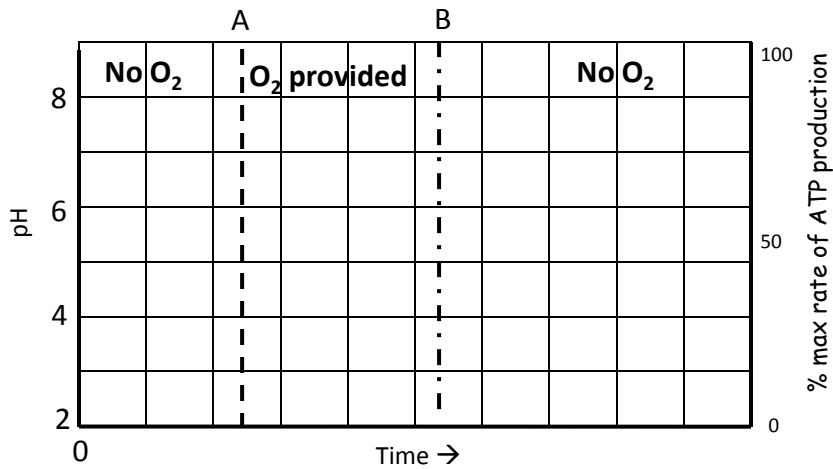


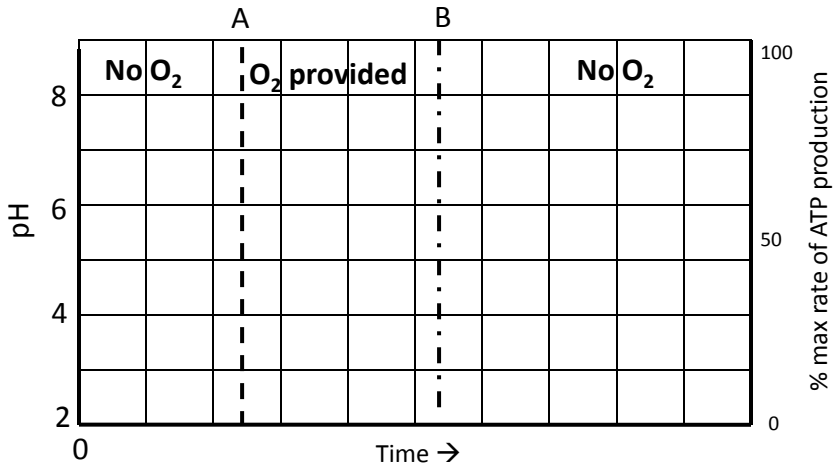
A mitochondrion in a cell starved of oxygen for several minutes is suddenly provided with oxygen at time A. The mitochondrion actively undergoes aerobic cellular respiration for a period of time and then the oxygen is removed. Predict (graphically) the changes in pH in the intermembrane space over time. \*Also graph changes in ATP production over time.

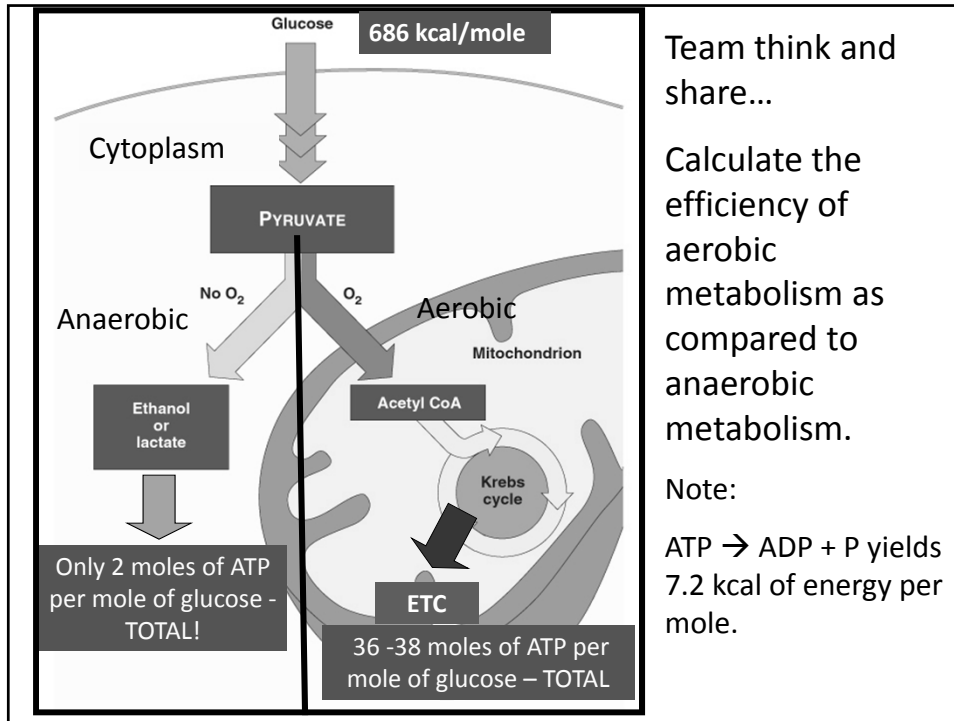
*\*When graphing both % max rate of ATP production and pH, start your lines on the left side of the graph (at time = 0). pH of a mitochondria at equilibrium = 5. Be sure to label your lines!*



Predict (graphically) the changes in pH in the intermembrane space and ATP production over time in a muscle cell of a person with Complex I Mitochondrial Myopathy. Be sure to draw in the lines for a normal cell (your last graph), and show how the graphs for a person with Mitochondrial Myopathy would be different.

*\*When graphing both % max rate of ATP production and pH, start your lines on the left side of the graph (at time = 0). pH of a mitochondria at equilibrium = 5. Be sure to label your lines!*





Team think and share...

Calculate the efficiency of aerobic metabolism as compared to anaerobic metabolism.

Note:

ATP → ADP + P yields 7.2 kcal of energy per mole.

Graph the relative rate of ATP production vs. oxygen concentration in a muscle cell (not just a single mitochondrion). Be able to explain the following about your graph:

- Why in terms of the reactions of cellular respiration does ATP production change with oxygen concentration? Be sure to EXPLAIN (not describe) the graph you draw and relate it to the pathways of cellular respiration.

- Describe two ways the body would naturally increase oxygen supply to muscles? (Note – think beyond breathing deeper or faster...breathing only bring O<sub>2</sub> to the lungs!)

