Advanced Biology Cellular Respiration

Learning Objectives:

- Catabolic pathways release energy by oxidizing organic foods.
- Glycolysis harvests chemical energy by oxidizing glucose to pyruvate.
- The citric acid cycle completes the energy-yielding oxidation of organic molecules.
- During oxidative phosphorylation, chemiosmosis couples electron transport to ATP synthesis.
- Fermentation enables some cells to produce ATP without the use of oxygen.
- Glycolysis and the citric acid cycle connect to many other metabolic pathways.

Major Terms:

Aerobic	Citric acid cycle	Fermentation	Oxidative phosphorylation
Alcoholic fermentation	Cristae	Glycolysis	pyruvate
Anaerobic	Electron transport system	Lactic acid fermentation	
Catabolic		Matrix	
Cellular respiration	Facultative anaerobes	Mitochondrion	
Chemiosmosis	FAD	NAD	

Read: Chapter 8

Lecture:

Cellular Respiration

I. Overview

A. _____ is the process where primarily glucose is _____ and the potential energy released in the breaking of chemical bonds is stored as _____.

B. Cellular respiration may be _____(utilizing _____) and takes place in the mitochondria, or it may be _____ (_____Oxygen) and includes glycolysis and fermentation. The anaerobic portions of cellular respiration are _____.

C. Cellular respiration is a _____ and _____ pathway and is the combination of glycolysis, the Kreb's cycle and the Electron Transport Chain.

D. ATP production is fueled by the _____H^+ pump. The H^+ come from _____ and _____ which is produced in the Kreb's Cycle

E. The NET ATP yield from 1 glucose molecule entering the aerobic pathway is _____ (2+2+32).

F. Anaerobic glycolysis and fermentation are inefficient — yielding only _____ per cycle.

II. Glycolysis

A. _____

B. Rearranges the bonds in _____(6C) is broken down into _____(3C) through a series of steps.

C. _____ are used to start the reaction.

D. _____ are produced.

E. Net gain is _____

F. _____ are also produced.

III. Citric Acid Cycle (_____)

A. Pyruvate goes into the mitochondrial _____.

B. Through many steps, each catalized by an enzyme, the _____ are broken down and the net results are:

C. _____ (CoA) is needed to start the reaction

IV. The Electron Transport Chain

A. In the _____

B. _____and _____ drop off their high energy electrons which pass through a series of electron accptors.

C. The energy drives the synthesis of ATP in _____.

D. _____ accepts the electrons. It combines with H^+ to form _____.

E. ETC does not make ATP. It sets up the H^+ differential that _____ uses to make ATP

F. If the process occurs without making ATP, there is an increase in _____

V. Fermentation Anaerobic respiration

A. O_2 is the electron receptor in Aeorbic.

B. Fermentation regenerates _____ and allows Glycolysis to occur without O_2.

C. Get _____

D. Two Types: _____ and _____ - Each adds no more ATP then Glycolysis

1. Alcoholic Fermentation
    a. Pyruvate is converted to _____and _____
    b. _____ is released
    c. _____, such as yeast, are organisms that can synthesize ATP by either aerobic or anaerobic mechanisms.
    d. Comercial uses:
        i.
        ii.
2. Lactic Acid Fermentation
    a. Pyruvate is reduced by NADH to form _____
    b. _____ is released
    c. Occurs in our _____
    d. Comercial Uses:
        i.
        ii.

VI. Glycolysis and the citric acid cycle connect to many other metabolic pathways.

A.

B.

VII. Overall Reaction:

Do Practice : Reviewing the Chapter pg 146