CER: CER: The Roles of Chloroplasts and Mitochondria in Cellular Energetics

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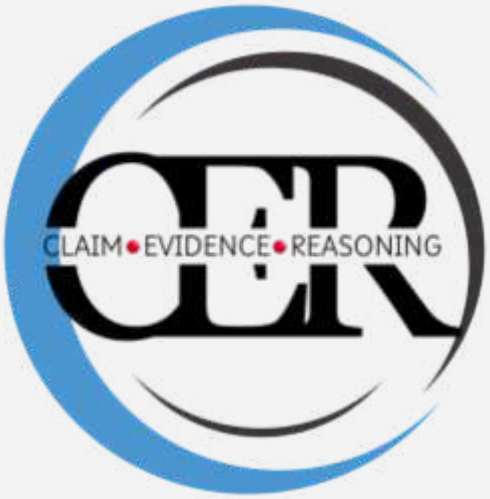

What is C.E.R.?

C.E.R. stands for **Claim, Evidence, and Reasoning**. It's a way to explain and support your ideas using facts and logical thinking. You will make a claim, back it up with evidence, and explain why the evidence supports your claim. This process helps you think critically and organize your ideas clearly.

Steps for Writing Your C.E.R. Response:

1. **Read the Article Carefully:**
   - First, read the background article about how plants and body systems work together. Make sure you understand the key ideas in the article.

2. **Write Your Claim:**
   - Your **claim** is your main idea or statement that answers the question. It is your position or opinion about the topic.
   - Use the **Claim Sentence Starter** to help you get started. This will guide you in making a strong, clear statement.
   - **Example**:
     The respiratory, circulatory, and muscular systems work together to maintain essential body functions by…
   - **Highlight** the section in the article that helps support your claim.

3. **Provide Evidence:**
   - **Evidence** is the facts, data, or information from the article that supports your claim. You need to find at least **four pieces of evidence** from the article.
   - Evidence can include details like descriptions, examples, or data from the article.
   - Example:
     The respiratory system provides oxygen and removes carbon dioxide, which is needed by the cells for energy.

4. **Explain the Evidence (Reasoning):**
   - **Reasoning** is how you explain why the evidence supports your claim. This is where you connect the dots between your claim and the evidence.

- Use the **Sentence Frames** to help you explain how the evidence proves your claim.
- **Example**:
  "This piece of evidence supports my claim because it shows how the respiratory system supplies oxygen to the body, which is necessary for energy production."

5. **Organize Your Writing:**

   - Your response should have three parts:
     1. **Claim**
     2. **Evidence**
     3. **Reasoning**

   - Use the Sentence Starters and Frames to help guide your writing.

Background Article:

Introduction
Photosynthesis and **cellular respiration** are two essential processes in cellular energetics. Photosynthesis occurs in plants, algae, and some bacteria, while cellular respiration happens in almost all eukaryotic cells. Both processes involve the transformation of energy, but they have different roles, reactants, and products.

Photosynthesis
Photosynthesis takes place in the **chloroplasts** of plant cells. It involves two main stages:

1. **Light-Dependent Reactions**: These reactions occur in the **thylakoid membranes** and require light. Light energy is used to split water molecules, releasing oxygen and producing ATP and NADPH, which are energy carriers.

2. **Calvin Cycle**: The Calvin Cycle occurs in the **stroma** of the chloroplast and does not require light. During this cycle, carbon dioxide is fixed into glucose using the energy from ATP and NADPH.

Cellular Respiration
Cellular respiration occurs in **mitochondria** and consists of three main stages:

1. **Glycolysis**: This occurs in the cytoplasm, where glucose is broken down into pyruvate, producing small amounts of ATP.

2. **Krebs Cycle**: In the mitochondria, pyruvate is further broken down, producing carbon dioxide and transferring high-energy electrons to NADH and FADH2.

3. **Electron Transport Chain**: The high-energy electrons are passed through the inner mitochondrial membrane, ultimately producing large amounts of ATP. Oxygen is consumed in this process, and water is produced as a byproduct.

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Comparison: Photosynthesis vs. Cellular Respiration
Photosynthesis and cellular respiration are opposite processes. Photosynthesis captures energy from the sun and stores it in glucose, while cellular respiration breaks down glucose to release energy in the form of ATP. Photosynthesis takes place in chloroplasts, and cellular respiration occurs in mitochondria. The **reactants** of photosynthesis (light energy, water, and carbon dioxide) are the **products** of cellular respiration (oxygen and glucose), and vice versa.

Conclusion
Photosynthesis and cellular respiration are two interconnected processes that involve the transformation of energy. Photosynthesis stores energy in glucose, while cellular respiration releases that energy for the cell to use.

Research Question

How do photosynthesis and cellular respiration work to transform energy, and what are the differences between these two processes?

Brainstorming / Turn & Talk - 2-3 minutes prior to writing anything!

Claims	Evidence	Reasoning

Your Response:

Claim	☐ Does the answer match the question? (The answer should be about the question.) ☐ Does the answer explain why? (The answer should tell why.)	**Claim Sentence Starter:** *Photosynthesis and cellular respiration are two processes that transform energy by… Photosynthesis takes place in chloroplasts, while cellular*

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	☐ Is the answer more than just "yes" or "no"? (The answer should be more than just "yes" or "no.") ☐ Is the answer a full sentence? (The answer should be a whole sentence.)	*respiration happens in mitochondria. The reactants and products of these processes are opposite because... (highlight the portion of the article you will refer to)*
Evidence	☐ Do all the facts help? ☐ Are there enough facts to help? ☐ Are the facts only things seen or measured? ☐ Are the facts very clear? ☐ The article says that [insert evidence]. This means that...	• ***Photosynthesis*** *stores ...* • ***Cellular respiration*** *releases energy by ...* • *The* ***reactants and products*** *of photosynthesis and cellular respiration are opposite...* • ***Glycolysis***, ***Krebs cycle***, *and the* ***electron transport chain*** *are key stages in ...*

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Reasoning	☐ Does each reason explain why? ☐ Does each reason connect to the answer? ☐ Does each reason tell why the fact supports the answer? ☐ Are the reasons written in whole sentences?	*"This evidence supports my claim because it shows how photosynthesis stores energy and cellular respiration releases it. For example, [explain how the products and reactants of both processes are interconnected]."*

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Final Draft: Putting it Together: