

# GHSGT Review: Biology (Day 2)

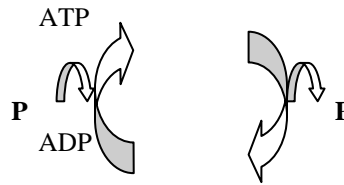
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**OBJECTIVE:** Explain the cycle of photosynthesis and respiration.

## ENERGY FOR LIVING CELLS

Cells require chemical energy to make tasks necessary for life. This energy is stored in the form of chemical bonds between atoms in food. The energy is taken from the food and stored in molecules that can provide the energy where it is needed in the cell.

Many reactions in the body are endergonic. This means that they require energy to keep them going. In most cases, a molecule called ATP (adenosine triphosphate) provides this energy. ATP consists of a sugar, base, and a chain of three phosphates. The bond that holds the second and third phosphate together is easily broken. Enzymes help ATP to transfer this phosphate to another molecule. When this transfer takes place, energy is released that drives the chemical reactions in a cell.

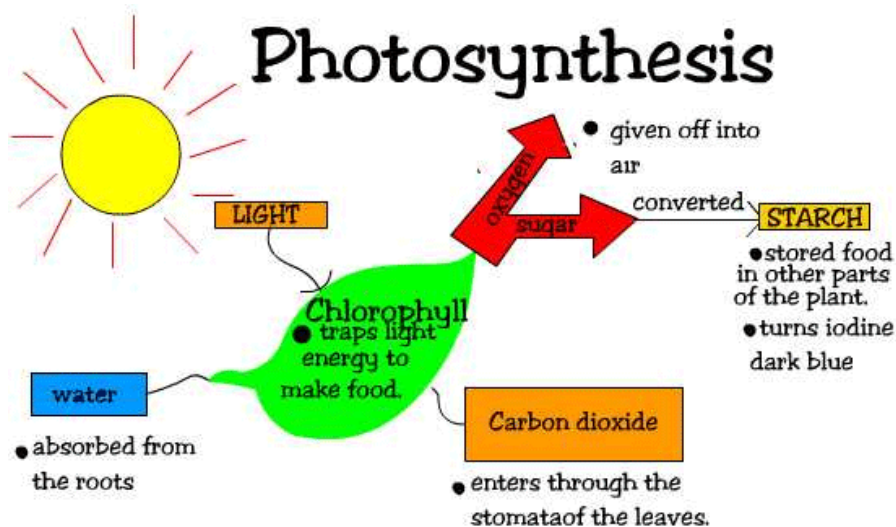


For ATP to be effective, it must lose its final phosphate. The phosphate is returned to ATP by adding a **P** to ADP. The series of reactions between ATP and ADP form a cycle. See the diagram to the right. Think of it as a battery that is continually recharging itself. The phosphate group is returned to ATP during a process called cellular respiration. Glucose is broken down and the energy in its bonds is transferred to the energy bonds of ATP.

## PHOTOSYNTHESIS

The ultimate source of the energy that powers cells is the sun. Green plants and other organisms capture the light energy of the sun through the process of photosynthesis. Photosynthesis requires light, chlorophyll, and raw materials. Enzymes are also needed for the reactions to proceed. Chlorophyll in the plants traps the light of the sun. Carbon dioxide from the air and water from the ground are the raw materials for the process of photosynthesis. Glucose is the end product. Oxygen and water are also given off.

The purpose of photosynthesis is to store the energy of the sun in the bonds of the glucose molecules. These molecules are then used by organisms to provide energy for cellular activities. The energy is removed from the glucose in a process called respiration.



## **RESPIRATION**

Cellular respiration involves breaking the chemical bonds of organic food molecules and releasing energy that can be used by the cells. The food molecules were the ones produced in plants during the process of photosynthesis.

Respiration involves several steps. Glycolysis is the first step where glucose is broken down into a compound, pyruvic acid, and energy for 2 ATP. From there, the pyruvic acid goes through Krebs cycle and releases energy for 36 ATP. Glycolysis occurs in the cell's cytoplasm and Krebs cycle occurs in the mitochondria. Respiration requires glucose and oxygen and it produces carbon dioxide, water, and energy.

The end result of respiration is the energy gain of 38 ATP. Remember that plant and animal cells use ATP to run the chemical reactions they need to survive.

*Respiration is the release of energy from the breakdown of food molecules in the presence of oxygen. The process of respiration can be summarized in the following equation:*

