

Photosynthesis & Cellular Respiration

by Brianna Chang, Mastbaum Area Vocational Technical School, Philadelphia, 2010¹

Construct Your Puzzle Pieces

1. Obtain 9 squares of paper – these will be your puzzle pieces.
2. In each square, you will write in the chemical formula for one of the molecules involved in the processes of photosynthesis and cellular respiration. Use the following terms:
 - i. CO_2 _____
 - ii. H_2O _____
 - iii. $\text{C}_6\text{H}_{12}\text{O}_6$ _____ (food/carbohydrate/sugar)
 - iv. O_2 _____
 - v. ENERGY
3. In the spaces provided above, write the NAME of the molecule next to its chemical symbol for your reference.
4. In the remaining squares on your paper, write in symbols you will need to complete your chemical reaction. You will need 3 "+" symbols and one "→" symbol.

In a chemical reaction, what does the "→" signify?

Put Your Pieces Together: PHOTOSYNTHESIS

1. Arrange your pieces into the chemical equation for photosynthesis. Write this equation below:
$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$
2. (Use the NAMES of the molecules) According to your equation, the process of photosynthesis uses _____, _____, and _____ to produce _____ and _____.
3. What type of energy is used in photosynthesis? _____
4. Photosynthesis typically occurs in what type of organism? _____
5. Where are CO_2 and O_2 found in our environment? _____
6. Given what you know about plants, why does your position for CO_2 and O_2 in the equation make sense?
7. Interpret the chemical reaction - what is the overall purpose of photosynthesis?

¹ Teachers are encouraged to copy this student handout for classroom use. A Word file (which can be used to prepare a modified version if desired) and links to additional activities are available at <http://serendip.brynmawr.edu/exchange/bioactivities>.

Put Your Pieces Together AGAIN: CELLULAR RESPIRATION

1. From the equation for photosynthesis, rearrange your pieces into the chemical equation for cellular respiration.

Write this equation below:

_____ + _____ → _____ + _____ + _____

2. (Use the NAMES of the molecules) According to your equation, the process of cellular respiration uses _____ and _____ to produce _____ and release _____.
3. In cellular respiration, chemical energy is released from _____ molecules and transferred to _____ molecules, which cells can use to provide energy for cellular processes.
4. Was it difficult to rearrange your pieces to produce the equation for cellular respiration? Why or why not?
5. Cellular respiration occurs in both plants and animals. Given what you know about animals, why does your position for CO_2 and O_2 in the equation make sense?
6. Interpret the chemical reaction - what is the overall purpose of cellular respiration?
7. What are the two main differences between the chemical reaction for photosynthesis and the chemical reaction for cellular respiration?

Extension Questions – Please answer these items on line paper.

1. Cellular respiration occurs in BOTH plants and animals. Why do plants need cellular respiration?
2. Plants produce carbon dioxide as a product of cellular respiration. But you know that plants release oxygen, not carbon dioxide. Develop a logical argument for how this is possible.
HINT: Think about both chemical reactions and the speeds at which they could occur.
3. Plants can make their own food through photosynthesis and then break it down for usable energy through the process of cellular respiration. Analyze how your life might be different if you could make your own food through photosynthesis.