

AP BIOLOGY SUMMER ASSIGNMENT 2023:

Welcome to AP Biology! The goal of this course is to help you develop a conceptual framework of modern biology and to gain a great appreciation of science as a process. The main purpose of these assignments is to make sure that you are adequately prepared for the upcoming year and to get you in the biology state of mind. Hopefully, you will have some fun along the way!

Part 1 Chemistry Review:

1. How do ionic bonds compare with covalent bonds?

2. Below make a table comparing intermolecular forces versus intramolecular forces

3. What makes hydrogen bonds so special

4. Why is water considered a polar molecule?

5. For each of the 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 AND a real-life example of this property
 - a. Cohesion

 - b. Adhesion

 - c. surface tension

 - d. high specific heat

 - e. heat of vaporization

 - f. evaporative cooling

6. Define the following terms

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

7. Familiarize and draw each of the following functional properties

- a. Hydroxyl
- b. Carbonyl
- c. Carboxyl
- d. Amino
- e. Sulfahydryl
- f. phosphate

Part 2 Macromolecules Review

1. What are a monomer and a polymer?

2. List the function of each macromolecule and their monomer and polymer
 - a. Protein
 - i. Monomer:
 - ii. Polymer:
 - iii. Function:

 - b. Lipid
 - i. Monomer:
 - ii. Polymer:
 - iii. Function:

 - c. Carbohydrate
 - i. Monomer:
 - ii. Polymer:
 - iii. Function:

 - d. Nucleic Acid
 - i. Monomer:
 - ii. Polymer:
 - iii. Function:

Part A. Classify each as a carbohydrate, protein, or lipid.

Starch	
Cholesterol	
Steroid	
Glycogen	
enzyme	

saturated fat	
polypeptide chain	
Glucose	

Polysaccharide	
Phospholipid	
Glycerol	
Monosaccharide	
Cellulose	
amino acid	
unsaturated fatty acid	

Part B. Identify the specific molecule (use the above terms) from each description. Some terms may be used

16. _____ provides long-term energy storage for animals
17. _____ provides immediate energy
18. _____ sex hormones
19. _____ provides short-term energy storage for plants
20. _____ animal and plant structures
21. _____ forms the cell membrane of all cells
22. _____ speeds up chemical reactions by lowering activation energy
23. _____ one sugar
24. _____ monomer of proteins
25. _____ provides long-term energy storage for plants
26. _____ steroid that makes up part of the cell membranes
27. _____ 3-carbon “backbone” of a fat
28. _____ provides short-term energy storage for animals
29. _____ many sugars
30. _____ forms the cell wall of plant cells

Part 3 Biological Photo Collection:

For this assignment, you will “collect” 25 photographic examples of biological terms/concepts and compile them on one document. These must be your own pictures and you must have the same unique identifier (such as the giraffe in the examples at the end) included in each picture you take. Select any 25 of the items from the Biological Collection List to include in your document. This will introduce you not only to the language of biology, but also help you understand the biological concepts around you.

The format of the document created must be typed, organized, and easy to follow. The Table should be completed and added at the beginning of the document before your pictures.

Directions for the Biological Photo Collection:

1. **“Collect” an item by taking a picture of it.** Then **define**, IN YOUR OWN WORDS, the biological term/concept. Also, within a couple of statements, **explain** how the picture represents the term or concept. Use the Biological Collection List given on the next page. **The connection between the item and the definition must be clear and correct or no credit will be given for that item.**
2. **Upload the photo, definition, and explanation** to a document that you create for the class. **Title each entry with the term that you are using.**
3. **Be creative.** If you choose an item that is internal to a plant or animal, like a phloem, you could submit a photograph of the whole organism or a close up of one part, and then explain *what* a phloem is and **specifically where** the phloem is in the specimen. However, **each item can only be used for one term.** So, if you use a picture of a daisy for the term phloem you must find a completely different kind of plant to explain the term xylem.
4. **Use original photos ONLY.** You MAY NOT use an image from any publication or from the internet. You must take the photo yourself. The best way to prove that the photo is your work is to have a Proof Object in each photo. A Proof Object is something in your picture that represents you. This could be a key chain, a bracelet, a small toy, etc. **The item must be unique and at the end of the document you must have a picture of you with your Proof Object.**
 - a. **Proof Object** – Your proof must be an object that is inanimate and separate from you. It must be unique – not a yellow #2 pencil or a penny. If you lose your Proof Object before you are able to take a

picture with it then you must start over. For that reason, I suggest taking a picture with your Proof Object early on. I will not allow more than two objects used per project--so if you lose it twice, you will need to redo some of your photos! Safeguard your Proof Object carefully.

5. **You should only use natural items.** Take a walk in your neighborhood, go to the park or zoo, go for a hike in the woods, etc. Humans are natural items and may be used, but only for a **total of two** entries.

6. **This is an individual project.** While brainstorming, discussing, and even going on collecting adventures together (while abiding by any current Social Distancing and Masking Guidelines, of course!) is welcome, your items and photos are to be unique. With over 90 concept choices, probability says there is a very slim chance that any two students will have the same items chosen from their list.

7. **Be careful and respectful!** Never touch plants or animals you are unfamiliar with. Don't kill or hurt any organisms. Don't remove any organisms from the natural environment. If any pictures deem that you didn't follow this rule then they will not be accepted.

Biological Collection List for Assignment 3

1. Adaptation of an animal
2. Adaptation of a plant
3. Altruistic behavior
4. Amniotic egg
5. Analogous structures
6. Animal that has a segmented body
7. Anther and filament of stamen
8. Archaeobacteria
9. Asexual reproduction
10. ATP
11. Autotroph
12. Auxin producing area of a plant
13. Basidiomycete
14. Batesian mimicry
15. Bilateral symmetry
16. Biological magnification
17. C3 Plant
18. C4 Plant
19. CAM Plant
20. Calvin Cycle
21. Cambium
22. Cellular respiration
23. Coevolution
24. Commensalism
25. Connective tissue
26. Cuticle layer of a plant
27. Detritivore
28. Dominant vs. recessive phenotype
29. Ectotherm
30. Endosperm
31. Endotherm
32. Enzyme
34. Ethylene
35. Eubacteria
36. Eukaryote
37. Exoskeleton
38. Fermentation
39. Flower ovary
40. Frond
41. Gametophyte
42. Genetic variation within a population
43. Genetically modified organism
44. Gibberellins
45. Glycogen
46. Gymnosperm cone – male or female
47. Gymnosperm leaf
48. Hermaphrodite
49. Heterotrophy
50. Homeostasis
51. Homologous structures
52. Hydrophilic
53. Hydrophobic
54. Introduced species
55. Keystone species
56. Krebs cycle
57. K-strategist
58. Lichen
59. Lipid used for energy storage
60. Littoral zone organism
61. Long-day plant
62. Mating behavior (be careful!!)
63. Meristem
64. Modified leaf of a plant
65. Modified root of a plant
66. Modified stem of a plant
67. Mullerian mimicry
68. Mutualism
69. Mycelium
70. Mycorrhizae
71. Niche
72. Parasitism
73. Parenchyma cells
74. Phloem
75. Pollen
76. Pollinator
77. Population
78. Predation
79. Prokaryote
80. R-strategist
81. Radial symmetry (animal)
82. Redox reaction
83. Rhizome
84. Seed dispersal (animal, water)
85. Spore
86. Sporophyte
87. Stigma and style of carpel
88. Succession
89. Taxis
90. Territorial behavior
91. Tropism
92. Unicellular organism
93. Vestigial structures
94. Xylem

Biological Photo Assignment 3 Table

Photo Order	Biological Lists/ Concepts	Teacher Comments	Points earned
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Rubric for Biological Photo Collection Assignment #3			
Points	Biological Photo Collection Entry (per photo)	Points	Table of Contents*
1	Original photo posted		* Points in this section are awarded in an all or none format. If guideline is not <u>fully</u> met, no points will be awarded.
1	Biological term/concept identified	5	Picture of you with your proof object submitted
1	Biological term/concept defined in own words	10	Each biological term/concept listed in the order it appears
2	Biological term/concept and photo relationship explained fully	10	Document is easy to follow and neatly presented

Example Entries for Assignment #2 Photo Collection

Notice the toy giraffe in the pictures below. This is the Proof Object and is used to demonstrate that the photos in the document are indeed original. **Make sure you have Proof Object in each of your photos.**

4. Detritivore



This is a picture of an earthworm. The earthworm represents a *detritivore*. A detritivore, also called a decomposer, is an organism that consumes non-living organic materials (corpses, fallen plant material, and wastes) to obtain its energy and nutrients. They can be found in many different areas (land and water). They can also be found in many different types, for example, fungi, bacteria, and protists, as well.

10. Modified Leaf



This is a picture of pine needles. Pine needles are an example of a *modified leaf of a plant*. A modified leaf is one that has adapted to perform another function, other than photosynthesis and transpiration. A pine needle's shape functions to retain moisture, which is helpful in dry and windy areas.