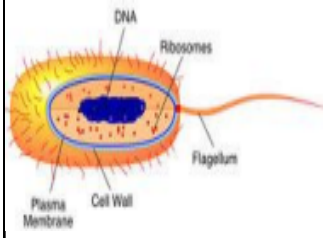
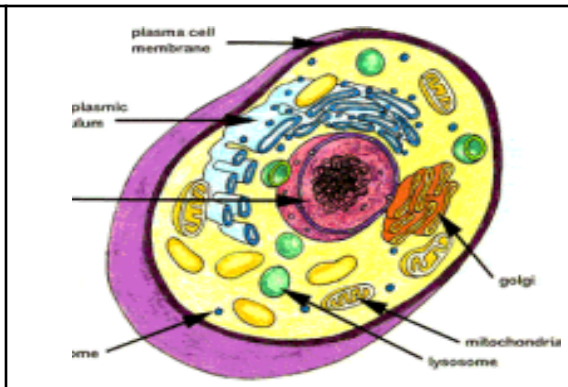
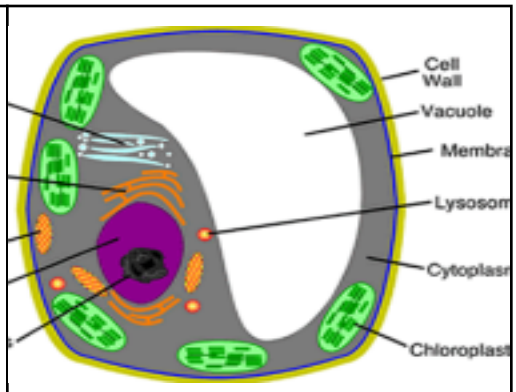
Biology End of Course Test - Study Guide for the 2022-2023 School Year

Content Domain 1: Cells

1. What is the basic unit of structure and function in all living organisms?

2. There are 2 main categories of cells:

	&	

		
Prokaryotic cell	Eukaryotic cell - animal cell	Eukaryotic cell - Plant cell

- Which organelles/structures are **only** found in **plant** cells?

1.	&	2.

- Which four structures do both prokaryotes and eukaryotes contain (all cells)?

1.	2.
3.	4.

- In which organelle does cellular respiration take place?

- Which structure does the plant and bacteria cell contain, that is not present in an animal cell?

- If a cell has a nucleus and membrane bound organelles, it is said to be

- If a cell **does not** have a nucleus or organelles, it is said to be

- There are only 2 kingdoms whose members contain prokaryotic cells. They are

	&	

- All bacteria/prokaryotic cells are **unicellular**, this means that they contain how many cells?

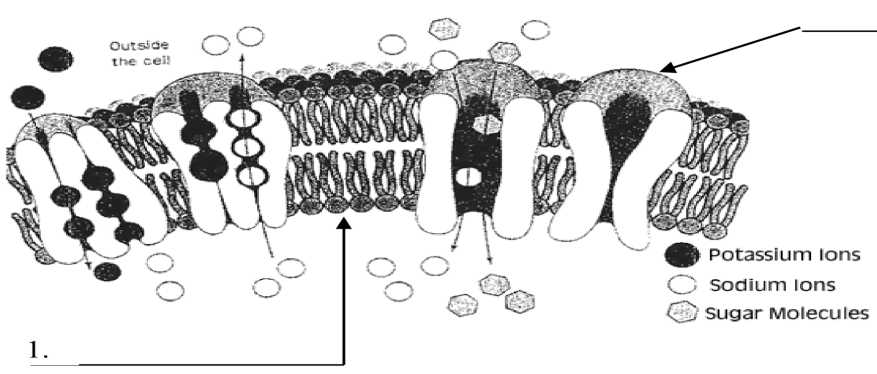
- Eukaryotes can be both **unicellular** and **multicellular**. What does this mean?

- Which of the following are characteristics of living things? (Circle correct characteristics)

Be able to reproduce	*Grow and develop*	*Uses energy*	*Be able to move*
Respond to stimuli	*Made of one or more cells*	*Has vision*	*Made of two or more cells*
Homeostasis	*Needs a host to survive*	*Evolve*	*Contains DNA & RNA*

- Which organelle maintains homeostasis and controls what enters and leaves the cell?

- Label the following structures in the membrane below:



1.	**2.**

- In the image above, what type of diffusion is being displayed (NO ATP)?

- The parts inside of a cell which perform a specific function for the cell are known as

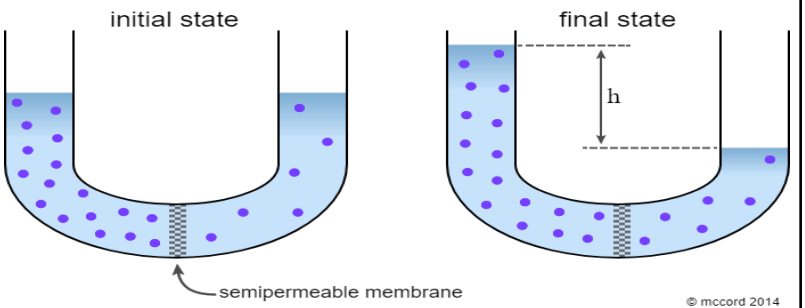
- Fill out the table below on the cellular structures

Cellular Structures	Function
	Energy center or "powerhouse" of the cell. Turns glucose/food into usable energy (ATP). This is the site for Cellular Respiration.
	Synthesizes proteins after receiving a mRNA transcript
	Processes, packages and secretes proteins & lipids in vesicles out of the cell.
	Contains digestive enzymes, used to get rid of worn out cell parts and cellular intruders.
	Site of protein synthesis due to having a large amount of ribosomes on its surface. Helps in transporting proteins throughout the cell.
	Animals - contain several very small storage units
	Plants - Contains a very large storage unit that stores water, waste, and nutrients.
	Site of lipid synthesis and detoxification. Helps in transporting lipids throughout the cell and has a very smooth surface.
	Uses sunlight/radiant energy to turn water and carbon dioxide into glucose and breathable oxygen. The site of photosynthesis (found in all plant cells and some protist cells.
	Provides additional support to the cell by giving it a defined shape. Typically made out of carbohydrate and can be found in(plant, fungi, and bacteria cells).
	Jelly-like fluid interior of the cell. Hold all the organelles.
	The "control center" of the cell because it contains the cell's DNA (chromosomes).
	Controls what enters and leaves the cell. Helps the cell maintain homeostasis by controlling what enters and leaves the cell.

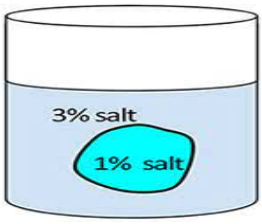
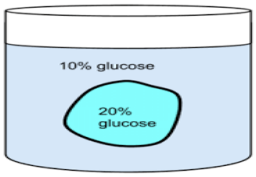
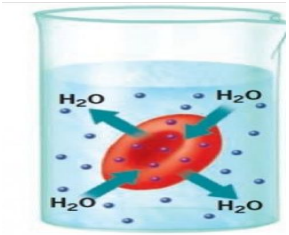
- Living things maintain a balance between materials entering and exiting their cell(s). Their ability to maintain this balance is called

- The movement of substances across the cell membrane from an area of high concentration to an area of low concentration **without the use of energy** is known as

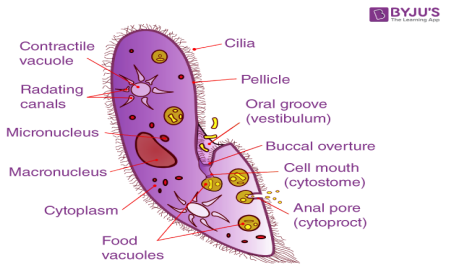
- The diagram below is illustrating the process of

	•

- The following diagrams represent different solutions that can affect the rate of osmosis. Label the diagrams as being either **hypotonic**, **hypertonic** , or **isotonic**.

	The solution would be:
	The solution would be:
	The solution would be:

- The contractile vacuole inside of some protists like the **paramecium** below maintains osmotic balance by pumping out excess



- What type of cellular transport requires energy in the form of ATP? (Low to high)

- Bulk transport into the cell is known as

- Bulk transport out of the cell is known as

- Special **proteins** that speed up the rate of chemical reactions are known as

- The substance an enzyme acts upon is known as the

- What do enzymes lower in order to speed up chemical reactions?.

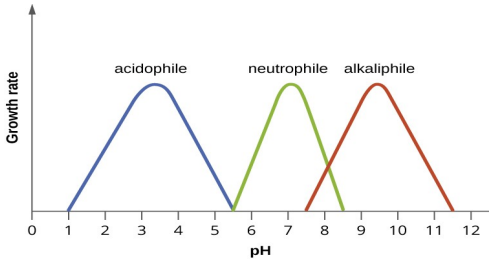
- List three factors that play a role in enzyme activity

1.	2.	3.

- Circle each of the enzymes listed below:

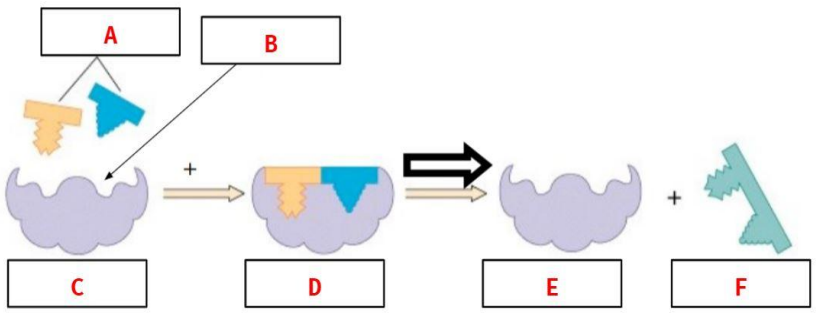
Lactose	Galactase	Lactase	Glucose	Lipase
Fructase	Amylose	Amylase	Sucrase	Sucrose

- List the optimal pH of each of the enzymes in the space provide:



Enzyme	ph
Acidophile	
Neutrophile	
Alkaliphile	

- Label the diagram below with the following terms: Enzyme/substrate complex, substrate, enzyme, products



A:
B:
C:
D:
E:
F:

- If you see a word that ends in -ase, it is probably a(n)

- If you see a word that ends in -ose, it is probably a(n)

- The area in which a substrate molecule fits into an enzyme is known as the

- A cell that has 50 chromosomes divided by mitosis, how many chromosomes will each of its daughters cells contain? Identical or non-identical? How many cells are made?

- List three purposes of mitosis in eukaryotic organisms.

- A cell that has 20 chromosomes divided by meiosis, how many chromosomes will each of its daughters cells contain? Identify or non-identical? How many cells are made?

- Fill in missing information on the table related to the four major biomolecules

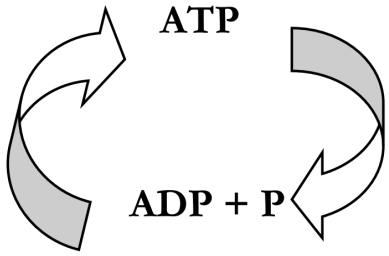
Biomolecule	Monomer	Function	Example
1. Carbohydrate			
2.	• **Glycerol** • **fatty acids**		
3.		**Some are important structural components of living things- some serve as enzymes .**	
4.			**DNA and RNA**

- Each of the macromolecules above are considered organic. What does that mean?
- If being chased from a grizzly bear, which macromolecule will provide quick energy?
- Which macromolecule contains the most amount of energy per gram?
- Which macromolecules are the primary components of a virus?
- Which macromolecule would you consume to increase the size of your muscles?
- Which macromolecule would you use to help speed up a chemical reaction?

ATP-*Adenosine Triphosphate* is a special molecule that stores and releases the energy in its bonds when the cell needs it. Below is a diagram showing the ATP-ADP cycle. **energy released for chemical reactions** or **energy supplied through cellular respiration.**

In the two spaces below next to the ATP / ADP + P cycle, write either if:

1. **Energy released for chemical reactions** or
2. **Energy stored through cellular respiration**

- The process in which plants convert light energy into chemical energy in the form of glucose is called

- The process above takes place in a plant cell's

- What is the relationship between carbon dioxide in the atmosphere and photosynthesis?

- Fill in the summary reaction for photosynthesis below with the correct reactants and products. Use the following terms: ***water***, ***carbon dioxide, glucose, oxygen***, 6CO_2, 6H_2O, $C_6H_{12}O_6$, 6O_2 *(Place symbols on the top lines and words on the bottom.)*

	+		→→→→		+	
	+		**Light Energy**		+	

- The process of splitting a molecule of glucose into two 3-carbon molecules (pyruvate) is called

- The process above takes place outside of the cell's

- Fill in the summary reaction for cellular respiration below with the correct reactants and products. Use the following terms: ***water***, ***carbon dioxide, glucose, oxygen***, $6CO_2$, $6H_2O$, $C_6H_{12}O_6$, $6O_2$ *(Place symbols on the top lines and words on the bottom.)*

	+		→ → → →		+		+	
	+		→ → → →		+		+	

- Fill out the chart below about the stages of cellular respiration:

Stage of Cellular Respiration	Location	Aerobic or anaerobic?	Amount of ATP produced
Glycolysis			
Kreb Cycle (Citric Cycle)			
Electron Transport Chain			

- The process of converting glucose into ATP in the absence of oxygen is called

- Fill out the chart below on fermentation.

Type of fermentation	Organism(s)?	Amount of ATP produced?	By-product?
Lactic Acid			
Ethanol (alcohol)			

Content Domain: Classification & Phylogeny

- The branch of biology that deals with the grouping and naming of organisms is called

- Carolus Linneaus developed the two word system to name organisms known as

- Today, the most accurate and effective way of classifying an organism is by using

- The first word of a scientific name is the

- The second world of a scientific name is the

- How many taxa (classification categories) are in the modern classification system?

- List the taxa from smallest to largest.

1.	2.	3.	4.
5.	6.	7.	8.

- In the modern day classification system, how many kingdoms and domains are there?

# of Kingdoms		# of Domains	

- A. Of all the kingdoms, which one(s) do not have a cell wall? B. Which ones do not contain a nucleus?

A.	B.

- Viruses are not considered living, but what characteristics do viruses share with living things?

- Viruses often get confused with bacteria, how are they different?

- Correctly identify the kingdoms given the descriptions in the table below. Provide an example organism in each kingdom.

Kingdom	Description	Example Organism
	Consumers that stay put. They have eukaryotic cells. They may be unicellular or multicellular. They decompose dead organisms and waste from the environment.	What is the only single celled organism in this group?
	Multicellular eukaryotes that photosynthesize. Have cellulose cell walls.	
	Mainly found in extreme environments. These prokaryotic cells like extremely hot temperatures and areas of high salt content.	
	Multicellular consumers. They do not contain cell walls. Most have the ability to move.	
	Most diverse kingdom of organisms. They may be unicellular or multicellular. They live in moist environments. Some are plant-like, some animal-like, some fungus-like.	
	This group of prokaryotes can be both beneficial and harmful. Some cause diseases while others are used in the food industry and use decomposers	

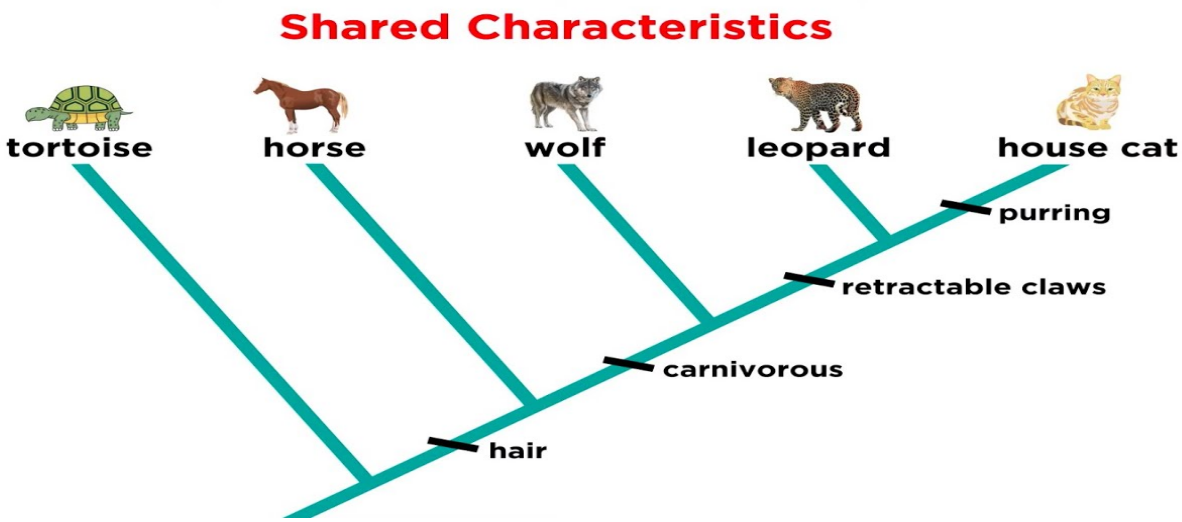
- Which kingdom(s) organisms can live in extreme environments such as hot springs and the dead sea?

- Which of all the domains, which ones cells do not have a nucleus?

- In which kingdom would you place an organism that is eukaryotic, makes its own food, and multicellular?

- Scientific names Canis lupus and Canis latrans share which taxa? Be specific

- The more taxa that two organisms share, the more



- Using the cladogram above, which organism's DNA would be least like the tortoise? Explain

- Even though it is not listed on the cladogram, what trait could the tortoise have?

- Which organism is most closely related to the house cat? Which traits do they share?

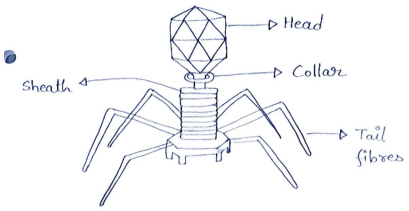
- On the cladogram, where would you place a dog? Place a dog on the cladogram above.

- Cladograms are used to show what type of relationships?

- What would be the most accurate way of placing organisms on a cladogram?

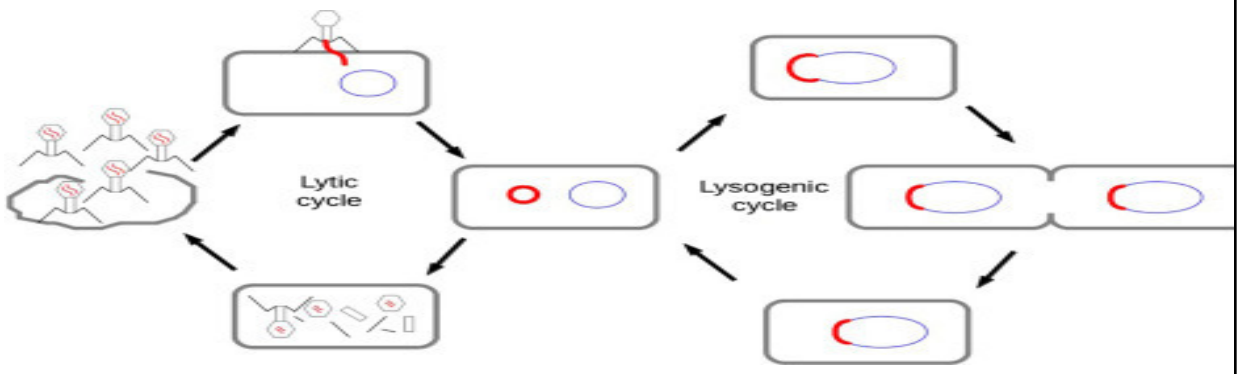
- What is the purpose of a dichotomous key?

In the image below, is a picture of a bacteriophage **VIRUS**. Bacteriophages are viruses that infect bacteria cells. Using the box to the right, explain why a virus would be considered **NON-LIVING**:



- Which type of entity requires a host cell to reproduce?

Analyze the image below, describe the difference between the lysogenic and lytic cycles of a virus in the space provided under the image:



- The endosymbiotic theory describes the origins of all eukaryotic organisms on the planet. In the space provided, explain the endosymbiotic theory in your own words.

- Which organelles provide the most evidence for the endosymbiotic theory? Explain?

Content Domain: Genetics

- Chromosomes are made up of the organic molecules called

- What are the two types of nucleic acids?

1.	2.

- What are the differences between these two types of nucleic acids?

1.
2.
3.
4.

- List the four nitrogenous bases found in the DNA molecule and how they pair together

	pairs with	
	pairs with	

- List the four nitrogenous bases found in the RNA molecule and how they pair together

	pairs with	
	pairs with	

- Name the three types of RNA *(know the function of each). Circle the one that carries amino acids.*

- The DNA molecule has the shape of a

- How many strands does a RNA molecule contain?

- The process by which DNA makes a copy of itself is known as:

- During which phase of the cell cycle does DNA make a copy of itself? *(Highly important)*

- Where does the above process take place in the cell? (replication)

- The process of protein synthesis occurs in two stages. List the name of each stage and the location in the cell where it occurs below:

Stage 1:	Location:
Stage 2:	Location:

- If the sequence of codons on an mRNA molecule are **ACG AAC CUU AGG**, what would the template strand on the DNA molecule have been?

- What does a codon on a mRNA molecule code for?

- How many chromosomes do humans have in each somatic (body) cell?

- What is this number known as and how is it abbreviated? (Haploid or Diploid)/(1n or 2n)

- How many chromosomes do humans have in each gamete (sex) cell?

- What is this number known as and how is it abbreviated? (Haploid or Diploid)/(1n or 2n)

- Which cellular division process do cells undergo for growth, repair, and replacement?

- List in order, the 4 phases of the above cell division process after Interphase

1.	2.
3.	4.

- During which phase do the chromosomes line up in the middle?

- During which phase do replicated chromosomes separate from each other?

- The division of the cytoplasm of the cell is known as cytokinesis. How does this differ between plant and animal cells?

- List two other names for sex cells is (do not use sperm or egg for your answer)

- A. In ***mitosis***, how many daughter cells are produced? B. Are they identical? C. Haploid or diploid?

A.	B.	C.

- In ***mitosis***, in terms of continuity, how many chromosomes are passed to the daughter cells? All or half?

- A. In ***meiosis***, how many daughter cells are produced? B. Identical or non-identical? C. Haploid or diploid?

A.	B.	C.

- In ***meiosis***, in terms of continuity, how many chromosomes are passed to the daughter cells? All or half?

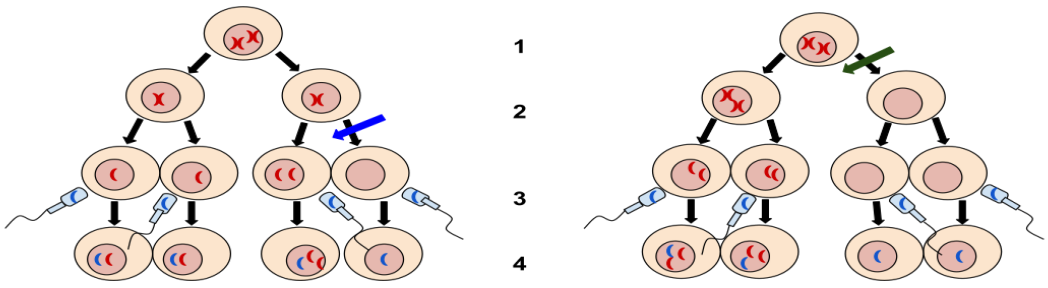
- What are the names for the male and female gametes?

Female:	Male:

- During meiosis, chromosomes form what type of pairing prior to the synapsis?

- During meiosis I or II, when these homologous pairs and/or sister chromatids do not separate properly, genetic disorders can occur. This failure of chromosomes to separate is known as

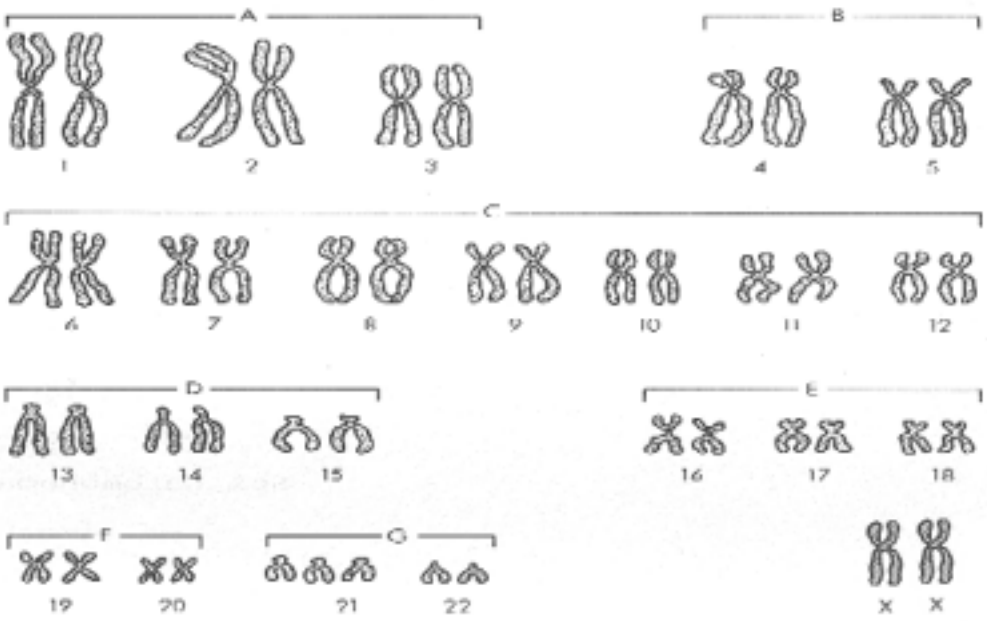
- Analyze the image below (left side is nondisjunction during meiosis II and the right side is nondisjunction during meiosis I). A. How many haploid cells would be affected by nondisjunction occurring during meiosis II? B. Nondisjunction occurring during Meiosis I?



A.	B.

- The karyotype below illustrates what would happen if this mutation occurred. What type of disorder would this individual have? What is the sex of this individual?

Disorder:	Sex:



- A. What occurs to the homologous pairs of chromosomes in prophase 1 of meiosis that gives us genetic variation? B What is another way organisms can get genetic variation?

A.	B.

- The study of inheritance is known as

- An Austrian monk is referred to as the Father of Genetics. What is his name?

- He explained the principles of dominance, independent assortment and segregation. Name the plant he used to make crosses to discover these principles.

- What type of diagram is used to determine (predict) the outcome of genetic crosses?

- If you cross a homozygous tall plant with a short plant. Tall is dominant. What would be the genotype of the short plant? Use the word form (i.e heterozygous)

Short Plant:	

- What would be the possible phenotypes of the offspring from the cross described above? Use the Punnett Square to make your prediction. Give percentages.

	Tall:
	Short:

- If you cross a red flower with a white flower and all of the offspring are pink. Which pattern of inheritance is being represented?

- Blood type is an example of codominance. Which blood types are dominant and which one is recessive?

Blood Types:	Possible Genotypes	Dominant or Recessive
Type A	i^Ai^A or i^Ai	
Type B	i^Bi^B or i^Bi	
Type AB	i^Ai^B	
Type O	ii	

- What is the expected phenotypic ratio of a dihybrid cross between two parents that are heterozygous for both traits? (AaBb * AaBb)

Dominant & dominant	
Dominant & recessive	
Recessive & dominant	
Recessive & recessive	

- For each of the genotypes (AA, Aa or aa) below determine what the phenotype would be. Purple flowers are dominant to white flowers.

AA	
Aa	
aa	

- Bobtails in cats are recessive. Normal tails are dominant.

AA	
Aa	
aa	

- In dogs, the gene for fur color has two alleles. The dominant allele (F) codes for gray fur and the recessive allele (f) codes for black fur.
    - A heterozygous female dog mates with a male dog is homozygous recessive. Figure out the percentage or ratio of possible phenotypes and genotypes of their puppies by using a Punnett Square below:

Genotypes	Phenotypes			
FF:	Gray:			
Ff:	Black:			
ff:	~~----------~~			

Below is a normal DNA sequence. Describe the mutation that is taking place:
(**Remember to always compare EACH mutated sequence to the ORIGINAL DNA sequence.**)

ATG CTG GGG	
Mutations	**Type of Mutation**
Mutation 1: ATG CTC GGG	
Mutation 2: TGC TGG GG	
Mutation 3: ATG CTA GGG G	

- Which mutations are considered frameshift mutations?

- Where must a mutation occur in order for the mutation to be passed to the next generation?

- Mutations can increase what in an organism which could lead to evolution of the species?

Content Domain IV: Ecology

- Choose a word from the word bank below to complete the following:

Ecology	Habitat	Niche	Biome
Limiting Factors	Predator	Prey	Decomposers
Photosynthesis	Symbiosis	Parasitism	Mutualism
Commensalism	Succession	Primary Succession	Secondary Succession
Pioneer	Ecosystem	Food Chain	Food Pyramid
Food Web	Abiotic	Biotic	Carrying Capacity
Heterotrophs	Autotrophs	Carnivore	Herbivore
Biomass	10%	90%	Climax Community

_____ is the branch of biology that studies the interaction of living organisms in their environments. The living things are called _____ factors and the nonliving factors such as wind, air, water, soil, etc. are the _____ factors.

Where an organism lives, such as an owl in a tree is its _____ and the job the organism has in the environment is its _____. An owl's niche would be that of a _____. The mouse an owl eats would be a _____. This relationship plus what the mouse eats could be shown in a _____ _____.

If several food chains intertwine showing many feeding relationships and energy flow you would have a _____ _____. If the flow of energy is shown in a food or energy pyramid, which kinds of organisms normally form the base of the pyramid?_____(producers or consumers). How much energy is available for the next level?_____.

The total amount of living matter produced in an environment is called its_____. All of the biotic and abiotic factors interacting in an area form a(n) _____. An area characterized by a dominant climate and plant/animal life is known as a _____.

Plants are the only organisms that can convert sunlight into chemical energy in the form of carbohydrates. Plants are the _____ or _____ and the animals and fungi are the _____ or _____.The process by which plants trap the energy from sunlight to make glucose or other sugars is known as_____.

Organisms that break down dead organic matter and return nutrients to the soil are called _____. Sometimes two organisms live together in a relationship known as _____. If both organisms benefit from the relationship such as in lichens, the relationship is called _____, but if one organism is harmed due to the relationship it is called _____.

All organisms require things in order to live. When these things are not available, they cannot reproduce or stay alive. These factors are called the _____factors. They could include space, food, nutrients, water, etc. When an area has reached the maximum capacity of individuals, it is said to be at _____.

The gradual change of an ecosystem or environment to a different kind of environment is known as _____. When it occurs after a fire, hurricane, or other natural disaster it is known as _____, but when it occurs where there h__as never been any life before it is called _____. The first plants, such as lichens, mosses, and ferns to live on bare rock or ground are called _____plants. The stable community containing mostly hardwood trees would be known as _____.

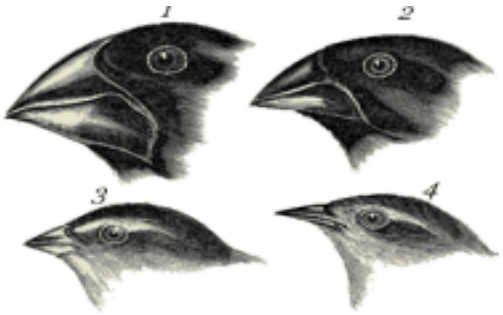
Content Domain V: Evolution

- Who was the English naturalist who traveled to Galapagos Islands making careful notes and descriptions of the organisms there such as tortoises and finches?

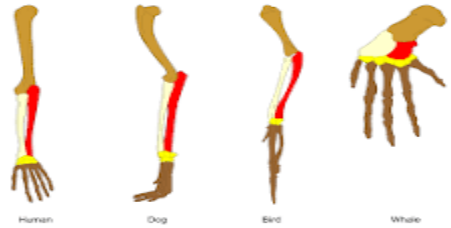
- What is the name of the theory he came up with that said, organisms who were well-suited to the environment would survive and pass on their traits to their offspring.

- Favorable variations within a species that allow them to be well-suited to the environment are known as

- The finches below show similar birds with variations in beaks and eating habits. This could have been the result of



- The diagram below shows anatomical evidence for evolution. What are these structures called?

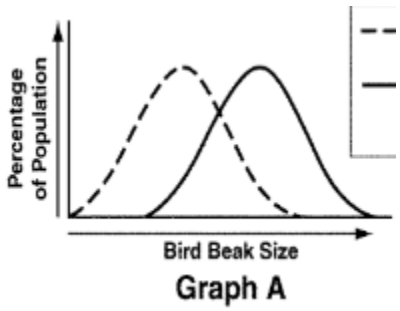


- What type of evolution occurs when two unrelated species have similar form?

- Would breeding race horses be an example of artificial or natural selection?

- What are the traces of organisms that once lived that can also provide evidence for evolution called?

- Label the following types of selection as ***stabilizing***, ***directional***, or ***disruptive***.

 Graph A	 Graph B	 Graph C

- The formation of a new species is called?

- The process can occur very slowly over a long period of time and it is referred to as:

- Or, several species can form quickly called

- How well an organism is suited to its environment and can produce offspring is known as

- If environmental conditions change and an organism no longer has adaptations suited to the environment, this may occur

- The total number of alleles present in a population is its

- Which evolutionary theorist came up with the term of ***acquired traits or acquired characteristics*** based on the use or disuse of a body part?

- Which form of dating fossils is based on the fossils location and depth in the ground?

- What are the two ways in which the age of fossils can be determined?

1.	2.

- This method shows if a fossil is older or younger than other fossils based on their depth in a rock bed. What is it called?

- This method of dating fossils uses the half life of elements such as carbon to determine the fossil's age. What is it called?

- What condition must occur in order for speciation to take place?

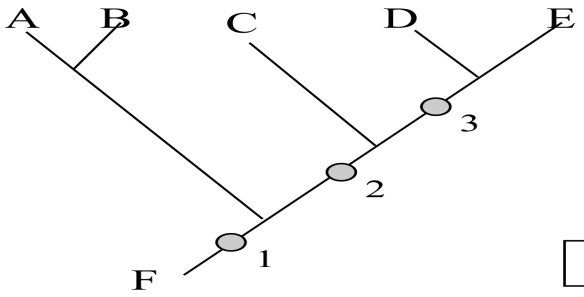
- One form is when a physical boundary live a river or canyon separates a population and it is referred to as

- In the space below, provide five pieces of evidence that supports the theory of evolution:

- Bacteria can undergo very rapid evolution, often times when paired with antibiotics this can lead to what is known as:

- Why can bacteria become resistant to substances faster than plants and animals?

- Insects, bacteria, and many other organisms can become immune to things that would normally kill them. What must ALREADY exist in the population in order for an organism to be biologically resistant?



The diagram above represents a	
The ancestor of all the other organisms is letter	
The two closest related organisms are: (2 sets)	
The numbers on the diagram represents	

- Explain how a cactus is adapted to live in the desert.
- Explain how the polar bear is adapted to live in the tundra.
- Organisms that can maintain a constant body temperature regardless of external temperatures are known as
- Organisms whose body temperature is similar to the temperature of the environment are known as
- What is the waxy substance on the leaves of plants that reduces water loss?
- Openings in the epidermis of a leaf that allows for gas exchange and transpiration are called
- What is the name of an adaptation that allows an organism to blend in with its environment?
- When an organism has a similar phenotype of a much dangerous organism it is known as?

- What is tropism?

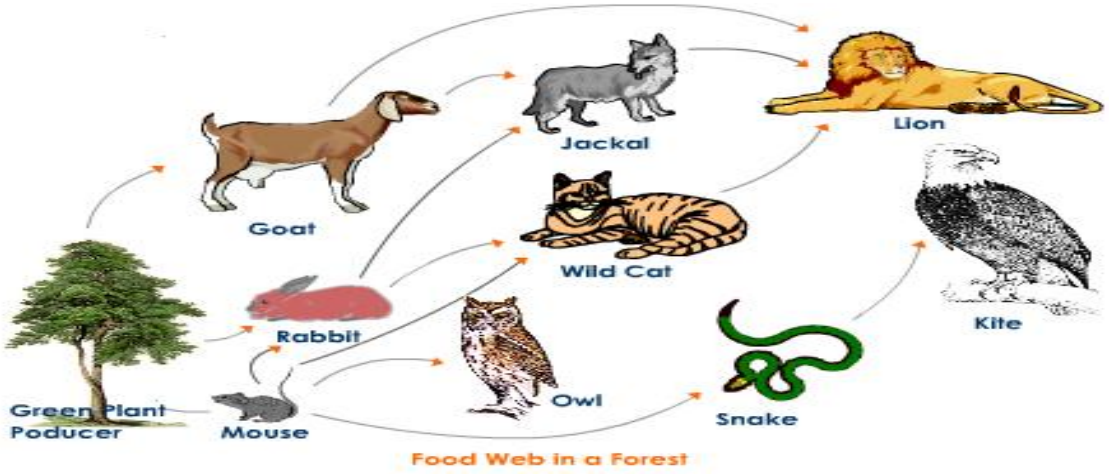
- In the space below, describe each type of tropism

Phototropism	
Thigmotropism	
Geotropism	
Hydrotropism	
Chemotropism	

Fill out the following character matrix. Mark an "X" if an organism has the trait.

	Legs	*Wings*	*Cells*	*Double Set of Wings*	*Antenna*
Spider					
Dragonfly					
Carpenter Ant					
Worm					
House Fly					

Create a cladogram in the space below:

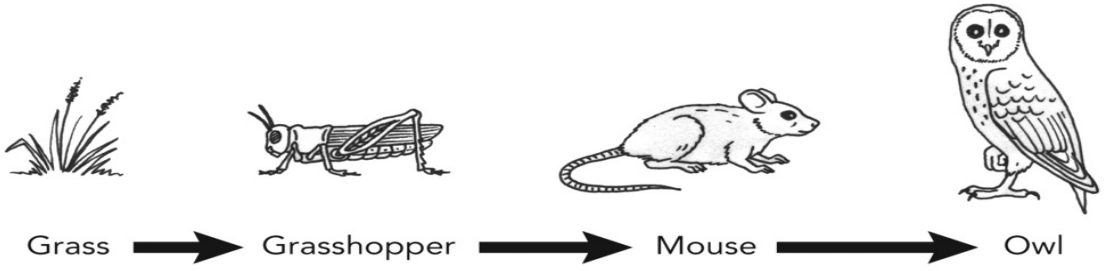


- Which organism contains the most amount of energy in the food web above?

- Identify all the primary consumers in the food web above?

- A.What percentage of energy is transferred between each trophic level? B. How is it lost?

- If the mouse population were to decrease, how would it affect the food web? Explain



- If the grass contains 200,000,000 joules, how much energy would the owl receive from the food chain?

- Explain what would happen to each population if the mouse population were to increase significantly?

Use this page to write any notes that you feel you may need to remember on for your EOC