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Welcome to AP Biology 2016-17! Extra Credit Summer Assignment
Go to <http://www.bozemanscience.com/ap-biology/> and complete all videos and worksheets to get ready and earn extra credit!

Video: AP Biology Supplemental, Biology (9:08)

_____ Name _____

1. Biology is the:
2. Big Idea 1: Evolution -
 - a. What did Darwin propose: all life...
 - b. What is macroevolution?
 - c. Darwin came up with a mechanism for evolution called:
 - d. 5 things that can cause evolution are:
 - e. Natural selection allows organisms to become better
3. Big Idea 2: Free Energy –
 - a. Starts with the _____ then plants do _____ then organisms do respiration that generates _____ and eventually all leaves as _____
 - b. Define Free Energy:
 - c. Homeostasis: maintaining a stable internal _____ using _____ mechanisms.
4. Big Idea 3: Information – flow from organism to organism, generation to generation
 - a. Diagram the Central Dogma of Life: DNA
 - b. Genetics: what scientist helped with our early understanding of genetics?
 - c. Responding to our environment through cell _____ - an example of information transfer.
5. Big Idea 4: Systems –
 - a. Emergent Properties: properties that weren't there the
 - b. E.O. Wilson is known as the _____ of _____.



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Video: AP Big Idea 1 - Evolution: 001, Natural Selection (10:15)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. What did Charles Darwin do? He gave us a
2. Evolution is:
3. Gene Pool: all
4. Natural Selection: when you live or die based on..
5. As the environment changes you are:
6. Enough fitness (survive and reproduce) over time that can lead to:
7. Smallest unit that can evolve is a:
8. Two ways to get variety in a population: novel characteristics: _____
another way to get variety is _____.
9. What is the genotype of a light moth _____ for a dark moth _____
10. Why did the light moth survive?
11. Why did the dark moth population increase?
12. Write the Hardy-Weinberg equation out:
13. Adaptation is a _____
14. Best definition of Natural Selection:



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Video: AP Big Idea 2: 012, Life Requires Free Energy (12:58)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. Introduction:
 - a. Where do we get a constant supply of free energy?
 - b. What do plants do with it?
 - c. How do we utilize free energy?
 - d. What is “neat” about glycolysis?
 - e. What are the three major things we GET from free energy?
 - f. What is homeostasis?
 - g. What can we do with extra free energy?
 - h. What happens when we get disruptions?
2. Life requires:
3. To maintain order we require a constant
4. What is the first law of thermodynamics?

5. Eventually all energy ends up as
6. What is the second law of thermodynamics?

7. What is entropy?
8. How can evolution occur if things are going to greater disorder?

9. What is glycolysis? Why does it cost ATP?

10. How is it that different types of sugars can use glycolysis though they all don't contain glucose?
11. What is the relationship between metabolism and size? Why do mice have such a high metabolism?

12. Organization requires
13. What is released when you break down ATP to ADP?
14. Growth isn't just about getting bigger but also
15. We use extra energy to do:
16. We can store
17. What happens if we have a decrease in free energy – as people?
18. Describe what happened at Easter Island.



Video: AP Big Idea 2: 018, Positive and Negative Feedback Loops (14:26)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. Introduction

a. Negative Feedback loop: dance around that point, brings you...

b. Positive Feedback loop: amplifying and moving

c. What can alterations in our feedback loops lead to?

2. Negative Feedback

a. Homeostasis defined:

b. How does a hairless cat maintain homeostasis? Through

c. Ectotherms defined:

d. Endotherms defined:

e. What types of feedback loop do we use to maintain our temperature?

i. If too hot we (also explain why we would do that):

ii. If too cold we (again, explain why that behavior):

3. Positive Feedback

a. What plant hormone does ripe fruit give off?

b. Why can one "bad apple" spoil a barrel?

c. How is fruit ripening an example of positive feedback?

d. What is the example in humans?

e. Positive feedback is not used for a long time, it is used when you want to do something....

4. Mistakes in Feedback Loops

a. Besides being in your blood, where else could glucose go? (2x)

b. What two hormones help with blood glucose regulation:

c. What organ and what other job does it have?

d. What are the two cells found in the pancreas and what does each do?

e. Why does the blood glucose levels usually rise three times per day?

f. What else was rising at the same time?

g. What is wrong when you have type I diabetes?

h. What is type II diabetes a result of usually?

i. What pattern do you see with diabetes worldwide and why is that?



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Video: AP Big Idea 3: 029, Mendelian Genetics (16:04)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

A. Introduction

1. What did Mendel work with?
2. What is the P Cross?
3. What is the F1 cross?
4. Describe the incorrect idea of “Blending”?
5. The F1 was a “hybrid” – what does that mean?

B. Diagram the first Punnett square that he created below and explain how white flower could come from two purple flowers:

C. Mendel's Laws:

- a. Law of Segregation: like a _____ flip. It is a _____ of those two alleles. Random _____
- b. Independent Assortment: Traits on different chromosomes don't _____ each other. Sometimes things do travel together, but that is because those two genes are found on the same:

D. Pause the video at the Sample Problems and try and work them out.

1. Coin flip:
2. Heterozygous means:

Homozygous means:
3. What is an organism's genotype? What is an organism's phenotype?
4. What is the probability of homozygous recessive (rr)?
5. Why is there a greater chance of green seeds in problem 5 than wrinkled seeds (rr) in problem 4 above?
6. Two Punnett squares because you need to multiply the _____ together.

E. Disease: Would you want to know?

AP Biology 037 – Cell Communication

Video Review Sheet

www.bozemanscience.com/037-cell-communication

1. Overview: do diagrams (or use his) to represent each (the work cell in a box and spacing etc.)
 - a. No distance
 - b. Short distance
 - c. Long distance
2. No distance: Immune Response example (Post-it note)
 - a. Antigens is an _____
 - b. APC example: m_____
 - c. T-helper cell has to know specifically what the _____ is
 - d. MHC2 is a p_____ that brings the surface of that antigen to its surface
 - e. CD4 is on the surface of the
 - f. The activated helper T-cell can then activate:
 - i. B Cell so it can make
 - ii. Killer T cell so it can
3. Short Distance: local regulator, neuron example (email)
 - a. Neurons are not directly connected, neurotransmitters have to cross the
 - b. Why aren't the two neurons directly connected? It is hypothesize that this is for
 - c_____.
 - c. What sport does Mr. Anderson do?
 - d. After a few hours of exercise, what is released and what does it do?
4. Long Distance: (Facebook example)
 - a. Example:
 - b. How is a hormone like Facebook?
5. Summary: Our body cells are like us: You have to know your _____ and send a
_____ that is _____



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Video: AP Big Idea 4: 042, Biological Molecules (15:20)

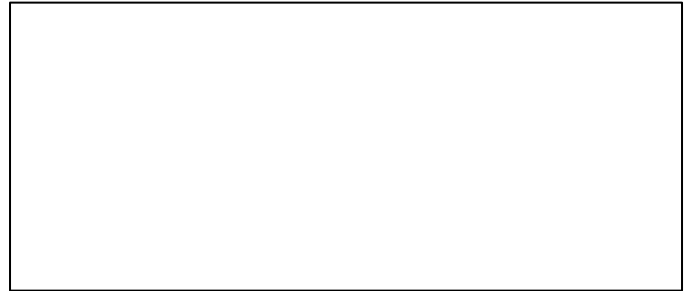
_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. What are the four categories of macromolecules?
2. What is a monomer?
3. Lipids are unique because they don't have a single type of monomer. Name two reasons why lipids are important.
4. Lipids are generally polar molecules. T/F circle one
5. Nucleic acid monomers are _____ and are made up of _____
6. What are the functions of nucleic acids?
7. Protein monomers are:
8. What differentiates one amino acid from another?
9. Carbohydrate monomers are
10. The significance of "directionality" of the monomers in a polymer is that when you put the monomers together in a certain sequence/order they have
 - a. The process of "putting monomers together" is called
 - b. What is lost during the process of #11?
 - c. What kind of bond is formed generally? Specifically between amino acids of a protein?
 - d. What must be added to break the bonds?
 - e. What is the name of that process?
11. Concerning **Nucleic Acids**:
 - a. What are the two examples of nucleic acids he gave? (btw ATP is also an example)
 - b. What is a nucleotide and what are its three parts?
 - c. What are differences between DNA and RNA?
 - d. What are the four nucleotides in DNA? RNA?

- e. When you see 3' and 5', this is referring to the nucleic acid's directionality and specifically to the carbons found in the
- f. What makes DNA antiparallel?

12. Concerning **Proteins**:

- a. The protein monomer is:
- b. How many amino acids are there?
- c. Draw and label a basic amino acid in the box to the right.



- d. What part of the amino acid differentiates it from another?
- e. What is the directionality of a protein?
- f. What is the significance of the directionality in protein digestion?

13. Concerning **Lipids**:

- a. List the different types of lipids (4):
- b. What is the similar structure between the four?
- c. What is significant about hydrocarbons found in lipids? (2):
- d. What is unique about phospholipids?
- e. What does amphipathic mean?
- f. What is the difference between saturated and unsaturated fatty acids?
- g. Why do unsaturated fats bend?
- h. Why is margarine a solid though it originates from plants? (btw, butter is *solid* at room temperatures)

14. Concerning Carbohydrates:

- a. Carbohydrates give us: (2)
- b. Carbohydrate monomers are
- c. What are the two types of glucose molecules indicated?
- d. What determines directionality in carbohydrates?



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Video: AP Big Idea 4: 046, Communities (13:41)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. What does BBECPO stand for?
2. What is community structure built on? (2x)
3. What is the key term for community interactions?
4. Growth: all populations start with what type of growth?
5. What is a community made of?
6. What is symbiosis and what are the three types?
7. Explain the Leaf-Cutter ant symbiotic relationship with the fungus
8. Concerning population growth: what are the two limiting factors and examples for each?
9. What is the carrying capacity?
10. Draw a simple age-structure diagram:
11. What happens when most of the population is very young?
12. How is the United State's age-structure diagram different from Angola's?



Video: AP Big Idea 4: 051, Ecosystem Change (12:18)

_____ Name _____ Per. ____ Date: _____

1. Give a short summary of his introduction piece relating to jet traffic, temperature and the short experiment:

2. What is climate?: _____ over a long period

3. Ecosystem change driven by Humans: Global Warming example:

a. What did the Average Temperature Map from 1950-1981 show?

b. As permafrost starts to melt, what gas is given off?

c. How is the arctic ecosystem change above an example of positive feedback?

d. Describe the water vapor increase and how it is also an example of positive feedback:

e. It is predicted that:

i. if there is a .5 degree Celsius over the next 100 years we could have damage to:

ii. If there is a 1-degree change, coral reefs will become _____.

This means the coral will extrude the _____. Additionally _____% of the global ecosystems will become transformed. It will impact the areas near the _____ more.

iii. If there is a 2-degree change, what are the three predicted results?

iv. How many species could become extinct if there is a 3-degree change?

f. Species simply can't evolve _____ enough.

4. Ecosystem change driven by Geologic Factors: Continental Drift example:
 - a. Biogeographical changes: changes in the _____ that are living on continents.
 - b. As the continents drifted, they change their _____ and thereby their ecosystems.
 - c. What group of organisms did he use as an example?
5. Ecosystem change driven by Meteorological Factors: El Nino example:
 - a. El Nino happens every:
 - b. You get a warming of the waters in the:
 - c. What two things happen to the marine iguanas during El Nino as a result of the decrease in the algae?



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Video: AP Biology Practices, 1- Models and Representations (12:24)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

A. What is a model?.....A visual representation of

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 associated example:

1. _____ - example shows natural _____

2. Free _____ - example:

3. _____ - genetics and cell

4. _____ - pyramid of

C. 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 was 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.

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

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



Video: AP Biology Practices, 2- Using Mathematics (9:28)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

NEED YOUR CALCULATOR FOR THIS BOZEMAN!!!

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
3. Computing _____: computers are getting
4. Laboratory experiments in silico:
 - a. In vitro:
 - b. In vivo:
 - c. In silico: simulating

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

- | | |
|-----------------|--|
| 1. Evolution: | 3. Information: |
| 2. Free energy: | 4. Systems: (write it out even though this one we have not done yet ☺) |

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! _____ M Sucrose



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Video: AP Science Practices: 3, Scientific Questioning (9:14)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. I should be able to ask you, "How do we...."
2. Students should be able to answer, "This is how...."
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: (2x)
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?



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Video: AP Science Practices: 4, Data Collection Strategies (8:34)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. What is science? Diagram his flow chart (you can do it left to right): The belief that:
2. In addition to collecting data you have to be able to:
3. Questions in four areas:
 - a. To _____ Data Collection Strategies. See if you can guess the right answer to the photosynthesis question BEFORE he explains it. You can see how he *justified* his answer. Did you get it right? _____
 - b. To _____ a plan for _____ Data of your own
 - i. First you would need to:
 - ii. Then: _____ an experiment that
What would a good essay contain?
 - c. To _____ to
 - d. To _____ of Data.
4. What makes science, science?



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Video: AP Science Practices: 5, Analysis & Evaluation of Evidence (6:49)

1. One of the first things you want to do with data is:
2. When you look at data, see if there are patterns that you can
3. You will be asked:
 - a. To _____ data to Identify
 - b. To _____ Observations and
 - c. To _____ Evidence
4. We collect data. First we have to _____ it and then we have to



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Video: AP Biology Practices, Scientific Explanations & Theories (8:00)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

A. Diagram the process of developing a theory; be sure to include the feedback loops.

B. The five ways to deal with theories and scientific explanations: *(Initially we will use this video to introduce you to the practice, eventually you will understand the content to be able to use the examples in this practice more readily and as a review for the AP exam)*

1. Justify claims with
2. Construct explanations based on
3. _____ the Reasons that Explanations and Theories are
4. Make _____ and predictions about
5. Evaluate

C. Theories get better and better over _____ and on the test they want you to be able to



Video: AP Biology Practices, 7- Scales, Concepts and Representations (7:24)

_____ Name _____ Per. ____ Date: _____ S: _____ F: _____

1. This practice is about _____ knowledge. Bringing together different disciplines.
2. Scale: draw and label intersecting diagram and use one of his examples:

3. Domains: _____ of biology.

a. Thermodynamics (Physics) Example:

b. Biochemistry Example:

c. Chemistry Example:

4. Big Idea examples: elaborate on

a. Evolution example: peppered moth, what happens over _____

b. Free Energy: Feedback loops and how they allow organisms to survive in...

c. Information: Himalayan rabbit ex, expressing different genes depending on

d. Systems: Cotton ex sugar able to create

5. Two goals:

a. Connect Phenomenon and Models Across _____ and _____ scales. Try answering the question before he does. _____

b. Connect Concepts _____ and _____ Domains. Try _____

Are you going to try his Wiki game?