

MCAS Biology

Review Packet

THE CHEMISTRY OF LIFE

1. Define organic.
2. All living things are made up of 6 essential elements: SPONCH. Name the six elements of life.
S – N –
P – C –
O – H –
3. Elements join together by chemical bonds to form compounds. Name the 3 types of chemical bonds.
4. There are 4 major categories of organic molecules that are made up of the SPONCH elements. Complete the following chart on the macromolecules of life.

<u>LIPIDS</u>	<u>CARBOHYDRATES</u>
<i>Elements:</i>	<i>Elements:</i>
<i>Structure:</i>	<i>Structure:</i>
<i>Function:</i>	<i>Function:</i>
<i>Examples:</i>	<i>Examples:</i>
<u>PROTEINS</u>	<u>NUCLEIC ACIDS</u>
<i>Elements:</i>	<i>Elements:</i>
<i>Structure:</i>	<i>Structure:</i>
<i>Function:</i>	<i>Function:</i>
<i>Examples:</i>	<i>Examples:</i>

5. Define chemical reaction
6. Write an example of a chemical reaction and label the reactants and products.
7. Define activation energy.
8. Define enzyme.
9. How does an enzyme affect the activation energy for a chemical reaction?
10. **Any factors that affect the shape of an enzyme affect the enzyme's activity.** What effect does pH and temperature have on an enzymes ability to catalyze (speed up) a reaction?

CELL BIOLOGY

1. Draw a plant and animal cell and label the following parts:

- Cell (plasma) membrane
- nuclear envelope
- nucleus
- nucleolus
- cytoplasm
- mitochondria
- endoplasmic reticulum
- golgi apparatus
- lysosome
- ribosome
- vacuole
- cell wall
- chloroplast
- cytoskeleton
- centriole

Plant Cell

Animal Cell

2. Complete the table below

Cell Part	Function (job)	Plant, Animal or Both
Plasma Membrane		
Nuclear envelope		
Nucleus		
Nucleolus		
Cytoplasm		
Mitochondria		
Endoplasmic reticulum		
Golgi apparatus		
Lysosome		
Ribosome		
Vacuole		
Cell wall		
Chloroplast		
Cytoskeleton		
Centriole		

3. Explain the differences between a prokaryote and a eukaryote. Give examples of each.

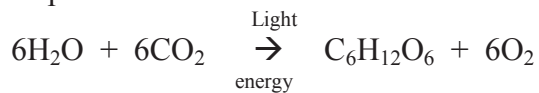
4. Draw the structure of the cell membrane. What is it called?

5. Explain how diffusion, osmosis, and facilitated diffusion work. Be sure to know which way water flows across a membrane.

- Diffusion
- Osmosis –
- Facilitated Diffusion –

6. What are the 6 kingdoms of life?

7. Identify which formula represents photosynthesis and which formula represents cellular respiration.



8. Define photosynthesis.

9. Define cellular respiration.

10. How are photosynthesis and cellular respiration related?

11. Humans need oxygen to be able to perform cellular respiration and gain ATP energy for our cells. What would happen to the oxygen levels on Earth if photosynthesis stopped?

12. What happens when a phosphate group is removed from ATP? Is energy released or gained? Compare the energy levels of ATP, ADP, and AMP to the energy levels of a battery.

13. Draw and label the five phases of the cell cycle. What is the function of the cell cycle?

14. Compare and contrast mitosis and meiosis in terms of the steps and end products.

15. Describe fertilization using the terms haploid, gamete, diploid, and zygote.

GENETICS

1. What is DNA?
2. Draw and label the 3 parts of a nucleotide. How do nucleotides form the structure of DNA?
3. Draw a molecule of DNA. Label the following parts:
 - sugar/phosphate backbone
 - nucleotides
 - nitrogen bases
 - hydrogen bonds
4. What does the expression “double helix” mean?
5. What is the base-pairing rule?
6. What is the relationship between gene and DNA?
7. List the 3 steps of DNA replication using the following terms: dna helicase, replication fork, dna polymerase, base-pairing rule
8. Gene expression is the process of how genes in the DNA are turned into a phenotype that can be seen. Draw and label the 2 phases of gene expression. Describe where each happens in the cell.

9. Distinguish the end products of replication, transcription, and translation.

	Replication	Transcription	Translation
<i>Start</i>			
<i>End</i>			

10. List 4 types of DNA mutations. Do all mutations result in a change in phenotype? Explain using the terms introns, exons, and codon.

11. What will happen if there is a mutation to the gametes?

12. Complete the following monohybrid cross. Two parents that are heterozygous for brown eyes. Be sure to identify the genotypes of the parents, complete the punnett square, identify the phenotypes with genotypes and the ratio of the phenotypes. What percent of the offspring have blue eyes?

13. Why do men experience male-pattern baldness more than women?

14. Using Mendel's laws of segregation and independent assortment, explain why not all tall people have brown hair.

15. Describe an example for each of the following:

Codominance	Polygenic Traits
Incomplete Dominance	Multiple

ANATOMY & PHYSIOLOGY

1. Describe the 4 levels of structural organization in the human body.

2. Complete the following chart for the major organ systems of the human body.

Digestive System		
<i>Function</i>	<i>Path of Food (all major organs)</i>	<i>Important Digestive Enzymes</i>

Circulatory System	
<i>Function</i>	<i>Path of Blood (all major organs)</i>

Excretory System	
<i>Function of Kidneys</i>	<i>Function of Liver</i>

Respiratory System	
<i>Function</i>	<i>Path of Oxygen/Carbon Dioxide (all major organs)</i>

Nervous System		
<i>Function</i>	<i>Basic Unit – The Neuron How it works?</i>	<i>Major Components</i>

Muscular/Skeletal System	
<i>Function of Muscles</i>	<i>2 Functions of Bones</i>
<i>3 Types of Muscle Tissue & their Functions</i>	<i>2 Types of Connective Tissue & How They Attach Muscle to Bone and Bone to Bone</i>

3. Define homeostasis.

4. The organ systems of the human body work closely together to maintain the health of the entire body. An organism who cannot maintain homeostasis within all its systems will not live very long. Problem – It is cold out and you begin to shiver. Explain how the nervous system, muscular system, skeletal system, and circulatory system all work together to help you keep a constant body temperature.

EVOLUTION & BIODIVERSITY

1. What is evolution by natural selection?

2. Give an example of evolution by natural selection.

3. Describe evidence for evolution by filling in the chart below.

Fossil Record	Comparative Anatomy		Genetic & Molecular Similarities
	<i>Homologous Structures</i>	<i>Vestigial Structures</i>	

4. Use an example to explain the steps of speciation (the formation of a new species).

1.) Mutation –

2.) Reproductive Isolation –

3.) Natural Selection –

4.) Divergence –

5.) New Species

5. Define species.

6. What characteristics are organisms classified (grouped) by?

7. List the 8 levels of classification for all living things.

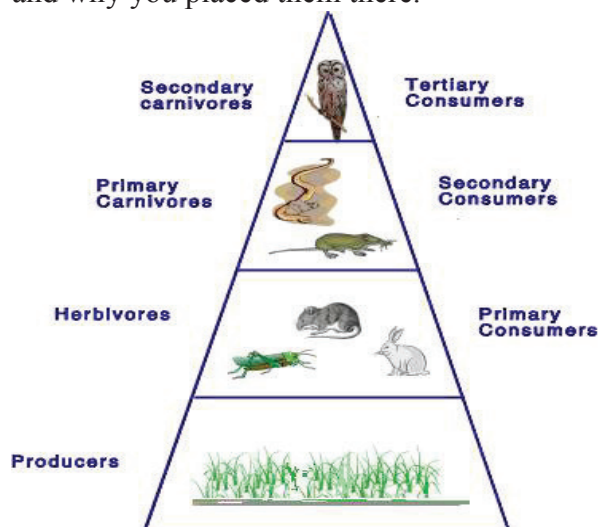
8. Binomial nomenclature is the system for scientifically naming organisms. Using an example, describe the rules for naming an organism.

9. Define biodiversity.

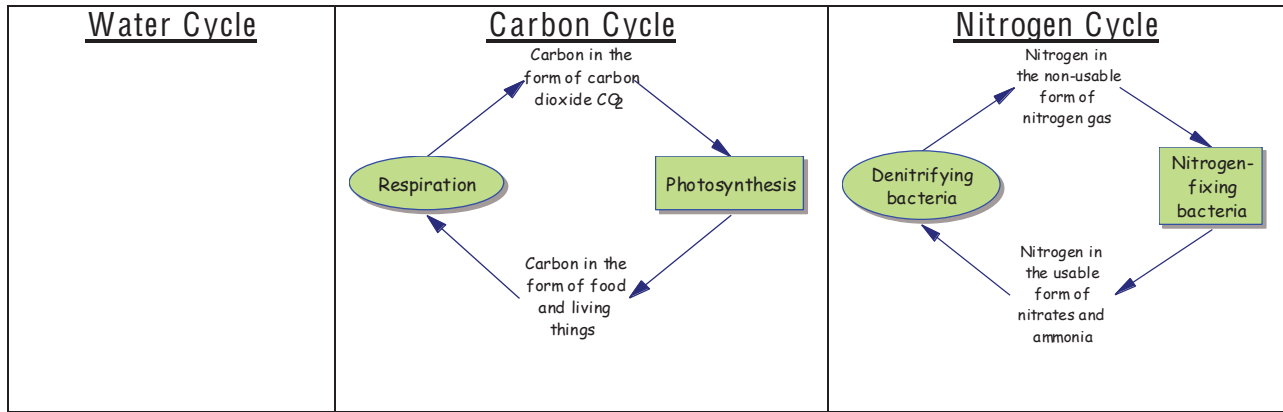
10. How does evolution by natural selection affect the biodiversity of life on earth?

ECOLOGY

1. What is ecology?
2. What are the components of an ecosystem
3. Define community.
4. Trace the flow of energy through the members of a community.
5. What does a food chain show? Give an example.
6. How do food chains relate to food webs?
7. Why are energy pyramids usually no more than 4 trophic levels?
8. Identify where the decomposers belong in the energy pyramid below. Explain their niche and why you placed them there.



9. Biogeochemical cycles are important to all ecosystems because they recycle all the important nutrients necessary for living things. Water, carbon, and nitrogen are essential for life. Describe how these materials are recycled in an ecosystem.



10. Biological communities are very complex due to the many interactions (symbiotic relationships) that happen between all organisms. Describe each of the following:

<p><u>Commensalism</u></p>	<p><u>Competition</u></p>
<p><u>Parasitism</u></p>	<p><u>Mutualism</u></p>
<p><u>Predator/Prey</u></p>	

11. Define population.

12. Describe what factors can affect population size and biodiversity.