**Chapter 2: Cell Processes and Energy**

**Lesson 1: Photosynthesis**

How Do Living Things Get Energy From the Sun?

* Every living thing needs energy!
* Certain organisms can make their own food – some organisms have to eat to obtain energy.



The Sun as an Energy Source

* PHOTOSYNTHESIS: the process by which a cell captures energy in sunlight and uses it to make food.
	+ Photos = light, syntithenal = putting together
* Almost all living things get energy directly or indirectly from the energy of sunlight that is captured during photosynthesis.
	+ Grass = energy directly
	+ Zebra = energy indirectly

Producers and Consumers

* Producer = organism that makes its own food = AUTOTROPH
* Consumer = organism that cannot make its own food = HETEROTROPH

What Happens During Photosynthesis

* During photosynthesis, plants and some other organisms absorb energy from the sun and use the energy to convert carbon dioxide and water into sugars and oxygen.
	+ Stage 1: Capturing the Sun’s Energy
		- Energy from sunlight is captured by the plant’s leaves
			* CHLOROPHYLL: green pigment inside chloroplasts that captures sunlight
		- Water is split into hydrogen and oxygen
			* Oxygen is given off as a waste product.
	+ Stage 2: Using Energy to Make Food
		- Cells make sugar using hydrogen and carbon dioxide from the air.
			* Carbon dioxide enters the leaves through small openings on the bottom of leaves.
			* C6H12O6 (glucose) is the sugar made.
		- Oxygen exits through the openings on the leaves’ undersides
			* Almost all oxygen on Earth produced through photosynthesis!

The Photosynthesis Equation (write it below)



**Lesson 2: Cellular Respiration**

What Is Cellular Respiration?

* CELLULAR RESPIRATION: the process by which cells obtain energy from glucose.
	+ Cells break down glucose and other molecules from food (in the presence of oxygen) releasing energy.
	+ Living things need a CONSTANT supply of energy.
* Your body stores and uses energy like a savings account.
	+ Eat a meal – store glucose
	+ Need energy – withdraw glucose and break down through cell respiration
* Breathing is different than respiration
	+ Breathing brings oxygen into your lungs and removes waste products of cellular respiration from your body.
* Cellular Respiration has 2 stages:
	+ Stage 1: Cytoplasm
		- Molecules of glucose get broken down into smaller molecules.
		- No oxygen is needed
		- A small amount of energy is released
	+ Stage 2: Mitochondria
		- Small glucose molecules are broken down even more.
		- Requires oxygen
		- Lots of energy is released!

The Cellular Respiration Equation (write it below)



* Cellular Respiration and Photosynthesis are opposite processes (look at the equations)
	+ They form a cycle that keeps oxygen and carbon dioxide fairly constant on Earth

What Happens During Photosynthesis?

* FERMENTATION: an energy- releasing process that does not require oxygen
	+ Cells release energy from food WITHOUT oxygen!
	+ Releases lots less energy than cell respiration
* 2 types of fermentation
1. Alcoholic Fermentation: produces alcohol, carbon dioxide and small amounts of energy
	1. Example: Bread dough rising
2. Lactic Acid Fermentation: produces lactic acid, which causes a painful sensation in your muscles.
	1. Lactic acid is broken down when your cells get more oxygen.
		1. Example: You run a marathon.

**Lesson 3: Cell Division**

What Are the Functions of Cell Division?

* Cell division allows organisms to grow larger
* GROWTH, REPAIR, and REPRODUCTION are functions of cell division.

What Happens During the Cell Cycle?

* CELL CYCLE: the regular sequence of growth and division that cells undergo
	+ A cell grows, prepares for division and divides into two new cells called daughter cells

Stage 1: Interphase

* INTERPHASE: period before cell division when the cell grows, copies its DNA and prepares to divide into two new cells.
	+ Cell grows to full size and produces all organelles it needs.
	+ Copies DNA
		- REPLICATION: cell makes an exact copy of the DNA in its nucleus in a process
		- CHROMOSOMES: threadlike structures formed by DNA and proteins in the nucleus.
	+ Preparing for Division
		- Cell produces structures that help it divide into two new cells.

Stage 2: Mitosis

* MITOSIS: phase in which cell’s nucleus divides into two new nuclei and one set of DNA is distributed into each daughter cell.
	+ Divided into four phases: prophase, metaphase, anaphase, and telophase (see pg 60-61)

Stage 3: Cytokinesis

* CYTOKINESIS: Final stage in which the cytoplasm divides and structures are distributed into each of the two new cells.
	+ After cytokinesis, cell enters interphase
		- Animal cell: cell membrane squeezes together around the middle of the cell and pinches cytoplasm into two cells.
		- Plant cell: cell plate forms across the middle of the cell and form new cell membranes, then new cell wall forms.