MSA Review Key

BASIC BIOCHEMISTRY:

1. What is an enzyme? a type of protein that speeds up chemical reactions
2. What group of biomolecules are enzymes in? protein
3. What is the job of an enzyme? to aid in chemical reactions
4. List 2 ways to increase an enzyme's function. give it an optimum pH and temperature
5. What are two things can cause enzymes to denature? heat and pH
6. An acid is a substance with a pH of less than 7, a base is a substance with a pH of more than 8, and a neutral solution has a pH of 7.
7. One example of an acid is hydrochloric acid, a base is sodium hydroxide, and a neutral solution is water.
8. Draw a water molecule. Label its atoms and their associated charges.

2 positive hydrogens
1 negative oxygen

9. **List and explain** four properties that make water unique and vital to life:
   1. universal solvent: dissolves many things
   2. polarity: has a positive side and negative side
   3. high heat capacity: retains heat; heats up and cools slowly
   4. density: liquid → solid → gas (ice floats!)
10. **Explain** two ways in which water helps maintain homeostasis in an organism's body:
    1. water helps maintain body temperature
    2. water helps maintain salts/nutrients balance
    3. water helps maintain pH balance
11. Fill in the chart:

Biomolecule	Building blocks	Type(s) and function(s) within the cell
Carbohydrate	monosaccharides	- quick energy - ends in "ose"
A) monosaccharide ↑ 1	 5 carbon sugar	glucose: also known as blood sugar

B) disaccharide 2	 2 put together	ex: Sucrose: table sugar
C) polysaccharide 3 or more	 etc.	ex: cellulose: plant cellwall, dietary fiber
Lipid	fatty acids and glycerol	-wax, oil, fats -long term energy
Protein	amino acids	-enzymes: ends in "ase" -raw materials for body
Nucleic Acids	nucleotide  phosphate sugar nitrogen base	- DNA and RNA - genetic material

Cells and Cell Chemistry

1. Complete the following:

Organelle	Function	Where found (animal, plant, and/or, prokaryote)
Cell (plasma) membrane	-barrier -water balance	all cells
Ribosome	-protein synthesis -makes protein	all cells
~~Vacuole~~		
Cell wall	-protection and structure	Plants
Chloroplast	photosynthesis	Plants
Cytoplasm	fluid that fills the cell	all cells
~~Endoplasmic reticulum~~		
~~Golgi Body~~		
~~Lysosome~~		
Mitochondria	cellular respiration	eukaryotes -plants and - animals

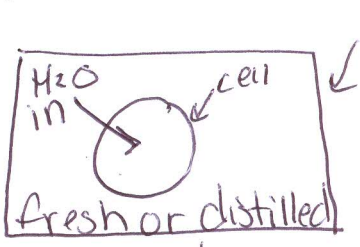
Nucleus	- holds the DNA - control center	eukaryotes

2. Why is the cell membrane called "selectively permeable"?

it can control or "select" what enters and exits the cell

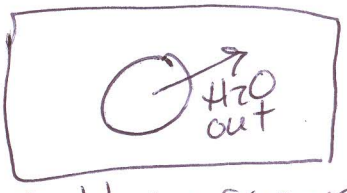
3. Discuss the conditions needed to cause water to diffuse into a cell. (Draw a picture, too!!!)

Water will enter the cell if there is a higher water concentration outside the cell.



4. Discuss the conditions necessary to cause water to diffuse out of a cell. (Draw a picture, too!!!)

Water will exit the cell if there is a lower water concentration outside of the cell.



5. Describe what would happen to a red blood cell in each of the following situations:
   a. It is placed in a solution with an extremely high concentration of salt.

      cell would shrink

   b. It is placed in distilled water.

      cell would swell

6. What are some body systems that help organisms remove excess water? Explain how these systems work to remove water.

excretory: sweat and urine
circulatory: blood brings water to kidneys

7. How is osmosis related to homeostasis?

Osmosis is maintaining water balance, or homeostasis.

8. Osmosis is the movement of water from high concentration to low concentration.

9. Diffusion is the movement of particles from high concentration to low concentration.

~~10. When a cell is placed in a hypertonic solution it will _____ because _____.~~

11. Active transport uses ATP, passive transport uses no energy, and facilitated diffusion is a form of passive transport.

12. Fill in the blanks with the following terms:

Pseudopodia Flagella Skeletal
Ciliate Movement

The movement of organisms is dependent upon the relationship between its muscular and its skeletal system. The muscles are required to pull the bones in order for movement to occur. Protozoa are classified according to their method of locomotion, or movement. One type of movement is through the twirling or lashing of the flagella, which are long, whip-like structures on the surface of a cell. Another type of movement is amoeboid, which is a creeping caused by pseudopodia. The third type of movement is cilia, which is the synchronized beating of short hair-like projections.

Photosynthesis and Cellular Respiration

1. Write the photosynthesis equation below:

$Sun + H_2O + CO_2 \longrightarrow C_6H_{12}O_6 + O_2$

2. Write the cellular respiration equation below:

$C_6H_{12}O_6 + O_2 \longrightarrow ATP + H_2O + CO_2$

3. What organelle carries out photosynthesis? chloroplast

4. What organelle carries out cellular respiration? mitochondria

5. **Fill in the chart below**

Type of Respiration	Conditions in which it occurs	How much energy does it produce?
Aerobic respiration	with oxygen	more
Anaerobic respiration	without oxygen	less

aka: fermentation

6. CO_2 used during photosynthesis is placed in the atmosphere by heterotrophs

the process that produces CO_2 in cells is called cellular respiration

7. The CO_2 is used by autotrophs. They take CO_2 + sunlight and produce glucose + oxygen in their chloroplast (organelle)

this process is called photosynthesis

Cell Division and Genetics

1. The DNA must replicate before mitosis in order to have enough DNA to create 2 clone cells.

2. The cell will complete mitosis when making somatic cells.

3. The cell will complete meiosis when making Sex cells. or gametes!

4. List four differences between mitosis and meiosis:

Mitosis	meiosis
- Somatic cells	- gametes
- makes clones	- Creates variation
- makes 2 cells	- makes 4 cells
- growth + repair	- reproduction

5. Summarize how sexual reproduction, which includes meiosis and fertilization, affects genetic variation within an offspring.

Meiosis creates the sex cells, or gametes. During meiosis crossing over creates variation. Once the gametes are made, the sperm and egg unite creating a zygote during fertilization.

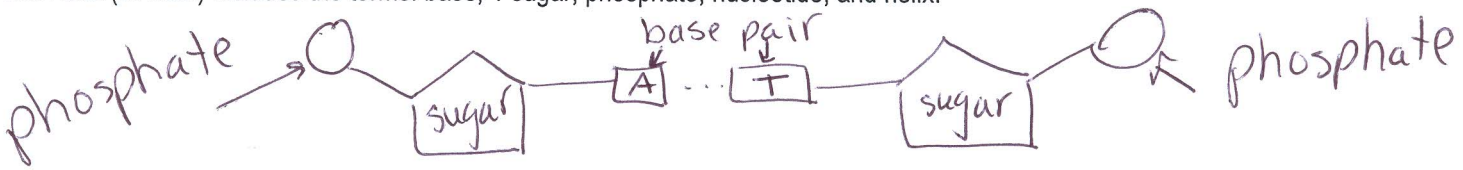
6. Mitosis phases

PMAT

Phase	What happens in the phase
Interphase	
Prophase	
Metaphase	
Anaphase	
Telophase	

9. What are the three components of a nucleotide? - sugar - phosphate - base

10. Draw a picture of the structure of DNA that (at least) includes the terms: base, 1 sugar, phosphate, nucleotide, and helix.



11. Describe gel electrophoresis using the following terms: electrophoresis, agarose gel, DNA bands, banding pattern, lane, DNA fragment, common ancestry, relatedness

Gel electrophoresis is a process where DNA is placed into the lanes of an agarose gel. When electricity is applied the DNA fragments create a banding pattern which can be used to determine relatedness and common ancestry.

12. What do the bands in the gel pattern represent? What causes some bands to move further than other?

DNA ↗ ↑ the smallest fragments move further than the larger ones.

13. RNA/ DNA Comparison: Fill in the chart

Characteristic	DNA	RNA
Sugar present	deoxyribose	ribose

Number of strands	2	1
Location(s) It Can Be Found	nucleus	nucleus + ribosome
Function(s)	stores genetic info.	moves genetic info to make protein

13. **Mutations:** Mutations and crossovers create different genes and gene sequences. Explain how mutations are an important and normal part of sexual reproduction.

Mutations and crossing over occur during meiosis normally to produce variation or diffences in the offspring.

14. Protein Synthesis Definitions

Word	Definition/Picture
Codon	a group of 3 bases on mRNA that codes for 1 amino acid
Nucleotide	the building blocks of DNA and RNA. Made of a phosphate, sugar, and nitrogen base
Replication	the copying of DNA prior to mitosis
~~Auticodon~~ Anticodon	a group of 3 bases on tRNA that attaches to the codon of mRNA
Clone	an exact copy of a cell or organism
mRNA	messenger RNA. Carries the code for a gene from the nucleus to the ribosome.
tRNA	transfer RNA. carries amino acids to the ribosome to be assembled into a protein

15. What happens during transcription? the DNA opens up to reveal the code for a gene. mRNA copies the code and levels the nucleus via a nuclear pore.

16. What happens during translation? the mRNA is read 1 codon at a time by the ribosome. The tRNA brings the amino acids to the ribosome and creates a protein.

17. What is a chain of amino acids called? a protein

18. Genetics Definitions

Word	Definition
Allele	one version of a gene
Autosome	any chromosome that is not a sex chromosome
Dominant	A trait that only needs 1 copy to be expressed
Gene	A segment of DNA that codes for a protein
Genotype	the genetic make up for a particular trait
Heterozygous	Bb – one recessive and one dominant allele
Homozygous	BB or bb - both dominant or both recessive
Phenotype	the expression or physical trait
Recessive	A trait that requires two copies of the allele to be expressed.
Sex-chromosome	XX for girls XY for boys

Complete the following punnett squares. Give the genotype and phenotype of each.

19. Monohybrid Cross a heterozygous right handed person with a left handed person. Right is dominant over left.

Rr rr

1:1 Ratio

	R	r
r	Rr	rr
r	Rr	rr

20. Sex-linked Cross a female who is a carrier for hemophilia with a hemophiliac male.

$X^H X^h$ $X^h Y$

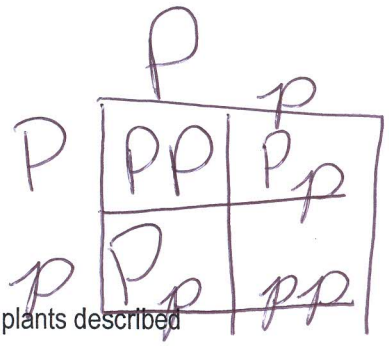
	X^H	X^h
X^h	$X^H X^h$	$X^h X^h$
Y	$X^H Y$	$X^h Y$

21. Answer the following questions.

In *Pisum sativum*, a pea plant, the allele for purple flower (P) is dominant over the allele for white flowers (p). A cross between two purple-flowered plants in both purple-flowered and white-flowered offspring, as shown in the table below.

RESULTS OF PEA PLANT CROSS

Flower	Number of Plants
Purple	103
White	35



On a piece of paper, do the following:

- Draw a Punnett Square that shows the cross between the two purple-flowered parent plants described above. When writing the allele pairings, underline all lowercase letters (p).
- Fill in the genotypes of the offspring on the Punnett Square.
- Make a key to indicate which genotype produces which flower color. PP and Pp = purple
- Give the ratio of flower colors that can be expected from the cross. pp = white
- Explain how the data in the table and in the Punnett square helped you determine the ratio.

3:1 radio

Both parents are purple, but they create some white flowers. this means both parents must be heterozygous.

22. A genetics study was conducted that crossed two red-flowered plants. The next generation was a mixture of red-flowered and white-flowered offspring. Which of these represents those of the parent generation?

A) rr and rr B) Rr and Rr C) RR and rr D) RR and RR

B

Classification and Evolution

1. Directions: Fill in the blanks using the words provided. Each paragraph is provided with a separate list of words.

Adaptations	Diversity	Prokaryotes
Anatomical similarities	Eukaryotes	

In a classification system, organisms may be group according to the likenesses of their body parts, or anatomical similarities. They may also be classified according to the type of cells they have. For example, some cells do not have a true nucleus and are called prokaryotes; some cells are eukaryotes and have a nucleus. Classifying organisms shows that there area wide variety of living things, that there is much diversity among organisms. Organisms exhibit a wide variety of traits. Many of these traits are adaptations, which enable the organisms to survive in their surroundings.

2. List the 7 levels of organization in the system of classification starting with kingdom.

Kingdom
phylum
class
order
family
genus
species

3. Complete the table below:

Characteristic	Monera	Protista	Fungi	Plantae	Animalia
Has a Nucleus?					
Has a Cell Wall?					
Uses Cilia, Flagella, or Pseudopodia					
Autotroph or Heterotroph?					
Muticellular or Unicellular?					
Examples					

4. Explain how natural selection occurs. (~~HINT: Use "VIST" to help you!!!~~)

Certain traits make individuals within a population better suited to survive and reproduce.

5. Does evolution occur in individuals or in population?

It occurs within population over time.

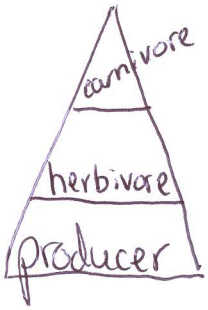
Ecology

1.What is the ultimate source of energy for life? the sun

2.What common characteristics do all producers have? they do photosynthesis

3.What common characteristics do all consumers have? they must get energy from somewhere else.

4.Predict which organism type would have the most biomass in an ecosystem: carnivore, herbivore, producer; by drawing a food pyramid. Explain why.



Producers have the highest biomass because there are more of them.

5.In general, how do humans affect biodiversity?

human impact on the environment reduces biodiversity.

6.How does the lack of biodiversity affect an ecosystem?

it makes it unstable

7. **Factors affecting living organisms**

Factor	Abiotic or biotic	How it affects living things
Space	A	needs space to live
Soil		needed for many procedures to grow
Water	A	living things need water to survive
Light	A	producers need light to photosynthesize
Temperature	A	organisms have a climate they are suited for
Food	B	living things need food to survive

8. **Relationships**

Relationship	+/ - / 0	Example
Parasite-host	+/-	ticks or tapeworms
Mutualism	+/+	bird on a cow (eats paracites)
Predator-prey	+/-	lion and gazelle
Commensalism	+/0	shark and sucker fish
Competition	-/-	two species trying to get the same resources

9. **Succession**

Stage	Definition	What happens
Primary	an ecosystem is created where there wasn't one.	
Secondary	one ecosystem replaces a previously destroyed one	
Pioneer stage	the first species to establish a new ecosystem	
Climax community	a mature, healthy ecosystem	

phytoplankton → medium fish → shark → killer whale

10. **Food web**
Shark, phytoplankton, bacteria, killer whale, medium sized fish
Draw a food chain for the organisms above.

11. Fill in the blanks with the following terms:

Habitats	pH	Toxins
Oxygen	Pollution	Urbanization

Cells exist within a narrow range of conditions. Some conditions that affect cells art the pH, or acidity, or the environment, and the amount of water and oxygen, or air, available. Changes in environment will affect the cell and may cause death to the cell or organism. Some events that affect the cell and organism are the release of poisons, called toxins; pollution (contamination of the environment); destruction of areas where the organisms live, called habitats;
And urbanization the change of areas of land into cities.

Body Systems

1.Fill out the following chart

System	Functions	How functions help maintain homeostasis
Circulatory	uses blood to transport things	temperature and ptl balance
Nervous system	Controls the body	senses changes in the body and environment
Digestive	to break down food	nutrient balance
Excretory	to get rid of waste	water and salt balance
Skeletal	to give the body structure	minerals, such as calcium, balance
Muscular	muscles move the skeleton	can help to regulate body temp. by shivering
Endocrine	to create hormones to regulate body processes	regulates many body functions such as blood sugar and blood pressure