

Name (Last, First): _____

Chem 355 Test 4, Professor David L. Huffman, Friday, 11/21/2003

**Questions for TEST FORM A. THIS EXAM WILL BE COLLECTED AT 12:50 PM.
PAGE 5 IS FOR SCRATCH WORK. DO NOT USE YOUR OWN PAPER. COMPLETE
THE SCANTRON PORTION OF THE TEST BEFORE PROCEEDING TO THE SHORT
ANSWER SECTION.**

Number 1 through 15 are worth 6 points each.

1. The building blocks of heme biosynthesis include
 - A. Succinyl CoA
 - B. Glycine
 - C. Carbon monoxide
 - D. A and B above
 - E. A, B, and C above
2. Lipid bilayers of a cell . . .
 - A. are typically made of a triacylglycerols
 - B. are typically rigid and stiff
 - C. may contain membrane-bound proteins
 - D. A, B, and C above
 - E. None of the above
3. Cholesterol . . .
 - A. is synthesized from squalene
 - B. is a synthetic precursor for bile salts
 - C. is synthesized by the liver
 - D. A, B and C above
 - E. None of the above
4. Which of the following statements are true?
 - A. The urea cycle only occurs in the kidney.
 - B. β oxidation of fatty acids occurs in the cytosol.
 - C. Acetyl CoA cannot traverse the inner mitochondrial membrane.
 - D. A, B, and C above
 - E. A and C above
5. High density lipoproteins particles . . .
 - A. transport endogenous lipids
 - B. transport cholesterol from the liver to the tissues, predominantly
 - C. A and B above
 - D. None of the above above
6. Glucose permease
 - A. is an example of a passive, facilitated transport protein
 - B. is an example of active transport
 - C. changes glucose to glucose-6-phosphate
 - D. A, B, and C above
 - E. A and B above
7. Acetyl CoA carboxylase . . .
 - A. is activated by citrate
 - B. is activated by palmitate or palmitoyl SCoA
 - C. is the rate-determining step of fatty acid breakdown
 - D. B and C above
 - E. A and B above
8. Adipocytes . . .
 - A. store large amounts of glycogen
 - B. store triacylglycerols
 - C. contain the enzyme adenylate cyclase
 - D. A and C above
 - E. B and C above
9. Fatty acid breakdown
 - A. produces acetyl CoA
 - B. produces palmitate
 - C. Produces NADPH
 - D. A, B, and C above
 - E. A and C above
10. Fatty acid breakdown of odd-numbered chain length fatty acids
 - A. requires Vitamin B₁₂ to ultimately produce succinyl CoA
 - B. is catalyzed by normal β oxidation until propionyl CoA is produced
 - C. occurs only in plants
 - D. A and B above
 - E. A and C above
11. Glutamate dehydrogenase . . .
 - A. produces glutamine from oxaloacetate
 - B. produces glutamate from α -ketoglutarate
 - C. catalyzes a key reaction of nitrogen metabolism
 - D. A and C above
 - E. B and C above
12. Alanine . . .
 - A. is categorized as a nonessential amino acid
 - B. can be made from pyruvate with alanine aminotransferase
 - C. is a glucogenic amino acid
 - D. B and C above
 - E. A, B, and C above
13. Aspartate . . .
 - A. provides a source of nitrogen atoms for the urea cycle
 - B. can be synthesized in several steps starting from fumarate
 - C. is a ketogenic amino acid
 - D. A and B above
 - E. A, B, and C above
14. Amino acids . . .
 - A. are stored in chylomicrons
 - B. produce carbon dioxide after transamination
 - C. can be obtained by digesting protein
 - D. A and C above
 - E. A, B, and C above
15. Fatty acid synthase . . .
 - A. catalyzes several different enzymatic reactions
 - B. requires FADH₂ for full activity
 - C. requires NADH for full activity
 - D. A, B, and C above
 - E. None of the above

SHORT ANSWER PORTION OF TEST. VARIABLE NUMBER OF POINTS. TELL ME WHAT YOU KNOW. DO NOT LEAVE ANSWERS BLANK.

16. Outline **ONE** of the following pathways. (15 points)
- Fatty acid synthesis. How is this regulated by blood glucose? Mention regulation mechanisms. How does the process start? Name cofactors and enzymes necessary. What is the product of the pathway?
 - Fatty acid breakdown – Start with glucagon and fat cells. Outline the steps all the way to the production of acetyl CoA. Mention organs, organelles, and key enzymes when necessary.

16.

17. Discuss the purpose of the urea cycle. Outline the urea cycle showing key enzymes and intermediates. Discuss how fumarate can be recycled. Don't forget to mention organelles. What role does glutamate play in the process? (15 points)

17.

Name (Last, First): _____ Chem 355, Professor David L. Huffman, Test 4, FORM A

Extra space for page 2 answers

18. Discuss the importance of lipoproteins and lipoprotein particles. (15 points)

- What is their purpose?
- Where are they made?
- What are their components?
- Be sure to mention the importance of cholesterol and lipid transport.

18.

19. What is the rate-determining step of cholesterol biosynthesis? How is the enzyme regulated? (10 points)

19.

20. Discuss a metabolic disease related to amino acid metabolism (5 points).

20.

Name (Last, First): _____ Chem 355, Professor David L. Huffman, Test 4, FORM A

Extra Space for page 4 answers.

21. Discuss a topic of your choice from metabolism that is unrelated to your previous answers from the material you studied for test 4. Give at least three main points (15 points)

21.

22. Discuss the central role that α -ketoglutarate has in amino acid metabolism and nitrogen assimilation. Give examples. How does this effect regulation of the CAC? (15 points)

22.

Name (Last, First): _____ Chem 355, Professor David L. Huffman, Test 4, FORM A

Extra Space for page 6 answers.

EXTRA CREDIT – 5 points

Draw the structure of cholesterol

-- Office Use Only --

Part I : _____ x 6 = _____

Part II: _____

Total (out of 180) = _____

Total Normalized to 200 = _____