Name_____

Date_____Per_____

WEBQUEST & VIRTUAL LABS: Photosynthesis!!

OVERVIEW: You will be visiting 4 websites and going through various simulations about photosynthesis and what affects this process.

SCIENCE UP CLOSE: Photosynthesis

Go to: http://www.harcourtschool.com/activity/science_up_close/512/deploy/interface.html

Watch or read the tutorial found at the website above. Fill in the following answers as you watch.

1) Plants use photosynthesis to make_____for the plant.

2) What are the 3 ingredients that plants need in order to perform photosynthesis? (Hint: you may need to go to the next slide). Also, identify the **sources** of these ingredients (where do they come from?).

"Ingredients" for photosynthesis	Source for "ingredient"
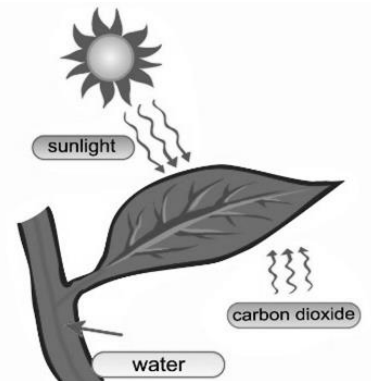
3) a) What are **stomata** (singular = stoma)?_____

   b) Where on a plant are they located?_____

4) Identify the plant **organelle** where photosynthesis occurs._____

5) Briefly describe the **steps** of **photosynthesis.**

   a) _____

   b) _____

   c) _____

   d) _____

6) Now that the plant has sugar, what will it do with the sugar later on?_____

7) What molecule or gas is not necessary for plants and is then released?_____

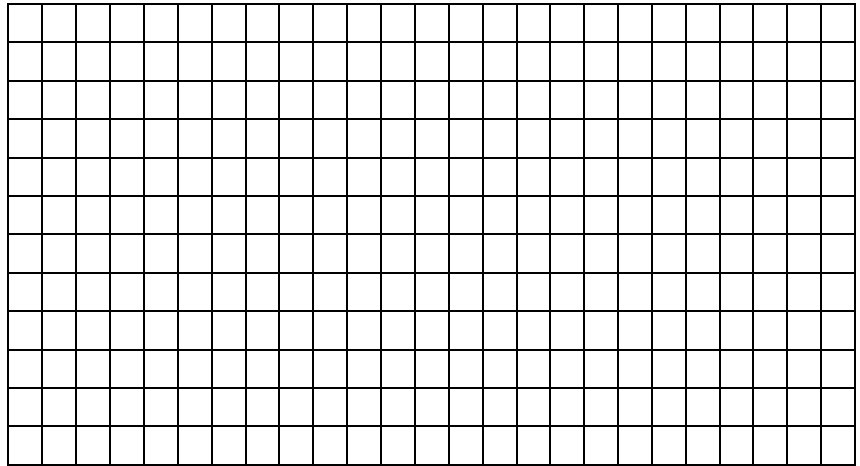## VIRTUAL LAB #1 - Measuring the Rate of Photosynthesis in Elodea

Go to: **http://www.reading.ac.uk/virtualexperiments/ves/preloader-photosynthesis-full.html**

Bubbles are given off by the plant through photosynthesis. By measuring the rate at which the bubbles are produced it is possible to tell how fast the plant is photosynthesizing. *Read and follow the directions on how to use this lab simulator.* Press start and record the bubbles per minute for each of the following light distances. Then graph your data. ***Be sure to label the axes, give units, use appropriate intervals, and give a descriptive title.***
HINT: Start with 200 to get the hang of counting the bubbles.

GRAPH: _____

Light Distance (cm)	Bubbles per minute
100	
120	
150	
180	
200	

1) Based on your results, explain how light intensity affects the rate of photosynthesis. **Use your data to help explain your answer.**

_____

_____

VIRTUAL LAB #2: Photolab

Go to: **http://www.kscience.co.uk/animations/photolab.swf**.

In this lab, you will be experimenting with how different variables affect the rate of photosynthesis.

1) Set the thermometer at 25°C (room temperature) and the light intensity to 20. Press the green button to start the simulation, then start counting the number of bubbles as they are released for one minute.

a) What were the bubbles per minute at this setting? _____ bpm

b) Now increase the CO_2 available to the Elodea. What were your bubbles per minute? _____ bpm

c) Based on your data, explain how the amount of available CO_2 affects the rate of photosynthesis. _____

_____

2) Keep the same settings (25°C, light intensity 20, increase CO_2 available).

a) What were the bubbles per minute at this setting? _____ bpm (see 1a)

b) Now **increase** the temperature to **40°C**. What were your bubbles per minute? _____ bpm

c) Based on your data, explain how a **increase in temperature** affects the rate of photosynthesis. _____

_____

3) Keep the same settings (25°C, light intensity 20, increase CO_2 available).

a) What were the bubbles per minute at this setting? _____ bpm (see 1a)

b) Now **decrease** the temperature to **10°C**. What were your bubbles per minute? _____ bpm

c) Based on your data, explain how a **decrease in temperature** affects the rate of photosynthesis. _____

_____

4 Which **combination** of the variables changed above (light intensity, temperature, CO_2 available) produced the highest number of bubbles per minute? **Explain why this might be. (HINT: think about the requirements for photosynthesis!)**

_____

_____

VIRTUAL LAB #3: Light and Plant Growth
Go to: http://www.glencoe.com/sites/common_assets/science/virtual_labs/LS12/LS12.html

Read the information in the left column and answer the questions below.

1) What is photosynthesis? _____

2) What is white light? _____

3) **TRUE or FALSE** (circle one). Pigments only absorb light.

4) Which pigment is most commonly found in plants? _____

Next, you will be conducting an experiment using the simulation from the website to determine which light spectrum affects the amount of plant growth. Assume that all conditions (e.g. soil, moisture, number of seeds, etc…) **other than color** are the same among the seeds.

Which color, red, blue, or green will have the greatest effect on the amount of lettuce growth.

State and EXPLAIN your prediction here: _____

_____

Procedure:
1) On the simulator, choose the **lettuce seeds** and plant your seedlings.

2) Underneath the plants, you will see arrows were you can change the color of the light. On the right side, change the color to **GREEN** by clicking on the arrow. On the left side, keep the color **RED**.

3) In the center, you will see an on/off switch. Click the switch on and you will see your experiment go for 30 days.

4) Underneath the plants, you will see a ruler. Click on the ruler and measure the height of all 6 of your plants and record the data in the table below.

5) Click on reset and **repeat steps 1-4**,but this time, in step 2, compare the colors **GREEN** and **BLUE**.

DATA TABLE: Comparing color of light and plant growth

	Green Light Plant Growth				Red Light Plant Growth			
	Plant 1	Plant 2	Plant 3	*Average*	Plant 1	Plant 2	Plant 3	*Average*
Growth (cm)								

	Green Light Plant Growth				Blue Light Plant Growth			
	Plant 1	Plant 2	Plant 3	*Average*	Plant 1	Plant 2	Plant 3	*Average*
Growth (cm)								

<u>**RESULTS:**</u> Create 2 separate bar graphs comparing the average plant growth and color of light. With each graph, make sure to include a <u>title, equal intervals, labels for the x and y axes, and a key / legend for the color of light</u>.
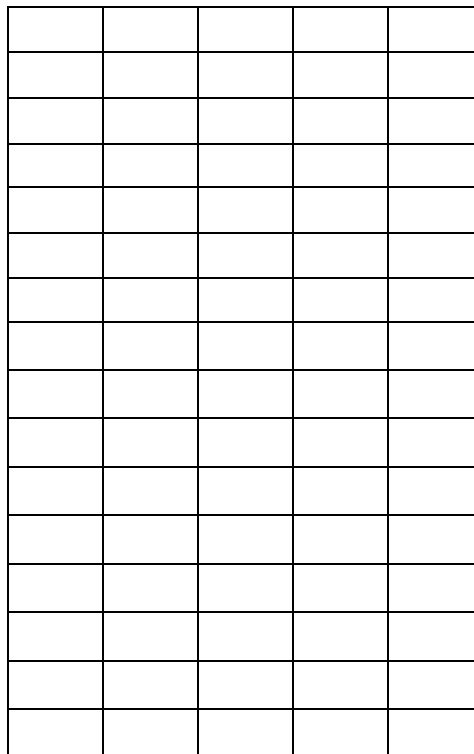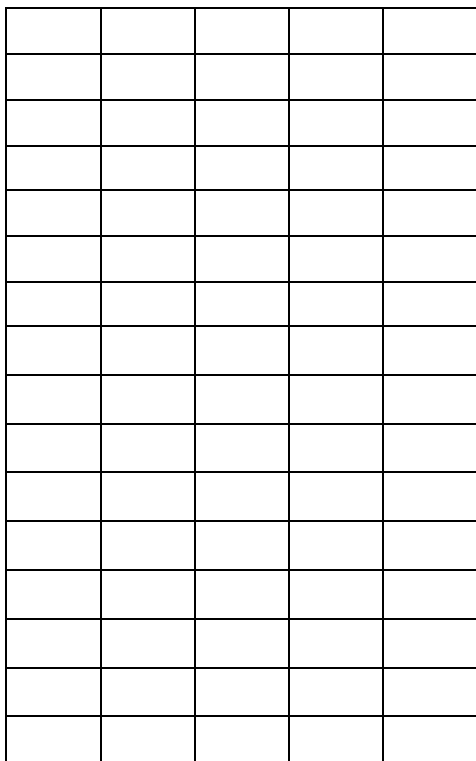
Conclusion Questions:

1) a) Which variable was your **independent variable**? _____

   b) Which variable was your **dependent variable**? _____

   c) List two variables that were kept **constant** for the experiment. _____

2) Which color had the **greatest effect** on the lettuce growth? Which had the **least effect**?

3) Do the data support your original hypothesis? **EXPLAIN**.

4) Given that white light contains all colors of the spectrum, what growth results would you expect under white light? **EXPLAIN**.