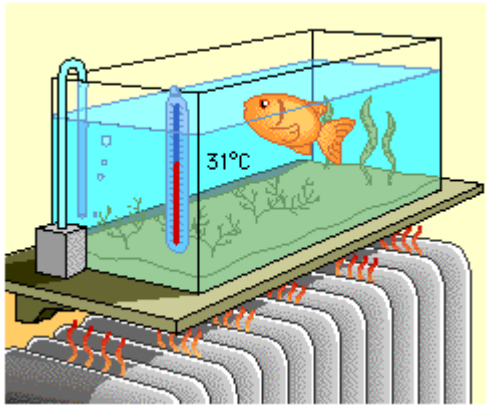
Name_____Period_____Assignment #_____

Virtual Lab 10 Energy Dynamics

http://www.phschool.com/science/biology_place/labbench/lab12/intro.html

Read the introduction

Click *Next*



1) Why did the fish above die?

Click *Next Concept*

2) What are some of the factors that affect the amount of oxygen dissolved in water?

I.

II.

III.

IV.

V.

Click *Next Concept*

3) Answer the following questions

1. Which environment has the greater concentration of dissolved oxygen: salt water or fresh water?

Check Your Answers

2. Which environment has the greater concentration of dissolved oxygen: warm water (31°C) or cool water (18°C)?

Check Your Answers

3. Which environment has the greater concentration of dissolved oxygen: a clear pond or a pond with a heavy algal mat? Explain.

Check Your Answers

Explain your answers to the 3 questions above

1.

2.

3.

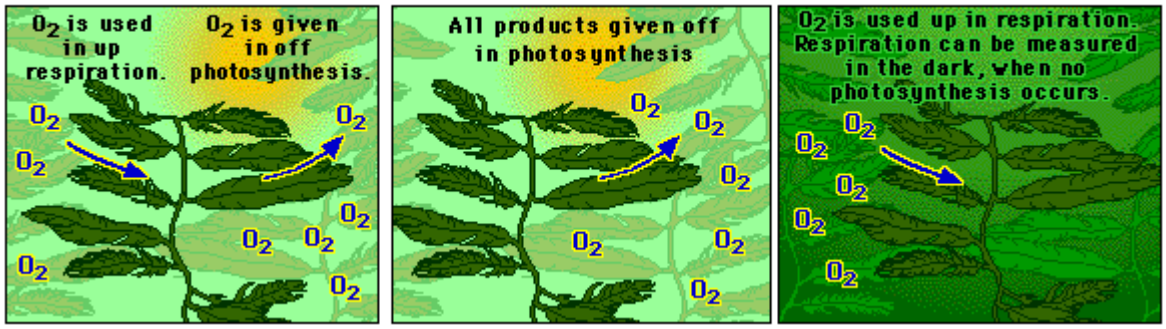
Click *Next Concept*

4) Define primary productivity

5) Define gross productivity

6) Define net productivity

Net Productivity = Gross Productivity - Respiration



7) Explain how we can measure gross productivity (your explanation must reference the illustrations above)

Click *Next Concept*

8) What is the equation for photosynthesis?

9) What are the 3 ways primary productivity can be measured?

I.

II.

III.

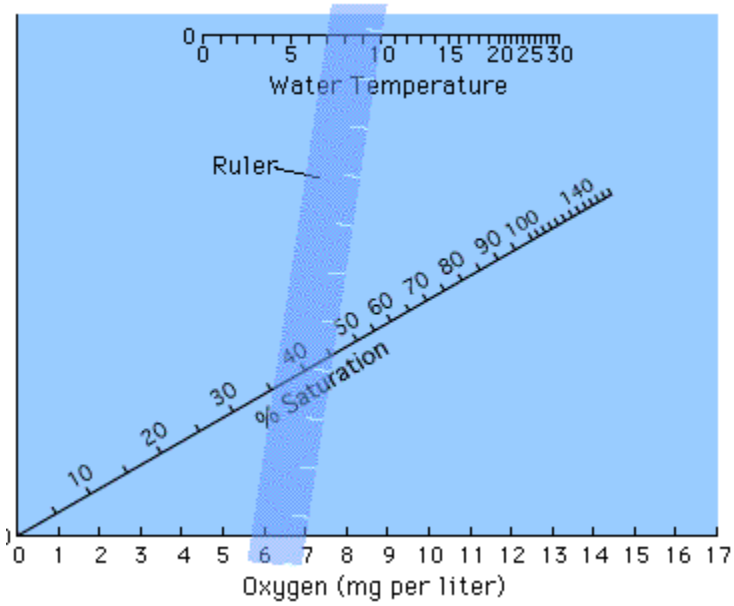
10) Explain why measuring dissolved oxygen can be used to measure primary productivity.

Click *Next*

11) Why do we use class mean data?

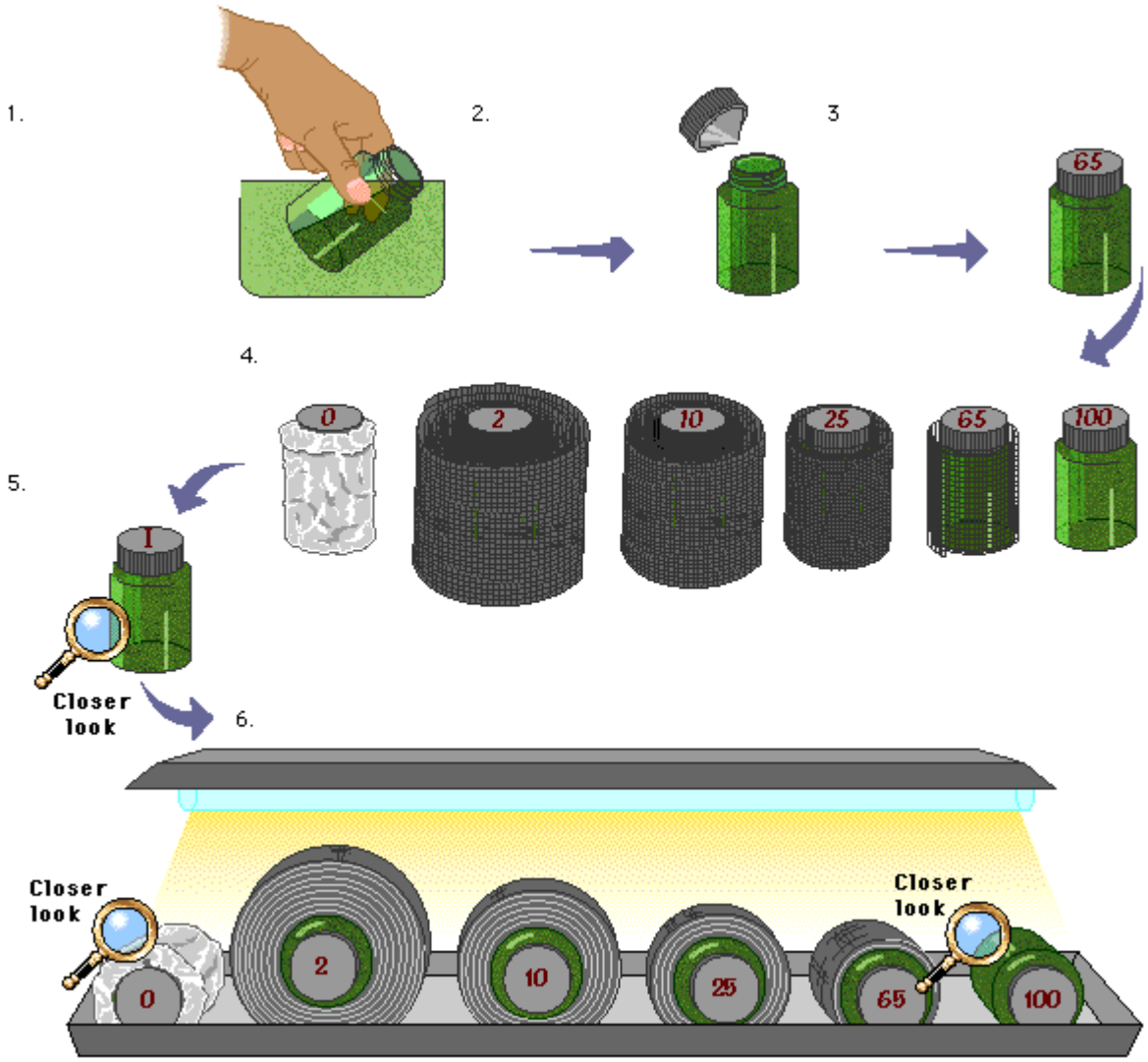
12) What is the percent oxygen saturation for a water sample at 10°C that has 7 mg O2/l?

13) What is the percent oxygen saturation for a water sample at 25°C that has 7 mg O2/l?



Click *Next*

14) Fill in the diagram below



Click *A Closer Look*

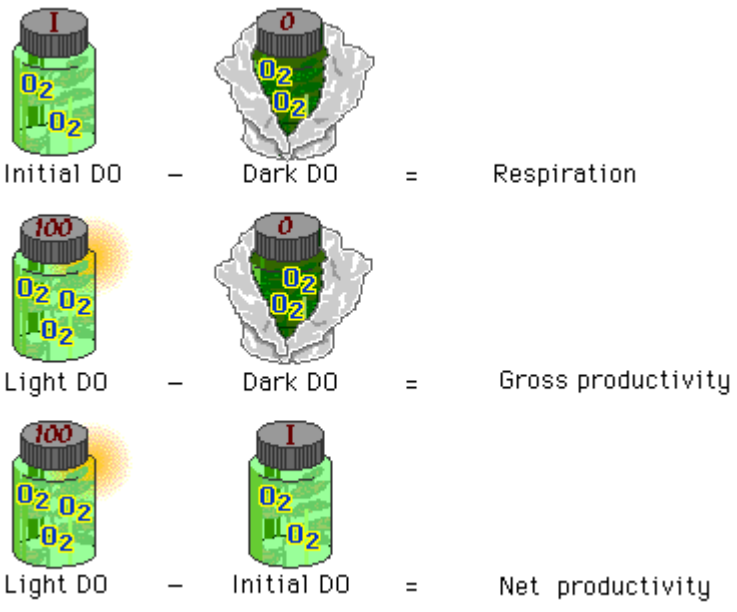
Watch the models videos of primary productivity in each condition

Click *Next*

Read Lab tips

15) Explain how you will model primary productivity using BOD bottles (biological oxygen demand bottles)

Click *Next*

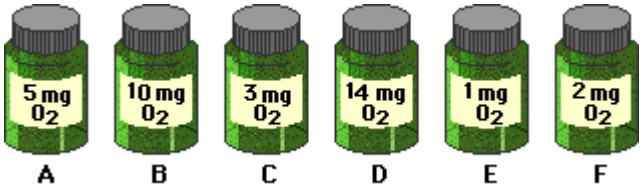


16) Explain why gross productivity = Light DO – Dark DO

Click *Next*

17) Complete the problem below

A biology student inadvertently removed all the screens and labels from the water-sampling bottles before he measured the amount of dissolved oxygen. **One of the bottles received NO light**. When he tested the unidentified bottles, he obtained the results shown below.



The **initial oxygen reading the water in ALL bottles was 4 mg O_2/L**. Based on the results predicted by the hypothesis that light increases productivity, enter the letter of the bottle that corresponds to each light percentage. Then complete the rest of the table and, using the graph below as a model, graph the gross and net productivity for these data.

% Light	Bottle	Gross Productivity (light bottle minus dark bottle)	Net Productivity (light bottle minus initial bottle)	Carbon fixed
0				
2				
10				
25				
65				
100				

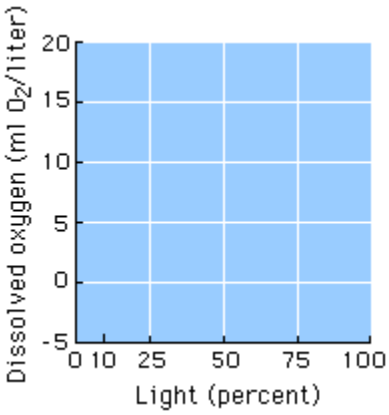
check answer

18) Graph the gross productivity and net productivity from the experiment above.

Graphing Hints

1. Be sure to label both x- and y-axes on the graph. Place the independent variable on the x-axis and the dependent variable on the y-axis. (If you're not certain what a dependent variable or an independent variable is, check the glossary.)

2. Be sure to mark units correctly on the graph — the interval between 2% light and 10% light is NOT the same as the interval between 10% and 25%!



19) Calculate how much carbon was fixed in each of the bottles above using the equations below. Record in the data table above.

Example:

Primary Productivity Calculation

mg O_2/L x 0.698 = mL O_2/L

mL O_2/L x 0.536 = mg carbon fixed/L

$$\text{Net productivity} = \frac{5\ mg\ O_2}{L}$$

Convert mg O_2/L to mL O_2/L

$$\frac{5\ mg\ O_2}{L} \times 0.698 = \frac{3.49\ mL\ O_2}{L}$$

Convert mL O_2/L to mg carbon fixed/L

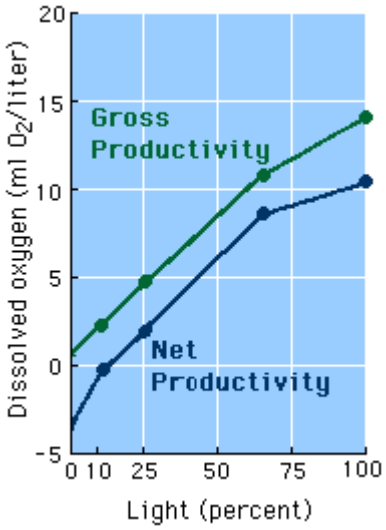
$$\frac{3.49\ mL\ O_2}{L} \times 0.536 = \frac{1.87\ mg\ carbon\ fixed}{L}$$

Show your work!

Click *Self Quiz*

20) In what aquatic environment would you expect dissolved oxygen to be highest? Explain your answer as well.

21) At what light intensity do you expect there to be no net productivity? Explain your answer as well.



22) What is meant by "net productivity" and how is it calculated in a sample aquatic environment? Explain your answer as well.

23) A biology class used two aquatic cultures as described below for the experiment with screens that reduce light. They measured dissolved oxygen initially, and then after 24 hours.

Culture A	**Culture B**
Little phytoplankton	Rich in phytoplankton
Rich in zooplankton	Rich in zooplankton
Low initial dissolved oxygen	High initial dissolved oxygen

What results would you predict for this experiment?

24) Justify your prediction. A justification has 3 components: 1) Scientific knowledge and/or theory; 2) specific data from your analysis related to the knowledge; and 3) an explanation of HOW the data from your analysis supports the knowledge.