Name _____ Per: _____

AP Biology Summer Assignment 2016-2017

AP Biology is a fast paced course that often requires learning a chapter or two a day from our textbook. Summer is a great time to be able to casually read an interesting science book other than a textbook! To get you thinking about science and the AP Biology curriculum, your summer assignment will involve reading a book of your choosing (from a given list) and making connections between the book and our AP Biology curriculum. This is Part 1 of the assignment.

Part 2 consists of reviewing important chemistry material prior to the start of class. Chemistry topics are now considered prior knowledge for the AP Biology course, so this will allow you to review/reinforce the material.

Do not wait until the end of the summer to start this! All requirements are clearly laid out for you. Follow the required formats and adhere to the given due dates. The end of this document has a checklist of items that must be complete for the assignment.

Part 1 of 2: Summer Reading and Curriculum Connections

Your book choices include:

1. *The Inner Fish* by Neil Shubin
2. *The Selfish Gene* by Richard Dawkins
3. *Survival of the Sickest* by Dr. Sharon Moalem
4. *The Immortal Life of Henrietta Lacks* by Rebecca Skloot

The AP Biology curriculum has gone through a complete overhaul since 2012-2013. The course is focused around 4 Big Ideas:

Big Idea 1: The process of evolution drives the diversity and unity of life.

Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.

Big Idea 3: Living systems store, retrieve, transmit, and respond to information essential to life processes.

Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.

Within each Big Idea are several Enduring Understandings, which are described further into numerous Essential Knowledge concepts. The new organization of the curriculum provides students explicit benchmarks in the enduring of biology as a systematic science. All four books address the 4 Big Ideas in a personal and intriguing nonfiction platform.

1. *Read* one of the four books listed

2. Choose passages from the book that *demonstrates* TWO (2) different Enduring Understandings per Big Idea. Since there are 4 Big Ideas, you must choose 8 passages (2/Big Idea) for 8 different Enduring Understandings. Please see the attached charts for explanation of the 4 Big Ideas, 17 Enduring Understandings and 55 Essential Knowledge's. This is the framework of our curriculum! The AP Biology Core Curriculum can also be accessed on the College Board website. Tip-it may be helpful to read through these items PRIOR to reading your book so that you understand what you are looking for! Here is the online link to the core curriculum: http://media.collegeboard.com/digitalServices/pdf/ap/10b_2727_AP_Biology_CF_WEB_110128.pdf

   Please use the attached sample format for your typed responses:
   The **heading** on your document must include the following:

   Name: _____
   Date of Submission: _____
   Teachers Name: _____
   Period: _____
   AP Biology Summer Assignment
   Name of Book: _____

3. *Explain* how each passage relates to the Enduring Understandings and the Big Ideas. Be specific and use examples within the reading to back up your explanations.

4. *Submit* your document on Turnitin.com. This requires you to have access to the class ID and password. This information will be posted on your teachers E-Board under the "Summer Assignment" tab. Follow the directions carefully for signing up and submission. Turnitin.com checks for plagiarism, a serious academic offense. Please keep in mind that your academic integrity and honesty is just as important as a grade. Points will be deducted if a certain level of plagiarism is picked up through Turnitin. **Students will receive a zero for the assignment if an unreasonable amount of work is copied from sources without proper citation**

Reading Assignment Format

***Note-line length is not an indicator for how long your response should be! They should be thought out and well written!**

Big Idea 1: The process of evolution drives the diversity and unit of life.

Passage 1:
_____
_____

Enduring Understanding (Number and Letter): _____
Explanation:
_____
_____

Passage 2:
_____
_____

Enduring Understanding (Number and Letter): _____
Explanation:
_____
_____

Complete this format for each of the 4 Big Ideas

Part 2 of 2: Required Chemistry Prior Knowledge

The chemistry covered in this course, according to the College Board, is now considered prior knowledge. It is in your best interest to research and attempt to learn/reinforce some of the chemistry skills needed for the course.

To assist you with this process, complete the following chemistry handout. All responses must be handwritten on a piece of paper and stapled to the question sheet (question sheet on top).

Introductory Chemistry

This handout is the pre-requisite material that you are supposed to have had prior to taking this course. You should be able to answer the questions below without assistance; if not, make sure that you review or learn the material on your own.

You are to answer all questions on a separate sheet of paper. Attach this sheet to the front of your work for full credit. THIS MUST BE HANDWRITTEN and NOT typed! Complete Sentences.

Important Terms to Know- Define, Describe and Give Examples of:

1. Potential energy
2. Kinetic energy
3. Neutrons
4. Protons
5. Electrons
6. Atomic number
7. Atomic weight
8. Isotope
9. Valence
10. Structural formula
11. Molecular formula
12. Covalent bond
13. Polar
14. Nonpolar
15. Cations
16. Anions
17. Hydrogen bond

Study Questions:

1. Define both potential energy and kinetic energy and give an example of each.

2. How do elements differ from compounds?

3. Name and define the subatomic particles that are part of an atom. How do they differ from each other? How do these differences contribute to the properties of atoms and molecules?

4. What is an atom? Give an example.

5. What is the difference between atomic number and atomic weight?

6. Determine the atomic number and atomic weight of the following:
   a. Carbon
   b. Oxygen
   c. Nitrogen
   d. Phosphorus
   e. Calcium
   f. Hydrogen
   g. Selenium
   h. Manganese

7. Where is the mass number put with respect to an element's symbol?

8. What does the subscript number to the left of an element's symbol indicate?

9. What is the difference between ^{12}C and ^{14}C?

10. In #9 above, what is ^{14}C called?

11. What is a valence electron? Why are they important?

12. Draw a structural formula for the following:
    a. CH_4 b. NaCl c. O_2 d. H_2O

13. Which of the structures in #12 above have or can form:
    a. Single covalent bonds
    b. Ionic bonds
    c. Double covalent bonds
    d. Hydrogen bond

14. Which of the structures in #12 above are:
    a. Polar? Why are they polar?

    b. Nonpolar? Why?

15. Explain electronegativity:

AP BIOLOGY STUDENT SUMMER ASSIGNMENT CHECKLIST

- ✓ I carefully read one of the 4 suggested books
- ✓ I completed Part 1 of the assignment using the proper format
- ✓ I signed up for Turnitit.com using my teachers E-Board as a guide
- ✓ I submitted Part 1 on Turnitin.com by the due date: **Wednesday September 7th by midnight**
- ✓ I printed and stapled my Part 1 assignment to hand in the first day of school (September 6th)
- ✓ I completed the introductory chemistry questions, Part 2 of the summer assignment, handwritten on a separate sheet of paper.
- ✓ I printed out the question document for Part 2 and stapled that to the front of my responses.
- ✓ I will hand in both part 1 and part 2 separately on the first day of school!

Appendix

AP Biology Concepts at a Glance

Big Idea 1: The process of evolution drives the diversity and unity of life.

Enduring understanding 1.A: Change in the genetic makeup of a population over time is evolution.	**Essential knowledge 1.A.1**: Natural selection is a major mechanism of evolution.
	Essential knowledge 1.A.2: Natural selection acts on phenotypic variations in populations.
	Essential knowledge 1.A.3: Evolutionary change is also driven by random processes.
	Essential knowledge 1.A.4: Biological evolution is supported by scientific evidence from many disciplines, including mathematics.
Enduring understanding 1.B: Organisms are linked by lines of descent from common ancestry.	**Essential knowledge 1.B.1**: Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.
	Essential knowledge 1.B.2: Phylogenetic trees and cladograms are graphical representations (models) of evolutionary history that can be tested.
Enduring understanding 1.C: Life continues to evolve within a changing environment.	**Essential knowledge 1.C.1**: Speciation and extinction have occurred throughout the Earth's history.
	Essential knowledge 1.C.2: Speciation may occur when two populations become reproductively isolated from each other.
	Essential knowledge 1.C.3: Populations of organisms continue to evolve.
Enduring understanding 1.D:The origin of living systems is explained by natural processes.	**Essential knowledge 1.D.1**:There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence.
	Essential knowledge 1.D.2: Scientific evidence from many different disciplines supports models of the origin of life.

Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.

Enduring understanding 2.A: Growth, reproduction and maintenance of the organization of living systems require free energy and matter.	**Essential knowledge 2.A.1:** All living systems require constant input of free energy.
	Essential knowledge 2.A.2: Organisms capture and store free energy for use in biological processes.
	Essential knowledge 2.A.3: Organisms must exchange matter with the environment to grow, reproduce and maintain organization.
Enduring understanding 2.B: Growth, reproduction and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments.	**Essential knowledge 2.B.1**: Cell membranes are selectively permeable due to their structure.
	Essential knowledge 2.B.2: Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes.
	Essential knowledge 2.B.3: Eukaryotic cells maintain internal membranes that partition the cell into specialized regions.
Enduring understanding 2.C: Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.	**Essential knowledge 2.C.1**: Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes.
	Essential knowledge 2.C.2: Organisms respond to changes in their external environments.
Enduring understanding 2.D: Growth and dynamic homeostasis of a biological system are influenced by changes in the system's environment.	**Essential knowledge 2.D.1**: All biological systems from cells and organisms to populations, communities and ecosystems are affected by complex biotic and abiotic interactions involving exchange of matter and free energy.
	Essential knowledge 2.D.2: Homeostatic mechanisms reflect both common ancestry and divergence due to adaptation in different environments.
	Essential knowledge 2.D.3: Biological systems are affected by disruptions to their dynamic homeostasis.
	Essential knowledge 2.D.4: Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis.
Enduring understanding 2.E: Many biological processes involved in growth, reproduction and dynamic homeostasis	**Essential knowledge 2.E.1**:Timing and coordination of specific events are necessary for the normal development of an organism, and these

include temporal regulation and coordination.	events are regulated by a variety of mechanisms.
	Essential knowledge 2.E.2:Timing and coordination of physiological events are regulated by multiple mechanisms.
	Essential knowledge 2.E.3:Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection.

Big Idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes.

Enduring understanding 3.A: Heritable information provides for continuity of life.	**Essential knowledge 3.A.1:** DNA, and in some cases RNA, is the primary source of heritable information.
	Essential knowledge 3.A.2: In eukaryotes, heritable information is passed to the next generation via processes that include the cell cycle and mitosis or meiosis plus fertilization.
	Essential knowledge 3.A.3:The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring.
	Essential knowledge 3.A.4:The inheritance pattern of many traits cannot be explained by simple Mendelian genetics.
Enduring understanding 3.B: Expression of genetic information involves cellular and molecular mechanisms.	**Essential knowledge 3.B.1**: Gene regulation results in differential gene expression, leading to cell specialization.
	Essential knowledge 3.B.2: A variety of intercellular and intracellular signal transmissions mediate gene expression.
Enduring understanding 3.C:The processing of genetic information is imperfect and is a source of genetic variation.	**Essential knowledge 3.C.1**: Changes in genotype can result in changes in phenotype.
	Essential knowledge 3.C.2: Biological systems have multiple processes that increase genetic variation.
	Essential knowledge 3.C.3: Viral replication results in genetic variation, and viral infection can introduce genetic variation into the hosts.
Enduring understanding 3.D: Cells communicate by generating, transmitting and receiving chemical signals.	**Essential knowledge 3.D.1**: Cell communication processes share common features that reflect a shared evolutionary history.
	Essential knowledge 3.D.2: Cells communicate with each other through direct contact with other cells or

	from a distance via chemical signaling.
	Essential knowledge 3.D.3: Signal transduction pathways link signal reception with cellular response.
	Essential knowledge 3.D.4: Changes in signal transduction pathways can alter cellular response.
Enduring understanding 3.E:Transmission of information results in changes within and between biological systems.	**Essential knowledge 3.E.1**: Individuals can act on information and communicate it to others.
	Essential knowledge 3.E.2: Animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses.

Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.

Enduring understanding 4.A: Interactions within biological systems lead to complex properties.	**Essential knowledge 4.A.1:** The subcomponents of biological molecules and their sequence determine the properties of that molecule.
	Essential knowledge 4.A.2:The structure and function of subcellular components, and their interactions, provide essential cellular processes.
	Essential knowledge 4.A.3: Interactions between external stimuli and regulated gene expression result in specialization of cells, tissues and organs.
	Essential knowledge 4.A.4: Organisms exhibit complex properties due to interactions between their constituent parts.
	Essential knowledge 4.A.5: Communities are composed of populations of organisms that interact in complex ways.
	Essential knowledge 4.A.6: Interactions among living systems and with their environment result in the movement of matter and energy.
Enduring understanding 4.B: Competition and cooperation are important aspects of biological systems.	**Essential knowledge 4.B.1**: Interactions between molecules affect their structure and function.
	Essential knowledge 4.B.2: Cooperative interactions within organisms promote efficiency in the use of energy and matter.
	Essential knowledge 4.B.3: Interactions

	between and within populations influence patterns of species distribution and abundance.
	Essential knowledge 4.B.4: Distribution of local and global ecosystems changes over time.
Enduring understanding 4.C: Naturally occurring diversity among and between components within biological systems affects interactions with the environment.	**Essential knowledge 4.C.1**: Variation in molecular units provides cells with a wider range of functions.
	Essential knowledge 4.C.2: Environmental factors influence the expression of the genotype in an organism.
	Essential knowledge 4.C.3:The level of variation in a population affects population dynamics.
	Essential knowledge 4.C.4:The diversity of species within an ecosystem may influence the stability of the ecosystem.