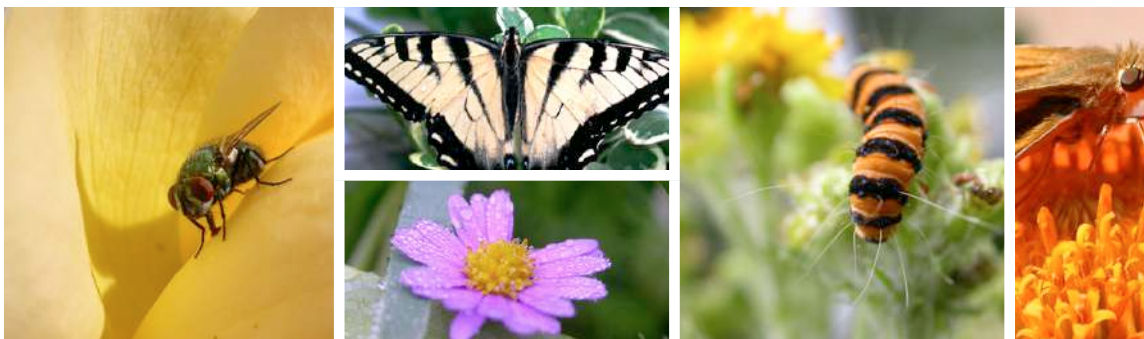

Taste the Rainbow!

Using Skittles to explore the chemistry of photosynthesis
and cellular respiration

Name: _____ • Class: _____



Background Information



Plants cells and animal cells use chemical reactions to engage in photosynthesis and cellular respiration.

During this lab you will be using Skittles to represent the molecules found in photosynthesis and respiration reactions. While studying these two reactions you will encounter the following molecules: CO_2 (carbon dioxide), H_2O (water), $\text{C}_6\text{H}_{12}\text{O}_6$ (glucose), and O_2 (oxygen).

As you know, **photosynthesis** is the process in which plants (also called autotrophs or producers) use water and the radiant energy of the sun to create simple sugar (glucose) as a food source with oxygen as one of the products of the reaction.

Cellular respiration is the process that takes place in the cells of organisms in which chemical reactions turn sugar (glucose) that we get from food along with oxygen into adenosine triphosphate (ATP). For the purposes of this lab, we will refer to ATP as “energy”, you can think of it as a kind of chemical battery that allows our body to store energy and rerelease it when needed.

The law of conservation of matter is a fundamental principle of science that states that matter is neither created nor destroyed, it simply changes forms. You will see that during photosynthesis and respiration that the number of atoms in the reactants (the “ingredients” on the left side of the formula) will equal the atoms in the products (the things that are given off after the “ingredients” undergo a chemical reaction, on the right side of the formula). You will also learn the molecules that make up the reactants and products for photosynthesis and respiration.

Directions:

1. Decide what color Skittle you are going to use to represent each kind of atom. Write the color below so you won't forget.

_____ Carbon _____ Hydrogen _____ Oxygen

2. Complete the chart below. Use the provided equations to write out the common names of the molecules that are found in the reactants and products. For example, if NaCl were one of the molecules in the equation, you would write out Sodium Chloride (or salt) in the blank. Refer to the background information if you forgot the common names of any of the molecules.

Photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

	Reactants (ingredients)	Products (Given off)
Photosynthesis		
Respiration		

3. How many total carbon atoms are there in the reactants of photosynthesis? _____
4. How many total oxygen atoms are there in the reactants of photosynthesis? _____
5. How many total atoms of hydrogen are there in the reactants of photosynthesis? _____
6. How many total carbon atoms are there in the products of photosynthesis? _____
7. How many total oxygen atoms are there in the products of photosynthesis? _____
8. How many total atoms of hydrogen are there in the products of photosynthesis? _____

9. Place the correct color and number of Skittles you chose on all of the atoms of the reactants of photosynthesis. For example, if you chose red Skittles to represent carbon, place one red skittle for each atom of carbon on the reactants side. Arrange the Skittles in the correct order so they represent the molecules on the reactants side. Have your teacher check your model for accuracy.

10. Draw a colored picture of your Skittle representation of the photosynthesis and cellular respiration reaction (both the reactants and the products).

Photosynthesis:

Cellular respiration:

11. How many total carbon atoms are there in the reactants of photosynthesis? _____

12. How many total carbon atoms are there in the reactants of respiration? _____

13. How many total oxygen atoms are there in the reactants of photosynthesis? _____

14. How many total oxygen atoms are there in the reactants of respiration? _____

15. Do you notice a pattern between how many atoms are in the reactants and how many are in the products? Can you guess the significance of the pattern?

16. How many total atoms of oxygen are there in the products of photosynthesis? _____

Conclusion questions:

17. What were your observations about the photosynthesis and respiration formulas?

18. What is the law of conservation of matter?

19. How was the law of conservation of matter demonstrated in this lab?

20. Why are the products of the photosynthesis reaction necessary for life on earth?

21. BONUS: What is the relationship between the products of cellular respiration and our respiratory system?
