

Photosynthesis & Respiration 3 level Project

During the photosynthesis unit, you will need to review your reading notes on Chapters 8 and 9 before the days of lecture. You should have a basic understanding of the major components of photosynthesis and respiration.

By the end of the unit, you should be able to answer the following questions (based on Costa's three levels of questioning). If you cannot answer one or more of the questions, make sure you come in for help and clarification!!!!

Once you can answer the questions in the level you are working on you are ready to pick a project for that level. You must do projects at all 3 levels.

Level 1 Objectives:

- A. List the 2 overall equations for photosynthesis and respiration.
- B. Draw and label the major organelles involved in photosynthesis and respiration (paying attention to both internal and external structures).
- C. Define the following terms:

ATP

Matrix

Inner Membrane (both mitochondria and chloroplast)

Cristae

Grana

Glucose

Carbon Dioxide

Calvin Cycle

Light Energy (Photon)

Visible Light Spectrum

Outer Membrane (both mitochondria and chloroplast)

Stroma

Thylakoid

Oxygen

Water

Kreb Cycle

Level 2 Learning Objectives:

- A. Analyze the endothermic and exothermic components in the coupled reactions of photosynthesis and respiration as a complete system.
- B. Compare and contrast light reactions versus dark reaction in photosynthesis.
- C. Sequence the 4 main steps to aerobic respiration and explain how each is important in providing energy.

Level 3 Learning Objectives:

- A. Evaluate the strategies used by certain organism(s) that utilize fermentation to the organism's benefit. Provide an example and describe the organism(s) particular strategy.
- B. Why do organisms utilize fermentation chemophosphorylation versus photophosphorylation. Choose an organism that performs one of these strategies and describe when and where it takes place.
- C. If a heat wave (108°F – 116°F for 8 days) hits Paoli Valley, an apple orchard in central California, in late July burning the majority of the axial side of leaves hypothesize the net effect on the life cycle of the trees.

The Project

Level 1 – Individual Project Due _____

Option 1: Create a picture dictionary book for your photosynthesis and respiration vocabulary. Make sure to include the definition in your own words. All pictures must be hand-drawn and have color. **(20 words minimum)**

Option 2: Create 3-dimensional models for both the chloroplast and the mitochondria. Make sure to **label each portion** of your model. **Include a key with functions** for each portion of the model.

Level 2 Project (groups of two): Due _____

Option 1: Make a travel brochure for an electron as it travels through the chloroplast. Make sure to include maps, "side-streets," directions, etc. Make it fun. Be creative. You WANT people to travel with you!

Option 2: Write a business letter to the chairman of "Sunlight-R-Us" explaining why your neighborhood needs more sunlight to grow. Include endothermic and exothermic reactions in your letter. **Be as detailed as possible** and creative!!!! Link the energy from the sun through the plants and to the other trophic levels.

Option 3: Make up a song or rap related to the reactions in aerobic cell respiration & perform it in class. You must provide the class with copies of the lyrics so we may read along. (you may use index cards)

Level 3 Project (Groups - see below): Due _____

Option 1: Choose oxidative phosphorylation **or** photophosphorylation. In groups of no more than 2, create a poster with a timeline detailing when and where the reaction occurs. Use a clock face for your analogy.

Option 2: Draw a before (June) and after (October) picture of the apple orchard that was hit by the severe heat wave in late July. Make sure to **show what is happening on a cellular level** in your picture. Then write an essay, answering question "C" under level three. Use this picture as the cover page to your essay.

Option 3: Using iMovie, create a podcast explaining energy flow in plants and animals: 1. Detailing the 4 steps of aerobic respiration and 2. Detailing the steps photosynthesis. Make sure to include as many details as possible. You need to have pictures to accompany your explanation.