in May.

Enjoy Your Summer - Mrs. Mihatov lmihatov@lvhs.org

Lenape Valley Regional High School
Science Department - Laura Mihatov lmihatov@lvhs.org

Advanced Placement Biology Summer Assignment

DUE DATE: 1ST FULL DAY OF SCHOOL

Welcome to the world of Advanced Placement Biology at Lenape Valley Regional High School! The attached summer assignment is required for all AP Biology students for the 2015-2016 school year.

The assignment consists of a series of questions to be answered on Introductory Biology.

- The assignment must be neatly handwritten in a ONE SUBJECT NOTEBOOK.

Write on:

ONE SIDE of each page ONLY!

- Typed assignments will result in a grade of 0.
- **The assignments are due on the first full day of school.**

Introductory Biology

In order to adequately cover the material required by the College Board it is ESSENTIAL that you complete much of the work independently. I have developed a series of questions regarding a relatively simple, yet extensive topic: Introductory Biology. The outline provided presents, as questions, major themes and topics covered in an AP Biology course.

- You must answer the questions for each topic. Be specific and complete in your response. Answer the question that is asked, and answer it COMPLETELY!
- Don't write an essay for each; just pick out the big ideas.
- **Use any information source possible to answer the questions, but you must work independently.** Err on the side of explaining more rather than less on topics you find complicated.

The Course.

The text we use is Campbell Biology in Focus AP Edition. The questions that drive our class discussions come from YOU! We will complete the 8 required AP labs as well as many additional labs and activities. You will gain practice in writing AP essays, and in answering AP level objective questions.

You may want to invest in an AP study guide such as Barron's AP Biology, or the McGraw-Hill 5 Steps to a 5. These will NOT get you through the course with an A, but may help to reinforce concepts as well as providing additional review for the AP exam.

If you have questions about this assignment, you may contact me at lmihatov@lvhs.org. Don't wait until the week before school to find out what you need to do!

Answer the following questions using any text or Internet sources. This list of questions is not exhaustive; it is only a beginning, and I encourage you to add conceptual questions of your own. You should focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. Less important is the memorization of specialized terminology and technical details.

For example, understanding how protein structure affects enzyme action is more important than memorizing a list of enzyme names. Questions on Advanced Placement Biology Examinations will test students' abilities to explain, analyze, and interpret biological processes and phenomena more than their ability to recall specific facts.

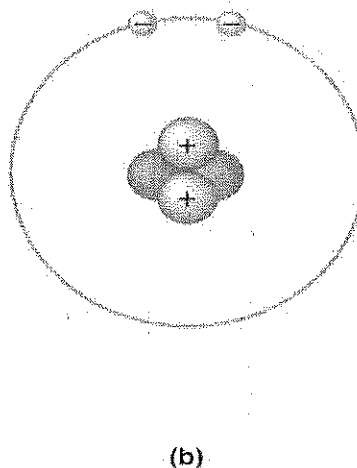
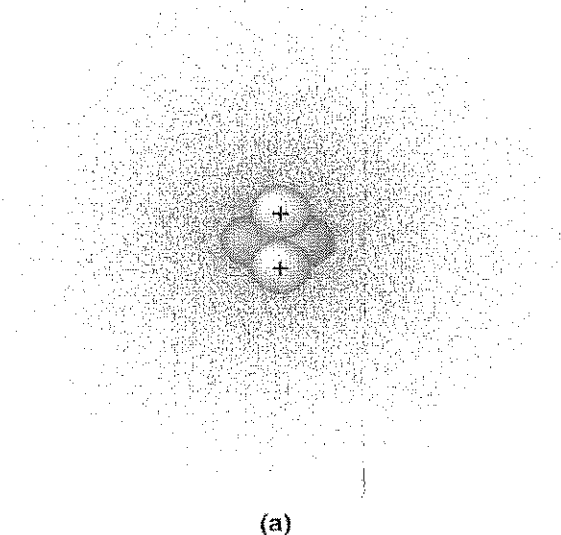
Chapter 1- Exploring Life

1. Explain the properties of life listed below:
 - a. Order
 - b. Evolutionary adaptation
 - c. Response to the environment
 - d. Regulation
 - e. Energy processing
 - f. Growth and development
 - g. Reproduction
2. List and define ALL ten levels of biological organization
3. Describe how energy flows through and ecosystem – can energy be recycled?
4. What is the relationship between genes, DNA, and cells as the basic unit of structure and function in living organisms?
5. Compare and contrast eukaryotic and prokaryotic cells.
6. Explain the concept of emergent properties and how they relate to “being alive”.
7. In your own words, what is reductionism?
8. What is bioinformatics?
9. What is feedback and how does it relate to property of life – regulation?
10. By the end of the year you will be able to explain this in your sleep – define the following terms and give an example of each – in your own words – relate the example you choose and how it meets the criteria of your definition.
 - a. Positive feedback
 - b. Negative feedback
11. Why is classification of living organisms necessary to understanding biology?
12. What does the statement “there is unity in diversity” mean in terms of biology and why is it said that “Evolution is the unifying theme of biology?”

13. Based on your reading of the Darwin's theory of Natural Selection – imagine you are at the dinner table – explain the theory in your own words and give an example that supports your statements.
14. Compare and contrast inductive and deductive reasoning.
15. What are the elements of a well designed controlled experiment?
16. How is the term theory used in science?

Chapter 2- The Chemical Context of Life

1. Contrast the term element with compound.
2. Label the diagram below and define the terms that you label.

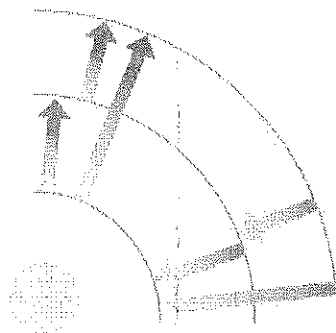


3. Contrast the terms atomic mass and atomic number.
4. What is the difference between the terms atomic mass and atomic weight?
5. What is an isotope and what is "special" about radioactive isotopes?
6. Explain how radioactive tracers are used in science?
7. Explain how the movement of electrons relates to the concept of potential energy – use the diagram below to help answer the question.

(a)



(b)



8. What determines interactions between atoms? Why are valence electrons important?

9. Define the following terms:
 - a. Chemical bond
 - b. Covalent bond
 - c. Single bond
 - d. Double bond
 - e. Valence
 - f. Electronegativity
 - g. Nonpolar covalent bond
 - h. Polar covalent bond
10. What is the difference between a structural and molecular formula?
11. How do ionic bonds compare with covalent bonds?
12. Compare and contrast hydrogen bonds and van der Waals interactions.
13. Based on the reading, what is an example, in a living system, of how molecular shape is critical?
14. Define a dynamic chemical equilibrium in terms of quantities of reactants and products. This is a critical concept!

Chapter 3- Water and the Fitness of the Environment

This chapter is a review from your previous biology class – these concepts are critical and repeated throughout the year. If you have not covered this material previously or need additional assistance with the concepts please schedule time to see me.

1. Why is water considered a polar molecule?
2. For each of the below listed properties of water – briefly define the property and then explain how water's polar nature and polar covalent bonds contribute to the water special property. Include an example in nature of each property also.
 - a. Cohesion
 - b. Adhesion
 - c. Surface tension
 - d. High specific heat
 - e. Heat of vaporization
 - f. Evaporative cooling
3. What is special about water and density?
4. Define the following terms:
 - a. Solute
 - b. Solvent
 - c. Aqueous solution
 - d. Hydrophilic
 - e. Hydrophobic
 - f. Colloid
 - g. Hydration shell
 - h. Molarity

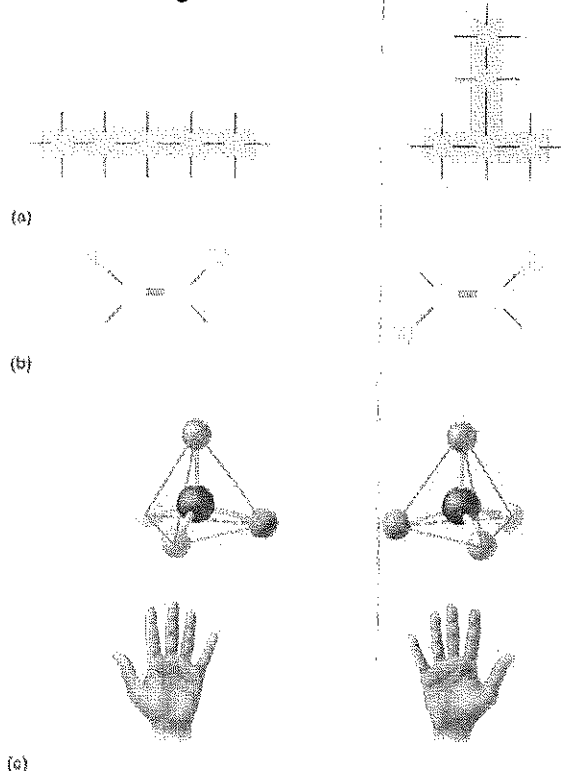
5. Label the diagram below to demonstrate the dissociation of the water molecule and then relate this diagram to pH.



6. What defines an acid and a base?
 7. Why are “apparently” small changes in pH so important in biology?
 8. What is a buffer and write and explain the carbonic acid buffer system in human blood – yes we are back to the equation AGAIN!
 9. What is acid precipitation and why is it important to living organisms?

Chapter 4- Carbon and the Molecular Diversity of Life

1. Why is organic chemistry so important in the study of biology?
 2. Why was the Urey-Miller experiment so important?
 3. What is special about carbon that makes it the central atom in the chemistry of life?
 4. Use the diagram below to label and contrast the three types of isomers.



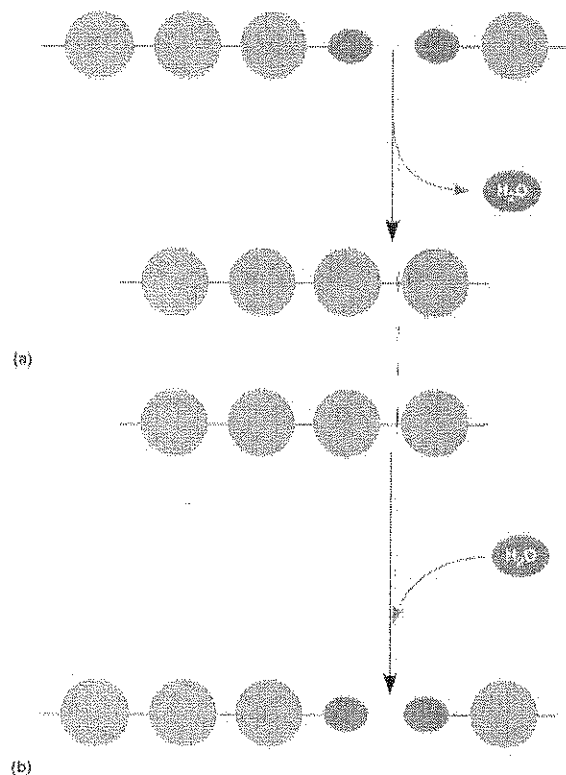
5. Create a table below: after each functional group – draw the structure, name the compound, write an example and note the functional properties

- a. Hydroxyl
- b. Carbonyl
- c. Carboxyl
- d. Amino
- e. Sulfhydryl
- f. Phosphate

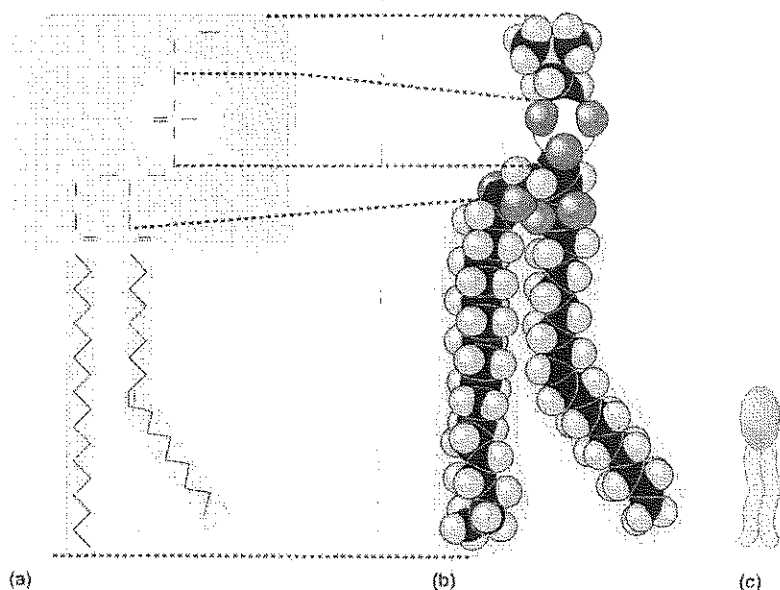
6. Stanley- Miller found urea among the products of his experiment. What conclusion could be drawn from its presence?
7. Draw a structural formula for C_2H_4 .
8. What is the chemical similarity between gasoline and fat?
9. What does the term "amino acid" signify about the structure of such a molecule?
10. What change usually occurs in ATP when it releases energy?

Chapter 5- The Structure and Function of Macromolecules

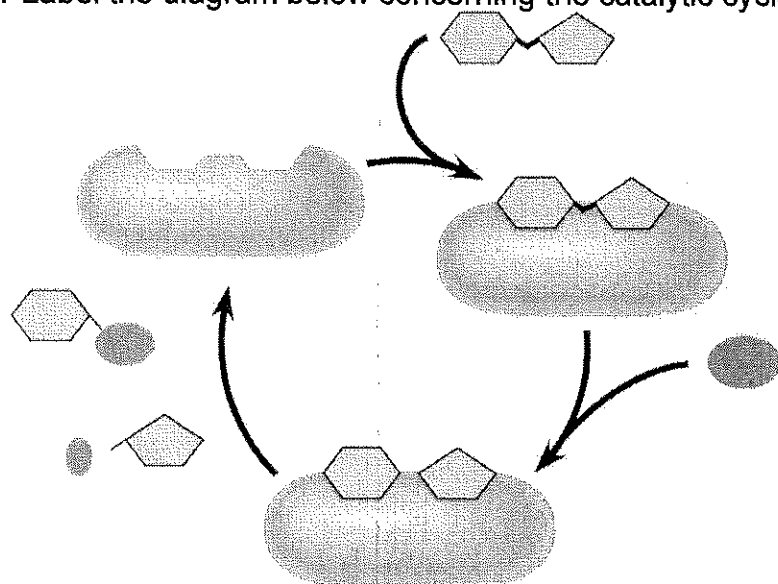
1. Label the diagram below – identify a monomer, polymer, condensation reaction, and hydrolysis.



2. What are the three hexose monosaccharides?
3. What is a glycosidic linkage and what do the numbers 1-4 and 1-2 relate to?
4. Compare and contrast the two storage polysaccharides.
5. Compare and contrast the two structural polysaccharides.
6. Why are lipids grouped together?
7. What are the building blocks of fats?
8. Contrast saturated and unsaturated fats – how does this relate to the concept that structure and function are linked?
9. Label the molecule below.

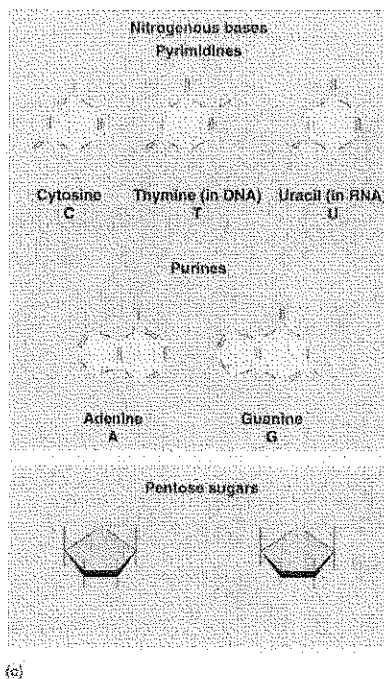
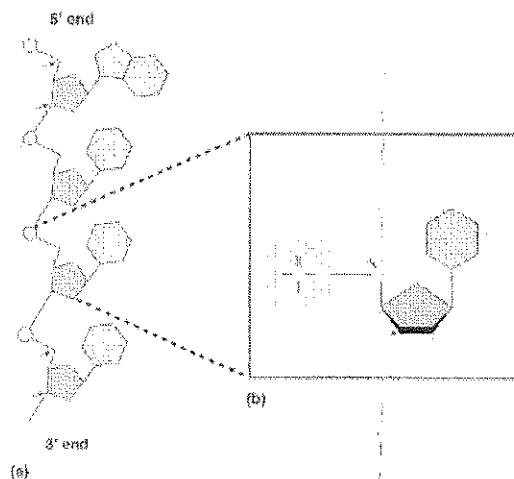


10. How would you recognize a basic steroid molecule?
11. List the eight types of proteins and their basic function.
12. What are the names for the monomers and polymers of proteins?
13. Label the diagram below concerning the catalytic cycle of an enzyme -



14. Draw two amino acids – note the amino group, the carboxyl group and the alpha carbon, circle the water molecule to be removed and then note the peptide bond formed when the two are joined.
15. Explain the four levels of protein structure –
 - a. Primary
 - b. Secondary
 - c. Tertiary
 - d. Quaternary
16. How does the characteristics of an amino acid – nonpolar, polar, acidic or basic relate to the issue of tertiary and quaternary structure?

17. What does denaturation mean and why is it important?
18. What are chaperonins and what is their role in protein structure?
19. Describe the technique of x-ray crystallography.
20. What are the roles of nucleic acids?
21. Label the blank diagram below:



22. What is meant by the term that DNA is antiparallel?

Recommended Sequence of Reading a Textbook and Taking NOTES

1. READ the entirety of the Chapter(don't forget the KEY CONCEPTS at the very beginning)
 - DO NOT forget to "Read" all of the diagrams, charts and tables
2. READ the Summary of Key Concepts in the Chapter Review
 3. REREAD the chapter and this time TAKE NOTES in your notebook as you proceed.
4. READ the Summary of Key Concepts again to see if you "get" them.
5. CAUTION: the www is a wonderful place to find reviews, tutorials, animations, etc. but not in PLACE of reading and taking notes...rather in addition to!