

Study Guide: Fall Final Exam

HONORS BIOLOGY: UNITS 1-5

Directions: The list below identifies topics, terms, and concepts that will be addressed on your Fall Final Exam. This list should help you focus your review. This is not a homework assignment you will turn into me.

Chemical Bonds

- 3 types of bonds (Examples of each. Comparative strengths of bonds)
- Importance of electron configuration (**rule of 8**)

Enzymes

- Importance to living things
- Effects of enzymes on chemical reactions
- **Lock and key model** (Enzyme, Substrate, Active site)
- Importance of 3-dimensional shape ("Structure determines function")

Organic Compounds

- Unique qualities of carbon
- 4 categories of carbon-based (organic) compounds
 - **Monomers** and **polymers** of each
 - Importance to living things
- **Dehydration synthesis** (examples)
- **Hydrolysis** (examples)
- **Metabolism, catabolism, anabolism**
- Compare and contrast **saturated** and **unsaturated fats**

Homeostasis

- Definition
- Examples of homeostasis
- **Negative feedback** systems (and positive feedback)

pH

- pH scale (acid-neutral-base)

Scientific Method

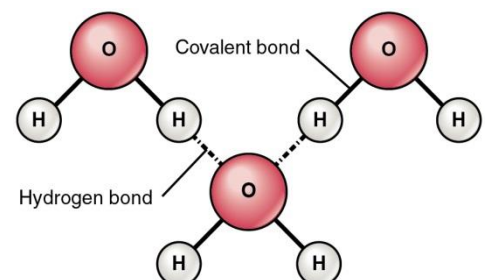
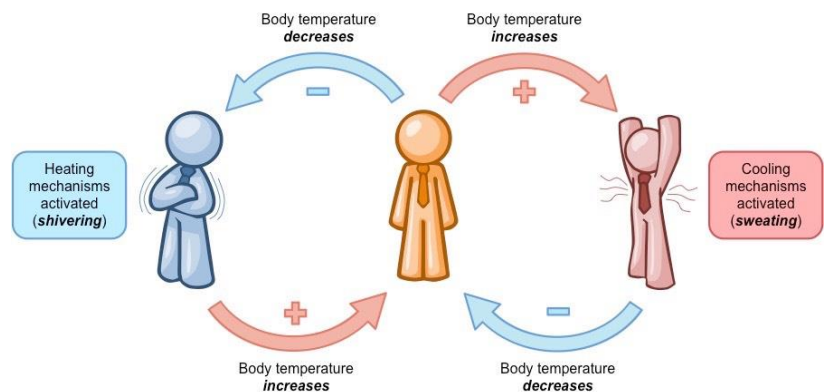
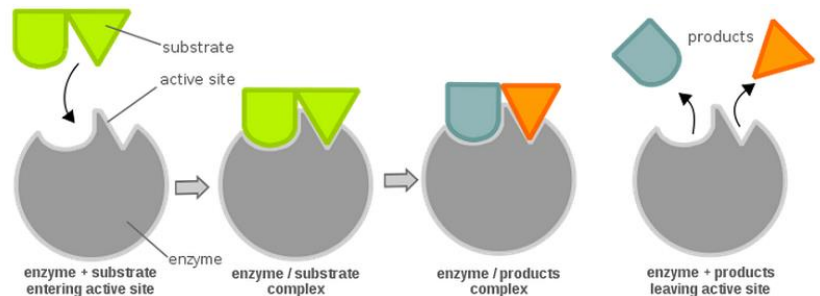
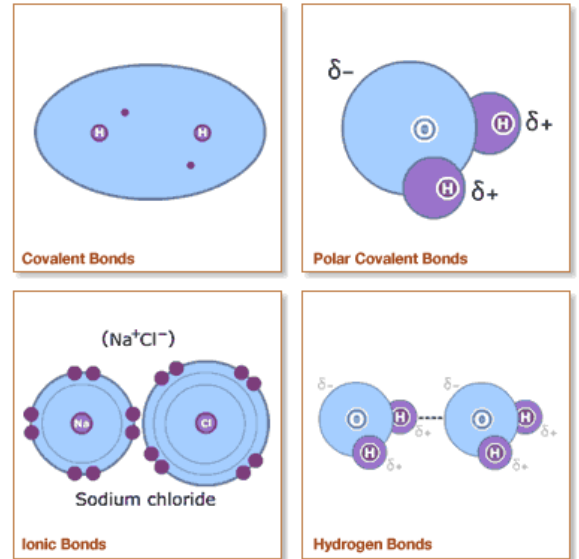
- Steps of Scientific Method
- Controlled experiment (importance)
- Variables
 - **Dependent variables** (observed and measured)
 - **Independent variables** (manipulated)
 - **Controlled variables** (constants)

Data Analysis

- Interpreting graphs and data tables
- Interpreting experimental data and forming conclusions

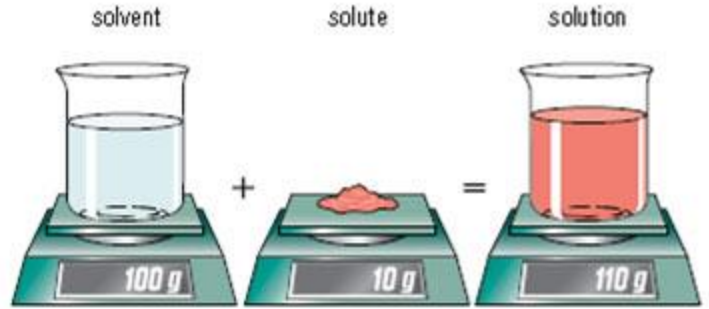
Properties of Water

- Polarity of water molecule
- Adhesion
- Cohesion



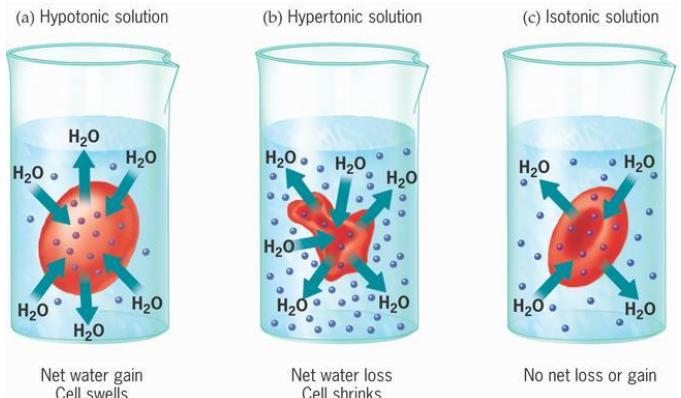
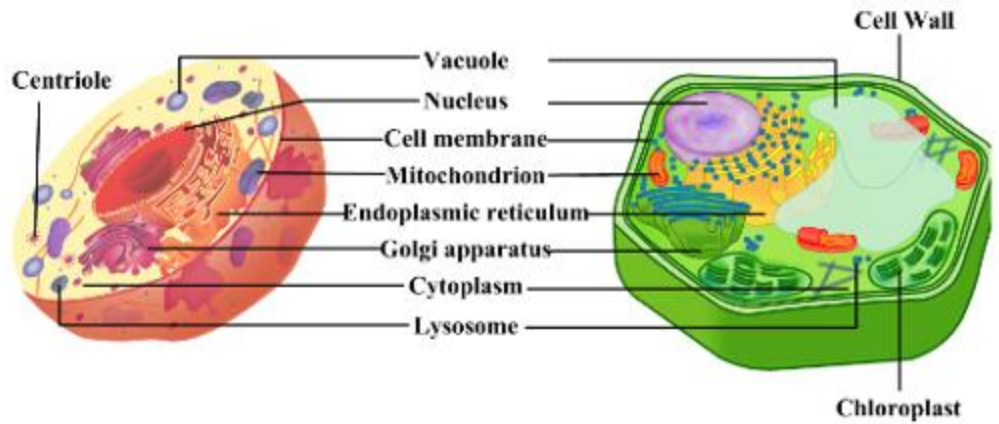
Chemistry

- Ions
- Atoms
- Elements
- Chemical compound
- Chemical reactions (Reactants and products)
- Solutions (Solute/solvent)
- Inorganic/organic compounds



Cell Structures and Organelles

- Identify cell structures/organelles and their function
 - **Nucleus**
 - **Nucleolus**
 - **Nuclear membrane**
 - **Cytoplasm**
 - **Cell membrane**
 - **Ribosomes**
 - **Rough ER**
 - **Smooth ER**
 - **Golgi apparatus**
 - **Lysosomes**
 - **Mitochondria**
 - **Chloroplasts**
 - **Vacuoles**
 - **Cytoskeleton**
 - **DNA/chromatin**
 - **Centrosomes/centrioles**
 - **Cell wall**
- Differences between plant and animal cells
- Pathway for production of a protein and releasing them from cell (organelles involved)



Cell Transport

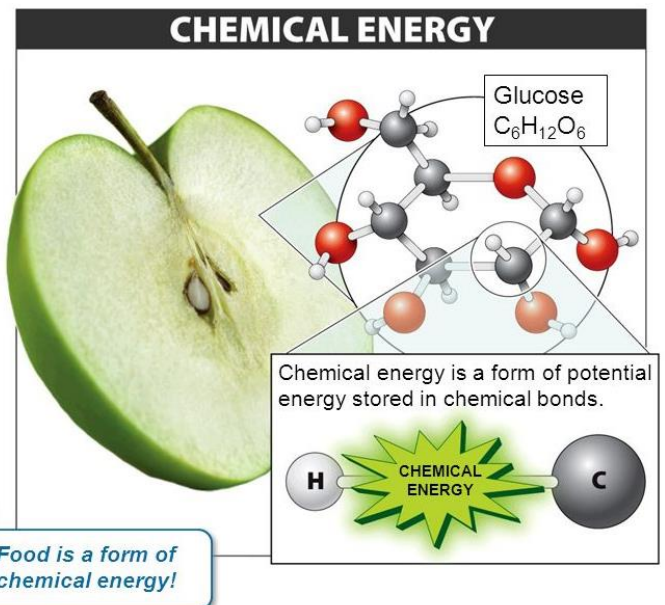
- **Active transport** (endocytosis, exocytosis)
- **Passive transport** (Diffusion and Osmosis, Facilitated diffusion)
- **Transport proteins**
- Concentration gradient (**Isotonic, Hypertonic, Hypotonic**)
- **Dynamic equilibrium**

Cell Theory

- **Prokaryotes vs. Eukaryotes**
- 3 parts of theory
- **Endosymbiotic theory**
- Importance of different organic compounds in the cell

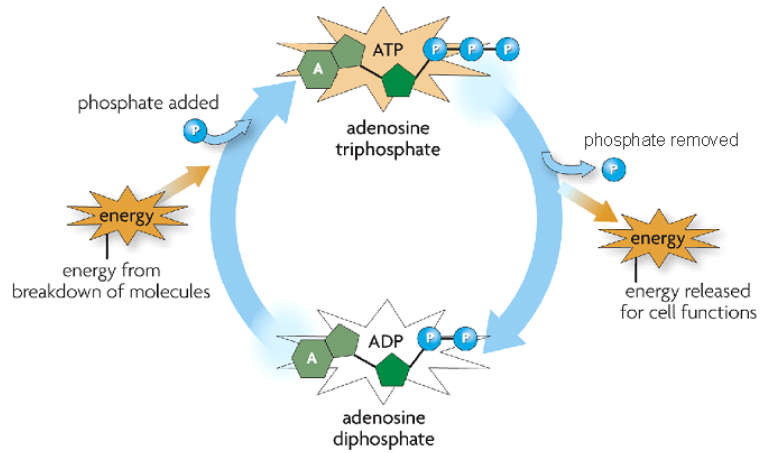
Energy

- What is energy?
- Forms of energy (**Kinetic energy, Potential energy**)
- Where is energy stored in molecules?
- **Law of Conservation of Energy** (examples of conversions of energy)



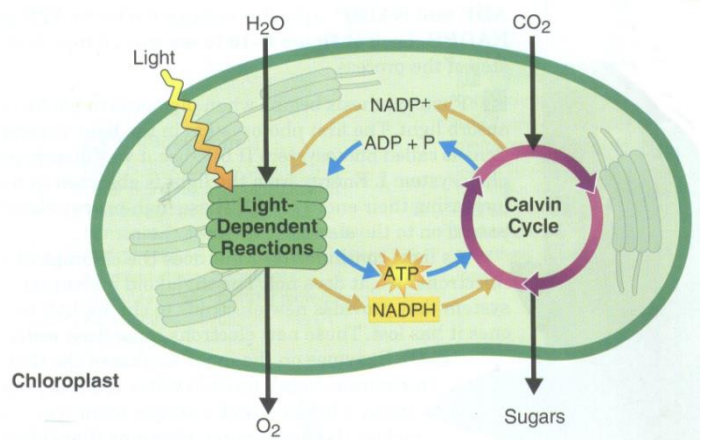
Chemical Energy and ATP

- What is **ATP** used for?
- Where is energy stored in ATP?
- Most important energy sources (types of organic compounds)
- Structure of ATP (3 parts)
- Describe cycle: **ATP** → **ADP** → **ATP** (What provides the energy add phosphate back onto ADP)
- **Autotrophs/producers, Heterotrophs/consumers**
- **Chemosynthesis**



Photosynthesis

- Definition of photosynthesis (equation for photosynthesis)
- **Chloroplasts**
 - Colors absorbed by chlorophyll and reflected
 - Grana
 - Thylakoids
 - Stroma
 - Importance of membranes (What reactions take place here?)
- Stages of Photosynthesis
 - **Light Dependent Reaction**
 - What powers LD reaction
 - Photosystem I and II
 - Where does it occur
 - ATP Synthase (what does it produce and what powers it?)
 - Reactants and Products
 - **Light Independent Reaction**
 - What powers LI reaction (name energy molecules and where they were produced?)
 - Where does it occur?
 - Reactants and products
- Functions of photosynthesis (Base of food chain, Regulation of Earth's atmosphere)

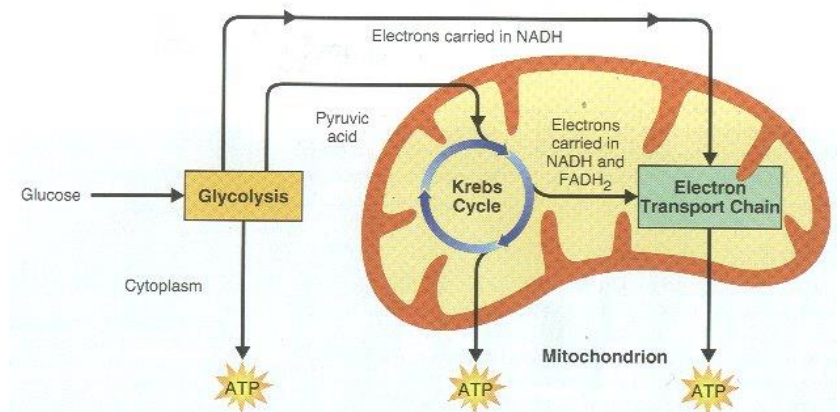


Leaf structure and function

- Guard cells and stoma (function and location)
- Palisade and Spongy Mesophyll (function and location)

Cellular Respiration

- **Mitochondria**
- Overall equation (reactants and products) and total 36 ATP produced
- **Glycolysis** (reactants and products)
 - Anaerobic
 - Net ATP production (2 ATP)
 - Location of glycolysis
- **Krebs cycle**
 - Location
 - Starting molecule C₆H₁₂O₆ first transformed into pyruvate in glycolysis
 - Pyruvate → CO₂
 - Energy molecules produced (NADH, ATP, FADH₂)
 - 2 molecules ATP produced



- **Electron Transport Chain**
 - Source of energy
 - Location it takes place
 - 32 molecules of ATP produced

Fermentation

- Allows glycolysis to continue (recycle NAD^+ to NADH)
- Purpose of fermentation (when does it occur and why)
- 2 types (**Lactic Acid** and **alcoholic**)

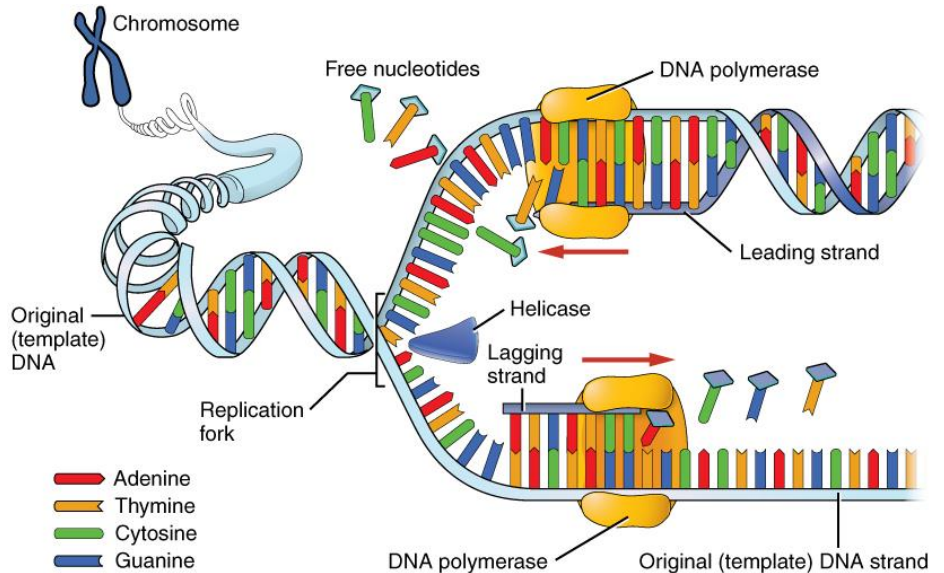
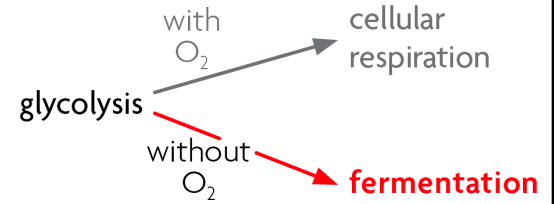
Energy and Exercise

- Quick energy (source and amount)
- Long term energy (source and amount)

Identifying DNA as the Genetic Material

- Discoveries and significance
 - **Griffith , Avery, Hershey and Chase** (DNA genetic material)
 - **Chargaff** ($A = T, C = G$)
 - **Rosalind Franklin and Maurice Wilkins** (DNA helix)
 - **Watson and Crick** (how did they use prior work to develop model of DNA?)

Fermentation is an anaerobic process that allows glycolysis to continue.

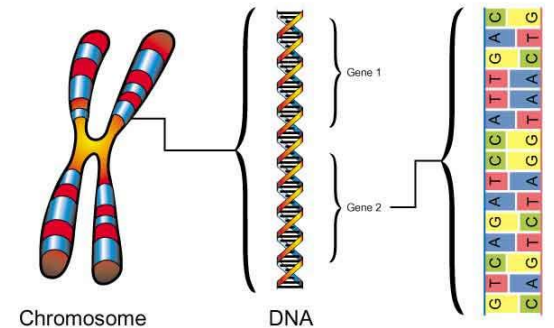


Structure of DNA

- Monomers (ATCG) and structure
- Chargaff's Rule
- DNA molecule (backbone and rungs, bonding on backbone and rungs)

DNA Replication

- Definition (purpose)
- Role of enzymes
- Importance of hydrogen bonds
- Result of replication (one old strand and one new strand)

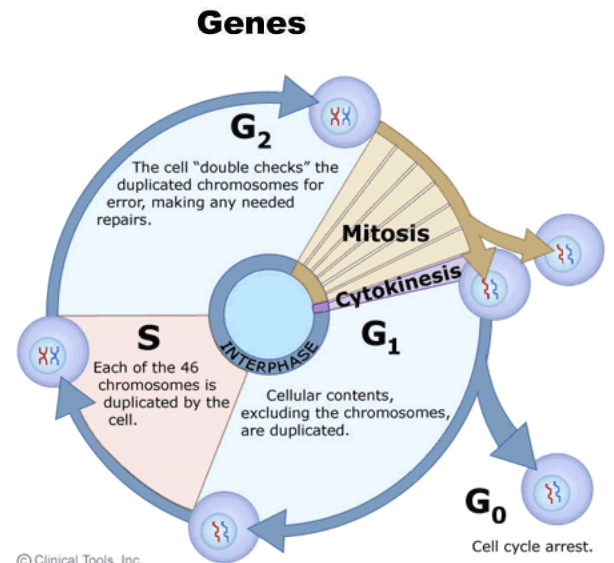


Chromosomes

- **Somatic cells**
- **Germ cells**
- **Autosomes** (22 pairs)
- **Sex chromosomes** (1 pair, XX or XY)
- **Homologous chromosomes**
- Composition of chromosome (sister **chromatids**)
- What are **genes**
 - How do they store genetic code?
 - What do genes do with code?
 - How many genes do we have?
- Diploid and haploid

Cell Cycle

- Stages of Cell Cycle
- Rates of cell division vary



- Limits of cell size (surface area to volume ratio)

Transcription

- Central dogma of molecular biology (Francis Crick)
 - **Replication (DNA → DNA)**
 - **Transcription (DNA → RNA)**
 - **Translation (RNA → Proteins)**
- **Prokaryotic cells**
 - Replication, transcription, translation in cytoplasm
- **Eukaryotic cells**
 - Replication and transcription in nucleus
 - Translation in cytoplasm
- Differences between DNA and RNA
- Transcription produces 3 kinds of RNA (mRNA, rRNA, tRNA)
- Process of transcription
- **Complimentary bases in RNA (A=U, C=G)**

