

Name:

## Photosynthesis Lab Unit 2

Standard: HS-LS1-5

Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. (Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organism's).

### Part 1 Plant Growth Photosynthesis virtual lab

#### Part 1 Purpose:

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#### Part 1 Pre-Lab Procedure:

1. Go to the following virtual lab;  
[http://www.glencoe.com/sites/common\\_assets/science/virtual\\_labs/LS12/LS12.html](http://www.glencoe.com/sites/common_assets/science/virtual_labs/LS12/LS12.html)
2. Answer the following pre-lab questions, which will serve as part of your abstract using the information to left of the experiment.
  - a. Explain what photosynthesis is.
  - b. Identify where the energy comes from.
  - c. Explain why plants are green.
  - d. Identify what colors are absorbed by each of the pigments in the chloroplast.
3. Watch the video, which is located on the bottom left and take notes to explain how light affects photosynthesis.
4. Create a hypothesis about which part of the light spectrum causes the most plant growth and which part causes the least plant growth.

**Hypothesis:** \_\_\_\_\_

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5. Identify the controls of the experiment.
6. Identify the variable.
7. You will perform the experiment for each type of seed and record your results in the data table on the next page.

#### Part 1 Procedure:

1. Choose the type of seed you want to start with and click the seed packet.
2. Click the arrows on the color display to select a color light filter for each set of the three plants.
3. Start the experiment by clicking the light switch on.
4. Click the ruler and drag it to each plant to measure the height.
5. Average the heights of the three plants for each light color and record your results on the data table below.
6. Click the reset button to repeat the experiment for each different light color.
7. Repeat for all types of seeds and colors until data table is complete.
8. Create a line graph for all three plants. (**ALL THREE LINES WILL BE ON ONE GRAPH.**)
9. Answer analysis questions, which will be restated and used in your conclusion of your lab report.

**Part 1 Data:**

Filter color	Spinach Average height (cm)	Radish Average height (cm)	Lettuce Average height (cm)
Red			
Orange			
Green			
Blue			
Violet			

**Graph: All three lines for the plants on one graph (line) with Title, Labels, x, y axis**

**Part 1 Analysis: Use for Results/ Discussion section, restate and answer.**

1. Look at your hypothesis, which color in the visible spectrum causes the most plant growth and which color in the visible spectrum causes the least plant growth?
2. Compare the three types of plants growth with each type of light. Which plant was similar to each other? Which was different?
3. Explain how you tested your hypothesis? Which variables did you control in your experiment and which variable did you change in order to compare your growth results?
4. Analyze the results of your experiment. Did your data support your hypothesis? Explain. If you conducted tests with more than one type of seed, explain any differences or similarities you found among types of seeds.
5. Describe the conclusions that you can make about the color in the visible spectrum that causes the most plant growth? Describe what the experiment showed you.
6. Given that white light contains all colors of the spectrum, **predict** what growth results would you expect under white light? Would it be better to use a white light or colored lights? Explain why.

## **Part 2: Photosynthesis lab bench virtual lab chromatography**

### **Part 2 Purpose:**

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### **Part 2 Pre-Lab:**

1. Go to the following link; [http://phschool.com/science/biology\\_place/labbench/lab4/intro.html](http://phschool.com/science/biology_place/labbench/lab4/intro.html)
2. On the left of the screen click on 4-1 Chromatography, go through the screens by clicking the “next” button and answer the following pre-lab questions that will serve as part 2 of your abstract.
  - a. What is paper chromatography?
  - b. What 3 factors affect the rate at which pigments migrate?
  - c. What is a pigment?
  - d. What is meant by the solvent front?
  - e. What is meant by the term Reference Front?

### **Part 2 Procedure:**

1. Obtain a chromatography paper from your teacher.
2. Measure each pigment line exactly and transfer it below in the results chromatography paper, be sure to indicate the solvent front.
3. Label each pigment by referring to the website.

### **Part 2 Results: Complete copy of chromatography paper and data table on next page**



What is the measurement of the solvent front for the chromatogram drawn above? \_\_\_\_\_

Pigment Name	Colors Associated with this pigment	Distance Pigment Migrated (mm)	Rf Value
Chlorophyll a			
Chlorophyll b			
Carotene			
Xanthophyll			

**Part 2 Analysis:** Use for Results/ Discussion section, restate and answer.

1. Explain what chromatography is.
2. Explain your results from your data chart.
3. Identify each pigment and explain how they function in photosynthesis.
4. Identify what pigments are essential to photosynthesis and predict how plants that have red leaves can carry on photosynthesis.
5. What are the two byproducts of photosynthesis that are important to humans and other animals?
6. Name the **pigments** most common in spring and summer leaves.
7. Name the **pigments** most common in fall leaves.
8. Name the 4 pigments from the plant separation in order from largest to smallest based on what you know about how far they travelled on the chromatography paper.
9. Which pigment went the farthest on the virtual ink Pigment Separation?
10. Which pigment barely moved?