

Biology

Midyear Cornerstone Assessment

The Cornerstone Assessments were developed with support through the VDOE Mathematics and Science Partnership Grant Program NCLB Title II, Part B program by high school teachers as a part of the Old Dominion University Learning Enhanced through the Nature of Science (LENS) project.

2012 – 2013

This assessment consists of two parts.

DIRECTIONS to provide to read to students:

Today you will be taking the Biology Midyear Cornerstone Assessment to find out your skills in scientific investigation, data analysis and interpretation, and scientific reasoning. Read each question carefully and provide your *best* answer or response.

Record your answers directly on the spaces provided in the assessment. Be sure your work and responses are legible.

Biology Mid-Year Cornerstone Assessment: Part A. Experimental Design

Directions: Read the paragraph below and then respond to the questions.

Suzy’s Biology classroom has two potted plants. At the beginning of the year, both plants were the same size. Now Suzy notices that the plant on the teacher’s desk, located farthest from the window, has not grown as much as the plant near the window. She decides she would like to know if distance from the light source affects the plant growth. Design an appropriate experiment to test the effect of light source distance on the rate of plant growth by responding to questions 1 through 7.

The following materials are available to you:

- | | |
|-----------------|---------------------------------------|
| 1. Bean seeds | 5. Lamps |
| 2. Small pots | 6. Cardboard boxes |
| 3. Potting soil | 7. Ruler |
| 4. water | 8. Balance (scale for measuring mass) |

1. State an appropriate **hypothesis**. Explain your reasoning.

2. What should be the **independent variable** in the experiment? Explain your choice.

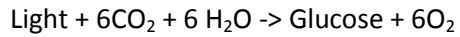
3. What should be the **dependent variable** in your experiment? Explain your choice.

4. Are there conditions that should **remain constant** in this experiment? Explain your answer, and give examples, if necessary.

Biology Mid-Year Cornerstone Assessment: Part B. Data Analysis and Scientific Reasoning

Directions: Review the information and data table below. Then, answer the questions that follow.

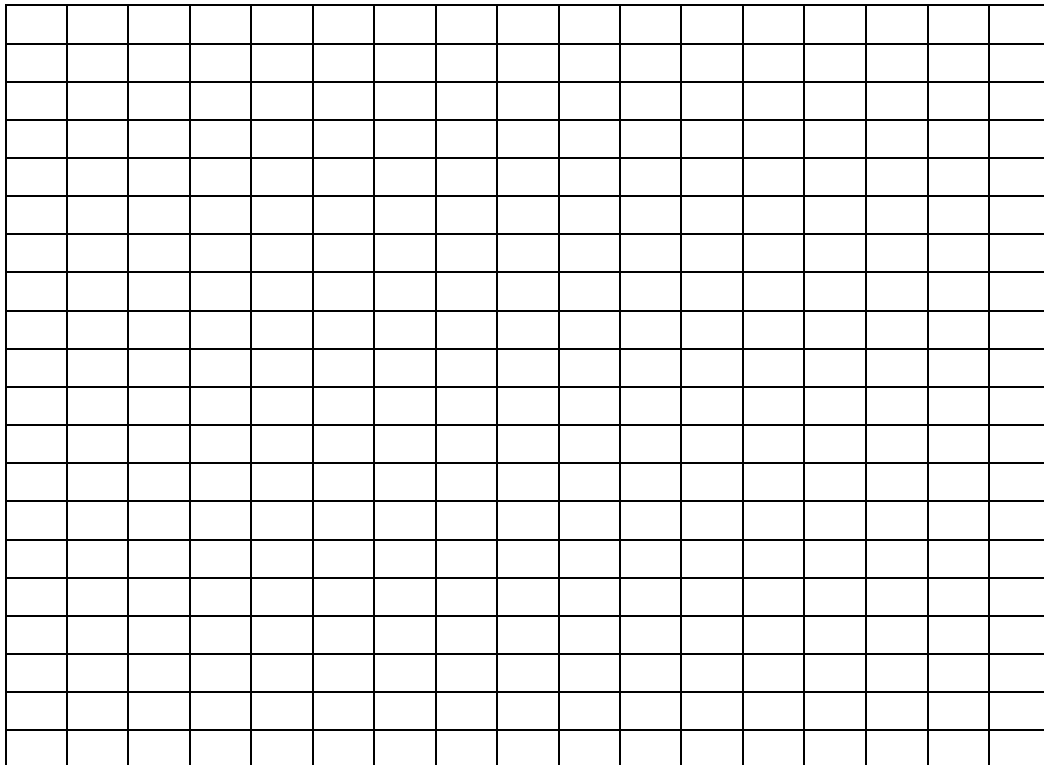
The students believed that the rate of photosynthesis would decrease with an increased distance from the light source. Photosynthesis can be described by the following chemical reaction:



The data collected from *Elodea*, an aquatic plant, is listed below:

Distance from light source (cm)	# bubbles/1 min
0 cm	50
10 cm	201
20 cm	145
30 cm	115
40 cm	50
50 cm	10

- Using the grid below, create a line graph from these data.



Name: _____

2. What is your **independent variable**? Explain your choice.

3. What is the **dependent variable**? Explain your choice.

4. At what distance from the light source was bubble production the greatest?

5. How many bubbles would you predict would be seen 60 cm from the light source? Explain your reasoning.

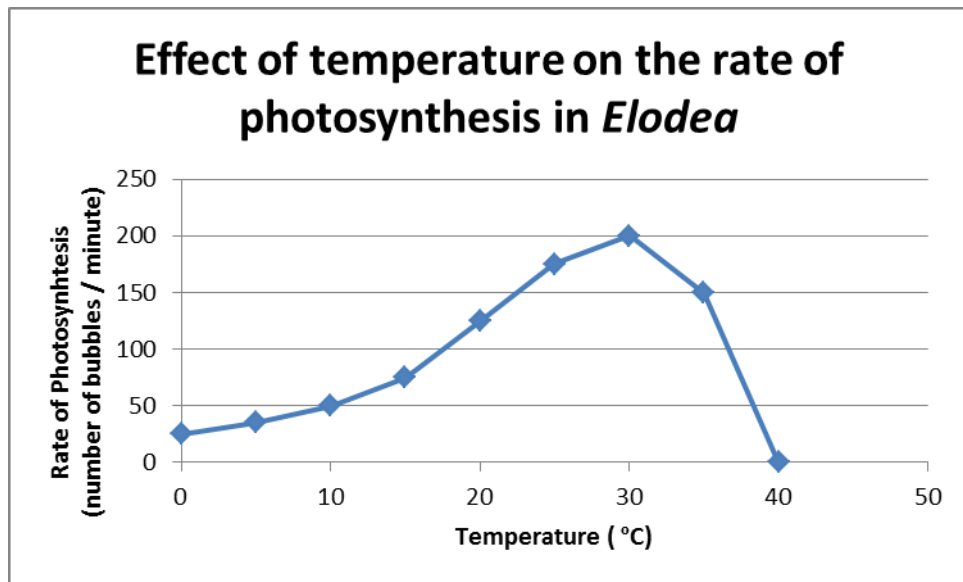
6. The bubbles are what type of gas? Why is bubble production a good measurement of rate of photosynthesis?

7. What conclusion(s) can be made based on these results?

Name: _____

8. Describe a way in which this experiment can be improved or expanded to further explore the effect of distance from light source on photosynthetic rate?

Use the following graph to answer questions 9 and 10.



9. At what temperature does Elodea photosynthesize the best?

10. If most plants exhibit a similar response to temperature as the Elodea, explain what happens to Virginia plants in the autumn and winter months? Use the graph above to explain your answer.
