Essay Writing Skills
Developing a Free Response

OBJECTIVE
This lesson is designed to introduce students to the skill of planning appropriate free response essays.

LEVEL
All

NATIONAL STANDARDS
UCP.1, UCP.2, G.1, G.2

TEKS
6.2(C), 6.2(D)
7.2(D)
8.2(D)
IPC: 2(D)
Biology: 2(D)
Chemistry: 2(E)
Physics: 2(D)

CONNECTIONS TO AP
Writing appropriate free response answers is a fundamental skill needed in both AP® Biology and AP® Environmental Science.

TIME FRAME
45 minutes

MATERIALS
- transparencies of Practice Essay #1-4
- copies of student answer pages
- transparency of *Tips for Writing Free Response Essays*

TEACHER NOTES
An appropriately written Free Response essay for an AP Biology or AP Environmental Science exam is markedly different from the type of essay that students are typically asked to write in English courses. For this reason, the skill of writing an essay in AP Biology and AP Environmental Science must be explicitly addressed. This activity is designed to help students understand how to set up a mechanical outline, or plan, to use when writing free response essays in AP science courses. It emphasizes the need for planning a response prior to writing. This planning and pre-thinking approach gives the students a tool to use, and enables them to dissect complex prompts into manageable units. This practice activity focuses on the mechanics of dissecting the prompt rather than on writing the specific content. Once students have mastered the skill of planning or outlining a free response prompt, they need to practice writing essays using specific content throughout the school year.

SUGGESTED TEACHING PROCEDURE

1. Explain the need for knowing how to write appropriate essays in a science class and describe strategies for writing essays using the handout: *Tips for Writing Free Response Essays* as your guide.

2. Distribute copies of student pages. Show the transparency of Practice Essay #1 and explain how to use the strategies covered in step 1 with the sample essay. Explain to students how a mechanical outline of a response to this prompt might look (see answer key for Practice Essay #1). At this point, students may not be able to provide the correct content for the response, so focus on the mechanics of what should be included.

3. Show the transparency of Practice Essay #2 as you model how to outline an appropriate response for the students (see answer key for Practice Essay #2). Elaborate on tip 5 by showing the students a possible outline for the question.

4. Focus student attention on Practice Essay #3 and allow students time to work alone and outline the major items that should be included in an appropriate free response. After 2–3 minutes of individual planning, have students compare their outline to that of their partner's. Call on two or three volunteer pairs to write their outlines on the board for all students to see.

5. Have students read the prompt for Practice Essay #4 and prepare an outline of the items that should be included in a well designed free response. Restate tip 5 from the strategies list.

6. Show the students the sample student answer to essay #3. Ask them to look at the response and identify 4 things that this student could do to make this essay better. Use the annotated and revised student response to show the students how the incorrect answer could be written more appropriately.

7. Follow up this activity in future lessons by including the outlining and writing of free response type questions in their daily warm-ups quizzes, homework assignments, and/or major tests. The following list of grading hints taken from *Advanced Placement and TEKS: A Lighthouse Initiative for Texas Science Classrooms* may be of assistance as you approach the inclusion of free response questions in your assessment strategies:
   a. Begin writing free response questions (over a simple topic) in class and going over the rubrics with students early in the school year. Sharing the rubric with the students helps them gain insight into what types of information should and could be included.
   b. Create a rubric with positive points when you write the question. Students are more willing to take a chance when writing an essay in which points are collected rather than lost.
   c. Highlight or check off correct parts of free response answers as you grade them to make it easier for you to add up the points.
   d. Grade all free response answers at one sitting to develop a flow/pattern, and encourage consistency in your grading.
   e. On math problems, a correct answer with correct units and work shown clearly earns full credit. Give partial credit for
      i. Set up of problem
      ii. Correct unit labels
      iii. Hint: look for final answer; if correct, just scan that supporting work is present.

f. Encourage students to separate and label each section as this will help them organize their response and allow for easier grading.
g. Go over the rubric with the entire class to eliminate the need for making individual remarks. Alternately, you can use colored highlighter to mark the papers using a code such as blue—this statement scores a point, yellow—this statement included unnecessary or off topic information, and pink—this sentence contains incorrect information.
h. Use the College Board prompts and rubrics whenever possible.

POSSIBLE ANSWERS TO THE CONCLUSION QUESTIONS AND SAMPLE DATA

1) Practice Essay #1 – #4 could be dissected/outlined as follows:

Practice Essay #1

Main Topic: Carbon & Organic Compounds

A. Characteristics of carbon atom
   * characteristic #1
   * characteristic #2
   * characteristic #3

B. Structure and function of
   a. Lipids
      i. Structure
      ii. Function
   b. Proteins
      i. Structure
      ii. Function
   c. Nucleic Acids
      i. Structure
      ii. Function

Practice Essay #2

Main Topic: Usefulness of the Scientific Method

Components
   Name & describe

   Name & describe

   Name & describe

   Name & describe

1. How used in biological discovery #1

2. How used in biological discovery #2

Practice Essay #3

Main Topic: Changes in rate of photosynthesis

A. Descriptions
   How low levels of light affect the rate of photosynthesis.

   How high temperature will affect the rate.

   How low levels of water will affect the rate.

B. An adaptation to low levels of light
   a. Describe adaptation
   b. Give an example

Practice Essay #4

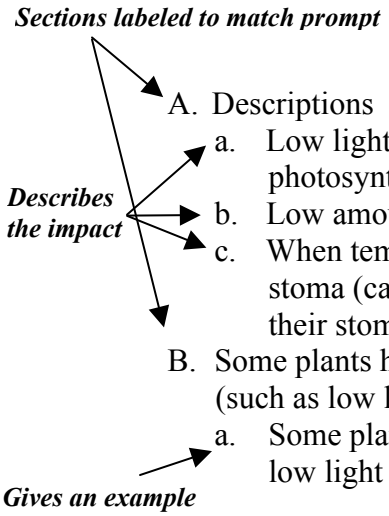
Main Topic: Growth curve fluctuations

A. Explain what is happening in phase A

B. Three factors that might cause changes in phase B
   a. Factor one
   b. Factor two
   c. Factor three

C. Strategies
   a. Explain (r) strategy
   b. How (r) strategies effect population size
   c. Explain (K) strategies
   d. How (K) strategies effect population size

Annotated and Revised Student Response to Practice Essay #3



A. Descriptions
   a. Low light levels make it hard for plants to have enough solar energy to go through photosynthesis (so the rate of photosynthesis will go down in low light).
   b. Low amounts of water will (also reduce the rate of photosynthesis).
   c. When temperatures get really high plants lose too much water when they open their stoma (causing photosynthesis rate to decline) so some plants are adapted to opening their stoma at night in order to take in carbon dioxide to use in photosynthesis.

B. Some plants have special adaptations that allow them to survive in extreme environments (such as low levels of light).
   a. Some plants have broad leaf surfaces to catch any available sun rays and can live in low light levels while some have thin leaves.

Revised Student Answer

A. Low light levels make it hard for plants to have enough solar energy to go through photosynthesis so the rate of photosynthesis will go down in low light. Low amounts of water will also reduce the rate of photosynthesis. When temperatures get really high plants lose too much water when they open their stoma causing the photosynthesis rate to decline so some plants are adapted to opening their stoma at night in order to take in carbon dioxide to use in photosynthesis.

B. Some plants have special adaptations that allow them to survive in extreme environments such as low levels of light. Some plants have broad leaf surfaces to catch any available sun rays and can live in low light levels while some have thin leaves.

REFERENCE

Jones, Kristen, Project Editor. *Advanced Placement and TEKS: A Lighthouse Initiative for Texas Science Classrooms*. Austin: Texas Education Agency, 2003. pg. 85.

Essay Writing Skills
Developing a Free Response

An appropriately written free response essay for an AP® Biology or AP® Environmental Science exam is markedly different from the type of essays that are typically written in English courses. For this reason, you can improve your free response writing skills through the practice of dissecting a prompt and preparing a brief outline of the components that should be included in a quality answer. The free response portion of an AP Exam is a timed exercise, and as such, requires efficient use of the allotted time. By making an outline prior to actually writing the essay, you will be much more likely to include the important parts of a good response. With practice, you will be able to dissect even the most complex prompts into manageable pieces.

PURPOSE
In this activity you will practice the skill of dissecting a free response prompt and preparing a mechanical outline of an appropriate response.

MATERIALS
copy of *Tips for Writing Free Response Essays*
copy of *Practice Essay Prompts #1–4*

PROCEDURE

1. Read through *Tips for Writing Free Response Essays* as your teacher explains specific tips mentioned in the document.

2. Read the prompt for Practice Essay #1. Observe and record the sample mechanical outline of an appropriate response to this prompt as shown by your teacher.

3. Read the prompt for Practice Essay #2, record the outline of an appropriate response as your teacher goes through this essay with the class.

4. Read the prompt for Practice Essay #3. For 2–3 minutes, work alone to use the tips discussed in *Tips for Writing Free Response Essays* to prepare a mechanical outline for this prompt. When the individual planning time expires, compare the outline you have designed with that of your partner's. You may be asked to share your outline with the class.

5. Read the prompt for Practice Essay #4 and prepare an outline of the items that should be included in a well designed free response. You will be working alone to prepare your outline. Refer to *Tips for Writing Free Response Essays* if needed.

6. Read through the sample student response to Practice Essay #3. This response is written incorrectly. In the space below the prompt, identify 4 things that this student could have done to make this essay more appropriate.

Tips for Writing Free Response Essays
AP Biology and AP Environmental Science*

1. Read the question twice.
2. Dissect the question to determine exactly what is being asked. (Highlight or underline)
3. Prepare a skeleton outline of the main components of your response.
4. Begin answering the question in the order it is written and DO NOT restate the question or write an introductory paragraph.
5. If the question says to 'discuss' or 'describe':
   a. Define the topic.
   b. Describe or elaborate on the topic.
   c. State an example of that topic.
6. If the question says to 'compare and contrast':
   a. Clearly state what the items have in common.
   b. Clearly state how items are different.
7. If the question asks for a graph to be made:
   a. Label each axis with the name of the variable and units.
   b. Title the graph.
   c. Scale and number the axes correctly.
   d. Use the correct type of graphs (typically, line or bar).
8. If the question asks a mathematical problem
   a. Show every single step of all work.
   b. Set up problems so that units cancel out (dimensional analysis).
   c. Write answers with units.
   d. If numbers are very large or very small, use scientific notation.
9. If the question asks for lab design
   a. State a hypothesis in the "if, then" format.
   b. Describe each step of a planned experiment in detail including what will be measured and how often the readings will be taken.
   c. Clearly identify the control(s).
   d. State that the experiment will have multiple trials for validity.
   e. Describe the expected results.
10. For ALL questions
   a. Answer in complete sentences, DO NOT use lists, charts or outlines in your final response.
   b. Label each section of your response as it is labeled in the question.
   c. Diagrams can support your statements but will not be scored.
   d. For every statement you write, ask yourself "why". If there is an answer to that why, keep on writing!
   e. Do not answer more than what is asked. For example, if the question says to choose 3 out of 5 topics, ONLY answer 3 of the 5. If the question asked about RNA specifically, do not discuss DNA replication.
   f. Remember—this writing is timed. Use your time wisely.

*Edited from strategies list provided on page 85 of *A Lighthouse Initiative for Texas Science Classrooms.*

Free Response:
Planning for Success

PRACTICE ESSAY #1

Prompt:
Structure and function are closely related in living systems. For example, the structure of the carbon atom allows it to be the building block of a variety of organic compounds.

A. Explain the characteristics of carbon that allow its atoms to provide molecular diversity.
B. Choose three of the following categories of organic compounds and describe each in terms of the compound's structure and function in living organisms.
   1. Carbohydrates
   2. Lipids
   3. Proteins
   4. Nucleic Acids

Main Topic: _____

A. _____
   * _____
   * _____
   * _____

B. _____
   _____
      _____
      _____

   _____
      _____
      _____

   _____
      _____
      _____

PRACTICE ESSAY #2

Directions: Read the prompt and prepare an outline of the major components that should be included in a response using the lines and numbers as your guide.

Prompt:
The scientific method of problem solving is a useful tool for scientific investigation. Describe the components of the scientific method and cite two examples of how the scientific method has been used to make biological discoveries.

Main Topic: _____

_____

_____

_____

_____

_____

1. _____

2. _____

PRACTICE ESSAY #3

Directions: Read the prompt and prepare a mechanical outline of the major components that should be included in a response.

Prompt:
The rate of photosynthetic activity may change in response to changes in various environmental conditions.
A. Describe how each of the following environmental conditions could impact the rate of photosynthesis in a terrestrial plant.
   * low levels of light
   * high temperature
   * low availability of water
B. Select one of the conditions listed above and describe an adaptation that would allow a plant species to photosynthesize effectively in that specific environmental condition.

Main Topic: _____

A. _____

_____

_____

_____

B. _____

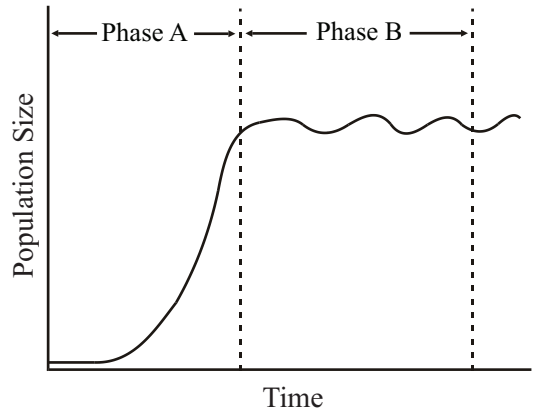
* _____

* _____

PRACTICE ESSAY #4: Ecology question from 2003 exam

Directions: Read the prompt and prepare an outline of the major components that should be included in a response.

Many populations exhibit the following growth curve:



a. Describe what is occurring in the population during phase A.
b. Discuss THREE factors that might cause the fluctuations shown in phase B.
c. Organisms demonstrate exponential (r) or logistic (K) reproductive strategies. Explain these two strategies and discuss how they affect population size over time.

Main Topic: _____

A. _____

B. _____
   a. _____
   b. _____
   c. _____

C. _____
   * _____
   * _____
   * _____
   * _____

Read the following student's response to Essay #3. Identify 4 things that this student could do to make the essay better.

Prompt:
The rate of photosynthetic activity may change in various environmental conditions.
A. Describe how each of the following environmental conditions could impact the rate of photosynthesis in a terrestrial plant.
   * low levels of light
   * high temperature
   * low availability of water
B. Select one of the conditions listed above and describe an adaptation that would allow a plant species to photosynthesize effectively in that specific environmental condition.

Student's Answer
The rate of photosynthetic activity may change in various environmental conditions. Some plants have special adaptations that allow them to survive in extreme environments. Some plants have broad leaf surfaces to catch any available sun rays and can live in low light levels while some have thin leaves. Low light levels make it hard for plants to have enough solar energy to go through photosynthesis. Low amounts of water will harm plants. When temperatures get really high plants lose too much water when they open their stoma so some plants are adapted to opening their stoma at night in order to take in carbon dioxide to use in photosynthesis.

List 4 things this student could have done differently to improve the quality of this free response:

1.

2.

3.

4.

Content Skills Chart