

AP Biology Summer Assignment

Welcome to AP Biology!

The two main goals of AP Biology are to help you develop a conceptual framework for modern biology and to gain a deeper appreciation of science as a process (as opposed to an accumulation of facts). Because of the rapid pace of discovery in the life sciences our primary emphasis is on developing an understanding of unifying concepts that connect the major topics of biology. The AP Biology Curriculum centers around the four Big Ideas and you will need to not only know these but also understand how they all relate:



- **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.

What to do before the first day of school:

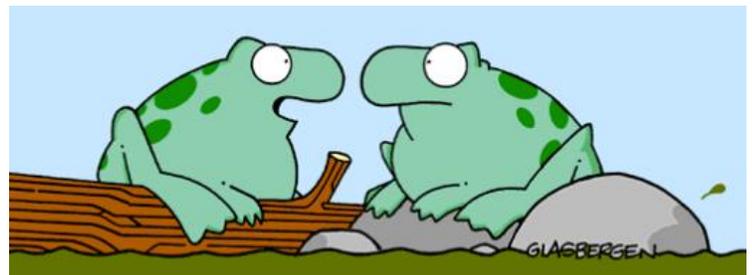
- **(Highly suggested but not mandatory)** Purchase a copy of 5 Steps to a 5 by Mark Anestis (Amazon or your local book store). **It must be the NEWEST addition because the course was redesigned this year.**
- AP Biology was designed by a select group of college professors and high school science teachers to be equivalent to an introductory college biology course. Visit the below College Board site to explore what an AP Biology course is like:
 - <https://apstudent.collegeboard.org/exploreap?affiliateId=apcentral&bannerId=exploreap1>
- It is **important** that you now, as a young adult getting ready to enter college, create a PROFESSIONAL e-mail account. BigDog@hotmail.com may be cool, but not good for your future endeavors in the academic arena or placing on a job application!!!
 - I need a clear, easy to understand e-mail address for you... don't have one? Create a Gmail account. It is great for sharing information and documents.
 - Once you have an account, email me to introduce yourself. I'd like to know some of your immediate and long term goals as well as why you decided to take AP Biology. Include the following in your email:
 - Your full name (& nickname that you go by if you have one)
 - Who was your last science teacher? What class? What grade did you earn?
 - What other science classes have you taken?
 - Why are you taking AP Biology? What do you hope to accomplish/gain?
 - What do you like to do (hobbies, sports, music, interests, etc.)?
 - Tell me a little about your family (Mom, Dad, Guardian, Siblings, Pets, how long you've lived in the area, etc.)
 - What are you most anxious about in AP Biology?
 - Anything else you think I should know or would like to share with me.
 - My email is margaret.ishee@stjohns.k12.fl.us and I will be checking it all summer. If you encounter problems with your summer assignment, please contact me through that email as well.

- We have a small problem in AP Biology. Each year new advances in science are discovered but the length of the school year (and when the test occurs) stays the same. What does this mean? We are short on time. In order to cover ALL of the material, you are responsible for reviewing the Chemistry section on your own. Here is what you are to do:
 - Your 5 Step book is an amazing resource, if you get it, use it!!! It will definitely help you to review some of the chemistry that you will need!
 - Watch the following two YouTube videos. These are called Crash Courses with Hank Green. Get to know him as we will tune into him quite a bit during the year. These two videos are great chemistry reviews.
http://www.youtube.com/watch?v=HVT3Y3_gHGg&list=PL6C159EF1A62143A2&index=11
http://www.youtube.com/watch?v=QnQeoxW_JY4&list=PL6C159EF1A62143A2&index=8
 - **Print and complete the Chemistry Worksheet.** As an AP Biology student the expectation is that if you don't know it, find it out!! Use all of your resources!!! Check my website for provided notes and information.
- Because vocabulary in this course can be a stumbling block, you need to take some time to review the scientific Latin/Greek roots that form many of our scientific terms.
 - **Print and complete the Biology Prefixes and Suffixes.** These should have been learned in Honors Biology so this should just be review! It will make life in AP Biology much easier if you KNOW these roots. Most of these were included in the prefixes you have been quizzed on over the last three years. That list is on my web page as a reference. Any pre/suffixes that are not on that list can be looked up on the internet.
- The Chemistry Worksheet will be **turned in on the first day of class for a grade.**
- Be prepared for a quiz during the first couple of days!!! This quiz will be on Chemistry and some common biology terms (made from the prefixes and suffixes).

I truly am looking forward to working with you next year! Don't procrastinate on this assignment but don't let it keep you from having a wonderful summer!!!

Sincerely,

Mrs. Ishee, M.Ed.
 AP Biology/Honors Biology
 Allen D. Nease High School
Margaret.ishee@stjohns.k12.fl.us

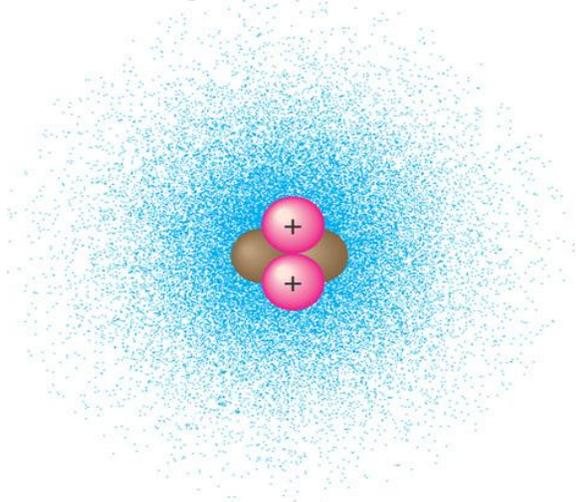


“Looks aren't everything. It's what's inside you that really matters. A biology teacher told me that.”

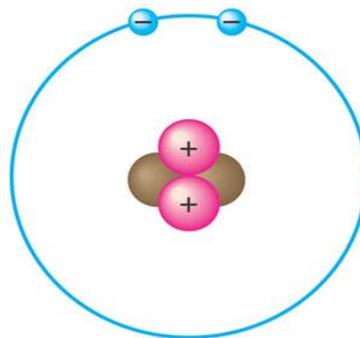
AP Biology Essential Chemistry

This is a review of basic chemistry – we will not spend any class time on these concepts as they should have been learned in chemistry. Please make sure that you know them and if not, be sure to study through them. **You will need access to a periodic table to complete this. You can find one easily online.** Please put this all in your AP Biology three ring (1 ½ or 2 in.) binder!

1. Contrast the term element with compound.
2. Know the symbols of the following elements and their charge:
 - a. Carbon
 - b. Hydrogen
 - c. Oxygen
 - d. Nitrogen
 - e. Phosphorus
 - f. Sulfur
3. Label the diagram below and define the terms that you label.



(a)



(b)

4. Contrast the terms atomic mass and atomic number.
5. What is the difference between the terms atomic mass and atomic weight?
6. What is an isotope and what is “special” about radioactive isotopes?
7. What determines interactions between atoms? Why are valence electrons important?

8. Define the following terms:
 - a. Chemical bond
 - b. Covalent bond
 - c. Single bond
 - d. Double bond
 - e. Electronegativity
 - f. Nonpolar covalent bond
 - g. Polar covalent bond
9. What is the difference between a structural and molecular formula?
10. Know both the molecular and structural formula for the following compounds.
 - a. Oxygen gas
 - b. Carbon dioxide
 - c. Glucose
 - d. Phosphate
 - e. Ammonia
 - f. Water (you would be surprised at how many people missed this!!!)
11. How do ionic bonds compare with covalent bonds?
12. Compare and contrast hydrogen bonds and van der Waals interactions.
13. Define a dynamic chemical equilibrium in terms of quantities of reactants and products. This is a critical concept!

14. Why is water considered a polar molecule?
15. 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.
- Cohesion
 - Adhesion
 - Surface tension
 - High specific heat
 - Heat of vaporization
 - Evaporative cooling
16. What is special about water and density?
17. Explain how these properties of water are related to the phenomena described in the statements below. More than one property may be used to explain a given phenomenon.
- During the winter, air temperatures in the northern United States can remain below 0°C for months; however, the fish and other animals living in the lakes survive.
 - Many substances—for example, salt (NaCl) and sucrose—dissolve quickly in water.
 - When you pour water into a 25-ml graduated cylinder, a meniscus forms at the top of the water column.
 - Sweating and the evaporation of sweat from the body surface help reduce a human’s body temperature.
 - Water drops that fall on a surface tend to form rounded drops or beads.
 - Water drops that fall on your car tend to bead or round up more after you polish (or wax) the car than before you polished it.
 - If you touch the edge of a paper towel to a drop of colored water, the water will move up into (or be absorbed by) the towel.

18. Define the following terms:

- a. Solute
- b. Solvent
- c. Aqueous solution
- d. Hydrophilic
- e. Hydrophobic
- f. Molarity

19. MOLARITY

A. Concentration – *comparison of solute to solvent (solute : solvent)*

- a. Concentrated – *large ratio of solute to solvent*
- b. Dilute – *small ratio of solute to solvent*

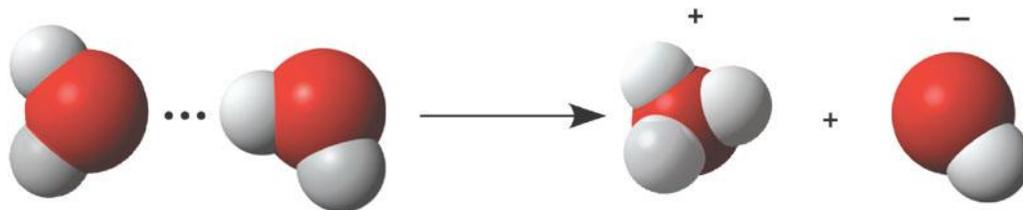
B. Molarity – <http://www.wikihow.com/Calculate-Molarity> and <https://www.youtube.com/watch?v=O7xi3SVbKw4&t=4s>

- a. Symbol – M
- b. Equation – $M = \frac{\text{moles of solute}}{\text{L of solution}}$

C. Example Problems

1. What is the molarity of a solution formed by mixing 10.0 g of H ₂ SO ₄ with enough water to make 0.100 L of solution?	2. To prepare 10.5 L of a 2.50 M solution of KOH, how many grams of potassium hydroxide must be used?
3. How many moles of LiBr must be added to .650 L of water to make a 2.0 M solution?	4. What is the molarity of the solution produced when 145 g of NaCl is dissolved in sufficient water to prepare 2.75 L of solution?
5. How many grams of KCl are needed to prepare 0.750 L of a 1.50 M solution?	6. What is the molarity of the solution produced when .594 mol of HCl is dissolved in 0.385 L of water?
7. To produce 3.00 L of a 1.90 M solution of sodium hydroxide, how many grams of NaOH must be dissolved?	8. If 8.77 g of KI are dissolved in enough water to make 4.75 L of solution, what is the molarity of the solution?

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



21. What defines an acid and a base?

22. Why are small changes in pH so important in biology?

23. What is a buffer? Give an example on how they would work in a living organism.

24. What is acid precipitation and why is it important to living organisms?

25. Why is organic chemistry so important in the study of biology?

26. What is special about carbon that makes it the central atom in the chemistry of life?

27. Describe and contrast the three types of isomers. Draw a sketch of each

a. Structural –

b. Geometric –

c. Enantiomers –

28. Be familiar with each of the following functional groups – know its chemical compound and the functional properties

a. Hydroxyl

b. Carbonyl

c. Carboxyl

d. Amino

e. Sulfhydryl

f. Phosphate

Biology Prefixes and Suffixes-The Language of Science

The main reason students find it difficult to understand science is because of all the hard to write, spell and read words. Actually, scientific vocabulary is a mix of small words that are linked together to have different meanings. If you learn the meanings of the little words, you'll find scientific vocabulary much easier to understand. Find the meaning to the following Greek/Latin root words.

Word	Meaning
a / an	
meso	
leuco	
aero	
anti	
amphi	
aqua / hydro	
arthro	
auto	
bi / di	
bio	
cephal	
chloro	
chromo	
cide	
cyto	
derm	
haplo	
ecto (exo)	
endo	
epi	
gastro	
genesis	
herba	
hetero	
homo	
ov	
kary	
neuro	
soma	
saccharo	
primi / archea	
phyll	

Word	Meaning
hemo	
hyper	
hypo	
intra	
-itis	
lateral	
-logy	
-lysis	
-meter	
mono	
morph	
micro	
macro	
multi / poly	
pod	
-phobia	
-philia	
proto	
photo	
psuedo	
synthesis	
sub	
troph	
therm	
tri	
zoo, zoa	
-tropism	
-taxis	
-stasis	
zyg / zygyous	
phago	
path / pathy	
sym / syn	

Once you have completed the above table, use it to develop a definition, in your own words, for each of the following terms.

1. Hydrology _____

2. Cytolysis _____

3. Protozoa _____

4. Epidermis _____

5. Spermatogenesis _____

6. Exoskeleton _____

7. Abiotic _____

8. Pathogen _____

9. Pseudopod _____

10. Hemophilia _____

11. Endocytosis _____

12. Herbicide _____

13. Anaerobic _____

14. Bilateral _____

15. Autotroph _____

16. Monosaccharide _____

17. Arthropod _____

18. Polymorphic _____

19. Hypothermia _____

20. Biogenesis _____