

## AP BIOLOGY SUMMER ASSIGNMENT 2017

**Instructions:** Below is a list of items to complete for your summer assignment. You must complete work on the Biochemistry Unit using internet lectures. The chapters in your text that are included in your summer reading assignment will not be covered in class. Therefore, you are responsible for understanding all of the material. You will find that much of this assignment may be a review of concepts covered in Honors Biology (although you will find more detail this time around).

### Due Dates:

- Introductory Letter (7/1/2017)
- Biochemistry Refresher (8/8/2017)
- Writing for Science (8/8/2017)
- Book Study: Stiff, The Secret Lives of Cadavers

### Assignments:

1. **LETTER OF INTRODUCTION:** We are going to spend a lot of time together next year, so it's best if I get a head start on learning a bit about you. Your first digital assignment is to successfully send me an e-mail.

**jrgibson@mail.kana.k12.wv.us**

Draft an e-mail to me following these rules:

- a. Use clearly written, full sentences. Use spell check! This is a professional communication like you would have with a college professor, so let's practice for your rapidly nearing future!
- b. Make the Subject: "AP Bio: Introduction to <Insert Your Name Here>"
- c. Now introduce yourself (your name) and tell me a little bit about yourself, like:
  - What do you like to do (hobbies, sports, music, interests, etc.)?
  - Do you have a job? Will your work schedule interfere with your studies?
  - Tell me a little bit about your family (Mom? Dad? Guardian? Siblings?)
  - What topics did you enjoy in your earlier biology class?
  - What career plans do you have?
  - What are you looking forward to the most in AP Biology?
  - What obstacles do you foresee in making an "A" in this class?
  - Have you had other AP classes?
  - Do you plan to take the AP exam?
  - What are you most anxious about in AP Biology?
- d. End the e-mail with a formal closing: "Cordially", "Sincerely", "Warmest regards", etc. and add your name as if you signed a letter.

2. **BIOCHEMISTRY:** Interact with this material by

1. Viewing presentations and/or
2. Watching videos/podcasts,
3. Reading articles, etc.

Figure out what works for you. You do not have to use every resource, but you must be able to answer the questions and understand the learning objectives. If you choose to find your own resources, be SURE the source is legitimate and current.

- a. Answer the questions attached to this document.
- b. Yes, write the question and the answer. **ALWAYS write the question and the answer.**
- c. Be sure your answers are concise (never repeat the same information as your source, just worded differently). Write neatly (if you have illegible handwriting, now is the time to fix that). I do not want your answers typed. The only reason I will accept this assignment typed is if you have a diagnosed disability. Carefully word your answers to be intelligently conveyed, worthy of a college freshman course (i.e., without juvenile narrative) and write complete answers--beginning, middle and end.
- d. I WILL READ these answers!
- e. Make sure you understand the "*Things you should make sure you understand*". If you finish this portion of the packet and you do not, go back and do it again.

**4. WRITING FOR SCIENCE:** Writing “scientifically” must be a skill you possess PRIOR to entering AP Biology. You will write MANY papers and invariably, the most points lost will be for immature writing skills. This is a practiced skill.

- a. Read <http://web.mit.edu/me-ugoffice/communication/technical-writing.pdf>
  - 1) Planning
  - 2) Clarity
  - 3) Brevity
  - 4) Simplicity
  - 5) Word Choice
  - 6) Active Voice
  - 7) Committing to Writing as a Process
- b. Read, <https://owl.english.purdue.edu/owl/resource/560/15/>
- c. Write a short-300 words or less, paper on your opinion of *Eugenics as an Acceptable Use for Advancements in Genetic Engineering*.
- d. Submit your paper to turnitin.com by August 8, 2017 (login information below)  
**ID: 15376748**  
**Enrollment Key: APBIO**

**5. BOOK STUDY:** Obtain a copy of Stiff: The Secret Lives of Cadavers

**ISBN-10:** 0393324826

**ISBN-13:** 9780393324822

**Pub. Date:** 05/17/2004

**Publisher:** Norton, W. W. & Company, Inc.

AFTER you FINISH reading the book, email me for your own, personal assignment.

*"One of the funniest and most unusual books of the year....Gross, educational, and unexpectedly sidesplitting."—Entertainment Weekly. Stiff is an oddly compelling, often hilarious exploration of the strange lives of our bodies postmortem. For two thousand years, cadavers—some willingly, some unwittingly—have been involved in science's boldest strides...*

## Biochemistry

### Supplementary Resource suggestions:

Bozeman Science by Paul Anderson

<http://www.bozemanscience.com/ap-biology/>

The Penguin Prof Channel (don't know her actual name but she's AWESOME).

<https://www.youtube.com/watch?v=0MPv8ZOOKmQ>

Khan academy

<https://www.khanacademy.org/test-prep/mcat/biological-sciences-practice>

YES, WRITE THE QUESTION AND THE ANSWER  
DO NOT TYPE

**Part 1: General Chemistry**

1. List the top 10 elements found in life and show their abundance in nature in the format of percentages.
2. How are matter and energy related?
3. Explain how atoms bond.
4. Some molecules are molecularly polar yet contain covalent bonds, how is this possible?
5. How do bond types in a substance affect its chemical and physical properties?
6. Breaking bonds requires the addition of energy. How is it then that some reactions are able to produce energy rather than expend it?
7. What are some examples of the use of radio isotopes in biology research?

**Part 2: Water**

1. Why are living things are predominantly made of water?
2. Draw a water molecule and indicate its polarity and diagram why it is polar.
3. Write the following properties exhibited by water. Then describe how waters structure accounts for each.
  - a. Cohesion
  - b. Adhesion
  - c. High Specific Heat
  - d. Floating Ice
  - e. Good Solvent Properties
  - f. Dissociation of water molecules
4. The maintenance of life requires all the above. Write one example of this requirement for each of the properties.
5. Explain the dissociation of water and how it is related to the pH of a particular aqueous solution.

**Part 3: Carbon**

1. What makes 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. What are enantiomers and why are they biologically significant?
4. Draw each of the following functional groups:
  - a. hydroxyl
  - b. carbonyl (ketone)
  - c. carbonyl (aldehyde)
  - d. carboxyl
  - e. amino
  - f. sulfhydryl
  - g. methyl
  - h. phosphate
5. Why do molecules that contain carboxyl groups have a pH lower than 7?
6. Why do molecules that contain amino groups have a pH above 7?
7. "Form fits function" is a common alliteration used in Biology. How great a structural change must occur before a biological molecule is no longer able to perform its duties?

**Part 4: Carbohydrates, & Lipids**

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?
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?

## Part 5: Proteins

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. Define each of the following levels of protein structure and explain the bonds that contribute to them:
  - a. Primary
  - b. Secondary
  - c. Tertiary
  - d. Quaternary
6. How can the structure of a protein be denatured?
7. Draw a nucleotide. Label the phosphate, sugar, and nitrogenous base.
8. Explain the three major structural differences between RNA and DNA.

**OPTIONAL:** Your understanding of statistical analysis is very important for AP Biology. If you are "rusty" or cannot calculate the following statistical tests, you may want to go through this course.

- Mean
- Median
- Mode
- Standard deviation
- Standard error
- Students T-test
- Chi<sup>2</sup>
- Percent change

### Directions:

- a. Sign in to [khanacademy.org](https://www.khanacademy.org) (if you don't have an account, create one)
- b. Visit [khanacademy.org/coaches](https://www.khanacademy.org/coaches) (it's the "coaches" tab on your profile)
- c. In the "add coach" field, enter the class code: **QDWW8X**
- d. You're set. Now click home and begin.