Name _____ Date _____ Period _____

Biology EOCT Study Guide

The Biology End of Course Test is a state mandated test which covers ALL content taught in both semesters of Biology. **This test counts as 20% of the students second semester average.** This student version study guide is a condensed form of the Georgia Dept. of Education study guide found online at http://www.doe.k12.ga.us/curriculum/testing/eoct_guides.asp.

Resources to help you study include your **text book, guided notes, and assignments**. Content is broken up into 7 domains. The Biology EOCT is made up of all multiple choice questions. Testing block is 2 hours, however students with accommodations may receive up to 1 hour additional time for testing. The Biology EOCT test will be taken on Monday, **Wednesday May 7, 2014.**

Topic 1: Science Process Skills and Lab Safety

A. Steps of the scientific method –

B. **For the following experiment, identify the Independent Variable, Dependent Variable, and Control:** You want to know whether human steroid hormones affect the growth of plants. You take two of the same plant species, plant A and plant B, and place them in identical conditions. Plant B receives 10ml of human steroid hormone a day while Plant A receives none. After 10 weeks you measure the growth and find Plant A to have increased in height by 5.4 cm. Plant B increased in height by 6.3 cm. Plant A has bright green leaves. Plant B has dull yellow leaves with brown spots.

C. **Safety Procedures –** Review safe and unsafe laboratory behaviors.

Topic 2: Research and the Nature of Biology

A. Biology is the study of living things. It has many more specific branches such as…

1) Botany – study of _____
2) Zoology - study of _____
3) Ecology - study of _____
4) Genetics - study of _____
5) Mycology - study of _____
6) Microbiology - study of _____
7) Taxonomy - study of _____
8) Ecology - study of _____

CHARACTERISTICS OF LIVING THINGS

MULTIPLE CHOICE:

_____1. Organisms that CAN'T photosynthesize and must get their energy by eating other organisms are called _____.

A. mutants
B. unicellular
C. autotrophs
D. heterotrophs

_____2. _____ reproduction produces offspring by combining the genetic information from 2 parents.

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A. asexual B. sexual

_____3. Growing a new plant by breaking off a piece of an existing plant and sprouting it, is an example of _____ reproduction.

A. Sexual B. asexual

4. Shivering when you get too cold is an example of which two concepts you learned about? ***Circle two (2)***

A. evolution B. metabolism
C. homeostasis D. stimulus-response

* * * * * * * * * * * * *

MATCH THE VOCAB WORD FROM THE WORD BANK WITH ITS DEFINITION:

BIOLOGY	**HOMEOSTASIS**	**ORGANISM**	**STIMULUS**
METABOLISM	**DIFFERENTIATION**		**EVOLUTION**

A signal to which an organism responds _____

Another name for a living thing is _____

The "science of life" that studies all living things is called _____

The process by which organisms as a group change over time; Process by which modern organisms have descended from ancient organism's _____

The process in which cells change as they grow and develop to become specialized with different functions _____

A set of chemical reactions through which an organism builds up or breaks down materials as it carries out its life processes _____

Process by which organisms maintain a relatively stable internal environment _____

Topic 3: Cellular Biology – Structure

A. List the 8 characteristics of all living organisms

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

B. The Cell Theory has three parts:
1. _____
2. _____
3. _____

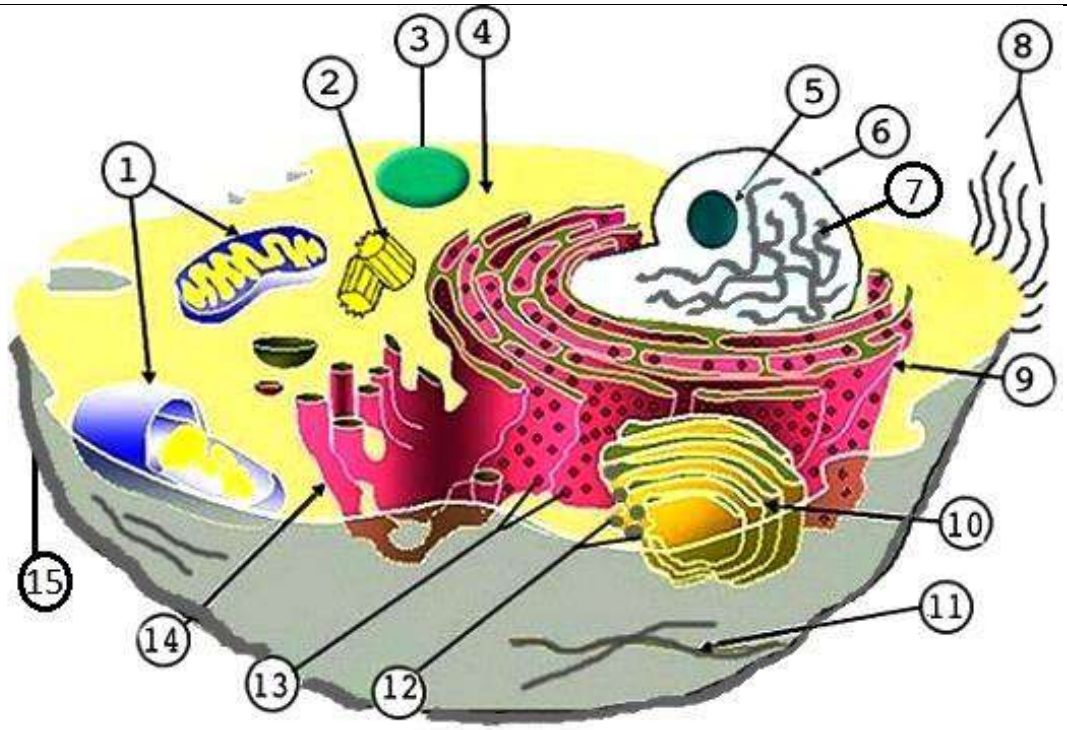
C. What are the differences between prokaryotic cells and eukaryotic cells?

Name _____ **Date** _____ **Period** _____

D. What organelle(s) are in plant cells that are not in animal cells? What are the functions of these parts?

E. Common cell organelles include the following: Label the following animal cell and list the function of each of the parts:

• Nucleus
• Ribosomes
• Cell membrane
• Mitochondria
• Golgi Body (Golgi Apparatus)
• Lysosome
• Centrioles
• Cytoplasm
• Nucleolus
• Nuclear membrane
• Chromatin
• Rough endoplasmic reticulum (ER)
• Smooth ER
• Microtubules/filaments



F. **<u>Topic 4: Cell Biology – Homeostasis</u>**

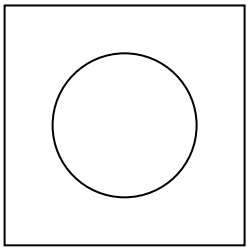
A. Homeostasis is critical to cell survival because cells must control what enters and leaves them.

Name _____ Date _____ Period _____

	Active Transport	Passive Transport
Requires the cell to use energy		
Happens without energy use		
Materials move from high to low concentration		
Materials move from low to high concentration		
Osmosis		
Diffusion		
Facilitated Diffusion		
Sodium-Potassium Pump		
Endocytosis		
Exocytosis		

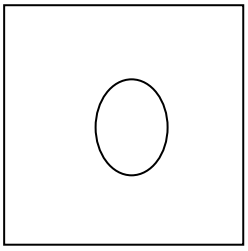
The effects of Hypertonic, Hypotonic and Isotonic Solutions.

Hypotonic



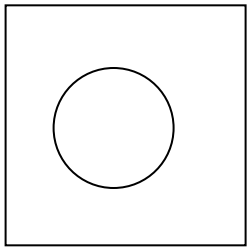
The water moved _____.
The cell _____.

Hypertonic



The water moved _____.
The cell _____.

Isotonic



_____ amounts of of water moved. The cell _____.

1. What is a hypertonic solution?

2. What is a hypotonic solution?

Name _____ Date _____ Period _____

3. If the outside of a cell and the inside of the cell are now isotonic, then the cell has reached _____.

****

MULTIPLE CHOICE: Write the letter of the answer(s) that best completes the sentence.

_____4. The substance that dissolves to make a solution is called the _____.
A. diffuser B. solvent
C. solute D. concentrate

_____5. When the concentration of a solute is the same throughout a system, the system has reached _____.
A. maximum concentration B. homeostasis
C. osmotic pressure D. equilibrium

_____6. The diffusion of water across a selectively permeable membrane is called _____.
A. active transport B. facilitated diffusion
C. osmosis D. phagocytosis

_____7. Energy for active transport comes from a cell's _____.
A. Golgi complex B. nucleus
C. mitochondria D. lysosomes

_____8. White blood cells engulf, digest, and destroy invading bacteria using _____.
A. Facilitated diffusion B. pinocytosis
C. Phagocytosis D. osmosis

_____9. When molecules move DOWN the concentration gradient it means they are moving from _____
A. an area of low concentration to an area of higher concentration
B. an area of high concentration to an area of lower concentration

Topic 5: Biochemistry

A. All living things need water. Pure water is neutral. Its pH would be _____.

Water Characteristics

Characteristic	Definition	Example
Polar Molecule		
Cohesion		
Adhesion		
Capillary Action		

Name _____ **Date** _____ **Period** _____

Surface Tension		
High Specific Heat		

Living things are composed of the following four main types of macromolecules:

	Carbohydrate	**Lipid**	**Nucleic Acid**	**Protein**
Monomer				
Polymer				
Examples				
Functions/ Uses in living things				

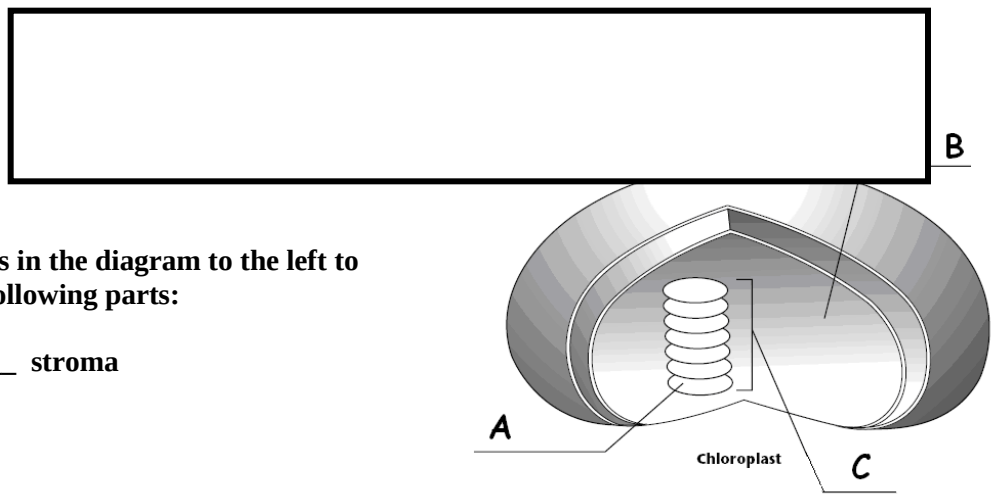
1. Enzymes are a type of _____. What is the purpose of enzymes?

2. How are enzymes used in an organism? (Give Examples)

3. Why is the structure of an enzyme referred to as a "lock and key"?

<u>Topic 6: Photosynthesis and Respiration</u>

A. Photosynthesis and cellular respiration are of critical importance to living things because they form a cycle by which energy enters and moves through the living world. Photosynthesis is performed by plants, algae, and cyanobacteria. **The chemical equation for photosynthesis is:**



Use the letters in the diagram to the left to identify the following parts:

_____ stroma

Name _____ Date _____ Period _____

_____ thylakoid

_____ granum

Use terms from the word bank to fill in the chart comparing and contrasting the light-dependent reactions and the Calvin Cycle. (You can use them more than once!)

in stroma	**O_2**	**CO_2**
in thylakoid membrane	**ATP**	**H_2O**
Requires light	**Doesn't require light**	
	Sugar (glucose)	

	LIGHT-DEPENDENT REACTIONS	CALVIN CYCLE
LOCATION		
REACTANTS		
PRODUCTS		
LIGHT		

B. Respiration takes place in <u>all</u> living cells—not just animal cells. The chemical equation that describes cellular respiration is:

_____1. _____ is the first step in cellular respiration that begins releasing energy stored in glucose.

A. Alcoholic fermentation B. Lactic acid fermentation
C. Glycolysis D. Electron transport chain

_____2. If oxygen is NOT present, glycolysis is followed by _____.

A. Krebs cycle B. fermentation

_____3. Name the 3 carbon molecule produced when glucose is broken in half during glycolysis.

A. pyruvic acid B. lactic acid
C. Acetyl-CoA D. citric acid

Name _____ Date _____ Period _____

_____4. Since fermentation does not require oxygen it is said to be _____.
A. aerobic B. anaerobic

_____5. Which of the following shows the correct sequence during cellular respiration?
A. Electron transport chain → glycolysis → Krebs cycle
B. Glycolysis → Electron transport chain → Krebs cycle
C. Krebs cycle → Electron transport chain → glycolysis
D. Glycolysis → Krebs cycle → Electron transport chain

_____6. Because cellular respiration requires oxygen it is said to be _____
A. aerobic B. anaerobic

_____7. How many total ATP molecules are produced by 1 molecule of glucose completing cellular respiration?
A. 2 B. 6 C. 24 D. 36

_____8. Which stage of cellular respiration produces the most ATP?
A. glycolysis B. Krebs cycle
C. Electron transport D. Acetyl-CoA charging

****

<u>Identify the type of fermentation used in each example</u>.
{Lactic Acid Fermentation or Alcohol Fermentation}

- Yeast uses this to make bread dough rise. _____
- Your muscle cells use this during rapid exercise when oxygen is low. _____
- Bacteria and yeast use this to make beer and wine. _____
- Bacteria use this to make cheese, yogurt, and sour cream. _____

<u>Topic 7: Protein Synthesis</u>

A. Draw and label a detailed molecule of DNA. Make sure to include all of the following vocabulary terms:
   - Double helix
   - Nucleotides
   - 4 nitrogen bases
     - adenine, thymine
     - cytosine, guanine
   - Sugar (deoxyribose)
   - Phosphate

Name _____ Date _____ Period _____

B. **DNA Replication**: If the DNA sequence is **AGTCCT**, what would be the newly replicated sequence? _____

What enzyme is responsible for this process? Where does this occur? _____
_____
_____

****When DNA replicates, each side chain is used as a template to make the other half of the DNA molecule. This is called "semi-conservative replication" because half of each original chain is saved for the two new DNA strands.**

C. Which nitrogen bases are found in RNA? _____, _____,_____, and _____.

D. What are the three types of RNA used for?

1) rRNA-

2) mRNA-

3) tRNA-

E. The structure of RNA molecules differs from DNA in several important ways:

	DNA	**RNA**
Name of 5-carbon sugar in nucleotide units		
How many chains in molecule?		
Names of Nitrogen Bases in nucleotides		

F. What is the Central Dogma? _____
_____
_____

DNA → mRNA → proteins

G. **PROTEIN SYNTHESIS DNA → RNA → PROTEIN – TRANSCRIPTION**:
If the DNA sequence is **AGTCCT**, what would be the mRNA sequence transcribed? _____

Name _____ Date _____ Period _____

What enzyme is responsible for this process? Where does this occur? _____
_____
_____

H. **PROTEIN SYNTHESIS DNA→ RNA→PROTEIN – TRANSLATION**:
Take the mRNA sequence from above and write the corresponding tRNA anticodon sequence.
_____

Which sequence is read to determine the amino acid sequence? _____

I. A _____ is a change in the DNA sequence. If the there is a change in the genetic code, ultimately, it will cause a change in the sequence of _____ and thus a different _____. Name three types of mutation: _____, _____, and _____.

1. Below is the base sequence for the normal protein for normal hemoglobin and the base sequence for the sickle cell hemoglobin.

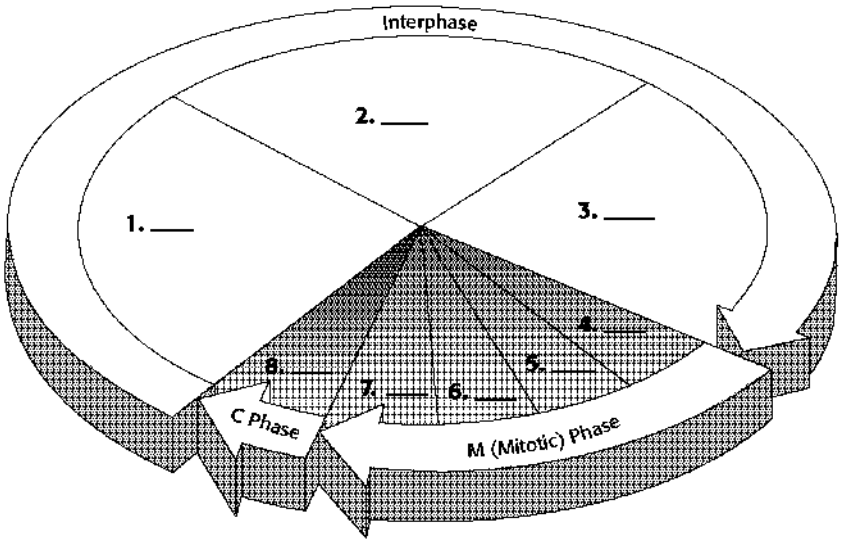
   Normal GGG CTT CTT TTT
   Sickle cell GGG CAT CTT TTT

   a. Identify the type of mutation: _____

Topic 8: Genetics (Cell Division)

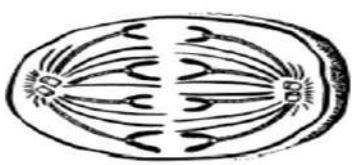
THE CELL CYCLE

In the space provided in the figure below, write the letter of the phase of the cell cycle that matches each phase in the figure.

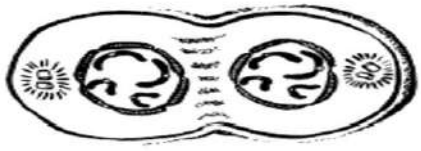


In the space provided below each animal cell, write the name of the stage of mitosis that is represented.

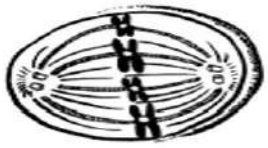
Name _____ **Date** _____ **Period** _____



9. _____



10. _____



11. _____

12. _____

Match each phase with its description. ***You CAN use them more than once!***

Interphase (I)	**Prophase (P)**	**Cytokinesis (C)**	**Anaphase (A)**
	Telophase (T)	**Metaphase (M)**	

_____ DNA is all spread out as chromatin and nuclear membrane is visible

_____ DNA scrunches up and chromosomes are first visible

_____ Chromosomes line up in middle of cell

_____ DNA is copied and cell prepares to divide

_____ Sister chromatids separate and move to opposite ends of the cell

_____ Nuclear membrane & nucleolus disappear

_____ Two nuclei are visible

_____ Made up of G_1, S, G_2

_____ Cytoplasm is split between two cells

Comparison of Mitosis and Meiosis

	Mitosis	**Meiosis**
Occurs in What Type of Cell?		
Purpose of This Type of Cell Division		
Parent Cell Chromosome Number		
Daughter Cell Chromosome Number		
Number of Daughter Cells Produced		

Name _____ Date _____ Period _____

Number of Times DNA is Copied		
Number of Cell Division(s)		
Comparison of Mother Cell and Daughter Cells		
Shuffling of DNA?		
Does ***crossing-over*** occur?		

Topic 9: Mendelian Genetics

GENETICS	**HEREDITY**	**TRAIT**	**PURE-BREEDING**	**GENOTYPE**
DOMINANT	**RECESSIVE**	**ALLELE**	**FERTILIZATION**	**PHENOTYPE**

1. _____ A characteristic that can be observed such as hair color, seed shape, flower color, etc
2. _____ The joining of a sperm and egg to make a zygote
3. _____ A gene choice that **masks another** choice for a trait
4. _____ A gene choice that **is masked by another** choice for a trait
5. _____ The branch of biology that studies how characteristics are transmitted from parent to offspring
6. _____ The passing of characteristics from parent to offspring
7. _____ An alternative choice for a gene (such as brown, green, or blue eyes)
8. _____ An organism that always produces offspring identical to itself if self-pollinated
9. _____ the combination of alleles present in an organism
10. _____ outward appearance of an organism: the allele that is expressed

**Mendel described Three Laws of Inheritance:

i. **Law of Dominance** – The presence of a dominant allele can mask the presence of a recessive allele.
ii. **Law of Segregation** –Because each diploid organism has two alleles for each trait, it can produce two types of gametes, one with each allele.
iii. **Law of Independent Assortment**—genes for different traits are inherited independently of each other.

Punnett Square Practice

Name _____ Date _____ Period _____

Use a Punnett Square to show the possible offspring from the crosses given and answer the following questions:

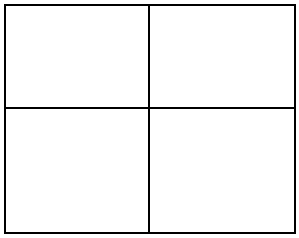
1. If P is for purple, and p is for white, describe the genotypes and phenotypes of the below examples.

a) Pp _____, _____ b) PP _____, _____

c) pp _____, _____

2. Make a cross between a **HOMOZYGOUS PURPLE FLOWERED** plant and a **HETEROZYGOUS PURPLE FLOWERED** plant.

a. Genotypes of Parents: _____ **x** _____



b. Possible offspring **gentoypes**
_____

c. Possible offspring **phentoypes**
_____

d. What is the probability an offspring will show the DOMINANT TRAIT (PURPLE FLOWERS)? _____%

e. What is the probability an offspring will show the RECESSIVE TRAIT (WHITE FLOWERS)? _____%

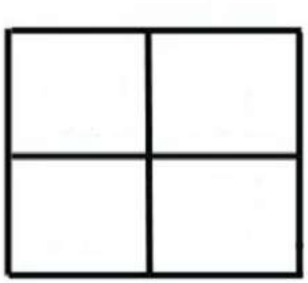
Define *incomplete dominance:* _____

---

1. In Four O'clock plants RED FLOWERS (R) are **INCOMPLETELY** dominant over white (r) flowers. Heterozygous plants show a *blended* intermediate phenotype of PINK flowers.

b. MAKE A CROSS WITH 2 **HETEROZYGOUS** FOUR O'CLOCK PLANTS.

c. Genotypes of Parents: _____ X _____



c. Genotypic Ratio _____

d. . Phenotypic Ratios _____

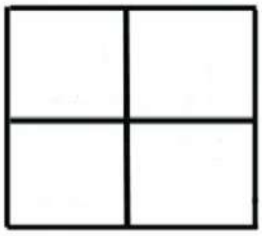
BLOOD TYPES:

Name _____ Date _____ Period _____

In the ABO blood type system the A and B alleles are dominant to O allele, and A and B are co-dominant to each other. A, B, and O alleles can combine to produce four possible phenotypes: Type A, type B, Type O and Type AB.

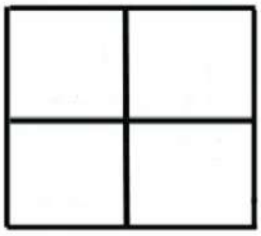
Wanda thinks either Ralph or Fred could be the father of her baby. Wanda's genotype is AO. Wanda's baby has type O blood. Ralph's genotype is AB. Fred's genotype is BO.

Ralph X Wanda



Is it possible for Ralph to be the baby's father? _____

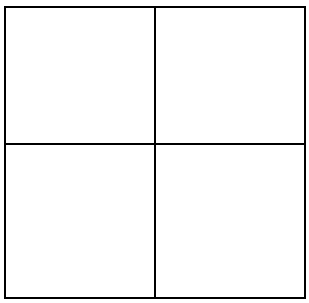
Fred X Wanda



Is it possible for Fred to be the baby's father? _____

DEFINE SEX LI Does this absolutely PROVE that he IS the baby's father? ____ _____

Hemophilia and red-green colorblindness are examples in humans.



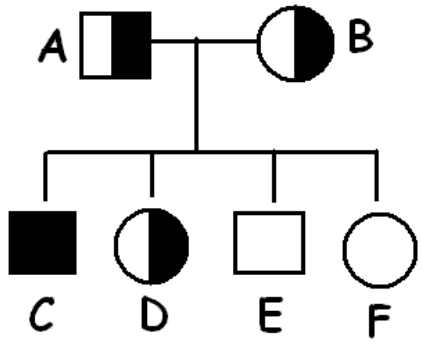
1. Colorblindness is a recessive sex linked trait (X chromosome). Set up a punnett square to show the likelihood (percentage) of a colorblind female ($X^{\underline{c}}X^{\underline{c}}$) and a normal male (XY) having a colorblind daughter. Can they have a colorblind son?

   Daughter_____
   Son _____

READING PEDIGREE CHARTS

Which members of this family show the trait? (Circle all that apply)

A B C D E F



Which members of this family are carriers for the trait? (Circle all that apply)

A B C D E F

Which member of this family is a MALE without the trait?

A B C D E F

<u>Topic 10: Patterns of Inheritance</u>

Important Vocabulary Terms:

- Nondisjunction – when chromosomes don't separate from each other correctly

- Monosomy – in diploid organisms, when one chromosome of a pair is missing
- Trisomy – in diploid organisms, when there is an extra chromosome of any of the pairs

Topic 11: Genetic Engineering

A. Genetic engineering is a new field of biology in which genes can be transferred from one organism to another.
B. This field has led to the development of oil-spill eating bacteria, bacteria that make human insulin for diabetics, and many disease-resistant crops.

Topic 12: The Theory of Evolution – Theories of Origins of Life and the Universe

A. Theory of Evolution through inheritance of acquired traits – Lamarck
    a. Giraffes have long necks because their ancestors had to stretch to reach high leaves
    b. Traits acquired during an organism's lifetime were passed to their offspring
    c. This theory has been proved to be wrong!

B. Theory of Evolution through Natural Selection – Charles Darwin's evidences that species change over time:
    1) Fossil Record
    2) Genetic evidence in DNA, amino acid sequence comparisons (Biochemistry)
    3) Comparative Anatomy (Homologous, Analogous, and Vestigial Structures)
    4) Embryology
    5) Biogeography

C. List the three parts to Darwin's Theory of Natural Selection -
    1.

    2.

    3.

D. What are the three patterns of evolution?
    1.

    2.

    3.

Topic 13: Classification

A. The current system of two-word names was developed by _____ and is called _____.
    a. Every species has a two word scientific name in _____.
    b. The scientific name is composed of the organism's _____ first and then the _____.

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c. The scientific name of an organism is either _____ or written in _____. The genus is always _____ and the species is _____ capitalized.

B. What are the 8 hierarchal levels of classification? _____
_____
_____

C. Organisms in the same _____ are so closely related that they can produce fertile _____.

****Be able to use/read a dichotomous key and a cladogram.**

Kingdom Characteristics

	Archaebacteria	Eubacteria	Protista	Fungi	Plantae	Animalia
Prokaryote or Eukaryote?						
Unicellular or Multicellular?						
Metabolism (Method of Nutrition)						
Cell Wall?						
Method of Reproduction						
Example						

Topic 14: Viruses

1. Are viruses living?
2. What is the basic structure of a virus?
3. What must a virus do before it can reproduce?
4. Can a virus infect any host? Why or why not?
5. What is the difference between the lytic infection and a lysogenic infection?

Name _____ Date _____ Period _____

6. In which type of infectious pathway is it more likely that the host will be aware that they are infected? Why?

7. A wart is caused by a virus that may lie dormant for years before any symptoms appear. Does this resemble a lytic or lysogenic infection? Why?

Topic 15: Ecology

1. What are the levels of ecology from most specific to most general:

2. The deciduous forest regions are exposed to warm and cold air masses, which cause this area to have four seasons. The average yearly temperature is about 10°C. The areas in which deciduous forests are located get about 750 to 1,500 mm of precipitation spread fairly evenly throughout the year. Most of the trees are broadleaf trees such as oak, maple, beech, hickory and chestnut. There are also several different kinds of plants like mountain laurel, azaleas and mosses that live on the shady forest floor where only small amounts of sunlight get through.
    a. List the biotic factors in this ecosystem.
    b. List the abiotic factors.
    c. Give an example of a population in this ecosystem.

3. Relationships between organisms within ecosystems:
    a. Food chains and food webs trace the flow of _____ through the ecosystem.

4. In the Amazon Jungle, the cappuccino monkey thrives in the high trees of the Peruvian area of the jungle. In the high trees, it can feed on hazelnuts and scavenge for food along the jungle floor. It also is food for many predators such as jaguars.

    a. What would be the monkey's habitat? _____

    b. What would be the monkey's niche? _____

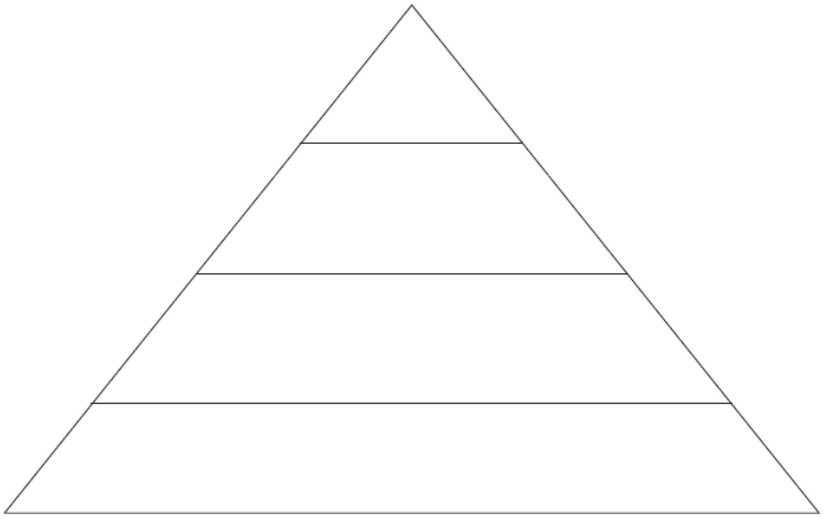
5. Label the food chain below with the correct trophic level description.

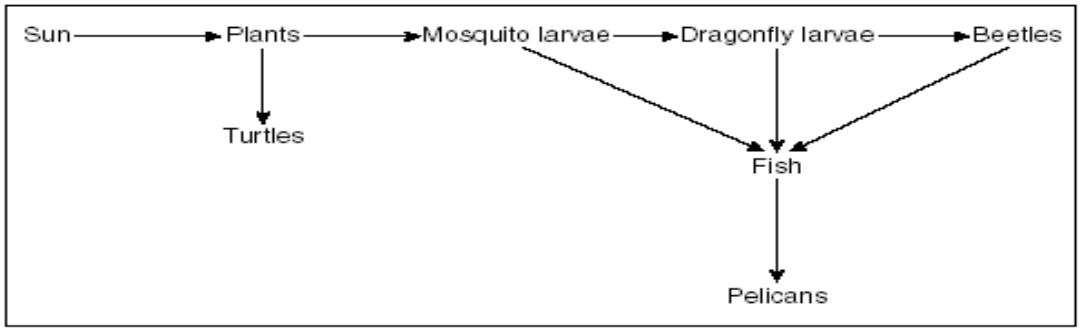
Algae → shrimp → squid → whale

6. What does the 10% rule state? _____
_____
_____

7. Label the four tiers of the energy pyramid with the correct trophic level (***producers, primary consumers, secondary consumers, and tertiary consumers***). Be sure to show include arrows to indicate energy loss and energy transfer.

Name _____ **Date** _____ **Period** _____





8. If all of the mosquito larvae are removed from the food web above, which populations will decrease? _____

9. If the ecosystem above was contaminated with DDT, a harmful chemical, which population would contain the highest *concentration* of DDT? _____

Match the following terms with the correct statement. Each statement may be used only once.

1. _____Heterotroph
2. _____Succession
3. _____Ecology
4. _____Prey
5. _____Carnivore
6. _____Autotroph
7. _____Parasitism
8. _____Commensalism
9. _____Herbivore
10. _____Mutualism
11. _____Decomposer
12. _____Omnivore
13. _____Predator

A. One organism benefits without harming the other
B. Maintaining a natural balance on earth
C. Study of organisms and their environment
D. Gradual replacement of one community by another
E. A relationship in which both organisms benefit
F. Organisms that cannot make their own food
G. A relationship in which one organism benefits but harms the other
H. Organisms that can make their own food
I. An organism that hunts
J. Organisms that eats only meat
K. Organism that breaks down dead material
L. Any biotic factor that restricts distribution of organisms
M. Organism that eats both plant and animals
N. Organism that is hunted
O. An organism that eats only plants

Name _____ Date _____ Period _____

14. _____Limiting Factor
15. _____Homeostasis

Identify the type of symbiotic relationship being described.
A termite has a small protozoan living in its intestine. Termites feed on wood. Although they cannot chemically break down the cellulose in the wood, the protozoans living inside them can.

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An orchid is a tropical flower that lives in the branches of trees. By getting higher up into the canopy of the tropical forest, the flower receives more light. The tree it lives in is not affected by the orchid at all.

_____

A tapeworm is a parasite that lives in the intestines of many mammals. It absorbs food that is eaten by the animal. The tapeworm steals food that would normally be available to the animal.

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