All You Need to Know for 2.0

**2.01- Organic Molecules**

**Four organic molecules are proteins, carbohydrates, lipids, and nucleic acids**

* **Proteins** are composed of nitrogen, sulfur, carbon, hydrogen and oxygen
* Proteins are made of chains of amino acids
* Amino acids are held together by peptide bonds
* The arrangement of amino acids determines the role of the protein
* The test for proteins is Biurets
* **Carbohydrates** are composed of carbon, hydrogen, and oxygen
* Examples of carbohydrates are sugars, starches, and cellulose
* Carbohydrates are used as sources of quick energy and support in plants
* Carbohydrates are held together by weak hydrogen bonds
* The test for sugars is Benedicts and the test for starches is Iodine or Lugols
* **Lipids** are composed of glycerol molecules and fatty acid molecules
* Examples of lipids are fats, oils and waxes
* Lipids are (hydrophobic or water fearing) meaning they do not dissolve, or break apart in water
* Lipids store energy from food
* Lipids insulate and waterproof organisms
* The test for lipids is the brown bag or Sudan III
* **Nucleic acids** are made up of carbon, hydrogen, oxygen, nitrogen, and phosphorous
* Nucleic acids are made up of nucleotides
* Nucleotides are made up of a 5-carbon sugar, a phosphate group, and nitrogenous base
* DNA and RNA are the most important nucleic acids
* Nucleic acids store genetic information

**2.02-Structure and function of cells**

**The most important cell organelles are chloroplasts, vacuoles, cell walls, nucleus, cell membranes, cytoplasm, and mitochondria**

* **Chloroplasts** are found in plant cells and contain chlorophyll, the green pigment in plants that absorbs sunlight for photosynthesis
* **Vacuoles** are found in plants and some protists and store water, enzymes, and wastes
* **Cell walls** are found in plant cells, made up of cellulose and surrounds the cell membrane and protects the plants
* **The nucleus** is the control center of the cell. It contains DNA.
* **Cell Membranes** are a thin layer surrounding the cell. It is semi-permeable and allows certain materials into and out of the cell.
* **Cytoplasm** is jelly like material inside the cell that is located between the cell membrane and nucleus.
* **Mitochondria** is the site of ATP(energy) production, and is considered the powerhouse of the cell
* **Tissues** make up **organs, organs** make up **organ systems, organ systems** make up **organisms.**
* **Eukaryotes and Prokaryotes** are categorized by their organelles. Eukaryotes have membrane bound organelles and prokaryotes do not have membrane bound organelles.

**2.03- Homeostasis and transport**

* **Homeostasis** is the ability of a cell or organism to regulate its internal conditions despite changes to the environment. Homeostasis depends on pH and temperature
* **Acids** have a pH range of 1-6
* **Bases** have a pH range of 8-14, a pH of 7 is all neutral
* **Diffusion** is the movement of particles from an area of high concentration to low concentration
* **Osmosis** is the movement of water through a selectively permeable membrane
* **Facilitated diffusion** is when a few molecules pass through the cell membrane more easily than expected through protein channels
* **Passive transport** is the movement of particles across a membrane without the use of energy
* **Active transport** is the movement of particles across a concentration gradient and requires the use of energy
* **Activation energy** is the smallest amount of energy needed to start a reaction

**2.04-Enzymes**

* **Enzymes** lower the activation energy of a reaction and are affected by pH and temperature
* **Substrates** are the reactants affected by enzymes
* **Enzymes and substrates** fit together like a lock and key
* **Buffers** help organisms maintain normal pH levels

**2.05-Respiration and Photosynthesis**

* **Aerobic respiration** requires oxygen, cellular respiration produces carbon dioxide and water molecules,
* **Anaerobic respiration** does not require oxygen, examples are lactic acid fermentation (yogurt and cheese/muscle cramps in humans)and alcohol fermentation (used in bread and wine making), only 2 ATP are produced
* **Electron transport chain** produces 36 ATP
* **Autotrophs** make their own food
* **Heterotrophs** cannot produce their own food
* **Photosynthesis** plantsconvert light energy into chemical energy to make their own food
* The **reactants** of **photosynthesis** are the **products** of **cellular respiration**
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* **Photosynthesis-** carbon dioxide + water glucose + oxygen
* **Cellular Respiration-** glucose + oxygen carbon dioxide + water