



ACTION PLAN TEMPLATE

Teacher(s): Christine Morrow

Grade(s): 9-12

Subject(s): Biology Honors, Anatomy & Physiology Honors, or AP Biology

Title of Lesson (Learning Activity): (first days of school/course introductory activity) What is life? What sustains life?

This activity is primarily designed for freshmen Biology students but could easily be adapted to a more complex level for the AP Biology students and the question altered to What is human life? What sustains human life? for the Anatomy & Physiology Honors classes. It is a modification of a simpler activity that I already use every year. The design of the activity has been planned with typical responses that I have received about the first question over the years.

Learning Objectives:

- Students will activate prior knowledge of the nature and characteristics of living things.
- Students will address misconceptions about the nature of living things.
- Students will respond to the questions in a structured but open format to provide a beginning of the year writing sample and, for freshmen students, to begin learning and practicing written assignment MLA formatting.
- Through this introductory activity, students will begin to understand what is science, what is not science, what can be explored through science and what cannot be explored through science.
- Introduction to systems science.

Standards Addressed:

The following standards are introduced through this opening activity.

- SC.912.E.7.1 Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
- SC.912.L.14.1 Describe the scientific theory of cells and relate the history of its discovery to the process of science.
- SC.912.L.16.9 Explain how and why the genetic code is universal and is common to almost all organisms.
- SC.912.L.18.12 Discuss the special properties of water that contribute to Earth's suitability as an environment for life.
- SC.912.N.1.3 Recognize the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
- SC.912.N.2.1 Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science)..
- SC.912.N.2.2 Identify scientific questions that can be disproved by experimentation/testing. Recognize that pseudoscience is a claim, belief, or practice which is presented as scientific, but does not adhere to strict standards of science.
- SC.912.N.2.4 Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

Lesson Outline:

1. First days of school are used to introduce students to the Biology course as the study of life. As an introduction to understanding the nature and characteristics of living things students are asked to write a paragraph to answer each question: What is life? What sustains life? This should be assigned after the following has been discussed and introduced during class. The paragraphs could be written as a homework assignment or written in class. Formatting guidelines would of course be adjusted to exclude word processing if the assignment were completed in class. This could be one assignment or broken down into two assignments.
2. Describe/demonstrate the MLA formatting guidelines for students when turning in written assignments with the proper heading, spacing, font, and size.
3. Review the basic characteristics of writing in paragraph form: indentation, capitalization, punctuation. Set a paragraph length for the beginning assignment. More in depth review of paragraph construction could be used here but this activity also lends itself as a "pretest" activity to evaluate students' strengths and weaknesses in their writing skills. The length should be established at minimum of five sentences for each paragraph. For the needs of the in class follow up activity, it would seem better to limit students to 2 longer paragraphs as opposed to writing multiple paragraphs for each question. This activity may be better suited to two separate writings and class analysis of the responses. The meaning of the word "sustain" should be taught and discussed.
4. **IMPORTANT: Students are not limited in their type of response to the questions. It is not meant to have any specific answer and students are encouraged to write whatever they choose to answer the questions.**
5. Share responses in class. Ask students to read their responses or offer to read them out loud without identifying the writer if needed. Explain that there are no wrong answers to the questions assigned.
6. After reading and briefly discussing responses, use examples to help students evaluate if the description of life could be tested scientifically or not and why. This activity could be accomplished easily by asking students to move to one side of the room if their definition of life and what sustains life **could be** tested scientifically and moving to the other side of the room if their definition of life and what sustains life **could not be** tested scientifically. Ask students to explain why they think their description of life falls in a specific category. This is meant to be an introductory activity.

Systems thinking connection (learning habits and/or tools used):

Student responses can be used in later activities in the first unit to introduce systems thinking.

- Students could identify key words in their descriptions of life to be used in a systems diagram or concept map. These could be a framework for the introductory unit of study in which they learn about the nature of life and characteristic of living things and the scientific method. Key words can be written on note cards and added to a bulletin board or white board to form a systems diagram. At this point systems thinking will be introduced in a separate lesson. As more key vocabulary in the unit is used it can fill into the diagram to develop the systems thinking lesson.
- A description of life and what sustains life from the student responses can be used in teaching the scientific method in lessons on experimental design. Students working in groups could design experiments to test the chosen definition of life and/or what sustains life. Systems thinking can be introduced in the action of variables in the experiment and predicted outcomes of the interaction of the variables.

Learning Strategies:

See plan.

Science Concept(s):

- The nature of science, scientific method.
- Characteristics of living things.
- What is the difference between a living thing and that which sustains a living thing?

Humanities Concept(s):

- The definition of life and what sustains life may incorporate many descriptions influenced by or making up the human experience and not simply a scientific definition.

Student Assessment Strategies:

- Assessment for this activity is usually a completion grade for required formatting, acceptable length of assignment, and paragraph form. Remember, there is not a correct answer or incorrect answer to the questions.

Benefit to my students:

- Introduction to understanding the nature of scientific inquiry, what is studied in Biology, and systems thinking.
- Introduction to environmental factors that affect the sustainability of life. This helps to bring environmental/ecology connections within the course in much earlier in the year.

Resources and Materials (supplies needed for activities):

- If students are required to use word processing formatting, they will need access to a computer and printer or submit on google drive.
- Note cards.