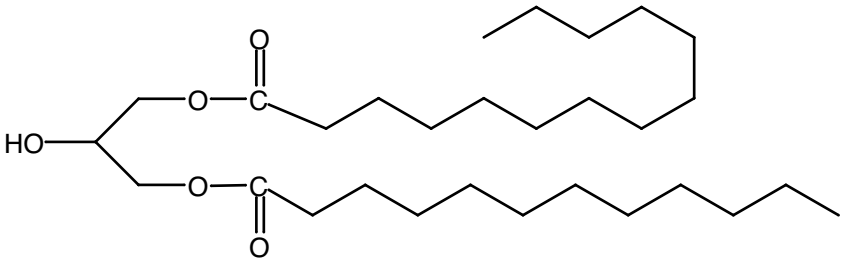
November, 26 2001
Exam 2 (Short answer section) Biochemistry
NESA – Fall 2001

Name _____

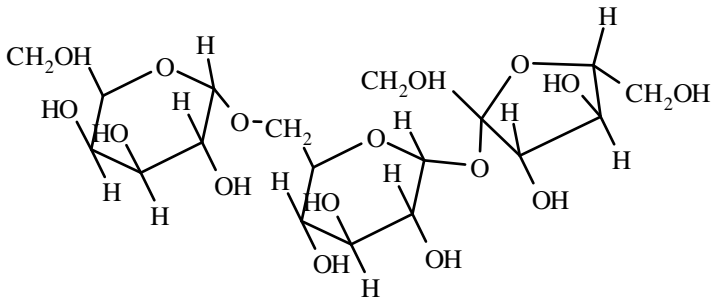
All questions are worth the point values designated in parentheses. This section of the exam is open book, open notes, and collaboration is allowed. Though collaboration is allowed, this section of the exam will be graded individually. This section will be collected before the multiple-choice section of the exam is distributed.

1. What would be the net yield of ATP molecules if the following diglyceride were hydrolyzed and completely metabolized to H_2O and CO_2? What metabolic pathways would be used to in the metabolism of this molecule? Show your work. (10)

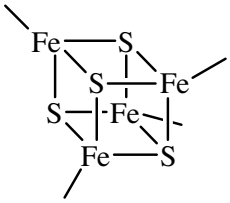


Number of ATP: _____

2. Below is a sugar (raffinose) that we examined in Exam 1. Assuming all the individual sugars of can be converted to glucose how many ATP molecules would result from the complete metabolism is this molecules to carbon dioxide and water. (5)

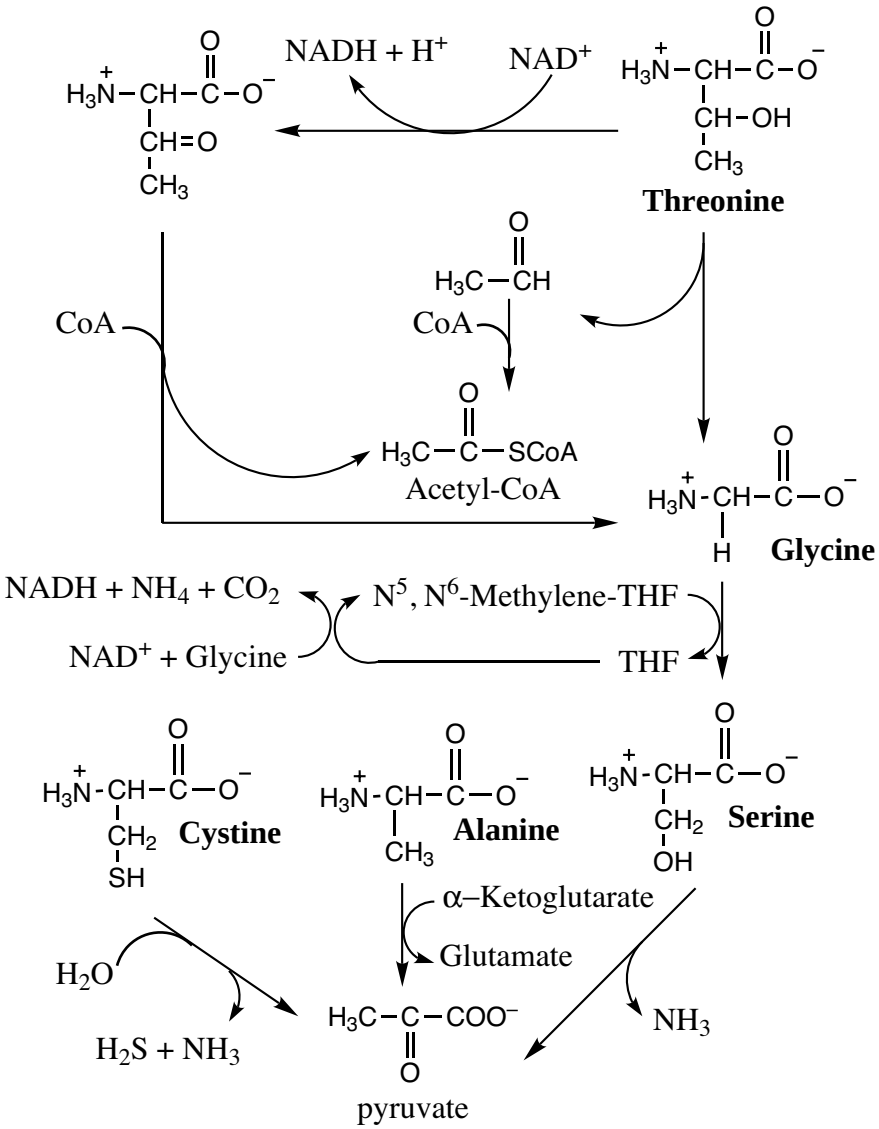


3. Some of the proteins involved in electron transport contain the following iron-sulfur complex: (2)



Each iron ion is bound to 4 sulfurs, yet only 3 bonds to sulfur are shown. To what amino acid must the irons be bound?

If some of the iron ions depicted in the above diagram have a charge of 3^+ and then participate in a redox reaction that changes the charge to 2^+. What kind of reaction might have occurred?



4. Using the above diagram figure out with amino acids could potentially be glucogenic, ketogenic, or both. Briefly explain your answer. (8)

November, 26 2001
Exam 2 (multiple choice and matching section) Biochemistry
NESA – Fall 2001

Name _____

Below you will find some multiple-choice questions. All questions are worth two points unless otherwise specified in parentheses. This section of the exam is closed book, closed notes, and individual (no collaboration).

1. True or False: The Krebs cycle produces three NADH molecules, one $FADH_2$ molecule, and 1 ATP each time acetyl CoA is converted to 2 CO_2 molecules.
   a. True b. False

2. Glycolysis produces pyruvate, but the Krebs cycle requires acetyl-CoA. What are the by-products of the reaction between CoA–SH and pyruvate?
   a. $FADH_2$ and H_2O. b. NADH and H_2O.
   c. NADH and CO_2. d. $FADH_2$ and CO_2.

3. Ideally when NADH is oxidized to form NAD via oxidative phosphorylation, _____ ATPs are produced:
   a. 1.5 b. 2 c. 2.5 d. 3

4. This is the same number of ATPs that are actually produced in oxidative phosphorylation
   a. True b. False

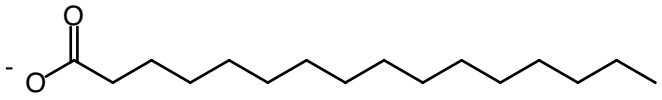
5. During oxidative phosphorylation, NADH is oxidized to NAD and $FADH_2$ is oxidized to FAD. In both cases, ATP is produced, however the NAD reaction produces more ATP than the FAD process. Why?
   a. NADH is a bigger molecule than $FADH_2$.
   b. There are more NADH produced than $FADH_2$.
   c. NADH enters the process several steps before $FADH_2$.
   d. NADH is a better anti-oxidant than $FADH_2$.

6. The oxygen that is inhaled is used in which of the following metabolic pathways?
   a. Oxidative Phosphorylation b. Glycolysis
   c. Krebs Cycle d. Gluconeogenesis

7. The urea cycle serves which of the following perposes:
   a. Acts as a synthesis pathway for some amino acids.
   b. Acts as a synthesis pathway for intermediates of the citric acid cycle.
   c. Converts nitrogens in ammonium ions in the blood to a less toxic form.
   d. All of the above

8. Maltose, the common disaccharide composed of two glucose molecules, is hydrolyzed and each glucose undergoes glycolysis. The acetyl-CoA produced can be converted to the palmitic acid (see below). How many maltose molecules must be broken down in order to form one palmitic acid molecule?

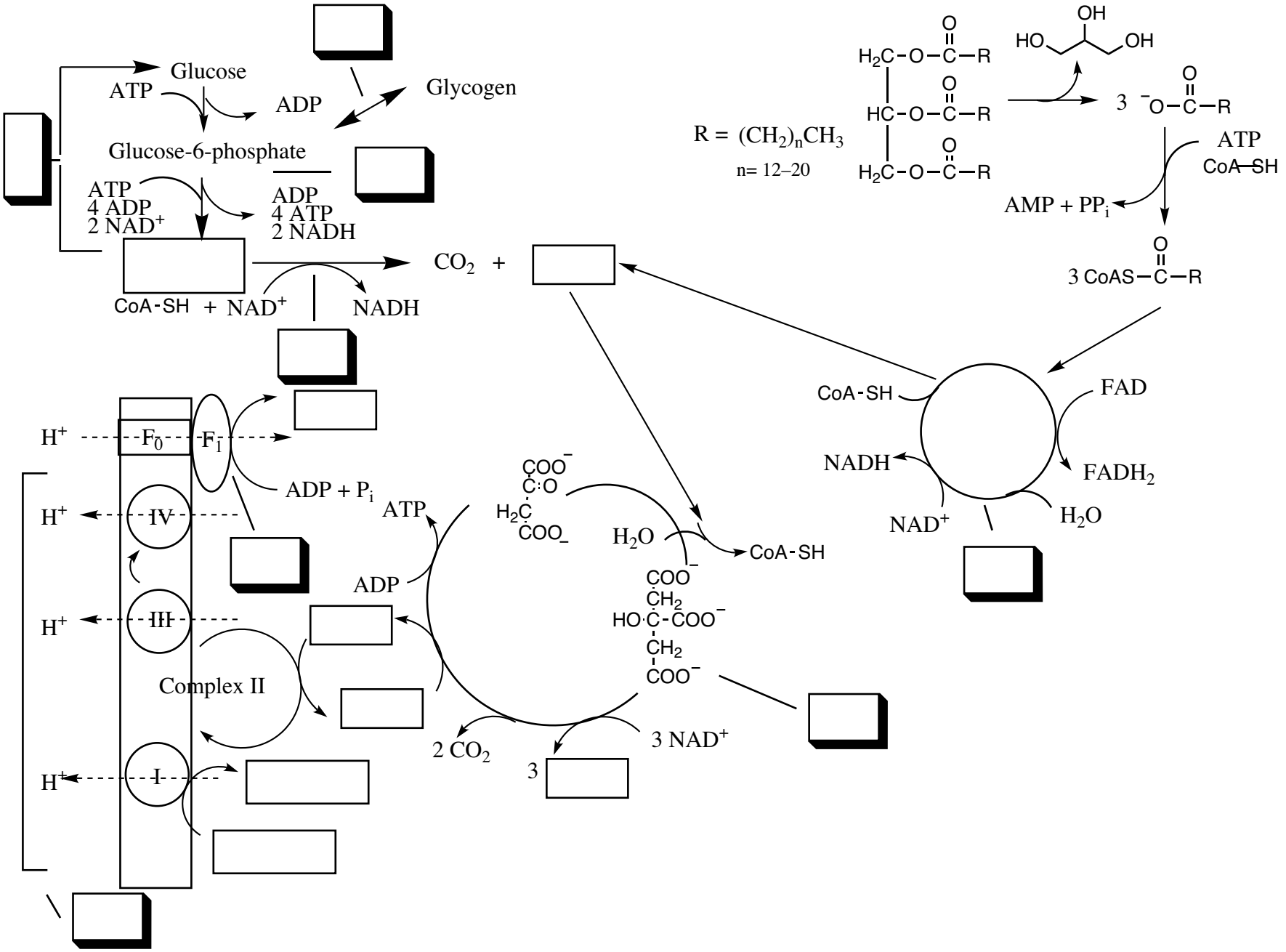
a. Two b. Three
c. Four d. Five



palmitic acid

9. On the diagram on the following page fill in the letters and numbers (found in the table below) that match up with the metabolic pathway of compound. A plan box is a compound and a shadowed box is a metabolic cycle. Not all options will be used and some may be used more than once. (Each box worth 1 point)

	Pathways		Compounds
A	α-reduction	1	Citriate
B	Glycolysis	2	Pyruvate
C	Amino acid catabolism	3	NADH
D	Lipid synthesis	4	ATP
F	Citric Acid cycle	5	Acetyl coenezyme A
G	Gluconeogensis	6	$FADH_2$
H	β-oxidation	7	Coenzyme CoQ
I	Electron transport chain	8	NAD^+
J	Glycogensis	9	FAD
K	Oxidative phosphorylation	10	Lactic acid
L	Oxidative decarboxylation		


Glucose
ATP
ADP
Glycogen
Glucose-6-phosphate
ATP
4 ADP
2 NAD+
ADP
4 ATP
2 NADH
CO2 +
CoA-SH + NAD+
NADH
R = (CH2)nCH3
n= 12–20
OH
HO
OH
3
ATP
CoA-SH
AMP + PPi
3 CoAS
H+
F0
F1
ADP + Pi
IV
III
Complex II
I
ATP
ADP
H2O
CoA-SH
2 CO2
3
3 NAD+
CoA-SH
FAD
NADH
FADH2
NAD+
H2O