Advanced Placement Biology Syllabus

Instructor: Marian D Press
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Text
Hillis, Sadava, Heller, Price. Principles of Life
AP Biology Investigative labs: An inquiry-Based Approach

Supplemental Resources:
Campbell, Neil A and Jane B. Reece, Biology 6th edition

Supplemental Materials
Required:
Lab Notebook for labs (composition).
Notebook for reading notes and classroom notes
Folder to store handouts
Internet access! We will be using several websites to support coursework.
AP Exam study books are strongly recommended but it should be a study book published in 2014. The older books will not help with the new current AP exam.
Graph paper, pens, pencils

Throughout the year we will have various labs and we can always use your donations of paper towel, latex free gloves and disinfectant wipes. I am always thankful for parent donations of such items.

Course and Classroom Expectation

How to Survive AP Biology

Before you panic about the amount of work and material in AP Biology, here are a few things to try. All of these methods have been suggested by students successful in the AP Biology Course:

- Tape/staple this at the beginning of your notebook!
- Stay organized! There will be a LOT of handouts for this course. Keep them in dated order, secured (not just shoved into your notebook) in folders, and review them before quizzes/tests.
- Extra help: Extra help for the course is available from Mrs. Press most days after school.
- Do your objectives and homework assignments in a timely manner! These guides are linked to each unit. Rather than filling out the diagrams by copying from the book, fill them out from memory and correct them using the book.
- Use 5 Steps to a Five throughout the year or other ap help book. The book has great review questions, summaries, etc. and will help you focus on what’s important.
- Use the CDROM or internets quizzes and videos that comes with Campbell and Reece and POL– it has got HUNDREDS of videos/quizzes/etc.
• Use the following video resources – many of these use YouTube, so will have to accessed via a non-school site:
  o Bozeman Biology – GREAT video reviews of specific topics in biology.
    ▪ http://www.youtube.com/user/bozemanbiology#g/u
  o Khan Academy – GREAT video reviews of specific topics in biology. The biology section is the equivalent of AP Biology.
    ▪ http://www.khanacademy.org/#biology
  o OpenStax offers a FREE comprehensive online textbook including quizzes and animations.
    ▪ http://openstaxcollege.org/textbooks/biology
    ▪ http://openstaxcollege.org/textbooks/biology/resources

• Review the homework questions. Questions similar to homework and review questions will appear on tests/quizzes.
• Many students choose to buy additional review books and/or flashcards. Make sure any review book you buy is for the course revision. You cannot just use your older brothers book.

There is a lot of out of classroom reading that will be necessary for students to be successful in this course. There will be warm up quizzes and chapter reading quizzes. Attendance is essential in order for the student to be successful in class. All work including notes from class must be kept in an organized fashion in the student’s notebook. Students should have their notes in class on a daily basis. They can separate semester notebooks but I do not recommend discarding anything until they have successfully completed the class. You should maintain a binder for daily handouts. I will not post all homework or daily assignments. It is up to the student to write these down from my instruction or what is on the board and to check with me in class if they feel they are missing something. I do not offer any extra credit to individual students. Throughout the year I may add extra credit points to quizzes and tests

In the classroom:
It is a rigorous course so I expect students to act in a mature and respectful manner towards me and towards their classmates. Students should arrive on time and be prepared in class. I do adhere to all district and school discipline rules including dress code, no use of cell phones, arriving before the tardy bell, academic honesty, etc. I expect strict adherence to lab safety rules and respecting the classroom property. Students are expected to complete their work and turn it in on time. Points will be deducted from late work. I will be available for tutoring.
Please make sure to ask for help if you need it. I am here to help you be successful with this course material.
I ask that students refrain from discussing personal concerns regarding missed work or other class related concerns before class starts. I will occasionally have a few minutes, towards the end of class, but always after school and of course during tutoring times. Please follow all classroom procedures, they will be explained in class, for example work turned in only in designated area.

Grading Policy:
Summative grades: 65% Formative grades: 35%
Late work will receive point deductions no stricter than the school guidelines for late work. If you are absent the day before an assessment is scheduled and you return on the day of the assessment, you must take the assessment as they are announced in advance.

Late Work Policy
When absent, a student will have one day for every absent day in which to turn in work. If a student is seen copying any portion of another student’s homework it will be an automatic 50% deduction of the completion grade. If the assignment copied is a lab report or project, all credit will be denied.

Course Description
AP biology is a rigorous, advanced course designed to be the equivalent of a two semester college introductory biology course. This course will prepare the student to take the AP biology test in May 2015. Depending on a student’s score on the exam and each individual university’s standards, a student may earn up to 4 hours of college biology credit. This class includes quite a few labs in which students are expected to use the data collected to solve biological problems. This course conforms to the standards instituted by the College Board for all AP courses.

The AP Biology Curriculum Framework includes four “Big Ideas”. The “Big Ideas” are as follows:
Big Idea I: The Process of evolution drives the diversity and unity of life.
Big Idea II: Biological systems utilize free energy and molecular building blocks to grow, reproduce, and to maintain dynamic homeostasis.
Big Idea III: Living systems store, retrieve, transmit, and respond to information essential to life processes.
Big Idea IV: Biological systems interact, and these systems and their interactions possess complex properties.

Lab Component
There are 13 labs in AP biology of which 8 are required, we will perform no less than the minimum of 8, we will study all thirteen and supplement with a few others. Students will
be engaged in investigative lab work for a minimum of 25% of instructional time. The labs will be spread out throughout the school year and labs will be inquiry based student-directed investigations. It is important for students to be present for these labs as many cannot be set up during tutoring time for makeup work. Lab reports will be expected for most of these labs and will have an expected due date.

Summer Assignment Part I:
**Summer Reading Assignment**

1. Summer reading: You will be reading one book this summer. It is written at a college-level, but is engaging and interestingly written.
   - While the book is very readable and intended for a general audience, I would allow yourself two weeks of reading 15-20 minutes a day to complete the assignment. Many students require far less time.

Your reading guide for this assignment is attached. I will NOT be correcting the reading guides. You will have a QUIZ the first week of school on the content.

You may type your answers onto this document.

**Survival of the Sickest**

**Introduction**

1. What is the “big” question the book will attempt to answer?

**Chapter I**

2. The author points out many ways in which iron impacts life. Identify/describe at least five.

3. In the context of this chapter, explain the author’s reference to Bruce Lee and to the barber pole.

**Chapter II**

4. Distinguish between each of the three types of diabetes.

5. What did the ice cores of 1989 reveal about the Younger Dryas?

6. Describe the body’s “arsenal of natural defenses” against cold.

7. Describe the connection between *Rana sylvatica* and diabetes.

8. In Chapters I and II several inherited disorders were discussed. Create and complete a chart with the following information: Disease/Disorder, Symptoms, Evolutionary Advantage.

**Chapter III**

9. Why do we need Vitamin D? Cholesterol? Folic acid?

10. Briefly describe the connection between the two concepts:
   a. tanning beds; birth defects
   b. sunglasses; sunburn
   c. hypertension; slave trade
   d. Asian flush; drinking water
e. skull shape; climate  
f. body hair; malaria  
11. What’s so fishy about the Inuits’ skin color?  
12. Explain the good and the bad of ApoE4.  

**Chapter IV**  
13. Explain the role of G6PD.  
14. Briefly describe the connection between the two concepts:  
   a. European clover; Australian sheep breeding crisis of the 1940s  
   b. Capsaïsin; birds and mammals  
   c. Malaria; air conditioning  
   d. Favism; fava beans  
15. Explain the following statement found on page 87: “Life is such a compromise.”  

**Chapter V: “Of Microbes and Men”**  
16. Complete Parasite Chart (Go to end of assignment.)  
17. Identify 3 ways in which microbes/parasites move from host to host.  
18. For each pathway listed in question #2, explain the relationship of the mode of transmission to the virulence of the invader.  
19. What is our advantage in the survive-and-produce race?  

**Chapter VI: “Jump Into the Gene Pool”**  
20. Briefly discuss the following terms/scientists:  
   a) Jenner  
   b) vaccine  
   c) antibodies  
   d) B-cells  
   e) “junk DNA”  
   f) Lamarck  
   g) McClintock  
   h) retroviruses  
21. What is the Weissman barrier?  
22. Make connections between the following terms:  
   a. transposons; viruses; evolution  
   b. sunspots; flu epidemics  
23. Humans have about 25,000 genes and more than a million different antibodies. How is this possible?  
24. What is a persisting virus?  

**Chapter VII: “Methyl Madness”**  
25. Make connections between the following terms:  
   a) vitamin supplement; agouti mice  
   b) snakes; long-tailed lizards  
   c) Barker Hypothesis; fathers who smoke  
   d) Smoking grandmothers; asthmatic children  
   e) Betel nut chewing; cancer
26. Epigenesis may be partially responsible for the childhood epidemic of obesity. Explain.
27. “Good times mean more boys. Tough times mean more girls.” Explain.

Chapter VIII: “That’s Life: Why You and Your iPod Must Die”
28. Make connections between the following terms:
   a) Progeria; lamina A
   b) Hayflick limit; telomeres
   c) Cancer cells; stem cells
   d) Size; life expectancy
   e) Risky child birth; big brains and bipedalism
29. Explain the author’s iPod and aging analogy.
30. Identify the 5 lines of cancer defense.
31. What are the two accomplishments of biogenic obsolescence?
32. Compare and contrast the Savanna and aquatic ape hypotheses.

Conclusion
33. The author hopes that you will come away from this book with an appreciation of three things:
   a) Life is in a constant state of creation
   b) Nothing in our world exists in isolation
   c) Our relationship with disease is often much more complex than we may have previously realized.
   On a personal note, what would you add to his list?

34. “Nothing in biology makes sense except in the light of evolution.” How does the book, Survival of the Sickest, support this quote by Theodosius Dobzhansky, a noted evolutionary biologist?
<table>
<thead>
<tr>
<th>Parasite</th>
<th>Host/s</th>
<th>Manipulative Adaptation</th>
<th>Evolutionary Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dracunculus medinensis</em></td>
<td>Guinea worm</td>
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<td><em>Hymenoptericae argyraphaga</em></td>
<td>Wasp</td>
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<td><em>Dicrocoelium dentriticum</em></td>
<td>Liver fluke</td>
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<td><em>Spinochordodes tellinii</em></td>
<td>Hairworm</td>
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<td>Rabies virus</td>
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<td><em>Toxoplasma gondii</em></td>
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<td>Pin worms</td>
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<td>Cholera</td>
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<td><em>Plasmodium Malaria</em></td>
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</table>
AP Biology Summer Assignment 2015 Part II:
Read the standards below, watch videos and answer the questions

Standard 7.4: All biological systems from cells and organisms to populations, communities and ecosystems are affected by complex biotic and abiotic interactions involving exchange of matter and free energy.

**Learning Objectives:**

7.4A. Refine scientific models and questions about the effect of complex biotic and abiotic interactions on all biological systems, from cells and organisms to populations, communities and ecosystems.

7.4B. Design a plan for collecting data to show that all biological systems (cells, organisms, populations, communities and ecosystems) are affected by complex biotic and abiotic interactions.

7.4C. Analyze data to identify possible patterns and relationships between a biotic or abiotic factor and a biological system (cells, organisms, populations, communities or ecosystems).

Book Reading for This Section: Campbell Chapters 52 and 54

Online Videos to Help:

**Crashcourse Biology Videos::**

*Community Ecology: Feel the Love - Crash Course Ecology #4*

*Community Ecology II: Predators - Crash Course Ecology #5*

*Ecological Succession: Change is Good - Crash Course Ecology #6*

**Videos by Paul Anderson:**

"Niche"

"Communities"

"Coevolution"

"Ecological Succession"

"Biodiversity"

Assignment Question I:
Standard 7.5: The level of variation in a population affects population dynamics.

**Learning Objectives:**

7.5A. Use evidence to justify a claim that a variety of phenotypic responses to a single environmental factor can result from different genotypes within the population.

7.5B. Use theories and models to make scientific claims and/or predictions about the effects of variation within populations on survival and fitness.

**Book Reading for This Section:** Chapter 52

**Online Videos to Help:**

- **Crashcourse Biology Videos:**
  - The History of Life on Earth - Crash Course Ecology #1
  - Population Ecology: The Texas Mosquito Mystery - Crash Course Ecology #2
  - Human Population Growth - Crash Course Ecology #3

- **Videos by Paul Anderson:**
  - "r- and K- Selection"
  - "Communities"
  - "Ecosystems"

**Assignment Question 2.**
7.8: The diversity of species within an ecosystem may influence the stability of the ecosystem. 

**Learning Objective**

7.8A Make scientific claims and predictions about how species diversity within an ecosystem influences ecosystem stability.

7.9: Distribution of local and global ecosystems changes over time. 

**Learning Objectives**

7.9A Explain how the distribution of ecosystems changes over time by identifying large-scale events that have resulted in these changes in the past.

7.9B Predict consequences of human actions on both local and global ecosystems.

Book Reading for This Section: Chapters 52-54

Online Videos to Help:
Crashcourse Biology Videos:
- [Ecosystem Ecology: Links in the Chain - Crash Course Ecology #7](#)
- [The Hydrologic and Carbon Cycles: Always Recycle! - Crash Course Ecology #8](#)
- [Nitrogen & Phosphorus Cycles: Always Recycle! Part 2 - Crash Course Ecology #9](#)

Assignment Question 3 and 4
The diagram above shows the succession of communities from annual plants to hardwood trees in a specific area over a period of time.

(a) Discuss the expected changes in biodiversity as the stages of succession progress as shown in the diagram above.

(b) Describe and explain THREE changes in abiotic conditions over time that lead to the succession, as shown in the diagram above.

(c) For each of the following disturbances, discuss the immediate and long-term effects on ecosystem succession.

(i) A volcano erupts, covering a 30-square-kilometer portion of a mature forest with lava.

(ii) A 10-square-kilometer portion of a mature forest is clear-cut.

and...

Consumers in aquatic ecosystems depend on producers for nutrition.

(a) Explain the difference between gross and net primary productivity.

(b) Describe a method to determine net and gross primary productivity in a freshwater pond over a 24-hour period.

![Graph: Net Primary Productivity in a Freshwater Pond Ecosystem During Spring]

In an experiment, net primary productivity was measured. In the early spring, for water samples taken from different depths of a freshwater pond in a temperate deciduous forest.

(c) Explain the data presented by the graph, including a description of the relative rates of metabolic...
### Key terms from Campbell Biology

#### Chapter 2 Key Terms
1. array
2. atom
3. atomic mass
4. atomic number
5. atomic radius
6. cation
7. chemical reaction
8. compound
9. covalent bond
10. electron
11. electron shell
12. electricity
13. hydrogen bond
14. ion
15. ionic bond
16. ionic compound
17. isotope
18. mass number
19. neutron
20. noble gas
21. polar covalent bond
22. proton
23. ionic bond
24. atomic number
25. product
26. reagent
27. reactant
28. theory
29. valence electron
30. valence shell

#### Chapter 3 Key Terms
1. acid
2. acid precipitation
3. gelatin
4. bone
5. buffer
6. cohesion
7. desiccative cooling
8. heat
9. heat of dissociation
10. hydrogen bond
11. hydrogen ion
12. hydroxyl ion
13. hydrotropic
14. hydrophobic
15. hydrophilic
16. isoelectric point
17. molecule
18. mole
19. pH
20. solution
21. sublimation
22. sublimate
23. specific heat
24. structural isomer
25. temperature

#### Chapter 4 Key Terms
1. amino acid
2. amino group
3. antacid
4. aromatics
5. apoprotein
6. ATP (adenosine triphosphate)
7. base
8. base pair
9. beta
10. beta-carbon
11. beta-glucose
12. beta-lactamase
13. beta-lactamase
14. beta-lactamase
15. beta-lactamase
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30. beta-lactamase

#### Chapter 5 Key Terms
1. alpha helix
2. amino acid
3. antiparallel
4. aromatic ring
5. apoprotein
6. ATP (adenosine triphosphate)
7. base pair
8. base pair
9. beta
10. beta-carbon
11. beta-glucose
12. beta-lactamase
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#### Chapter 6 Key Terms
1. glycolysis
2. lipoic acid
3. desulfurization
4. desulfurization
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#### Chapter 7 Key Terms
1. hydrophobic interaction
2. insulin
3. insulin-like growth factor
4. insulin-like growth factor
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8. insulin-like growth factor
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#### Chapter 8 Key Terms
1. hydrophobic interaction
2. insulin
3. insulin-like growth factor
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#### Chapter 9 Key Terms
1. hydrophobic interaction
2. insulin
3. insulin-like growth factor
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#### Chapter 10 Key Terms
1. hydrophobic interaction
2. insulin
3. insulin-like growth factor
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#### Chapter 11 Key Terms
1. hydrophobic interaction
2. insulin
3. insulin-like growth factor
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8. insulin-like growth factor
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30. insulin-like growth factor
Create flashcards for the above terms

Put them in your OWN words!!!!!!!!!!!
I suggest making a graphic organizer or table for the terms in chapter 4 and 5
Course Syllabus: Lab information:

An overview of the current AP labs with the Big Idea and science practice they correspond to is listed below:

**BLAST** Science Practice 1 and 5

**Hardy-Weinberg** Science Practice 1, 2, 5

**Artificial Selection** (Big Idea 1) Science Practice 1, 2, 5, 7

**Cellular Respiration** (Big Idea 2) Science Practice 1, 2, 3, 6, 7

**Photosynthesis** (Big Idea 2) Science Practice 1, 2, 3, 4, 6, 7

**Diffusion & Osmosis** (Big Idea 2) Science Practice 2, 4, 5

**Cell Division:** (Big Idea 3) Science Practice 1, 5, 6, 7

**Biotechnology Lab #1: Bacterial Transformation** (Big Idea 3)
Science Practice 1, 3, 5, 6, 7

**Biotechnology Lab #2: Restriction Enzyme Analysis** (Big Idea 3)
Science Practice 3, 6

**Energy Dynamics** (Big Idea 4) Science Practice 1, 2, 3, 4, 5, 6, 7

**Fruit Fly Behavior** (Big Idea 4) Science Practice 1, 3, 4, 5, 6, 7

**Transpiration** (Big Idea 4) Science Practice 1, 2, 4, 6, 7

**Enzyme Activity** Science Practice 5, 6, 7

*Attached:* Tentative Outline and course pacing guide
### Topic outline and tentative pacing guide for 2015-16 AP Biology

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topics</th>
<th>Chapter</th>
<th>Lab and Activity Options</th>
<th>Big Idea/Enduring Understanding</th>
<th>Tentative Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit 1: Biochemistry And Introduction To the Cell</strong></td>
<td>Water, Bonding, pH, Biomolecules, Thermodynamics Prokaryote vs. Eukaryote Cell Organelles (structure and function) Cell Membrane (structure and function)</td>
<td>CH.2-5</td>
<td>APLab#4 Diffusion and Osmosis Lab Inquiry M&amp;M lab</td>
<td>Big Idea 1,2,3,4 Enduring Understandings: 1D, 2A, 2B, 3A, 4A, 4B, 4C</td>
<td>8/26 – 9/27</td>
</tr>
<tr>
<td><strong>Unit 2: Cellular Energy</strong></td>
<td>Metabolism Enzyme structure and functions Cell Respiration ATP cellular Work Photosynthesis Evolution of alternative methods of carbon fixation</td>
<td>CH. 5-6</td>
<td>AP Lab #5 Leaf disk Assay photosynthesis lab AP Lab #6 Cellular Respiration Enzyme Lab</td>
<td>Big Idea 1,2,4 Enduring Understandings: 1A, 1D, 2B, 4A, 4B</td>
<td>9/27 – 10/24</td>
</tr>
<tr>
<td><strong>Unit 3: Cell Communication and Cell Cycle</strong></td>
<td>Cell communication -reception, transduction, response Apoptosis Mitosis / Cell Cycle Evolution of mitosis and cell communication</td>
<td>CH. 5.5 and 7</td>
<td>AP Lab # 7 Cell division : mitosis and meiosis Project Meiosis Diagraming Animated tutorials with Venn diagram</td>
<td>Big Idea 1,2,3 Enduring Understandings: 2E, 3A, 3B, 3D</td>
<td>10/24 – 11/1</td>
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<tr>
<td><strong>Unit 4: Mendelian</strong></td>
<td>Meiosis Mendelian Inheritance</td>
<td>CH. 8</td>
<td>Genetics problems</td>
<td>Big Idea 1, 3, 4 Enduring</td>
<td>11/1 – 11/22</td>
</tr>
</tbody>
</table>
| **Genetics**  
**And**  
**non-Mendelian**  
**genetic**  
**inheritance** | patterns / laws  
Non-Mendelian inheritance patterns  
Chi Square statistical analysis  
Evolutionary significance of genetic variation  
And  
Gene linkage | Chi square lab with pennies  
Pedigree analysis problems  
AP Lab #2  
Mathematical modeling | **Understandings**  
1A, 3A, 3C, 4C |
| --- | --- | --- | --- |
| **Unit 5:**  
**Biotechnology** | The Molecular basis of inheritance  
Gene to Protein  
Gene Regulation  
Viruses  
Biotechnology  
Genomes and their Evolution | CH.9-13  
AP lab #8  
Bacterial Transformation  
AP lab #3  
blast  
AP lab 9  
Restriction Enzyme Analysis | **Big Idea 1, 2, 3, 4**  
Enduring Understandings  
1A, 2C, 2E, 3A, 3B, 3C, 4A  
11/22 – 12/20 |
| **Unit 6:**  
**Evolution and Phylogeny** | Origin of Life  
Darwin and Descent with Modification  
Origin of Species  
Adaptation, Speciation  
Behavior patterns  
Genetics, Sexual selection and reproductive success  
Phylogeny and the tree of life  
Bacteria and Archaea | CH. 14,  
15, 16,  
17, 18,  
19  
AP Lab #2  
Hardy Weinberg  
AP Lab #1  
Natural Selection Lab  
Blast Lab  
Activity :  
Cladograms / Phylogenetic Trees | **Big Idea 1, 3, 4**  
Enduring Understandings  
1A, 1B, 1C, 1D, 3A, 3C, 4C  
1/7/2014 - 2/7 |
| **Unit 7:**  
**Diversity** | Origin and Diversity of Eukaryotes  
Animal Form and Function  
Review of Systems  
Homeostasis  
Hormones  
Immune System  
Development  
Nervous System | CH. 20,  
23, 29,  
30, 31,33, 34,  
AP Lab #12  
Fruit Fly behavior  
Demo: Dissections | **Big Idea 1, 2, 3, 4**  
Enduring Understandings  
1A, 1B, 2A, 2C, 2D, 2E, 3E, 4A, 4B  
2/7 – 3/7 |
| **Unit 8:**  
**Plants and**  
**Evolution of Plants**  
**Plant growth and**  
**Transpiration** | CH. 21,  
26, 42,  
AP Lab #11  
Transpiration | **Big Idea 1, 2, 3, 4**  
Enduring  
3/7 – 4/16 |
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<th>AP Lab # 10 Energy Dynamics</th>
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<td>Wrap Up and Review</td>
<td>Wrap up any loose ends Review for AP Biology Test in May Dig deeper into subjects that students showed the most interest in during the course of the year</td>
<td>All</td>
<td>Review Activities Review Videos Review Games</td>
<td>All</td>
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