AP (and DE) **Biology**

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Use the AP Bio Prior Knowledge document to review key concepts in AP Biology, including the linked instructional videos. After completing the review, print the AP Bio Summer Content Review Questions and answer them independently based on your understanding from the videos and prior knowledge. Responses may be written either on the printed document or on notebook paper. All work should be neat, thorough, and reflect your best effort. The completed assignment is due to Mrs. Andrews on the first day of school.

Topic	Prior knowledge needed to be successful in this unit	Review resources
Biochemistry and Enzymes	Chemical bonds (polar/nonpolar)	Crash course video (types of bonds) Crash course video (polar/nonpolar)
	Organic Molecules (carbs, lipids, proteins, nucleic acids): know their monomer, polymer, function(s), general characteristics, and examples	Amoeba sisters video CK-12
	Laws of Thermodynamics	Khan academy (first law) Khan academy (second law)
	Enzyme Mechanics	Amoeba sisters video CK-12
Cells	Prokaryotes vs. Eukaryotes	Amoeba sisters video CK-12
	Cell Organelles/Cell Parts: Nucleolus, Ribosomes, Peroxisomes, ER, Nucleus, Golgi, Lysosomes, Mitochondria, Vacuoles, Chloroplast, Cytoskeleton, Cell Wall, Plasma Membrane	Amoeba sisters video CK-12
	Animal vs. Plant Cells	Khan academy CK-12
	Passive vs. Active Transport	Amoeba sisters video CK-12
Cell Energy (Respiration and Photosynthesis)	ATP basics	Bozeman science video CK-12
	Aerobic respiration: know the equation. What are the reactants? What are the products? How does a cell obtain the reactants? What does a cell do with the products?	Amoeba sisters video CK-12
	Anaerobic respiration: alcohol fermentation and lactic acid fermentation	CK-12
	Photosynthesis: know the equation. What are the reactants? What are the products? How does a plant cell obtain the reactants? What does a plant cell do with the products?	Amoeba sisters video CK-12
Inheritance	Mitosis vs. Meiosis: What are these processes used for? How would you characterize the cells at beginning, middle, and end of the process? (use terms such as diploid, haploid, somatic, gamete). What is the end result (how many cells, what type of cells)?	Khan academy CK-12
	Mitosis Phases	Amoeba sisters video CK-12
	Meiosis Phases: including details on how genetic variation occurs through this process	Amoeba sisters video CK-12
	Cell Cycle	Khan academy CK-12
	Genetics terminology: recessive, dominant, homozygous, heterozygous, genotype, phenotype	Quizlet
	Monohybrid crosses	Amoeba sisters video CK-12
	Special types of Punnett squares: incomplete dominance, codominance, sex-linked crosses	Amoeba sisters video (incomplete and codominance) Amoeba sisters video (sex-linked)

	Pedigrees	Amoeba sisters video CK-12
	Karyotypes	Learn.genetics (make your own karyotype)
	Structure of DNA	Amoeba sisters video CK-12
	DNA vs. RNA	Amoeba sisters video CK-12
Protein Synthesis and Biotechnology	Describe the basic process of protein synthesis using correct terminology: transcription, translation, codon, anticodon, DNA, mRNA, tRNA, rRNA, peptide bond, polypeptide chain, nucleus, ribosome, protein	Amoeba sisters video CK-12
	Know how to read a codon chart and understand the purpose of start and stop codons	Youtube video NIH link (start/stop codons) CK-12
Taxonomy and Evolution	General characteristics of the 3 Domains (Bacteria, Archaea, Eukarya)	Bozeman science video CK-12
	General characteristics of the 4 Kingdoms in the Domain Eukarya (Protista, Fungi, Plantae, Animalia)	Quizlet CK-12
	Know how to interpret phylogenetic trees/cladograms	Khan academy Bozeman science CK-12
	Evidence for evolution	Bozeman science CK-12
	Theory of Natural Selection	Amoeba sisters video CK-12
	Speciation vs. Extinction	Amoeba sisters video (speciation)
Plant anatomy and reproduction	Plant adaptations: cell walls, roots, stomata, vascular tissues	Amoeba sisters video CK-12
	Asexual reproduction vs. Sexual reproduction	Amoeba sisters video CK-12
Ecology and Behavior	Ecology terminology: population, community, ecosystem, abiotic vs. biotic factors, biosphere	Quizlet Khan academy
	Population growth: carrying capacity, limiting factors (density dependent and independent),	CK-12
	Symbiosis: mutualism, commensalism, parasitism	Learn.genetics CK-12
	Food chains: producers, consumers, trophic levels, decomposers, how energy is transmitted in a food chain	Amoeba sisters video CK-12
	Animal behaviors: innate vs. social vs. learned	Khan Academy Bozeman science CK-12

Name _____

AP BIO- Summer Content Review Questions

Cells

1. Bacteria and Archaea are
    a. Unicelled and eukaryotic
    b. Unicelled and prokaryotic
    c. Multicellular and Eukaryotic
    d. Multicellular and Prokaryotic
2. The main difference between prokaryotic and eukaryotic cells is
    a. Prokaryotes contain DNA while Eukaryotes do not
    b. Prokaryotes are much larger than Eukaryotes
    c. Prokaryotes do not contain a nucleus while Eukaryotes do not
    d. Prokaryotes contain membrane-bound organelles while Eukaryotes do not
3. Which of the following are found in both prokaryotes and eukaryotes?
    a. Ribosomes
    b. Cytoplasm
    c. Cell membrane
    d. All of the above
4. Which two structures are found in plant cells but not in animal cells?
    a. Ribosomes and nuclei
    b. Plasma membranes and chromosomes
    c. Cell walls and chloroplasts
    d. Ribosomes and chloroplasts
5. _____ produce proteins, which are made of _____.
    a. Mitochondria, nucleic acids
    b. Amino acids, ribosomes
    c. Mitochondria, amino acids
    d. Ribosomes, amino acids
6. If you looked through a microscope at a cell and saw a nucleus, mitochondria, chloroplasts, and a cell wall which type of cell would you be looking at?
    a. Bacterial cell
    b. Animal cell
    c. Plant cell
7. When water moves into a cell to establish equilibrium between the cell and its external environment this process is called
    a. Diffusion
    b. Osmosis
    c. Facilitated diffusion
    d. Active transport

Match the following cell parts with their appropriate function. Only use each cell part once.

A. Cell Membrane	G. Golgi Apparatus
B. Cytoplasm	H. Mitochondria
C. Ribosome	I. Chloroplasts
D. Nucleus	J. Vacuole
E. Rough Endoplasmic Reticulum	K. Cell Wall
F. Smooth Endoplasmic Reticulum	L. Vesicles

8. The fluid in which all cell parts and molecules can move.
9. Site of cellular respiration.
10. Site of photosynthesis.
11. Made of cellulose and offers protection for plant cells and some bacteria.
12. Transports molecules such as proteins throughout the cell and may fuse with the cell membrane if the molecule needs to be exported outside of the cell.
13. Site of protein synthesis.
14. Controls all activities within the cell if the cell is a eukaryote.
15. Organelle that is attached to the nucleus and is studded with ribosomes. Proteins may be made here and begin their modification process.
16. Organelle in which excess nutrients are stored. May be very large in a plant cell.
17. Processes proteins that need to be shipped out of the cell. Vesicles pinch off of this organelle.
18. Organelle that is attached to the nucleus and does not contain ribosomes. It synthesizes lipids and helps with the breakdown of certain harmful substances.
19. Controls what goes into and out of the cell.

Molecular Biology

1. What are the basic building blocks that make up DNA?
    a. Amino acids
    b. Fatty acids
    c. Monosaccharides
    d. Nucleotides
2. Which option below would represent a monomer of RNA?
    a. Phosphate, ribose, uracil
    b. Phosphate, ribose, thymine
    c. Phosphate, deoxyribose, thymine
    d. Phosphate, deoxyribose, uracil
3. DNA is a double helix. One side of the twisted ladder runs in the 5’ to 3’ direction while the opposing side of the ladder runs in the 3’ to 5’ direction. What is this trait called?
    a. Semiconservative
    b. Antiparallel
    c. Dispersive
    d. Conservative

4. The purines in DNA are
    a. Adenine and guanine
    b. Cytosine and thymine
    c. Adenine and thymine
    d. Cytosine and guanine
5. After DNA replication the end result is
    a. Two strands of DNA each with original DNA only
    b. Two strands of DNA each with new (daughter) DNA only
    c. Two strands of DNA, one strand with only new (daughter) DNA and the other with only original DNA
    d. Two strands of DNA, both strands with one original DNA strand and one new (daughter) DNA strand
6. Which statement best describes the relationship that exists among proteins, DNA, and cells?
    a. Proteins combine to produce cells, which produce DNA
    b. Proteins are made up of DNA, which determines the cells that are produced
    c. DNA is made up of proteins, which tell a cell how to function
    d. Cells contain DNA, which controls the production of proteins
7. What makes the information in one DNA molecule different from the information in another DNA molecule that is found in a different organism?
    a. The unique sequence of nucleotides
    b. The unique shape of the double helix
    c. The unique amino acids used in the molecule
    d. The unique order of sugars and phosphates
8. The process of DNA replication is biologically significant because it allows the cells of living organisms to
    a. Convert solar energy into glucose
    b. Copy their DNA before cell division occurs
    c. Break down glucose molecules for energy
    d. Synthesize proteins from mRNA polymers

Respiration and Photosynthesis

1. Through what process would carbon dioxide from the atmosphere get fixed into carbohydrates?
    a. Photosynthesis
    b. Cellular respiration
    c. Decomposition
    d. Burning fossil fuels
2. During strenuous exercise your muscles may weaken and cramp up. You may be sore for several days after this strenuous exercise. What is the most probable cause of the cramping and soreness?
    a. A buildup of carbon dioxide in muscles from aerobic respiration
    b. A buildup of carbon dioxide in muscles from anaerobic respiration
    c. A buildup of lactic acid in muscles from aerobic respiration

d. A buildup of lactic acid in muscles from anaerobic respiration

3. The reactants of photosynthesis are
    a. Carbon dioxide, water, light
    b. Glucose and oxygen
    c. Glucose and carbon dioxide
    d. Oxygen, water, and light
4. Glucose is created in the _____ and used in the _____
    a. Chloroplast; mitochondria
    b. Cytoplasm; mitochondria
    c. Mitochondria; chloroplast
    d. Ribosome; chloroplast
5. By what process is oxygen removed from the atmosphere?
    a. Photosynthesis
    b. Aerobic respiration
    c. Anaerobic respiration
    d. Decomposition
6. Which is not true concerned the effect of photosynthesis and respiration on the flow of energy in the ecosystem?
    a. Photosynthesis converts light energy into chemical energy in the form of glucose
    b. Respiration uses chemical energy produced by plants and converts it into energy in the form of ATP
    c. Without photosynthesis, there would be no chemical energy to convert to ATP
    d. Without respiration, there would be no light energy to convert to ATP
7. The main result of aerobic respiration is the
    a. Conversion of radiant energy into chemical energy
    b. Production of lactic acid as an end product
    c. Storage of energy in a polysaccharide
    d. Production of ATP from the breakdown of glucose
8. Write the balanced chemical equation for aerobic cellular respiration.
9. Write the balanced chemical equation for photosynthesis.

Evolution

1. The term “Evolution” is best described as
    a. A process of change in a population through time
    b. A process by which organisms become extinct
    c. The reproductive isolation of members of certain species
    d. The replacement of one community by another
2. After the industrial revolution, dark-colored moths outnumbered light-colored moths in certain regions of England. Within the past 40 years, factories in these regions have added scrubbers (pull pollutants out of smoke) and air purifiers to their smokestacks, and the relative number of light-colored moths has increased. The probable reason for this increase is that
    a. The allele for light color became dominant over the allele for dark color
    b. The environment favored the survival of light-colored moths over dark-colored moths
    c. Dark-colored moths turned light because they needed to survive

d. Overpopulation occurred and most of the light-colored moths died, leaving only dark-colored moths to reproduce

3. The structural changes that occur in certain plants over time, enabling them to thrive in dry habitats, are examples of
    a. Energy flow relationships
    b. Succession
    c. Nutritional relationships
    d. Adaptations
4. Some insect species have developed an ability to resist pesticides. Which statement best describes this phenomenon?
    a. Their survival depended upon it, the insects developed variations that made them resistant to poisons
    b. Natural selection results in an unfavorable variation for the insects
    c. Random variation in the population led to a population with favorable adaptation
    d. Some insects became instantly immune when the poisons were introduced into their environment
5. Which of the following is true of evolution?
    a. Evolutionary changes increase the ability of a species to survive and reproduce in a specific environment
    b. Evolutionary changes increase the ability of a species to survive and reproduce under any circumstance
    c. Evolutionary changes result in a species becoming more and more abundant over time
    d. Evolutionary changes result in animals becoming larger over time and having larger numbers of offspring
6. The core idea of evolutionary “success” or “fitness” is oriented around
    a. Achievement of a long life
    b. Better senses
    c. Intelligence
    d. Reproduction
7. Which of the following best characterizes natural selection?
    a. Survival of the biggest and strongest organism in a population
    b. Elimination of the smallest organism by the biggest organism
    c. Survival and reproduction of the organism that occupies the largest area
    d. Survival and reproduction of the organisms that are genetically best adapted to the environment.
8. In the statement “survival of the fittest”, survival means
    a. Having a stronger, healthier life
    b. Outlasting other organisms in the population
    c. Producing offspring
    d. Passing genes to the next generation that can compete