

Fall 2003 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 8:30 am on Monday September 22. **EXAMS ARE DUE AT CLASS TIME ON MONDAY SEPTEMBER 23.** You may use a calculator and/or ruler. The **answers to the questions 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 Questions:

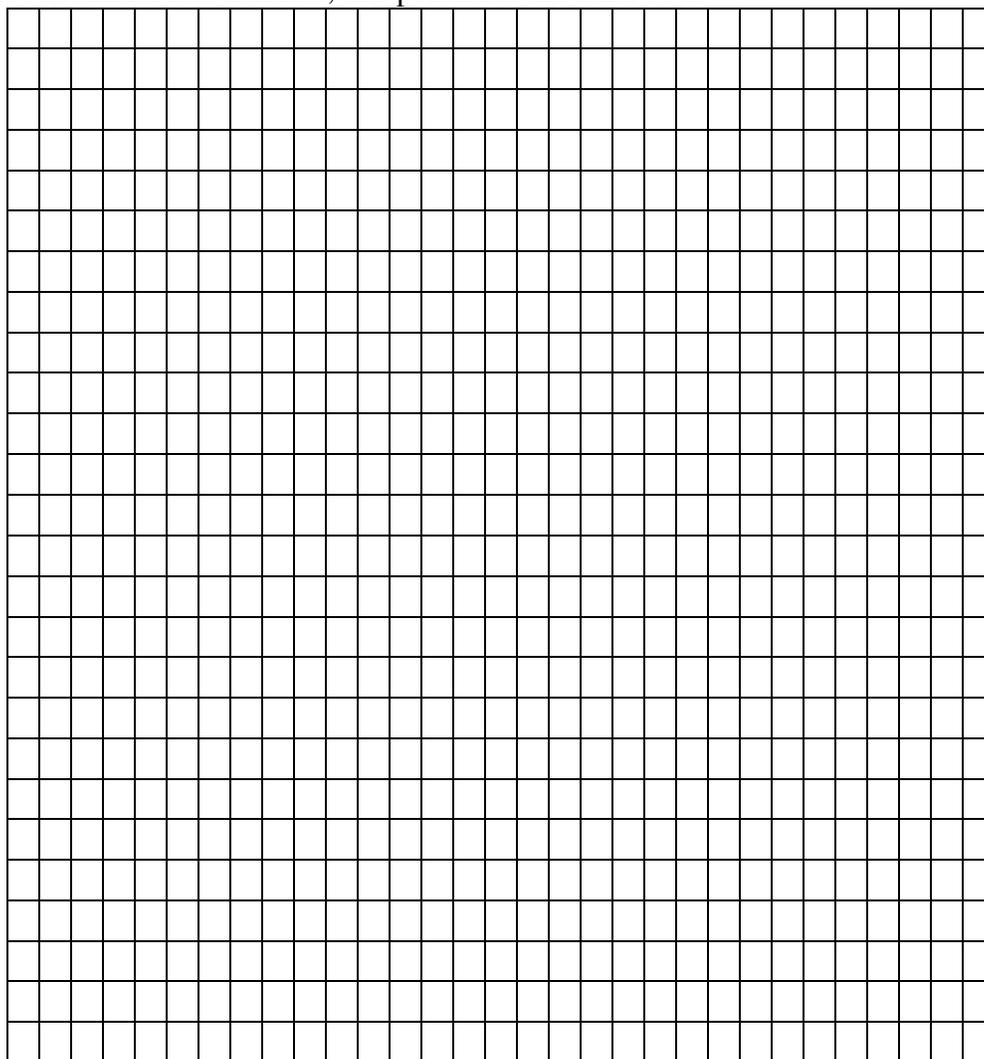
3 pts.

1) Provide the volumes to complete the table below used to set up an enzyme reaction.

Stock Solutions	Volumes (in μL)	Final Concentrations
250 mM isocitrate		10 mM isocitrate
enzyme solution		5% (v/v) enzyme
1.5 M buffer		0.1 M buffer
water		
Final Volume	300	

7 pts.

2) Graph the data from the table on page 3. Use red ink for the reaction with the fastest initial rate, blue ink for the slowest initial reaction rate, and pencil for the other two.



Time	Bobby	Tom	Leslie	Brenda
0.00	0.0100	0.0167	0.0741	0.0559
0.25	0.0412	0.0359	0.0793	0.0749
0.50	0.0729	0.0571	0.0845	0.0962
0.75	0.0779	0.0758	0.0914	0.1171
1.00	0.0812	0.0961	0.0978	0.1370

Lecture Questions:

4 pts.

3) Explain in 4 sentences or less with teleological language why you jumped in your chair on the first day when I scared you.

8 pts.

4) In the space provided, use chemical structure diagrams to illustrate why we can digest glycogen and starch but not cellulose. Be sure to label neatly any parts you want to highlight.

11 pts.

5) a. Define activation energy.

b. List three different non-protein allosteric modulators, which proteins they modulate, and whether each activates or inactivates the protein.

6 pts.

6) Explain why caffeine gives you a buzz. In your answer, choose one of the four systems we covered as a specific example.

10 pts.

7) ATP is a common source of energy. List 5 ways it is used in the 4 systems we have covered so far. For each way, be sure to use one sentence to describe what happens when the ATP is consumed (i.e. what task is accomplished immediately when ATP is consumed).

6 pts.

8) Explain the concepts of voltage and current using an analogy.

9 pts.

9) What ions contribute to muscle contraction? List the ions and then describe what role each ion plays. In your answer, only consider the muscle cell, not the neuron.

8 pts.

10) Draw a picture of a cortical granule. In your diagram, label all the parts, including the molecules that we did not discuss in this system, but must be present for exocytosis to occur in response to increased cytoplasmic calcium concentration.

8 pts.

11) Explain in molecular terms how myasthenia gravis causes flaccid paralysis when a person produces antibodies against his or her own acetylcholine receptors.

8 pts.

12) Outline an experiment to obtain purified IDH from human red blood cells so that the IDH is still functional. You do not want a general mixture of many protein, but one that is close to 100% IDH.

12 pts.

13) Use the skeletal muscle contraction system as a model for cellular communication. Describe 6 common themes of cellular communication.