

Fall 2002 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 three 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 23. **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:

On my honor I have neither given nor received unauthorized information regarding this work, I have followed and will continue to observe all regulations regarding it, and I am unaware of any violation of the Honor Code by others.

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

Lab Questions:

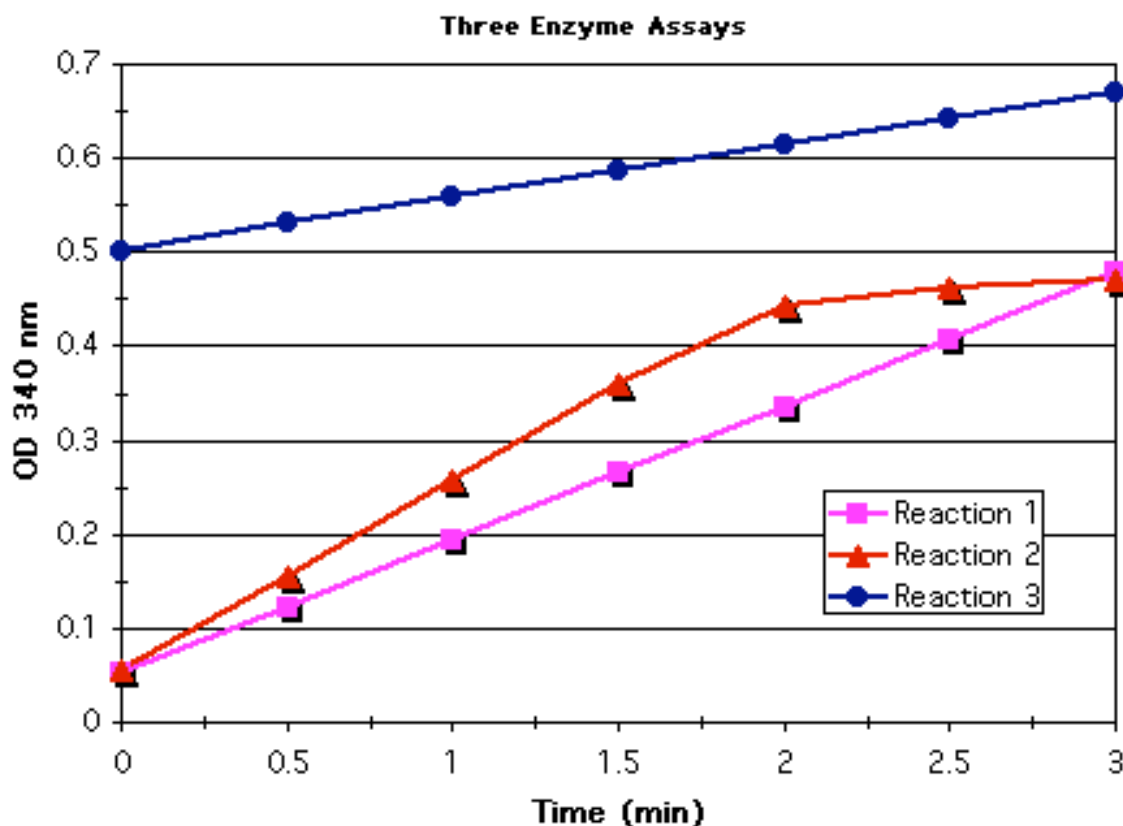
3 pts.

1) Fill in the table used to set up a reaction (unrelated to question number 2 below).

Stock Solutions	Volumes (in μL)	Final Concentrations
100 mM isocitrate	13	
57 mM enzyme	20	
1.5 M buffer	10	
water	257	

7 pts.

2) List the three reactions in order from fastest to slowest reaction rates. Explain why you placed each reaction where you did.



Lecture Questions:

4 pts.

3) Explain the basic elements of evolution in four sentences.

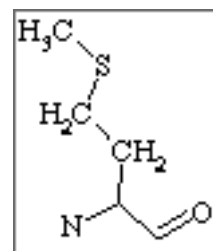
4 pts.

4) Using a specific example we studied, explain the phrase “form follows function”.

6 pts.

5) a) What kind of molecule is shown in this picture?

b) Is it hydrophobic or hydrophilic?



c) In the space below, diagram how two copies of this molecule would be connected together in one of your cells.

20 pts.

6) On the back of this page, draw a picture of the entire signal transduction pathway in your liver starting with ligand binding to receptor and ending with the production of glucose 1-phosphate. Your diagram must be clear and you must write labels for all parts of your figure. Make sure your writing can be read easily, so print neatly.

10 pts.

7) a) What is a gated ion channel?

b) List every type of gated ion channel we have studied so far and give one example of each type.

6 pts.

8) Explain how calcium is used to *open and close* the IP3 receptor.

6 pts.

9) List the ways a fertilized egg can reset its cytoplasm to prepare it for a new use of calcium as a second messenger.

6 pts.

10) Explain how calcium is used to regulate neurotransmitter release into the neuromuscular junction. You may include a diagram in your answer if it helps you.

8 pts.

11) Explain the difference/s between a more forceful heart contraction and a faster heart rate.

8 pts.

12) List four especially common phenomena in intercellular signaling systems.

6 pts.

13) Explain what would happen to a neuron that contained a defective K⁺ channel that was non-functional.

6 pts.

14) Explain how gels separate molecules based on size.

Bonus Question (+2 points): Hypothesize why benign familial neonatal convulsions disappear a few months after birth.