Dear AP or IB Biology Student:

Attached is your Ecology Summer Work packet, a journey into the world around you, and an introduction to our first unit of study for the fall semester. In the packet you will find the summer work project, which includes field observation and producing a summary of the material in a creative format. Please read the instructions carefully.

To help you to prepare for the project, and the unit of study, I have attached Guided Notes for Chapters 50-55, that are to be completed and turned in along with your project, on the first Friday of school (September 4).

We will be using the textbook Biology: 6th Edition: by Campbell and Reece. You may check out a copy of the textbook before the school year ends on June 16, or may decide to purchase a copy of the book (ISBN# 0-8053-0009-0). There are several websites that sell used textbooks for significantly less than the cost of a new book (you might try Amazon or EBay – there are some listed for less than a dollar, plus shipping of about $4.). You are NOT required to purchase a book. If you do not obtain a book by the end of the school year, or register late, you may contact me by email to arrange to check out a book.

If you have any questions feel free to contact me over the summer at AEHSBIO@gmail.com. I will check my email regularly, but not always the same day as you send your questions.

Have a great summer and I look forward to seeing you in the fall.

Dr. Judy Small
Albert Einstein High School
The Ecology Project (Due the 1st Friday of School)

Introduction:
One of the wonderful things about summer is that you have time to go outside and enjoy nature. What better time to study ecological principles for your AP or IB Biology class? After you have read and completed the work for all the assigned chapters, you are to take your own field trip through an ecosystem of your choice. This can be in your own backyard, the beach, an estuary, a forest, an open field, a weedy urban lot, a section at the zoo, any of Maryland’s ecosystems...... You get the picture.

Purpose:
In this exercise, you will investigate the structure and function of an ecosystem and generate a product to display your unique ecosystem.

Requirements:
1. Field Trip Observations
   Spend some time (at least one hour) observing the features of your study site, both abiotic and biotic. Based on your observations, write a brief description of the study site, including its physical and biological features. These observations should be recorded in a notebook or in some sort of written or typed form, and include the following:
   - Identify the location of your ecosystem.
   - Identify the biological community in your ecosystem, including producers, primary consumers, secondary consumers, and higher-level consumers. Be sure to give common names and scientific names of organisms. (The library should have several identification books for plants and animals or you may use on-line resources)
   - Describe how these organisms are ecologically linked to each other.
   - List abiotic factors in your environment and how these components are important to the biotic community.
   - Identify one example of a predator-prey relationship in your ecosystem.
   - Identify one example of a symbiotic relationship in your ecosystem. In the explanation you should describe how this relationship affects both organisms.
   - Observe one organism in your ecosystem for at least 10 minutes. Describe the behavior of this organism and the evolutionary significance of this behavior.
   - Describe evidence that demonstrates the impact humans may have on your ecosystem.
2. **Final Project**
   After your field trip, you will generate a product addressing all of the topics noted in your "Field Trip Observations." This can be in the form of an illustrated children's book, a scrapbook, a video documentary, etc... You may use PowerPoint or make a Brochure. Please do not put all of this on a poster board. (I.E. NO POSTERS) This project should be somewhat interactive. I give you full creative freedom to generate your own visual representation to document your ecosystem field trip.

   - Feel free to take pictures, draw, or collect the organisms at your study site for better identification and to help you in developing your final project.

**Ecology Field Trip Scoring Guide**

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Trip Observations notebook</td>
<td>10</td>
</tr>
<tr>
<td>Final Project</td>
<td></td>
</tr>
<tr>
<td>Location and description of ecosystem</td>
<td>5</td>
</tr>
<tr>
<td><strong>Biological Community</strong></td>
<td></td>
</tr>
<tr>
<td>Producers</td>
<td>5</td>
</tr>
<tr>
<td>Primary Consumers</td>
<td>5</td>
</tr>
<tr>
<td>Secondary Consumers</td>
<td>5</td>
</tr>
<tr>
<td>Higher-Level Consumers</td>
<td>5</td>
</tr>
<tr>
<td>Ecologically linked - food web, trophic levels</td>
<td>10</td>
</tr>
<tr>
<td>Abiotic factors and importance</td>
<td>10</td>
</tr>
<tr>
<td>Predator-prey relationship</td>
<td>5</td>
</tr>
<tr>
<td>Symbiotic Relationships</td>
<td>10</td>
</tr>
<tr>
<td>Animal Behavior and significance</td>
<td>10</td>
</tr>
<tr>
<td>Human impact</td>
<td>5</td>
</tr>
<tr>
<td>Effectiveness of showing ecological relationships</td>
<td>5</td>
</tr>
<tr>
<td>Mechanics, neatness, and creativity</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total Points:</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

- **All projects are due on the 1st Friday of school.**
Guided Notes Chapter 50: An Introduction to Ecology and the Biosphere

1. Define Ecology:
   

2. List examples of factors that limit geographic distribution.
   
   
   

3. Explain the relationship between Ecology and Evolution.
   
   
   

4. Define the terms:
   a. Biosphere  
   b. Ecosystem  
   c. Community  
   d. Population  

5. How does dispersal influence distribution?
   
   
   

6. How does behavior and habitat limit distribution?
   
   
   

7. What are some biotic factors that affect distribution?
   
   

8. What are some abiotic factors that affect distribution?
   
   

9. Define the term biome.
   

10. What is the largest biome on earth?
11. Identify factors that are significant to organism distribution and abundance in a lake.

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12. What is the difference between a lake that is oligotrophic and one that is eutrophic?

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___________________________________________________________________

13. What are the most important factors influencing terrestrial distribution?

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___________________________________________________________________

14. Fill in the following Chart:

**Biome** | **Abiotic Characteristics** | **Biotic Characteristics**
---|---|---
Tropical Rain Forest | | |
Desert | | |
Savanna | | |
Temperate Grassland | | |
Temperate Deciduous | | |
(Broadleaf) Forest | | |
Coniferous Forest | | |
Arctic Tundra | | |
Guided Notes Chapter 51: Behavioral Ecology


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2. Explain the difference between proximate and ultimate causes?

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3. Define the two basic types of behavior.

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________________________________________________________________________________________

4. What is a fixed action pattern? Give an example.

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________________________________________________________________________________________
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5. What is imprinting? Give an example.

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________________________________________________________________________________________
________________________________________________________________________________________

6. Describe the following innate behaviors:
   a. Kinesis __________________________________________________
   b. Taxis  __________________________________________________
   c. Migration ________________________________________________
   d. Signals _________________________________________________

7. What are pheromones and how do they help in communication?

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________________________________________________________________________________________
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8. Discuss the differences between innate and learned behaviors.

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________________________________________________________________________________________
________________________________________________________________________________________
9. Describe the following learned behaviors.
   a. habituation
   b. Spatial Learning
   c. Cognitive Maps
   d. Associative Learning
      · Classical Conditioning
      · Operant Conditioning
   e. Cognition and Problem Solving

10. Explain how behavioral traits can evolve.

11. Describe the Optimal Foraging Theory

12. Define the three types of mating/parental care systems:
   a. Promiscuous
   b. Monogamous
   c. Polygamous

13. Give an example of:
   a. Intersexual Selection
   b. Intrasexual Selection

14. Describe the following behaviors:
   a. Agonistic behavior
   b. Dominance Hierarchy
   c. Altruistic Behavior
   d. Social Learning
15. When will natural selection favor altruism?

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16. Explain the evolutionary adaptation of kin selection.

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Guided Notes Chapter 52: Population Ecology

1. How can an ecologist estimate the numbers of individuals in a population?

2. What are some possible difficulties in counting populations?

3. Describe three patterns of dispersal:
   a. 
   b. 
   c. 

4. Compare the survival strategies of species and give an example of each type.
   a. Type I 
   b. Type II 
   c. Type III 

5. What are the differences between semelparity and iterparity reproduction?

6. Write the formula for population growth without limits. Define the terms.

7. Define carrying capacity.
8. Write the formula for population growth with limits. Define the terms.

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9. What happens to a population when the number of individuals approaches carrying capacity?

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10. Compare K-selected and r-selected species. Give examples of each.

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11. Identify factors that regulate population size.

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12. Compare density-independent and density-dependent factors limiting populations.

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13. Look at the growth curve of the human population. How does it compare to the growth curves earlier in the chapter?

14. Have humans reached K? What factors are significant when explaining our growth curve?

15. Look at the age structure diagrams of different countries. How might the age structure influence a population?
Guided Notes Chapter 53: Community Ecology

1. Define interspecific interactions.

2. Fill in the chart of interspecific interactions:

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Effects on Population Density</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(includes parasitism)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutualism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commensalism</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. What is the competitive exclusion principle?

4. Describe Gausse’s experiment with Paramecia.

5. Define ecological niche.

6. Define and give an example of resource partitioning.
7. Define and give an example of the following animal defenses:
   a. Cryptic coloration ___________________________________________________
   b. Aposematic coloration _____________________________________________
   c. Batesian mimicry ___________________________________________________
   d. Mullerian mimicry _________________________________________________
8. Describe several defense mechanisms to predation in plants.
   ___________________________________________________________________
   ___________________________________________________________________
9. How is co-evolution significant in community ecology?
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
10. What is meant by the “trophic structure” of a community?
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
11. What does a food web show that isn't indicated by a food chain?
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
12. What limits the length of a food chain?
    ___________________________________________________________________
    ___________________________________________________________________
13. Define the following terms:
    a. Dominant species ___________________________________________________
    b. Keystone species __________________________________________________
    c. Foundation Species _________________________________________________
14. Why are keystone species important to a community?
    ___________________________________________________________________
15. Define ecological succession.

16. What is the difference between primary succession and secondary succession?

17. Describe the debate between the Integrated and Individualistic Hypotheses.
Guided Notes Chapter 54: Ecosystems

1. How does the definition of ecosystems expand on the concept of the community?

2. What is needed to maintain a self-sustaining ecosystem?

3. Define the following energy budget terms:
   a. Primary productivity
   b. Gross primary productivity
   c. Net primary productivity

4. Which ecosystems have the highest productivity per unit area?

5. What factors do you think contribute to such high productivity?

6. Why is the open ocean so low in productivity?

7. What is secondary productivity?

8. What happens to the size of each level in the idealized pyramid as energy is transferred through the trophic levels?
9. Explain what happens to the energy and biomass as it is passed through the trophic levels?

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10. Why is it essential that elements move through biogeochemical cycles in the ecosystem?

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11. What are the major processes that move carbon through the ecosystem?

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12. What is the impact of combustion on the carbon cycle?

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13. Identify the role of each of the following in the nitrogen cycle:
   a. Nitrogen fixation
      ___________________________________________________________________
   b. Ammonification
      ___________________________________________________________________
   c. Nitrification
      ___________________________________________________________________
   d. Denitrification
      ___________________________________________________________________
   e. Assimilation
      ___________________________________________________________________

14. Why is human population growth at the root of environmental issues?

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15. Define cultural eutrophication. Why is it a problem?

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_____________________________________________________________________
16. What is the source of acid rain?

17. Why is acid rain a problem?

18. What happens in biological magnification?

19. What would be some of the properties of molecules that could be candidates for biological magnification?

20. What are possible reasons for global warming called the greenhouse effect?

21. Is depletion of the ozone layer a possible reason for global warming?

22. What is the cause for the depletion of the ozone layer? Why is it a problem?
Guided Notes Chapter 55: Conservation Biology and Restoration Ecology

1. What is conservation biology?

2. What is Restoration Ecology?

3. Define the three levels of Biodiversity
   a. Genetic Diversity
   b. Species Diversity
   c. Ecosystem Diversity

4. What are some potential benefits of species and genetic diversity?

5. What are the four major threats to Biodiversity?

6. Explain how the extinction vortex works.

7. How does loss of genetic variation relate to a species ability to evolve?
8. Why is management aimed at conserving a single species considered poor ecosystem management?

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9. What is the goal of Landscape Ecology?

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10. What are some of the strategies used to preserve and protect landscape structure and biodiversity?

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11. Describe the following restoration ecology attempts:
   a. Bioremediation ____________________________________________
      _______________________________________________________
   b. Biological Augmentation ___________________________________
      _______________________________________________________
   c. Adaptive Management _____________________________________
      _______________________________________________________

12. What is the goal of sustainable development?

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