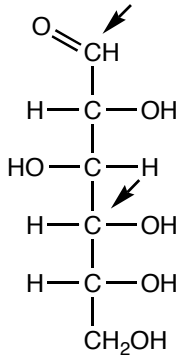
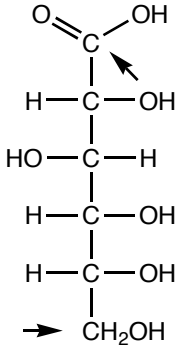
Test 4 Name_____
PHYS 0213
(Biochem)

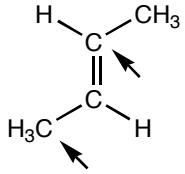
1. (6 pts.) Determine the oxidation numbers for the carbon atoms in the following molecules.

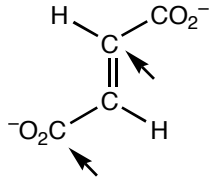
a. CO_2 b. CH_3OH c. CH_4

2. (8 pts.) In the following molecules, out of the indicated C atoms, circle the more oxidized carbon atom.

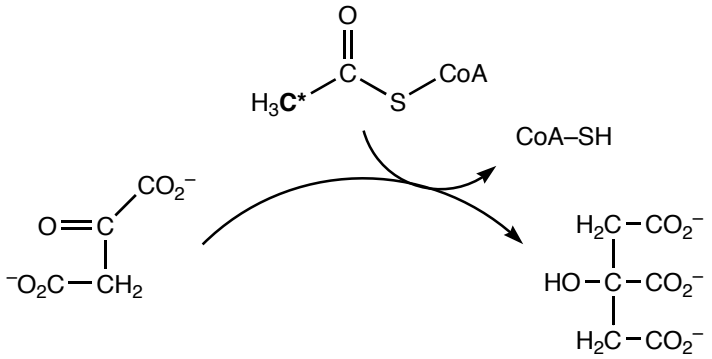
a. 

b. 

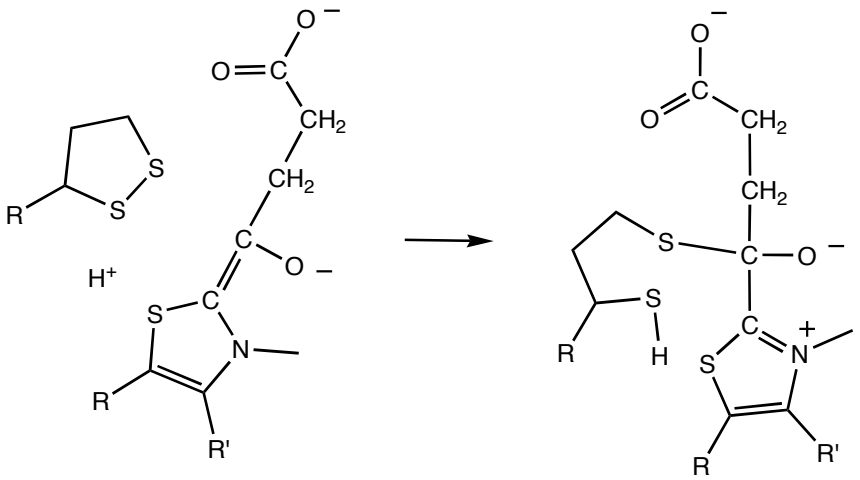
c. 

d. 

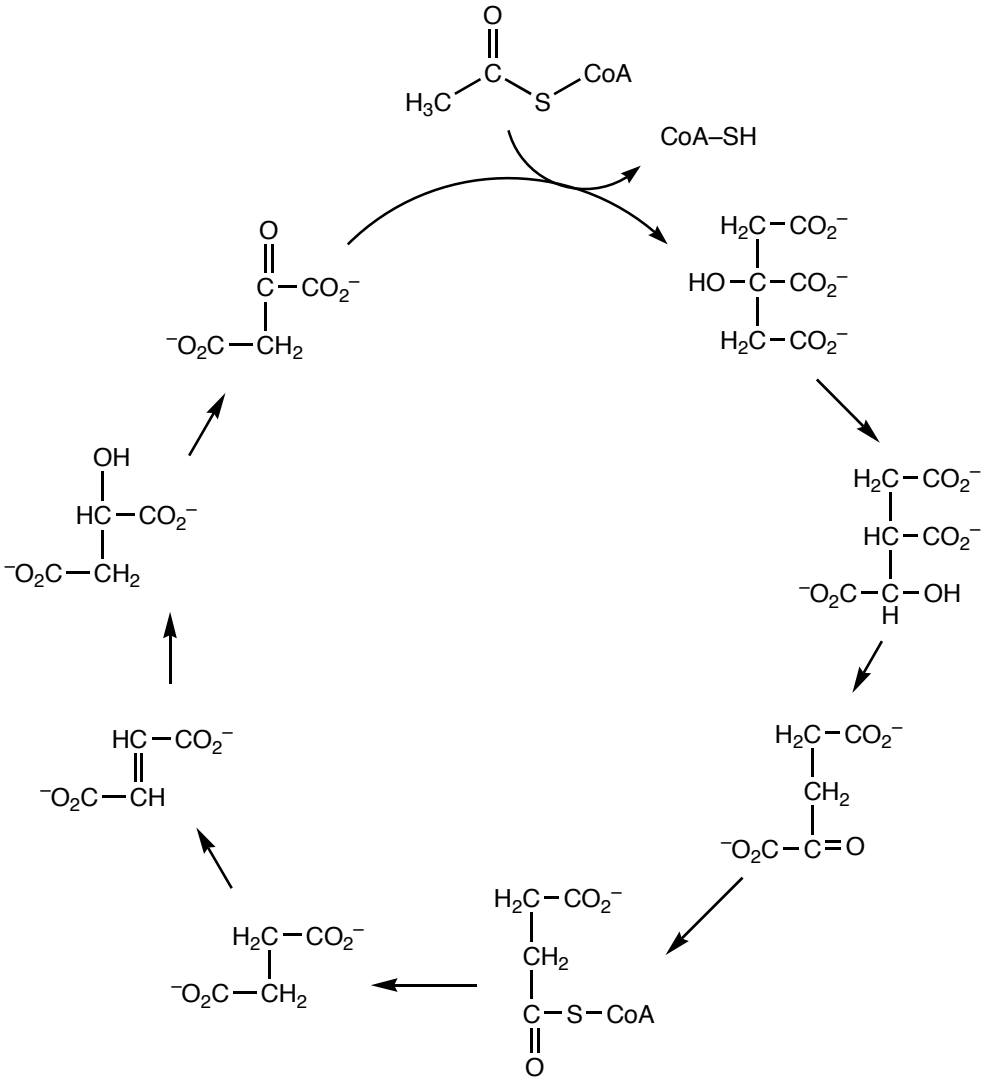
3. (8 pts.) The methyl group of acetyl-CoA is labeled with a star below. Indicate which carbon on citrate bears the label after acetyl-CoA transfers the acetyl group to the oxaloacetate.



4. (8 pts.) Draw arrows to show the movement of electrons in the following reaction that occurs as part of the citric acid cycle.



5. (10 pts.) Identify the steps in the citric acid cycle at which CO_2 and NADH and H^+ are produced.

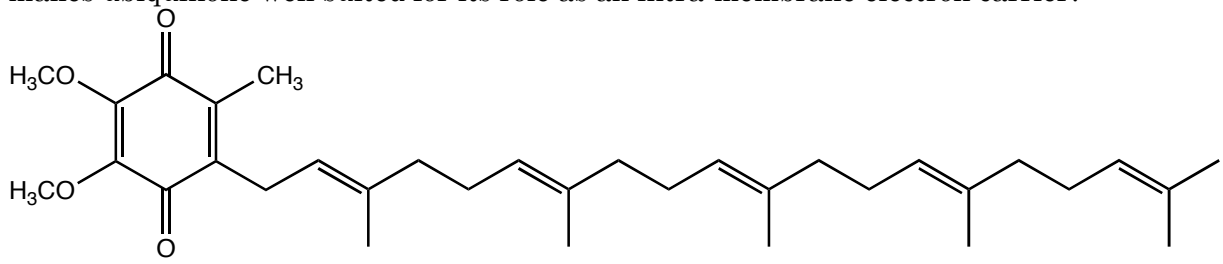


6. (6 pts) The NADH/NAD^+ red-ox pair work as a reducing or an oxidizing agent by donating or accepting a hydrogen atom along with a pair of electrons. However, the iron containing enzymes of the electron transport chain can accept only one electron at a time. What molecules do biological systems use to mediate the transfer of electrons from NADH to the iron containing enzymes of the electron transport chain.

7. (6 pts.) Complex I of the electron transport train oxidizes NADH to NAD^+. The energy released during this reaction is used to do what?

8. (4 pts.) Complex II of the electron transport chain uses the FAD dependent succinate dehydrogenase to oxidize succinate to fumarate. What does Complex II do with the electrons that are removed from the succinate; that is, what product is formed using the electrons removed from the succinate?

9. (6 pts.) The structure of ubiquinone, coenzyme Q, is draw below. What is it about the structure that makes ubiquinone well suited for its role as an intra-membrane electron carrier?



10. (4 pts.) Complex III transfers the electrons from dihydroubiquinone to what molecule? The molecule that is produced transports an electron to Complex IV.

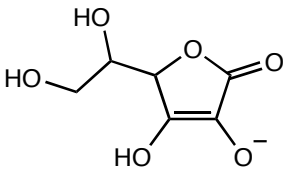
11. (4 pts.) The goal of the electron transport chain is to pump protons into or out of the mitochondrial matrix?

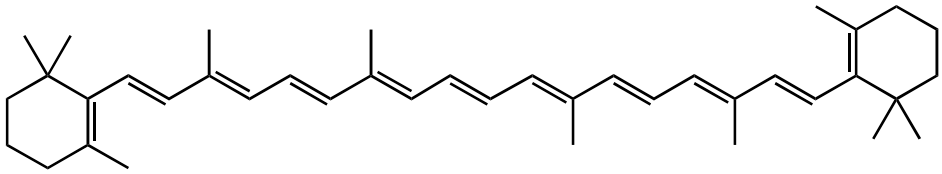
12. (6 pts.) ATP Sythase is a large molecular machine that synthesizes ATP. What provides the energy to drive this machine.

13. (6 pts.) Why are radicals so damaging to organic tissue?

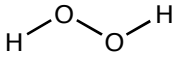
14. (8 pts.) There are two strategies that antioxidants use to eliminate dangerous free radicals. What are they? (Look at the molecules in question 15 for a hint.)

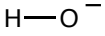
15. (4 pts.) Two antioxidants are drawn below. Which one would be more effective protecting membranes, and which one would be more effective protecting molecules in aqueous environments.





16. (3 pts.) Which molecules below are radicals.





17. (3 pts.) What makes a molecule a radical?