**Biology 12**

**Final Exam**

**Review Booklet Answer Key**

**Tips for Studying:**

1. **Answer each question in this review booklet**
2. **Rewrite your notes**
3. **Attend each lunch time tutorial your teacher holds (Biology 12 is Thursdays at lunch all January!)**
4. **Make cue cards and quiz yourself**
5. **Look at the learning goals that are worth the most marks and MASTER those sections**
6. **Find a study group that BRINGS OUT THE BEST IN YOUR LEARNING**
7. **Teach your parents, relatives, siblings, or pets this information**

**GOOD LUCK ☺**

**Continually SELF ASSESS using this learning goal chart**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Learning Goals | Out of… | Novice | Apprentice | Expert |
| 1. I can identify safety concerns in a science lab |  |  |  |  |
| 1. I can use the scientific method to conduct a science experiment |  |  |  |  |
| 1. I can read a graph to determine the data from a science experiment |  |  |  |  |
| 1. I will be able to describe the cell organelles and their functions |  |  |  |  |
| 1. I will be able to write the balanced chemical equation for cellular respiration |  |  |  |  |
| 1. I will be able to describe how a cell moves materials though and out |  |  |  |  |
| 1. I will be able to describe the characteristics of water and its role in the body |  |  |  |  |
| 1. I will be able to explain the role of acids, bases and bases in the body |  |  |  |  |
| 1. I will be able to explain dehydration synthesis and hydrolysis |  |  |  |  |
| 1. I will be able to differentiate between carbohydrates, lipids, proteins, and nucleic acids |  |  |  |  |
| 1. I will be able to explain how a protein is made (from DNA replication, translation, and transcription) |  |  |  |  |
| 1. I will be able to draw both DNA and RNA and explain the structure and function of both |  |  |  |  |
| 1. I will be able to explain how ATP is made and used in the body (cellular respiration – glycolysis, kreb’s cycle, ETC) |  |  |  |  |
| 1. I will be able to explain how recombinant DNA and made and used |  |  |  |  |
| 1. I will be able to explain the structure and function of the cell membrane |  |  |  |  |
| 1. I will be able to explain the roles of enzymes in biochemical reactions |  |  |  |  |
| 1. I will be able to draw and explain the various structures involved in the digestive system and their functions |  |  |  |  |
| 1. I will be able to describe the fluids and enzymes of the digestive system |  |  |  |  |
| 1. I will be able to describe the internal functioning of the heart (both blood and electrical) |  |  |  |  |
| 1. I can draw and explain the vessel structures and functions |  |  |  |  |
| 1. I will be able to explain the components of the blood and blood proteins |  |  |  |  |
| 1. I will be able to explain the structures and functions of the parts of the respiratory system |  |  |  |  |
| 1. I will be able to explain the process of breathing |  |  |  |  |
| 1. I will be able to explain the structures and functions of the kidneys and excretory system |  |  |  |  |
| 1. I will be able to explain the structure of a neuron and the process of transmission of a nerve impulse |  |  |  |  |
| 1. I will be able to explain the various parts of the brain and their functions |  |  |  |  |
| 1. I will be able to explain the various parts of the nervous system |  |  |  |  |
| 1. I will be able to explain the structures and functions of the male and female reproductive system and hormones |  |  |  |  |

**Learning Goal #1 🡪 I can identify safety concerns in a science lab**

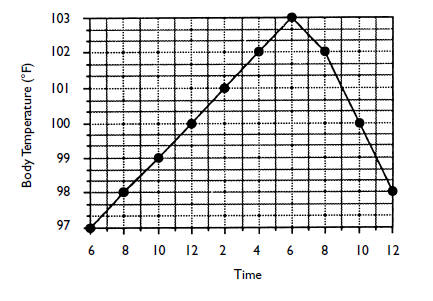
* What are seven safety rules that should be followed at all times when working in a science lab?
* Wear safety goggles if you are using chemicals or doing anything that might be risk to your eyes
* Tie your hair back if you are using Bunsen burners
* If you break glass you are to tell Mrs. Becker and she is dispose of it in the “Broken Glass” Bin
* If you spill a chemical, tell she Mrs. Becker and she will clean it up
* Be safe, be reasonable
* When using a microscope, what do you need to remember in order to use the equipment properly?
* When carrying a microscope you are to carry it with both hands to your work space
* You always start by focusing with the lowest objective lens and then move up magnification
* Never clean the lenses or slides with paper towel, only ever use Kimwipes
* When using a Bunsen burner, what do you need to remember in order to stay safe?
  + You are aiming for a blue flame
  + You want an inner cone and outer cone, the inner cone is hottest
  + Turn down the flame by turning down the gas

**Learning Goal #2 🡪 I can use the scientific method to conduct a science experiment**

1. What is the difference between an independent and dependent variable?
   * Independent variable is what you change (ie. Sunscreen lotion brands, acne cream, etc)
   * Dependent variable is what you measure (colour change, number of pimples, number of wrinkles, etc)
2. What is the appropriate wording for a hypothesis?
   * If….then….because
3. The fluid from a hibiscus flower is being tested as a possible sun screen. Devise a reliable experiment that will test this possibility. Outline the hypothesis and state the dependent and independent variables.
   * Hypothesis 🡪 If you use hibiscus flower juice and go out in the sun, then you will see no change in your skin colouration because the hibiscus flower will block UV A and B rays which will would have an impact on skin colouration change.
   * Independent variable 🡪 type of sunscreen applied (Coppertone SPF 15 vs Hibiscus flower juice)
   * Dependent variable 🡪 sun burn colouration (ranking system 0 – 5)

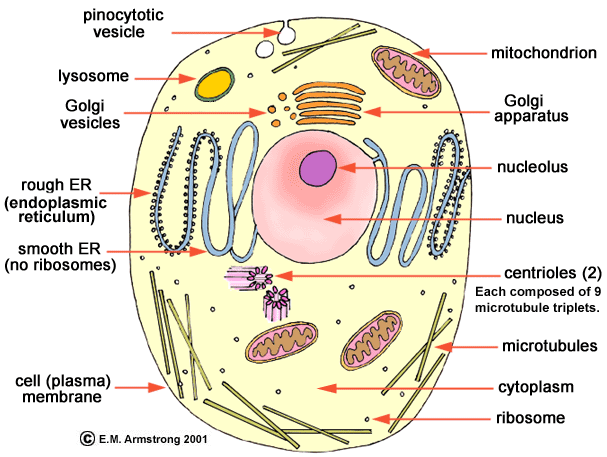
**Learning Goal #3 🡪 I can read a graph to determine the data from a science experiment**

1. In the graph below, what is missing from the graph?
   1. Missing a title that tells us what the graph is showing
   2. The x axis does not have units on it
2. What are some errors in the below graph?
   1. The x axis does not have a consecutive number orientation
3. In the graph below, what in the data on the Y axis?
   1. Body temperature in Fahrenheit
4. In the graph below, what is the time is takes to reach 97 degrees? 6 (time units unknown)



**Learning Goal #4 🡪 I will be able to describe the cell organelles and their functions**

1. Draw an animal cell and label the following structures: cell membrane, cytoskeleton, cytoplasm, golgi bodies, lysosome, mitochondria, nucleus (nuclear pore, chromatin, nucleolus, nuclear envelope, chromosomes), ribosomes, SER, RER, vacuoles, vesicles.

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=NKBXIrtEEx7K2M&tbnid=YnUs9CmjcCsWCM:&ved=0CAUQjRw&url=http%3A%2F%2Fwaynesword.palomar.edu%2Flmexer1a.htm&ei=VxrgUozgLYeDogSnjoGgBQ&psig=AFQjCNGxPgygQm5kblAnL7P8xtMMDw1pJw&ust=1390504901594346)

1. Make a chart of all the above organelles functions

|  |  |
| --- | --- |
| **Organelle** | **Function** |
| Nucleus | Houses the DNA of the cell |
| Nucleolus | A dense part of the nucleus where RNA is made |
| Nuclear pore | Hole within the nuclear membrane that allow RNA to exit the nucleus |
| Mitochondria | The energy centre of the cell, site of cellular respiration |
| Rough ER | Transport organelle and site of protein production for proteins that stay in the cell |
| Smooth ER | Transport organelle and site of lipid production |
| Golgi body | Packaging of proteins for export |
| Transport vesicle | Blebs off the golgi body and moves the item for export to the membrane |
| Lysosome | Hydrolyses macromolecules that enter the cell, contains digestive enzymes |
| Cell membrane | The phospholipid bilayer that surround the cell and is the gatekeeper for what goes in and out of the cell |
| cytoplasm | The jelly that fills the cell and that suspend the organelles |
| ribosome | Site of protein production |

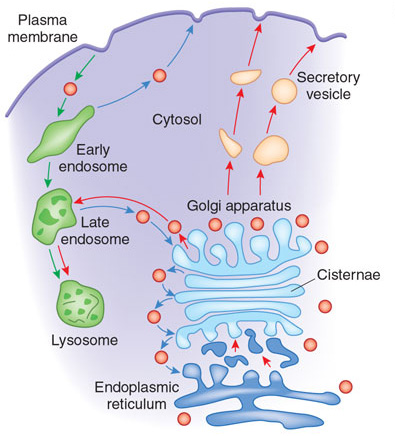
**Learning Goal #5 🡪 I will be able to write the balanced chemical equation for cellular respiration**

1. What is the balanced chemical equation for cellular respiration?

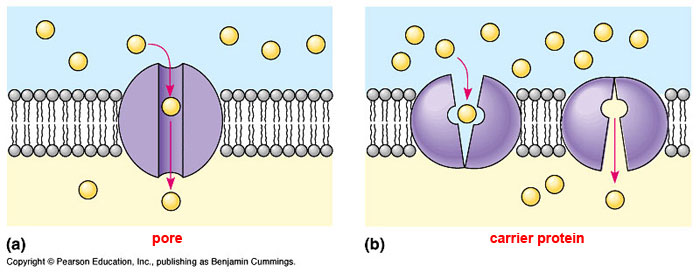
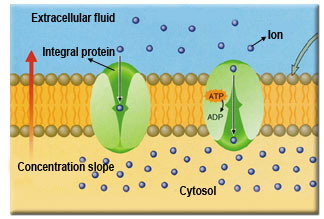
C6H12O6  + 6 O2 🡪 6 CO2 + H2O

**Learning Goal #6 🡪 I will be able to describe how a cell moves materials though and out**

1. Explain how a cell exports materials and which organelles are involved
   * Molecule travels down the ER, blebs off into vesicle which goes into golgi body for packaging
   * A secretory vesicle then gets formed off the golgi body and moves the package towards the cell membrane



1. Explain how a cell imports larger molecules
   * Pore (small monomers)
   * Carrier Proteins (medium sized particles)
   * Active Transport (requires ATP for very large molecules)

1. What are the different types of transport across a cell membrane?
   * Simple diffusion
   * Facilitated diffusion
   * Active transport

**Learning Goal #7 🡪 I will be able to describe the characteristics of water and its role in the body**

1. What are the roles of water in the human body?
   * Hydrate cell
   * In blood (most of volume)
   * Hydrolysis (used to break apart polymers)
2. Why do we need water in each of our cells?
   * hydrolysis to break down polymers
   * dehydration synthesis to build polymers
3. What body systems use or monitor our water concentrations?

* Aldosterone released by adrenal gland to increase water retention
* Blood pressure from ANH (in heart)

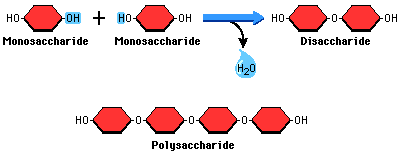
**Learning Goal #8 🡪 I will be able to explain the role of acids, bases and bases in the body**

1. What are examples of acids and bases that are in our bodies?
   * H ion from bicarbonate reaction in blood – acidic
   * Sodium bicarbonate from pancreas – basic
   * Hydrochloric acid in stomach – acid
2. How does our body try to maintain our pH?
   * Monitor H concentration – remove it in DCT in nephrons
   * Pancreas secretes sodium bicarbonate to neutralize stomach acid
3. What body system impacts the pH of your internal environment and how does your body try to monitor this?
   * Excretory system
   * Circulatory system
   * Digestion system
   * Respiratory system

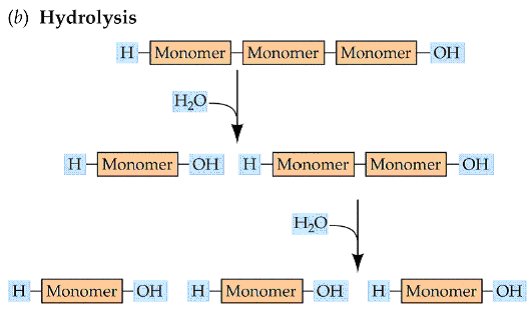
**Learning Goal #9 🡪 I will be able to explain dehydration synthesis and hydrolysis**

1. What is dehydration synthesis and when does this type of reaction occur?

* Dehydration synthesis is the building up of polymers and occurs in the body

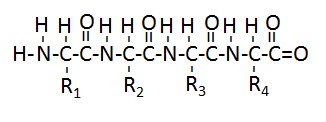
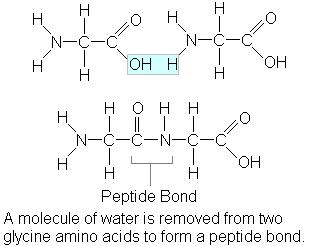


1. What is hydrolysis and when does this type of reaction occur?
   * Hydrolysis is the breaking apart of polymers to make monomers
   * This occurs in the lysosome on the cell organelle

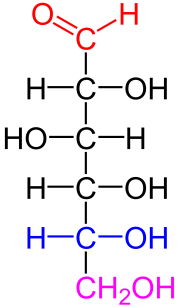
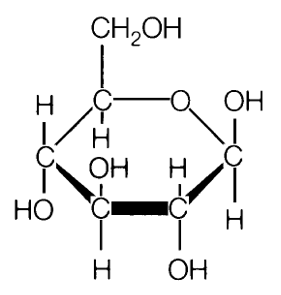
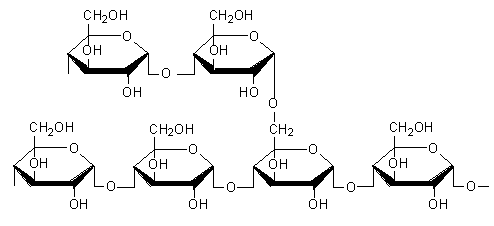


**Learning Goal #10 🡪 I will be able to differentiate between carbohydrates, lipids, proteins, and nucleic acids**

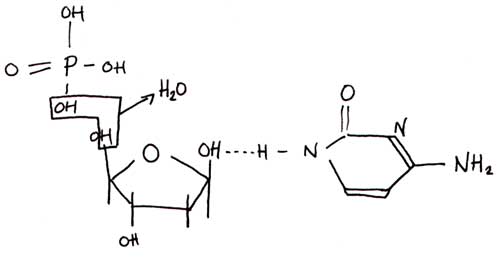
1. Draw the basic identifying structures of a carbohydrate, a lipid, a protein, and nucleic acid
   * Protein

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=JoHXg1I7yqhokM&tbnid=EGZHWSRHDvZ8jM:&ved=0CAUQjRw&url=http%3A%2F%2Fgnomespunyarn.com%2Fwordpress%2Findex.php%2F2011%2F03%2Fdyeing-101-weird-fibers-soy-milk-chitin-etc%2F&ei=uhbgUp7kEsqEoQTZmoHgBQ&bvm=bv.59568121,d.cGU&psig=AFQjCNH0JWXM-3HqrhYIuXAw416VgUmvkQ&ust=1390503975934350) [](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=c14lSclLO1qlBM&tbnid=pi4cvY7Df99KjM:&ved=0CAUQjRw&url=http%3A%2F%2Fhomepages.ius.edu%2FGKIRCHNE%2Fbiomolec.htm&ei=YBfgUun7IJfhoATU_4GYBg&bvm=bv.59568121,d.cGU&psig=AFQjCNGdGFUiRaRtz22F1BA4U1rzHxsFHg&ust=1390504140784369)

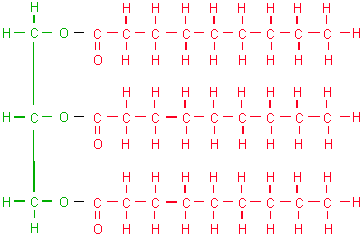
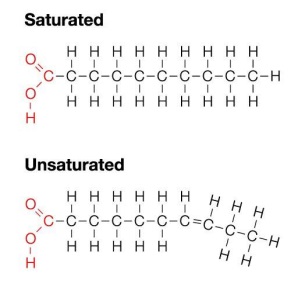
* + Carbohydrate

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=llReGZurHUZPoM&tbnid=vSZlN3GogKIoGM:&ved=0CAUQjRw&url=http%3A%2F%2Fen.wikipedia.org%2Fwiki%2FCarbohydrate&ei=CBfgUh2K4qAEsN-A6AU&bvm=bv.59568121,d.cGU&psig=AFQjCNFeZHlCK1gUUHNe1TTv6azKXlHIjg&ust=1390504060143402) [](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=mGDxpv5gSxzduM&tbnid=-FcI0BRwWOa9EM:&ved=0CAUQjRw&url=http%3A%2F%2Fwww.reboundhealth.com%2Fcms%2Farticles%2Ftopics%2Ftopic-carbohydrates.html&ei=FxfgUtPYB46JogT9qIGoDg&bvm=bv.59568121,d.cGU&psig=AFQjCNFeZHlCK1gUUHNe1TTv6azKXlHIjg&ust=1390504060143402) [](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=zMVO4-TyqYzOWM&tbnid=NRwNZodAxgZ4PM:&ved=0CAUQjRw&url=http%3A%2F%2Fwww.rsc.org%2FEducation%2FTeachers%2FResources%2Fcfb%2Fcarbohydrates.htm&ei=JhfgUtLKC5HtoASPmYGwDg&bvm=bv.59568121,d.cGU&psig=AFQjCNFeZHlCK1gUUHNe1TTv6azKXlHIjg&ust=1390504060143402)

* + Nucleic acid

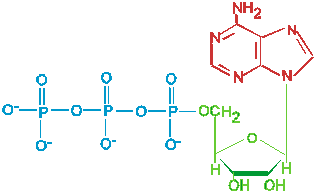
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* + Lipids

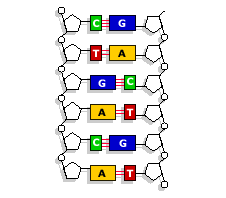
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1. Draw the following structures (on the test you will need to be able to identify these structures, not draw them): ATP, DNA, RNA, disaccharide, glucose, hemoglobin, monosaccharide, neutral fat, phospholipid, starch, glycogen, cellulose, saturated fatty acids, unsaturated fatty acids, steroids.

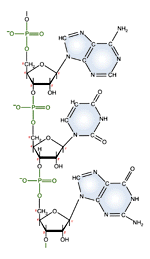
* ATP



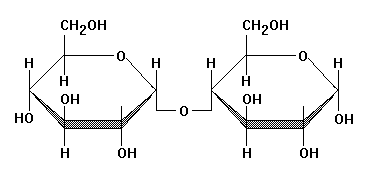
* DNA



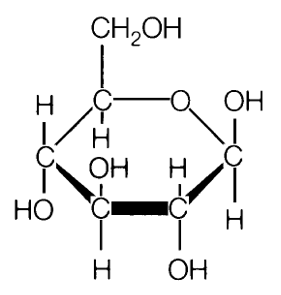
* RNA



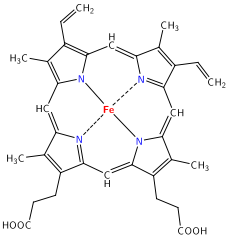
* Disaccharide



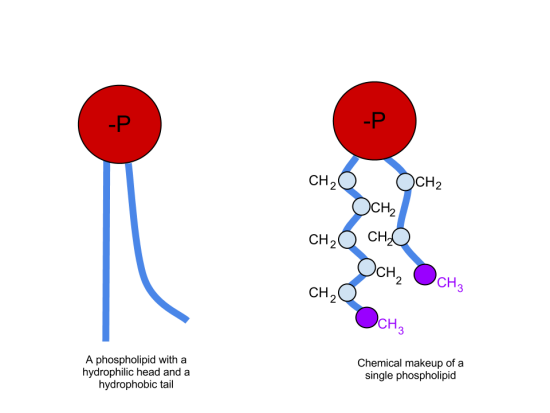
* Glucose



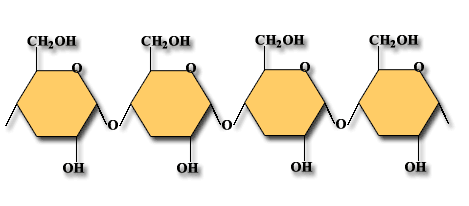
* Hemoglobin



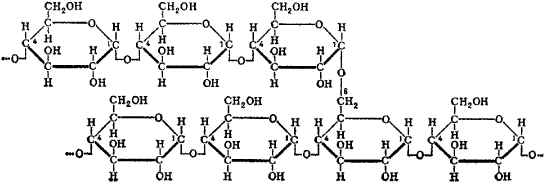
* Phospholipid



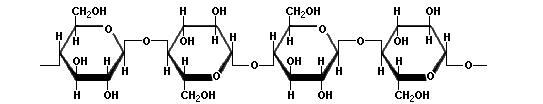
* starch



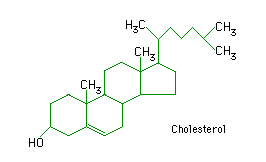
* glycogen



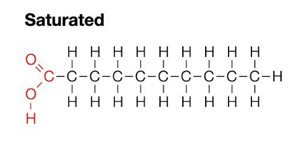
* cellulose



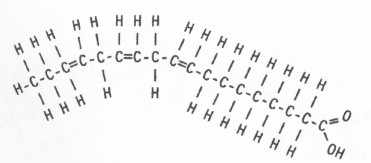
* steroid



* saturated fatty acid



* unsaturated fatty acid

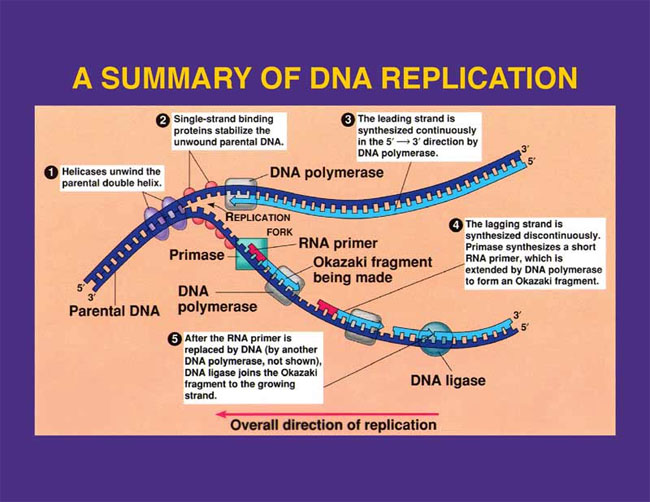


1. What are the functions of a carbohydrate?
   * Long term storage of energy
2. What is the difference between a monosaccharide, disaccharide, and polysaccharide?
   * Number of monosaccharides chained together
   * Mono – glucose or fructose
   * Di – sucrose, maltose
   * Poly – cellulose, starch, glycogen

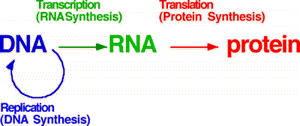
**Learning Goal #11 🡪 I will be able to explain how a protein is made (from DNA replication, transcription, and translation)**

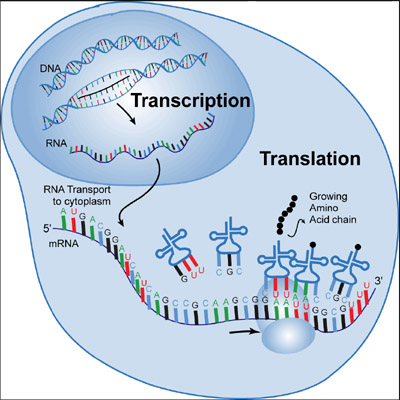
1. What is the function of a protein?
   * Energy production
   * Muscle production
   * Hormones, steroids, enzymes, antibodies
2. What is the difference between a primary, secondary, tertiary, and quaternary structure of a protein?
   * Primary is a linear strand of amino acids
   * Secondary is alpha and betabending
   * Tertiary structures of the protein is the twisting towards positive and negatives on the strand
   * Quaternary structure is several tertiary proteins grouped together

1. What are the 4 nitrogenous bases for DNA?
   * Adenine
   * Guanine
   * Cytosine
   * Thymine
2. Draw the back bone structure and the nitrogenous bases for a sample of DNA that on the 3’ to 5’ side reads AGCGTACGCTTAT
   * **TCGCATGCGAATA**
3. Describe and draw the process of DNA replication (for the purpose of cell mitosis) using the following terms: semi-conservative, 3’, 5’,DNA helicase, DNA polymerase, ligase, leading strand, lagging strand, Okasaki fragments. Where in the cell does this DNA replication occur?



1. Describe what happens when a cell wants to express a gene (make a protein that the DNA codes for). What are the three steps that happen? Where does each one take place? In your explanation, be sure to use the vocab: RNA, nuclear pore, transcription, codon, anti-codon, mRNA, tRNA, ribosome, translation, amino acid





1. Below is a “normal” gene and a mutated gene. Write out the mRNA strand and predict the polypeptide that is formed. Use the chart below.

a) “Normal” Gene 🡪 DNA Strand 3’CCTACATAAGCCTGACTGG5’

mRNA Strand 5’ GGAUGUAUUCGGACUGACC 3’

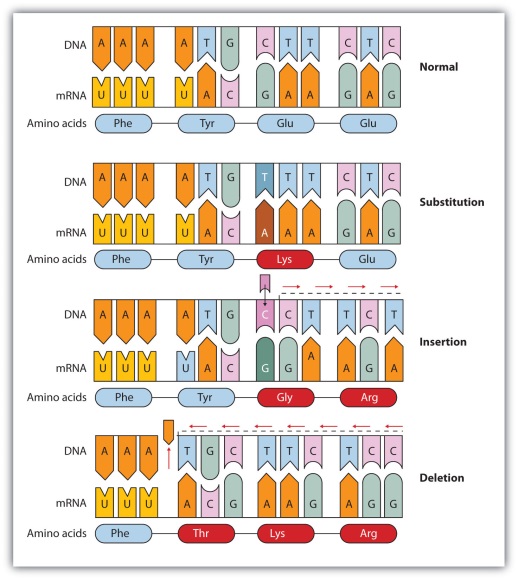
Amino acid chain = start – try – ser – asp - stop

b) “Mutated” Gene 🡪 DNA Strand 3’CCTACATAAGCCTGACAGGTA5’

mRNA Strand 5’ GGAUGUAUUCGGACUGUCCAU

Amino acid chain = start – try – ser – asp – cys – pro…

1. What type of mutations can happen to impact the production of the protein?

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=xtE-t-qEzafeRM&tbnid=dZDKTgJOsFAMwM:&ved=0CAUQjRw&url=http%3A%2F%2F2012books.lardbucket.org%2Fbooks%2Fintroduction-to-chemistry-general-organic-and-biological%2Fs22-nucleic-acids.html&ei=WxngUqfTJYaEogSejoCoDw&bvm=bv.59568121,d.cGU&psig=AFQjCNE34YtET3t_hKRyKHHl8Y9WVr0hpw&ust=1390504655509862)

Substitution

Insertion

Deletion

Silent (no change in aa)

Frameshift

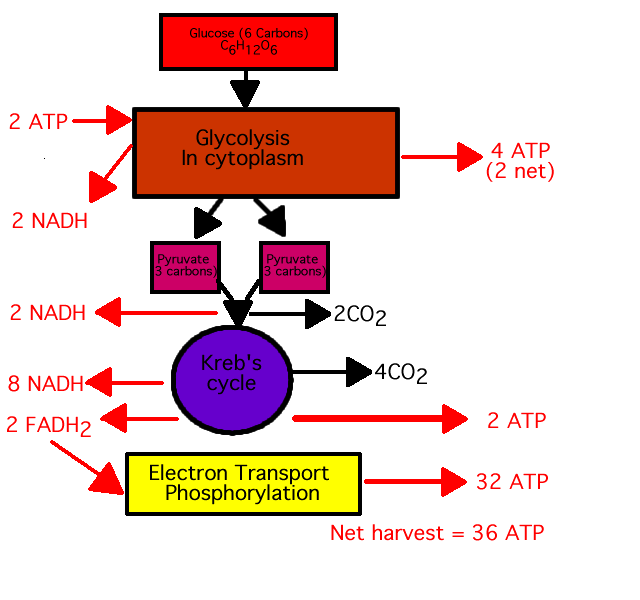
**Learning Goal #12 🡪 I will be able to draw both DNA and RNA and explain the structure and function of both**

1. What are the 4 nitrogenous bases for DNA?
   * Adenine
   * Guanine
   * Cytosine
   * Thymine
2. What is the backbone of DNA made from?
   * Phosphate group
   * 5 carbon sugar – ribose
3. What do the strands run anti-parallel?
   * For the hydrogen bond between the nitrogen base pairs
4. What are the 4 nitrogenous bases for RNA?
   * Adenine
   * Guanine
   * Cytosine
   * Uracil
5. What are the characteristics of RNA that are different from DNA?

* RNA is one strand instead of a double stranded DNA
* DNA has thymine where RNA has uracil

**Learning Goal #13 🡪 I will be able to explain how ATP is made and used in the body (cellular respiration – glycolysis, kreb’s cycle, ETC)**

1. Outline the three steps in ATP production using a flow chart or diagram.
   * Glycolysis
   * Krebs Cycle
   * Electron Transport Chain
2. How much ATP is produced in each step?



1. Why does this process happen? Where does each process happen?

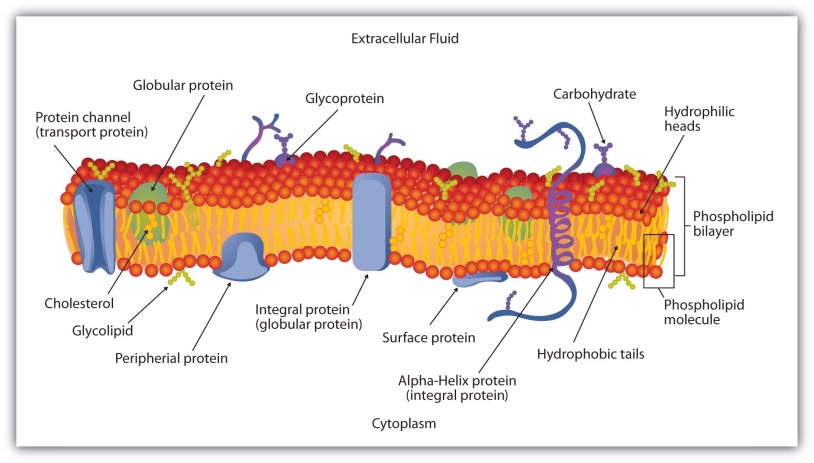
* Glycolysis is in the cytoplasm
* Krebs Cycle and Electron Transport Chain is in the mitochondria

**Learning Goal #14 🡪 I will be able to explain how recombinant DNA and made and used**

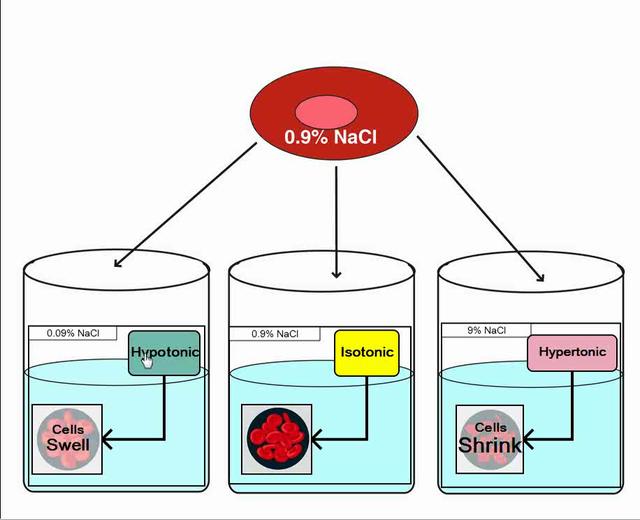
1. What is recombinant DNA?
   * When scientists will combine a desired trait or protein into an organisms DNA
   * For example, the glow in the dark gene from jellyfish can be put into the DNA of an organism
2. How do scientists make it?
   * Use a vector such as bacteriophage to insert the desired DNA
3. Why would they want to produce it?
   * You can use rDNA to make new genes in vegetables
   * For example vegetables that do not require soil to grow
   * Corn that will not in infected by fungus
4. What are some of the ethical implications surrounding rDNA?
   * Is it ethical to change an organism to suit our needs?
   * How is this going to impact the ecosystems and our food chains?

**Learning Goal #15 🡪 I will be able to explain the structure and function of the cell membrane**

1. Draw the phospholipid bilayer of a cell membrane. Label the hydrophilic side, hydrophobic side, glycoproteins, phospholipids, carrier proteins, glycolipids.



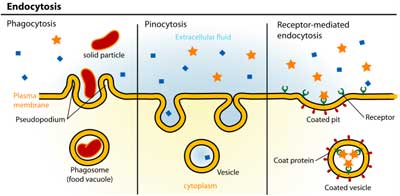
1. What is the fluid-mosaic model of the cell membrane? What does it describe?
   * The idea of the bilayer is fluid, it moves, the proteins and phospholipids are mobile within the layer
   * Hydrophilic and hydrophobic
2. Why is the cell membrane referred to as selectively permeable?
   * Some materials easily pass through the membrane, others use carrier proteins, and some can not pass at all.
   * Some materials require energy inorder to pass (ATP) using active transport
3. How do the following environments impact a cell: hypertonic, hypotonic, and isotonic?



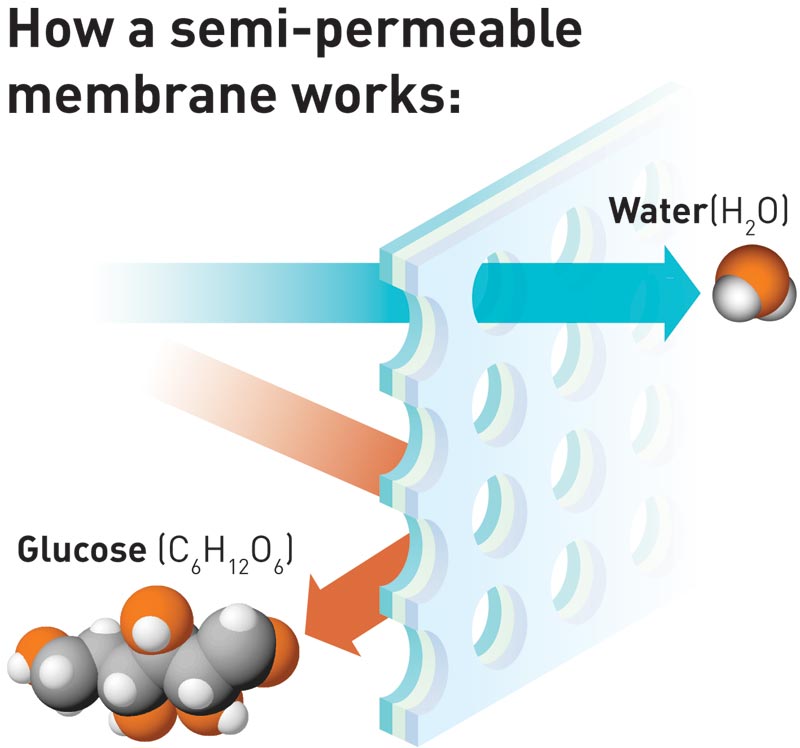
1. Describe the following passive transport processes: diffusion, osmosis, and facilitated transport

* Diffusion – movement of materials from an area of higher concentration to an area of lower concentration
* Osmosis – movement of water from an area of higher concentration to an area of lower concentration
* Faciliated transport – use of a carrier protein or pore to allow a molecule to pass across the membrane

1. Describe the following active transport processes: endocytosis (phagocytosis, pinocytosis) and exocytosis.



1. Describe an experiment that you could do to test which substances would cross over the semi-permeable membrane of a cell

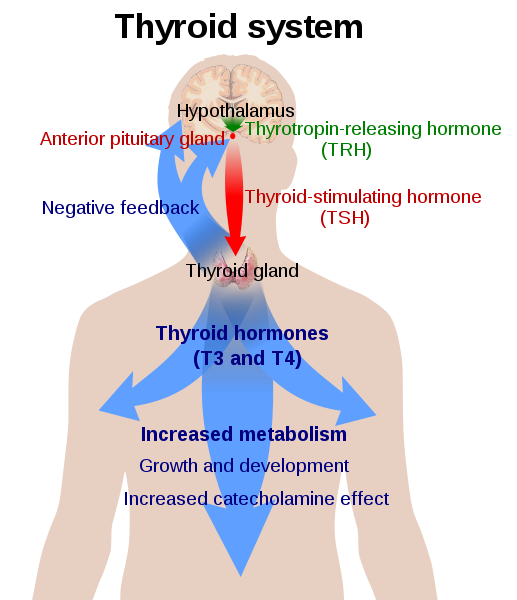


**Learning Goal #16🡪 I will be able to explain the roles of enzymes in biochemical reactions**

1. What is an enzyme?
   1. An enzyme acts as a catalyst to lower the activation energy of a reaction, which allows the reaction to occur
   2. Each enzyme has a specific “lock and key” substrate that fits it perfectly
2. What is metabolism?
   1. The sum total of every chemical reaction that occurs in the body
3. How are enzyme concentration and metabolism impacted?

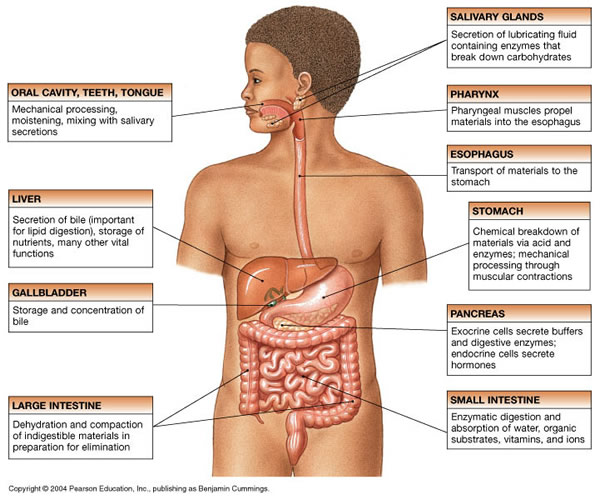
* Enzymes essential control the metabolic pathways and the rate at which these reactions take place

1. What are the 6 factors that impact the “speed” at which an enzyme functions?
   1. Concentration of enzyme
   2. Concentration of substrate
   3. pH
   4. temperature
   5. inhibitors (heavy metals)
   6. coenzymes (vitamins)
2. What are some examples of enzymes in the body and what reactions do they help with? List 4 different enzymes you have learned about throughout the course.
   1. Maltase – break apart maltose to glucose
   2. Amylase - break down starch
   3. Pepsidases – enzyme that breaks down peptides to amino acids
   4. Lipase – enzyme that breaks down lipids
3. What does the thyroid do and how does thyroxin play a role in your body’s metabolism?
   1. Thyroid produces thyroxin, which plays a role in regulating metabolism in the body

[](http://upload.wikimedia.org/wikipedia/commons/d/d1/Thyroid_system.svg)

**Learning Goal #17 🡪 I will be able to draw and explain the various structures involved in the digestive system and their functions**

1. Draw the digestive system and label the following parts: mouth, salivary glands, pharynx, epiglottis, esophagus, cardiac sphincter, stomach, pyloric sphincter, duodenum, liver, gall bladder, pancreas, small intestine, appendix, large intestine, rectum, anus

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=mk-57rWLln4BVM&tbnid=2thOR784yZ7jOM:&ved=0CAUQjRw&url=http://www.as.miami.edu/chemistry/2086/Chap%2024/Chapter%2024-newPART1.htm&ei=50HhUoCKCZDmoATV6oDADw&bvm=bv.59568121,d.cGU&psig=AFQjCNFLsHQo3mSh77kfBUMaEObw3EDF4A&ust=1390580577424398)

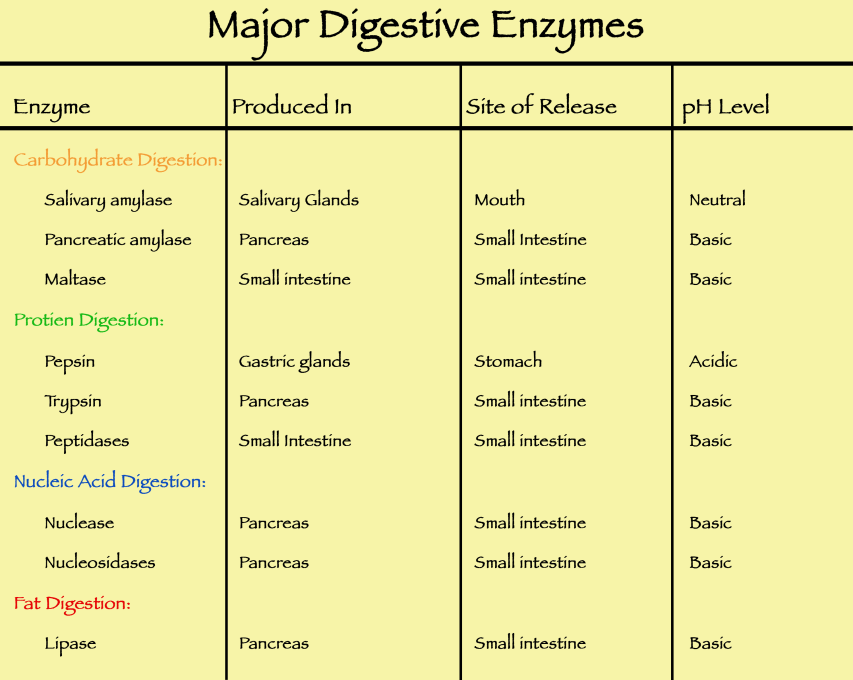
1. What is the role of each of the above parts of the digestive system? (make a chart)

See above diagram

1. Why is the small intestine shaped the way that it is?
   1. Microvilli increases the surface area of the small intestine
   2. Each finger has capillaries and a lacteal
   3. The lacteal absorbs fats to their own vessel system to then later on diffuse the breakdown down fats into the circulatory system
   4. Amino acids and sugars do immediately into the circulatory system in each villi into the capillaries

**Learning Goal #18 🡪 I will be able to describe the fluids and enzymes of the digestive system**

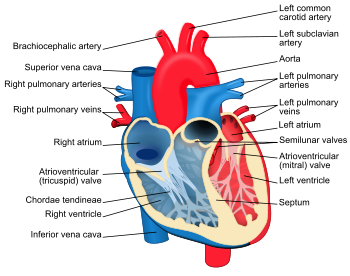
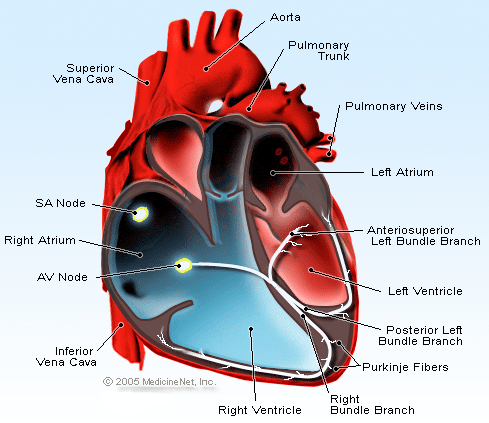
1. How do the following digestive juices impact, or play a play role in digestion: salivary amylase, pancreatic amylase, pepsin, trypsin, pepsinogen, lipase, peptidase, maltase, nuclease?

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=l-77xr89DfDf5M&tbnid=I-N4stxldl_waM:&ved=0CAUQjRw&url=http://commons.wikimedia.org/wiki/File:Major_digestive_enzymes.png&ei=vkLhUqWgHNLyoASRxILADQ&bvm=bv.59568121,d.cGU&psig=AFQjCNET7D9y6ppuP601VzKrUF5r6mnZOw&ust=1390580787701367)

1. What is the role of sodium bicarbonate in the pancreatic juices?
   1. Neutralizes the stomach acid pH so that it does not harm the cells of the small intestine, which is not coated with a layer of mucus like the stomach is
2. What are the roles of pH in the digestive system and how is the pH maintained so that it is appropriate for the specific location in the digestive system?
   1. pH helps to break down polymers
   2. the decrease in pH speed up the reaction of hydrolysis to a certain point and allows only one enzyme, which is built to work in that pH (pepsin) to be able to work
   3. The other digestive enzymes are not able to work in such a low pH
   4. The change in pH as food goes through the system allows some reactions to happen, and others not to

**Learning Goal #19 🡪 I will be able to describe the internal functioning of the heart (both blood and electrical)**

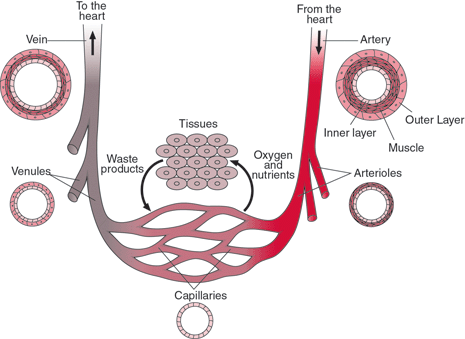
1. Draw the structure of the heart and label the following structures: right atria, left atria, right ventricle, left ventricle, anterior vena cava, posterior vena cava, aorta, pulmonary arteries, pulmonary veins, chordae tendineae, mitral valve, tripcuspid valve, aortic valve, septum, AV node, SA node, pukinje fibres, bundle of his

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=OLvnNi4JJe_VaM&tbnid=jkzDPfCA0JFsYM:&ved=0CAUQjRw&url=http%3A%2F%2Fwww.answers.com%2Ftopic%2Fheart&ei=oEPhUvHzFMLkoATwwoLICw&bvm=bv.59568121,d.cGU&psig=AFQjCNEW9WE3qYruJuk7fFME9h4i9oZ0kg&ust=1390581011888153) [](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=Ja_Ne9VXGFMk0M&tbnid=idBWlTIZ6AwEUM:&ved=0CAUQjRw&url=http://www.medicinenet.com/premature_ventricular_contractions/article.htm&ei=v0PhUsa-JY3voATynYCYAw&bvm=bv.59568121,d.cGU&psig=AFQjCNHfJWN7OsueajvdECOuN2h4rZDWdA&ust=1390581047434540)

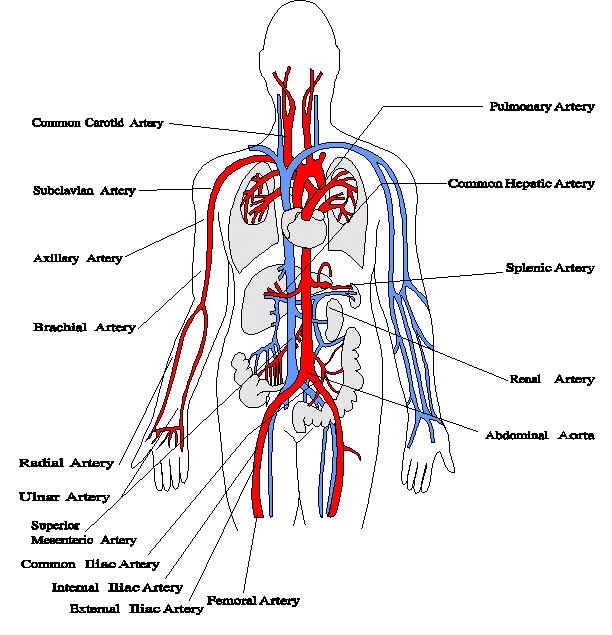
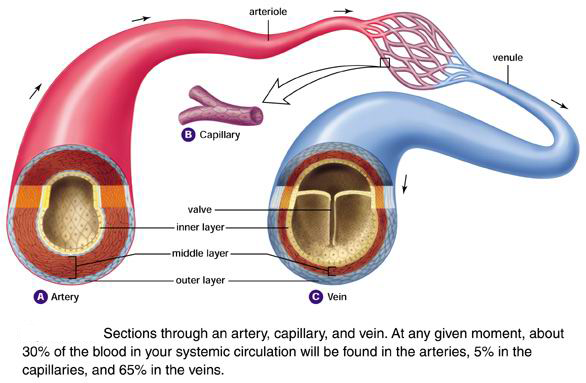
1. Explain how the pulse of contraction travels through the various parts of the heart
   1. SA node 🡪 AV node (muscle wave from top of heart down towards centre) 🡪 nerve bundle 🡪 down left and right 🡪 purkije fibers (contraction from bottom of ventricle up towards middle)
2. What is blood pressure? How do you measure it? What is systolic and diastolic pressure?
   1. Blood pressure is how much pressure the artery walls are under
   2. It can be impacted by blood volume, health of arterial walls (plaques)
   3. Systolic pressure 🡪 first number (maximum number), pressure when ventricle contracts
   4. Diastolic pressure 🡪 second number (small number), pressure when ventricle relaxes

**Learning Goal #20 🡪 I can draw and explain the vessel structures and functions**

1. What are the 5 types of blood vessels?
   * Arteries
   * Arterioles
   * Cappilaries
   * Venules
   * Veins
2. Make a chart outlining characteristics of each of the type of blood vessels.



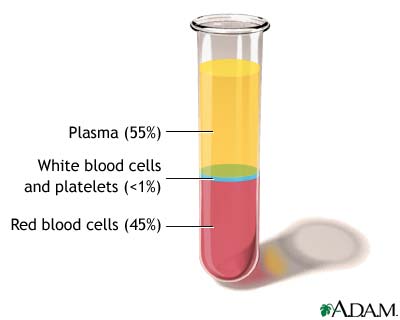
1. What are the main arteries and veins that lead out of the dorsal aorta? What organ or structure do they go to?

1. Describe what happens in a capillary?

**Learning Goal #21 🡪 I will be able to explain the components of the blood and blood proteins**

1. Draw what a hematocrit (blood sample) would look like with the various % of each type of cell

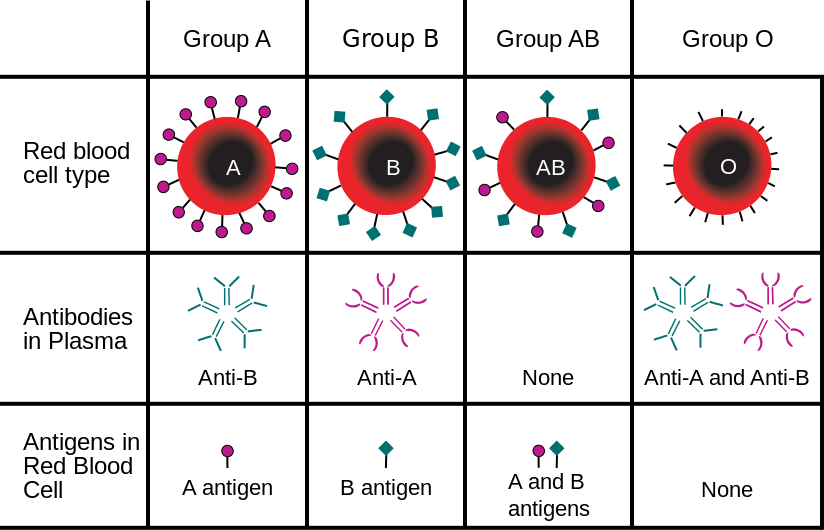


1. Explain the path of a red blood cell as it travels from the aorta until it gets back to the aorta again. What does it connect with? What vessels does it go into?

* Aorta 🡪 dorsal aorta 🡪 arterioles 🡪 capillaries (internal respiration) 🡪 venules 🡪 vein 🡪 posterior vena cava 🡪 right atrium 🡪 right ventricle 🡪 pulmonary artery 🡪 lung 🡪 pulmonary vein 🡪 left atrium 🡪 left venricle 🡪 aorta

1. What are the major components of plasma?
   * Plasma is 90% water, 8% proteins (like fibrinogen) and 2% hormones
2. Explain how the blood proteins antibodies and antigens work? Why is it important to get blood from a specific blood type when getting a transfusion?

* Blood proteins antibodies are what your body makes in response to NON-SELF proteins. This is a way to fight against anything that is invading. Antibodies are made to specifically fit antigens.
* Blood proteins antigens are proteins that are part of the outside of the cell.

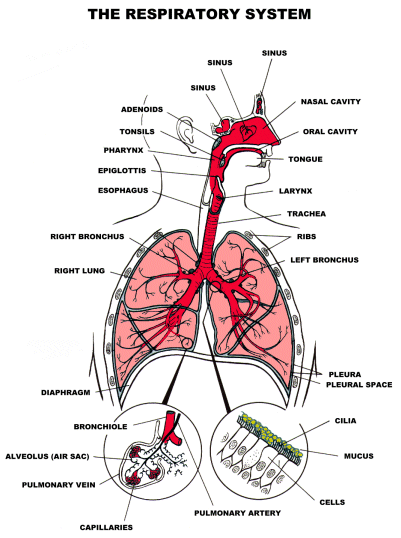


1. What are the differences between an adult circulatory system and a fetal circulatory system?

* Umbilical arteries (carry deoxygenated blood) to fetus and umbilical vein (carry oxygenated blood) from fetus to placenta
* Foramen ovule (hole in the septum)
* Ductus venosus (bypass the liver)
* Ductus arteriosus (bypass the lungs and go straight to the aorta)

**Learning Goal #22 🡪 I will be able to explain the structures and functions of the parts of the respiratory system**

1. Define the following vocabulary: alveoli, bicarbonate ion, bronchi, bronchiole, carbon dioxide, cilia, diaphragm, external respiration, internal respiration, pH, oxyhaemoglobin, medulla oblongata, stretch receptors, trachea, pleural membrane
   * Alveoli
   * Bicarbonate ion
   * Bronchi
   * Bronchiole
   * Carbon dioxide
   * Cilia
   * Diaphragm
   * External respiration
   * Internal respiration
   * pH
   * oxyhaemoglobin
   * medulla oblongata
   * stretch receptors
   * trachea
   * pleural membrane
2. Draw the respiratory system and label the following structures: nasal cavity, pharynx, larynx, trachea, bronchi, alveoli, diaphragm, pleural membrane



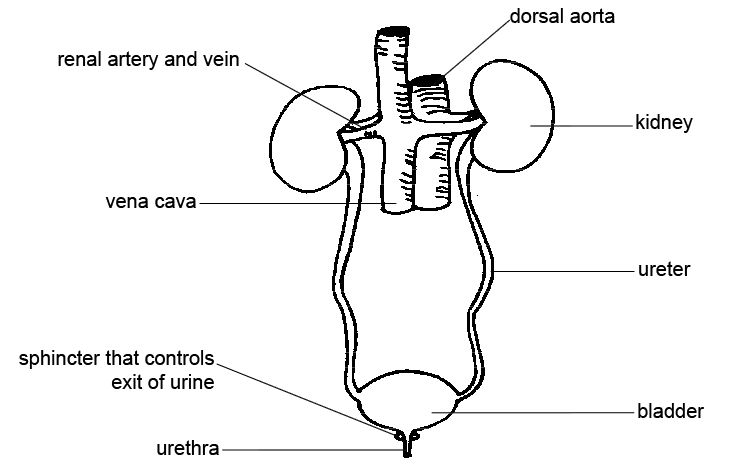
1. What is the role of cilia in the trachea?
   * Catch any dirt or particles that could clog up the lungs
2. Why are there stretch receptors on the alveoli?
   * Allow you to only breath in so much
   * Prevents you from bursting your alveoli
3. Compare the process of external respiration and internal respiration.
4. Explain the roles of oxyhaemoglobin, carbaminohaemoglobin, and bicarbonate ion in the transport of CO2  and O2.
   * oxyhaemoglobin

**Learning Goal #23 🡪 I will be able to explain the process of breathing**

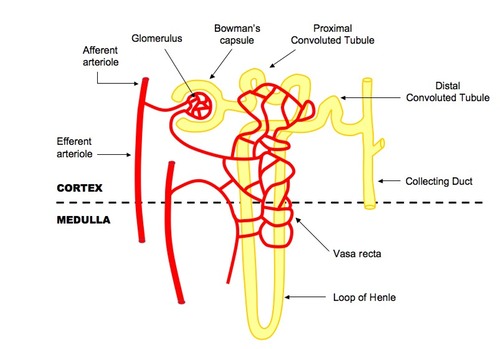
1. What are the goals of inhalation and exhalation?
   1. Inhalation –
   2. Exhalation -
2. How does the process of breathing work? How does air come into the thoracic cavity?

**Learning Goal #24 🡪 I will be able to explain the structures and functions of the kidneys and excretory system**

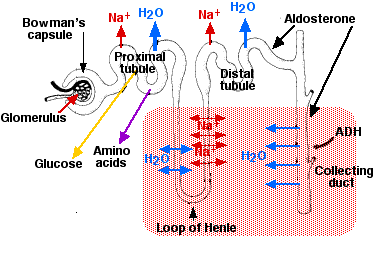
1. Draw and label the parts of the excretory system: kidney, ureter, urethra, urinary bladder,



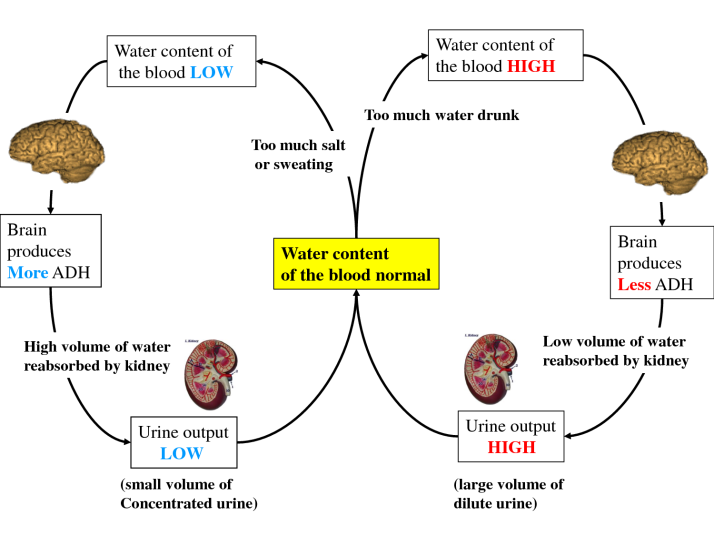
1. Draw and label the details of a nephron: glomerulus, bowman’s capsule, afferent and efferent arterioles, proximal and distal convoluted tubules, collecting duct, loop of Henle



1. In your above diagram add the movement of Na, glucose, water, K ion, H ion, amino acids, urea



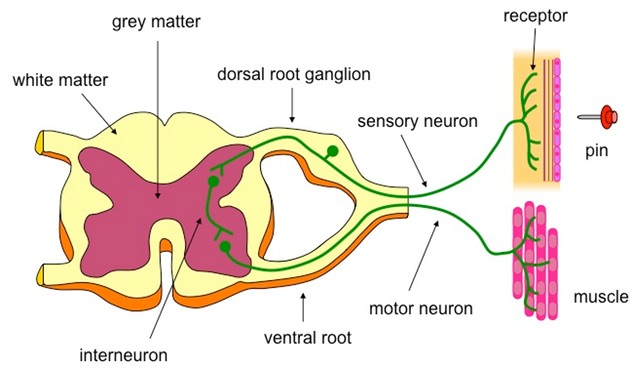
1. What do ADH and aldosterone do to the filtrate?
   * ADH 🡪 increase water reabsorption in the collecting duct.
   * Aldosterone 🡪 promotes the excretion of K ion and reabsorption of Na. The reabsorption of Na causes the reabsorption of water. Blood volume and blood pressure increases



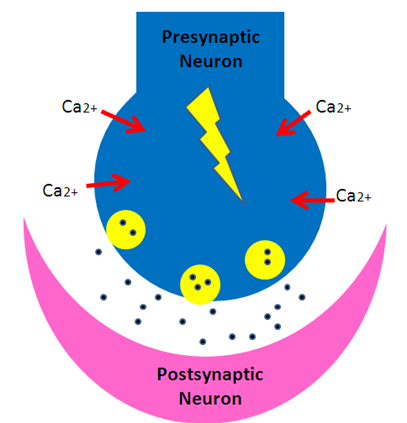
1. What are the three main processes in the excretory system?
   * Filteration
   * Absorption
   * Secretion
2. How is homeostasis maintained in respect to water, ions, pH, and glucose?
   * Water 🡪 aldosterone, ADH,
   * Ions (H ions) 🡪 created by internal respiration, secreted in nephron
   * pH 🡪 balanced through juices of digestive system
   * glucose 🡪 glucagon/insulin monitoring in liver and pancreas

**Learning Goal #25 🡪 I will be able to explain the structure of a neuron and the process of transmission of a nerve impulse**

1. Draw and label a sensory neuron, interneuron, and motor neuron. Make sure that you label the dendrites, cell body, nucleus, axon, myelin sheath, Schwann cells, axon terminal



1. Draw what happens at the axon terminal.

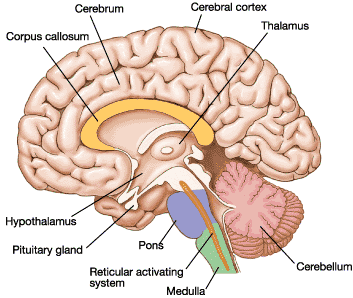


* + Once the sodium and potassium channels reach the presynaptic cleft, calcium comes in to the cell instead of sodium
  + This triggers the vesicles (which are full of neurotransmitters) move towards the end of the cell and bleb with the cell membrane
  + The neurotransmitters release into the gap
  + They are then taken up by the postsynapstic cleft to trigger the sodium channels on the receiving side

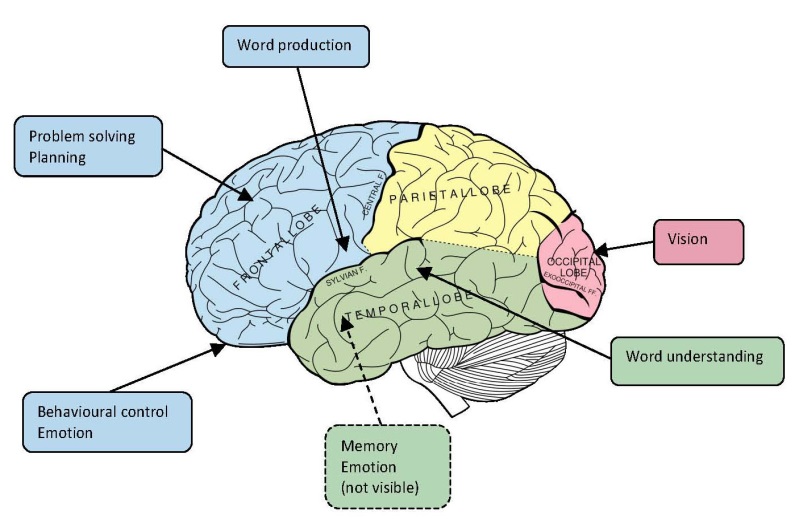
1. What happens when you step on a tack? Explain the complete process of the reflex arc including depolarization, repolarization, recovery, synaptic transmission, and continue it along the whole reflex arc.
2. What are some examples of a neurotransmitter used in the nervous system?

**Learning Goal #26 🡪 I will be able to explain the various parts of the brain and their functions**

1. Identify the function of the following parts of the brain: medulla oblongata, cerebrum, thalamus, cerebellum, hypothalamus, pituitary gland, corpus callosum, meninges



1. What are the four lobes of the cerebrum and what are they responsible for?

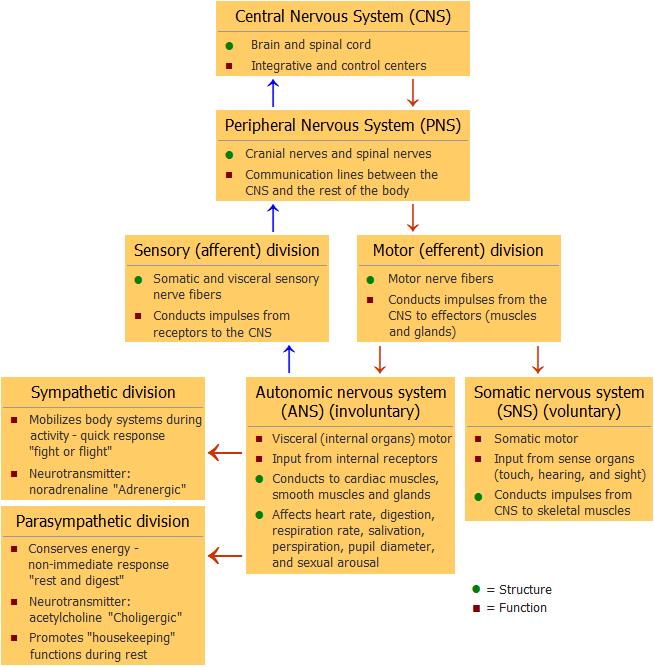


1. What covers the brain to separate it?

* Menengial membrane coats the cerebrum

**Learning Goal #27 🡪 I will be able to explain the various parts of the nervous system**

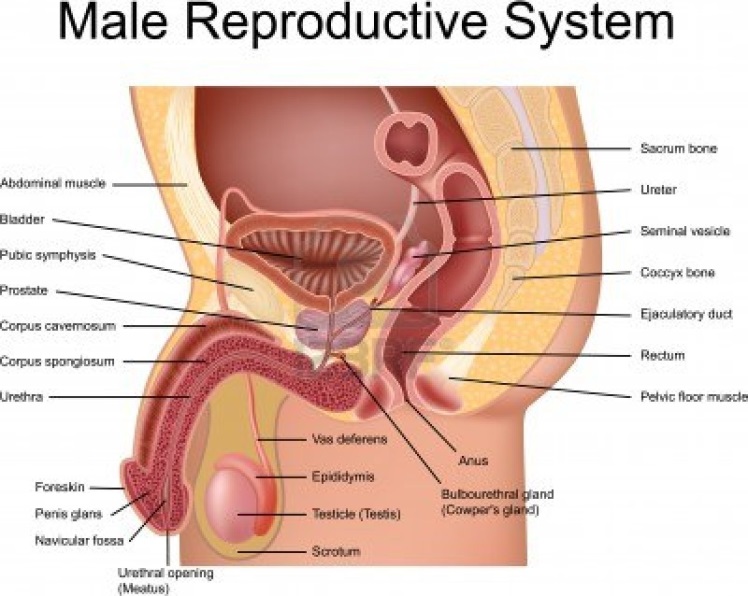
1. What are the roles of the autonomic and somatic nervous system?
   * Autonomic nervous system is involuntary
   * Somatic nervous system is voluntary (respond to stimuli)
2. Draw a flow chart to show the various parts of the nervous system?



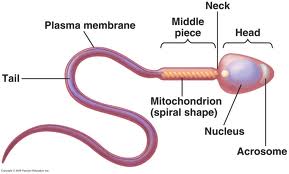
1. What is the difference between the sympathic and parasympathetic nervous system?
   * Sympathetic system is the fight or flight system
     1. Neurotransmitter is noradrenalin
   * Parasympathetic system is the rest or digest system
     1. Neurotransmitter is acetyl choline

**Learning Goal #28 🡪 I will be able to explain the structures and functions of the male and female reproductive system and hormones**

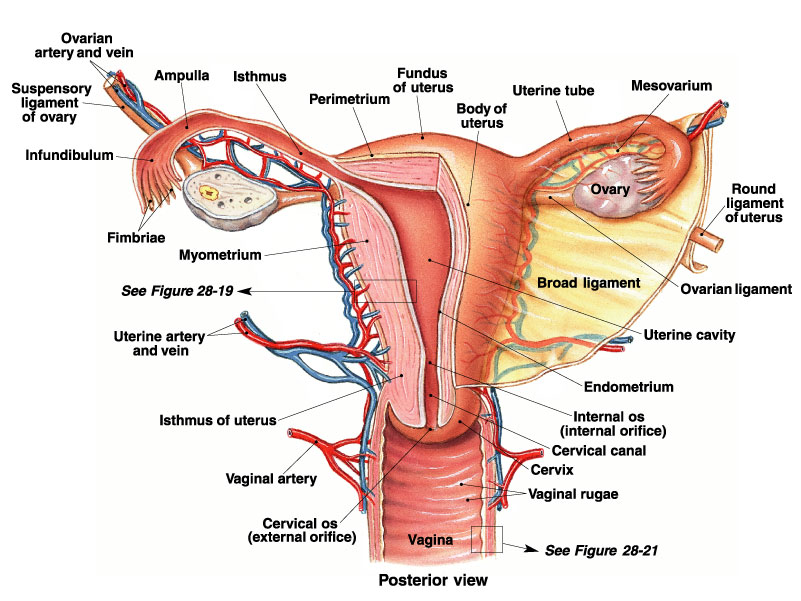
1. Draw and label the male reproductive system: testes, seminiferous tubules, scrotum, epididymis, vas deferens, prostate gland, Cowper’s gland, seminal vesicles, penis, urethra

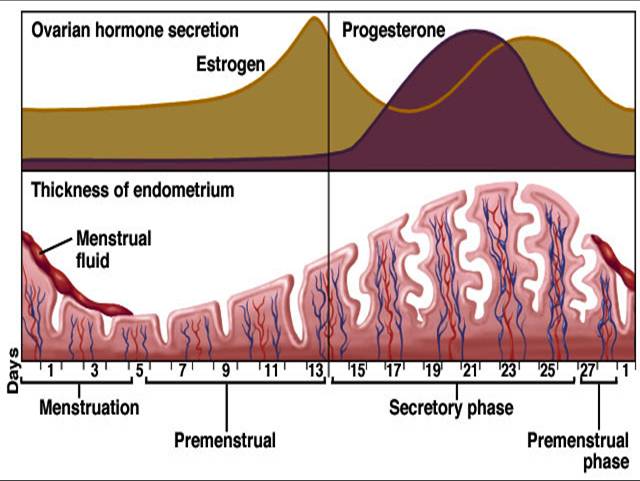


1. List the components of seminal fluid and what glands or cells contribute it.
   * Seminal vesicle – produced 65% of the seminal fluid by volume
     1. Contributes citrate (for Krebs cycle)
     2. Contributes fructose (for Glycolysis)
   * Prostrate – contributes zinc
   * Cowpers Gland – produces pre-ejaculate to clean the urethra
2. Identify the parts of the sperm.



1. What are the functions of testosterone?
   * Testosterone is a steroid hormone that triggers the development of the secondary sex characteristics
   * Also responsible for the maturing of sperm in the seminiferous tubules
   * Testosterone produced in the interstitial cells
2. Draw and label the female reproductive system: ovaries, fallopian tubes, follicles, corpus luteum, uterus, endometrium, cervix, vagina



1. Describe the functions of estrogen
   * Estrogen is one of the hormones produced in the ovary and it is responsible for the thickening of the endometrial lining
   * Although not part of the reproductive cycle, estrogen also impacts bone strength and functioning of the internal body temperature
2. What hormones are involved in the female reproductive system?
   * GnRH – released by hypothalamus to activate the pituitary to produce LH and FSH
   * LH – Luteinizing hormone produced by the pituitary, focus on egg development
   * FSH – Follicle stimulating hormone produced by pituitary, focus on follicle maturation
3. What are the hormonal changes that occur as a result of implantation?
   * HCG – this is the hormone that doctors are looking for in pregnancy tests
     1. It is released once the blastocyst implants in the endometrial lining
   * Later in the pregnancy the placenta will take over the production of estrogen and progesterone from the corpus luteum as it dissolves
4. What is the sequence of events in the menstruation cycle? Make sure that you include all the hormones involved with each stage.
   * 
   * Three main stages: menstruation, proliferation, secretory
   * This cycle focuses just on the changes in the uterus and the growth and maturing of the endometrial lining of the uterus
   * Estrogen and progesterone are the main hormones that impact the uterine cycle