

Chap 10.1 - Cellular Respiration: An Overview



Essential Questions

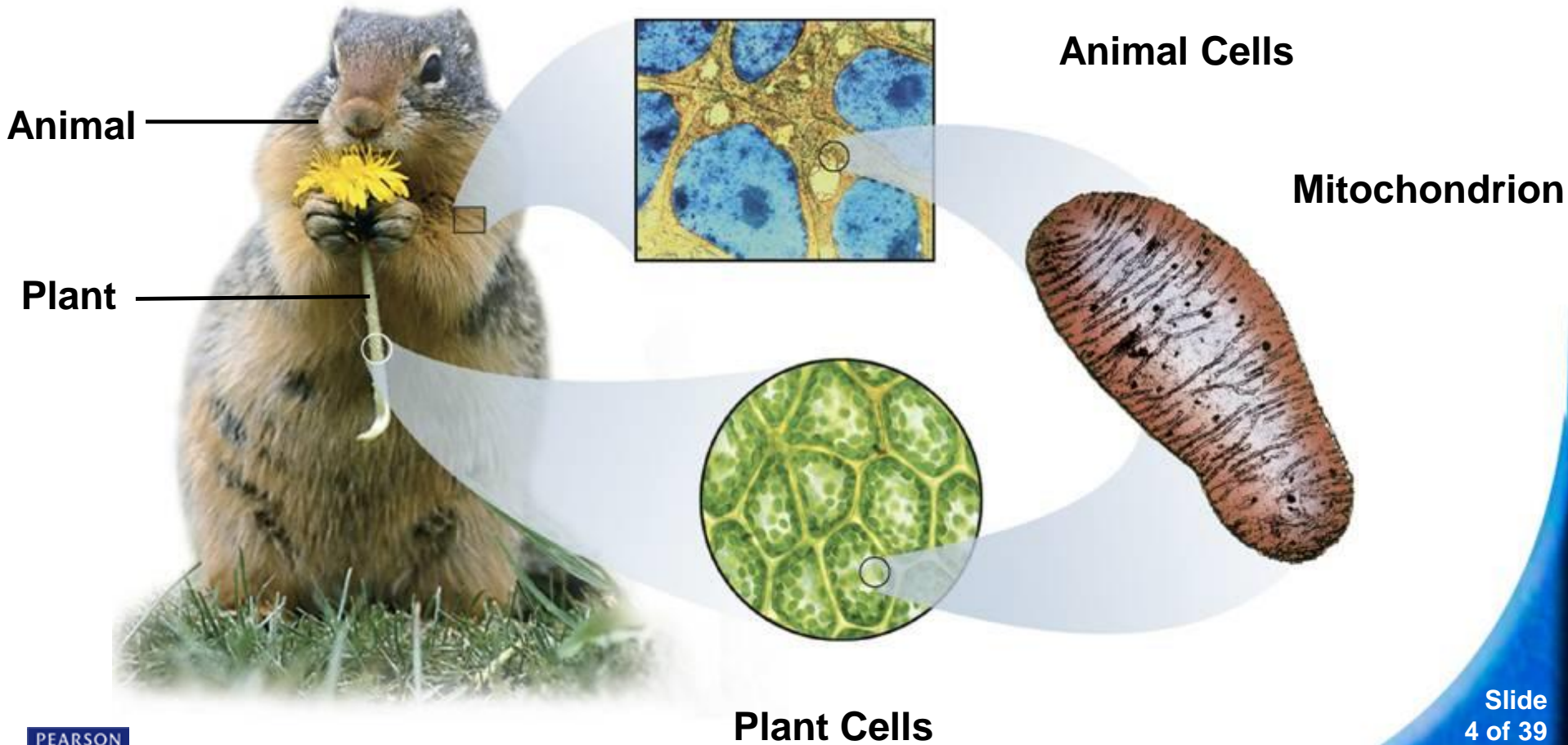
Where do organisms
get energy?

What is cellular
respiration?

Learning Objectives

- Identify how organisms get energy.
- Explain how cellular respiration works.
- Explain the relationship between photosynthesis and cellular respiration.

Food serves as a source of raw materials for the cells in the body and as a source of energy.



Animal Cells

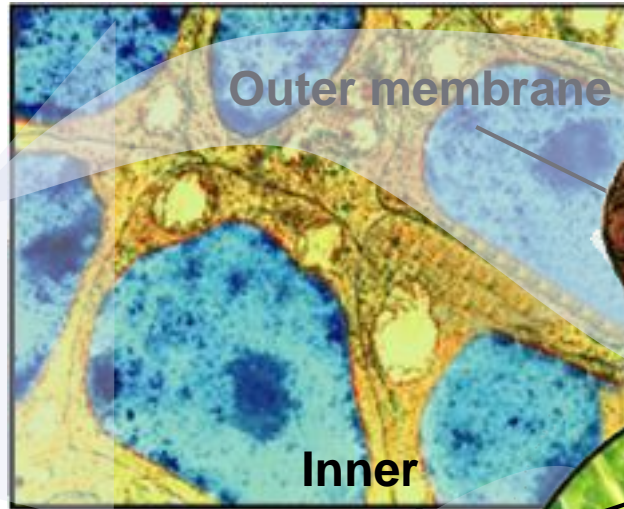
Mitochondrion

Plant Cells

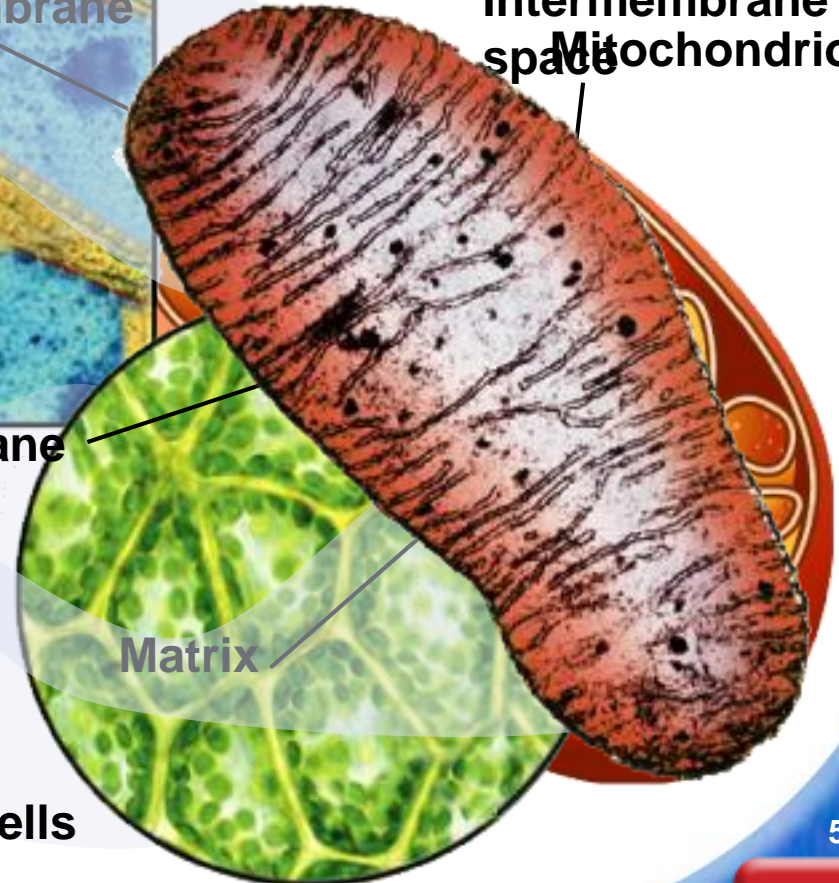


Both plant and animal cells carry out the final stages of cellular respiration in the mitochondria.

Animal Cells



Mitochondrion
Intermembrane space



Plant Cells

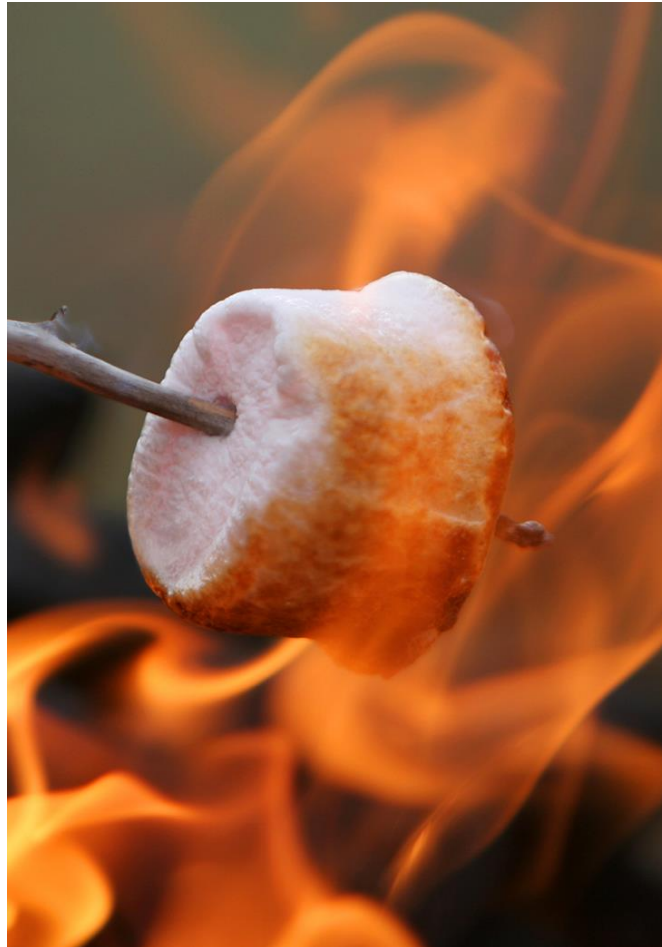
Chemical Energy and Food

One gram of the sugar glucose ($C_6H_{12}O_6$), when burned in the presence of oxygen, releases 3811 calories of heat energy.

A **calorie** is the amount of energy needed to raise the temperature of 1 gram of water 1 degree Celsius.

Cellular Respiration

Cellular respiration is a process of energy conversion that releases energy from food in the presence of oxygen.



Cellular Respiration

The chemical summary of cellular respiration is:

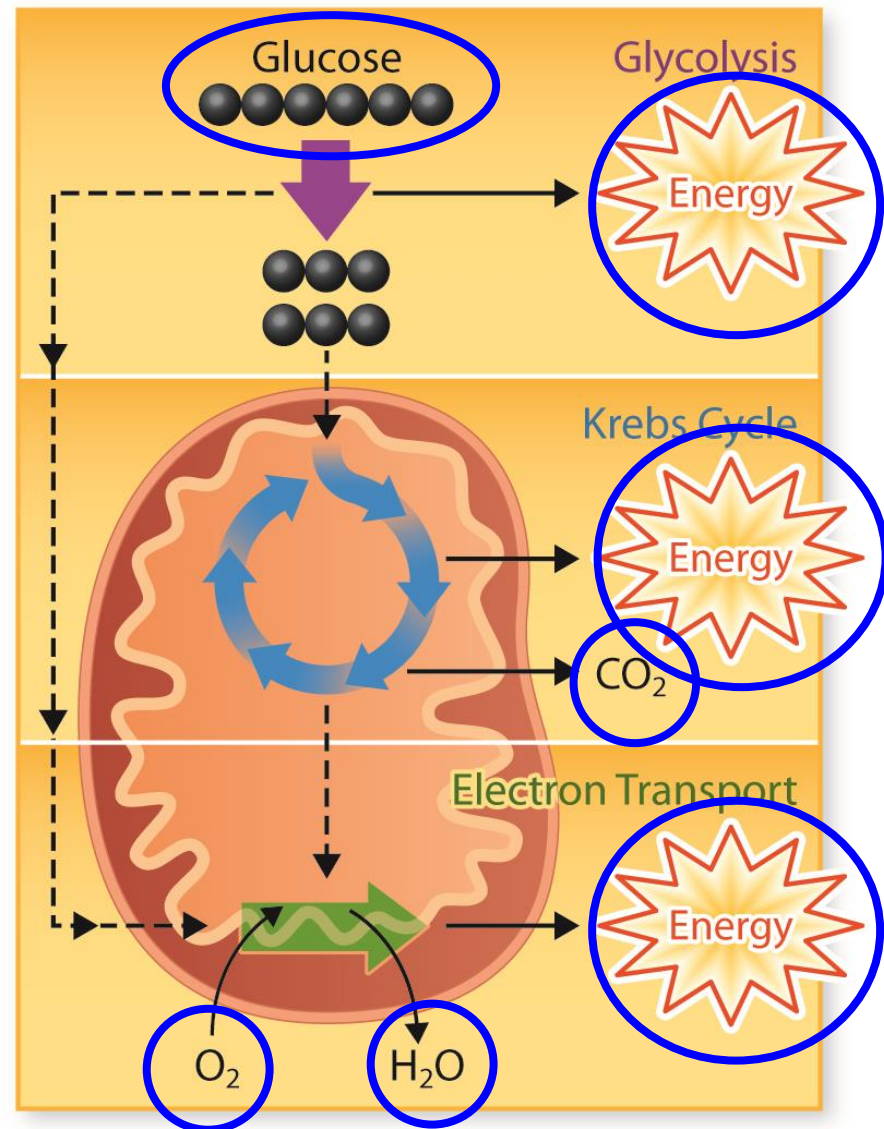
Oxygen + Glucose → Carbon Dioxide + Water + Energy

What does the equation look like expressed in symbols?



Stages of Cellular Respiration

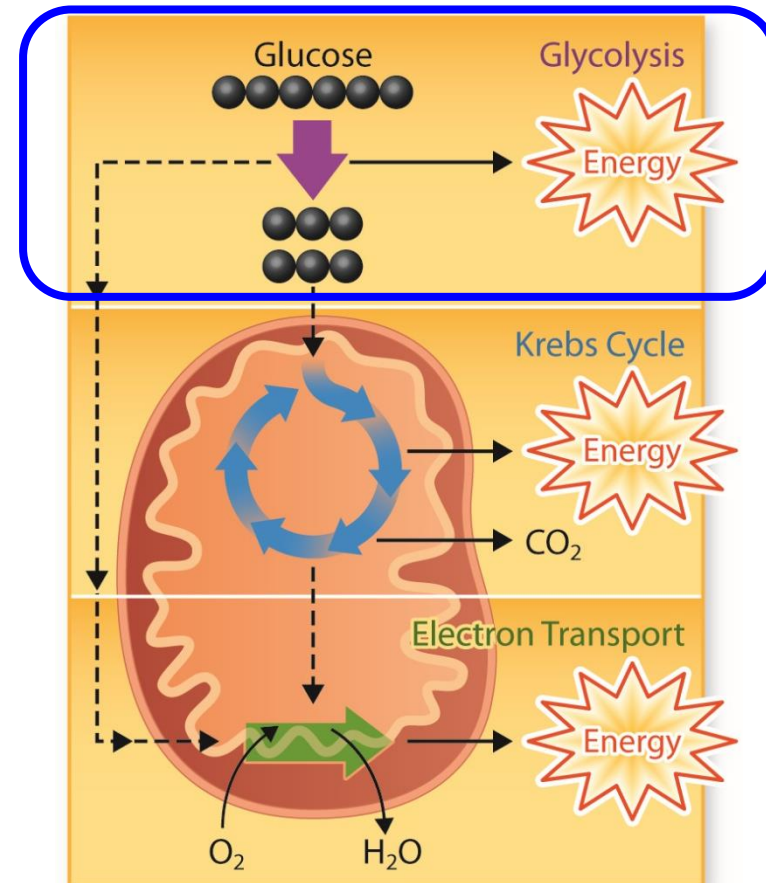
- Glycolysis
- Krebs cycle
- Electron transport



Stage 1: Glycolysis

Glucose first enters a chemical pathway known as glycolysis. A small amount of energy is captured to produce ATP.

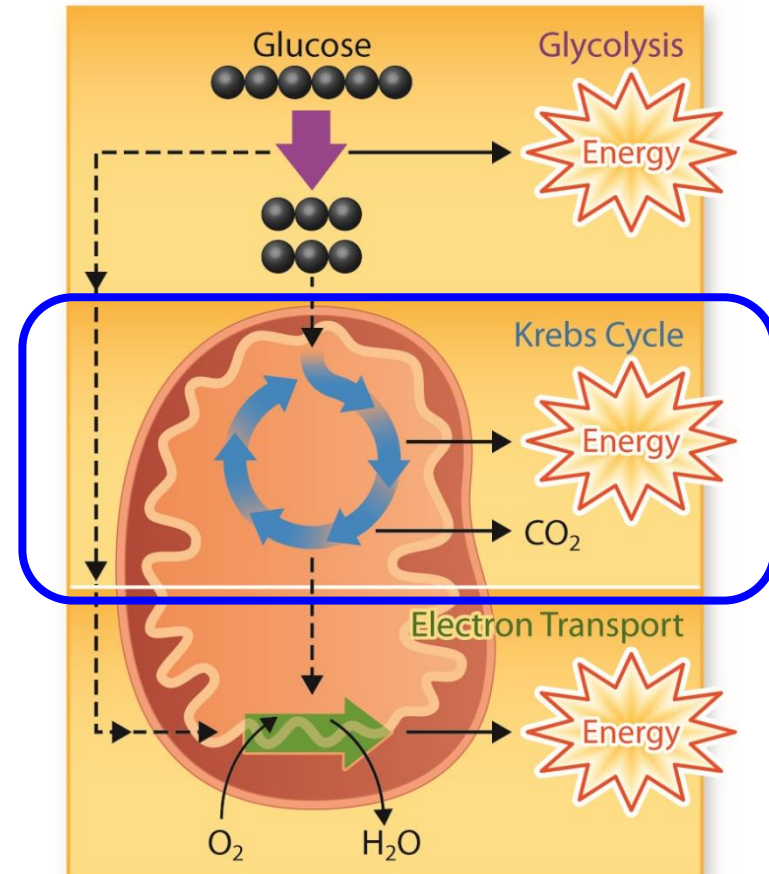
Glycolysis does not require oxygen, nor does it rely on an oxygen-requiring process to run and therefore is considered anaerobic.



Stage 2: Krebs Cycle

In the second stage of cellular respiration a little more energy is converted.

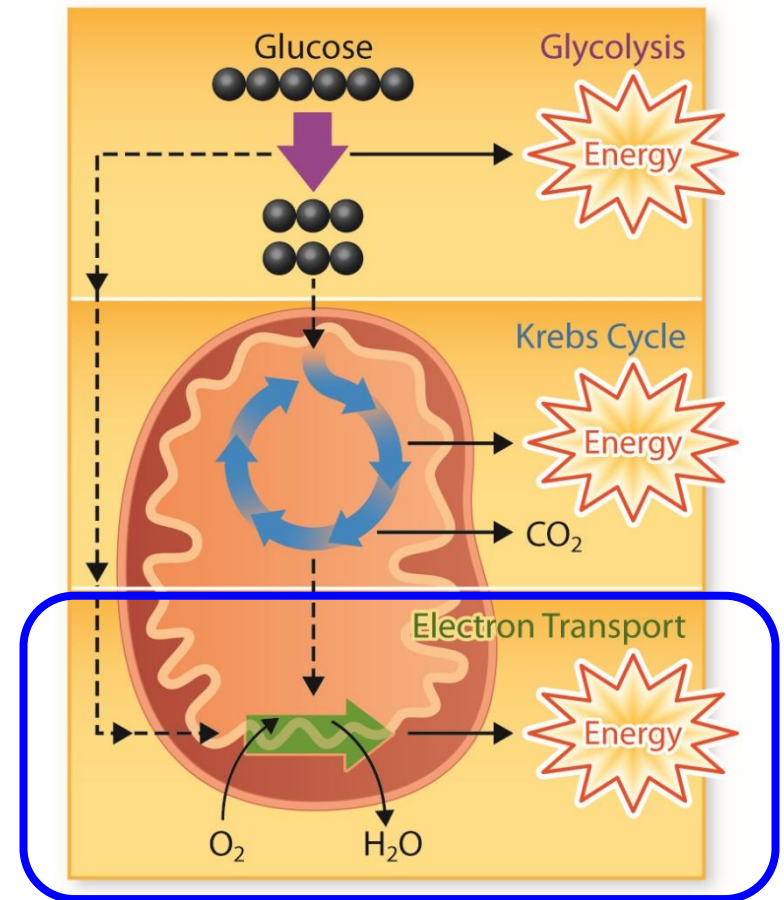
The Krebs Cycle does not directly require oxygen but it cannot run without the oxygen-requiring ETC and therefore is called an aerobic process.



Stage 3: Electron Transport

The final stage requires reactants from the other two stages of the process.

The ETC requires oxygen and therefore is called an aerobic process.



Photosynthesis and Cellular Respiration

Photosynthesis and cellular respiration can be thought of as opposite processes.

Photosynthesis removes CO_2 from the atmosphere and cellular respiration puts it back.

Photosynthesis releases oxygen into the atmosphere and cellular respiration uses that oxygen to release energy from food.

