Name _____

CELLULAR RESPIRATION

URL: http:://www.2.nl.edu/jste/cellular_respiration.htm

INTRODUCTION

List five topics covered in this activity:

What does it mean that living cells are constantly fighting against the 2nd Law of Thermodynamics?

The ultimate energy source for life on Earth is the sun, by what process do living things convert light energy? into what form?

What molecule is used to do work in cells of living things?

GLYCOLYSIS

Summarize what occurs in glycolysis in one sentence.

Where does glycoloysis occur? Is the process aerobic or anaerobic?

What are products of glycolysis? What must be supplied in order to run the set of reactions?

What is meant by **substrate-level phosphorylation**?

AEROBIC RESPIRATION

PREP STEP

How many ATP's are used to form glucose in photosynthesis?

Run the 1st animation that shows a pyruvate molecule transported in the mitochondria. We called this step the "prep step", summarize what occurs.

CITRIC ACID CYCLE (KREB'S CYCLE)

The Citric Acid Cycle or Kreb's Cycle produces little ATP directly (by substrate level phosphorylation, how will the events of the Citric Acid Cycle result in significant ATP production?

Run the animation of the Citric Acid Cycle, describe how citric acid is formed in the cycle.

Run the next animation of the Citric Acid Cycle, indicate the number of NADH, FADH2, and ATP's formed from 1 "turn" of the cycle (REMEMBER: THIS HAPPENS TWO TIMES PER GLUCOSE BECAUSE OF THE TWO PYRUVATE MOLECULES PRODUCED IN GLYCOLYSIS)

Run the last animation on the page (summary of previous animations). How long does each turn of the cycle take? Make sure you can account for the "in's and out's) on the summary table for the Citric Acid Cycle.

ELECTRON TRANSPORT CHAIN

When NADH deposits electrons to the first "carrier" (protein or cytochrome) of the electron transport chain, the electron moves from one carrier to the next, the energy released each time an electron moves is used to do what? Which side of the membrane is the proton (H+) gradient established?

For each NADH, how many protons are pumped to the outer compartment? How many ATP's will be created as a result?

Run the animation to see the creation of 3 ATP's/NADH

What is the function of O_2 in cells?

How many protons are pumped when $FADH_2$ delivers electons. How many ATP's are created?

Run the animation to see the creation of 2ATP's/$FADH_2$.

Explain why some cells will produce 36 ATP's per glucose while others will produce 38 ATP's per glucose.

Explain why it takes 54 ATP's to form glucose in photosynthesis but the best yield of ATP's by oxidizing glucose is the production of 36 or 38 ATP's.

FERMENTATION

In the absence of O2, why can pyruvates not be sent to the mitochondria?

How will the products of glycolysis be oxidized in the absence of O2 in mammals? in yeast/bacteria?

Although the products of Lactic Acid Fermentation and alcoholic fermentation are different, what is the similarity of the two pathways.