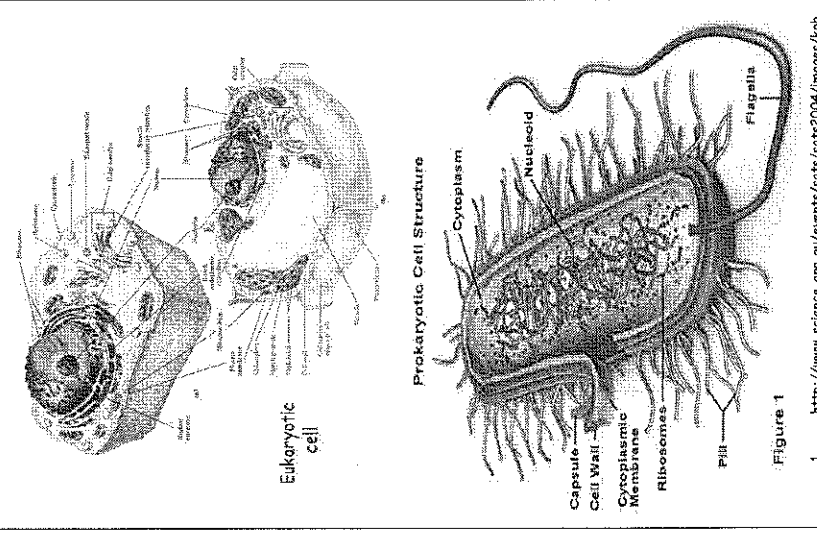


## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<b>Scientific Method</b>	The scientific method is the step by step process by which scientists investigate hypotheses using experiments.	Observation Hypothesis Control group Experimental group Independent variable Dependent Variable Conclusion Theory	A valid experiment always has a control group (used for a comparison). The independent variable is the variable being manipulated in the experiment (the "thing" tested). In comparison, the dependent variable is the variable being measured. If... then statement If (independent variable) then (dependent variable). A scientific theory has been supported by many successful tests and supported hypothesis.	<p style="text-align: center;"> <a href="http://www.sciencemethods.org/mentor/01review_scientific_method2.gif">http://www.sciencemethods.org/mentor/01review_scientific_method2.gif</a> </p>
<b>Organic Molecules</b>	Large complex molecules that are made by living organisms. These molecules contain carbon and include: lipids, proteins, carbohydrate s, and nucleic acids.	Glycerol Fatty acid Amino acid Peptide bond Amine group Nitrogenous base Phosphate group Lipid Protein Nucleic acid Carbohydrate Enzyme Catalyst Dehydration synthesis hydrolysis	-Lipids are fats, they are made up of fatty acids and glycerol (stored energy, insulation, and protection): they give you long term energy (ie. Peanuts) -Saturated fats (solid at room temp) v. unsaturated fats (liquid at room temp - better for you) -Carbohydrates are sugars, monosaccharides (end in -ose), disaccharides (ex. Sucrose), and polysaccharides (ex. Starch or cellulose). Glucose is an example of a monosaccharide (quick energy). Glucose is made by photosynthesis and broken down in CR to make ATP. -Proteins are made up of amino acids, made by the code in DNA via protein synthesis (function: gene expression, Enzymes (end in -ase), strength, proper cell function) -Nucleic Acids are made up for nucleotides (nitrogenous base, phosphate group and a five carbon sugar). Examples are DNA (holds the genetic code) and RNA (moves the genetic code around the cell)	<p style="text-align: center;"> <a href="http://www.palsons.com/Files/RF/02/02/images/Glucose.gif">1. http://www.palsons.com/Files/RF/02/02/images/Glucose.gif</a>  <a href="http://go.alex.com/files/06/WG/Edu/FN/7/0/D/3/m6884R-1J-FLRPO/BD2V/GdY_faminoacidstruc.jpg">2. http://go.alex.com/files/06/WG/Edu/FN/7/0/D/3/m6884R-1J-FLRPO/BD2V/GdY_faminoacidstruc.jpg</a> </p>

# Biology Year Review

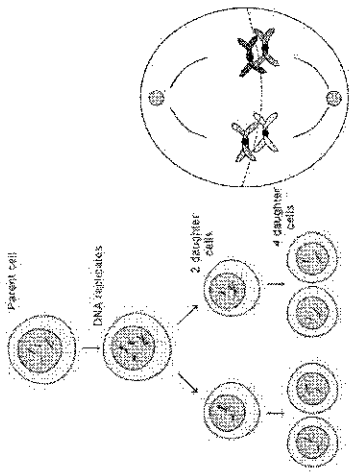
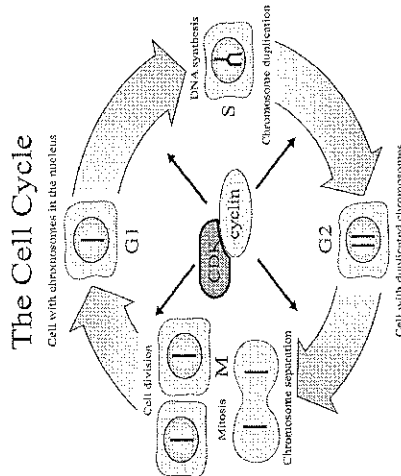
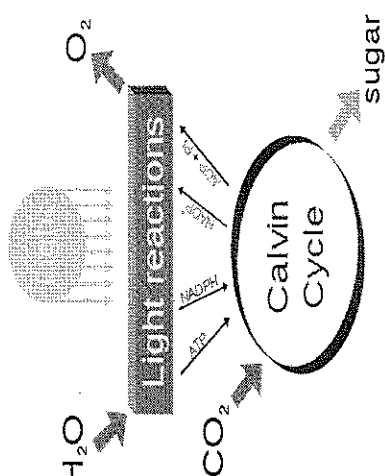
Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
Cell Anatomy	Cell anatomy relates to the structure of cells.	Prokaryote Eukaryote Organelles Cell membrane Phospholipid bilayer Nucleus Lysosome Endoplasmic reticulum Golgi apparatus ribosome Centriole Mitochondria Plant cell Animal cell Chloroplast Cell wall Cytoplasm	<p>Prokaryotic cells are different from eukaryotic cells in they only have a cell membrane and genetic material. These cells do not have membrane organelles and do not have a true nucleus, ex. Bacteria</p> <p>Eukaryotic cells are cells that have membrane organelles and true nucleus: Protozoa, plant cells, animal cells. Protozoans (amoeba, paramecium, euglena) are unicellular eukaryotic cells. They look a lot like bacteria (b/c unicellular and simple) but they have organelles and a membrane bound nucleus.</p> <p>Plants cells differ from animal cells, because they have a cell wall and chloroplasts which animal cells do not have. Organelles are membrane bound structures that carry out specific functions in the cell.</p>	 <p>The diagrams illustrate the structural differences between eukaryotic and prokaryotic cells. The eukaryotic cell diagram shows a complex internal structure with various organelles labeled, including the nucleus, mitochondria, Golgi apparatus, and endoplasmic reticulum. The prokaryotic cell diagram shows a simpler structure with a capsule, cell wall, cytoplasm, and a nucleoid region, but lacks a true nucleus and membrane-bound organelles.</p>

1. <http://www.science.sra.eu/events/zets/zets2004/images/feb56.jpg>
2. <http://teachmean.com/paramus.k12.nj.us/Noian/2005-2006/prokaryote.jpg>

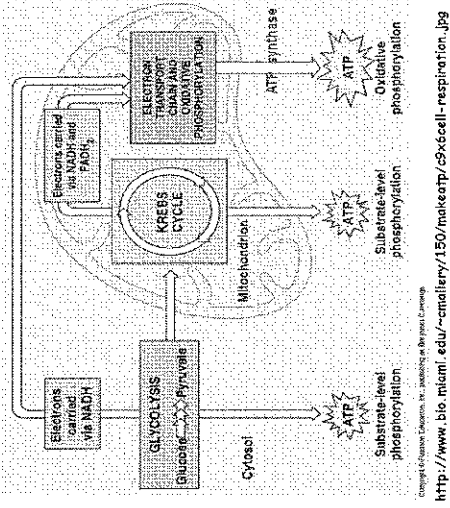
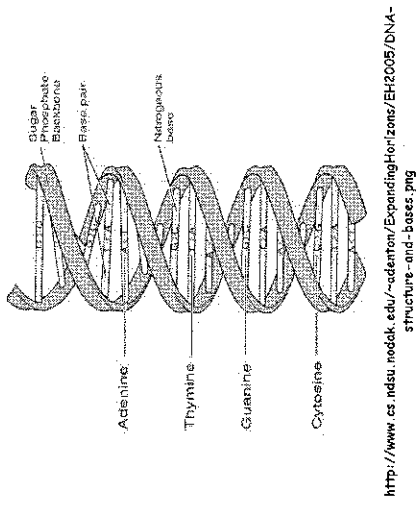
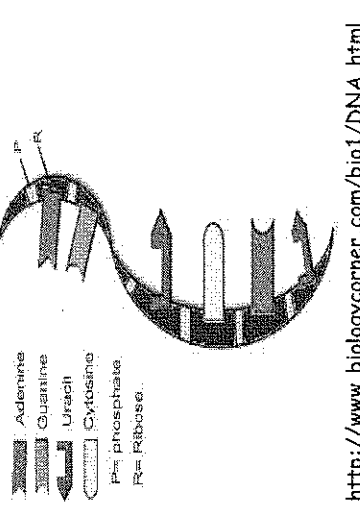
# Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<p><b>Cell Transport</b></p>	<p>How materials are transported in and out of the cell and throughout the cell.</p>	<p>Cell membrane Membrane protein Passive transport Concentration gradient Diffusion Osmosis Active transport Phagocytosis Pinocytosis Isotonic Hypertonic Hypotonic Solute Solvent solution</p>	<p>Substances like oxygen and water typically move passively across a cell membrane from HIGH to LOW concentration. Tonicity is the measure of how much solute there is in a solution. (Hypertonic – sea water; Hypotonic solution – ex. Distilled water) Human cells have a mixture of salt and water in them (Saline solution is isotonic to our bodies). If a human cell is placed in a solution of JUST water it would be placed in a hypotonic environment. In a hypotonic environment there is more water outside of the cell, therefore water moves from a HIGH to LOW concentration and rushes IN to the cell until an equilibrium is reached. If the concentration gradient is too great the cell can burst. Proteins act as channels or doors that selectively allow substances in the cell. The can also, sometimes ACTIVELY pump substances into the cell if needed. H → L concentration (concentration gradient)</p>	<p>Carrier molecule Transported ion Symport Antiporter Energy Coupled transport Active transport</p> <p><a href="http://www.ageni.edu/~dymag2162/OnlineBiologyOLBB/www.emc.maricopa.edu/faculty/furnbee/BIOBK/ncemts2.gif">http://www.ageni.edu/~dymag2162/OnlineBiologyOLBB/www.emc.maricopa.edu/faculty/furnbee/BIOBK/ncemts2.gif</a></p>
<p><b>Mitosis</b></p>	<p>When the cell divides for growth, repair, regeneration, and in some organisms asexual reproduction.</p>	<p>Diploid Daughter cell Interphase G1, S, and G2 DNA replication Sister chromatids centromere</p>	<p>The phases of mitosis (nuclear division): prophase (nuclear envelope disappears); metaphase (sister chromatids line up); anaphase (sister chromatids separate at centromere); telophase (cell starts to pinch in, nuclear envelope starts to reappear); Cytokinesis (cell divides) DNA replication occurs during phase of interphase. DNA needs to replicate in order for a cell to divide properly. Mitosis occurs in body cells and makes 2 new IDENTICAL DAUGHTER CELLS. Asexual Reproduction (cloning, binary fission, budding, regeneration) is able to occur because of Mitosis. -benefit is when organisms reproduce asexually they do not have to find a "partner"; this occurs faster and less energy is expended -disadvantage is that the offspring DO NOT have genetic diversity; the only way you can get genetic diversity in this type of population is by a mutation</p>	<p>Chromosomes Spindle fibers Nuclear envelope Centrioles Prophase Metaphase Anaphase Telophase</p> <p><a href="http://staff.kings.edu/kellis/StudentWork/Kaliny%20Lessons/esson_plan_3_files/image007.jpg">http://staff.kings.edu/kellis/StudentWork/Kaliny%20Lessons/esson_plan_3_files/image007.jpg</a></p>

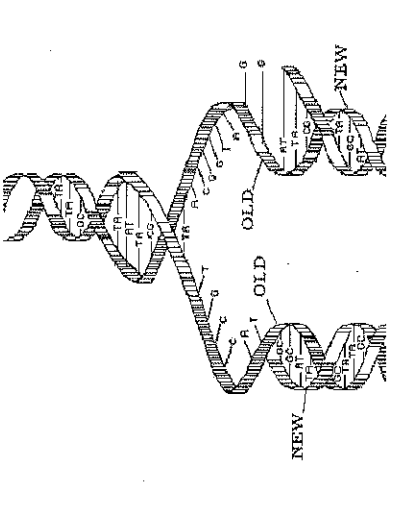
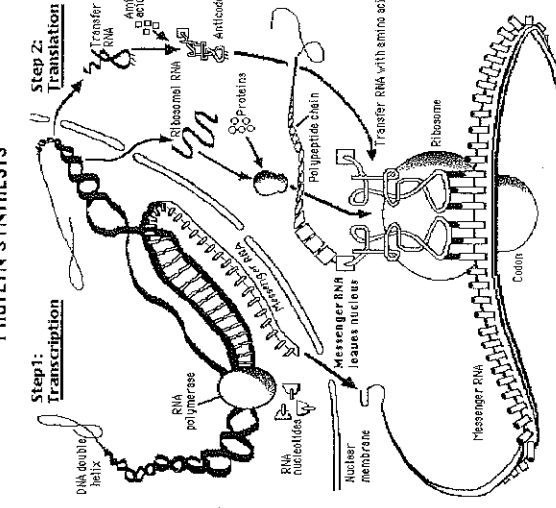
## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<b>Meiosis</b>	When a cell divides to make gametes.	Haploid Homologous pairs Crossing over Gamete	<p>-Two cell divisions: prophase I (homologs pair up); metaphase I (homologous pairs line up on the plate); anaphase I (homologs separate); telophase (cell pinches) and then divides. Each new cell goes on to divide again, similar to mitosis. Prophase II, Metaphase II, Anaphase II, Telophase II</p> <p>-Meiosis occurs only in the reproductive organs; occurs to produce gametes (sex cells)</p> <p>-sex cells are haploid in number and are genetically unique!</p>	 <p><a href="https://www.devidandina.info/images/meiosis.jpg">https://www.devidandina.info/images/meiosis.jpg</a>  <a href="https://worldofbiology.wikispaces.com/File/View/metaphaseI.comp.jpg/34160967/metaphaseI.comp.jpg">https://worldofbiology.wikispaces.com/File/View/metaphaseI.comp.jpg/34160967/metaphaseI.comp.jpg</a></p>
<b>Cell Cycle</b>	"the cells life"; The stages that a cell goes through, leading to its division and duplication (replication).	Interphase G1 Phase Protein Synthesis S Phase DNA Replication G2 Phase Mitotic/Meiotic Phase Chromosomes Condense	<p>The cell cycle is an ordered set of events, culminating in cell growth and division into two daughter cells. The stages, pictured to the right, are G1-S-G2-M. The G1 stage stands for "GAP 1". This is where protein synthesis occurs; the cell also grows. The S stage stands for "Synthesis". This is the stage when DNA replication occurs. The G2 stage stands for "GAP 2". The M stage stands for "mitosis", and is when nuclear (chromosomes separate) and cytoplasmic (cytokinesis) division occur. Mitosis is further divided into 4 phases.</p>	 <p><a href="http://nobelpriize.org/nobel_prizes/medicine/laureates/2001/press.html">http://nobelpriize.org/nobel_prizes/medicine/laureates/2001/press.html</a></p>
<b>Photo-synthesis</b>	The process in which plants (autotrophs) make their food (glucose) using sunlight	Glucose Chloroplast Chlorophyll Stomate Thylakoid Autotrophs Abiotic Biotic Producers	<p>Sunlight + water + carbon dioxide → Glucose (C6H12O6) and oxygen</p> <p>Autotrophs are organisms that can make their own food. Plants are type of autotroph. They make their own food (glucose) from sunlight via photosynthesis.</p> <p>The process in which plants capture sunlight (chloroplast) and use it to make glucose.</p>	

## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<p><b>Cellular Respiration</b></p>	<p>The process in which organisms (plants and animals) convert glucose into ATP energy</p>	<p>ATP Mitochondria Glucose Cytosol Glycolysis Krebs cycle Electron transport chain Anaerobic cellular respiration Lactic acid ethanol</p>	<p>Glucose + oxygen → carbon dioxide + water + 36 ATP</p> <p>BOTH producers and consumers conduct cellular respiration. This is how they convert their food energy into energy that can be used by their cells.</p>	 <p>The diagram illustrates the three main stages of cellular respiration. Glycolysis occurs in the cytosol, converting glucose into pyruvate and producing ATP through substrate-level phosphorylation. Pyruvate then enters the mitochondrion for the Krebs cycle, which also produces ATP through substrate-level phosphorylation. Finally, electrons from the Krebs cycle are carried to the electron transport chain and oxidative phosphorylation, where ATP synthase uses the proton gradient to produce a large amount of ATP.</p> <p><small>Copyright © Pearson Education, Inc., publishing as Benjamin Cummings http://www.bio.miami.edu/~cmallery/150/Makeup/c9xcell-respiration.jpg</small></p>
<p><b>DNA Structure</b></p>	<p>Deoxyribonucleic Acid is the nucleic acid found in the nucleus of cells. It holds the genetic code for living things and is made up of nucleotides.</p>	<p>Nucleotide Phosphate group 5-carbon sugar Nitrogen base Deoxyribose Ribose RNA Genes Double helix Hydrogen bond</p>	<p>DNA is a double helix made up of nucleotides. Each nucleotide comprises of a sugar, phosphate group, and nitrogen base.</p> <p>DNA holds the genetic code that codes for everything in an organism. The code is transferred throughout the cell by RNA.</p> <p>RNA is another type of nucleic acid. It is single stranded and has a different sugar (ribose) and nitrogen base (uracil) than DNA.</p> <p>Watson and Crick discovered the structure of DNA.</p>	 <p>The diagram shows a DNA double helix. The two strands are connected by hydrogen bonds between nitrogenous bases. The bases are Adenine, Thymine, Guanine, and Cytosine. The backbone consists of alternating sugar and phosphate groups.</p> <p><small>http://www.cs.ndsu.nodak.edu/~edentom/Expansion/izoms/EH2005/DNA-structure-and-bases.png</small></p>
<p><b>RNA Structure</b></p>	<p>Single stranded, nucleic acid present in all living cells.</p>	<p>Nucleotide Sugar Phosphate Adenine Guanine Cytosine Uracil mRNA tRNA rRNA</p>	<p>Its principal role is to act as a messenger carrying instructions from DNA for controlling the synthesis of proteins</p> <p>RNA is involved in carrying the genetic code from the nucleus to the ribosome for protein production</p> <p>The tRNA interprets the codons on the mRNA; resulting in a chain of amino acids</p>	 <p>The diagram shows a single-stranded RNA molecule. It is composed of nucleotides with a phosphate group, a ribose sugar, and a nitrogenous base (Adenine, Guanine, Uracil, or Cytosine).</p> <p><small>http://www.biologycorner.com/bio1/DNA.html</small></p>

## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<p><b>DNA Replication</b></p>	<p>The use of existing DNA as a template for the synthesis of new DNA strands. In humans and other eukaryotes, replication occurs in the cell nucleus.</p>	<p>Helicase Dna polymerase Leading strand Lagging strand Ligase Semi-conservative replication</p>	<p>In order for DNA to replicate the double helix must first open. The enzyme helicase, breaks the hydrogen bonds that connect the nitrogen bases, thus opening the helix. RNA primase begins the process of DNA Polymerase adding complimentary nucleotides in the 5→3' direction. Bases on the leading strand are added in the same direction in which helicase is working, this happens at a faster rate than the lagging strand. The enzyme ligase glues together the fragments of nucleotides added to the lagging strand. In the end, two new DNA helices are made, each comprising of a new and old strand (semi-conservative replication)</p>	 <p><a href="http://library.thinkquest.org/CO06188/basics/pictures/dna_replication.gif">http://library.thinkquest.org/CO06188/basics/pictures/dna_replication.gif</a></p>
<p><b>Protein Synthesis</b></p>	<p>The process in which the genetic code carried by messenger RNA directs cellular organelles called ribosomes to produce proteins from amino acids.</p>	<p>Helicase Transcription Nucleus Rna polymerase Cytoplasm Mrna Trna Codon Anticodon Amino acid Peptide bond protein</p>	<p>Transcription (nucleus) = DNA → RNA Translation (ribosome) = RNA → Protein Summary: -Helicase unwinds the dna; one strand of the dna acts as a template to make a complimentary mRNA strand -mRNA leaves the nucleus → cytoplasm → ribosome -at the ribosome the codons on the mRNA strand are read and translated; tRNA goes and gets the amino acid and anticodon that match up with the codon on the mRNA -amino acids are added and held together by peptide bond -when the protein is finished being made it is released and goes in the cell to where it needs to in order to carry out its function; <u>proteins carryout genetic expression!</u></p>	 <p><a href="http://www.agen.ufl.edu/~chyn/age2062/On-LineBiology/CLBB/www.etc.mar.icopa.edu/faculty/farabee/BIOLBK/protein_synthesis.gif">http://www.agen.ufl.edu/~chyn/age2062/On-LineBiology/CLBB/www.etc.mar.icopa.edu/faculty/farabee/BIOLBK/protein_synthesis.gif</a></p>

## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic								
<b>Genetics</b>	study of heredity and the variation of inherited characteristics	<b>Genotype</b> <b>Heterozygous</b> Homozygous dominant Homozygous recessive <b>Phenotype</b> <b>Codominance</b> Incomplete dominance <b>Pedigree</b> <b>Test cross</b> Parent generation F1 generation Sexlinked Autosomal trait Mutation Polygenic trait	<p><b>Law of segregation</b> - members of a pair of homologous chromosomes separate during the formation of gametes</p> <p><b>Law of independent assortment</b> - each member of a pair of homologous chromosomes separates independently of the members of other pairs so the results are random</p> <p><b>while viruses lack cellular structure, they have the genetic material to invade living cells</b></p> <p>sex linked traits are those only on the X chromosome (males are more commonly affected bc they only need one allele for the trait)</p> <p>RNA has the ability to "do" things with the genetic code</p> <p>DNA only stores the code in chromosomes, in the nucleus</p> <p>Hair type and Blood types: example of codominance</p> <p>Eye and Skin color: example of polygenic traits</p>	<p>Substitute genotypes for male and female</p> <p>Cannot get this gene from this parents show</p> <p>Legend: <math>\square</math> = male, <math>\circ</math> = female</p> <p><a href="http://webhome.broward.edu/~fsearcj/pedigree.html">http://webhome.broward.edu/~fsearcj/pedigree.html</a></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2" style="text-align: center;">Mother</td> </tr> <tr> <td style="text-align: center;"><math>I^A I^A</math></td> <td style="text-align: center;"><math>I^A I^A</math></td> </tr> <tr> <td style="text-align: center;"><math>I^B I^B</math></td> <td style="text-align: center;"><math>I^B I^B</math></td> </tr> <tr> <td colspan="2" style="text-align: center;">Father</td> </tr> </table> <p>Half of the children predicted to be <b>Type A</b>, and half <b>Type B</b>.</p> <p><a href="http://www.biology.arizona.edu/mendelian_genetics/problem_sets/morehybrid_cross/13t.html">http://www.biology.arizona.edu/mendelian_genetics/problem_sets/morehybrid_cross/13t.html</a></p>	Mother		$I^A I^A$	$I^A I^A$	$I^B I^B$	$I^B I^B$	Father	
Mother												
$I^A I^A$	$I^A I^A$											
$I^B I^B$	$I^B I^B$											
Father												
<b>Evolution</b>	Idea that things change over time	Natural selection Adaptation (noun) Fossils Homologous structures Analogous structures Adaptive radiation Comparative anatomy Coevolution Speciation Hardy weinberg equilibrium equation	<p>taxonomic system classifies living things into domains (eubacteria, archaeobacteria, and eukaryotes) and kingdoms (animals, plants, fungi, etc.)</p> <p>scientists classify based on evolutionary history</p> <p>species: group of interbreeding organisms</p> <p>Darwin: credited with the theory of natural selection</p> <p>Variation is present due to mutations and sexual reproduction</p> <p>Must have variation in order for evolution to occur: mutations or sexual reproduction</p> <p>Needed for evolution:</p> <ul style="list-style-type: none"> <li>Selective mating</li> <li>Variation (sex or mutations)</li> <li>Environmental change</li> <li>Gene flow</li> <li>Genetic drift</li> </ul>									

## Biology Year Review

Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
<p><b>Ecology</b></p>	<p>branch of biology that deals with the relations of organisms to one another and to their physical surroundings</p>	<p>Commensalism Mutualism Parasitism Symbiosis Consumer Producer Autotroph Heterotroph Biological accumulation Carrying capacity 10% rule Ecosystem Habitat Population Abiotic factor Biotic factor Food chain v food web succession</p>	<p>biotic and abiotic factors cycle in an ecosystem (water, carbon, oxygen, and nitrogen) photosynthesis and cellular respiration affect the carbon cycle nitrogen fixing bacteria are needed for the nitrogen cycle producers, consumers, and decomposers come together to make food webs <b>Only 10% of energy is transferred through trophic levels</b> Competition for resources (food, space, mates) influence fluctuations in population size natural causes, changes in climate, human activity, or introduction of non-native species can all change an ecosystem symbiotic behavior produces interactions within ecosystems; mutualism ++, commensalism +0, parasitism +-</p>	

### Essay Topics: Be able to:

- compare and contrast mitosis and meiosis
- compare and contrast asexual and sexual reproduction
- classify the following organic molecules (protein, carb, nucleic acid, or lipid): DNA, RNA, Helicase, Wax, Sucrose, Starch
- Explain meiosis
- Design a scientific experiment (making sure to follow all steps of the scientific method)
- Compare and contrast cellular respiration and photosynthesis
- Explain how an environmental change can result in natural selection: ex. Peppered Moth
- Explain how the extinction of a plant or animal can disrupt an ecosystem
- Explain the transfer of energy through a food chain