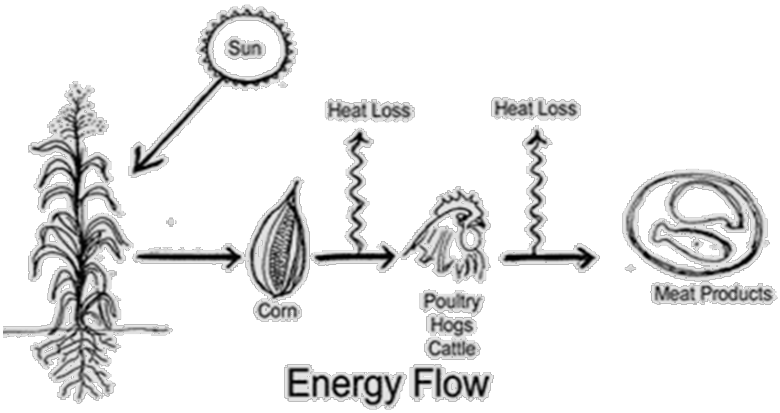
NAME _____ HR_____
Photosynthesis and Cellular Respiration Notes Outline

Energy in Living Systems

- You get _____ from the _____ you _____.
- Directly or indirectly, almost all of the _____ in living systems needed for _____ comes from the _____.
- _____ from the _____ enters living systems when _____, _____, and certain _____ absorb _____.
- Some of the _____ in _____ is captured and _____ to make _____ _____.



- These _____ _____ store chemical _____ and can serve as _____ for _____.

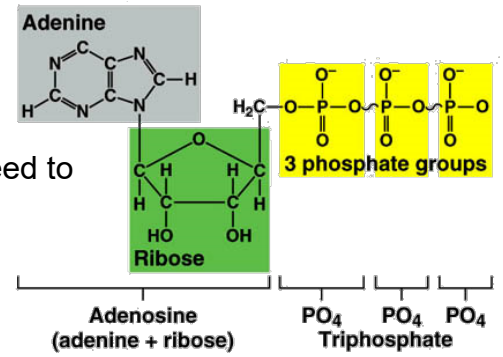
Building Molecules that Store Energy

- _____ involves either using _____ to build _____ or breaking _____ molecules in which _____ is _____.
- _____ is the process by which _____ energy is converted to _____ energy.
- _____ that use energy from _____ or from chemical _____ in _____ substances to make organic _____ are called _____.
- Most _____ (usually _____) are _____ organisms.
- Some _____, including certain _____, use chemical _____ from _____ substances to make _____ compounds.

- _____ found near deep-sea _____ vents live in perpetual _____.
    - _____ does not reach the bottom of the _____.
- These _____ get _____ from _____ flowing out of the _____.

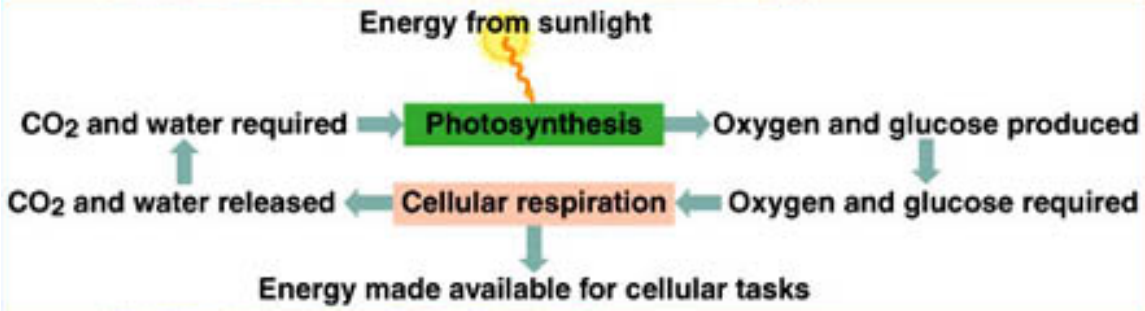
Breaking Down Food for Energy

- The chemical _____ in organic _____ can be transferred to other _____ compounds or to _____ that consume _____.
- _____ that must get _____ from _____ instead of directly from _____ or inorganic _____ are called _____.
    - _____, including _____, get _____ from _____ through the process of _____ _____.
- _____ _____ is a _____ process similar to burning _____.
- While burning _____ almost all of the _____ in a fuel to _____, cellular _____ releases much of the energy in _____ to make _____.
- _____ provides _____ with the _____ they need to carry out the _____ of _____.



Transfer of Energy to ATP

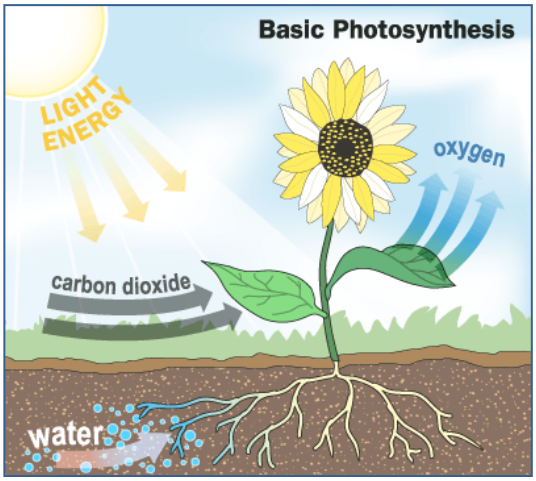
- The word _____ is often used to describe how _____ get _____ from _____.
    - The overall process is similar. However, the "_____" of _____ in living _____ differs from the burning of a log in a campfire.
    - When a log _____, the energy _____ in wood is _____ quickly as _____ and _____.
    - In _____, chemical energy _____ in food molecules is _____ gradually in a series of _____ assisted chemical _____.



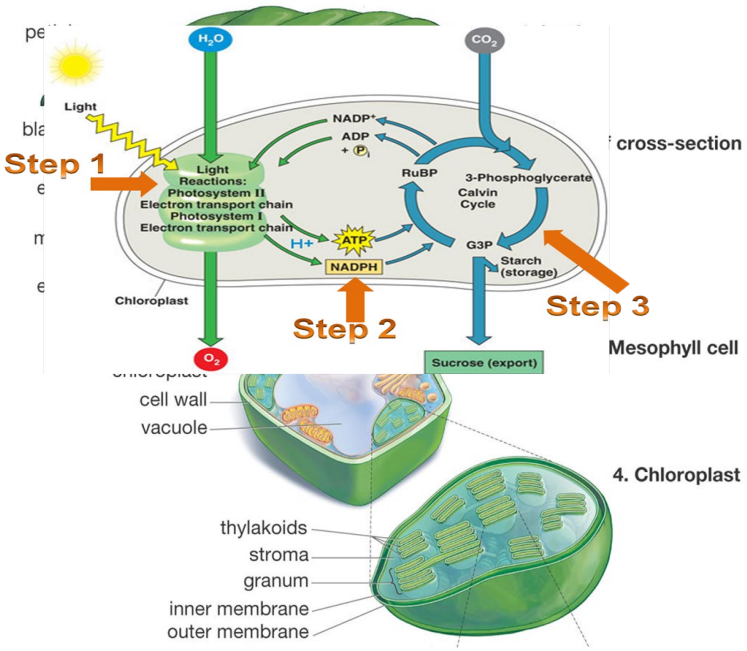
- As shown in the above diagram, the _____ of one chemical _____ becomes a _____ in the next _____.
- When _____ break down food _____, some of the _____ in the _____ is released as _____.
- Much of the remaining _____ is stored temporarily in molecules of ____.
- _____ delivers _____ wherever _____ is needed in a _____.
    - The _____ released from _____ can be used to _____ other chemical _____, such as those that build _____.
    - Most chemical _____ require _____ energy than is _____ from _____.

Photosynthesis

- _____, _____, and some _____ capture about __% of the _____ in the _____ that reaches the _____ and convert it to _____ energy through the process of _____.
- _____ is the process that provides _____ for almost all _____.
- _____ occurs in the _____ of _____ and _____ cells and in the cell _____ of certain _____.



Site of Photosynthesis



The Steps of Photosynthesis

Step 1 _____ is captured from _____.

Step 2 _____ energy is converted to _____ energy, which is temporarily stored in _____ and the energy carrier molecule _____.

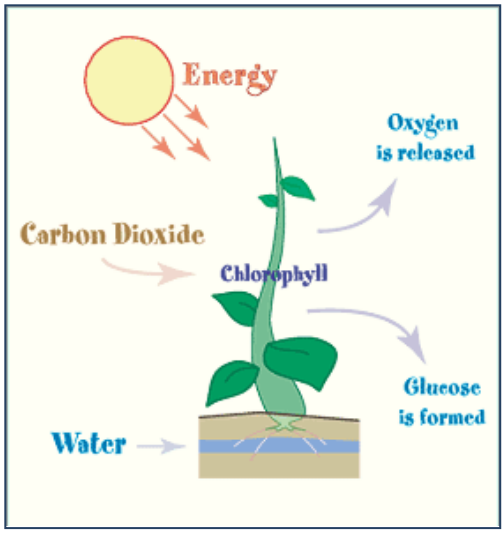
Step 3 The _____ energy stored in _____ and _____ powers the formation of organic _____, using _____ (_____).

_____ can be summarized by the following _____:

_____ + _____ → _____ + _____

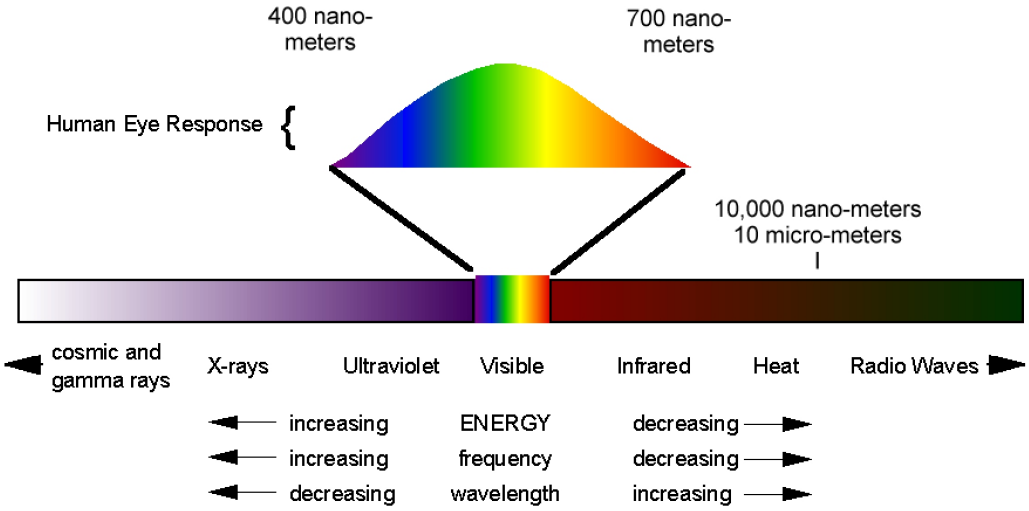
Step One: Absorption of Light Energy

- The _____ reactions that occur in the _____ and _____ steps of _____ are sometimes called "_____ _____," or _____ _____ reactions.
    - Without the _____ of _____, these reactions could _____ occur.



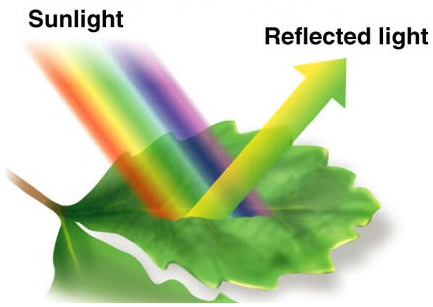
- _____ energy is used to make _____-storing _____.
- _____ is a form of _____, _____ in the form of _____ that travel from our _____ through _____.
- Different types of _____ (_____ and _____) have different _____ (the distance between two consecutive _____).
- When the _____ shines on you, your _____ is bombarded by many kinds of _____ from the _____.
- However, we only can see _____ known as _____ light.

Electromagnetic Spectrum

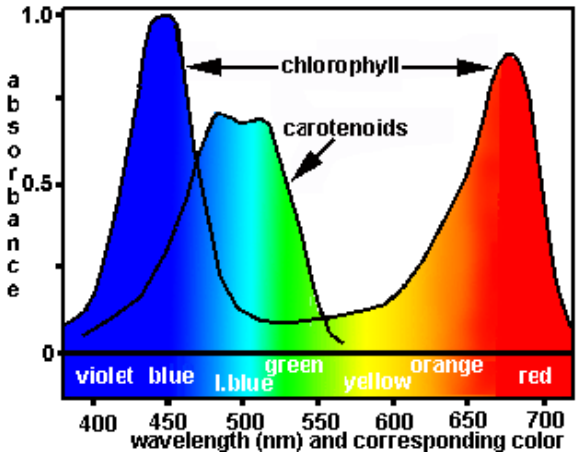


Pigments

- The _____ containing _____-absorbing substances are called _____.
- _____ absorb only certain _____ and _____ all the others.
- _____, the primary _____ in _____, absorbs mostly _____ and _____ light and reflects _____ and _____ light.
- This _____ of _____ and _____ light makes many _____, especially their leaves, look _____.
- Plants contain _____ types of _____, chlorophyll ____ and chlorophyll ____.
    - Both types of _____ play an important role in plant _____.



- The _____ that produce _____ and _____ fall _____ colors, as well as the _____ of many _____, _____, and _____, are called _____.
- _____ absorb _____ of light different from those absorbed by _____, so having both _____ enables _____ to absorb more _____ energy during _____.



Step Two: Conversion of Light Energy

- _____ electrons that leave _____ molecules are used to produce new _____, including _____, that temporarily store chemical _____.
- The series of _____ are called _____ _____ _____.

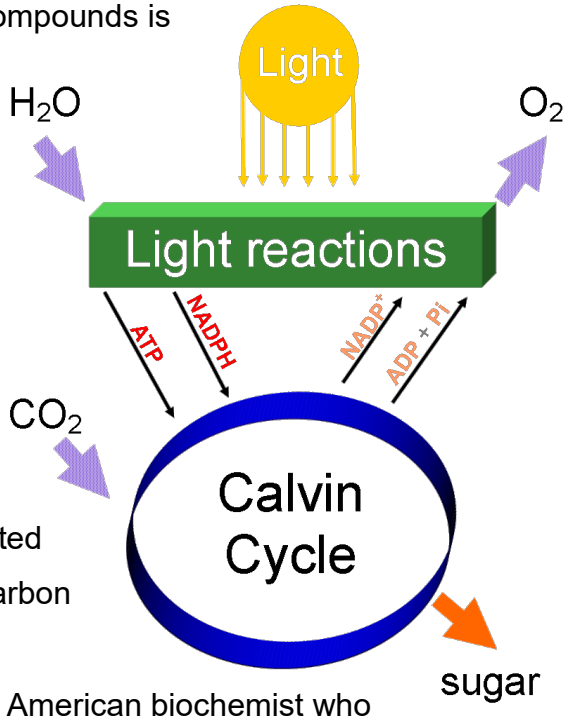
Light-Dependent Reaction Summary

- _____ molecules in the _____ of _____ absorb _____ energy.
- _____ in the _____ are excited by _____ and move through _____ transport chains in thylakoid membranes.
- These _____ are replaced by electrons from _____ molecules, which are _____ by an _____.
- _____ atoms from _____ molecules combine to form _____ gas.
- _____ ions accumulate inside _____, setting up a _____ gradient that provides the _____ to make _____.

Step Three: Storage of Energy

- In this final stage of _____, _____ atoms from carbon dioxide in the _____ are used to make organic _____ in which _____ energy is _____.

- The transfer of _____ _____ to organic compounds is called _____ _____ _____.
- The reactions that "_____" carbon dioxide are sometimes called "_____ _____," or _____-_____ reactions.



The Calvin Cycle

- The most common method of carbon dioxide _____ is the _____ _____.
- The _____ cycle is a series of _____-assisted chemical _____ that produces a _____-carbon _____.
- The Calvin Cycle is named for _____, the American biochemist who worked out the _____ reactions of the cycle.
- The _____ are _____; they _____ the _____-carbon _____ needed to _____ the cycle again.

Stages of Photosynthesis

	Used	Produced
Step 1		
Step 2		
Step 3		

Factors that Affect Photosynthesis

- _____ is directly affected by _____ factors.
- The most obvious factor is _____.
  - In general, the _____ of _____ increase as _____ intensity _____ until all the _____ are being _____.
  - At this _____ point, the _____ of the Calvin cycle cannot proceed any _____.

    - The overall _____ of _____ is limited by the _____ step, which occurs in the _____ cycle.
- The carbon dioxide _____ also affects the rate of _____.
    - Once a certain _____ of carbon dioxide is _____, _____ cannot proceed any _____.
- _____ is most _____ within a certain range of _____.
    - _____ involves many _____-assisted chemical _____ and unfavorable _____ may inactivate certain _____.

Cellular Energy

- Most of the _____ we eat contain usable _____.
    - Much of the _____ is stored in _____, _____, and _____.
- _____ transfer _____ in organic compounds to _____ through a process called _____.
    - _____ in the air makes the production of _____ more _____.
- _____ processes that require _____ are called _____.
- _____ processes that do _____ require _____ are called _____ (_____ _____).

The Steps of Cellular Respiration

- _____ respiration is the process _____ use to produce the _____ in organic _____.
- _____ respiration can be summarized by the following _____:

  _____ + _____ → _____ + _____ + _____

- _____ respiration occurs in _____ steps.

Step 1 – _____ is converted to _____, producing a small amount of _____ .

Step 2 – When _____ is present, _____ is used to make large amounts of _____ (aerobic respiration). _____ respiration occurs in the _____

of all _____. When _____ is _____ present, _____ is converted to either _____ or _____ and _____.

Step One: Breakdown of Glucose

- The primary _____ for _____ respiration is _____, which is formed when _____ such as _____ and _____ are broken down.
- If too few _____ are available to meet an organism's glucose _____, other molecules, such as _____, can be broken down to make _____.
    - One gram of _____ contains _____ energy than _____ grams of _____.
- _____ and _____ _____ can also be used to make _____, but they are usually used for _____ important cell _____.

Glycolysis

- In the first _____ of _____ respiration, _____ is broken down in the _____ during a process called _____.
- _____ does not require _____.
- _____ uses two _____ molecules but produces four _____ molecules, yielding a net _____ of _____ ATP molecules.
- _____ is followed by another set of reactions that use the _____ temporarily stored in _____ to make more _____.

Step Two: Production of ATP

- When _____ is present, _____ produced during _____ enters a _____ and is converted to a carbon compound.
- This reaction produces one _____ molecule, one _____ molecule, and _____ ATP molecules.

Krebs Cycle

- This series of _____-assisted reactions is called the _____ cycle.
- The cycle is named for the biochemist _____, who first described the cycle in _____.

Electron Transport Chain

- In _____ cells, the electron transport chain is located in the inner _____ of _____.

- At the end of the _____ transport chain, _____ ions and spent _____ combine with _____ molecules, O_2, forming _____ molecules, _____.

Respiration in the Absence of Oxygen

- What happens when there is not enough _____ for _____ respiration to occur?
    - The _____ transport chain does _____ function because _____ is not available to serve as the final electron _____.
- Anaerobic Respiration is called _____.
- Two important forms of _____ are _____ fermentation and _____ fermentation.
    - _____ fermentation by some _____ and _____ is used in the production of _____ such as _____ and some _____.

Lactic Acid Fermentation

- _____ _____ _____ _____
- During vigorous _____, pyruvate in _____ is converted to _____ when _____ cells must operate _____ enough _____.
- _____ removes excess _____ from _____.
    - _____ can build up in _____ cells if it is not removed _____ enough, sometimes causing muscle _____.

Alcoholic Fermentation

- In other _____, the _____ is broken down to _____, a _____-carbon compound, through _____ fermentation.
- _____ is released during the process.
- Alcoholic _____ by _____, a _____, has been used in the preparation of many _____ and _____.
- _____ released by the _____ causes the rising of _____ dough and the _____ of some alcoholic beverages, such as _____.

- _____ is actually _____ to yeast.
    - At a concentration of about _____percent ethanol _____ yeast.

Production of ATP

- The _____ amount of _____ that a cell is able to harvest from each _____ molecule that enters _____ depends on the presence or absence of _____.
    - When Oxygen is **_____**, _____ respiration occurs._____
    - When Oxygen is **_____**, _____ occurs._____

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