

# 7th Grade

## Life Science / AP Biology

### Summer Assignment

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:

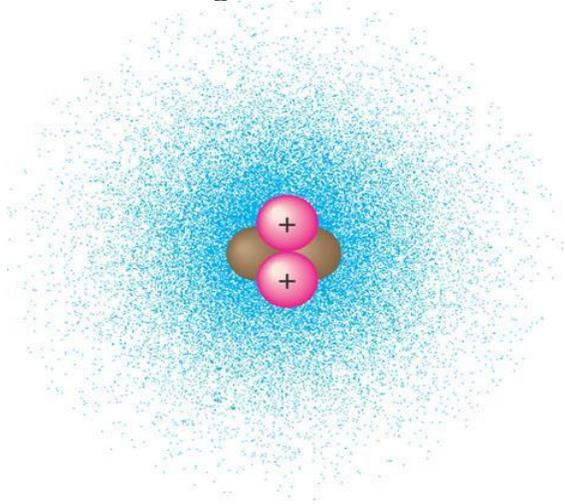
- AP Biology was designed by a select group of college professors and high school science teachers to be equivalent to an introductory college biology course. Visit the below College Board site to explore what an AP Biology course is like:
  - <https://apstudent.collegeboard.org/>
  - The Science Practices podcasts from the Bozeman website are a good introduction to the course:  
<http://www.bozemanscience.com/ap-biology>
  - In addition, the Bozeman website contains podcasts related to the most important topics covered in our course.
- **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!!!

Don't procrastinate on this assignment but don't let it keep you from having a wonderful summer!!!

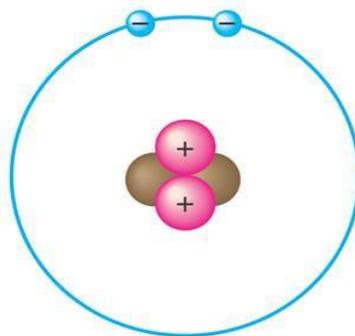
## AP Biology Essential Chemistry

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. 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. Covalent bond
  - b. Single bond
  - c. Double bond
  - d. Electronegativity
  - e. Nonpolar covalent bond
  - f. 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.

a. Cohesion

b. Adhesion

c. Surface tension

d. High specific heat

e. Heat of vaporization

f. 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.

a. 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.

b. Many substances—for example, salt (NaCl) and sucrose—dissolve quickly in water.

c. When you pour water into a 25-ml graduated cylinder, a meniscus forms at the top of the water column.

d. Sweating and the evaporation of sweat from the body surface help reduce a human's body temperature.

e. Water drops that fall on a surface tend to form rounded drops or beads.

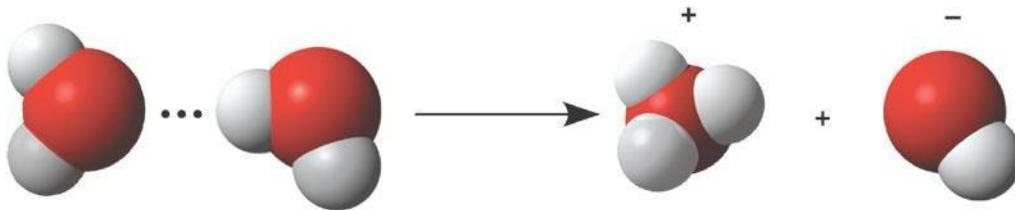
f. Water drops that fall on your car tend to bead or round up more after you polish (or wax) the car than before you polished it.

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



20. What defines an acid and a base?

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

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

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

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

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

26. Be familiar with each of the following functional groups – (textbook page 63)

a. Hydroxyl:

b. Carbonyl:

c. Carboxyl:

d. Amino:

e. Sulfhydryl

f. Phosphate