Biol1000 Section C
Test 2: Thursday November 8, 2012
7:00pm – 7:45pm
Instructor: Dr. Nicole Nivillac

This ENTIRE test package and scantron MUST be submitted to receive a grade.

Your **STUDENT NUMBER** and **NAME** must be clearly indicated on this package and scantron sheet to receive a grade.

Your **STUDENT NUMBER** must also be **BUBBLED CORRECTLY** on the scantron sheet to receive a grade.

There are 25 Multiple Choice questions (1 mark each - with one best answer per question) and 1 short answer question worth 5 marks. The entire test is worth 30 marks.

ELECTRONIC AIDS (e.g. calculators, phones iPods etc.) are **NOT PERMITTED!**

Invigilators and instructors will immediately **RELOCATE** anyone or **SUSPEND** the examination for any individual suspected of **ACADEMIC DISHONESTY.**

PLEASE MAKE SURE YOU FILL IN THE ANSWER TO EACH QUESTION ON THE SCANTRON BEFORE THE ALLOTTED TIME FOR THE TEST IS UP. YOU WILL NOT BE GIVEN EXTRA TIME TO DO SO.

If you finish the test before the allotted time then please raise your hand and an invigilator will come and collect your test.

GOOD LUCK!!!!

Last name:	**Version A**
First name:	**A**
Student number:	

HAVE YOU CORRECTLY FILLED IN YOUR STUDENT NUMBER ON THE SCANTRON SHEET? PLEASE CHECK

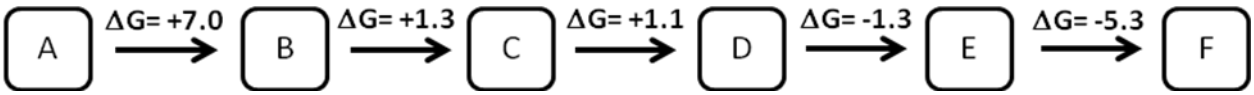
1. **You are completing VERSION A. Bubble in "A" beside #1 on your scantron. THIS QUESTION IS NOT WORTH A MARK BUT NEEDS TO BE COMPLETED TO BE GRADED.**
   A. Pick this one!
   B.
   C.
   D.

2. **Which of the following best describes how an enzyme works?**
   A. They bind to a substrate and decrease the change in free energy
   B. They bring reactants together and lower the activation energy
   C. They bind to a substrate and increase the activation energy
   D. They convert endergonic reactions into exergonic reactions

3. **A reaction has a ΔG = -12.3 kcal/mol. How many molecules of ATP would need to be hydrolyzed for this reaction to occur? (Hydrolysis of ATP releases 7.3kcal of energy).**
   A. 0
   B. 1
   C. 2
   D. 3

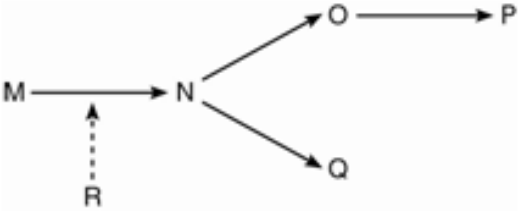
4. **Which of the following is an example of negative feedback?**
   A. You get cut and platelets form a clot. This in turn activates the fibrin clotting system and more blood forms clots.
   B. Transcription factors enter the nucleus to start mRNA production which in turn results in certain proteins being translated.
   C. Cyanide binds to an enzyme thereby changing the conformation of an enzyme's active site.
   D. All of the above are examples of negative feedback.

5. **The metabolic pathway in the figure below is**



   A. Anabolic; endergonic
   B. Catabolic; endergonic
   C. Anabolic; exergonic
   D. Catabolic; exergonic

6. **In the diagram below, solid arrows represent enzyme catalyzed reactions. The dashed arrow represents molecule R interacting with an enzyme. If the enzyme catalyzing the N to Q reaction *is inhibited by product P* what will the final products and relative amounts be if the reactions are permitted to go to completion? (Assuming all enzymes have equal rates of activity).**

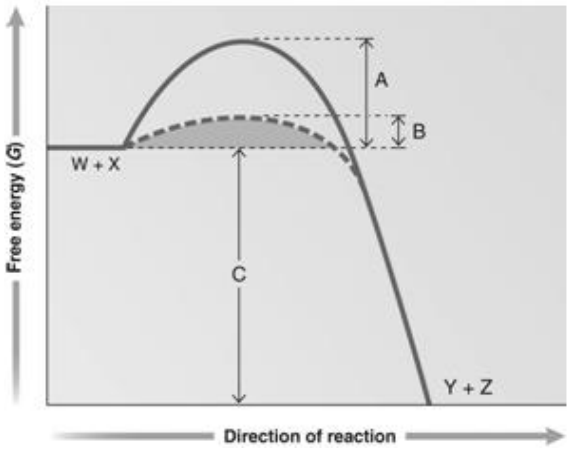


A. N only
B. Q only
C. P and Q at first, then more P
D. P and Q at first, then more Q
E. N and Q in equal amounts
F. P and Q in equal amounts regardless of time

7. **Rhodopsins are light-sensitive molecules composed of a protein (opsin) and a pigment (retinal). The opsin portion of rhodopsin is an example of a**

A. Peripheral protein
B. Monotopic integral membrane protein
C. Polytopic integral membrane protein
D. Phospholipid

8. **In the figure below, which portion represents the activation energy in a catalyzed reaction?**



A. A
B. B
C. C
D. W+X
E. Y+Z

9. **Succinate dehydrogenase catalyzes the conversion of succinate to fumarate. The reaction is inhibited by malonic acid. Increasing the concentration of succinate relative to malonic acid reduces the inhibitory effect of malonic acid. Based on this information, which of the following is correct?**
   A. Succinate dehydrogenase is the enzyme, and fumarate is the substrate.
   B. Fumarate is the product, and succinate is a competitive inhibitor.
   C. Fumarate is the substrate and malonic acid is a competitive inhibitor.
   D. Fumarate is the product, and malonic acid is a competitive inhibitor.
   E. Succinate dehydrogenase is the enzyme, and malonic acid is the substrate.

10. **The fluidity of a membrane will decrease as a result of which one of the following changes?**
   A. Increasing the average length of the fatty acids
   B. Increasing the number of double bonds in the fatty acids
   C. Increasing the temperature of the surrounding environment
   D. Answers A and B
   E. Answers B and C
   F. Answers A and C

11. **You are a student in a lab making two sucrose solutions, one of 0.5M and one of 2M. You make the solutions and go out for lunch. When you come back you realize that you forgot to label the beakers and now you have no idea which solution is which. You decide to make each solution again but you still try to guess which beaker was which. You remember the rules of tonicity and decide to fill two balloons (having semi-permeable membranes permeable to water but not to sucrose) with a solution of 1M sucrose and then immerse one of these balloons in each beaker to see what happens. After completing your experiment you saw that the balloon in the beaker with the 0.5 M solution _____ while the balloon in the beaker with the 2M solution _____meaning that the 0.5M solution was _____ relative to the balloon while the 2M solute solution was _____ relative to the balloon.**
   A. Swelled, Shriveled, hypertonic, hypotonic
   B. Shriveled, Swelled, hypertonic, hypotonic
   C. Swelled, Shriveled, hypotonic, hypertonic
   D. Shriveled, Swelled, hypotonic, hypertonic

12. **If all of the NADH inside the cell was depleted, which part(s) of the cellular respiration would be affected the least?**
   A. Glycolysis
   B. Pyruvate oxidation
   C. Electron Transport Chain
   D. Krebs Cycle
   E. A, B only
   F. A, B and D
   G. B, C and D

13. Two ATP molecules are expended (used) in the energy investment phase of glycolysis. Why is this energy necessary to begin the process of glucose catabolism?

A. It isn't; glucose contains 686 kcal/mole in its chemical bonds, so its catabolism is spontaneous.

B. It is directly needed to move the electron carriers NAD^+ and FAD^+ towards the electron transfer chain so that these carriers can change the conformation of ATP synthase thereby activating it.

C. It is needed to destabilize the enzymes involved in glycolysis so that all reactions can proceed.

D. Glucose is a stable molecule; thus, some energy must be invested to make the molecule unstable and begin the process of catabolism.

14. What is one of the purposes of the Citric Acid Cycle (Kreb's cycle)?

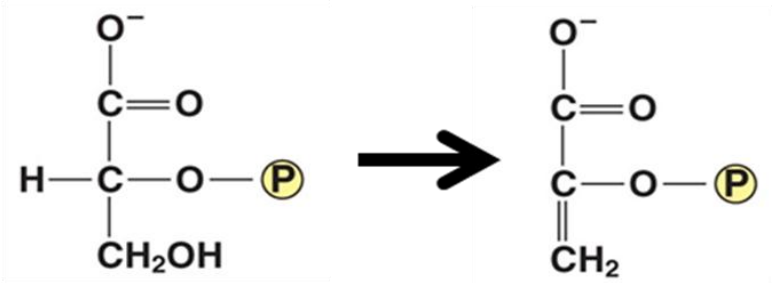
A. Oxidize NADH

B. Reduce NADH

C. Oxidize NAD^+

D. Reduce NAD^+

15. The following reaction occurs as part of glycolysis. What has occurred between the two molecules shown in the figure below?



A. Conversion of ATP to ADP

B. Creation of NADH

C. Creation of H_2O

D. Isomerization

16. When ATP is split into ADP and Pi,

A. Energy is released in the form of heat

B. Energy is directly transferred to a target molecule by an unknown mechanism

C. The remaining phosphates acquire energy that was present in the bonds of the three phosphates.

D. The binding of ADP or Pi to the target molecule allows the energy of ATP hydrolysis to be transferred to the target molecule

17. You have a friend that has decided to try beer brewing. To start, he adds baker's yeast, malt, hops, and sugar into a gallon of water. He then puts this mix into a gallon bucket without a lid, puts the bucket on the kitchen counter and says that he will leave it there to start the fermentation process. Seeing this, you know that he will never get any alcohol or carbonation (CO_2 production). You mention this to your friend and he replies "Why? I've added the right amounts of yeast and sugar so it should start fermenting any time now". You tell him it's because

A. Yeast will only perform fermentation under aerobic conditions and so because he left the lid off the bucket, alcohol and CO_2 production will never occur.

B. Yeast will only perform fermentation under anaerobic conditions and so because he left the lid off the bucket, alcohol and CO_2 production will never occur.

C. The fact that the lid was left off the bucket means that the yeast keep replenishing their supply of $NADP^+$ which means that they will never enter the fermentation pathway.

D. The yeast produce lactic acid instead of alcohol and CO_2.

18. The metabolic pathway, glycolysis, is active when cellular energy levels are _____ and the regulatory enzyme, phosphofructokinase, is _____ by ATP.

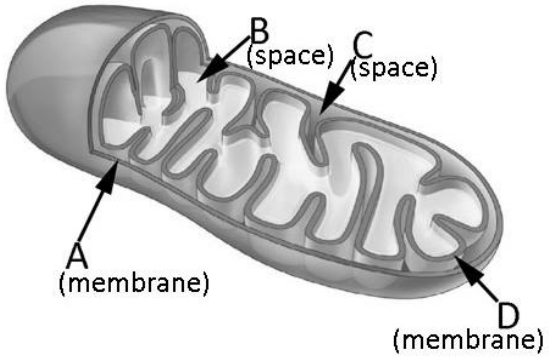
A. low; inhibited

B. low; activated

C. high; activated

D. high; inhibited

19. In the figure below, where would pyruvate be oxidized?



A. A

B. B

C. C

D. D

20. What process generates the most ATP (in total; not net) by substrate level phosphorylation from a single molecule of glucose?

A. Glycolysis

B. The conversion of pyruvate to Acetyl-CoA

C. The citric acid cycle (Kreb's cycle)

D. The electron transport chain

21. What are the functions of cytochrome *c* and ubiquinone?

A. They translocate protons from the matrix to the inner mitochondrial space
B. The synthesize water from molecular oxygen
C. They shuttle electrons between the protein complexes
D. The produce ATP by substrate-level phosphorylation

22. All of the following are associated with photosystem II except?

A. NADPH synthesis
B. Splitting of water
C. Accepting electrons flowing from the electron transport chain
D. Absorption of photons of light

23. Which is NOT involved in the Calvin Cycle?

A. ATP
B. CO2
C. 3-phosophoglycerate
D. NADH

24. Which of the following would absorb the photons of light in photosynthesis?

A. The reaction centre
B. Carotenoid
C. Cytochrome C
D. The primary electron acceptor

25. The Calvin cycle occurs in the

A. Mitochondrial matrix
B. Chloroplast stroma
C. Chloroplast inner membrane
D. Thylakoid lumen
E. Thylakoid membrane

26. What is the purpose of RuBisCo?

A. In photosynthesis it is the enzyme responsible for carbon fixation during the Calvin cycle
B. In photosynthesis it is the primary protein responsible for carrying out oxidative phosphorylation
C. In photosynthesis it catalyzes the splitting of water to generate electrons during the light dependent reactions
D. In photosynthesis it is directly fixed to CO_2 during the light independent reactions