

**Reverse the Formula! Activity**

*Directions: you will use your knowledge of photosynthesis and the reactants (inputs) and products (outputs) of this process to brainstorm what happens in cellular respiration. To do this activity, you will use the contents of the envelopes to manipulate the formula of photosynthesis to help you understand how closely related the two formulas are.*

**PART ONE – A reflection on photosynthesis**

1. Arrange all of the reactants and products (along with the arrow and “+” signs) to correctly lay out the formula for photosynthesis on your desk.

a. Write the formula in the space below:

b. Fill in the table below about the reactants and products:

<i>Reactant Name</i>	<i>Chemical Formula</i>	<i>Where did it enter the leaf</i>	<i>Product name</i>	<i>Chemical Formula</i>	<i>Where did it leave the leaf</i>

c. Complete the table below on the reactants and products by saying whether they are a GAS, LIQUID, or FORM OF ENERGY

<b>Reactant</b>	<b>Gas/Liquid/Form of Energy</b>	<b>Product</b>	<b>Gas/Liquid/Form of Energy</b>

d. Describe what the purpose and/or importance of photosynthesis is for (1) plants, and (2) animals.

e. Prediction → If the word prefix “hetero” means other, the prefix “auto” means self, and the suffix “trophos” means feeding; predict what the terms autotroph and heterotroph mean. Secondly, think about how each of these types of organisms (heterotrophs & autotrophs) get their energy. *Hint: humans are heterotrophs*

**PART TWO – Flip the Script!!**

*Directions: You are now experts at photosynthesis which takes radiant energy from the sun’s rays and converts it to chemical energy for the plant to use to carry out all its daily functions and growth. Flip the formula around now and make your reactants into the products, and the products into the reactants. This will show you what happens when glucose is broken down! Remember, formulas always go right to left.*

2. Reform the formula for photosynthesis in reverse to show what happens when glucose is used by cells.

a. Write the formula below.

b. In photosynthesis, the  $6\text{CO}_2$  and  $6\text{H}_2\text{O}$  molecules are broken apart. Explain what you think happens to the glucose molecule you now have as a reactant.

c. When you reverse the reaction for photosynthesis, what happens to the sunlight? Is this right? Support your answer with reasoning why you think this is correct. If you think that this is incorrect, state why you think so and use the remaining terms in your envelope to try and develop a different outcome. When you've done so, write any changes to the formula below and the reasoning for your suggested change.

d. What molecule is present in your envelopes (in a high quantity) that shows you a different form of chemical energy? Using the information diagrams in the envelope, what do you think this molecule's role is within the plant's cells and how would you guess it relates to glucose?

e. Now that you've dissected the reaction for cellular respiration, what would you give as a definition for the process of cellular respiration? *Hint: use the reaction in front of you!*

f. What would you hypothesize is the relationship between photosynthesis and cellular respiration for organisms on Earth? Additionally, how do the two processes rely and/or drive one another?