AP Biology Summer Assignment

Ecology is a broad subject that can be used to connect many topics in AP biology. You will find in many of the essay questions that one part of the questions relates to ecology so we will start with that so we can refer to it throughout the school year. This will also be one of the first grades you have in the grade book for this class.

In this packet you will find reading guides, virtual labs, a formal lab rubric, and a chart to fill out to help with the vocabulary associated with ecology.

This packet will be turned in for a grade you should answer all the questions with complete sentences, a big part of this class is being about to write about science. The Population biology lab will be done in the packet just perform the lab fill out the data table and answer the questions in complete sentences. The “Sex and the Single Guppy Lab” will be a separate lab grade. The single guppy lab will be typed and completed using the lab rubric, you will not have to do all the parts just the ones listed in the lab, please read carefully so that you do not miss any of the points. While we may not have a summative assessment you will see these topics throughout the course and the completion and understanding of this material is important.

Because we have not handed out books yet you will use this link to get to a free text book that will help you complete the reading guides.

Openstaxcollege.org/textbooks/biology/resources

The Single Guppy Lab will be typed handed in for a separate grade on September 11 or 12.

This packet is due on September 17 and 18.

If you have questions as you work through this please email Mrs Crumbliss or Mrs Hertema

Erin.crumbliss@lcps.org  or Melissa.hertema@lcps.org

Please remember it is summer and we may not check emails every day.
As you work through these assignments you will find bold words in the questions these are TASK words. Below I have a list of those TASK words and what they mean. Please review this list as we will be using TASK words in homework and you will see them in essay questions.

AP Biology Essay Writing with TASK Words

• Task words guide the writer to perform a particular function in answering a question.

• Task words are usually in bold font in AP Biology homework and essay questions.

The two most common task words are:

**Discuss** – talk to the reader about it. Paint a word picture

**Explain** – tell the reader what it means.

Other task words

**Identify** – name or label this for the reader.

**Describe** – tell the reader how it works or what is going on.

**Predict** – tell the reader what do you think will happen and why.

**Propose** – speculate or hypothesize for the reader what you think will happen and why.

**Construct and Label** - make a graph for the reader.

**Analyze** – interpret the data for the reader.

**Determine** – solve the problem and tell the reader your solution.

**Design** – make an experiment to test a hypothesis for the reader.

**Justify** – give evidence for your statement. Back up what you are saying with data or proof.
To help you read the unit please fill out the following table with a definition and an example for each type of behavior. When you have completed that answer the questions in complete sentences.

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical Conditioning</td>
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<tr>
<td>Operant Conditioning</td>
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<td>Imprinting</td>
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<tr>
<td>Cognitive Behavior</td>
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<td>Optimal Foraging Theory</td>
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<tr>
<td>Intrasexual Selection</td>
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<tr>
<td>Intersexual Selection</td>
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</tr>
</tbody>
</table>
1. **Contrast** and **compare** population density and dispersion.

2. **Identify** and **explain** the dispersion patterns seen in organisms.

3. One species of fish is highly territorial, while another lives in large schools. **Predict** and **explain** each species’ likely pattern of dispersion.

4. **Describe** what produces a Type I, Type II and Type III survivorship curve and give an **example** organism for each.

5. **Contrast** and **compare** FOUR characteristics of "r" and "k" life history strategies.

6. **Identify** and **discuss** THREE factors that regulate population size.
7. In some species of fish, females disperse some of their eggs widely and lay other eggs in a nest. Only the latter receive parental care. **Explain** the trade-offs in reproduction that this behavior illustrates.

8. Endangered organisms usually have which life history strategy? **Discuss** why their life history strategy may contribute to their being endangered.

9. Most pests have which life history strategy? **Discuss** why their life history strategy contributes to their success as pests.

10. As an ecologist that manages a wildlife preserve, you want to increase the preserve’s carrying capacity for a particular endangered species. **Discuss** how you might go about accomplishing this plan.

11. **Discuss** how humans differ from other species in their ability to “choose” a carrying capacity for their environment.

12. Ethology studies four questions that can be grouped into “how” and “why” a behavior occurs.
13. **Contrast** and **compare** the questions addressed by proximate causation to the questions addressed by ultimate causation.

14. **Discuss** the differences between classical conditioning and operant conditioning.

15. Male competition for breeding access to females often uses ritualized behaviors rather than fighting to the death. **Explain** the adaptive advantage of using ritualized fights.

16. **Describe** the role of mutation in the change over time or evolution of fixed action patterns.
**Virtual Lab: Population Biology**  
From: biologycorner.com

**How to get there:**
(http://glencoe.mcgraw-hill.com/sites/dl/free/0078757134/383928/BL_04.html)  
Alternately: type virtual lab population biology into google to find the page.

**Instructions:**
Follow through the lab on the site. Fill in the data table and answer the conclusion questions with complete sentences.

**Data Table:**

<table>
<thead>
<tr>
<th>Day</th>
<th>P. aurelia grown alone, cells/mL</th>
<th>P. caudatum grown alone, cells/mL</th>
<th>P. aurelia grown in mixed culture, cells/mL</th>
<th>P caudatum grown in mixed culture, cells/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 2</td>
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<td>Day 4</td>
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<td>Day 6</td>
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<td>Day 8</td>
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<td>Day 10</td>
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<td>Day 12</td>
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<td>Day 14</td>
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<tr>
<td>Day 16</td>
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</tbody>
</table>

**Conclusion:**

1. What are the objectives for this experiment? (you can summarize)
2. Make a hypothesis about how you think the two species of Paramecium will grow alone and how they will grow when they are grown together.

3. Explain how you tested your hypothesis.

4. On what day did the *Paramecium caudatum* population reach the carrying capacity of the environment when it was grown alone? How do you know?

5. On what day did the *Paramecium aurelia* population reach the carrying capacity of the environment? How do you know?

6. Explain the differences in the population growth patterns of the two Paramecium species. What does this tell you about how *Paramecium aurelia* uses available resources?

7. Describe what happened when the Paramecium populations were mixed in the same test tube. Do the results support the principle of competitive exclusion? (You may need to briefly explain competitive exclusion.)

8. Explain how this experiment demonstrates that no two species can occupy the same niche.
1. **Explain** the differences between competition, predation, parasitism, mutualism, and commensalism and given an example of a pair of species that illustrates each.

2. **Describe** the differences between Batesian and Müllerian mimicry.

3. Search for information on the internet on the relationship between Monarch and Viceroy butterflies. Is this a case of Batesian or Müllerian mimicry? **Explain** your reasoning and give the citation of your web resources.

4. **Explain** the Competitive Exclusion Principle and how it relates to the concept of the ecological niche.

5. **Discuss** if the Competitive Exclusion Principle explain the spacing of fast food restaurants on the “strip” in most towns.

6. **Describe** what is meant by a “foundation” species and **identify** one example.
7. **Describe** what can happen when a keystone species is removed from a community. **Identify** an example of a situation where this has happened.

8. **Discuss** the differences between Primary and Secondary Succession.

9. Choose an example of primary succession and **describe** the changes in the plant communities and soil from the beginning community to the climax community.

10. **Discuss** the most plausible hypothesis for why species richness is higher in tropical forests than in temperate forests.
**AP Biology: Formal Lab Reports**

We will use this report format throughout the school year. This and the rubric are what you need to use to write up the report for the Sex and the Single Guppy lab that follows.

Please follow all directions as listed below. If you have questions, please see me a FEW DAYS BEFORE the lab report is due. All lab reports must be typed, no larger than 12 font and preferably in Times New Roman, Arial, or Tahoma style font, with 1 inch margins on all sides. Penalties will be applied if these formatting requirements are not met. All students are required to turn in a lab report. The data from your group will be the same, but the rest of the lab report should be your own work. If cheating (copying of any kind from any person or source) occurs, a zero will be given to anyone involved. Citations must be a part of your lab report for it to be graded.

I. **Cover Sheet**
   a. AP Lab # and/or Title of the lab with a visual prompt to help you remember the lab
   b. Your Name, Date, Class Block

II. **Background**
   a. 2/3 to 3/4 of a page discussing topic of the lab and relating it to at least TWO of the Big Ideas and/or Science Practices (you will need to look on the AP website to find these).
   b. 2 sources other than your lab sheets and text must be cited in APA format. (Use the citation buttons on your computer software or the internet to create an APA citation. A web address alone is not sufficient).

III. **Objectives/Hypothesis**
   a. List the objectives (things you were hoping to find out or the goals of your investigation).
   b. List the experimental hypothesis (the one you developed) as well as the null and alternative (opposite of null and experimental) hypothesis. State whether these hypothesis were supported or not supported based on the data that was collected during your investigation.

IV. **Procedure**
   a. Written in paragraph form, a brief description of the general procedure. This should not be longer then two paragraphs.

V. **Data**
   a. A data table that provides data from experiment/investigation. Please be sure that your data table indicates the means/modes (averages) of your raw data. Do not forget appropriate units and indication of IV, DV, and control.

VI. **Graph**
   a. Use an appropriate graph to analyze data. Only graph means/modes (averages) of your data, NOT raw data.
   b. Must have correct title, axes labeled, and a key. Appropriate units and IV, DV, and control indicated correctly and clearly.

VII. **Analysis/Conclusion**
   a. In paragraph form, described the trends in your data/observations. Give a scientific explanation of your results based on your findings, and the background information and Big Idea/Science Skills that you cited earlier in your report. Discuss any errors that may have occurred and discuss additional questions that may have been raised as a result of your findings.
# Lab Rubric

<table>
<thead>
<tr>
<th>Area Graded</th>
<th>Possible Points</th>
<th>Points Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cover Sheet:</strong></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>AP Lab # and/or Title of the lab with a visual prompt to help you remember the lab</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Your Name, Your Lab Partners’ Name, Date, Class Hour</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Background:</strong></td>
<td>7</td>
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<tr>
<td>Appropriate length</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Discussion of topic stays focused on the lab</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Discussion is related to at least TWO of the Big Ideas and/or Science Practices (see page 1-3 of syllabus for lists).</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 sources other than your lab sheets and text must be cited in APA format.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Objectives/Hypothesis:</strong></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>List the objectives</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Includes the experimental hypothesis and if this hypothesis is supported</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Includes the null and if this hypothesis is supported</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Includes an alternative (opposite of null and experimental) hypothesis and if this hypothesis is supported</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Procedure:</strong></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Written in <em>paragraph</em> form, a brief description of the general procedure</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Includes instructions for collection of both qualitative and quantitative data</td>
<td>2</td>
<td></td>
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<tr>
<td>Includes instructions for how identified conditions are kept constant</td>
<td>1</td>
<td></td>
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<tr>
<td>Includes instruction for multiple trials</td>
<td>1</td>
<td></td>
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<tr>
<td>Includes instructions to test control when appropriate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Data:</strong></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>A data table that provides data from experiment/investigation.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Data table indicates the means/modes (averages) of your raw data</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Data table includes appropriate units and indication of IV, DV, and control.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Graph:</strong></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Use of appropriate graph to analyze data.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Only graph means/modes (averages) of your data, NOT raw data.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Graph includes correct title, axes labeled, and a key.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Appropriate units and IV, DV, and control indicated correctly and clearly.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Discussion and Conclusion</strong></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Paragraph form, brief, not wordy; Past tense used throughout; First person active voice; No personal opinions; Units of measurement are treated as collective nouns and take singular subject; Report all numbers with units</td>
<td>3</td>
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<tr>
<td>Reflect back to your hypothesis and objectives. Did the lab accomplish what it set out to do? Why or why not?</td>
<td>2</td>
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<tr>
<td>Includes description of the trends in your data/observations.</td>
<td>2</td>
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<tr>
<td>Gives a scientific explanation of your results based on your findings.</td>
<td>1</td>
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<tr>
<td>Compare your results to literature value when appropriate.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Reflects back to the background information and Big Idea/Science Skills that you cited earlier in your report.</td>
<td>2</td>
<td></td>
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<tr>
<td>Discuss any errors that may have occurred</td>
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</tr>
<tr>
<td>Include discussion of additional questions that may have been raised as a result of your findings.</td>
<td>1</td>
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</table>

**Total** 50
The purpose of this activity is to analyze how guppy populations change over time. The simulation activity allows you to start with a pool of guppies and your choice of predators, you will be able to watch what happens to your guppy population and how the introduction of predators can affect the guppy's appearance. The simulation will help you understand what pressures drive guppy evolution.

Open the Guppy Sex Simulator!!! --
http://www.pbs.org/wgbh/evolution/sex/guppy/index.html

Introduction
First of all, familiarize yourself with the site, you should know each of the following before proceeding to the simulation.
- View the guppy gallery, know the color variations found among guppies
- View the predator gallery, know the types of predators of guppies
- Read about John Endler's experiment
- View the three types of pools and know what guppy colors are common in each area
- Read the three possible hypotheses for guppy coloration

Experiment
Sexual selection and predation both play roles in the evolution of guppies. Both can affect the coloration of male guppies. In this experiment, you will attempt to answer the following question:

QUESTION: To what degree do predation and sexual selection affect guppy coloration? (Which has a greater effect, or do they work equally to influence guppy populations?)

Your lab report will be types - for this activity, the lab report includes the following sections:
1. A cover sheet
2. Background information
3. Objectives and Hypothesis
4. Procedure – while this is a simulation you need to tell me what data you collected and how you collected it, what did you use as a control, where there multiple trials, this should be written as a brief paragraph
5. Data - a data table or graph that shows your guppy coloration over several generations
6. Graphs – The graph for this lab should be a bar graph, we will work in class on what type of graph is good for what type of data. You can make a graph with microsoft exel, or you can go to an online graph-maker at http://nces.ed.gov/nceskids/graphing

**Make sure your data is defined - include beginning populations, number of generations, colorations and other pertinent labels

7. Discussions and Conclusions - answer the experimental question. The conclusion can be written in about a paragraph. Be sure to include general information about the trends in the data to support your conclusion.

The Simulation

The simulation allows you to choose your starting population of guppies (coloration) and the number and types of predators in the habitat. Remember that you will need to compare 2 sets of data in order to make a clear determination about how predators and sex selection affect guppy populations.

- You will need 2 sets of data (and two graphs) to compare - in effect run 2 simulations.
- You may want to run more than 2 simulations if you cannot make a determination with only 2.
- You will also need to make sure the simulation runs through enough generations to show patterns (5 minimal)

This will be graded using the lab rubric in this packet please read the rubric and the directions before typing this up.
1. **Identify** four common tropic levels in ecosystems.

2. **Explain** the difference between grazing food webs and a detrial food web.

3. **Contrast** and **compare** the movement of energy and matter in food chains and food webs.

4. **Explain** the difference between net productivity and gross productivity.

5. Based on the second law of thermodynamics, would you expect the typical biomass of primary producers in an ecosystem to be greater than or less than the biomass of secondary producers in the same ecosystem? **Explain** your reasoning.

6. The top carnivore of many ecosystems is often endangered species. **Speculate** on why this relationship is often correlated together.

7. **Discuss** why is the transfer of energy in an ecosystem referred to as energy “flow” not energy “cycling”.

8. **Identify** THREE reasons why only a small portion of the solar energy that strikes Earth’s atmosphere stored by primary producers.
Fill in the missing pieces for the following cycles.

**Carbon Cycle**

**Water Cycle**

**Nitrogen Cycle**
1. **Identify** the two broad categories of factors in the environment that shape the ecology of organisms and give **three** examples in each category.

2. **Imagine** that temperature (X axis) and available water (Y axis) are sliding scales from low to high with the scales intersecting at medium/medium to create four quadrates. **Describe** where six of the major terrestrial biomes would roughly fit on your diagram (e.g. what quadrate would they fit in (low temp, low water; high temp. high water etc.).

3. **Identify** and **describe** **two** terrestrial biomes and **two** aquatic biomes that are native to Virginia.

4. The soils for the tropical rainforest are usually very nutrient poor. **Explain** how these areas can be so rich in plant and animal diversity if the soil is so poor.

5. **Identify** three major factors that shape aquatic biomes and **discuss** how each factor affects the biome.

6. **Identify** TWO examples of human actions that could expand a species’ distribution by changing it’s  a) dispersal or b) biotic interactions.