AP Biology Summer Assignment 2018-2019

In order to be successful in AP Biology you will need to be proficient with all the material previously taught in Biology class. This summer assignment will help you review all the concepts you need to know. If you did not take Biology prior to registering for this class, you will need to make sure that you KNOW and UNDERSTAND all the topics covered in this assignment before the school year starts. You are expected to know this information before coming to AP Biology. AP Biology will dive deeper into these topics so if you do NOT know the BASIC information you will STRUGGLE with the content in this class. Remember that AP Biology is a college level course. Be aware that once you are in the class it is VERY hard to get out of it. This is a very rigorous course and there will be several homework assignments due each week. So, you are going to need to have good time management and be able to spend at least 2 hours each day for you to study and do homework.

Your Summer Assignment is worth 100 points and it is due the first week of school. Please print the packet and turn it in in a plastic three prong folder with your name on it. You will be tested on this material during the first week of school.

If you have any questions or concerns, please e-mail me at ian.hanson@redclayschools.com

Remind Code: gbd86k6 (For parents/guardians and students)

Signature Page

I understand that it is my responsibility to complete the AP Biology Summer assignment before the start of the school year. I am aware that I need to be proficient with all the information covered in this packet and I will be tested on this information during the first week of school. I also understand that once I am in the course I will not be able to get out of it just because I think the class is too hard or is too much work.

_____ _____

Student name (please print) Date

_____ _____

Parent Signature Date

PART 1: Science Vocabulary

1. Write a brief description of these terms used in scientific research (which uses the scientific method):

a. control group b. experimental variable c. dependent variable d. observation	e. experimental group f. data collection g. independent variable h. data analysis/representation	i. controlled experiment j. hypothesis k. inference l. conclusions/implications

A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	

2. Place the steps of the scientific method from #1 above in the correct order for proper research.

3. Distinguish among scientific laws, theories and hypotheses. What are they and how are they different?

4. Identify the metric units for the following:

a. mass b. volume c. length d. density e. temperature

Science Prefixes and Suffixes: The Language of Science

Many science words have prefixes and suffixes that are derived from Greek and Latin. Knowing these prefixes and suffixes used in science will make things much easier to understand unfamiliar terms. Using any source you would like, complete the chart below by defining the meaning of each prefix or suffix, finding an example science word using the prefix/suffix, and coming up with a definition of the word.

Prefix	Meaning	Example science word using the prefix + definition of the word
Ab-	"away from" or "outside of"	abaxial: away, or facing away, from the axis or center line
Anti-		
Auto-		
Bi-		
Cyto-		
Macro-		
Meta-		
Micro-		
Mono-		
Hemi-		
Hetero-		
Homo-		
Hydro-		
Hyper-		

Hypo-		
Inter-		
Intra-		
Iso-		
Neuro-		
Path-		
Poly-		
Photo-		
Pseudo -		
Sub-		
Therm-		
Trans-		
Tri-		
Un-		
Zoo-		

Suffix	Meaning	Example science word using the prefix + definition of the word
-asis		
-blast		
-emia		
-genic		
-gram		
-graph		
-ism		
-ist		
-itis		
-kinesis		
-lysis		
-meter		
-oma		
-osis		
-otomy		
-ous		

-phyll		
-philic		
-phobic		
-scope		

REQUIRED: Quizlet Online and Mobile App

Throughout the year we will be learning an incredible amount of new vocabulary in our science class. It will be necessary for you to review these vocabulary terms on a regular basis. Therefore, you will be required to create virtual index cards for new vocabulary using a free application called Quizlet. Quizlet offers review games for the vocabulary you are studying and can be used both at home and in class on a computer or on the go using the Quizlet mobile app.

1. Create a free Quizlet account by either going to https://quizlet.com/ or by downloading the iOS or Android Quizlet mobile app.
2. Create virtual index cards using the prefixes and suffixes (front), meanings (back), and examples (back) you've defined in the table above.
3. We will be referring to and adding to these prefixes and suffixes in our classroom. Please have these index cards completed by the first day of school.

Part 2: Hypothesis and Variable Statements

In Science, a hypothesis is written as an "If…then" statement. In the following statements, create a hypothesis and identify the independent and dependent variable.

Independent Variable: the variable that can be controlled by the experimenter.
Dependent Variable: is the variable that is directly affected by the independent variable.

Example: Will loud music affect the height of corn plants?

Hypothesis	If I play loud music, then the corn plants average height will be less than with softer music.
Independent Variable	Volume of music
Dependent Variable	Average height of corn plants

1. **Will nicotine in tobacco smoke affect mold growth?**

Hypothesis	
Independent Variable	
Dependent Variable	

2. **Will watering growing tomato plants using soda affect the mass size of their fruits?**

Hypothesis	
Independent Variable	
Dependent Variable	

3. **Will salt in water affect the breathing rate of a goldfish?**

Hypothesis	
Independent Variable	
Dependent Variable	

4. **Will the amount of bug spray used affect the number of mosquitoes attracted?**

Hypothesis	
Independent Variable	
Dependent Variable	

Part 3: Data Analysis and Graphing

Graphing is an important procedure used by scientists to display data that is collected during a controlled experiment. Line graphs must be constructed correctly to accurately portray the data collected. Many times the wrong construction of a graph distracts from the acceptance of an individual hypothesis.

A graph contains five major parts:

1. **The Title**: depicts what the graph is about. By reading the title, the reader should get an idea about the graph. It should be a concise statement placed above the graph.

2. **The Independent Variable:** the variable that can be controlled by the experimenter. It usually includes time (dates, minutes, hours), depth (feet, meters), temperature (Celsius). This variable is placed on the X axis (horizontal axis).

3. **The Dependent Variable**: is the variable that is directly affected by the independent variable. It is the result of what happens because of the independent variable. Example: how many oxygen bubbles a plant located five meters below the surface of the water produces? The oxygen bubbles are dependent on the depth of the water. This variable is placed on the Y axis (vertical axis).

4. **The Scales for Each Variable**: In constructing a graph one needs to know where to plot representing data, In order to do this a scale must be employed to include all the data points. This must also take up a conservative amount of space. It is not suggested to have a run-on scale making the graph too hard to manage. The scales should start with 0 and climb based on intervals such as: multiples of 2, 5, 10, 20, 25, 50 or 100. The scale of the numbers will be dictated by your data values.

5. **The Legend:** is a short descriptive narrative concerning the graph's data. It should be short and concise and placed under the graph.

Directions:

Using the following data, answer the questions below and then construct a line graph.

Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not brought under control, can lead to severe complications and even death.

Answer the following questions concerning the data below and then graph it.

Time after eating (minutes)	Amount of glucose per liter of Blood (mL), Person A	Amount of glucose per liter of Blood (mL), Person B
30	170	180
60	155	195
90	140	230
120	135	245
150	140	235
180	135	225

1. What is the dependent variable? Why?

2. What is the independent variable? Why?

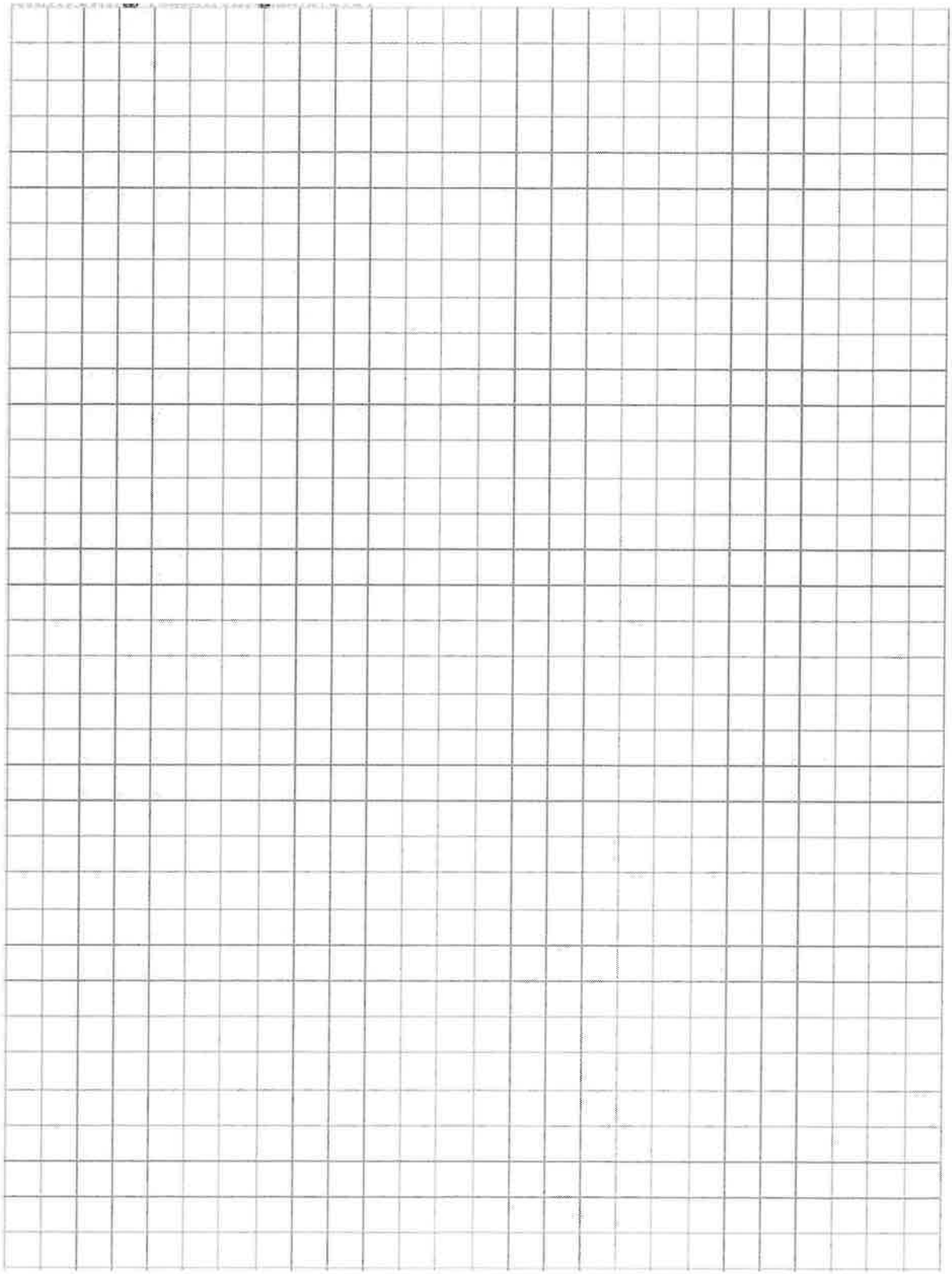
3. What title would you give the graph?

4. Which, if any, of the above individuals has diabetes?

5. What data do you have to support your hypothesis?

6. If the time period was extended to 210 minutes, what would be the expected blood glucose level for Person B?

7. What conclusions can be determined from the data in your graph?



Name_____ **Period**_____

AP Biology Summer Assignment

- Students will design and/or evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.

List and describe the steps of the Scientific Method.

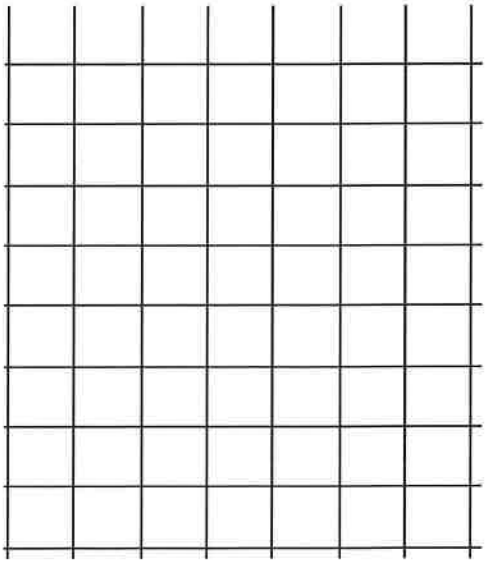
1. _____
2. _____
3. _____
4. _____
5. _____

Why do many experiments make use of a **control group?** _____
What are the characteristics of a good experiment? _____
What is an **independent variable**? _____
What is the **dependent variable**? _____

You have measured the rate at which a fish breaths at various temperatures by counting the rate at which its gills open. The data is below. Graph this data. Label the title, x, and y axis on the graph (use units)

Breathing rate (number of breaths/min) vs. Temperature

19 breaths/min at 5 ◦C
25 breaths /min at 10 ◦C
30 breaths /min at 20 ◦C
34 breaths /min at 30 ◦C
37 breaths /min at 35 ◦C



What is the independent variable?_____
What is the dependent variable?_____
What happens to breathing rate with increase in Temperature?
_____
What would be a good control for this experiment?
_____
How do you think the breathing rate was measured?
_____
What do you think would happen if you raised the temperature even more?_____
Why would it be a bad idea to do this?_____
_____

- Students will interpret and analyze data to make predictions and/or defend conclusions.

Interpret graphs.
Which axis has the independent variable? _____
Which axis has the dependent variable? _____

- Students will describe how scientific inferences are made from observations and identify examples from biology.
- Students will explain the development of a theory and recognize the differences between theories and laws.

Define the following terms.
Hypothesis_____
Theory_____
Law_____
How is a theory developed? _____
_____

- Students will identify ways in which a scientific claim is evaluated

What happens if new information is discovered, or new evidence presented that is different from what is already known? _____

_____

- Students will identify and/or describe the basic molecular structure of carbohydrates, lipids, proteins, and/or nucleic acids.
- Students will describe the primary functions of carbohydrates, lipids, proteins, and/or nucleic acids in organisms.

Complete the following chart on Macromolecules

Macromolecules (Draw the Monomer)	Function	Subunits
Carbohydrates		
Proteins		
Lipids		
Nucleic Acids		

Complete the following chart on Macromolecules:

Specific Molecule	Function	Type of Macromolecule
Starch		
Cellulose		
Insulin		
Glycogen		
Glucose		
Enzymes		
Hemoglobin		
Fats		
DNA		
RNA		

- Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

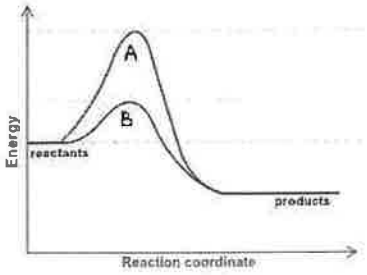
Pertaining to the properties of water, explain what is meant by the following terms:

Hydrogen Bonding: _____
Polarity_____
Cohesion: _____
Adhesion: _____
Ability to moderate temperature: _____
Expansion upon freezing_____
Universal solvent_____
If water sank when it froze, what would happen to the world's lakes, oceans, and climate? _____
_____
Draw a picture of several water molecules showing how the hydrogen bonds interact with the O and H:

- Students will explain how enzymes speed up the rate of a biochemical reaction by lowering the reaction's activation energy.
- Students will identify and/or describe the effect of environmental factors on enzyme activity.
- Items referring to the factors that affect enzyme activity are limited to concentration, pH, and temperature.

What is the function of **enzymes** in cells? (Or, what is a **catalyst**?) _____
_____
Define activation energy_____
Draw 3 different graphs showing how the rate of reaction (y axis) is affected by temperature, pH, and substrate concentration (Make sure to label the title, x, and y axis with units):

How do extreme pH and temperature extremes affect enzymes? (What is **denature**?) _____
_____
Label the activation energy and the line that uses a catalyst on the graph

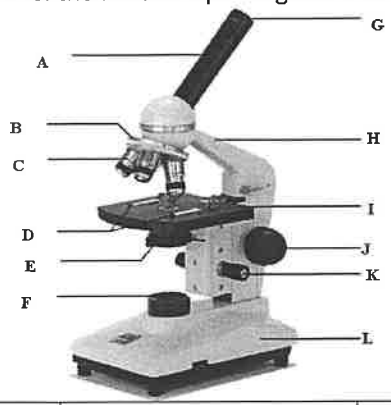


- Students will compare and/or contrast the structure and function of the compound microscope, dissecting microscope, scanning electron microscope, and/or the transmission electron microscope.

What is a **compound microscope**? _____
What is a **dissecting microscope**? _____

What is a **scanning electron microscope**? _____
What is the **transmission electron microscope**? _____

Label the microscope diagram and describe the function of each structure



	STRUCTURE	FUNCTION
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		

- Students will describe and/or explain the cell theory.

What are the 3 parts to the **cell theory**?
1. _____
2. _____
3. _____
Why is the term "cell theory" appropriate? (Why is the cell theory a theory?) _____
_____

- Students will compare and/or contrast the structures found in prokaryotic cells and in eukaryotic cells.

What are prokaryotic cells? _____
What are eukaryotic cells? _____
Complete the table with the STRUCTURES found in prokaryotic and eukaryotic cells. Use the structures in the following chart.

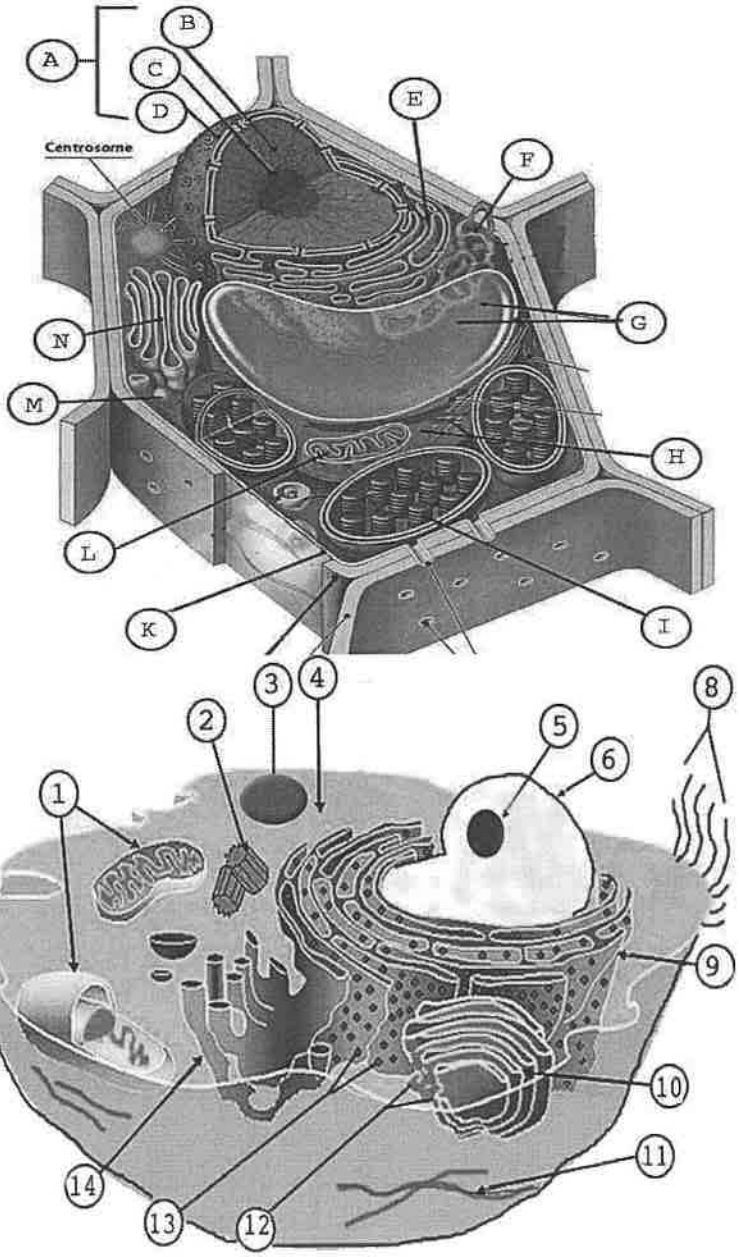
Prokaryotic	Eukaryotic

- Students will describe how structures in cells are directly related to their function in the cell.
- Students will compare and/or contrast the structures found in plant cells and in animal cells.

Complete the following Chart using the two illustrations below:

Cell Part and Letter	Structure Description w/ Drawing	Function	Letter or Number
Nucleus			
Nuclear Envelope			
Nucleolus			
Plasma (Cell) Membrane			
Cell wall			
Mitochondria			
Endoplasmic Reticulum			
Central Vacuole			
Vesicle			
Lysosomes			
Chloroplasts			
Golgi Apparatus			

Microtubules / Microfilaments Cytoskeleton			
Ribosomes			
Cytoplasm			
Cilia / Flagella			



Which cell is the plant cell (top or bottom)? How do you know? _____

_____

Which 3 structure(s) are found **only** in the plant cell?

1. _____
2. _____
3. _____

Which structure is found **only** in the animal cell?

_____

What does the term "membrane bound organelles mean?" What cell type are they found in? _____

_____

Put the following in order from smallest to largest (1-4):

Organ systems _____ Cells _____ Organs _____ Tissues _____

- Students will explain the role of the cell membrane during active and passive transport.

What is the function of the **cell membrane**?_____

_____

Describe 3 functions of the proteins found in the cell membrane.

1. _____

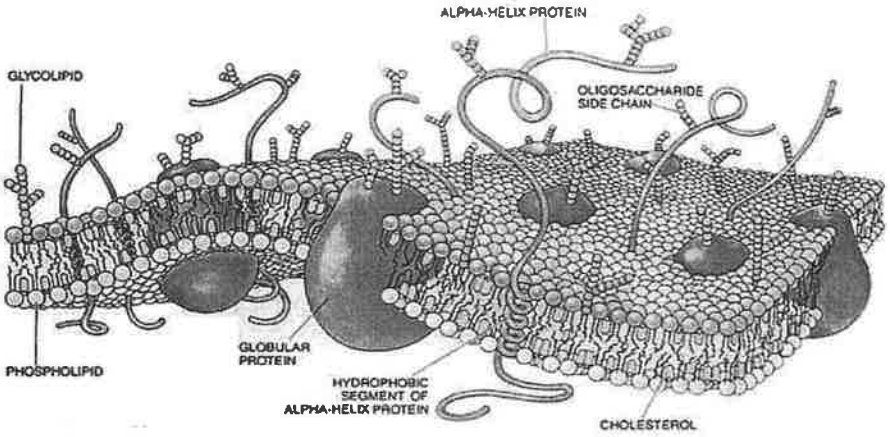
_____

2. _____

_____

3. _____

_____



Explain what has happened in the

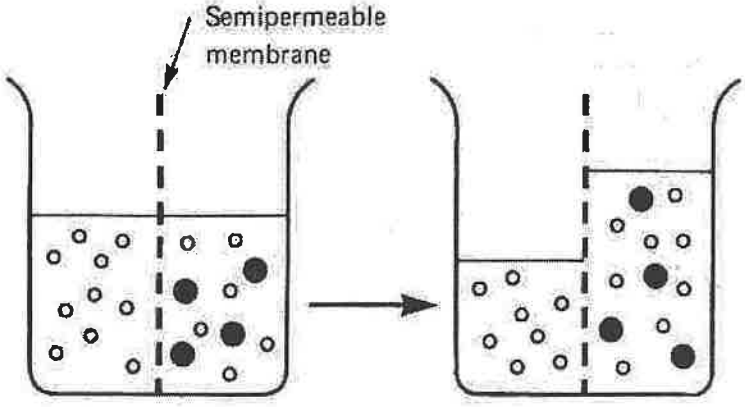


diagram to the left._____

_____

_____

Why did the large dark molecules NOT move to the left?_____

_____

_____

How is the semi-permeable membrane like a cell membrane?_____

_____

If the dark molecule is starch, where is the starch concentration greatest (left or right)? _____

If the white molecule is water, where is the water concentration greatest at first? _____

In osmosis, water moves from an area of _____ to an area of _____ concentration. (higher/lower)

If the dark molecules could move, in what direction would they move? _____ Why? _____

In diffusion, molecules move from an area of _____ to an area of _____ concentration. (higher/lower)

What is **osmotic pressure**? _____

Which way **water** will move in each of the following situations?

a. Salt inside the cell 65% and outside the cell 40%. _____
b. Sugar inside the cell 27% and outside 80%. _____

What is **homeostasis**? _____

How do cells maintain homeostasis? Consider *pH, temperature, blood glucose, water balance*

_____

Define the following terms:

Hypotonic: _____

Hypertonic: _____

Isotonic: _____

Endocytosis: _____

Exocytosis: _____

Comparison of active and passive transport

	PASSIVE TRANPORT	ACTIVE TRANSPORT
Requires energy?		
Low to high concentration or high to low concentration?		
Examples		

- Students will explain how the products of photosynthesis are used as reactants for cellular respiration and vice versa.
- Students will explain how photosynthesis stores energy and cellular respiration releases energy.
- Students will identify the reactants, products and/or the basic function of photosynthesis.
- Students will identify the reactants, products and/or the basic functions of aerobic and anaerobic cellular respiration.
- Students will connect the role of adenosine triphosphate (ATP) to energy transfers within the cell.

What are the reactants and products for each of these?

Process	Reactant	Product	Found in?
Photosynthesis			
Cellular Respiration			

How do factors such as pH, temperature, light and food availability affect these reactions?_____

_____

Label the equation as photosynthesis or cellular respiration and label the following molecules in these equations (*water, glucose, oxygen, carbon dioxide*)

A) $6H_2O + 6CO_2 \longrightarrow C_6H_{12}O_6 + 6O_2$

B) $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$

Which reaction(s) requires or stores energy? _____

Which reaction(s) release energy (ATP)? _____

Which reaction releases the most energy? _____

Why? _____

Which reaction requires chlorophyll? _____

What is the purpose of the chlorophyll? _____

Which reaction requires light? _____

What is the light used for? _____

Which organisms carry out process A? _____

Which organisms carry out process B? _____

Which organisms carry out process C? _____

Which process uses chloroplasts in eukaryotes? _____

Which process uses mitochondria in eukaryotes? _____

What are the reactants of photosynthesis? _____

What are the products of photosynthesis? _____

What are the reactants of cellular respiration? _____
What are the products of cellular respiration? _____
How are **photosynthesis** and **cellular respiration** related? _____
_____
Draw a diagram explaining how photosynthesis and cellular respiration are related:

What is ATP? _____
Where is it found and how is it made? _____
_____
Draw and ATP molecule and show how and where energy is release:

- Students will differentiate the processes of mitosis and meiosis.
- Students will explain how mitosis forms new cells and its role in maintaining chromosome number during asexual reproduction.
- Students will describe the process of meiosis, including independent assortment and crossing over.
- Students will explain how meiosis results in the formation of haploid gametes or spores.

Complete the following table below comparing and contrasting Mitosis and Meiosis

Mitosis	Meiosis

- Students will describe the role of mitosis in asexual reproduction, and/or the role of meiosis in sexual reproduction, including how these processes may contribute to or limit genetic variation.

How does meiosis contribute to genetic variation? _____
How does mitosis limit genetic variation? _____

- Students will describe specific events occurring in each of the stages of the cell cycle and/or phases of mitosis.

Describe the 5 Stages of the cell cycle

Stage	Description

Draw the stages of mitosis, and label each stage. Briefly explain what is occurring in each stage of mitosis.

Prophase	Metaphase	Anaphase	Telophase

Draw the stages of meiosis, and label each stage. Briefly explain what is occurring in each stage of meiosis.

Prophase I	Metaphase I	Anaphase I	Telophase I
Prophase II	**Metaphase II**	**Anaphase II**	**Telophase II**

Describe the 3 mechanisms that lead to genetic variations which occur during meiosis

1. Crossing over - _____
2. Independent Assortment - _____
3. Random Fertilization - _____

- Students will explain how cancer (uncontrolled cell growth) may result from mutations that affect the proteins that regulate the cell cycle.

Define Mutation - _____
What is **cancer**? _____
What are some causes of cancer? _____
How/why does cancer kill? _____
_____

- Students will use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.

Define the law of segregation_____
Define the law of independent assortment_____
How do the laws of segregation and independent assortment impact genetic variability?___ _____
_____

Define:
Haploid – _____
Diploid – _____
Gametes – _____

Spores – _____
Genetic Variation – _____
Nondisjunction – _____
What genetic disorders result from nondisjunction?_____

- Students will identify, analyze, and/or predict inheritance patterns caused by various modes of inheritance.

Term	Definition
Dominant	
Recessive	
Heterozygous	
Homozygous	
Genotype	
Phenotype	
Codominance	
Incomplete Dominance	
Multiple Alleles	
Sex-linked	
Polygenetic	

In humans, brown eyes (B) are dominant over blue (b)*. A brown-eyed man marries a blue-eyed woman and they have three children, two of whom are brown-eyed and one of whom is blue-eyed. Draw the Punnett square that illustrates this marriage. What is the man's genotype? What are the genotypes of the children?
Dad's genotype:_____
Mom's genotype:_____
Children's Genotypes: _____ _____ _____

If you have type A blood, what are your possible genotypes? _____
If you have type B blood, what are your possible genotypes? _____
If you have type AB blood, what are your possible genotypes? _____
If you have type O blood, what are your possible genotypes? _____

Could two individuals with type A blood ever produce offspring with Type O? Explain with Punnett square.	Could two individuals with type O every produce offspring with Type A? Explain with Punnett square.

Two newborn babies were accidentally mixed up at the hospital. Determine the possible genotypes of both parents and babies, then determine which baby belongs to each of the parents.

Individual	Blood Type (Phenotype)	Possible Genotypes	Baby 1 or 2
Baby 1	A		
Baby 2	B		
Mrs. White	B		
Mr. White	AB		
Mrs. Smith	B		
Mr. Smith	B		

SpongeBob loves growing flowers for his pal Sandy! Her favorite flowers, Poofkins, are found in red, blue, and purple. Use the information provided and your knowledge of incomplete dominance to complete each section below.

1. Write the correct genotype for each color if R represents a red gene and B represents a blue gene.
Red - _____ Blue - _____ Purple - _____

2. What would happen if SpongeBob crossed a Poofkin with red flowers with a Poofkin with blue flowers. Complete the Punnett square to determine the chances of each flower color.
(a) Give the genotypes and phenotypes for the offspring.
(b) How many of the plants would have red flowers? _____%
(c) How many of the plants would have purple flowers? _____ %
(d) How many of the plants would have blue flowers? _____ %

3. What would happen if SpongeBob crossed two Poofkins with purple flowers? Complete the Punnett square to show the probability for each flower color.
(a) Give the genotypes and phenotypes for the offspring.
(b) How many of the plants would have red flowers? _____%
(c) How many of the plants would have purple flowers? _____ %
(d) How many of the plants would have blue flowers? _____ %

Set up a punnett square using the following information:

- Dominate allele for black fur in guinea pigs = B
- Recessive allele for white fur in guinea pigs =b
- Dominate allele for rough fur in guinea pigs =R
- Recessive allele for smooth fur in guinea pigs = r
- Cross a heterozygous parent (BbRr) with a heterozygous parent (BbRr)

Using the punnett square:

a. What is the probability of producing guinea pigs with black, rough fur?_____
Possible genotype(s)?_____
b. What is the probability of producing guinea pigs with black, smooth fur?_____
Possible genotype(s)?_____
c. What is the probability of producing guinea pigs with white, rough fur?_____
Possible genotype(s)?_____
d. What is the probability of producing guinea pigs with white, smooth fur?_____
Possible genotype(s)?_____

- Students will describe the process of DNA replication and/or its role in the transmission and conservation of genetic information.

DNA is made up of nucleotides.
Draw a picture of the nucleotide and label three main parts.

What bonds hold DNA's bases together?_____
What are the 4 bases of DNA, and how are these bases paired? _____
_____
What is the purpose of DNA Replication?_____
What stage of the cell cycle does DNA replication occur?_____
Describe the process of DNA replication using the following terms (Helicase, DNA polymerase, Ligase, RNA Primase, semiconservative replication)_____
_____
_____

- Students will describe gene and chromosomal mutations in the DNA sequence.

What is a mutation? _____

How do they happen? _____

_____

- Students will explain how gene and chromosomal mutations may or may not result in a phenotypic change.

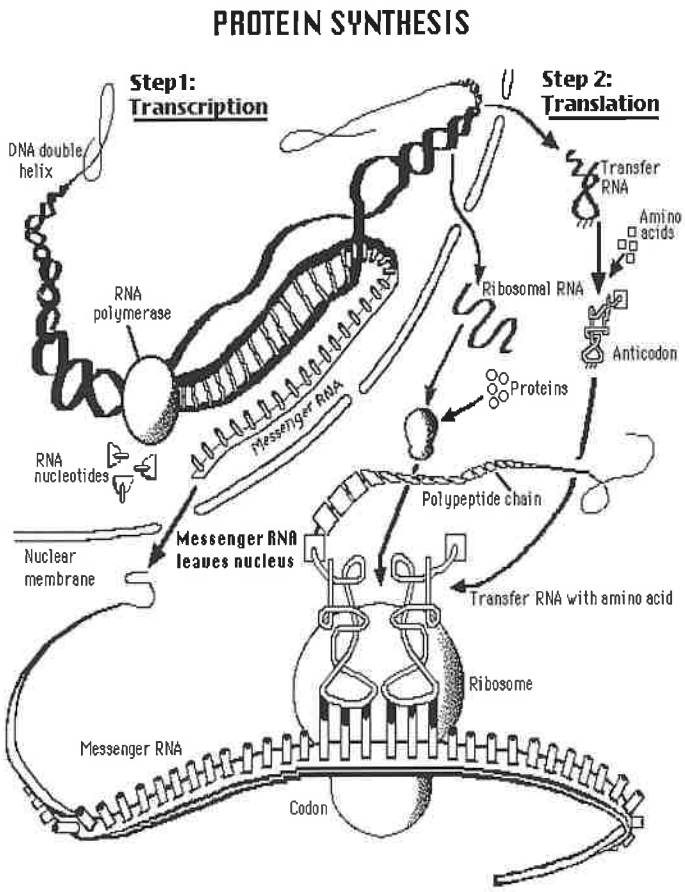
Not all changes in DNA result in a phenotype mutation. Explain when changes in DNA do and don't affect phenotypes.

_____

_____

Mutations in which cells will affect the offspring? _____

- Students will explain the basic processes of transcription and/or translation, and their roles in the expression of genes.



Describe the process of **protein synthesis:**

_____

_____

_____

What is **transcription**? _____

_____

_____

What is **translation**? _____

_____

_____

What happens to DNA when a **mutation** occurs?

_____

_____

How does this affect the mRNA?

_____

How can this affect translation?

_____

How does this affect the structure and shape of the resulting protein? _____

_____

- Students will explain that the basic components of DNA are universal in organisms.

Why do you think all life has the same DNA? _____

_____

- Students will explain and/or describe how mutation and genetic recombination increase genetic variation.

In which ways can mutation and genetic recombination increase genetic variation? _____

_____

_____

_____

- Students will explain how similarities in the genetic codes of organisms are due to common ancestry and the process of inheritance.

How can you explain how genetic similarities are due to common ancestry? Where do we get our DNA from?

_____

- Students will evaluate examples and/or explain the possible impact of biotechnology on the individual, society, and/or the environment.

What is biotechnology? _____

What are some examples of biotechnology? _____

Define Genetic Engineering: _____

Give 3 examples of genetic engineering and the positive and negative effects of each

Genetic Engineering	Positive	Negative

- Students will describe scientific explanations of the origin of life on Earth.
- Students will identify situations or conditions contributing to the origin of life on Earth.

For each of the scientists below, describe the experiments they performed and the results that contributed to the understanding of how life began.

Scientist(s)	Experiment/Model	Results/Conclusions
Francesco Redi		
Louis Pasteur		
Oparin and Haldane		
Miller and Urey		
Louis Lerman		

What were the conditions like on early Earth? _____

_____

What gases made up the atmosphere on early Earth? _____

Which nucleic acid is thought to have emerged first? _____

Describe the theory of how the first life forms originally form? _____

_____

Define endosymbiosis: _____

How did endosymbiosis occur? _____

_____

How did cyanobacteria aid in the development of life? _____

_____

- Students will identify evidence and/or explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observable evolutionary change.

What is evolution? _____

What is meant by the term theory? _____

How do we know that evolution is a theory? _____

What could cause scientists to change the theory? _____

Define Natural Selection _____

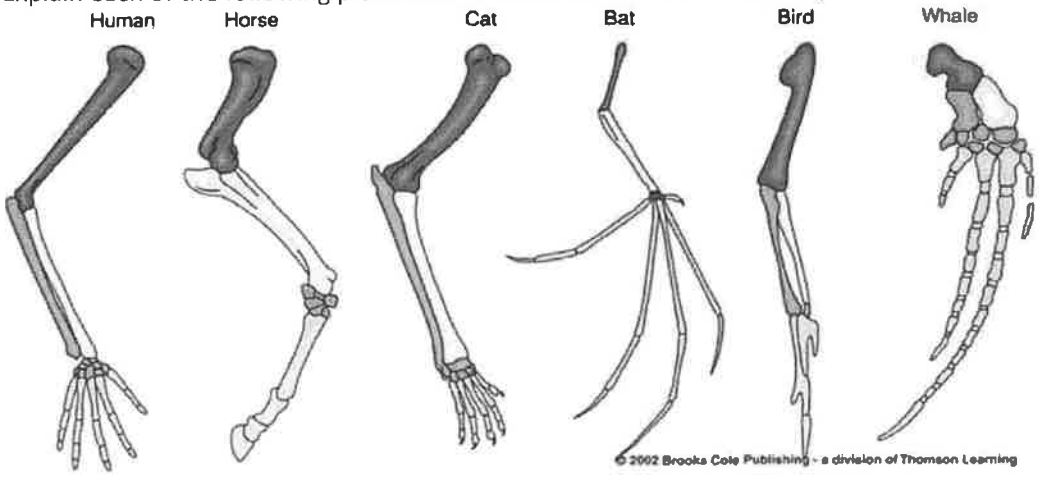
Complete the following chart describing the research or experiments that each of the following scientists contributed to developing the theory of evolution:

Scientist	Contribution to the Theory of Evolution
Darwin	
Lamarck	
Lyell	
Malthus	
Mendel	
Wallace	

There is much evidence to support the theory of evolution. Complete the chart below describing how the following evidence is used, and how it supports the theory of evolution.

Evidence	What does it mean?	How does it support Evolution?
Fossil record		
Comparative anatomy		
Comparative embryology		
Biogeography		
Molecular biology		
Observable evolutionary change		

Explain each of the following pictures in terms of evidence of evolution.



What do we call structures like this? (different organisms with similar structures?) _____

_____

What does this mean from an evolutionary perspective?

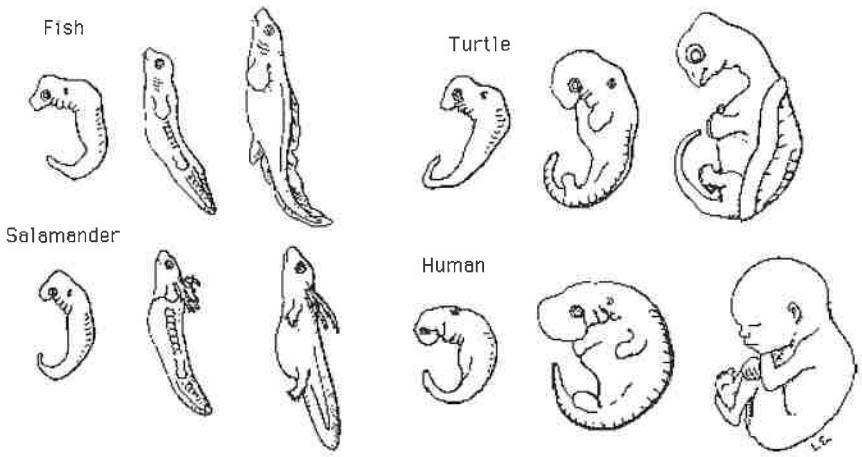
_____

_____

_____

_____

_____



What does this picture show? _____

_____

What 4 structures do all vertebrate embryos initially have?

1. _____
2. _____
3. _____
4. _____

What does this mean from an evolutionary perspective?

_____

_____

_____

- Students will identify examples of and basic trends in hominid evolution from early ancestors to modern humans.
- Items referring to the development of language or the manufacturing of tools will relate this development to changes in the skull or brain size.

What is a hominid? _____

What evidence is available to support the trends in hominid evolution? _____

_____

_____

Explain how each of the following structures have changed throughout hominid evolution:

1. Bipedalism: _____
2. Cranial capacity: _____
3. Skull shape: _____
4. Jaw: _____
5. Teeth: _____
6. Tools: _____
7. Language: _____

Who were the Australopithecines? Describe their importance in human evolution. _____

_____

_____

Who are the *Homo sapiens?* Describe their importance in human evolution. _____

_____

_____

What does an increased cranium (skull) indicate about the size of the hominid brain? _____

_____

- Students will classify organisms based on the distinguishing characteristics of the domains and/or kingdoms of living organisms.
- Students will identify and/or describe how and/or why organisms are hierarchically classified based on evolutionary relationships.
- Students will identify and/or explain the reasons for changes in how organisms are classified.

How is taxonomy useful? _____

What are the 3 Domains? _____ _____ _____

What are the 6 kingdoms? _____ _____ _____

_____ _____ _____

The classification system has changed many times over the century. Why does it continuously being updated? _____

_____

_____

Describe why scientists classify organism based on evolutionary relationships._____

_____

The chart below shows the classification of three organisms. Certain categories are not shown.

Organism *A*	**Organism *B***	**Organism *C***
Animalia	Animalia	Animalia
Insecta	Mammalia	Mammalia
Diptera	Carnivora	Carnivora
Musca domestica	*Canis lupus*	*Felis domestica*

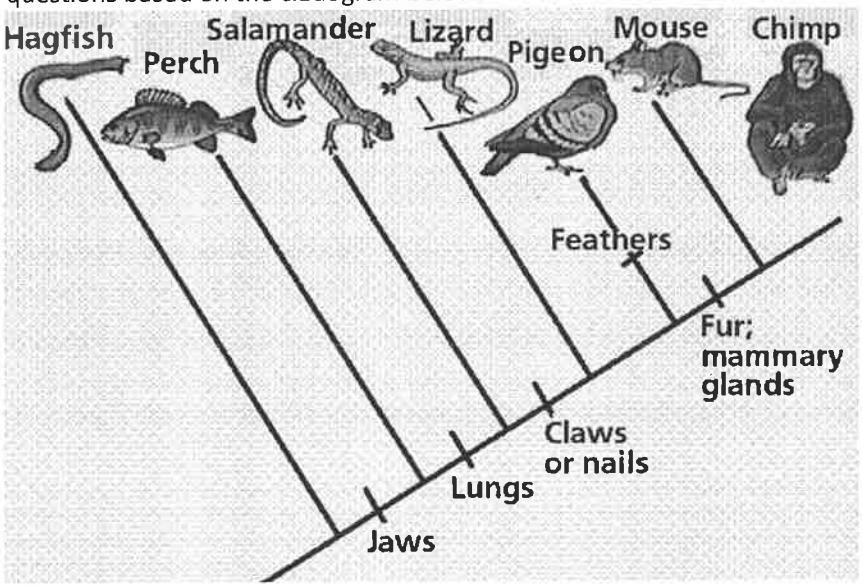
Which two organisms are most closely related?_____

The scientific name for dog is *Canis familiaris*. The scientific name for wolf is *Canis lupus*. Which classification groups do dogs and wolves have in common? How can you tell they are similar organisms just by looking at their scientific names?

_____

What is phylogeny? _____

Answer the following questions based on the cladogram below:



After which animals did mammary glands develop? _____

What animal does not have jaws? _____

Which animals have lungs? _____

Which animals are probably predators? _____

After which animal did protection from the elements arise? _____

What other animals would come after the chimp? _____

Which animals would come before the hagfish? _____

Complete the following chart. List at least two organisms from each category and 3 defining characteristics:

Classification	**Organisms Included**	**Characteristics**
***Domain* Archaea**	1. 2.	1. 2. 3.
***Domain* Bacteria**	1. 2.	1. 2. 3.
***Domain* Eukarya**	1. 2.	1. 2. 3.
***Kingdom* Protista**	1. 2.	1. 2. 3.

Kingdom **Fungi**	1. 2.	1. 2. 3.
Kingdom **Plantae**	1. 2.	1. 2. 3.
Kingdom **Animalia**	1. 2.	1. 2. 3.

- Students will explain and/or describe the conditions required for natural selection that result in differential reproductive success.

Describe Darwin's theory of natural selection:_____

_____

Explain how the following terms relate to natural selection:

Overproduction of offspring:_____

Inherited variation:_____

Struggle to survive:_____

Competition:_____

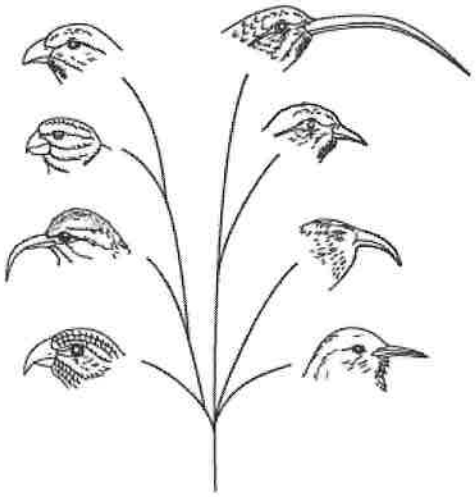
Inherited traits:_____

Mutations:_____

Explain how changes in the environment play a role in natural selection._____

_____

_____



Founder Species

What would cause the different beaks in these birds?

_____

_____

_____

_____

_____

_____

Explain survival of the fittest._____

_____

- Students will explain and/or describe the scientific mechanisms, such as genetic drift, gene flow, and nonrandom mating, resulting in evolutionary change.

Complete the following table

	Definition	How it impacts evolutionary change
Genetic Drift		
Gene Flow		
Nonrandom mating		

- Relate the structure of each of the major plant organs and tissues to physiological processes.

Complete the following chart on Plant structure and function:

	Organ, Tissue, or Structure	Description	Function
Roots			
Stems			
Leaves			
Flowers			
Fruits			
Cones			
Meristematic			
Ground			
Dermal			
Vascular			
Cambium			
Guard Cells			
Phloem			
Seed			
Stomata			
Xylem			

- Explain the functional role of the following processes in plants - transpiration, photosynthesis, cell respiration, and reproduction

Why do plants go through transpiration? _____

Describe the process of transpiration of water through plants. (Use the terms cohesion, adhesion, and evaporation.

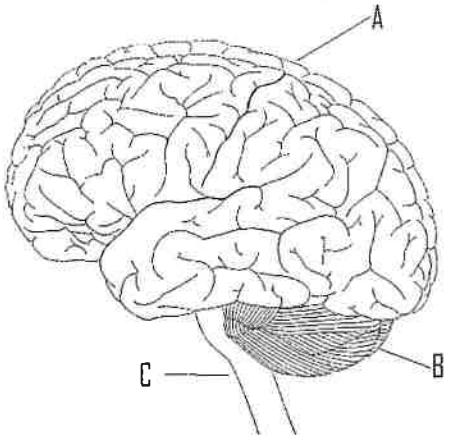
_____

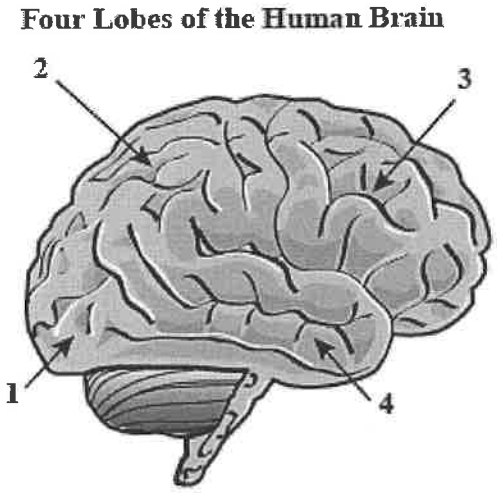
_____

_____

- Students will identify the major parts of the brain on diagrams.

Identify the following structures on both pictures: **cerebrum, cerebellum, pons, medulla oblongata, brain stem, frontal lobe, parietal lobe, occipital lobe, and temporal lobe**.





- Students will identify factors that affect blood flow and/or describe how these factors affect blood flow through the cardiovascular system.

What is the **cardiovascular system**? _____

For the following factors, identify the effect it would have on blood through the cardiovascular system:

Blood Pressure: _____

Blood Volume: _____

Resistance in the cardiovascular system: _____

Cardiovascular Disease: _____

What are some examples of cardiovascular disease? _____

Exercise: _____

Smoking: _____

- Students will identify and/or explain the basic functions of the human immune system, including specific and nonspecific immune responses.

What does the **immune system** do? _____

Identify and explain the **nonspecific immune** responses (1st and 2nd line of defense): _____

_____

_____

Identify and explain the **specific immune** responses:

_____

_____

Define the following terms:

T-Cells: _____

B- Cells: _____

Memory Cells: _____

Macrophage: _____

Antibody: _____

Pathogen: _____

Inflammatory Response: _____

Vaccination: _____

Vaccine: _____

Allergy: _____

Immunity: _____

Aids: _____

HIV: _____

Describe how the HIV virus infects a white blood cell, uses reverse transcriptase, and creates new proteins. What are the results of the infection to the cell and the body? _____

_____

_____

_____

- Students will describe how the human immune system responds to vaccines and/or antibiotics.

How do the **vaccines** that you receive as a baby protect you as an adult? _____

_____

What do **antibiotics** do? _____

Do antibiotics work on viruses? _____ Why or why not? _____

_____

What type of **pathogens** do antibiotics work on? _____

- Students will explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspective of both individual and public health.

Some people live in areas that can literally make them sick. What type of conditions do you suspect could make a typical person ill? _____

_____

Select 3 genetic disorders (One must be sickle cell) and describe how it affects humans.

1. _____

_____

2. _____

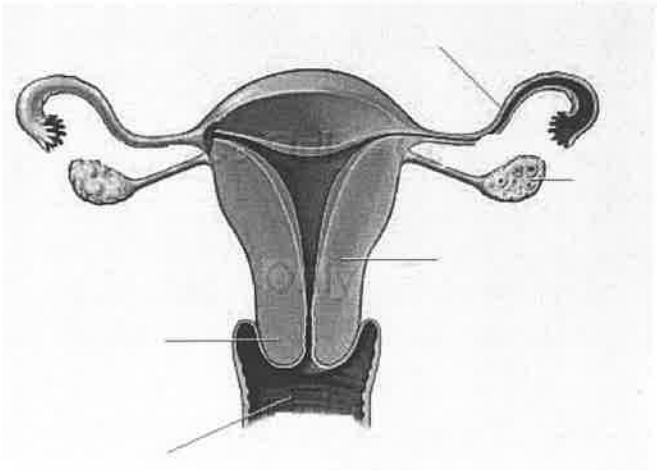
_____

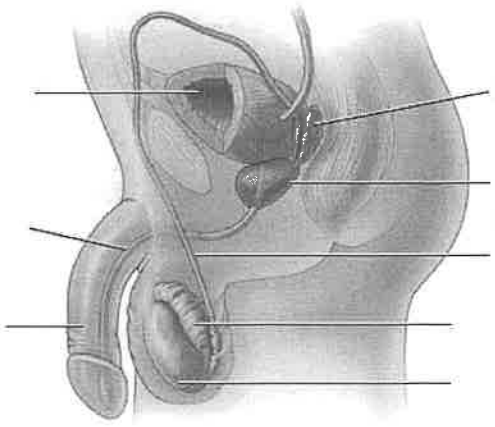
3. _____

_____

- Students will identify and/or describe the basic anatomy and physiology of the human reproductive system.
- Items referring to the male human reproductive system are limited to the seminal vesicle, prostate gland, vas deferens, urethra, epididymis, scrotum, penis, and testes.
- Items referring to the female human reproductive system are limited to the ovaries, oviduct (fallopian tube), uterus, cervix, and vagina.

Label the following structures with a number. Under each illustration, identify the basic function of each structure.





Structure	Function
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	

Explain the overall process of human development from the fertilization to the end of the third trimester and birth.

Stage	Process
Fertilization	
1st Trimester	
2nd Trimester	
3rd Trimester	
Birth	

Explain how the following structures aid in the development of a fetus:

Structure	Function
Placenta	
Umbilical cord	
Amniotic sac	
Amniotic Fluid	

Explain the roles of the following hormones in the reproductive systems:

Hormone	Function
Estrogen	
Progesterone	
Testosterone	

- Students will use data and information about population dynamics, abiotic factors, and/or biotic factors to explain and/or analyze a change in carrying capacity and its effect on population size in an ecosystem.

What are the differences between **living and non-living things**?_____

_____

List and define the 8 characteristics of life:

What are the ways that living things get energy to live? _____

What are some of the ways that living things use energy? _____

Define the following terms:

Biotic_____

Abiotic_____

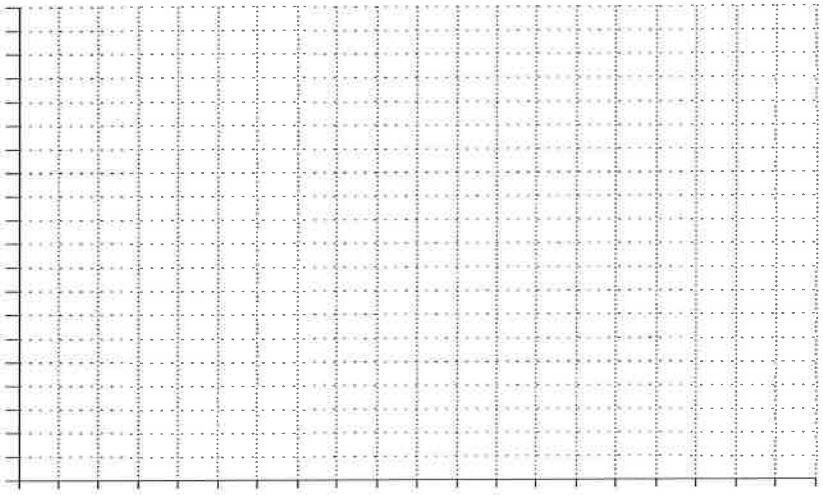
Population_____

Immigration_____

Emigration_____
Limiting Factor_____
Carrying capacity_____
Birth rate_____
Death rate_____
Graph the following data (make sure to label the title, x, and y axis with units)

Title:_____

DATA TABLE	
Year	Deer Population
1905	4,000
1910	9,000
1915	25,000
1920	65,000
1924	100,000
1925	100,000
1926	100,000



What is the carrying capacity of the deer population?_____
In what year did the deer population reach its carrying capacity?_____

- Students will describe the potential changes to an ecosystem resulting from seasonal variations, climate changes, and/or succession.

What is succession? _____
What is primary succession? _____
What is secondary succession? _____
Draw succession in a forest and label the organisms and stages from pioneer species to the climax community

How do seasonal variations affect an ecosystem? _____

_____

- Students will identify positive and/or negative consequences that result from a reduction in biodiversity.

Define Biodiversity: _____

Benefits of reduction in Biodiversity	Negative Consequences of reduction in Biodiversity

What is an invasive species? _____

How do human activities lead to a loss in biodiversity?

_____

Explain what climate change is, and how this impacts biodiversity _____

_____

- Students will describe the energy pathways through the different trophic levels of a food web or energy pyramid.

Define food web _____

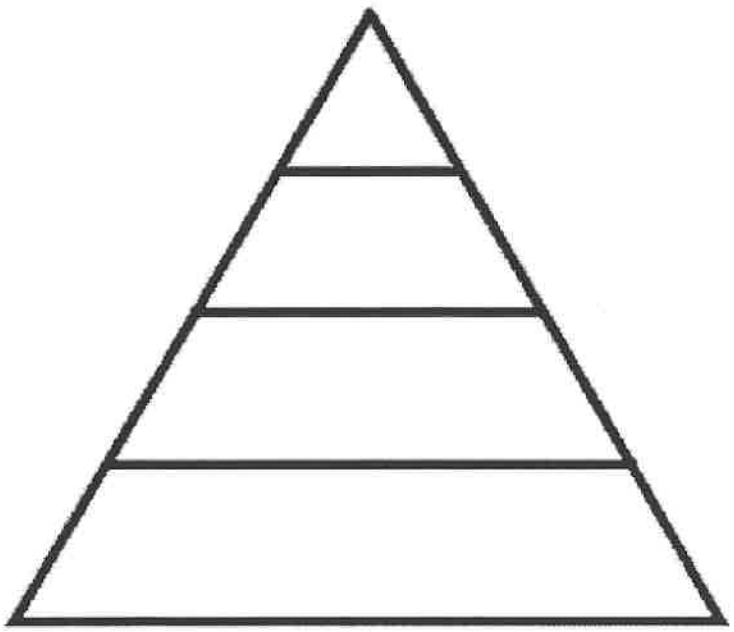
Define Energy pyramid _____

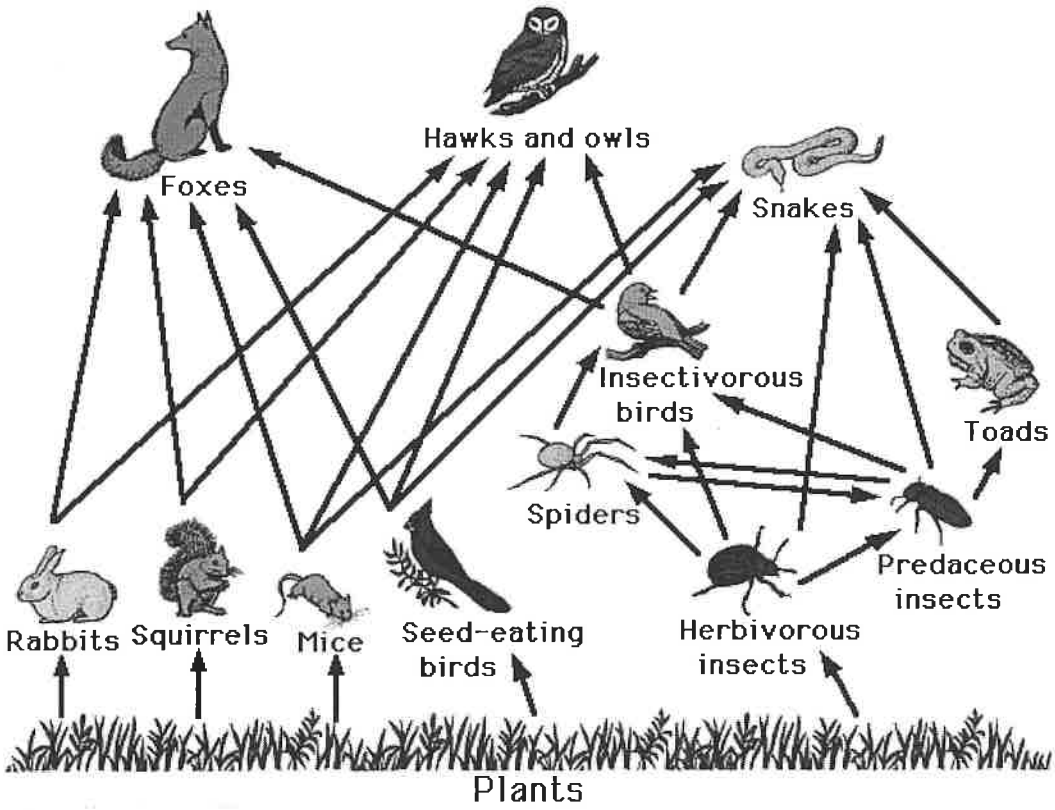
How does energy move through a food web _____

Explain why energy is lost as you move up the energy pyramid _____

_____

Label the energy pyramid showing the percentage of energy being lost as you move up each level. Label trophic levels.





Using the food web above:

1. Name the autotroph in this diagram._____
2. Identify two primary consumers in this diagram._____
3. Identify two secondary consumers in this diagram._____
4. Explain what would happen to the population of snakes if the mice were removed._____
   _____
5. Identify which animals are at the top of the food chain._____
6. Identify a herbivore_____
7. Identify a carnivore_____
8. Identify an omnivore_____

Explain the role of plants in this food web, and include in your response why it is at the bottom of the web.

_____

_____

What would happen if all the predators were removed from a food web? _____

_____

What would happen if all of the autotrophs were removed from a food web? _____

_____

- Students will explain that different types of organisms exist within aquatic systems due to chemistry, geography, light, depth, salinity, and/or temperature.

How do biological materials respond to **acids and bases**? _____

What is a **buffer**? _____

Explain how organisms living in aquatic environments are limited by both biotic, and abiotic factors._____

_____

_____

At what pH are most aquatic organisms able to function efficiently at?_____

Do most organisms survive better in a higher or lower O2 concentration?_____

At what depth in the ocean are aquatic plants able to produce the most sugars using photosynthesis?_____

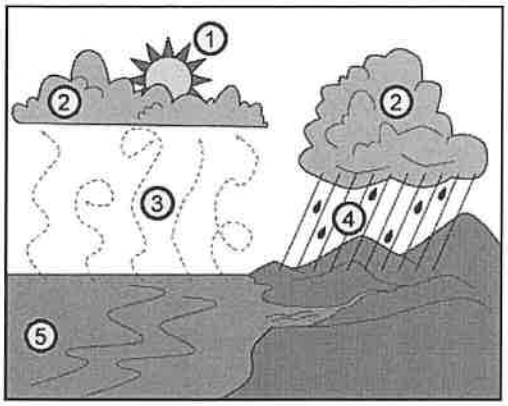
If salt concentrations increase too much in the ocean (such as the Dead Sea) what will happen to the aquatic life? Explain why._____

_____

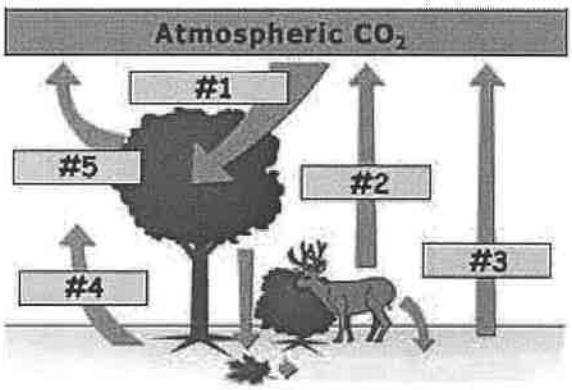
- Students will analyze the movement of matter through different biogeochemical cycles.

Identify and describe each of the numbers below. Identify the biogeochemical cycle.

A



B



A- Cycle:_____ B- Cycle:_____

Step	Cycle A	Cycle B
1		
2		
3		
4		
5		

Explain how energy moves through an ecosystem. _____

_____

Describe how energy is never lost or gained, just transferred._____

_____

- Students will predict how the actions of humans may impact environmental systems and/or affect sustainability and evaluate possible environmental impacts resulting from the use of renewable and/or nonrenewable resources.

What is the difference between renewable and nonrenewable resources? _____

_____

Complete the chart below while considering the environment:

	Pro's	**Con's**	**Examples**
Renewable Resources			
Nonrenewable Resources			

How have humans impacted the Earth? _____

_____

What is sustainability?_____