### EOC Study Guide

#### CELLS

## SB1. Students will analyze the nature of the relationships between structures and functions in living cells.

Units	Questions	Points	Points
		Possible	Earned
Unit 1	1. What are the characteristics that all living things share?	1	
	2. What is homeostasis?	1	
Unit 2	3. <b>Describe</b> the 4 properties of water.	1	
	4. What are the <b>functions</b> of the four macromolecules: carbohydrates, lipids,	1	
	proteins, and nucleic acids?		
	5. List the <b>elements</b> in EACH macromolecule (C, H, O, N, or P) and the	1	
	monomer name for each macromolecule.		
	6. What are the 3 parts of the Cell Theory?	1	
	7. List the differences between a prokaryotic cell and a eukaryotic cell using the	1	
	following questions: does it have a nucleus? Does it have membrane bound		
	organelles? How many cells: unicellular, multicellular, or both? What parts do		
	the 2 cells have in common?		
	8. List <b>ALL</b> the cell's organelles and their functions.	4	
	9. Which 3 organelles do plant cells have that are different from animal cells?	1	
	10. Define selective permeability.	1	
	11. How many layers does the cell membrane contain and what are the 2 main parts	1	
	of the membrane?	1	
	12. What is the difference between hydrophobic and hydrophilic sides of a	1	
	phospholipid?	1	
	13. What are the functions of the following parts of the cell membrane: receptor	1	
	protein, transport protein, cholesterol, carbohydrate?	1	
	14. Define passive and active transport: energy used and concentration gradient	1	
		1	
	movement (high to low or low to high)  15. Define diffusion facilitated diffusion and compaign including what type of	1	
	15. Define diffusion, facilitated diffusion, and osmosis: including what type of	1	
	molecule each transports	1	
	16. Explain the difference between the three types of environments that cause	1	
	osmosis: hypertonic, hypotonic, and isotonic. Include amount of solute on the		
	outside, whether there is high, low or equal amounts of water compared to		
	the inside of the cell, and what happens to the shape of the cell		
	17. Explain each of the following active transports: Sodium/Potassium pump,	1	
	Endocytosis, and Exocytosis.		
Unit 3	18. What is an enzyme? What macromolecule is an enzyme?	1	
	19. What are activation energy, substrate, and active site?	1	
	20. How does the enzyme change the activation energy of a reaction?	1	
	21. List the main characteristics of enzymes.	1	1
	22. Explain how the following factors affect enzyme function: temperature, pH, and	1	
	inhibitors		
	23. If the enzyme concentration increases and there is plenty of substrate available,	1	
	what will happen to the amount of product formed?		
Unit 5	24. List what occurs in the 3 phases of Interphase of the cell cycle	1	
	25. Define mitosis and cytokinesis.	1	1
	26. What is the main goal of Mitosis? List the end results of Mitosis.	1	1
	27. Explain what happens to the DNA from the start of the cell cycle to the end –	1	1
	including each phase of mitosis	1	1
	28. What is the term for the cell division in prokaryotic cells?	1	
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### **GENETICS**

### SB2. Students will analyze how biological traits are passed on to successive generations.

Units	Questions	Points Possible	Points Earned
Unit 4	1. Describe the differences between DNA and RNA in terms of <b>types of sugar</b> ,	2	Earneu
Omt 4	base pair rules, # of sides, location in the cell, and function.	2	
	2. What are the 3 parts of a typical nucleotide?	1	
	3. Describe the steps of DNA replication and when it occurs in the life of a cell.	1	
	4. What are the functions of the three types of RNA?	1	
	5. Which types have codons and which types have anticodons?	1	
	<ul><li>6. Describe the steps and location of transcription.</li></ul>	1	
	7. Describe the steps and location of translation.	1	
	8. What is genetic engineering?	1	
	<ul><li>9. Explain gel electrophoresis, PCR, and organism cloning</li></ul>	1	
	10. Define stem cells.	1	
	11. What are some factors that can cause DNA mutations?	1	
	12. If a mutation occurs in your somatic (body) cells, can you pass on the mutation	1	
		1	
Unit 5:	to your offspring? Why or why not?	2	
Cell	13. Define the following: chromosome/chromatin, chromatid/centromere,	2	
Division	diploid/haploid, sex chromosome/autosome	1	
Division	14. Define homologous chromosome	$\frac{1}{2}$	
	15. Explain the types of DNA mutations that can occur: deletion, inversion, translocation, nondisjunction, point - substitution, point - frameshift		
		1	
	16. What are the advantages and disadvantages of sexual and asexual reproduction?	1 1	
	<ul><li>17. How is genetic diversity caused in meiosis (what happens in Prophase I)?</li><li>18. What phases of meiosis have homologous chromosomes lining up in the middle</li></ul>	1	
		1	
	of the cell? What phases of meiosis have sister chromatids lining up in the middle of the cell?		
	19. What are the main differences between Mitosis and Meiosis (main goal, # of	3	
	divisions, # of cells at the end, # of chromosomes at the end: haploid or diploid,	3	
	identical or not identical to parent cell, crossing over)?		
	20. When a sperm and egg (gametes) unite in fertilization, what is the resulting first	1	
	cell called?	1	
Unit 5:	21. What is genetics?	1	
Genetics	· · · · · · · · · · · · · · · · · · ·		
Geneucs	<ul><li>22. What is the difference between traits, alleles, and genes?</li><li>23. Describe Mendel's experiment with pea plants including the generation names</li></ul>	1 1	
	and results.	1	
	24. Draw the 2 Punnett Squares to show Mendel's crosses: homozygous dominant	4	
	crossed with homozygous recessive and then heterozygous crossed with	4	
	heterozygous. Include the phenotypic and genotypic ratios or percentages. (Use		
	B=purple flowers and b=white flowers)		
		2	
	25. Define the following: dominant/recessive, homozygous/heterozygous, genotype/phenotype, monohybrid/dihybrid	2	
	26. What is the difference between complete dominance, incomplete dominance,	1	
	and co-dominance?	1	
	27. Dihybrid cross: RrBb X RrBb: R = tall, r = short, B = brown eyes, b = blue	1	
		1	
	eyes. What are the phenotypic ratios?  28. Explain Mandal's Law of Independent Assortment and Law of Sagragation	1	
	28. Explain Mendel's Law of Independent Assortment and Law of Segregation.	1	
	29. What is the difference between multiple alleles, polygenic inheritance, and sex-linked traits?	1	
		1	
	30. What is a pedigree analysis and how is it used?	39	
		39	

#### ORGANISMS

## SB3. Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.

Units	Questions	Points	Points
		Possible	Earned
Unit 1	1. What is taxonomy and classification?	1	
	2. Who developed the current naming system?	1	
	3. What is the term given to the two-word naming system for organisms?	1	
	4. In an organism's scientific name, what does the first word represent and what does the second word represent?	1	
	5. Define phylogenetic tree and cladogram. What information can you learn from these diagrams?	1	
	6. What is a dichotomous key?	1	
	7. What pieces of evidence do scientists use to construct phylogenetic trees and cladograms?	1	
	8. Using the plant phyla cladogram on p.429 (also in the Classification Notes), what type of plant is most closely related to the flowering plants and what type of plant is least closely related to the flowering plants?	1	
	9. Starting with domain, write down the levels of organization for classification.	1	
	10. What is a virus and what characteristics do they have in common with living things and what characteristics do they lack?	1	
	11. Explain the lytic and lysogenic cycles of viral replication.	1	
	12. For each of the 6 kingdoms, list the main characteristics: cell type, # of cells, nutrition, and cell wall	4	
Unit 3	13. What is the full name of the energy molecule for living things? Write the equation for how <b>ATP</b> is built and broken down.	1	
	14. Write the equations for <b>photosynthesis</b> and <b>cell respiration</b> and the main purpose of each process.	2	
	15. What <b>organelles</b> are responsible for photosynthesis and cell respiration?	1	
	16. Where do the 2 parts of photosynthesis take place? light reaction and Calvin cycle	1	
	17. List the <b>main purpose</b> of each of the following: light reaction and Calvin cycle in photosynthesis	1	
	18. Where do the 3 parts of cell respiration take place? glycolysis, Krebs cycle, electron transport chain	1	
	19. List the <b>main purpose</b> of each of the following: glycolysis, Krebs cycle, and electron transport chain in cellular respiration	1	
	20. What is fermentation, what are the types and how does it compare to cell respiration: use of O <sub>2</sub> and amount of energy made?	1	
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### ECOLOGY

# SB4. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

Units	Questions	Points	Points
		Possible	Earned
Unit 6	1. What is ecology?	1	
(and some	2. Define the following terms: biosphere, ecosystem, community, population, organism	2	
from Unit 3)	3. What is the difference between biotic and abiotic factors and give examples of each?	1	
Omt 3)	<ol> <li>Draw the flow of energy through the levels of a food chain starting with producers. (Make sure the arrows are pointing the correct direction)</li> </ol>	1	
	5. What is the difference between autotrophs and heterotrophs?	1	
	6. What is a trophic level? Why does only 10% of the energy get passed to the next trophic level?	1	
	7. How are decomposers helpful in an ecosystem and what are some examples of decomposers?	1	
	8. What is the difference between a food chain, food web, and energy pyramid?	1	
	9. What is the ultimate source of energy for living things? Which level of the food web has the most amounts of organisms?	1	
	10. Why is it important to recycle nutrients such as C, O, N, P, and water?	1	
	11. Draw the nutrient cycles for carbon, water, and nitrogen and be sure to label the steps	2	
	<ul><li>12. Explain the difference between primary and secondary succession and give an example of each.</li></ul>	1	
	13. Define the following: pioneer species and climax community	1	
	14. Draw the two population model graphs and explain the difference between the two.	1	
	15. What is the equation for determining population growth? What is a carrying capacity?	1	
	16. What is the difference between density-independent and density-dependent factors in a population?	1	
	17. Define the following: symbiosis, predation, competition, mutualism, commensalism, parasitism.	1	
	18. What is the difference between a niche and a habitat and can an organism ever share a niche with another organism?	1	
	19. List the characteristics of the following biomes: tundra, taiga, grassland, and savanna	2	
	20. List the characteristics of the following biomes: deciduous forest, tropical rainforest, desert, marine and freshwater	2	
	21. What is the difference between renewable and nonrenewable resources and	1	
	list an example of each?	1	
	22. What is pollution?		
	23. Describe 3 ways that humans have impacted the environment: global warming, habitat destruction/deforestation, Ozone depletion, overpopulation	2	
		28	

#### **EVOLUTION**

## SB5. Students will evaluate the role of natural selection in the development of the theory of evolution.

Units	Questions	Points	Points
		Possible	Earned
Unit 7	1. What is evolution? What is biodiversity?	1	
	2. What is the difference between macroevolution and microevolution?	1	
	3. Explain Darwin's studies – include the organisms he looked at, where he went, and what facts did he collect, and his 4 observations	1	
	4. Explain the meaning of descent with modification and modification by natural selection.	1	
	5. What was Lamarck's contribution to the thoughts on evolution? Were his ideas correct?	1	
	6. Define natural selection and artificial selection.	1	
	7. What is an adaptation? What is adaptive radiation?	1	
	8. What is the difference between reproductive and geographic isolation?	1	
	9. Explain the difference between stabilizing, directional, disruptive, and diversifying selection.	1	
	10. Explain the following pieces of evidence that scientists use to support evolution and HOW does it show evidence for evolution  a. Fossils	4	
	b. Anatomy – homologous structures c. Embryology/development d. Molecular data		
	11. What is the difference between homologous structures, vestigial structures, and analogous structures?	1	
	12. What is radioactive dating and half-life? What is relative dating?	1	
	13. If an amino acid sequence is compared between two organisms and found to only have a few differences, what does that mean about how closely the organisms are related to each other?	1	
	14. Define co-evolution, convergent evolution, and divergent evolution.	1	
	15. What is extinction? How old is the Earth according to scientists?	1	
	16. List the order that molecules AND organisms showed up on the Earth according to scientists.	1	
	17. What is speciation? What is the difference between gradualism and punctuated equilibrium?	1	
	18. Explain how biological resistance (insects and bacteria) occurs?	1	
	19. What is the endosymbiotic theory? What organelles are involved?	1	
	20. Explain the 4 different plant tropisms AND list 4 ways that animals have adapted to better survive in their environment?	2	
		24	