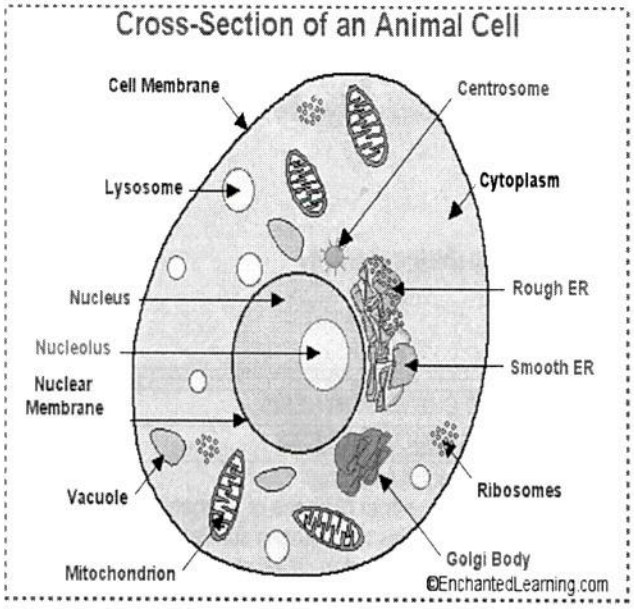

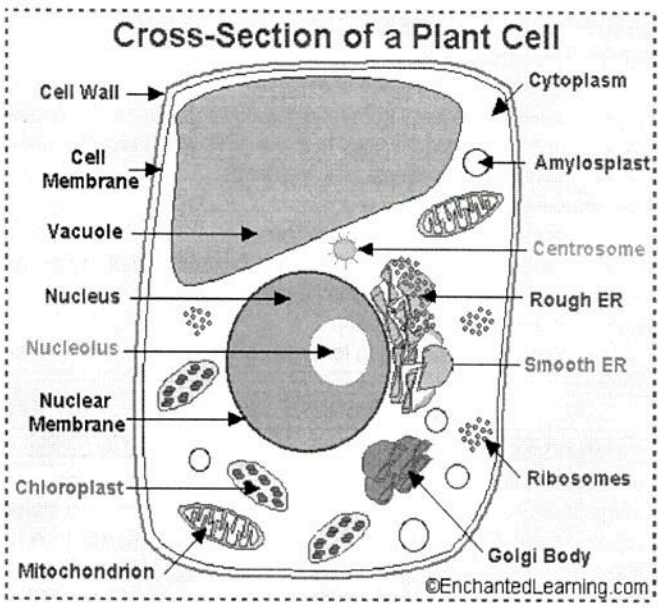

CELL TRANSPORT:

- ***Passive Transport*** – movement of substances across the plasma membrane without the use of the cell's energy (with the concentration gradient)

1. DIFFUSION – movement of substances across the plasma membrane from an area of high concentration to an area of low concentration
2. OSMOSIS – diffusion of water across the plasma membrane from areas of high concentration to areas of lower concentration
3. FACILITATED TRANSPORT – a carrier molecule embedded in the plasma membrane transports a substance across the plasma membrane following the high-to-low concentration gradient

- ***Active Transport*** – movement of substances across the plasma membrane that requires the use of the cell's energy and carrier molecules; substances are moving from an area of low concentration to an area of higher concentration (against the concentration gradient)

1. ENDOCYTOSIS – large particles are brought into the cell
2. EXOCYTOSIS – large particles leave the cell

- ***HOMEOSTASIS*** – internal equilibrium; the plasma membrane regulates what enters and leaves the cell; a selectively permeable membrane only allows certain substances to pass through
- ***Effect of Concentration on a Cell***

1. HYPOTONIC – water moves in; cell bursts
2. HYPERTONIC – water moves out; cell shrivels
3. ISOTONIC – no net movement; cell maintains equilibrium

HOMEOSTASIS: Self-regulating mechanism that maintains internal conditions (with individual cells and within organs, systems) Example: body temperature, respiration, nutritional balance, etc. Cells communicate their needs to each other mainly through their cell membranes by releasing chemical messengers that, ultimately, tell the hypothalamus gland in the brain that a change needs to be made in the interstitial fluid. Since it is the ruler of homeostasis, the hypothalamus sends neural and chemical signals to other glands, tissues, organs, and organ systems to adjust the internal environment, the interstitial fluid, so that it is more suitable for all the cells at that particular time. And since we are always changing what we are doing, homeostasis needs to change along with our activities, both day and night. This constantly changing internal environment is the process of homeostasis.

- Negative Feedback: Glucose / Insulin levels in cells
- Positive Feedback: Blood platelets / Blood clotting

BIOCHEMICAL REACTIONS: chemical bonds are formed and broken within living things creating chemical reactions that impact the ability to maintain life and carry out life functions

- ***Cellular Respiration*** – food molecules are converted to energy; there are three stages to cellular respiration; the first stage is called glycolysis and is anaerobic (no oxygen is required); the next two stages are called the citric acid cycle and the electron transport chain and are aerobic (oxygen is required)

  $C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O +$ **ENERGY (36 ATP)**

- ***Photosynthesis*** – plant cells capture energy from the Sun and convert it into food (carbohydrates); plant cells then convert the carbohydrates into energy during cellular respiration; the ultimate source of energy for all living things is the Sun (in Chemosynthesis, organisms use sulfur or nitrogen as the main energy source)

  $6CO_2 + 6H_2O +$ **ENERGY(from sunlight)** $\Rightarrow C_6H_{12}O_6 + 6O_2$

- ***ATP*** – ATP is a molecule that stores and releases the energy in its bonds when the cell needs it; removing a phosphate group (P) releases energy for chemical reactions to occur in the cell and ATP becomes ADP; when the cell has energy, the energy is stored in the bond when the phosphate group is added to the ADP

  ATP $\Leftrightarrow$ ADP + P + ENERGY

- ***Fermentation*** – when cells are not provided with oxygen in a timely manner, this process occurs to continue producing ATP until oxygen is available again; glucose is broken down; there are two types of fermentation

  Lactic Acid Fermentation (muscle cells) — **Glucose $\Rightarrow$ Lactic Acid + 2ATP**

  Alcoholic Fermentation (plant cells) — **Glucose $\Rightarrow$** CO_2 **+ Alcohol + 2ATP**

AEROBIC AND ANAEROBIC RESPIRATION:

Aerobic Respiration –

- requires the presence of oxygen
- release of energy from the breakdown of glucose (or another organic compound) in the presence of oxygen
- energy released is used to make ATP, which provides energy for bodily processes
- takes place in almost all living things

Anaerobic Respiration –

- occurs in the absence of oxygen
- breakdown of food substances in the absence of oxygen with the production of a small amount of energy
- produces less energy than aerobic respiration
- often called fermentation
- seen as an adaptation for organisms that live in environments that lack oxygen

COMPARISON OF CELLULAR RESPIRATION, PHOTOSYNTHESIS AND CHEMOSYNTHESIS

CELLULAR RESPIRATION	***PHOTOSYNTHESIS***	***CHEMOSYNTHESIS***
Food Broken Down	Food Synthesized	Food Synthesized
Energy from Glucose Released	Energy from Sun stored in Glucose	Energy from Methane or Inorganic Material
Carbon Dioxide given off	Carbon Dioxide taken in	(ex: H gas or Hydrogen sulfide)
Oxygen taken in	Oxygen given off	Organisms often called chemotrophs
Produces Carbon Dioxide and Water	Produces Sugars (Glucose) from PGAL	Organisms called extremophiles
Does not require Light	Requires Light	Live in environments without oxygen
Occurs in ALL Living Cells	Occurs only in presence of Chlorophyll	Anaerobic Bacteria
Organisms often called Heterotrophs	Organisms called Autotrophs	Habitats: hydrothermal vents

ENZYMES:

Enzymes are special proteins that regulate nearly every biochemical reaction in the cell. Different reactions require different enzymes.

Enzymes function to:

- Provide energy to cells
- Build new cells
- Aid in digestion
- Break down complex molecules ("substrate" = reactant)
- Catalysts (speed up chemical reactions without being used up or altered)
- Factors that affect enzymes: pH, temperature, and quantity