Fall 2002 Biology 111 Exam #3 – BioEnergetics

There is no time limit on this test, though I have tried to design one that you should be able to complete within 2.5 hours, except for typing. There are four pages for this test, including this cover sheet. You are <u>not allowed to use your notes, old tests, the internet, or any books, nor are you allowed to discuss the test with anyone</u> until all exams are turned in at 8:30 am on Monday November 25. **EXAMS ARE DUE AT CLASS TIME ON MONDAY NOVEMBER 25**. You <u>may</u> use a calculator and/or ruler. The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers in the appropriate location, I may not find them.

You must have access to the web to take this exam.

-3 pts if you do not follow this direction.
Please do not write or type your name on any page other than this cover page.
Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.
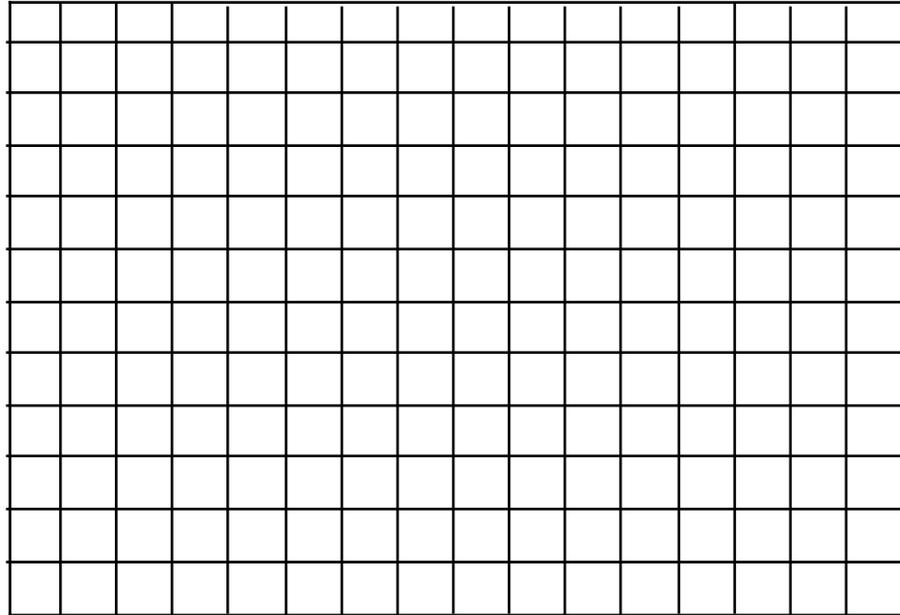
Name (please print):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

Lab Question:
10 pts.
1)

This question requires that you generate graphs using the grid above. Be sure to label the X and Y axes and provide real numbers and units. Extend your graph for 3 hours of regeneration. Assume standard lab conditions unless told otherwise.
a) Using a pencil, draw squares to graph the regrowth of *Chalmydomonas* flagella under control conditions.
b) Using a pencil, draw triangles to graph the regrowth of *Chalmydomonas* flagella when all protein synthesis is blocked after deflagellation and the block were maintained for 3 hours.
c) Using a pencil, draw filled circles to graph your prediction of what would happen if the cells in b were deflagellated a second time and allowed to grow for 3 hours.
d) Using blue ink and X's, graph your prediction of what would happen if cells were grown at 10° C for 3 hours.
e) Using blue ink and open circles, graph your prediction of what would happen if cells were grown at 80° C for 3 hours.

Lecture Questions:
6 pts.
2) Use photosynthesis as an example of the two laws of thermodynamics. In other words, use photosynthesis to define the two laws.

6 pts.
3) Make a list with the names of leaf pigments in one column and colors of light absorbed in the second column. List as many as you can remember.

6 pts.

4) In the space provided below, draw a picture/cartoon of a photosynthetic reaction center. Be sure to NEATLY label all parts.

12 pts.

5) Draw any chemical structures you know to demonstrate the following terms. Be sure to clearly indicate which parts I should look at and type out sentences to explain your drawing. Leave a blank space to draw in after you have typed and printed your answers.

a) reduction

b) reducing agent

c) oxidation

d) oxidizing agent

3 pts.

6) How is energy stored in glucose? Use words with pictures as needed.

8 pts.

7) several $NADH + C_3O_3H_3 \rightarrow\rightarrow\rightarrow$ several $NAD^+ + CO_2 + C_2H_6O_1$

Define the following for the reaction above:

a) $-\Delta G$ or $+\Delta G$?

b) spontaneous or non-spontaneous

c) $-\Delta H$ or $+\Delta H$?

d) $-\Delta S$ or $+\Delta S$?

6 pts.

8) a) Why do plants need water?

b) Do plants ever produce CO_2 as a waste product?

9 pts.

9) a) In what form or forms must nitrogen be supplied to non-legumes in order for them to absorb the nitrogen?

b) How do legumes absorb nitrogen?

c) How many species are needed to produce the mighty soy bean (exclude humans but include all others)?

3 pts.

10) Explain the passive transport of glucose.

20 pts.

11) In a flow diagram or in an outline format, show the flow of energy from **glucose** to **ATP** production. In your diagram, be sure to account for all carbons and all electrons.

5 pts.

12) a) Which step in cellular respiration is allostericly modulated to regulate the entire pathway.

b) Explain why this enzyme is the best one to be the regulator of the pathway.

6 pts.

13) List the substrates and the resulting products for all forms of fermentation. Then tell me how many ATPs were produced for each pathway you list.