

Advanced Placement Biology
Introduction and Summer Work for SY 2017-2018

Introduction

The AP Biology course is built around the four Big Ideas in Biology, which will be integrated throughout the course.

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.

In AP Biology, the students will perform at least 2 labs that relate to each Big Idea. These labs can be found in the AP Biology Lab Manual for Students, and other labs will be added in as determined by the instructor. The time spent on lab work will allow the students to directly observe biological phenomena, while developing observation and data analysis skills.

Lab activities are hands-on so that students can experience the process of science, not just the results. During lab activities, students will develop and test hypotheses, collect, analyze and present data and clearly present their results. Lab reports will include discussion of the aforementioned areas and also clearly presented tables and graphs.

Students will maintain a laboratory notebook in which they will record lab procedures, data, graphs and analysis.

This packet contains your summer assignments. Please take this seriously, as these items will be your first grades in AP Biology. Please email me if you have any questions over the summer at rmichaels@spisd.us

We are going to have a great year! ☺

Summer Assignments are attached.

Advanced Placement Biology
Introduction and Summer Work for SY 2017-2018

Assignment #1 - Join the AP Biology 17-18 Google Classroom

We will be using Google Classroom to submit your Summer work and also throughout the year. I will use Classroom to communicate with the class, to post helpful information and links, and for assigning/collecting work.

I strongly suggest that you install the Classroom App on your phone if you haven't already, and enable notifications. You'll link the Classroom App to your "spsd.us" Google account.

To join our Google Classroom:

- Log into your spsd.us Google account.
- Click Classroom icon in your "waffle" in the upper right corner of your screen, or go to website directly by typing the url: classroom.google.com
- In the upper right corner of your Classroom homepage, there is a plus "+" sign. Click on this, and select "Join Class".
- Use this class code to join the AP Bio 17-18 Classroom: **yqyz14**

Due Date: Thursday, June 22, 2017

When you join our Google Classroom, download the rest of your Summer Assignment. Email me at rmichaels@spsd.us if you have any questions or problems.

Assignment #1 - Join the AP Biology 16-17 Google Classroom

Instructions & due date provided by Mrs. Michaels when you picked up your textbook.

Assignment #2 - Introductory Email

Send me an email to allow me to begin to get to know you.

You should use your spsd.us email account for these communications.

Due Date: Friday, June 23, 2017

Your email needs to adhere to the following rules (*borrowed from Mrs. Kim Foglia, Levittown, NY*)

- a. Use clearly written, **full sentences**. Do not abbreviate words like you are texting your friend! Use spell check! This is a professional communication like you would have with a college professor, so let's practice for your rapidly nearing future.
- b. Address it to me at: rmichaels@spsd.us
- c. Make the **Subject**: "AP Bio: Introduction to <Insert your name here>" (Do not include the quote marks or the brackets, just the words)
- d. Begin the email with **formal salutation**, like "Mrs. Michaels, " or "Dear Mrs. Michaels,"
- e. Now introduce yourself (your name) and tell me a little about yourself, like:
 - ❖ What do you like to do (hobbies, sports, music, interests, etc.)?
 - ❖ Do you have a job?
 - ❖ Tell me a little about your family (Mom? Dad? Guardian? Siblings? Pets?)
What do your parents do for a living?
 - ❖ Was there anything you liked about your previous biology class?
 - ❖ What was the last book you read for fun?
 - ❖ What are you looking forward to the most in AP Biology?
 - ❖ What are you most anxious about in AP Biology?

- f. End the email with a **formal closing**: “Cordially”, “Sincerely”, “Best Regards”, etc. and add your name as if you signed a letter.

Assignment #3 - Biology Collection

(also borrowed from Mrs. Foglia)

For this part of your summer assignment, you will be familiarizing yourself with science terms that we will be using at different points throughout the year. On the next page, you will find the list of terms.

1. Select 40 terms – 20 due Thursday, July 20 and 20 MORE due Thursday, August 17:

- ❖ Define 10 of these terms in a Google Doc and submit it in Classroom.

- ❖ “Collect” 10 other items from this list of terms.

When I say “collect”, I mean you should collect that item by finding it and taking a **photograph** of that item. You do not need to find the exact item on the list – say for example, if it is an internal part of an organism, but you must apply the term to the specimen you find and explain how this specimen represents that term.

Create a Google Slides presentation. Each slide should have:

- the term & definition
- the photo
- explanation of how the photo represents the term.

- ❖ Example

If you choose the term “phloem”, you could submit a photograph you have taken of a plant leaf or a plant stem and then explain *what* phloem is and specifically *where* phloem is in your specimen.

2. Requirements:

- ❖ Original Photos Only: You cannot use an image from any publication or the Web. You must have taken the photograph yourself. The best way to prove that is to place an item in all of your photographs that only you could have added each time, something small like a coin, action figure, keys, etc....

- ❖ Natural Items Only: Some specimens may be used for more than one item, but all must be from something that you have found in nature. Take a walk around your yard, neighborhood, and town. **DON'T SPEND ANY MONEY!** Research what the term means and in what organisms it can be found....and then go out and find one!

3. Team Work:

You may work with other students in the class to complete this project, but **each student must turn in his or her own project with a unique set of terms chosen.** There are 109 choices....probability says there is a very small chance that any two students will have most of the same 40 terms chosen.

BIOLOGY COLLECTION TERMS

1. adaptation of an animal
2. adaptation of a plant
3. abscisic acid
4. actin
5. amniotic egg
6. amylase
7. angiosperm
8. animal that has a segmented body
9. annelid
10. anther & filament of a stamen
11. arthropod
12. autotroph
13. archaeobacteria
14. auxin producing area of a plant
15. basidiomycete
16. Batesian mimicry
17. bilateral symmetry
18. biological magnification
19. bryophyte
20. C4 plant
21. Calvin cycle
22. carbohydrate – fibrous
23. cambium
24. cellulose
25. chitin
26. cnidarian
27. coelomate
28. connective tissue
29. cuticle layer of a plant
30. deciduous leaf
31. deuterostome
32. dicot plant with flower & leaf
33. echinoderm
34. ectotherm
35. endosperm
36. endotherm
37. enzyme
38. epithelial tissue
39. ethylene
40. eubacteria
41. eukaryote
42. exoskeleton
43. fermentation
44. flower ovary
45. frond
46. fruit – dry with seed
47. fruit – fleshy with seed
48. gametophyte
49. gastropod
50. genetically modified organism
51. gibberellins
52. hermaphrodite
53. insect
54. K-strategist
55. keratin
56. leaf - angiosperm
57. leaf - gymnosperm
58. lepidoptera
59. lichen
60. lignin
61. lipid used for energy storage
62. littoral zone organism
63. long-day plant
64. meristem
65. modified leaf of a plant
66. modified root of a plant
67. modified stem of a plant
68. monocot plant with flower and leaf
69. muscle fiber - striated
70. mutualism
71. mycelium
72. mycorrhizae
73. myosin
74. nematode
75. niche
76. nymph stage of an insect
77. parasite
78. parenchyma cells
79. phloem
80. pine cone - female
81. platyhelminthes
82. pollen
83. pollinator
84. porifera
85. prokaryote
86. protein - fibrous
87. protein - globular
88. protostome
89. pteridophyte
90. pupa stage of an insect
91. r-strategist
92. radial symmetry
93. rhizome
94. animal with two-chambered heart
95. animal with three-chambered heart
96. spore
97. sporophyte
98. stem - herbaceous
99. stem - woody
100. stigma & style of carpel
101. tendril of plant
102. thorn of a plant

- 52. glycogen
- 53. gymnosperm cone
- 54. heartwood

- 106. unicellular organism
- 107. vascular plant tissue
- 108. xerophyte

109. xylem

Assignment #4 - Chapters 1 & 2, 12 & 13

This packet contains questions (referred to ever after as your Key Concept Questions, or KCQs) pertaining to Chapters 1, 2, 12 & 13 of your textbook.

Answer the questions on separate paper, and in complete sentences. You may type your answers if you prefer. Please note that the figures and diagrams in your text contain much valuable information – make sure to fully examine them as you read. You will be tempted to just search out the answers to the questions, but it is to your distinct advantage to read the entire chapter! Some of these questions can be answered simply by reading the text; others will require you to make connections and inferences about what you have read. Concept checks are very helpful, with answers in appendix A

You will be learning the material in Chapters 1 & 2 on your own, in preparation for a test on the second day of school. I have included Chapters 12 & 13 so that you can get a head start on the first few assignments of the year if you so desire.

After we go over Chapters 12 & 13, we will be going into our unit on Genetics. Take some time this summer to make sure you remember how to do the types of Punnett squares that were covered in your first-year class. I will expect you to be confident about and comfortable with solving the types of Genetics problems/Punnett Squares that are covered in a first-year Biology course. You should be able to solve Punnett Squares for:

1. 1-Trait Crosses ($Tt \times Tt$)
2. Incomplete Dominance ($RR \times WW$)
3. Codominance/Multiple Alleles – Human Blood Types ($I^A I^A \times I^B I^B$ or $I^A i \times ii$)
4. Sex-Linked Traits ($X^B X^b \times X^b Y$)
5. 2-Trait Crosses ($RrBb \times RRbb$)

To help refresh your memory, take a look at this website:

http://www.phschool.com/science/biology_place/biocoach/inheritance/intro.html

It takes you through the different types of problems, allows you to check your answers, and helps you if you get stuck. There is more on the website than is listed above. You are not required to solve every problem, but work through them as necessary to ensure you are familiar with the types of problems listed above.

Due Dates are as follows:

- Thursday, September 7, 2017 – We will have some class time to discuss any questions you may have had regarding Chapters 1 & 2
- Friday, September 8, 2017 – First Test! This test will cover material in Chapters 1 & 2. Chapter 1&2 KCQ's due.
- Monday, September 11, 2017 – We will cover Chapter 12. Chapter 12 KCQ's due.

- Tuesday, September 12, 2017 – Chapter 13 KCQ's due

Please separate the KCQ's by due date – Please have Chapter 1&2 stapled together to hand in on 9/8. Have Chapter 12 separated from Chapter 13 so they can be turned in as indicated above.

Chapter 1

1. What is Biology?
2. What are the characteristics of living things as shown in Figure 1.2?
3. Explain the hierarchy of biological organization as shown in Figure 1.3.
4. Contrast producers and consumers.
5. What is the difference between how nutrients and energy pass through an ecosystem?
6. What is a cell?
7. How does DNA direct the activities of the cell?
8. How did scientists get a bacterial cell to produce human insulin?
9. Define genome.
10. Distinguish between eukaryotic cells and prokaryotic cells.
11. What are emergent properties? Give an example.
12. Compare reductionism with systems biology. How is each one a valid way of understanding biological systems? How do these two approaches complement each other?
13. How does a negative feedback loop work? Give an example.
14. How does a positive feedback loop work? Give an example.
15. How many species have been identified and named? How many more species do scientists estimate are as yet undiscovered?
16. What changes have recently been made to the traditional 5-kingdom classification system?
17. What are the three domains, and what types of organisms do they contain?
18. What do the cilia of *Paramecium* and the cilia of the human windpipe have in common?
19. Name Darwin's famous work. What year was it published?
20. What were Darwin's two main points?
21. Summarize Darwin's idea of natural selection.
22. Explain how the Galapagos finches could have developed from a single South American ancestral species.
23. What is our evolutionary connection to ancient prokaryotes?
24. What is the basis for discovery science?
25. What is inductive reasoning? Give an example of a conclusion reached through inductive reasoning.
26. What is the basis for hypothesis-based science?
27. What is deductive reasoning? Give an example of a conclusion reached through deductive reasoning.
28. What are the two requirements for a valid hypothesis?
29. How could predators "know" not to attack a coral snake?
30. Summarize the experimental design and results of Pfennig and Harcombe's snake experiment.
31. How do researchers control variables?
32. What is the difference between the word *theory* in everyday language, and the word *theory* in science?
33. What is the usefulness of models in science?

34. What is the difference between science and technology?
35. What are some of the ethical concerns that go along with increasing technological innovations?
36. What are the biological themes that we will study throughout our text?

Chapter 2

1. How does the bombardier beetle defend itself?
2. What is matter?
3. Distinguish between weight and mass.
4. How is sodium chloride an example of an emergent property?
5. What are trace elements?
6. Define atom. What are atoms made of?
7. Distinguish between atomic number and mass number.
8. What is the difference between the three isotopes of carbon?
9. How can researchers utilize radioactive isotopes?
10. What affects the amount of potential energy electrons have?
11. What happens when an electron absorbs energy? What happens when an electron releases energy?
12. What is the importance of valence electrons?
13. Why are orbitals a better description of electron location than the electron shell?
14. How does a covalent bond form?
15. What is the difference between a structural and a molecular formula? Give an example of each.
16. What is electronegativity?
17. Distinguish between polar and nonpolar covalent bonds. Give an example of a molecule containing each.
18. How does an ionic bond form?
19. Define: ion, cation, anion
20. How does a hydrogen bond form?
21. What are van der Waals interactions?
22. Why is the shape of a molecule such an important consideration?
23. What is the difference between reactants and products in a chemical reaction?
24. What does it mean if a reaction goes to completion?
25. What is dynamic equilibrium?

Chapter 12

1. What different functions does cell division serve in an organism?
2. Contrast the prokaryotic and eukaryotic genome.
3. How many chromosomes are found in human somatic cells and in human gametes?
4. What are sister chromatids? What process forms the sister chromatids?
5. Draw a diagram of a duplicated chromosome. Label the sister chromatids and the centromere.
6. What are the phases of the cell cycle? What happens during each phase?

Refer to Figure 12.6 for questions 7-14.

7. Draw a cell in G₁ of interphase. What happens in this stage?

8. Draw a cell in prophase. What happens in this stage?
9. Draw a cell in prometaphase. What happens in this stage?
10. Draw a cell in metaphase. What happens in this stage?
11. Draw a cell in anaphase. What happens in this stage?
12. Draw a cell in telophase and cytokinesis. What happens in this stage?
13. Why are the chromosomes not visible until prophase?
14. What is the kinetochore?
15. What are the components of the mitotic spindle?
16. Explain how the kinetochore and nonkinetochore microtubules interact with the chromosomes.
17. What is the mechanism that separates the sister chromatids?
18. What is the function of the nonkinetochore microtubules?
19. Compare and contrast cytokinesis in animal and plant cells.
20. How do prokaryotes divide?
21. How may mitosis have evolved?
22. How was it determined that cytoplasmic signal chemicals regulate the cell cycle?
23. How do the cell cycle checkpoints regulate the cycle?
24. How are the protein kinases involved in regulation of the cell cycle activated? What are these kinases called?
25. Describe how MPF is produced and broken down within the cell and how it affects the cell cycle.
26. Explain how the kinetochores themselves can regulate the onset of anaphase.
27. What are growth factors?
28. What keeps cells from dividing in density-dependent inhibition?
29. How are cancer cells different from normal body cells? Give several examples.
30. What is the difference between benign and malignant tumors?
31. How may a malignant tumor affect the body?
32. When would a cancer patient be treated with radiation? With chemotherapy? How do these treatments affect cancer cells and normal cells?

Chapter 13

1. What are genes? How do genes determine the traits of an organism?
2. What is a gene's *locus*?
3. Give an example of an organism that reproduces asexually and one that reproduces sexually. What is the difference between the two methods of reproduction?
4. What is a clone?
5. What is a karyotype?
6. What are homologous chromosomes? Where did your homologous chromosomes come from?
7. What are diploid cells and haploid cells? Which cells in your body are diploid and haploid? How many chromosomes do you have in each of your diploid cells and each of your haploid cells?
8. Diagram the human sexual life cycle.
9. How does meiosis maintain the chromosome number of a species from generation to generation?

10. Diagram the plant sexual life cycle.

Refer to Figure 13.8 for questions 11-24.

11. Overall, what happens during meiosis I and meiosis II?
12. Draw a cell in interphase. What happens in this stage?
13. Draw a cell in prophase I. What happens in this stage?
14. What is a tetrad? What are chiasmata?
15. What happens during synapsis and crossing over?
16. Draw a cell in metaphase I. What happens in this stage?
17. Draw a cell in anaphase I. What happens in this stage?
18. Draw a cell in telophase I and cytokinesis. What happens in this stage?
19. Draw a cell in prophase II. What happens in this stage?
20. Draw a cell in metaphase II. What happens in this stage?
21. Draw a cell in anaphase II. What happens in this stage?
22. Draw a cell in telophase II and cytokinesis. What happens in this stage?
23. Why do you think that meiosis II is sometimes referred to as a mitotic division?
24. Why are the cells produced at the end of meiosis I considered to be haploid?
25. Compare and contrast mitosis and meiosis. Be specific.
26. How does independent assortment contribute to genetic diversity?
27. What are recombinant chromosomes? What process produces them?
28. Explain how crossing over occurs.
29. How does genetic variation contribute to the success of a species?

Assignment #5 - Materials Acquisition

Required materials for AP Biology:

1. 3-ring binder, **at least 1 ½”** thick (depends on how much material you want to be able to bring to class with you at once, and how often you’re willing to make room in your binder for new materials.)
2. Bound composition book to use as a lab notebook
 - a. A spiral notebook is **NOT ACCEPTABLE** as a lab notebook. Neither is one of those where the binding is glued on. I want you to have a lab notebook where the pages are sewn in.
 - b. I recommend finding one that is “Quad ruled” or “Quadrille ruled” – this means the pages of the notebook are graph paper. This will allow you to accurately graph data directly in the lab notebook. I found these on Amazon and also on the website for Staples.

http://www.staples.com/Staples-Composition-Notebook-Graph-Ruled-Assorted-Colors-9-3-4-inch-x/product_892281

http://www.amazon.com/Top-Light-Composition-Squares-41320/dp/B0031869B0/ref_sr_1_2?ie=UTF8&qid=1402686051&sr=8-2&keywords=composition+book+quad+ruled

- c. Prep your lab notebook by numbering the pages in the upper right corner, using blue or black ink. Label the last page of your notebook: **Index**. Write your name on the front of the notebook in blue or black ink.
3. Colored pencils or pens in different colors, highlighters – very helpful in drawing and labeling diagrams, and making important notes stand out.

Due Date – September 7, 2017