July 31, 2002
Exam 2
NESA – Summer 2002

Name _____

All questions are worth two points unless otherwise specified in parentheses. This exam is open book and open notes, but you may **not** collaborate.

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

2. Ideally when NADH is oxidized to form NAD^+ via the electron transport chain, _____ ATPs are produced:
   a. 1.5 b. 2 c. 2.5 d. 3

3. This is the same number of ATPs that are actually produced in the electron transport chain.
   a. True b. False

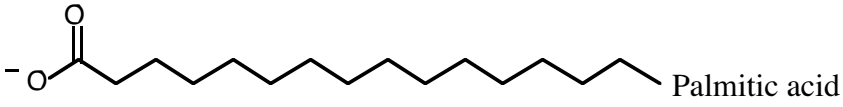
4. During the electron transport chain, NADH is oxidized to NAD^+ and $FADH_2$ is oxidized to FAD. In both cases, ATP is produced, however the NAD reaction produces more ATP than the FAD process. Why?
   a. NADH is a bigger molecule than $FADH_2$.
   b. There are more NADH produced than $FADH_2$.
  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

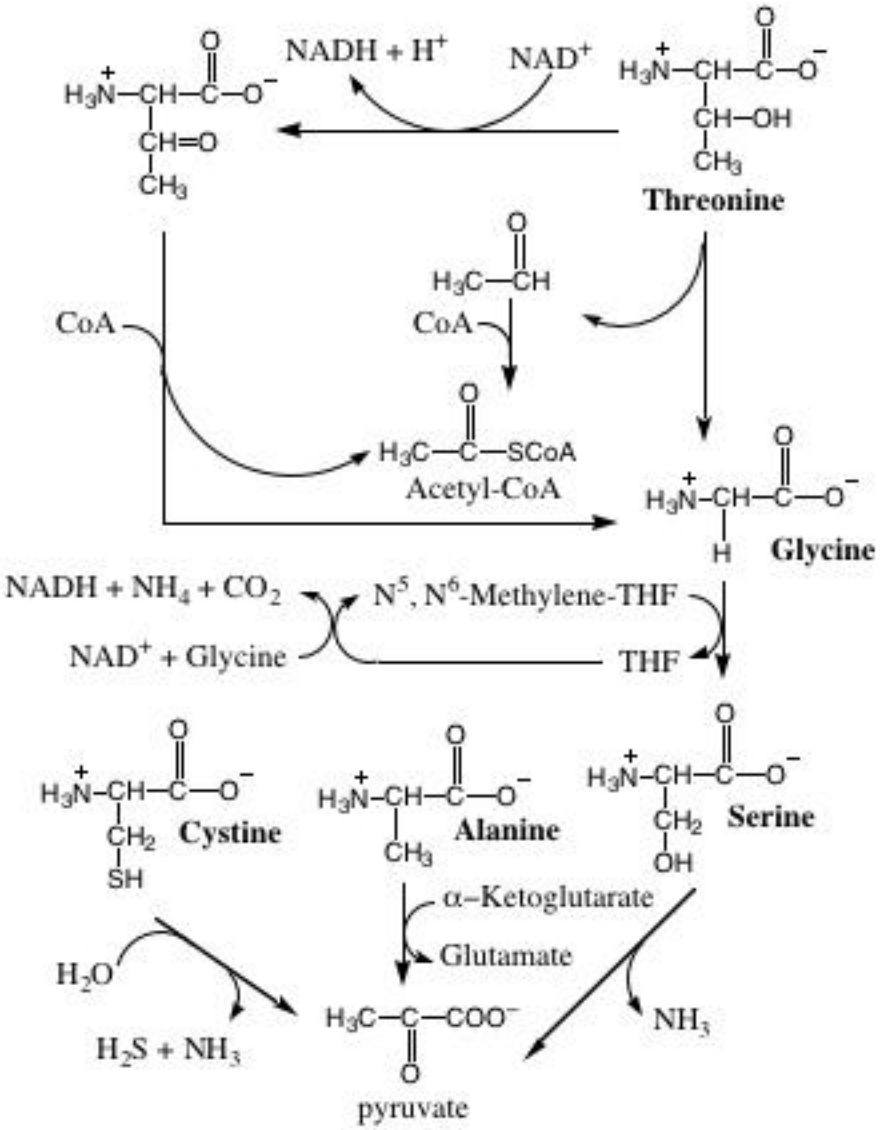
5. The oxygen that is inhaled is used in which of the following metabolic pathways?
   a. Electron Transport b. Glycolysis
   c. Krebs Cycle d. Gluconeogenesis

6. The urea cycle serves which of the following purposes:
   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 nitrogen atoms in ammonium ions in the blood to a less toxic form.
   d. All of the above

7. Maltose, the common disaccharide composed of two glucose molecules, is hydrolyzed and each glucose molecule 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





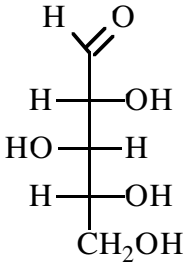
8. Using the above diagram figure out with amino acids could potentially be glucogenic, ketogenic, or both. (3 pts.)

9. What would the ATP yield be from the complete metabolism (conversion to CO_2 and H_2O) of the peptide: Ala–Cys–Thr–Ser. Assume that the hydrolysis of the peptide by a protease is exergonic and does not need any energy input. If you want potential partial credit show your work. (10 pts.)

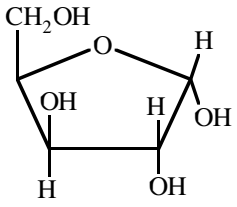
10. In the diagram on the following page fill in the letters and numbers (found in the table below) that match up with the metabolic pathway of compound. A plan box is a compound and a shadowed box is a metabolic cycle. Not all options will be used and some may be used more than once. (Each box is worth 1 point, total: 17)

	Pathways		Compounds
A	Fatty Acid activation	1	Citriate
B	Glycolysis	2	Pyruvate
C	Amino acid catabolism	3	NADH
D	Lipid synthesis	4	ATP
F	Citric Acid cycle	5	Acetyl coenzyme A
G	Gluconeogensis	6	$FADH_2$
H	β-Oxidation	7	Coenzyme CoQ
I	Electron transport chain	8	NAD^+
J	Glycogensis	9	FAD
K	Electron Transport Chain	10	Lactic acid
L	Oxidative decarboxylation	11	H_2O

11. Consider the following carbohydrate drawn in a Fischer projection: (**Extra Credit** 4 pts)



Which of the following (there could be more than one) correspond to which of the following cyclic structures?



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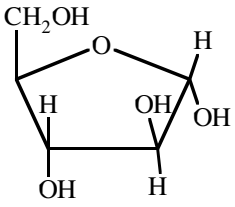
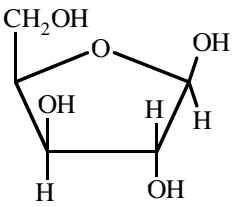
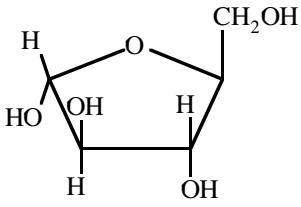


II



III



IV