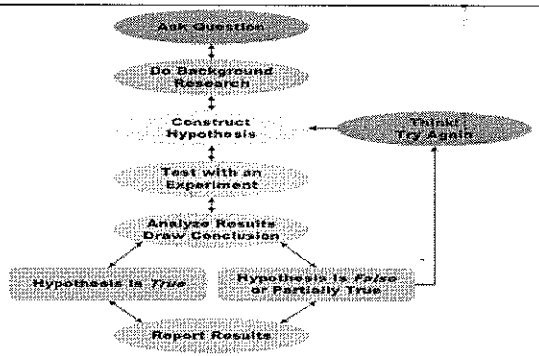
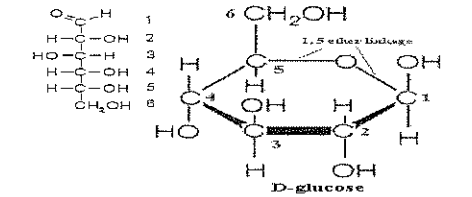
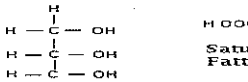
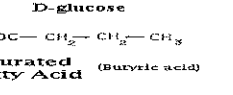
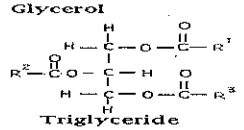
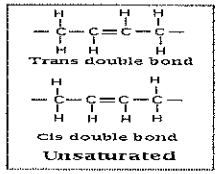
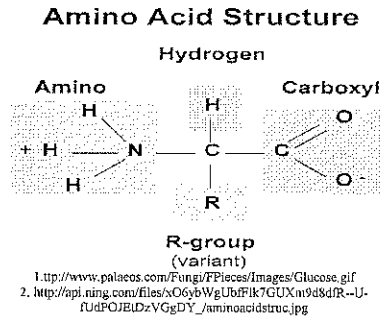
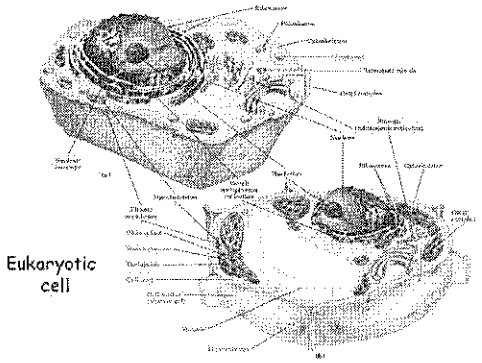
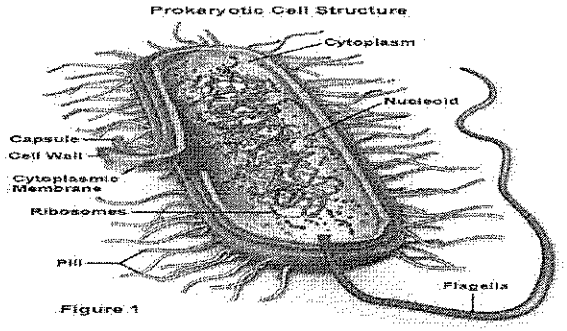
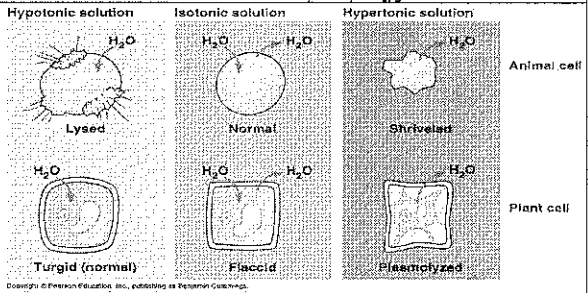
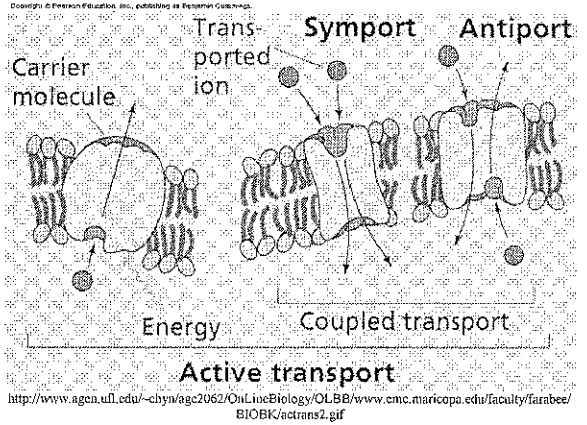
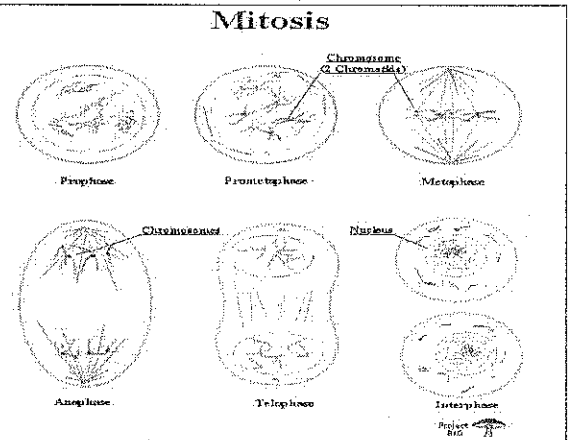
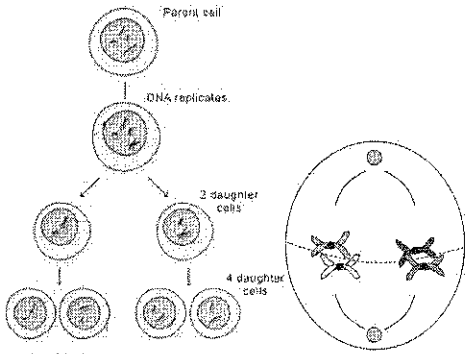
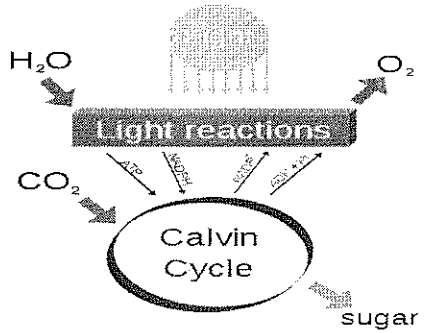
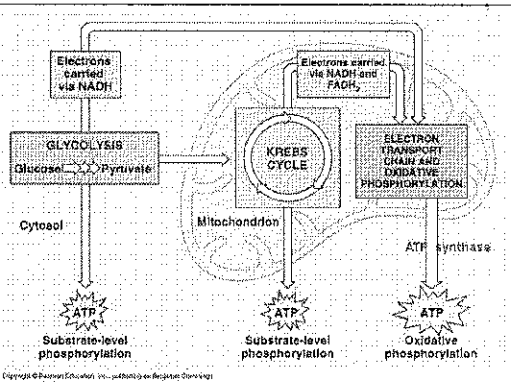
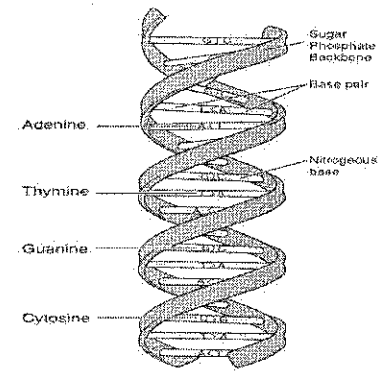
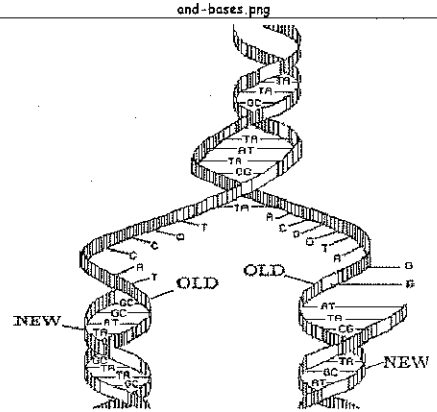
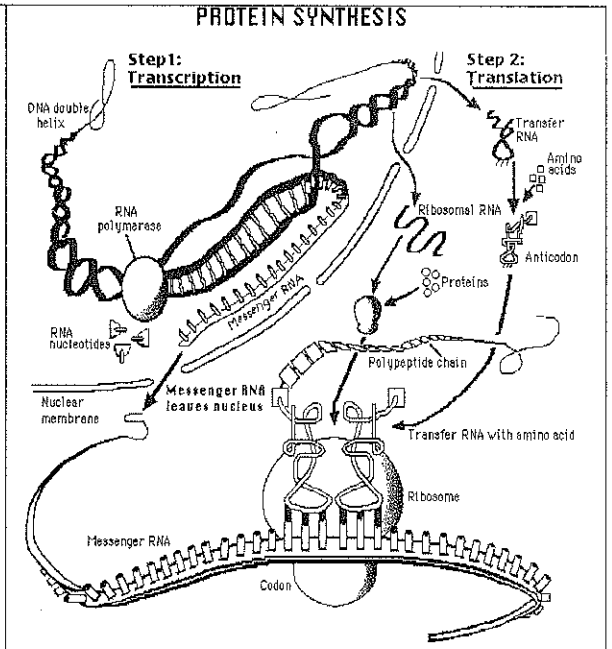
Topic Name	Define the topic	Vocabulary Relating to the Topic	Equations to Remember? Major Concepts to Remember?	Diagrams/Sketches that relate to the topic
Scientific Method	The scientific method is the step by step process by which scientists investigate hypotheses using experiments.	Observation Hypothesis 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.	 http://www.sciencebuddies.org/mentoring/overview_scientific_method2.gif
Organic Molecules	Large complex molecules that are made by living organisms. These molecules contain carbon and include: lipids, proteins, carbohydrates, 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, monosacharides (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)	      1.ttp://www.palaeos.com/Fungi/FPieces/Images/Glucose.gif 2. http://api.ning.com/files/xO6ybWgUbfFlk7GUXm9d8dfR--U-fUdPOJEtDzVGgDY_/aminoacidstruc.jpg

Cell Anatomy	Cell anatomy relates to the structure of cells.	Prokaryote Eukaryote Organelles Cell membrane Phospholipid bilayer Nucleus Lysosome Endoplasmic reticulum Golgi apparatus ribosome Centriolle Mitochondria Plant cell Animal cell Chloroplast Cell wall Cytoplasm	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 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. 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.	 Eukaryotic cell  1. http://www.science.org.au/events/sats/sats2004/images/kobe6.jpg 2. http://teachernotes.paramus.k12.nj.us/Nolan/2005-2006/procaryote.jpg
Cell Transport	How materials are transported in and out of the cell and throughout the cell.	Cell membrane Membrane protein Passive transport Concentration gradient Diffusion Osmosis Active transport Phagocytosis Pinocytosis Isotonic Hypertonic Hypotonic Solute Solvent solution	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)	  http://www.agen.ufl.edu/~chyn/age2062/OnLineBiology/OLBB/www.cmc.maricopa.edu/faculty/farabee/BIOBK/actrans2.gif

Mitosis	When the cell divides for growth, repair, regeneration, and in some organisms asexual reproduction.	Diploid Daughter cell Interphase G1, S, and G2 DNA replication Sister chromatids centromere	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 sphase 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	 http://staff.kings.edu/kdils/StudentWork/Kalinay%20Lessons/lesson_plan_3_files/image007.jpg
Meiosis	When a cell divides to make gametes.	Haploid Homologous pairs Crossing over Gamete	-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 -Meiosis occurs only in the reproductive organs; occurs to produce gametes (sex cells) -sex cells are haploid in number and are genetically unique!	 http://www.daviddarling.info/images/meiosis.jpg https://worldofbiology.wikispaces.com/file/view/metaphaseIcomp.jpg/34160967/metaphaseIcomp.jpg
Photosynthesis	The process in which plants capture sunlight (chloroplast) and use it to make glucose.	Glucose Chloroplast Chlorophyll Stomate Thylakoid Autotrophs Abiotic Biotic Producers	Sunlight + water+ carbon dioxide → Glucose ($C_6H_{12}O_6$) and oxygen Autotrophs are organisms that can make their own food. Plants are type of autotroph. They make their own food (glucose) from sunlight via photosynthesis.	 http://bioweb.uwlax.edu/bio203/s2009/cook_morg/images/photosynthesis.png

Cellular Respiration	The process in which organisms break down glucose to release ATP energy.	Heterotroph Consumer ATP Glycolysis Aerobic Respiration Anaerobic Respiration Mitochondria	Glucose ($C_6H_{12}O_6$) and Oxygen react to produce ATP Energy; carbon dioxide and water are given off as waste. Equation for Aerobic Respiration: $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + 36$ ATP Equation for Anaerobic Respiration: $C_6H_{12}O_6 \rightarrow CO_2 + 2$ ATP and Lactic Acid (or Ethyl Alcohol in plants) Cellular Respiration uses the carbon containing compound (glucose) and oxygen produced by photosynthesis. Photosynthesis helps to recycle the waste product (carbon dioxide) or cellular respiration into a usable form.	 http://www.bio.miami.edu/~cmallery/150/makeatp/c9x6cell-respiration.jpg
DNA Structure	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.	Nucleotide Phosphate group 5-carbon sugar Nitrogen base Deoxyribose Ribose RNA Genes Double helix Hydrogen bond	DNA is a double helix made up of nucleotides. Each nucleotide comprises of a sugar, phosphate group, and nitrogen base. DNA holds the genetic code that codes for everything in an organism. The code is transferred throughout the cell by RNA. RNA is another type of nucleic acid. It is single stranded and has a different sugar (ribose) and nitrogen base (uracil) than DNA. Watson and Crick discovered the structure of DNA.	 http://www.cs.ndsu.nodak.edu/~adenton/ExpandingHorizons/EH2005/DNA-structure-and-bases.png
DNA Replication	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.	Helicase Dna polymerase Leading strand Lagging strand Ligase Semi-conservative replication	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)	 http://library.thinkquest.org/C006188/basics/pictures/dna_replication.gif

Protein Synthesis	The process in which the genetic code carried by messenger RNA directs cellular organelles called ribosomes to produce proteins from amino acids.	Helicase Transcription Nucleus Rna polymerase Cytoplasm Mrna Trna Codon Anticodon Amino acid Peptide bond protein	Transcription (nucleus) = DNA → RNA Translation (ribosome) = RNA → Protein -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	 http://www.agen.ufl.edu/~chyn/age2062/OnLineBiology/OLBB/www.emc.maricopa.edu/faculty/farabee/BIOBK/protein_synthesis.gif

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