

AP Biology Summer Assignment: 2022

Hello! Welcome to AP Biology! I'm excited to be your teacher next year and show you how awesome living things can be!

Over the summer, I would like you to study some chemistry and cell biology. These two subjects are the basis for everything we will learn this year. The websites will get you started, but don't worry about understanding it all right now. We will cover this in class as the first topic for the year.

I would also like you to review ninth/tenth grade biology, so I am including a website at the end of this assignment that reviews many topics. Please go over it once in July, and then go through it again in mid-August. Having a background in biology is critical for AP Bio. We are forced to go at an accelerated pace, so the more you know on the first day of school, the better off you will be!

If you do not do the summer assignment, you will start behind in the course. Don't get overwhelmed. Plan out when you will do it. Have your list of terms ready to take a quick picture when you see something

The AP Biology course is rigorous. It is a college level course. Expect to do homework every night. You will get out what you put into the course. You will be given the tools needed to get a 4 or 5 on the AP Biology exam by taking this course, but it will be up to you to use them and employ them. During the year we will complete multiple required AP labs as well as many additional labs and activities. You will gain practice in writing formal lab reports and AP Free Response Questions, and in answering AP level multiple choice questions.

The summer assignment is due by the end of the day (11:59 PM) on Wednesday, August 31, 2022. You can print the assignment, write on it and hand in the paper copy at school. If you do not have access to a printer or would rather type into the document, you can email me the electronic version of the assignment via Synergy mail by the same date and time.

If you are interested in purchasing any **optional** study guides for the course and AP exam, here are a few I recommend. There are in NO WAY required for the class:

- 1) Cliff's AP Biology 5th Edition study guide. ISBN-13: 978-0544784680 ISBN-10: 0544784685
- 2) Pearson Test Prep Series for AP Biology ISBN-13: 978-0133458145 ISBN-10: 9780133458145
- 3) Barron's ISBN-13: 978-1438008684 ISBN-10: 1438008686

Can't wait to see you next year!

-Ms. Clark

Part I: Video Learning-Bozeman Science

You will learn about key practices to succeed in AP biology by watching videos and answering questions about each. We will be using a lot of videos for Bozeman science this year, so this will give you a good introduction to the host, Mr. Anderson, and his videos. Each video is about 10 minutes long, but allow yourself 30 minutes for each to pause video and answer questions

Each video centers on the 4 Big Ideas of AP Biology:

- 1) **Big Idea 1: EVOLUTION** The process of evolution drives the diversity and unity of life.

- 2) **Big Idea 2: Cellular Processes: ENERGY and COMMUNICATION** Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.
- 3) **Big Idea 3: GENETICS and INFORMATION TRANSFER** Living systems store, retrieve, transmit, and respond to information essential to life processes.
- 4) **Big Idea 4: INTERACTIONS of SYSTEMS** Biological systems interact, and these systems and their interactions possess complex properties.

The 4 videos are as follows:

- 1) Video 1 – Models and Representation <https://tinyurl.com/4nhpm3kw>
- 2) Video 2 – Using Mathematics <https://tinyurl.com/mr465v6s>
- 3) Video 3 – Beginner’s Guide for Graphing Data <https://tinyurl.com/mjchv8yx>
- 4) Video 4 – Scientific Questioning <https://tinyurl.com/2p94fy56>

Please answer the following questions for each video as you watch.

Video 1 – Models and Representation

A. What is a model?

B. A _____ of how it works is a “Conceptual Model”.

C. What are the four Big Ideas we will be discussing in AP Biology? List below along with the associated example:

1. _____ - example:
2. Free _____ - example:
3. _____ - example:
4. _____ - example:

D. What are the 5 things you will need to be able to do using models and visual representations? [Please keep in mind, some of the examples that he uses may be unknown to you at this time, focus on the “practice” not the content.]

1. _____
 - a. Relating to beetles, draw/label the final graph he created below:

b. Why do you think there were fewer light-colored beetles when the trees became darker?

2. _____
What is going to move in his example?

3. _____
They will give you a model and then _____ based on that.

4. _____
Means that you are _____ your knowledge to a visual representation.

5. _____
Asking you to _____ the knowledge that you have.

E. Models allow us to make _____ of a _____ model.

F. What is the most famous model of all? _____
That was created by _____

Video 2 – Using Mathematics

NEED YOUR CALCULATOR!!!

A. All sciences have what at their core?

B. What is “Mathematical Biology” driven by:

1. _____: sequencing DNA – what is the trend?

2. _____ Theory: being used to predict what?

3. Computing _____: computers are getting what?

4. Laboratory experiments in silico (define the following):

a. In vitro:

b. In vivo:

c. In silico: simulating what?

C. Four equations in the four big ideas: want to be familiar with these:

1. Evolution:

2. Free energy:

3. Information:

4. Systems:

D. Understandings in Using Mathematics:

1. _____ the _____ of a Mathematical Routine: Pause video, try and do it and then check it. You should do this one no problem. Show your work below.

2. Apply _____ Routines: Again, try this problem, showing your work below. I think you can do this one based on common sense!

3. _____ quantities that _____ natural phenomena.
a. You can absolutely do this, show work.

b. Potatoes: you can do this too! Show work. _____ M Sucrose

Video 3 – Beginner’s Guide for Graphing Data

1. What type of graph uses a best fit line?
2. Explain the difference between a bar graph and a histogram.
3. What type of graph shows change over time?
4. Which type of graph displays a correlation of variables?
5. Distinguish between the independent and dependent variables in an experiment, and where their axes are on a graph.
6. Which type of graph is best for comparing 2 or more different groups?

7. Which type of graph is better for showing distribution of data?
8. Explain when a pie chart/graph should be used and give (draw, label) any example.
9. State at least 5 elements that any graph should always display.

Video 4 – Scientific Questioning

1. I should be able to ask you, “How do we....” what?
2. Students should be able to answer, “This is how....” what?
3. What is a good example of how you ask questions all the time?
4. What is the problem with:
 - a. Smallest bird question?
 - b. Universe question?
 - c. Genetically modified food question?
5. Why is the plant growth question more scientific? But what is a problem with it too?
6. Why is the CO₂ question a good scientific question?
7. A good question is going to lead to:
 - a.
 - b.
8. What are the three things you have to be able to do during the practice of “Scientific Questioning”?

9. Write out one of the three questions he “posed” concerning the phylogenetic tree. (You are just asking, not answering.)

10. When you “refine” a question, you are taking it to another _____.

11. What is the third part of scientific questioning?

12. What can you then do if you are good at scientific questioning?

Part 2: Root Word Investigation

Research each root word on the next page and write their definition. These root words will help you understand many of the terms you will encounter this year, which is part of the battle in science!

Word	Meaning	Word	Meaning
a- / an-		hemo-	
meso-		hyper-	
leuco-		hypo-	
aero-		intra-	
anti-		-itis	
amphi-		lateral	
aqua- / hydro-		-logy	
arthro-		-lysis	
auto-		-meter	
bi- /di-		mono-	
bio-		morph-	
cephal-		micro-	
chloro-		macro-	
chromo-		multi- / poly-	
-cide		-path / -pathy	
cyto-		-ped / -pod	
derm-		phago-	
haplo-		-phobia	
ecto- / exo-		-philia	
endo-		proto-	
epi-		photo-	
gastro-		pseudo-	
-genesis		-stasis	
herba-		sub-	
hetero-		sym- / -syn	
homo-		-synthesis	

ov-		-taxis	
kary-		-troph	
neuro-		-tropism	
soma-		-therm	
saccharo-		tri-	
primi- / archea-		zoo- / -zoa	
-phyll		zyg- / -zygous	

Once you have completed the above root word table, use it to develop a SIMPLE 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 _____

Part 3: Essential Chemistry

This is a review of basic chemistry. We will not spend hardly any class time on these concepts as you should have learned them in chemistry. However, they are necessary to review as a foundation to the course. Please click the links to view the videos and answer the following questions.

<https://tinyurl.com/4n4xsek6> and <https://tinyurl.com/42m3e7e7>

1. What is the difference between an element and a compound?

2. Write the symbols of the following elements and their charge:
 - a. Carbon

 - b. Hydrogen

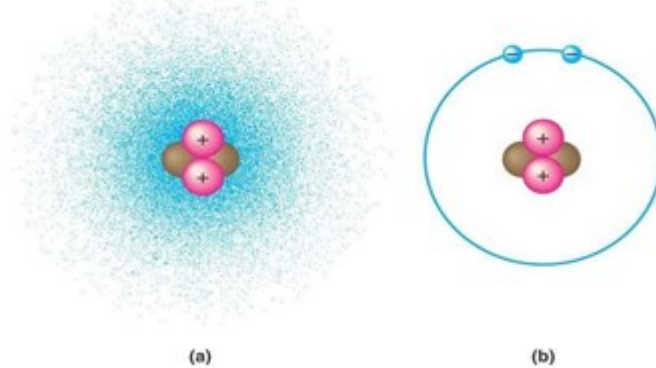
 - c. Nitrogen

 - d. Oxygen

e. Phosphorus

f. Sulfur

3. Label the diagram below with everything you can see and define the terms that you label.



4. What is the difference between atomic mass and atomic number.

5. What is an isotope and what is special about radioactive isotopes?

6. What determines interactions between atoms? Why are valence electrons important?

7. 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

8. Know the molecular formulas for the following compounds:
 - a. Oxygen gas
 - b. Carbon dioxide
 - c. Glucose
 - d. Phosphate
 - e. Ammonia
 - f. Water
9. How do ionic bonds compare to covalent bonds?
10. Why is water considered a polar molecule?
11. 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’s special property.
 - a. Cohesion
 - b. Adhesion
 - c. Surface tension
 - d. High specific heat
 - e. Heat of vaporization
 - f. Evaporative cooling
12. What is special about water and density?
13. Explain how these properties of water are related to the phenomena described in the scenarios below. More than one property may be at play in some scenarios.
 - a. During the winter, air temperatures in the northern U.S. can remain below 0°C for months. However, the fish and other animals living in the lake survive.
 - b. Many substances, like salt (NaCl) and sucrose, dissolve quickly in water.

- c. When you pour water into a 25mL graduated cylinder, a meniscus forms at the top of the water column.
- d. Sweating and 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. If you touch the edge of a paper towel to a drop of water, the water will move up into (be absorbed) by the towel.

14. Define the following terms:

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