

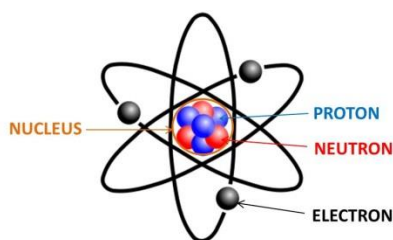
## BIOLOGY END OF COURSE REVIEW

### Biology Process (Unit 1)

- Demonstrate knowledge of inquiry techniques.
  1. What are the steps of the scientific method?  
**Observation, questions, hypothesis, experiment, analysis, and conclusion**
  2. What is a hypothesis and how should it be written?  
**Educated prediction written in a way that it can be tested**
  3. What is the independent variable?  
**The variable that is being changed on purpose**
  4. What is the dependent variable?  
**The variable being measured (dependent on the change in the independent variable)**
  5. What is the control variable?  
**The group used as comparison**
  6. What are constants?  
**Things kept the same throughout the entire experiment**
  7. Name as many characteristics of a good experiment as you can.  
**Only one variable changed, repeated trials, organized data**
- Identify criteria necessary to characterize life; define biological organization levels
  8. What are the 7 characteristics of life?  
**Organization (cells), genetic material (DNA and RNA), reproduction, metabolism, growth and development, homeostasis, responds to stimuli**
  9. What are the levels of life?  
**Atom, molecule, organelle, cell, tissue, organ, organ system, organism, population, community, ecosystem, biome, biosphere**

### Biochemistry; Cell (Unit 2, 4, 5& 10)

- Describe atomic structure, bonding between atoms, organic and inorganic compounds, enzymes, and ATP
  10. What is an atom?  
**The smallest unit of matter**
  11. Draw and label the parts of an atom. Include information about the **location** of protons, neutrons, electrons & **charges**.



12. What is a covalent bond? Give an example?

A bond in which the atoms involved share electrons, only between nonmetals,  $H_2O$

13. What is an ionic bond? Give an example?

A bond between ions, once electrons have been transferred, between a metal (cation) and a nonmetal (anion),  $NaCl$ .

14. What makes a compound organic?

Carbon

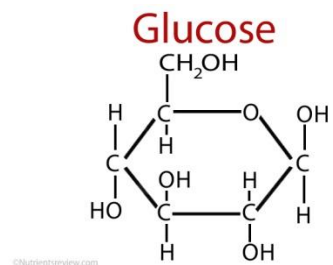
15. What are enzymes?

A protein that serves as a catalyst for all chemical reactions in living things, it helps to reduce the activation energy, or energy needed to start the reaction, to increase the speed and efficiency of the reaction. The enzyme is substrate specific and only works on certain chemical reactions, for example the enzyme Lactase works to help break down the sugar Lactose.

16. What is ATP? When and how is it made?

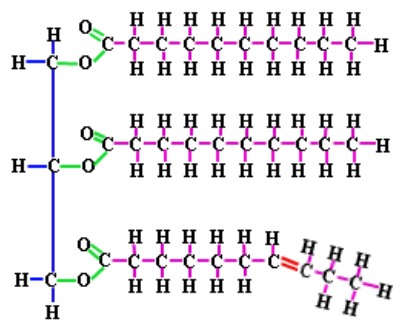
Adenine tri phosphate, the universal unit of energy in all living things. It is made during cellular respiration from glucose molecules.

17. What are carbohydrates used for?



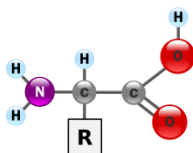
Used as the main source of quick energy.

18. What are lipids used for?



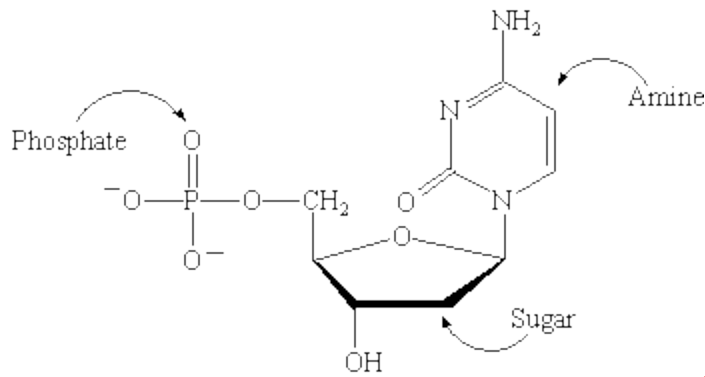
Used as the main source of stored energy.

19. What are proteins used for?



used for everything else, structure, enzymes, all other functions of the cell.

20. What are nucleic acids used for?



All genetic information.

- Explain properties of water and describe pH of a solution

21. Why is water so important to life?

Most living things are 70% or more of water, water is essential for most chemical reactions, and transport of nutrients, energy, and waste around the cell.

22. What is cohesion?

The attraction of water to other water molecules.

23. What is adhesion?

The attraction of water to other things.

24. What is surface tension?

Each molecule of water is pulled equally in all directions creating a thin skin.

25. What is the pH scale? What makes an acid? What makes a base?

### pH of Common Substances

ACIDIC						NEUTRAL		ALKALINE OR BASIC													
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14							
Battery Acid	Stomach Acid (Hydrochloric)	Lemon Juice, Vinegar	Coke and Pepsi	Grapefruit and Orange Juice	Apples, Dr. Pepper Soda	Tomato Juice, Beer	Acid Rain, 7-UP Soda	Black Coffee, Pepto Bismol	Healthy Skin, Hair and Nails	Urine, Saliva, Milk	"Pure" Water, Blood	Shampoos (7.0 to 10.0)	Baking Soda, Seawater, Eggs	Perm Solutions (8.5 to 9.5)	Toothpaste, Hand Soap	Milk of Magnesia, Mild Detergent	Household Ammonia and Cleaners	Soapy Water	Hair Straighteners (11.5 to 14.0)	Bleach, Oven Cleaner	Liquid Drain Cleaner, Caustic Soda

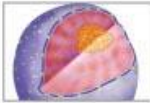












26. Identify cell types and describe functions of cellular organelles

a. What is the difference between a prokaryote and a eukaryote?

Prokaryotes have no membrane bound organelles.

b. Fill out the chart below:

SUMMARY TABLE 7.2 Eukaryotic Cell Components

Icons not to scale		Structure		Function
		Membrane	Components	
	<b>Nucleus</b>	Double ("envelope"); openings called nuclear pores	Chromosomes Nucleolus Nuclear lamina	Genetic information Assembly of ribosome subunits Structural support
	<b>Ribosomes</b>	None	Complex of RNA and proteins	Protein synthesis
	<b>Endomembrane system</b>			
	<b>Rough ER</b>	Single; contains receptors for entry of selected proteins	Network of branching sacs Ribosomes associated	Protein synthesis and processing
	<b>Golgi apparatus</b>	Single; contains receptors for products of rough ER	Stack of flattened cisternae	Protein processing (e.g., glycosylation)
	<b>Smooth ER</b>	Single; contains enzymes for synthesizing phospholipids	Network of branching sacs Enzymes for synthesizing lipids	Lipid synthesis
	<b>Lysosomes</b>	Single; contains proton pumps	Acid hydrolases (catalyze hydrolysis reactions)	Digestion and recycling
	<b>Peroxisomes</b>	Single; contains transporters for selected macromolecules	Enzymes that catalyze oxidation reactions Catalase (processes peroxide)	Oxidation of fatty acids, ethanol, or other compounds
	<b>Vacuoles</b>	Single; contains transporters for selected molecules	Varies—pigments, oils, carbohydrates, water, or toxins	Varies—coloration, storage of oils, carbohydrates, water, or toxins
	<b>Mitochondria</b>	Double; inner contains enzymes for ATP production	Enzymes that catalyze oxidation-reduction reactions, ATP synthesis	ATP production
	<b>Chloroplasts</b>	Double; plus membrane-bound sacs in interior	Pigments Enzymes that catalyze oxidation-reduction reactions	Production of ATP and sugars via photosynthesis
	<b>Cytoskeleton</b>	None	Actin filaments Intermediate filaments Microtubules	Structural support; movement of materials; in some species, movement of whole cell
	<b>Plasma membrane</b>	Single; contains transport and receptor proteins	Phospholipid bilayer with transport and receptor proteins	Selective permeability—maintains intracellular environment
	<b>Cell wall</b>	None	Carbohydrate fibers running through carbohydrate or protein matrix	Protection, structural support

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27. Describe movement of substances into and out of cells

a. What is Osmosis?

Movement of water from a high concentration to a low concentration.

b. What is diffusion?

Movement of small uncharged particles (like oxygen) across a membrane from high to low.

c. What is facilitated diffusion?

Carrier proteins move large molecules from high to low

d. What is active transport?

With the use of energy, proteins move large and charged molecules from LOW to HIGH

28. Describe cellular respiration

a. What is cellular respiration?

The process in which cells use glucose to produce a usable form of energy (ATP)

b. Where does cellular respiration take place?

In the cytoplasm and in the mitochondria.

c. What are the products of cellular respiration?

Carbon dioxide, water, and ATP

d. What are the reactants of cellular respiration?

Glucose and oxygen

29. Describe cell division and mitosis

a. What is the cell cycle?

Interphase (G1, S-phase, G2) and Mitosis

b. What are the phases of mitosis? Describe briefly what happens in each.

Prophase-chromosomes condense (start to look like X)

Metaphase – line up across the center plate

Anaphase- Begin to pull apart

Telophase- have reached opposite ends

Cytokinesis- cytoplasm begins to separate

c. What is the end result of mitosis?

2 identical daughter cells

d. What type of cells goes through mitosis?

Somatic cells, body cells

### **Genetics; Evolution (Unit 6, & 7)**

○ Describe basic structure and function of DNA, RNA, and proteins

30. What is DNA? What are the 4 bases?

Deoxyribonucleic Acid. Adenine, Guanine, Cytosine, Thymine.

31. What is transcription? What is RNA? What are the 4 bases? What are the base pairing rules?

When DNA is transcribed into a strand of mRNA. RNA is a single stranded piece of genetic information with Adenine, Guanine, Cytosine, and Uracil. A-U, G-C

32. What is translation? How does it work

When mRNA moves to the ribosome for tRNA to carry in amino acids to create a chain and fold into a protein.

33. What are proteins? How and where are they made by the cell?

Chains of amino acids, made in the ribosome, assembled by mRNA, tRNA, and amino acids.

○ Describe meiosis

34. What is meiosis?

A cell division of gametes, used specifically to make new organisms

35. What are the phases of meiosis?

Prophase 1, Metaphase 1, Anaphase 1, Telophase 1, Prophase 2, Metaphase 2, Anaphase 2, Telophase 2

36. What is the end result of meiosis?

4 genetically unique daughter cells with half (haploid) the number of chromosomes.

37. What type of cell goes through meiosis?

Gametes or sex cells.

38. Use correct terminology when working with genetic crosses

a. What is homozygous? What is heterozygous?

Two of the same alleles. Two different alleles.

b. What is dominant? What is recessive?

Dominant- expressed whenever present

Recessive- only expressed when paired with another recessive allele.

c. What is the purpose of a Punnett square? Show an example. What do the letters on the outside represent? What do the letters on the inside represent?

A Punnett square allows the prediction of the genotypes of possible offspring

		Father's Genes	
		B	b
Mother's Genes	b	Bb	bb
	b	Bb	bb

d. What is a genotype? What is a phenotype?

The specific allele combination. The physical characteristics of a gene.

e. What are sex-linked traits?

Traits that are specifically linked to a sex chromosome.

f. Name and describe 2 genetic disorders? Are they autosomal or sex-linked? Are they non-disjunction?

Down Syndrome- Trisomy 21

Colorblindness- Sex Linked

39. Define evolution and theory of natural selection

- a. What is the biological definition of evolution?

The change in genetic material in a population over time

- b. What are 5 pieces of evidence for evolution?

Anatomy- homologous structure (same structure different function), vestigial structures (still there but no purpose, ex: human appendix), analogous structures (different structure same function)

Biogeography: similar locations can produce similar species

Biochemistry: similarities in DNA, proteins, and amino acid chains can be used to show common ancestry

Embryology- Similarities in early development help show common ancestry

Fossil record- helps show intermediate phases between past and current organisms.

- c. What is natural selection?

Those organisms better suited for their environments will survive and reproduce to pass on those beneficial traits

- d. What are the 3 patterns of natural selection? Briefly describe each.

Directional selection: one extreme trait is selected for, entire curve moves

Stabilizing selection: the intermediate trait is selected for, middle of the curve increases

Disruptive selection: both extremes are selected for, ends of curve increase

- e. What is an adaptation?

An inherited trait that makes an organism better suited for their environment

40. Identify requirements to be a species?

Reproduce and make fertile offspring (make babies that can make babies)

41. Explain what it means for organisms to have shared evolutionary relationships?

Share a distant common ancestor

42. What is sexual selection? Give an example.

Mates are chosen for the traits they will help pass on to the offspring. A peacock's tail!

43. What is artificial selection? Give an example.

Traits are purposefully chosen and forcefully bred. Dogs and horses

#### **Animal/Plant Systems; Ecology (Unit 3, 8, 9 &10)**

44. What are the reproductive parts of a plant?

A flower, stigma and stamen

45. What type of reproduction do plants do?

Plants do both asexual and sexual .

46. What are the 3 main types of plant tissues? What purpose do they each have?

Epidermis (dermal tissue) – protective, gas exchange

Ground tissue – “meat or flesh” of plant, support, shape

Vascular tissue – transport water and nutrients throughout the plant

47. What is the xylem?

Specialized vascular tissue that transports water

48. What is the phloem?

Specialized vascular tissue that transports sugars

49. Describe photosynthesis

a. What is the equation of photosynthesis?



b. What factors affect how much photosynthesis a plant can do?

Amount of light, amount of carbon dioxide, amount of water, temperature

50. Describe influence of biotic and abiotic factors on biome type

a. What does biotic mean? Give an example.

Living factors. Predators, food availability, mates, competition

b. What does abiotic mean? Give an example.

Nonliving. Climate, soil, rocks, water.

c. Name 3 biomes and list 2 abiotic factors of each.

51. Describe energy flow through ecosystems using food webs, food chains and pyramids



- a. What is the 10% rule? What happens to the rest?

**Biome Summary Chart**

Biome	Location	Climate	Soil	Plants	Animals
Desert	midlatitudes	generally very hot days, cool nights; precipitation less than 10 inches a year	poor in animal and plant decay products but often rich in minerals	none to cacti, yuccas, bunch grasses, shrubs, and a few trees	rodents, snakes, lizards, tortoises, insects, and some birds. The Sahara in Africa is home to camels, gazelles, antelopes, small foxes, snakes, lizards, and gerbils
Tundra	high northern latitudes	very cold, harsh, and long winters; short and cool summers; 10-25 centimeters (4-10 inches) of precipitation a year	nutrient-poor, permafrost layer a few inches down	grasses, wildflowers, mosses, small shrubs	musk oxen, migrating caribou, arctic foxes, weasels, snowshoe hares, owls, hawks, various rodents, occasional polar bears
Grassland	midlatitudes, interiors of continents	cool in winter, hot in summer; 25-75 centimeters of precipitation a year	rich topsoil	mostly grasses and small shrubs, some trees near sources of water	american grasslands include prairie dogs, foxes, small mammals, snakes, insects, various birds. African grasslands include elephants, lions, zebras, giraffes.
Deciduous Forest	midlatitudes	relatively mild summers and cold winters, 76-127 centimeters (30-50 inches) of precipitation a year	rich topsoil over clay	hardwoods such as oaks, beeches, hickories, maples	wolves, deer, bears, and a wide variety of small mammals, birds, amphibians, reptiles, and insects.
Taiga	mid- to high latitudes	very cold winters, cool summers; about 50 centimeters (20 inches) of precipitation a year	acidic, mineral-poor, decayed pine and spruce needles on surface	mostly spruce, fir, and other evergreens	rodents, snowshoe hares, lynx, sables, ermine, caribou, bears, wolves, birds in summer
Tropical Rainforest	near the equator	hot all year round, 200-400 centimeters (80-100 inches) of rain a year	nutrient-poor	greatest diversity of any biome; vines, orchids, ferns, and a wide variety of trees	more species of insects, reptiles, and amphibians than anyplace else; monkeys, other small and large mammals, including in some places elephants, all sorts of colorful birds

- b. What is the difference between a food chain, a food web, and a food pyramid?

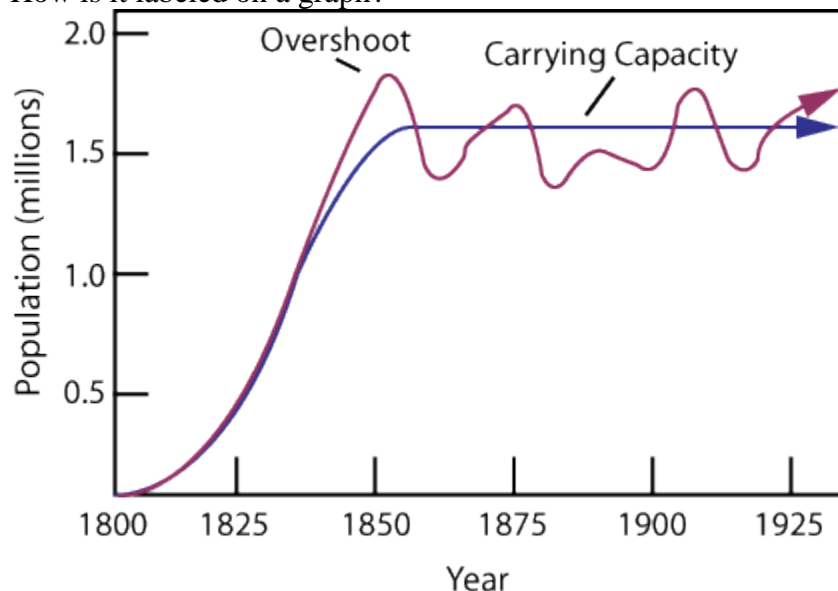
A food chain is a single pathway of energy, a food web are interconnected food chains, and a food pyramid shows the amounts of energy, individuals, and biomass in each level.

## 52. Describe population growth patterns and carrying capacity

- a. What is carrying capacity?

The maximum number of individuals a habitat can hold.

- b. How is it labeled on a graph?



c. What factors can affect a population's growth?

Limiting factors, anything that limits growth or reproduction

53. What is ecological succession?

a. What is primary succession? Give an example

Succession to occur where there has never been life before. After a volcano and a new island emerges.

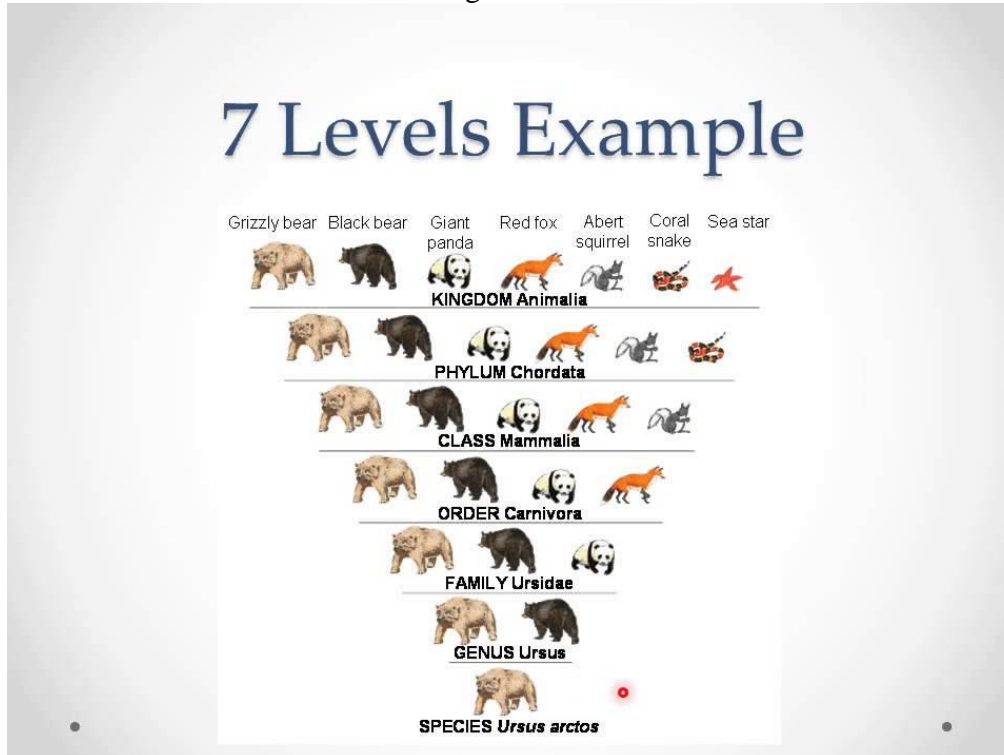
b. What is secondary succession? Give an example.

Type of succession to occur where life has already colonized. After a wildfire

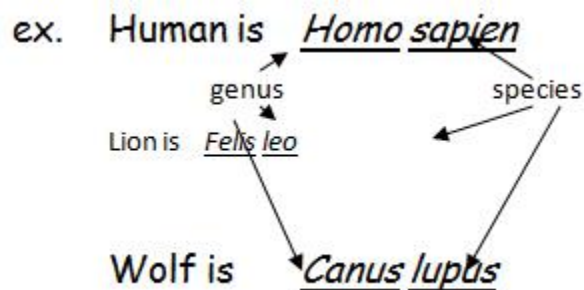
c. What is a pioneer species? Give an example.

The first to colonize after a disturbance. Usually a plant, small, low growing, able to tolerate harsh conditions.

54. What are the taxonomic levels of organism classification?

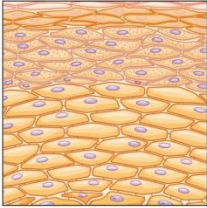
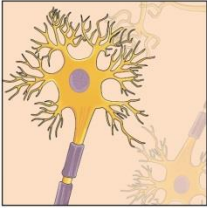
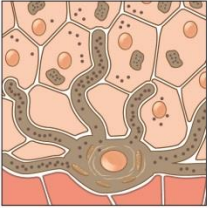


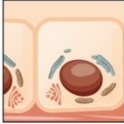



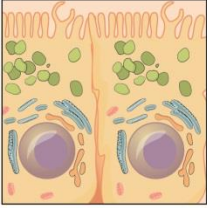
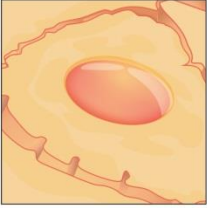


55. Explain binomial nomenclature. Give an example.



56. Describe types of animal and plant cells and tissues

a. Human tissues: Fill in the chart

Germ Layer	Gives rise to:
Ectoderm	<p>Epidermis, glands on skin, some cranial bones, pituitary and adrenal medulla, the nervous system, the mouth between cheek and gums, the anus</p> <div>    </div> <div> <p>Skin cells</p> <p>Neurons</p> <p>Pigment cell</p> </div>
Mesoderm	<p>Connective tissues proper, bone, cartilage, blood, endothelium of blood vessels, muscle, synovial membranes, serous membranes lining body cavities, kidneys, lining of gonads</p> <div>      </div> <div> <p>Cardiac muscle</p> <p>Skeletal muscle</p> <p>Tubule cell of kidney</p> <p>Red blood cells</p> <p>Smooth muscle</p> </div>
Endoderm	<p>Lining of airways and digestive system except the mouth and distal part of digestive system (rectum and anal canal); glands (digestive glands, endocrine glands, adrenal cortex)</p> <div>    </div> <div> <p>Lung cell</p> <p>Thyroid cell</p> <p>Pancreatic cell</p> </div>

b. Major Organ Systems of the body: Fill in the chart

<b>Organ System</b>	<b>Organs within the system</b>	<b>Function of the organ system</b>
<b>Integumentary System</b>	Skin, hair, nails	Protect the tissue beneath them
<b>Muscular System</b>	Cardiac muscle, smooth muscle Skeletal muscle	Works with the skeletal system to help you move
<b>Skeletal System</b>	Bones, joints, ligaments, cartilage	A frame to protect and support your body parts, produce blood cells, storage of minerals
<b>Cardiovascular System</b>	Heart, arteries, veins, capillaries, and blood	To pump blood through all the vessels of your body
<b>Respiratory System</b>	Nose, Pharynx, Larynx, Trachea, Bronchus, Lung, Diaphragm	To take in oxygen and remove carbon dioxide
<b>Nervous System</b> Central nervous system Peripheral nervous system	Brain, spinal cord Nerves, motor neurons, sensory neurons Somatic nervous system Autonomic nervous system	Receives and sends electrical messages throughout the body
<b>Digestive System</b>	Teeth, mouth, salivary glands, pharynx, esophagus, stomach, liver, gallbladder, pancreas, small intestine, large intestine, rectum, anus	Breaks down food so it can be used by the body
<b>Urinary System</b>	Kidney, ureter, urinary bladder, urethra	Produce, store, and eliminate urine
<b>Lymphatic System</b>	Tonsils, Thymus, spleen, lymph nodes, Lymphatic vessels	Returns leaked fluids to blood vessels, and helps get rid of bacteria and viruses
<b>Endocrine System</b>	Pituitary gland, parathyroid gland, thyroid gland, Thymus gland, adrenal gland, pancreas, ovaries, testes	Controls functions by using chemicals made by the endocrine glands
<b>Reproductive System</b>	Female – ovary, fallopian tube, pubic bone, uterus, urinary bladder, urethra, vagina Male – vas deferens, urinary bladder, urethra, pubic bone, prostate gland, epididymis, penis, testes, scrotum	Female- produces egg, nourishes and protects the fetus Male – produces and delivers sperm