Example 1: Drawing

In the following image, take a single electron and describe its path from glucose to water.

Indicate which steps are glycolysis, citric acid cycle and oxidative phosphorylation.

Adrienne Williams 2013  Examples of Class Activities for Cellular Respiration.
Example 2: Interfering chemicals

Several poisons and chemicals interfere with oxidative phosphorylation. Some of them interfere with the redox reaction, halting the oxygen consumed by the system. Some of them interfere with the ability to make ATP via chemiosmosis. Imagine an experimental setup that contains:

- Isotonic saline as a fluid base of the system
- Intact mitochondria removed from cells
- Succinate, a molecule that easily donates electrons to the electron transport chain
- ADP and Pi, as reactants needed to make ATP
- Air with normal 20% oxygen.

The results of this experiment are shown to the right.

Below are two experiments. First, decide which experiment(s) matches the figure. Second, describe why the results occurred.

1. Addition of cyanide – an inhibitor of Complex IV, which reduces oxygen
2. Addition of dinitrophenol, a chemical that is mostly nonpolar and can carry hydrogen ions across the membrane:
Example 3: Explain an old exam question.

Your group will be assigned one of the questions below. You will create a poster that demonstrates visually (no text) the process being described, and you should be able to explain to other groups WHY each answer option is right or wrong.

Rank these in order of the amount of ATP produced
A. oxidative phosphorylation
B. glycolysis
D. cellular respiration
E. fermentation

The purpose of lactic acid production within fermentation is:
A. To generate ATP when no oxygen is present
B. To regenerate NAD+
C. To remove lactic acid from the cell

(An example of a grad student incorporating their research at a Bio93 level). *Chlamydia* is an intracellular bacterium that relies on the host cell to provide energy. When a researcher tried to infect host cells that had a defective pyruvate transport protein, the *Chlamydia* infection didn’t last long. How did the defective pyruvate transport protein prevent the host cells from making enough energy to support the *Chlamydia*?
A. The intermembrane space was acidic compared to the mitochondrial matrix
B. NAD+ became oxidized in the cytosol
C. The electron transport chain stopped because it lacked a final electron acceptor
D. Host cells had to use lactic acid fermentation to make ATP
E. Substrate level phosphorylation was inhibited

When the electron transport chain in a mitochondrion is active, which of the following occurs?
A. Electrons are pumped into the intermembrane space
B. NADH is oxidized to NAD+
C. Oxygen is produced in the mitochondrial matrix
D. pH of the mitochondrial matrix decreases
E. ATP synthase actively pumps protons