# Assignment Summary

In this assignment, you will gather evidence to construct an explanation of how energy and matter move through the environment under aerobic and anaerobic conditions. You will then conduct additional guided research to revise your explanation based on the new information you discover.

Background Information

Cellular respiration is a process that allows organisms to produce energy to maintain life. The process involves a series of chemical reactions that use glucose and oxygen to produce carbon dioxide, water, and the high energy molecule, ATP. Organisms, including plants, undergo cellular respiration to create energy that they can use to maintain life processes. Cellular respiration may be aerobic, a type of respiration that requires oxygen, or anaerobic, a type of respiration that can occur in an environment with no or minimal oxygen.

Materials

* Computer with Internet access
* Notebook
* Pen or pencil

# Assignment Instructions

**Step 1: Prepare for the project.**

1. Read the entire Student Guide before you begin this project.
2. If anything is not clear to you, ask your teacher for assistance before you begin.
3. Gather the materials you will need to complete this project.

**Step 2: Gather evidence to construct your explanation.**

1. Research ways in which cells get energy.
2. Use these guided questions to conduct your research:
   1. How do cells in plants (i.e., trees, flowers, etc.) get energy?
   2. How do cells in animals (i.e., birds, horses, humans, etc.) get energy?
   3. What is an obligate anaerobe? How do obligate anaerobes, like the bacteria *C. botulinum*, get energy?
   4. How does each type of organism get the energy it needs for its essential life processes?
   5. How do organisms get the nutrients they need to survive?
   6. How do nutrients move through an environment? What drives the movement of nutrients?

**Step 3: Construct an explanation based on the evidence you gathered.**

1. Create a typewritten document.
   1. Be sure to put your name at the top.
   2. Include any other information your teacher would like on the document.
2. Use the evidence you gathered to write 1–2 paragraphs in response to the prompt below:
   1. Describe how energy and matter move through the environment under both aerobic and anaerobic conditions.

**Step 4: Conduct additional research to discover new information.**

1. Conduct additional research on chemosynthetic organisms.
2. Use these guided questions to conduct your research:
   1. What is chemosynthesis?
   2. How do chemosynthetic organisms get energy? Some examples of organisms include colorless sulfur bacteria, iron bacteria, and giant tube worms (*Riftia parchyptila*).
3. The following websites may be helpful:

<http://www.teara.govt.nz/en/diagram/8960/photosynthesis-and-chemosynthesis>

<http://www.divediscover.whoi.edu/vents/light.html>

<http://oceanexplorer.noaa.gov/facts/photochemo.html>

<http://www.pmel.noaa.gov/eoi/nemo/explorer/concepts/chemosynthesis.html>

<http://www.encyclopedia.com/doc/1G2-3409800124.html>

<https://www.quora.com/What-are-chemoautotrophs-What-are-some-examples>

<https://microbewiki.kenyon.edu/index.php/Riftia_pachyptila_symbiont>

**Step 5: Revise your explanation.**

1. Now that you have learned about chemosynthetic organisms, revise your explanation.
2. Below your original explanation, create another paragraph explaining what you learned and how this new information impacts your original explanation.
   1. Do not delete or change your original explanation.
   2. Give reasoning for how and why you would change your original explanation in light of the new information.

**Step 6: Evaluate your project using this checklist.**

If you can check each criterion below, you are ready to submit your project.

* Did you gather sufficient evidence to create your original explanation?
* Does your original explanation thoroughly describe how energy and matter move through the environment under both aerobic and anaerobic conditions?
* Did you research additional information about chemosynthetic organisms to revise your explanation?
* Did you write an additional paragraph explaining what you learned and how it changes your original explanation?
* Are your explanations clear and coherent?
* Are your paragraphs free of spelling, grammatical, and punctuation errors?

**Step 7: Complete and submit your project.**

1. If you were unable to check off all of the requirements on the checklist, make any necessary revisions.
2. When you have completed your project, submit the typewritten document through the Virtual Classroom. Be sure your name is on it.
3. Congratulations! You have completed this project.