Spring 2007 Biology 111 Take-Home Exam #1 - Cellular Communications

There is no time limit on the take-home portion of this exam, though I have tried to design one that you should be able to complete within 2 hours, except for typing. There are 2 pages for this exam, 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 the in-class exam is completed at 11:30 am on Monday February 12. **TYPED EXAM ANSWERS ARE DUE AT 10:30 AM ON MONDAY FEBRUARY 12**. You may use a calculator and/or ruler for both portions of the exam. The **answers to the take-home exam must be typed on separate sheets 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 Question:

6 pts.

1) a. Explain in chemical terms why IDH prefers $NADP^+$ over NAD^+.

b. How would you make 150 mL of a 0.15M solution of NADP+ if the FW = 765.39

Lecture Questions:

8 pts.

2) a. Can enzymes cause a reaction to happen that cannot happen without the enzyme? Explain your answer.

b. What do enzymes do to cause reactions to proceed? 5 sentence maximum.

8 pts.

3) Make a table with two columns. In the first column, list all the enzymes in the signal transduction pathway that we discussed that describes how the heart beats harder. In the second column, list how each enzyme becomes activated. Do not write more than one sentence for any of the activations.

8 pts.

4) Draw a picture of how calcium regulates exocytosis in egg cells. Include all the major players beginning with the second messenger. Label all parts clearly so I can read your labels. If you have messy handwriting, print neatly or type. You can draw arrows to show the flow of information. You may want to use more than one color.

8 pts.

5) List the major steps of the sodium/potassium pump and number this list. Then draw a picture showing these steps and label with numbers only. Start your list at the step where sodium has just been released from the pump. Be sure to quantify any critical components of this process.

6 pts.

6) Explain why a nerve terminus must perform as much endocytosis as exocytosis.

10 pts.

7) a. In outline format, describe how phospholipase C is activated.

b. What is are the substrate and products for phospholipase C (full names are worth more points than abbreviations)?

c. Draw a picture of the two products. Show as much chemical detail as you can.

6 pts.

8) Is it possible to predict whether an allosteric modulator will enhance or reduce an enzyme's activity? Explain your answer in 3 sentences or less.

8 pts.

9) a. As mentioned in the study guide, human vision utilizes cGMP. A certain biology student once hypothesized that consuming more caffeine would improve vision. Explain the basis for this hypothesis.

b. Based on what we have studied so far, explain why caffeine does not affect vision.