

## **AP Biology Summer Assignment 2017-2018**

**Instructor:** Mrs. Janet Counts

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**Textbook:** Biology, 11<sup>th</sup> Edition; Sylvia Mader

**Course Description:** Advanced Placement Biology is part of a nationwide program based on the belief that many students are ready for college work while still in high school, and their abilities should be recognized, encouraged and rewarded. As a college level course, the amounts of material covered as well as the complexity of the topics will be high. It is the responsibility of the student to come to class each day understanding the previous day's material. An ongoing unstated assignment, therefore, is to learn the material as it is presented. Students must be certain that they are willing to accept this challenge and be committed to keep up with the work.

AP Biology is structured around four **Big Ideas** which encompass the core scientific principles, theories, and processes governing living organisms and biological systems. At least one of the big ideas will be incorporated in every lesson throughout the course.

The four **Big Ideas** are:

**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.

The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The ongoing information explosion in biology makes these goals even more challenging. Students are encouraged to focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. This course provides opportunities to connect scientific knowledge to major social issues to help students become scientifically literate citizen.

**Please find in the attachments, directions for access to the textbook. You will need this to complete the summer assignment.**

Dear Upcoming AP Biology Students;

I am writing with some important information that you will need to know to be eligible for AP Biology 2017-2018. We have so much to cover by the AP Test date (May 7) that the following summer assignment must be done so that we have time to get through our curriculum. You will have homework EVERY night without fail.

#1 – The required text is Mader: BIOLOGY, AP Edition (11<sup>th</sup> edition). The ISBN # is 978-0-07-662004-3. You must use the attached information to log in to the online text. Please do this as soon as possible.

#2 – Summer Assignment-

- a. **Read chapters 1-3.**
- b. **Define all vocabulary words in chapters 1-3 ( 154 terms)**
- c. **Complete the attached reading guides.**
- d. **Complete the attached quizzes.**
- e. **Write and answer the following questions from the text:**
  - a. **Pg. 18-19 (Testing yourself, #1-15)**
  - b. **Pg. 35-36 (Testing yourself, # 1-19)**
  - c. **Pg. 58-59 (Testing yourself, # 1-20)**

#3 – Failure to complete this summer assignment could result in a failing grade for the 1<sup>st</sup> six weeks. This entire assignment is worth **1 test grade, 1 daily grade, and 1 homework grade**. If you do not have the summer requirements done by the first day of my class, you will be docked 20 points per day. Our first major test will occur on Friday, August 25<sup>th</sup>. Please think about your commitment to the course and make sure you really enjoy biology, you will work hard in here!

I look forward to seeing you and helping you become amazing science students – it's truly a journey😊

Sincerely,

Janet Counts

AP Biology Instructor

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AP Biology Student Textbook information

Go to the following website:

<http://connect.mheducation.com/class/i-counts-biology>

OR

<http://goo.gl/T4w6Sv>

Choose "Register Now"

Welcome!

ALREADY REGISTERED?

Email Address

Password

SIGN IN

Forgot your password?

REGISTER TO YOUR CLASS

Please check your class details below.

Course: Biology

Section: Biology

Instructor: Janet Counts

Textbook: Biology Mader, 11

REGISTER NOW

Enter your school email address:. Please check with Mrs. Counts for this information if you are not sure what your school email is. For most of you it will be the following:

[firstname.middleinitial.lastname@cloud.redoakisd.org](mailto:firstname.middleinitial.lastname@cloud.redoakisd.org)

Enter the registration code below:

**9BEB-QEHD-X9HB-YQC8-E7MK**

Complete the account set-up information and submit to complete registration. (If school is not listed, choose the "My school is not listed" option under the text box and type in school name.)

**A View Of Life**

For this first chapter, address the following questions below in as much detail as you need. Remember this will be your study guide for this chapter and you will have quizzes/tests over the following information.

1. Summarize how to scientists currently define life (6 big ideas):

2. Compare the terms population, community and ecosystem:

3. How is all life classified? Diagram the classification scheme and use any mnemonic you can to make it easy for you to remember this:

4. How are all scientific names written?

5. Talk to me about what *biodiversity* means to you:

6. Read Section 1.4 well! The scientific method is something we will use in EVERY lab. Outline the steps below and include any vocabulary that you need:

7. Summarize "Scientific Theory":

You may skip page 13 for now.

8. Is the pigeon pea/ winter wheat experiment a valid one? \_\_\_\_\_ Explain your answer:

9. Read the field study on bluebird aggression. The hypothesis on this is pretty vague – in your opinion is that alright? \_\_\_\_\_

10. Do you think field studies would be easy to do? \_\_\_\_\_ What are some problems that might exist in this type of study?

Define ANY 10 words that you don't know well from the Key Terms list on page 17:

## Chapter 1: A View of Life

### Pre-Test

- 1 Organisms/living things are best defined by all of the following EXCEPT:  
 A) their ability to respond to stimuli.  
 B) their ability to reproduce.  
 C) they have adaptations.  
 D) they are unorganized.
- 2 Homeostasis is \_\_\_\_\_.  
 A) balancing internal and external conditions  
 B) wild fluctuations in internal conditions  
 C) the use of the Sun's energy to convert carbon dioxide into organic molecules  
 D) the maintenance of normal internal conditions in a cell or an organism by means of self-regulating mechanisms
- 3 The instructions for the organization and metabolism of living things are encoded in the \_\_\_\_\_.  
 A) genes  
 B) plasma membrane  
 C) cell wall  
 D) ribosomes
- 4 The list that correctly indicates a sequence of increasing biological organization is:  
 A) molecule, cell, organelle, atom.  
 B) organelle, tissue, cell, molecule.  
 C) organ, tissue, atom, molecule.  
 D) atom, molecule, organelle, cell.
- 5 The first step in the scientific method is \_\_\_\_\_.  
 A) make conclusions  
 B) make observations and consider previous data  
 C) formulate a hypothesis  
 D) test a related hypothesis

## Chapter 1: A View of Life

### Post-Test

- 1 The list that correctly indicates a sequence of increasing biological organization is:  
 A) molecule, cell, organelle, atom.  
 B) organelle, tissue, cell, molecule.  
 C) organ, tissue, atom, molecule.  
 D) atom, molecule, organelle, cell.
- 2 The process that transforms solar energy into chemical energy in the bonds of organic molecules is called \_\_\_\_\_.  
 A) metabolism  
 B) homeostasis  
 C) photosynthesis  
 D) natural selection
- 3 Organisms/living things are best defined by all of the following EXCEPT:  
 A) their ability to respond to stimuli.  
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- 4 Homeostasis is \_\_\_\_\_.  
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 D) the maintenance of normal internal conditions in a cell or an organism by means of self-regulating mechanisms.
- 5 The instructions for the organization and metabolism of living things are encoded in the \_\_\_\_\_.  
 A) genes  
 B) plasma membrane  
 C) cell wall  
 D) ribosomes

6

As biological organization increases in complexity in living systems, each level acquires new \_\_\_\_\_ that are determined by the interactions between the individual parts.

- A) cells
- B) organisms
- C) emergent properties
- D) binomial nomenclatures

7

The correct way to write the scientific name of the garden pea is \_\_\_\_\_.

- A) Pisum Sativum
- B) PISUM SATIVUM
- C) *Pisum sativum*
- D) PISUM sativum

8

All the organisms classified into the Domain \_\_\_\_\_ are \_\_\_\_\_.

- A) Bacteria; multicellular
- B) Eukarya; single celled
- C) Archaea; single celled
- D) Eukarya; multicellular

9

The theory that accounts for both the diversity and the unity of all living things is the theory of \_\_\_\_\_.

- A) cell
- B) evolution
- C) mutation
- D) gene

10

Arrange the following taxonomic categories from the most inclusive to the least inclusive.

- A) family, class, order, genus, species, domain, kingdom, phylum
- B) domain, kingdom, phylum, class, order, family, genus, species
- C) species, genus, family, order, class, phylum, kingdom, domain
- D) domain, phylum, species, genus, class, family, order, kingdom

11

Which of the given statements is NOT true?

- A) The diversity of life includes some traits that are no longer functional and led to the extinction of those that possessed those traits.
- B) The theory of evolution does not provide an explanation for the origin and extinction of many different forms of life.
- C) All organisms share the same basic characteristics, such as being made of cells, having genes composed of DNA, performing metabolic activities, etc.
- D) Many millions of species of organisms are now extinct.

12

Which of the following statements best represent the role of mutations in natural selection?

- A) During the process of natural selection, mutations decrease the odds of having variable genes.
- B) The selective (mutating) agent must be a variable manually determined by the organism or surrounding organisms.
- C) Mutations fuel natural selection through the introduction of variable genes capable of being passed to new generations through reproduction.
- D) Mutations primarily will stop the new trait from being passed to new generations.

13

The great pattern of organization in nature is maintained primarily by \_\_\_\_\_.

- A) flow of energy from the Sun
- B) the annual climactic changes
- C) the action of organisms in the control of nature
- D) the action of bacteria and other microorganisms

14

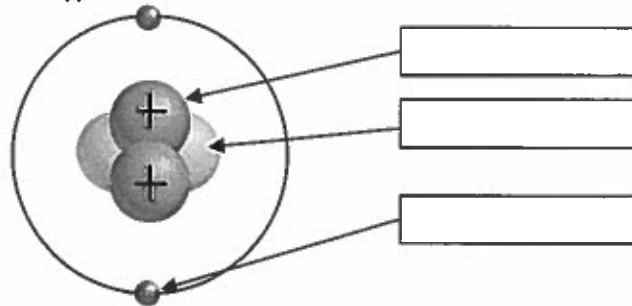
Negative impacts on the biodiversity of healthy ecosystems have included ALL of the following activities EXCEPT:

- A) the draining of natural wetlands of major rivers.
- B) destruction of South American tropical rainforests.
- C) an increase in the size and volume of barrier reefs.
- D) above average fishing off the coast of Africa.

Name: \_\_\_\_\_

## Guided Reading: Ch. 2 – Basic Chemistry

1. What are the six elements that are basic to life and make up 95% of the body weight of organisms?
2. Label this diagram illustrating the structure of a typical atom:



3. Complete this table:

Particle	Electric Charge	Atomic Mass	Location
	0		
			Electron Shell
	+1		

4. On page 23 they show you how the carbon atom is notated. In the space below, give the notation for oxygen (O):

5. Explain the difference between an atomic number and an atomic mass
6. What are isotopes and why are they biologically significant?
7. What is the maximum number of electrons that can be found in an orbital?
8. What is the octet rule, and how does it predict whether or not an atom will react?
9. Explain the difference between an ionic bond and a covalent bond:
10. Explain the difference between a nonpolar and polar covalent bond.
11. What are hydrogen bonds and why are they important?

12. Why do water molecules cling together?

13. Why does water absorb heat without a great change in temperature?

14. Why does water have a high heat of vaporization?

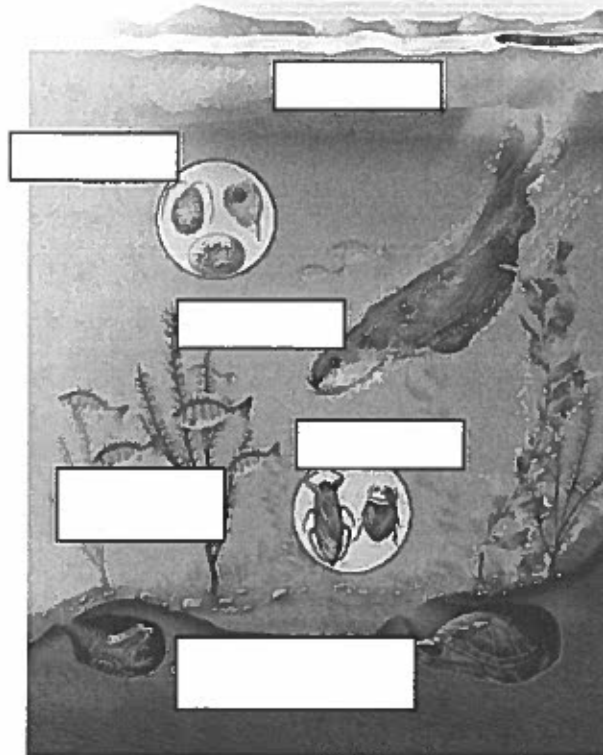
15. What is the biological significance of water's high heat capacity and heat of vaporization?

16. Explain the difference between hydrophilic and hydrophobic.

17. Explain how cohesion and adhesion is used to transport water in plants.

18. Explain why water is less dense as a solid (ice) than as a liquid.

19. Label this diagram illustrating the biological significance of the fact that ice floats in water:



20. Explain the difference between an acid and a base.

21. What is the pH scale used for, and discuss the difference between a pH of 3 and a pH of 9.

22. Discuss the biological significance of buffers:

23. Why is pH so important to biological systems?



Multiple Choice

Choose the choice that best completes the statement or answers the question.

- Which of the following would be a proposed mechanism by which stomach antacids work?
  - Antacids dilute the solution, therefore lowering the pH.
  - Antacids are bases and by definition can absorb  $H^+$  out of a solution.
  - Antacids are bases and by definition can absorb  $OH^-$  out of a solution.
  - Antacids contain mostly water and so they neutralize the solution.
- From the table below of radioisotopes and their properties, it is obvious that

Radioactive Isotope	Half-life	Energy of Particles Emitted
$^{131}I$	8.1 days	0.8 MeV
$^{32}P$	14.3 days	1.7 MeV
$^{32}P$	25.5 days	0.25 MeV
$^{32}S$	87.5 days	0.2 MeV
$^3H$	12.4 years	0.02 MeV
$^{14}C$	5730 years	0.2 MeV

- the longer the half-life, the more energy emitted by the particles
  - the longer the half-life, the less energy emitted by the particles
  - radioisotopes of the same element must emit the same amount of energy in their emissions and decay at the same rate
  - energy and half-life are not directly related
- Both  $^{18}O$  and  $^{16}O$  are found in nature although  $^{16}O$  is the most common. Which of the following is true?
    - These are different elements.
    - Oxygen atoms can have eight or 10 neutrons.
    - $^{18}O$  is the only form of oxygen that living cells can use.
    - Only the common form of  $^{16}O$  can bond with hydrogen to form  $H_2O$ .
  - The characteristic way in which atoms of an element react is most related to the
    - number of electrons in the outermost shell
    - number of electrons in the innermost shell
    - number of neutrons in the nucleus
    - size of the nucleus
  - Which of the following statements is true about electron configurations?
    - If an atom has only one shell, it is complete with eight electrons.
    - The octet rule applies to only the third and above level of electrons.
    - If an atom has two or more shells, the outer shell is complete with eight electrons.
    - Atoms with more than eight electrons in the outer shell react by gaining electrons.
  - Which of the following correlates the property of water with the correct example?
    - Water molecules are cohesive and are able to cling to each other to form surface tension.
    - Water is a universal solvent and is able to dissolve most hydrophobic substances.

- The temperature of water rises and falls very quickly allowing bodies of water to moderate air temperature.
- A solid (ice) is more dense than a liquid (water) so it sinks. The ice is capable of absorbing more heat energy as it freezes and will release it to provide a heat source in winter.

8. Based on the data in the table below, which structure in the human body is the most alkaline?

Structure	pH
Cytoplasm	7.2
Stomach	1.7
Intestine	8.0
Lysosome	4.5
Blood	7.4

- Cytoplasm
  - Blood
  - Intestine
  - stomach
- In the water molecule
    - the oxygen molecule is more electronegative than the hydrogen
    - the oxygen atom has an overall negative charge with the hydrogen atoms have an overall positive charge
    - unequal sharing of electrons results in a polar molecule
    - all of the choices are correct
  - As a solid, water (ice) floats. This means that
    - organisms in ponds, lakes, and reservoirs cannot photosynthesize under the water
    - covalent bonding occurred between water molecules
    - there is more space between the molecules in ice than in liquid water
    - All of the choices are correct
  - The coastal climate is moderated by water. Which of the following properties is primarily responsible?
    - Water is cohesive.
    - Water resists changes of state.
    - Water has a high surface tension.
    - Water is adhesive.
  - Acid deposition is harmful to all living organisms. Which of the following claims is the result of the increased acidity of precipitation?
    - Leaching of aluminum from the soil into lakes which results in the formation of toxic methyl mercury from mercury in the lake sediments
    - Weakens trees in the forests and kills seedlings.
    - Decrease in pH level of lakes.
    - All of the above

Name: \_\_\_\_\_

### Guided Reading:

## Ch. 3 – The Chemistry of Organic Molecules

Answer the following questions as you read the chapter. Be prepared for a Reading Quiz on any or all of the questions.

1. What are organic chemicals?
2. List the four classes of organic compounds.
3. Which atoms does carbon almost always share electrons with?
4. Explain how carbon's need for four electrons contributes to the diversity seen in carbon-based molecules.
5. How do double bonds contribute to the shape of a molecule?

6. Complete this table summarizing the characteristics of the most biologically significant functional groups:

Group	Structure	Compound	Significance
		Amine as in tryptophan	
			Polar, acidic; present in nucleotides, phospholipids
Hydroxyl			
		Carboxylic acid as in acetic acid	

7. Discuss the association between polymers and monomers.

8. Complete this table summarizing the macromolecules.

Category	Example	Subunit(s)
Carbohydrates		
	DNA, RNA	
		Amino Acid

9. Explain the difference between hydrolysis and synthesis reactions. [p.41]

10. Which monosaccharide is the major source of cellular fuel for all living things? \_\_\_\_\_

11. Match the polysaccharide to the correct function below:

- |               |  |  |
|---------------|--|--|
| Cellulose     |  | Forms the cell walls of bacteria.                                  |
| Chitin        |  | Forms the cell walls of fungi, and the exoskeletons of arthropods. |
| Glycogen      |  | Forms the cell walls of plant cells.                               |
| Peptidoglycan |  | The form in which animals store glucose.                           |
| Starch        |  | The form in which plants store glucose.                            |

12. Why are lipids insoluble in water?

13. Complete this table summarizing the types of lipids: [p.45]

Type	Function(s)	Human Uses
Steroids		
	Long-term energy storage and insulation in animals	
		None
Waxes		

14. Explain the difference between a saturated and unsaturated fatty acid (or sketch):

15. Discuss the benefit of using fat instead of glycogen for long-term energy storage.

16. List some of the many functions of proteins.

17. How do the 20 amino acids differ?

18. What is a peptide bond?

19. Why is a protein' shape so important?

20. Match the level of protein structure to its description and example:

Primary	Folding resulting in a three-dimensional shape.	Fibrous proteins, such as keratin.
Secondary	Results when there are two or more polypeptides combined in a protein.	Hemoglobin is an example.
Tertiary	The specific sequence of amino acids.	Globular proteins, such as enzymes.
Quaternary	The coils and folds of a polypeptide. Beta pleated sheets, alpha helices	No example.

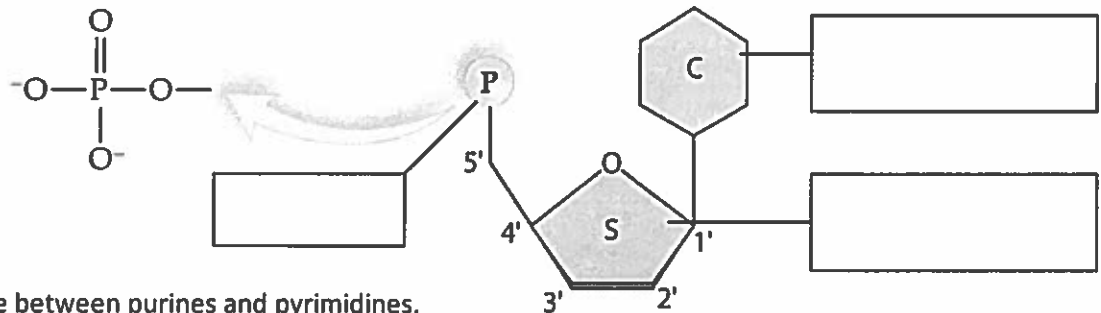
21. What happens when a protein denatures?

22. Discuss the effect of prions like in Mad Cow:

23. Explain how DNA and RNA work together to build a protein (remember transcription/translation?)

24. What is ATP used for?

25. Label this diagram showing the structure of a nucleotide:



26. Explain the difference between purines and pyrimidines.

27. What is complementary base pairing? Write the opposite strand to: A A T C G G A:

28. Why is ATP a high-energy molecule?

29. Explain why the last phosphate bond of an ATP molecule is called a "high energy" bond (though this is somewhat misleading....):

## Macromolecule Quiz (Ch. 3)

Name: \_\_\_\_\_

- Which of the following are building blocks of proteins?
  - amino acids
  - monosaccharides
  - nucleotides
  - peptides
  - fatty acids
- Which macromolecule catalyzes chemical reactions, thus is considered an enzyme?
  - ribonucleic acids
  - deoxyribonucleic acids
  - lipids
  - polysaccharides
  - proteins
- How does RNA and DNA differ?
  - type of sugar they contain
  - how many strands they contain
  - by the bases they contain
  - by their function
- Which of the following best describes the formation of a macromolecule?
  - all of these
  - removal of water to form a hydrogen bond
  - addition of water to form an ionic bond
  - the removal of water to form an ionic bond
  - the addition of water to form a covalent bond
- About how many typical amino acids are found in proteins?
  - 4
  - 16
  - 20
  - 64
  - 120
- Which level of protein organization is due to interactions between amino acid side chain groups? Turn over for choices:
  - primary
  - secondary

- tertiary
  - quaternary
  - all of these
7. When a protein is boiled, it loses all levels of organization besides the primary level. When this happens, the protein is said to be:
- hydrolyzed
  - lysed
  - denatured
  - dehydrated
  - plasmolyzed
8. Ribose, the sugar found in RNA, contains 5 carbons, and is thus considered a(n):
- disaccharide
  - pentose
  - hexose
  - amino acid
  - polyol
9. What is the generalized structure of a carbohydrate?
- $(CH_2O)_n$
  - $(CH_2)_n$
  - $(C_3H_2O)_n$
  - $(CCN)_n$
  - none of these
10. Phospholipids have:
- two hydrophobic tails and one hydrophilic head
  - two hydrophilic tails and one hydrophobic head
  - one hydrophobic tail and one hydrophilic head
  - three hydrophobic tails and one hydrophilic head
  - two hydrophilic heads and one hydrophobic tail