Cellular Respiration: Harvesting Chemical Energy Review Questions

1. Explain the difference between oxidation and reduction reactions. Be sure to mention the changes in energy that accompany these reactions.
2. If the following redox reaction occurred, which compound would be oxidized and which would be reduced? $C_4H_6O_5 + NAD^+ \rightarrow C_4H_4O_5 + NADH + H^+$ 3. Describe cellular respiration as a redox reaction.
4. What is the role played by NAD^+ and dehydrogenase enzymes in cellular respiration?
5. What evidence suggests that glycolysis is one of the earliest biochemical pathways have evolved?
6. What is the basic purpose of the citric acid cycle?
7. After the citric acid cycle, which molecules contain most of the energy from the redox reactions in the citric acid cycle? How will these molecules convert their energy to a form that can be used to make ATP?
8. What processes in your cells produce the carbon dioxide you exhale?
9. Consider the chemical structure of carbohydrates and lipids. Explain why lipids contain more energy per gram than carbohydrates.
10. As electrons are passed along the ETC they lose energy. Where does this energy go?
11. Explain how chemiosmosis and the proton-motive force result in the production of ATP synthase.
12. Why is fermentation a valuable metabolic pathway? Briefly describe two types of fermentation.
13. What evidence suggests glycolysis is a very old catabolic pathway?
14. a) Describe how the rate of cellular respiration is regulated.
b) What will happen in a muscle cell that has exhausted its supply of oxygen and ATP?