**Biology Semester 1 Final Review**

**Unit 1 – Characteristics of Life & Systems**

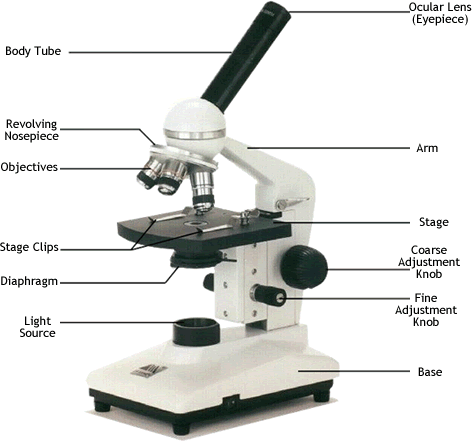
Characteristics of Life

* Biology is the study of living things
* 7 Characteristic of life
  + 1. Cellular Organization
    2. Uses Energy
    3. Reproduction
    4. Requires Water
    5. Respond to the Environment
    6. Uses DNA as genetic material
    7. Development
* Metabolism – all the chemical reactions that an organism carries out
  + - Nutrition (eating food)
    - Transport (moving the nutrients in your body)
    - Respiration (Breaking food down into energy)
    - Excretion (getting rid of waste)
    - Synthesis (incorporation of food nutrients)
    - Regulation
* Homeostasis
  + - The processes that keep living organisms stable in constantly changing environments

Systems

* An organized group of related parts that interact to form a whole
* Eg. Engine, humans, etc.

Microscopy

* 
* Diagraph adjusts amount of light
* Total magnification =ocular \* objective
* Wet mount slide
  + 1. Take out a clear, clean slide.
    2. Place 2 drops of water on the middle of the slide.
    3. Carefully place specimen in the middle of water.
    4. Gently lower cover slip onto water drops.

**Unit 2 – Scientific Method**

Scientific Process

* Variables
  + IV (MV) – what you change
  + DV (RV) – what is measured due to change
  + CV – what is kept the same
* Groups
  + Control group – setup without IV (MV)
  + Experimental group – setup with IV (MV)

**Unit 3 – Ecology, Pyramids and Populations**

Ecology

* The study of the interactions of living organisms with one another and their physical environments
* Levels of organisation
  + Biosphere
  + Ecosystem
  + Community
  + Population
  + Organism
  + System
  + Organ
  + Tissue
  + Cell
  + Molecule
  + Atom
* Interactions
  + Predation : + / -
  + Parasitism: +/ -
  + Commensalism: + / 0
  + Mutualism: + / +
* Biotic – all living factors of an ecosystem
* Abiotic – all the non-living components of an ecosystem (amount of rain, temp, etc.)
* Food Chain – describes the feeding relationships and the path of energy
* Food Web – shows interactions between a wide variety of organisms in environment

Pyramid Models

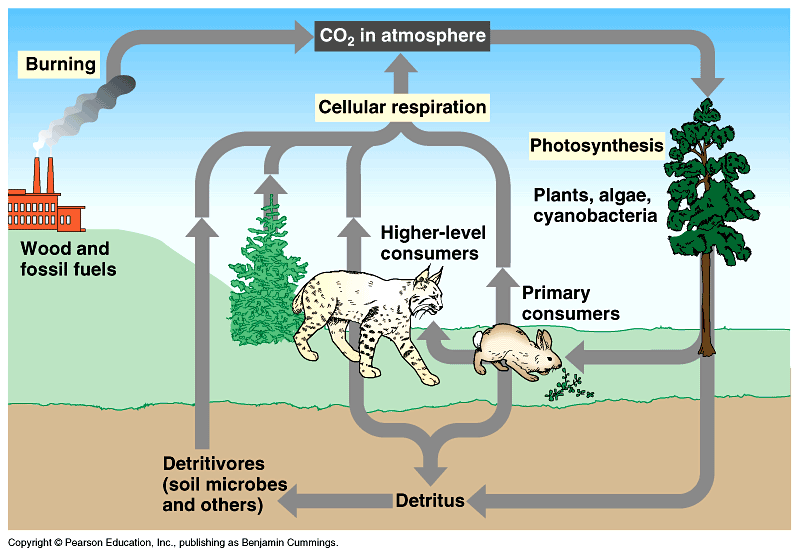
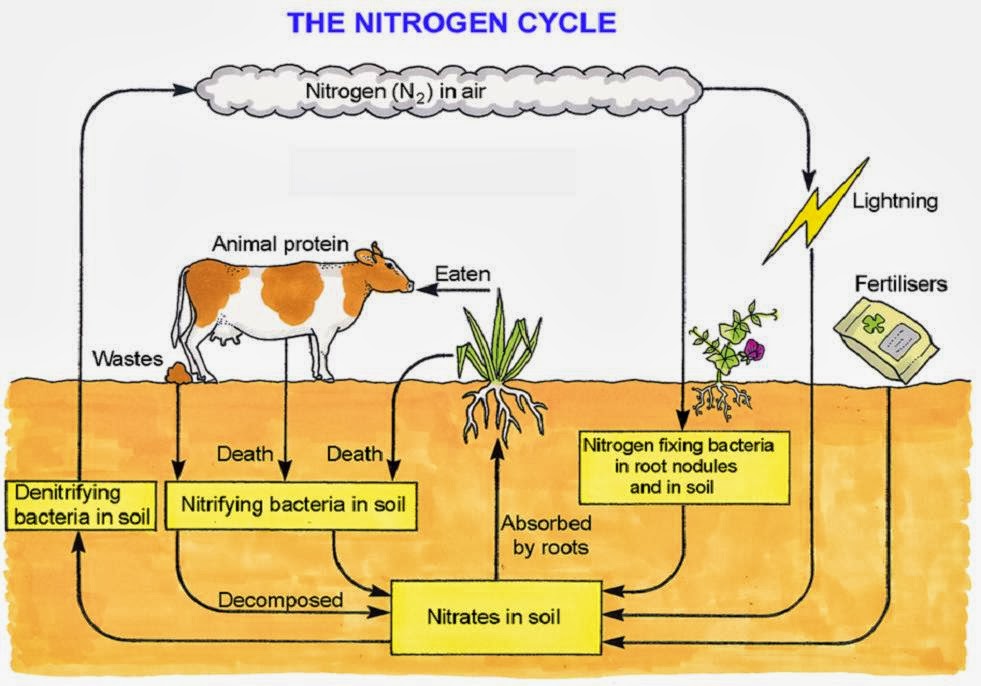
* Trophic Levels
  + Autotroph – capture energy from the sun and turn it into energy (plants)
  + Heterotroph – Consumers, gets energy by eating plats or other organisms
    - Primary
    - Secondary
    - Tertiary
  + Saprotroph – an organisms that feeds off of the dead or decaying organic matter
    - Decomposers-release energy back into the environment to be recycled
    - Detritivores
* Energy flow
  + 90% percent of energy is given off as heat
  + 10% moves onto the next trophic level
* Biomass – the mass of an animal minus water

Populations

* Population – all the members of a species that live in the same place at one time
* Dispersion
  + Uniform – organized
  + Random – scattered
  + Clumped – forms groups
* Growth rates
  + Depends upon:
    - + birth, emigration
    - - death, immigration
  + Logistic
  + Exponential (J-shaped)
  + Carrying capacity – the number of individuals the environment can support over a long period of time
* Limiting factors
  + Density Independent Factors – weather, fires, floods
  + Density Dependent Factors – food shortages, space limitations, waste accumulation

**Unit 4 – Human Impact**

Cycles

* Hydrologic Cycle
  + [](https://www.bing.com/images/search?q=water+cycle&view=detailv2&&id=2380DBA433736E84E7D9FF8288E785054942F3EA&selectedIndex=4&ccid=x6u%2fbElt&simid=608027126406385254&thid=OIP.Mc7abbf6c496d6c7359019688c86670a0H0)
  + Condensation
  + Precipitation
  + Evaporation
  + Transpiration – release of water through the leaves of plants into the atmosphere
    - More humidity = less transpiration
    - Higher temp = more transpiration
    - More wind = more transpiration
    - Stomata – pores in plant leaves that let out water
* Carbon Cycle
  + 
  + Photosynthesis
    - Water and carbon make energy (glucose)
  + Respiration
    - Energy makes water and carbon
* Nitrogen Cycle
  + 
  + Nitrogen gas makes up 79% of atmosphere
  + Plants and animals need nitrogen to make proteins and DNA

**Unit 5 – Cell Discovery & Theory, Cell Structure & Function**

Cell Discovery & Theory

* First Microscope – Zacharias Jansen
* First Cell – Antony van Leewenhoek
  + Discovered bacteria, protists, sperm cells, blood cells and nematodes
* Plants are made of cells – Mattias Schleiden 1838
* Animals are made of cells – Theodore Shwann 1839
* Cell Theory – Rudolf Virchrow
  + All living things are composed of one or more cells
  + In organisms, cells are the basic structure and function
  + All cells are produced from pre-existing cells

Microscopy

* Light microscope
  + 1,000x, uses light, can see living things, coloured images
* Electron Microscope
  + 100,000x, uses wavelength of electrons, can’t look at living specimens, black and white images

Cell Structure & Function

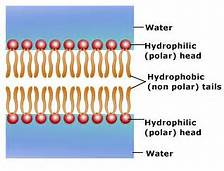
* Prokaryotes
  + no nucleus
  + Single celled organism
  + No membrane bound organelles
  + Made up of Cell Wall and DNA
  + Bacteria
* Eukaryotes
  + Has a nucleus
  + Membrane-bound organelles
  + Genetic material – in nucleus
  + Multi and single-cellular organisms
  + Plants and Animals
* Cell Membrane – surrounds the cell, controls movement in and out of the cell
* Cytoplasm – fills the space inside the cell, maintains structure
* Cytosol – fluid environment, mostly water
* Cytoskeleton – fibres crisscrossing the cell, gives cell shape, track for organelles to move on, enables cells to move and divide
* Organelles - sub-cellular structures, perform specialized tasks
* Nucleus – brain of cell, stores DNA (instructions for making proteins)
  + Nuclear Envelope: controls movement in and out of cell
  + Nuclear Pore: holes that allow movement between nucleus and cytoplasm
  + Nucleolus: dense region in the nucleus, where ribosomes are made
  + Chromatin: genetic material (DNA) which is organised into chromosomes during cell division
* Endoplasmic Reticulum – highway of cell, interconnected network of channels that aid in the movement of molecules in the cell
  + Rough ER
    - Ribosomes found on surface
    - Proteins leave ribosome and enter into ER where they are modified
  + Smooth ER
    - No ribosomes on surface
    - Makes lipids
    - Breaks down alcohol and drugs
* Vesicles – small membrane enclosed sacs, transport molecules from ER to Golgi Apparatus
* Ribosome – makes proteins and found in the cytosol or on the ER
* Golgi Apparatus – processes/sorts/packages protein/lipids (from ER) for distribution within the cell
* Mitochondria – “powerhouse”, converts food into usable energy for the cell
* Vacuole – fluid filled sacs that store water, food molecules, ions and enzymes
  + Animal cells have small vacuoles
  + Plant cells have on large central vacuole
* Lysosomes “suicide sac”, carry enzymes to destroy cellular waste, break down damaged/worn out parts, defend cell from invading bacteria/viruses
* Animal Cells
  + Centrioles, 2 cylindrical organelles (together make centrosome), aid in moving chromosomes during cell division, found in animals and algae
* Plant Cells
  + Cell Wall – gives cell shape and support and provides protection
  + Chloroplast – changes sunlight into food
  + Central Water Vacuole
* Unicellular
  + Single cell
  + Bacteria, Amoeba
* Multicellular
  + Larger organisms
  + Different cells have different functions
  + Humans, spiders

**Unit 7 – Lipids, Cell Membrane & Transport**

Lipids

* Organic molecule
  + Not soluble in H20, but are soluble in oils
  + More energy in lipids than carbohydrates
  + Made up of C,H,O , but very little O
* Triglyceride – 1 glycerol and 3 fatty acids
  + Saturated fatty acid – solid at room temp
  + Unsaturated fatty – liquid at room temp
* Phospholipid- same structure as triglyceride but with 1 phosphate group
* Steroids – hormones and cholesterol

Cell Membrane and Regulation

* Cell membrane regulates what comes in and out of the cell, maintains homeostasis
* [](https://www.bing.com/images/search?q=lipid+bilayer&view=detailv2&&id=3017537065B6D9A31752BFB486CB38CE51398C77&selectedIndex=0&ccid=X6A5xaHT&simid=608021633137639739&thid=OIP.M5fa039c5a1d3b8040ea47875387c72a9H0)
  + Hydrophobic – water fearing
  + Hydrophilic – water loving
* Fluid Mosaic
  + Fluid – the bilayer is fluid, can move side to side
  + Mosaic – assortment of different proteins
* Proteins
  + Receptor Protein
    - Transmits into from outside of the cell into the cell
    - Specifically shaped proteins that fit all the way through the bilayer
    - Specifically shaped molecule fits into the protein, this causes a change on the other side of the molecule that causes a change inside of the cell
    - Eg. Hormones
  + Marker Protein
    - Proteins that recognize self and non-self, eg. transplants
    - Only on the outside of the bilayer
    - Your body relies on marker proteins to tell one cell from another
  + Channel Protein
    - Specifically shaped proteins that fit all the way through the lipid bilayer
    - Used to transport polar sugars, amino acids and ions (Na+)
    - Particular channels fit only certain particles (lock and key)
* Types of membrane
  + Permeable – nearly all molecules can pass through
  + Impermeable – nothing can pass through
  + Semi-permeable (selectively permeable) – many molecules can pass, many cannot

Passive Transport

* Passive transport – does not expend cellular energy for movement to take place
* Parts of a solution
  + Solute – what gets dissolved
  + Solvent – what does the dissolving, more plentiful than solute
  + Solution – the mixture of solvent and solutes
* 3 types of passive Transport
  + Diffusion
    - Passive transport without a membrane
    - Transport of molecules from an area of higher to lower concentration, until equilibrium
  + Osmosis
    - Passive transport with a membrane
    - Diffusion through a membrane
    - Movement of H2O, from high to low concentration, until equilibrium
  + Facilitated Diffusion
    - Protein channels in the cell membrane accept only specific molecules
    - Many of these protein channels are “two-way” and are called pores
    - These transport ions or molecules (solutes) through membranes in either direction
* 3 types of Solutions
  + Hypertonic – water leaves the cell
    - Cell shrinks
  + Hypotonic – water enters the cell
    - Cell grows
  + Isotonic – even amounts of solvent/ solute

Active Transport

* Needs energy

**Unit 8 – Photosynthesis and Respiration**

Photosynthesis

* The process by which light energy (from the sun) is converted to chemical energy stored in Glucose
  + Glucose can then be used to fuel all life processes
* Autotrophs: organisms that make their own food
* In plant cells, photosynthesis takes place in the Chloroplast
  + Thylakoid: where light energy is absorbed, and ATP (cellular energy) is made
  + Granum (Grana): stack of Thylakoid
  + Stroma: fluid surrounding grana. It is where glucose is made
* 6CO2 + 6H2O -> C6H12O6 + 6O2
* Light Dependent Reaction
  + Thylakoid membrane
  + Light energy -> Oxygen gas and ATP
  + Green pigment, absorbs all but green wavelength light
* Light Independent Reaction (Calvin Cycle)
  + Stroma
  + CO2 and ATP -> Glucose
  + Energy in ATP bonds is used to make glucose using CO2. Some of the energy from the sun is stored in the bonds of glucose
  + CO2 enters the leaf through the stroma

Respiration

* Breaks down glucose into ATP (energy for the cell)
* In the Mitochondria
* 3 steps
  1. Glycolysis
     + Glucose is broken down into smaller parts (2 molecules of Pyruvic acid)
     + Produces some ATP
  2. Citric acid cycle
     + Pyruvic acid is broken into CO2
     + More ATP is produced
  3. Electron transport chain (ETC)
     + Hydrogen is released and forms with oxygen to create water
     + More ATP is produced (produces most ATP)
* C6H12O6 + 6O2 --> 6CO2 + 6H2O + energy (ATP)
* Aerobic respiration
  + Needs oxygen
  + Produces most ATP
* Anaerobic respiration
  + Does not need Oxygen
  + Only happens in oxygen deprived environments
  + Does not produce as much ATP as aerobic