**Learning Goals: SWBAT**

1. Understand the process of cellular respiration.
2. Understand the interdependence of cell respiration and photosynthesis.

***Level 2***

1. Write the balanced chemical equation for cellular respiration. Label the reactants and products.

C6H12O6+6O2 🡪 30-36ATP/ENERGY + 6CO2 +6H2O

Reactants Products

1. Fill in the chart below that outlines the 3 stages of cellular respiration. Please list them in order!

|  |  |  |
| --- | --- | --- |
| **Stage of Cellular Respiration** | **Where does it take place?** | **Aerobic or Anaerobic?** |
| Glycolysis | Cytoplasm | Anaerobic |
| Krebs (Citric Acid) Cycle | Matrix of mitochondria | Aerobic |
|  Electron Transport Chain  | Cristae of mitochondria | Aerobic |

***Level 3***

1. Which stage of cellular respiration produces the most ATP and WHY/HOW?

1 Last phase of aerobic cell respiration, Electron transport chain produces the most energy in ATP because it receives high energy electrons from the previous stages.

2 Electrons in covalent bonds of organic compounds in food store chemical pot energy.

3 As covalent bonds in organic food molecules are broken during glycolysis and Kreb’s cycle, they & the energy they possess are loaded onto empty electron carriers, NAD+ or FAD+, producing high energy, filled electron carriers NADH and FADH2.

4 Neither glycolysis or Kreb’s cycle directly provide much ATP, only 2 ATP per stage.

5 NADH and FADH2 transfer energy rich electrons to the electron transport chain proteins which convert energy, ultimately fueling operation of enzyme ATP synthase which catalyzes endothermic: 30+ ADP + 30+ Phosphate 🡪30+ ATP + some heat

1. Explain why eukaryotic **producers** contain both c**hloroplasts** and **mitochondria** whereas eukaryotic **heterotrophs** only have mitochondria

1 Producers carry out photosynthesis in chloroplasts, making sugars.

2 Producers can’t use sugar to do work; they have to use ATP.

3 Producers must use sugar to make ATP through cell respiration in their mitochondria.

4 Heterotrophs don’t do photosynthesis, so they don’t need chloroplasts.

5 Heterotrophs obtain energy by eating other organisms or the organic molecules made by other organisms.

6 But heterotrophs still require ATP to do cell work, so they must carry out cell respiration to convert chemical potential energy of their foods to chemical potential energy in ATP; for this, they use aerobic cell respiration in their mitochondria.