Biology 20: Cellular Respiration Assignment

Objectives:

- Explain, in general terms, how carbohydrates are oxidized by glycolysis and Krebs cycle to produce reducing power in NADH and FADH, and chemical potential in ATP, describing where in the cell those processes occur.
- Explain, in general terms, how chemiosmosis converts the reducing power of NADH and FADH to the chemical potential of ATP, describing where in the mitochondria the process occurs.
- Distinguish, in general terms, between animal and plant fermentation and aerobic respiration.
- Summarize and explain the role of ATP in cell metabolism.

Use your textbook pages 182-193, class notes, and the Internet to complete this assignment.

1. **Define** the following terms

• anabolism	• chemiosmosis
• catabolism	• lysis
• oxidized	• aerobic
• phosphorylation	• anaerobic

2. a) **Identify** the preferred energy source for living organisms.
   b) **Contrast** the energy storage form in both animals and in plants.

Metabolism is the total of all biochemical reactions that are occurring within cells.

3. **Describe** whether cellular respiration would be considered *anabolism* or *catabolism*.

Cellular respiration is only about 30% efficient in terms of ATP production.

4. **Describe** what happens to the other 70%, and **explain** why this is also important for mammals like ourselves.

5. **Describe** the specific locations within eukaryotic cells where the three processes of cellular respiration (glycolysis, Krebs cycle, oxidative phosphorylation) occur.

View the glycolysis animation at http://www.mcgrawhill.ca/school/applets/abbio/quiz/ch05/how_glycolysis_works.swf

6. **Explain** what is meant by the phrase "glycolysis requires an investment of energy".

7. Complete the following table contrasting glucose and pyruvate.

Contrasting Question	Glucose	Pyruvate
Reactant or product of glycolysis?		
Simple of complex?		
Number involved in each glycolysis reaction?		
Number of carbon atoms?		
Lower in energy or higher in energy?		

8. **Identify** what happens to the NADH electrons during *lactic acid formation*, and **explain** what is accomplished by this transfer.

9. a) **Identify** what happens to the NADH electrons during *alcohol fermentation*, and **explain** what is accomplished by this transfer.
   b) **Identify** both the intermediate molecule that is released during fermentation, and the final product.

Use the following information to answer the next question.

Mammalian cell types:
- fat
- nerve cell
- skin cell
- muscle cell

10. a) **List** the four cell types in order from the one with the least mitochondria to the one with the most.
    b) **Explain** your rationale behind the ranking.