Fall 2001 Biology 111 Exam #1 - Cellular Communications

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 not allowed to use your notes, old tests, the internet, or any books, nor are you allowed to discuss the test with anyone until all exams are turned in at 11:30 am on Monday September 17. **EXAMS ARE DUE AT CLASS TIME ON MONDAY SEPTEMBER 17**. You may 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.

-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)?

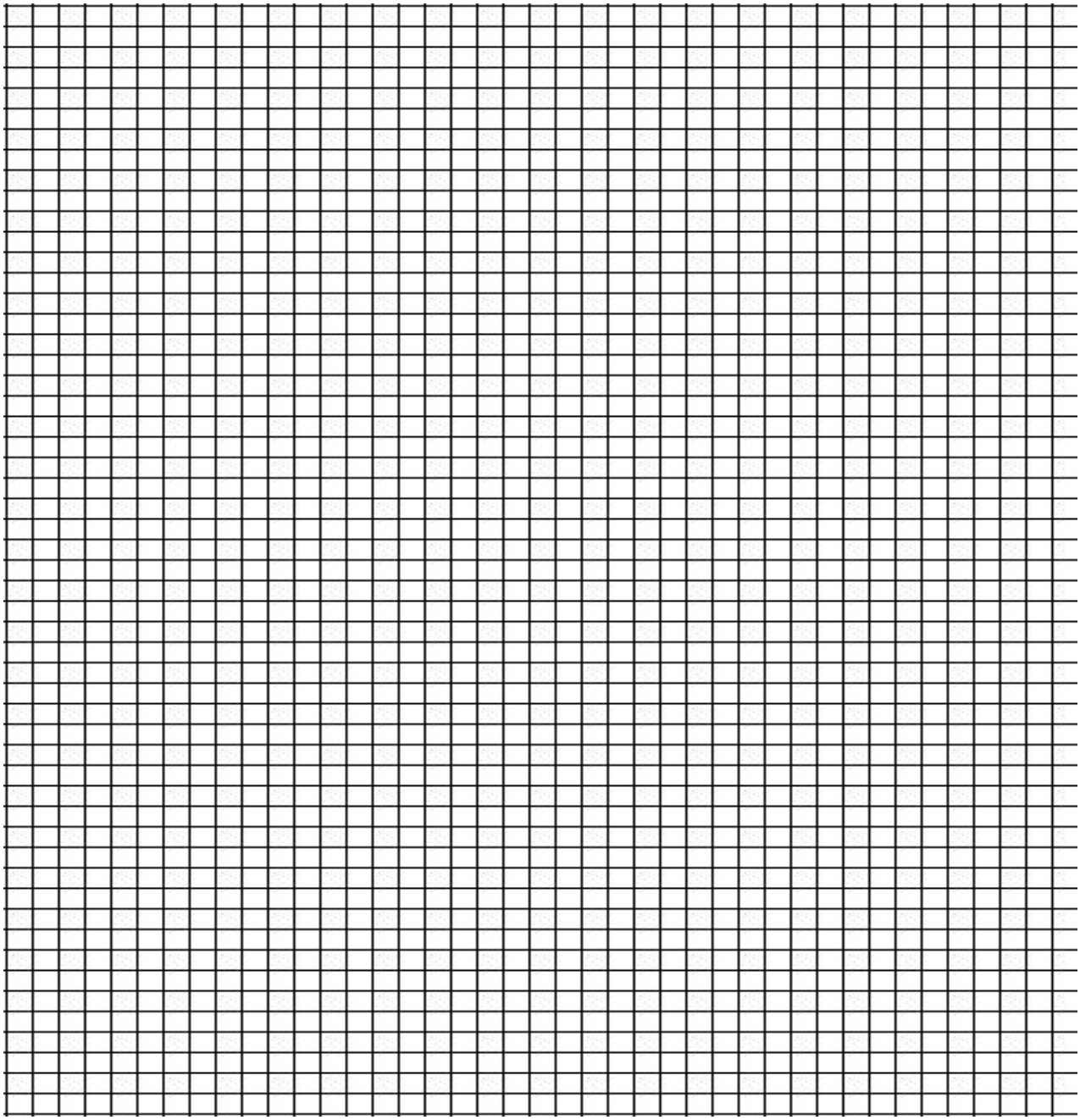
Lab Questions:

3 pts.

1) Tell me how to make a 200 mL solution that is 1.44 mM $NADP^+$, 50 mM isocitrate and 7% v/v IDH if your stock solutions are 28.8 mM $NADP^+$, 500 mM isocistrate and 100 mM IDH (to be considered 100% IDH stock solution).

7 pts.

2) In the graph paper below, graph out the enzyme reaction data in the table on the next page. Be sure to label both of the reactions and the axes. Explain which reaction has the higher reaction rate and support your conclusion with the data you have graphed.



Raw absorption data in table below. Wavelength of light used was 450 nm.

Time (sec)	Abs. Raction 1	Abs. Reaction 2	Abs. Blank
10	0.512	0.026	0.018
20	0.577	0.121	0.018
30	0.642	0.216	0.018
40	0.707	0.311	0.018
50	0.772	0.406	0.018
60	0.837	0.501	0.018
70	0.902	0.596	0.018
80	0.967	0.691	0.018
90	1.032	0.786	0.018

Lecture Questions:

6 pts.

3) Eukaryotic cells are full of organelles. Explain why this is an evolutionarily adaptive characteristic. Use an example from one of the four systems we studied in detail.

8 pts.

4) Explain how enzymes can be turned on or off by covalent modulation. To receive full credit, you must use a real example from one of the four systems we studied in detail.

8 pts.

5) Beat blockers are drugs that block the beta adrenergic receptor so epinephrine cannot bind to its receptor. Explain in molecular terms why these drugs would reduce the blood pressure in a patient.

8 pts.

6) Caffeine gives you a "buzz" because caffeine inactivates phosphodiesterase. Since you understand what role phosphodiesterase plays in your cells, explain why caffeine is a stimulant.

8 pts.

7) What role does calcium play in muscle contraction?

7 pts.

8) Explain why the Na+/K+ pump has to pump ions all the time.

8 pts.

9) Ligand-gated and voltage-gated ion channels are involved in the generation of an action potential. Describe the role played by both types of channels.

10 pts.

10) Explain how calcium controls excocytosis.

11 pts.

11) a. What is the substrate for phospholipase-C?
b. What are the products?
c. What is triggered by each of these products?

10 pts.

12) Using specific examples we have covered, describe how different cells can respond differently to a common stimulus. You only need to provide two examples.

6 pts.

13) Below is a photograph of a chicken cell that has been labeled with a fluorescent antibody that binds to the calcium pump. Explain how the antibody could have been produced.