Checklist for Test-Out Materials

Course Name: _____Biology_____

Circle Semester: (Semester A) Semester B

Materials Needed:

- X Book(s) ~~online~~
- X Necessary Assignments/Projects/Presentations/Etc.
- ____ Assessment Rubrics (if applicable)
- X Semester Exam Review
- X Final Semester Assessment

Course Specifics

Book(s) Names: _____~~see activation code sheet~~ McDougal Littell ~~Online~~ Book_____

List of assignments, projects, presentations, etc. students need to complete prior to testing. Please be very specific when listing assignments so students and parents know exactly what the expectations are:

- See attached requirements sheet

Specific suggestions for students to prepare for this assessment:

- Identify all related text chapters - Outline each
- Take end of chapter assessments.

Describe expectations for final semester assessment:
78% on mid-term exam

Other recommendations or information:

Office Use Only

Date of Test-Out: Aug. 9 9:00 am

Credit Granted: Yes:_____ No: _____

Student Name: _____

Teacher Name: _____

Counselor: _____

BIOLOGY TESTING OUT REQUIREMENTS:

1. PASS MIDTERM AND FINAL EXAMS – minimum score: 78%
2. Devise, conduct and write a lab report summarizing your findings on the following topic:
    - Cell Size and Efficiency (surface area to volume ratios)

    *Use of the scientific method must be visible in FINAL LAB REPORT – with proper lab format followed.

3. Complete the data analysis/Protein synthesis application (included in folder)
4. Choose a topic from the following. Research and pick a position (pro or con.) Using a minimum of two articles – support your position in a **two page paper**(double spaced, 12 font, 1" inch margins) – CITING EVIDENCE from both sides in your argument. Include hardcopies of all research.

TOPIC CHOICES:

- HUMAN IMPACTS ON THE ENVIRONMENT
- THEORY OF EVOLUTION AND CHANGE
- USE OF GENETIC TESTING

BIOLOGY FIRST SEMESTER EXAM STUDY GUIDE

All the information below can be found in your notes or textbook. Remember this is only a guide. There will be questions on the exam that are not mentioned on this handout. Not all of the ideas mentioned on this guide will be on the test. The exam will count for 20% of your semester grade and will consist of between 75-100 multiple choice questions. OLD QUIZZES,HOMEWORK & LABS are a good source of review.

Introduction & The Scientific Method

1. Common definitions:
   a. Hypothesis
   b. Control
   c. Data
   d. Independent variable
   e. Observation
   f. Dependent variable
2. What are some of the characteristics that all living organisms possess (essential life functions)?
3. Know the steps (IN ORDER) of the scientific method.
4. Be able to identify the variables if given a description of an experiment.
5. Labs: Pill bug and termite observations

Unit 1: Chemistry & Biochemistry

1. Common Definitions:
   a. ATP
   b. carbohydrate
   c. catalyst
   d. chemical bond
   e. covalent bonds
   f. DNA
   g. dehydration
   h. element
   i. enzyme
   j. hemoglobin
   k. high energy bonds
   l. hormone
   m. hydrolysis
   n. lipid
   o. molecular energy
   p. nucleic acid
   q. protein
   r. protein structure
   s. polymers
   t. RNA
   u. substrate
2. Know that ATP is the energy molecule of living things and how it supplies that energy.
3. Distinguish between hydrolysis and dehydration synthesis reactions.
4. Explain the role of enzymes and other proteins in biochemical functions
5. *Fill in the chart of the four major Organic Compounds*

Name	Monomers	Polymer	Composed of these elements	Function	Example
Carbohydrates					
Lipids					
Nucleic Acids					
Proteins					

Sample questions:

a. Carbon can form large, complex molecules – why?
b. Animals must store energy for later use. Which molecule is used for this purpose?
c. Which organic molecule is a polymer of amino acids?
d. Which provides cells with energy in order to make ATP?
e. The various enzymes in our bodies are
f. The molecule with the greatest amount of energy per gram (stores the most energy) is
g. Complete the following analogy with the best choice below:
Lipids are to polymers as amino acids are to _____.

Unit 2: Cells – Structure and Function

1. Common Definitions:
   a. active transport
   b. bacteria
   c. biological evolution
   d. cell function
   e. cellular differentiation
   f. chromosome
   g. diffusion
   h. DNA
   i. eukaryote
   j. organelle
   k. osmosis
   l. photosynthesis
   m. prokaryote
   n. protein
   o. transport of cell materials
   p. virus

2. Know the function, location, and appearance of the following organelles:
   a. nucleus
   b. nucleolus
   c. Golgi body
   d. mitochondria
   e. vacuole
   f. chloroplast
   g. ribosome
   h. ER
   i. cell membrane
   j. cell wall
3. How are molecules able to enter/exit cells through the processes of:
   a. diffusion
   b. osmosis
   c. active transport
4. Understand differences between plant and animal cells.
5. Understand differences between bacteria and viruses.
6. Lab: Build a Cell; Potato Osmosis

Sample questions:

a. Genes are located on the _____.
b. What is/are found in plant cells, but not animal cells?
c. Both bacteria and viruses have _____.
d . Eukaryotic cells are differentiated from prokaryotic cells because eukaryotic cells _____.
e . A cell from heart muscle would *probably* have an unusually high proportion of _____.
f . Under what conditions will a substance be likely to enter a cell through diffusion?
g .Complete the following analogy: Bacteria cells are to _____ as animal cells are to eukaryotic cells.
h&i: Answer the following question about an artificial cell: An artificial cell can be made with a short length of dialysis tubing filled with liquid and clamped on each end. It filled with an 80% sucrose solution, then placed it in a beaker of 40% sucrose solution.

h. The effect the movement of water will have on the size of this cell:
i. The solution surrounding the cell is ___ compared to the inside of the cell.

Unit 3: Cell Energetics

1. Common Definitions:
   a. aerobic
   b. anaerobic
   c. ATP
   d. breakdown of food
   e. cellular respiration
   f. cell energy conversion
   g. chloroplast
   h. enzyme
   i. mitochondria
   j. molecular energy
   k. photosynthesis
   l. potential energy
   m. product
   n. reactant
2. Know the balanced equations for both photosynthesis and respiration.
3. Distinguish between aerobic respiration and anaerobic respiration.
4. Where does each equation (photosynthesis and respiration) take place?
5. Lab: Elodea & Yeast Lab studying photosynthesis and respiration.

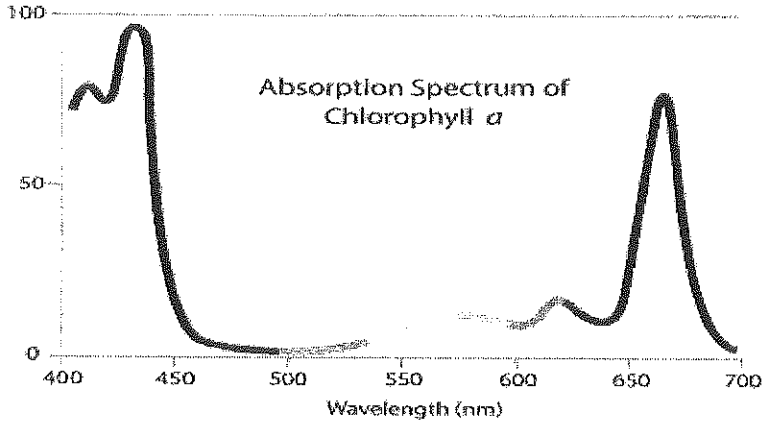
Sample questions:

a.Select and put in sequence the following phenomena involved in photosynthesis: (B3.1f, B3.1C)

1. production of carbon dioxide and carbohydrates
2. production of oxygen and carbohydrates
3. exposure to light
4. breakdown of proteins
5. intake of carbon dioxide
6. intake of oxygen

b. Two species of bacteria produce different respiratory end products. Species A produces ATP, carbon dioxide and water; species B produces ATP, ethyl alcohol and carbon dioxide. What conclusion can be drawn from this information? (B2.4e)
c. what is the correct BALANCED equation for photosynthesis
d. Cells release energy when ….? (B2.5e)
e. While observing the Elodea plant cell through a microscope, a student noticed some small moving green disks. Theses organelles were most likely what? Why were they moving?
f. In plant cells, which organelle is most closely associated with aerobic respiration?
g. Before energy can be used by a cell, the energy in the chemical bonds of sugar must be stored in what energy molecule?

h. Yeast cells produce carbon dioxide and alcohol as a result of what metabolic process?
i. Chloroplasts are to photosynthesis as – FINISH THIS ANALOGY
j. Use the graph below to explain why chlorophyll appears green. (B1.1h)



Violet blue green yellow red

Unit 4: Comparative Structure and Function of Living Things

1. Common Definitions:
   a. anatomical characteristic
   b. cell function
   c. cell organelle
   d. cellular differentiation
   e. cell waste disposal
   f. gills
   g. lungs
   h. membranes
   i. natural selection
   j. nitrogenous waste
   k. structural specialization
2. Describe how various organisms have developed different specializations to accomplish a particular function and yet the end result is the same (ex., excreting nitrogenous wastes; obtaining oxygen for respiration).
3. Explain how different organisms accomplish the same result using different structural specializations (gills vs. lungs vs. membranes).
4. Explain how major systems and processes work together in animals and plants, including relationships between organelles, cells, tissues, organs, organ systems, and organisms.
5. Labs: Dissections – flower, grasshopper, fish, frog.

Sample questions:

a. What **frog** organ is most like the **stamen** (filament/anther complex) in flowers?
b. Nitrogen waste removal is a task required by many organisms. What accomplishes this task in different organisms? List many(B2.4B)
c. What is true regarding frogs and flowers? List 4
d. Complete the following analogy. (B2.5B)
   The guard cells are to plants as _____ is(are) to mammals.
e. Fish are able to supply their cells with needed oxygen for respiration using _____.
f. Which of the following is responsible for the elimination of nitrogenous wastes in grasshoppers?
g. Complete the following analogy: 3 chambered heart is to mammals as _____ is to _____.

h. Which of the following are found in both frog and grasshopper? (B2.4B)
   a. swim bladder b. lungs c. kidneys d. tympanum
i. The veins/arteries and gills in fish work together just as the _____ and _____ work together in plants; both sets performing the **same** function. (B2.B)
j. Excretion requires many different organs working together. A correct grouping includes:
k. Complete the following analogy: Auxins are to plants as _____ are to _____. (B2.4C)

Unit 5: Human Systems

1. Common Definitions:
   a. breakdown of food
   b. cell division
   c. cell function
   d. cell organelle
   e. cell communication
   f. cell differentiation
   g. cell energy conversion
   h. cell regulation
   i. cell response
   j. cell waste disposal
   k. differentiation
   l. embryo formation
   m. environmental influence
   n. enzyme
   o. gene combinations
   p. gene expression
   q. homeostasis
   r. metamorphosis

s. neuron
t. neurotransmitter
u. recombination of genes
v. sexual reproduction
w. substrate
x. transplantation

2. Predict what would happen if the cells from one part of a developing embryo were transplanted to another part of the embryo.
3. Identify the general functions of the major systems of the human body and describe ways that these systems interact with one another.
   a. digestion
   b. respiration
   c. reproduction
   d. circulation
   e. excretion
   f. disease prevention
   g. control
   h. coordination
4. Explain that cellular differentiation results from gene expression and/or environmental influence.
5. Lab: Kidney dialysis simulation.

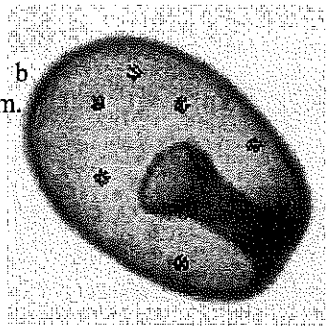
Sample questions:

a. John scraped his knee. Predict what could happen if he had fewer white blood cells than normal.

b. During exercise, human body temperature increases. How does the human body react to return its temperature to a normal level?

c. Choose the correct order from earliest to latest developmental stages below:

d. IF a problem occurred in the development of the germ layer labeled B in the diagram to the right, which of the following would most likely be affected?



e. Blood, blood vessels and _____ collectively make up the _____ system.

f. The respiratory system depends on the nervous system for signals to

g. Carbon dioxide is produced as cells break down nutrients for energy.
Which pair of systems would participate in removing the carbon dioxide from the body?

h. Which of these secretes a hormone that regulates the rate of metabolism of the body?

i. Choose the correct structures/ system pairing below:
   a. spleen, stomach, small intestine/ digestive system
   b. kidneys, ureters, urinary bladder/excretory system
   c. bone, muscle, cartilage/skeletal system
   d. lungs, heart, blood vessels/respiratory system

Unit 6: Homeostasis and Health

1. Common Definitions:
   a. behavioral response
   b. disease agents
   c. equilibrium
   d. homeostasis
   e. hormone
   f. neuron
   g. pH
   h. physiological change
   i. regulatory response

2. Describe how cells function in a range of temperature and pH to perform life functions.
3. Explain how stability is challenged by changing physical, chemical, and environmental conditions as well as the presence of disease agents.
4. Describe how human body systems maintain relatively constant internal conditions **(temp, acidity, blood sugar).**
5. Explain how human organ systems help maintain human health.

Sample questions:

a. In the human body, muscle cells have an increased need for energy during exercise. To help supply this energy, how does the body respond?

b. Which of these is **NOT** an example of homeostasis in a multicellular organism? (B2.3x)
   a. Passing genetic material to offspring
   b. Keeping a consistent electrolyte balance
   c. Maintaining a proper pH
   d. Regulating body temperature

c. Feeding, respiration, circulation and excretion are all things that are necessary in order for organisms to do what?

d. If you get a sliver, how will your body most likely respond in an attempt to maintain homeostasis? (list 3 steps)

e. Explain why HIV/AIDS can lead to death?

f. Adrenaline is released into the body during the presence of extreme stimuli (i.e. pain, fear, etc.) What is the function of this body chemical?

g. Normally, when the concentration of glucose in the blood falls below a certain level, stored glucose reenters the blood until the original concentration is reached again. This regulation of the concentration of blood glucose is part of the process known as

_____

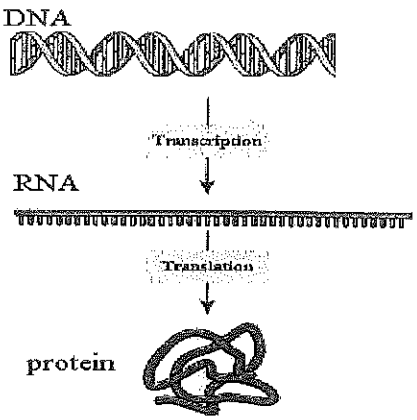
Name _____ Period _____ Date _____

Protein Synthesis Simulation Lab

Part 1: Introduction

DNA is a very long, thin molecule located in the nucleus. The DNA in one chromosome has 10s of millions of base pairs and hundreds or thousands of genes. Yet an individual cell will only use a small portion of those genes in its lifetime. Imagine a mechanic who spends a lifetime fixing nothing but cars, but he or she is required nonetheless to carry around an entire library of repair manuals for everything from kitchen sinks to washing machines to light fixtures to computers and so on – all information the mechanic will never be able to use because s/he's busy fixing cars.

Another peculiar thing about DNA is that it is located inside the nucleus, and pretty much stays inside the nucleus, yet the proteins that DNA helps to make are produced OUTSIDE of the nucleus. So how does the cell solve this problem? It sends a "messenger" from the nucleus to the ribosomes in the cytoplasm.



In a process called transcription, the DNA code is transcribed (copied) into mRNA, following rules similar to DNA replication we saw earlier (see below). mRNA moves out of the nucleus into the cytoplasm where it links up with ribosomes and begins churning out proteins.

Recall that DNA consists of a sugar-phosphate backbone with a nitrogenous base. There are 4 different bases in DNA abbreviated with the letters A,T,C, & G. The code contained in DNA derives from these 4 bases. We can think of them as letters in an alphabet that will spell different words. In a real language, words can be anywhere from 1 letter long (a, I) to an upper limit of 10-15 letters for functional, non-compound words.

In DNA code, a "word" is always 3 letters long and is called a "codon." Consider the following DNA segment:

A	T	C	G	T	C	C	A	A	A
T	A	G	C	A	G	G	T	T	T

"ATC" is a codon. "GTC" is a codon. "CAA" is a codon. Etc.

In transcription, the DNA code is transcribed (copied) into RNA code, following rules similar to DNA replication we saw earlier EXCEPT that:

DNA RNA
Matches with
A.....U
T.....A
C.....G
G.....C

1. Transcribe the following DNA sequence into mRNA. Draw a line separating each codon:

A T C G T C C A A A....

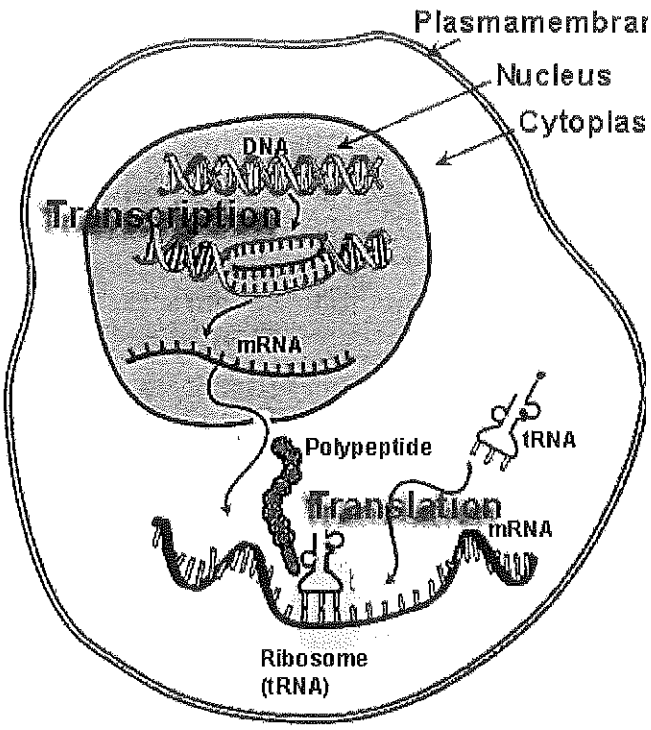
_____

2. Transcribe the following DNA sequence into mRNA. Draw a line separating each codon::

T A G C A G G T T T....

_____

Each mRNA codon corresponds to an amino acid that is transported to the RNA/ribosome complex by another special nucleic acid called tRNA. "T" stands for transfer. The ribosome essentially "reads" the RNA code and facilitates the linking of appropriate amino acids to make proteins. Summary diagram:



DNA (in nucleus) transcribed to mRNA

↓

mRNA leaves nucleus

↓

mRNA to cytoplasm

↓

mRNA hooks up with ribosomes.

↓

Ribosomes scroll through mRNA

↓

tRNA delivers amino acids to mRNA/ribosome complex

↓

Enzymes link amino acids together to form a protein

Activity: There are 4 letters of the mRNA code: U-A-C-G. How many possible combinations are there? In other words, how many "words" can you make with those 4 letters if any combination of letters is possible but all "words" are only 3 letters long? Hint – start with a single letter, how many codons can be produced that start with, for example, the letter "A?" You can infer the rest. I'll get you started…

AAA
AAC
AAU
AAG

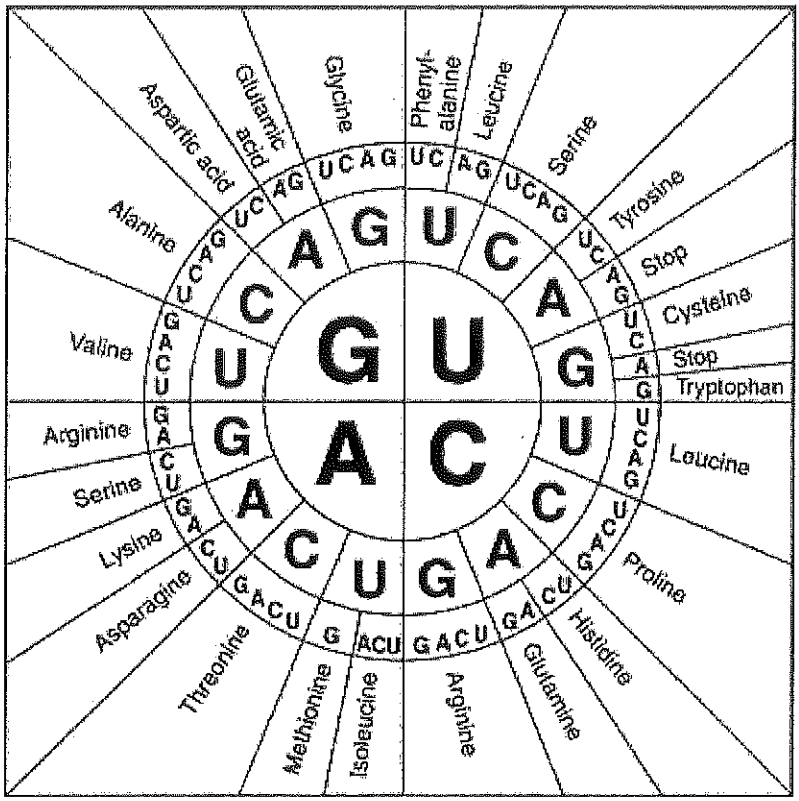
Name _____ Period _____ Date _____

Part 2: Questions

1. At this point, you should have figured out that there are _____ possible codons using 4 letters with 3 letters per codon in any order. However, there are only 20 amino acids, and each codon "codes" for one amino acid – so what does this mean?

_____

The table below shows which amino acid corresponds with which codons.



2. What does UAC code for?

_____

3. CAG? _____

4. AGG? _____

5. GAU? _____

6. UUU? _____

7. List the codons for Valine:

_____

8. Stop? _____

9. Methionine is a "Start" signal. What is its codon?

_____

Each amino acid is matched with one or more 3-letter "words." The **words** are analogous to an amino acid. When the words are put together they make a sentence. The **sentence** is analogous to a protein. So, let's break the following code.

10. Given the following DNA code, how would this segment be transcribed into mRNA?

T A C C C G A T A C T C C C T T C A A T T

_____

11. Give the 3-letter abbreviation (*see p. 4*) for the amino acids coded for in that sequence:

_____

12. What is the silly little sentence that this codes for (*see p. 4*)?

_____

Amino Acid – English word Table

MET START	GLY THE	ALA SAD	VAL RAT	ILE MET
PHE RAN	HIS OLD	TRP FOE	PRO SLY	SER CAT
THR WHO	GLU SAW	CYS MAD	ARG ATE	TYR DOG
ASN AND	GLN HIS	ASP FOR	LEU DAY	LYS BIG
		STOP		

Abbreviation Table

NAME	CODE
Alanine	ALA
Cysteine	CYS
Aspartic Acid	ASP
Glutamic Acid	GLU
Phenylalanine	PHE
Glycine	GLY
Histidine	HIS
Isoleucine	ILE
Lysine	LYS
Leucine	LEU
Methionine	MET
Asparagine	ASN
Proline	PRO
Glutamine	GLN
Arginine	ARG
Serine	SER
Threonine	THR
Valine	VAL
Tryptophan	TRP
Tyrosine	TYR

In the remaining space, create your own messages and, working backwards, determine what the DNA sequence would be:

Your message: _____

Amino acid (3 letter): _____

mRNA sequence: _____

DNA Sequence: _____

Your message: _____

Amino acid (3 letter): _____

mRNA sequence: _____

DNA Sequence: _____

BIOLOGY 2008-09 SECOND SEMESTER EXAM STUDY GUIDE

All the information below can be found in your notes or textbook. Remember this is only a guide. There will be questions on the exam that are not mentioned on this handout. The exam will count for 20% of your semester grade and will consist of 95 multiple choice questions. Reviewing old labs & homework will be helpful!

Introduction & The Scientific Method

1. Common definitions:
   a. Hypothesis
   b. Control
   c. Data
   d. Independent variable
   e. Observation
   f. Dependent variable
2. What are some of the characteristics that all living organisms possess (essential life functions)?
3. Know the steps of the scientific method.
4. Be able to identify the variables if given a description of an experiment.
5. Labs: Pill bug and termite observations

Unit 7: Matter and Energy in Ecosystems

1. Common Definitions:
   a) abiotic components of ecosystems
   b) biological molecule
   c) breakdown of food molecules
   d) carbon cycle
   e) carbon dioxide
   f) cellular energy conversion
   g) cellular respiration
   h) chemical bond
   i) chemical organization of organisms
   j) consumer
   k) energy requirements of living systems
   l) flow of energy
   m) flow of matter
   n) nitrogen cycle
   o) organic compound
   p) organic compound synthesis
   q) organic matter
   r) photosynthesizing organism
   s) producer
   t) product
   u) reactant
   v) recombination of chemical elements
   w) release of energy
   x) transforming matter and/or energy
   y) transporting matter and/or energy
   z) trophic level

1. Explain how cells transform energy from one form to another through the processes of photosynthesis and respiration.
2. Identify the reactants and products in the general reaction of photosynthesis.
3. Compare and contrast the transformation of matter and energy during photosynthesis and respiration.
4. Describe how organisms acquire energy directly or indirectly from Sunlight
5. Illustrate and describe the energy conversions that occur during photosynthesis and respiration.
6. Recognize the equations for photosynthesis and respiration and identify the reactants and products for both.
7. Explain how living organisms gain and use mass through the processes of photosynthesis and respiration.
8. Write the chemical equation for photosynthesis and cellular respiration and explain in words what they mean.
9. Lab: How does Energy flow through Ecosystems

Sample questions:

i. The universal form of energy for all living organisms is _____, which ultimately come from the _____.

ii. Only ten percent of the energy stored in an organism can be passed on to the next trophic level. The remaining energy is used to maintain the life processes of the organism and the rest is utilized how?

iii. An algae bloom is the rise of an algae population in an aquatic environment. Algae blooms can occur when large amounts of fertilizer runoff enter a lake.

- As algae blooms grow, some die, and bacteria reproduce rapidly as they consume the dead matter.
- This causes a massive increase in bacteria populations in a lake.

What is a **damaging** effect of algae blooms?

iv. Calculate the energy required in the 3rd trophic level if the 5th trophic level requires 2500 calories.

v. What would most likely be the result of a new species of producer being introduced into an ecosystem?

Unit 8: Population Ecology and Human Impacts on Ecosystems

1. Common Definitions:
   a. abiotic component of the ecosystem
   b. biological adaptations
   c. carrying capacity
   d. ecosystem stability
   e. equilibrium of ecosystems
   f. exponential growth
   g. global warming
   h. greenhouse effect
   i. human modification of the ecosystem
   j. population dynamics
   k. reproductive capacity
   l. succession
2. Propose how moving an organism to a new environment may influence its ability to survive and predict the possible impact of this type of transfer.
3. Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.
4. Human Impact: Humans can have tremendous impact on the environment. Sometimes their impact is beneficial, and sometimes it is detrimental
5. Describe the greenhouse effect and list possible causes.
6. List the possible causes and consequences of global warming.
7. Graph changes in population growth, given a data table.
8. Explain the influences that affect population growth.
9. Predict the consequences of an invading organism on the survival of other organisms.
10. Lab: Mark and Recapture, random sampling

Sample questions:

i. What is one of the leading accounts for the greenhouse effect on earth?

ii. Make a graph showing the data table below. WHAT is the shape of this graph?

Time (hrs)	Bacteria Colonies
1	100
2	200
3	400
4	800
5	1600
6	3200
7	6400
8	12800
9	25600
10	51200

iii. In secondary succession what is the correct order of growth?

iv. Some scientifically developed chemicals are sprayed on trees in orchards to control insect pests. How does the use of such chemicals potentially do the *most* harm to the environment?

v. Which is **NOT** considered a harmful greenhouse gas?

vi. draw a graph showing a populations before and after it reaches carrying capacity.

You are attempting to determine the population of lady slipper flowers in a forest plot. You have obtained the data below.

10 m x 10 m plot

4								5	
			5			4			
				6					
	3								0
		4				5			

What is the ESTIMATED total flower population in the $10m^2$ plot?

Unit 9: Division and Chromosome Mutations

1. Common Definitions:
   a. cancer
   b. carcinogenic
   c. chromosome
   d. chromosome pair
   e. crossing over
   f. deletion
   g. DNA replication
   h. diploid
   i. duplication of genes
   j. haploid
   k. gametes
   l. genetic variation
   m. jumping genes
   n. karyotype
   o. meiosis
   p. mitosis
   q. mutation
   r. new gene combinations
   s. progeny
   t. recombination of genetic material
   u. sex cell
   v. sex chromosomes

2. Explain cell division, growth, and development as a consequence of an increase in cell number, cell size, and/or cell products.
3. Describe how, through cell division, cells can become specialized for specific function.
4. Compare and contrast the processes of cell division (mitosis and meiosis), particularly as those processes relate to production of new cells and to passing on genetic information between generations.
5. Explain why only mutations occurring in gametes (sex cells) can be passed on to offspring.
6. Explain how it might be possible to identify genetic defects from just a karyotype of a few cells.
7. Explain that the sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations from the offspring of two parents.
8. Recognize that genetic variation can occur form such processes as crossing over, jumping genes, and deletion and duplication of genes.
9. Explain that gene mutation in a cell can result in uncontrolled cell division called cancer. Also know that exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.
10. Lab: Ideal Cell Size, Chromosome studies, karyotype activities

Sample questions:

i. What causes cells to become different (i.e. liver cells vs. muscle cells)?

ii. Which function is more difficult in larger cells than in smaller cells?

iii. A female, non-pregnant guinea pig is exposed to X-rays. Its future offspring will be affected only if a mutation occurs in one of the guinea pig's _____ cells

iv. Down Syndrome and Turner Syndrome are two diseases which can be detected by comparing the karyotypes of normal individuals with those having the disease. An abnormal karyotype will show which of the following?

v. Growth of a multi-cellular organism is MAINLY due to_____?

vi. write a statement that best describe WHAT cancer actually is.

vii. If the diploid number of chromosomes in a dog's body cells is 78, then the haploid number of chromosomes in each sex cell (sperm or egg) is:

Unit 10: DNA/RNA and Protein Synthesis

1. Common Definitions:
   a. amino acid sequence
   b. cell nucleus
   c. chromosome
   d. complementary sequence
   e. DNA
   f. DNA molecule
   g. DNA sequence
   h. DNA subunit
   i. double helix
   j. enzyme
   k. gene
   l. genetic diversity
   m. genetic mutation
   n. genetic variation
   o. inherited trait
   p. messenger RNA
   q. molecular synthesis
   r. new gene combinations
   s. nucleated cell
   t. phylogenetics
   u. protein
   v. protein structure
   w. protein synthesis
   x. recombination of genetic material
   y. ribosome
   z. storage of genetic information
   aa. transcription
   bb. translation
   cc. transfer RNA

2. Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
3. Recognize that every species has its own characteristic DNA sequence.
4. Describe the structure and function of DNA.
5. Predict the consequences that changes in the DNA composition of particular genes may have on an organism
6. Propose possible effects (on the genes) of exposing an organism to radiation and toxic chemicals.
7. Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.
8. Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.
9. Explain how mutations in the DNA sequence of a gene may be silent or result in phenotypic change in an organism and in its offspring.
10. Lab: DNA Model

Sample questions:

A strand of mRNA containing the repeating sequence AAUCAGACGAAG could code for which of the following amino acid sequences?

Which of the following is NOT part of the structure of a DNA molecule?

Using the amino acid chart (fig 1), what amino acid would be created from the mRNA sequence U G G?

What do we call a single trait that is controlled by more than two alleles?

Use the DNA template given to write the amino acid sequence created.

TACCCGTCAACT

Codons Found in Messenger RNA

First Base	Second Base U	Second Base C	Second Base A	Second Base G	Third Base
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

Unit 11: Mendelian and Molecular Genetics

1. Common Definitions:
   a. allele
   b. chromosome
   c. chromosome pair
   d. co-dominant traits
   e. DNA replication
   f. dominant trait
   g. gene encoding
   h. gene expression
   i. genetic diversity
   j. gene location
   k. genetic mutation
   l. genetic variation
   m. genotype
   n. heterozygous
   o. homologous chromosome
   p. human genetics
   q. independent assortment
   r. law of Segregation
   s. meiosis
   t. Mendelian genetics
   u. new gene combinations
   v. phenotype
   w. phylogenetics
   x. polygenic traits
   y. protein
   z. protein synthesis
   aa. Punnett Square
   bb. recessive traits
   cc. recombination of genetic material
   dd. sex cell
   ee. sex chromosomes
   ff. sex-linked traits
   gg. shared characteristics
   hh. storage of genetic information

2. Draw and label a homologous chromosome pair with heterozygous alleles highlighting a particular gene location.
3. Differentiate between dominant, recessive, co-dominant, polygenic, and sex-linked traits.
4. Explain the genetic basis for Mendel's laws of segregation and independent assortment.
5. Determine the genotype and phenotype of monohybrid crosses using a Punnett Square.

6. Recognize that genetic engineering techniques provide great potential and responsibilities.
7. Describe how inserting, deleting, or substituting DNA segments can alter a gene.
8. Recognize that an altered gene may be passed on to every cell that develops from it and that the resulting features may help, harm, or have little of no effect on the offspring's success in its environment.
9. Lab: Extracting DNA from Strawberries

Unit 12: Evolution

1. Common Definitions:
   a. behavioral structures
   b. biodiversity
   c. biological evolution
   d. chance inherited variants
   e. comparative anatomy
   f. degree of kinship
   g. differential survival
   h. DNA
   i. DNA molecule
   j. embryonic stages of development
   k. evidence for the unity among organisms
   l. gene pool
   m. genetic drift
   n. genetic diversity
   o. genetic mutation
   p. genetic variation
   q. homologous structures
   r. molecular structures
   s. morphological structures
   t. natural selection
   u. origin of life
   v. phylogenetics
   w. recombination of genetic material
   x. speciation

2. Explain that living things can be classified based on structural, embryological, and molecular evidence.
3. Analyze the relationships among organisms based on their shared physical, biochemical, genetic, and cellular characteristics And functional processes.
4. Recognize and describe that a great diversity of species increases the chance that at least some living organisms will survive in the face of cataclysmic changes in the environment.
5. Summarize the major concepts of natural selection and describe how natural selection provides a mechanism for evolution.
6. Summarize the relationships between present-day organisms and those that inhabited the Earth in the past.
7. Explain, using examples, how the fossil record, comparative anatomy and other evidence supports the theory of evolution.
8. Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.
9. Describe species as reproductively distinct groups of organisms that can be classified based on morphological, behavioral, and molecular structures.
10. Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of subpopulations.
11. Explain how natural selection acts on individuals, but it is populations that evolve.
12. Describe the role of geographic isolation in speciation.
13. Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.
14. Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of a new species.