Name _____

Cellular Respiration (p. 104 – 110)

I. Cellular Energy

1. **Define the term cellular respiration.**

   Cellular Respiration – cell transfer of energy in organic compound to ATP (harvesting of cellular energy)

2. **Differentiate between aerobic and anaerobic respiration.**

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   Aerobic Respiration : Metabolic process requiring oxygen

   Anaerobic Respiration : Metabolic process that does not require oxygen

3. **Write out the equation for cellular respiration.** *(Label your formula reactants & products)*

   $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$

   (glucose) (oxygen) (carbon dioxide) (water) (energy)

4. **Where does cellular respiration occur in the following?**

   Eukaryotes : Mitochondria Prokaryotes : Cell Membrane

II. Stage One : Breakdown Of Glucose *(Glycolysis)*

1. **List four substances that can be broken down to make ATP.**

   1. Glucose 2. Fats 3. Protein 4. Nucleic Acids

2. **Define the term glycolysis.**

   Glycolysis – enzyme-assisted anaerobic process that breaks down one six-carbon molecule of glucose into two three-carbon pyruvate ions

3. **Where does glycolysis occur in the cell?** cytoplasm

4. **List the four steps of glycolysis.**

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   1. Phosphate groups from (2) ATP molecules are transferred to a glucose molecule.
   2. Resulting 6-carbon molecule is broken down to (2) 3-carbon compounds (each with a phosphate group)
   3. (2) NADH molecules are produced; Another phosphate group is transferred to each 3-carbon molecule
   4. Each 3-carbon compound is converted into 3-carbon pyruvates (four ATP molecules produced)

   Uses 2 ATP

   Produces 4 ATP

   NET ATP: 2 ATP

   2 NADH

Name _____

III. Stage Two : Production Of ATP *(Aerobic Respiration)*

1. **Where does aerobic respiration occur in the cell?** mitochondria

2. **What is produced when each pyruvate is converted into a 2-carbon compound?**

   1- CO_2 1- NADH 1- acetyl CoA

3. **List the five steps of the Kreb's Cycle.**

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   1. Acetyl-Co-A forms a 6-carbon compound (combines with a 4-carbon compound)
   2. CO_2 released; (Creates a 5-carbon compound)
   3. CO_2 released; (Creates a 4-carbon compound)
   4. 4-carbon compound converted to new 4-carbon compound
   5. 4-carbon compound converted to original 4-carbon compound

4. **What happens to NADH and $FADH_2$ in an electron transport chain?**

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   Donate electrons (H^+ ions) to make ATP
   (Concentration gradient established)

5. **What is the final electron acceptor of H^+ ions?** O_2 (oxygen)

6. **What is the end result of the electron transport chain?** H_2O (water)

IV. Respiration In The Absence Of Oxygen *(Anaerobic Respiration)*

1. **Define the term fermentation.**

   Fermentation – recycling of NAD^+ using an organic hydrogen acceptor to produce cellular energy

2. **What is absent that causes fermentation to occur?** oxygen

3. **What is the electron acceptor during fermentation?** organic hydrogen acceptor

4. **Fill in the blanks.**

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Alcoholic Fermentation (2X)	Lactic Acid Fermentation (2X)
Glycolysis	Glycolysis
↓	↓
Pyruvate	Pyruvate
↓ (1 CO_2)	↓
2-Carbon Compound (Acetaldehyde)	↓
↓ (1 NADH)	↓ (1 NADH)
Ethanol	Lactate
(2 ATP)	(2 ATP)
(performed by yeast cells)	(causes muscle fatigue)