Name _____ Period _____ Date _____

Topic 8.2 Cell Respiration

8.2.U11 The structure of the mitochondrion is adapted to the function it performs.

8.2.S2 Annotation of a diagram of a mitochondrion to indicate the adaptations to its function.

1. Draw and label a diagram showing the structure of the mitochondrion as seen in a TEM image.
   Include the inner and outer mitochondrial membranes, matrix, cristae, mitochondrial DNA and ribosomes and a scale bar.
2. Complete the table below with the functions of the structures of the mitochondrion. Explain how each structure adapted to help maximize efficiency of respiration.

Structure:	Function:	Adapted to increase efficiency by:
Outer membrane		
Inner membrane (including cristae)		
Matrix		
Mitochondrial DNA and ribosomes		
Inter-membrane space		

8.2.A1 Electron tomography used to produce images of active mitochondria.

3. Electron tomography is aiding the understanding of mitochondria and cell respiration. State what is meant by the term electron tomography.

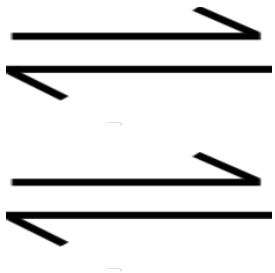
8.2.U1 Cell respiration involves the oxidation and reduction of electron carriers.

4. Many reactions in living things can be classified as either oxidation or reduction reactions. These are particularly important in cell respiration and photosynthesis. Complete the table below to compare oxidation and reduction reactions.

	OXIDATION	REDUCTION
Electrons are…	lost	
Oxygen is…		
Hydrogen is…		

5. Describe what an electron carrier is.
6. List the two most common electron carriers used in cell respiration. Give both their oxidised and reduced forms:

Oxidized *Reduced*



8.2.U3 In glycolysis, glucose is converted to pyruvate in the cytoplasm.

8.2.U4 Glycolysis gives a small net gain of ATP without the use of oxygen.

7. Draw a diagram to show the process of glycolysis. *Include the following: cytoplasm, phosphorylation, lysis, oxidation and ATP formation.*

8.2.U2 Phosphorylation of molecules makes them less stable.

8. Define phosphorylation.
9. Outline how phosphorylation aids cell respiration.

8.2.U5 In aerobic cell respiration pyruvate is decarboxylated and oxidized, and converted into acetyl compound and attached to coenzyme A to form acetyl coenzyme A in the link reaction.

10. Draw a diagram to show the link reaction. *Include the following: Pyruvate, CoA, Acetyl CoA, oxidation, decarboxylation, mitochondria, matrix.*

8.2.U6 In the Krebs cycle, the oxidation of acetyl groups is coupled to the reduction of hydrogen carriers, liberating carbon.

11. In the space below, draw a diagram of the Krebs cycle. *Include the following: Acetyl CoA, 4 carbon compound, 6 carbon compound, 5 carbon compound, rearrangement, oxidation, decarboxylation, substrate-level phosphorylation (ATP formation), NAD^+ reduced, FAD reduced, provides electrons to the electron transport chain.*

8.2.U7 Energy released by oxidation reactions is carried to the cristae of the mitochondria by reduced NAD and FAD. AND 8.2.U8 Transfer of electrons between carriers in the electron transport chain in the membrane of the cristae is coupled to proton pumping. AND 8.2.U10 Oxygen is needed to bind with the free protons to maintain the hydrogen gradient, resulting in the formation of water.

12. Annotate the diagram below with the stages of the electron transport chain.
    Include the following: H+, e^- (electrons), integral proteins, electron carriers, NADH, $FADH_2$, oxidation, return to Krebs cycle, pumping of H^+, high H+ concentration, transfer of electrons, electrochemical concentration gradient, Chemiosmosis by ATP synthase, O_2 is the final electron acceptor, production of water.