

2017-2018 CPSD SCIENCE PACING GUIDE



Biology I

Canton Public Schools
Biology I Pacing Guide 2017 - 2018

Biology I 1 st - 4 th 9 Weeks		
Competency 1 - Inquiry		Mastery
1a	Conduct a scientific investigation demonstrating safe procedures and proper care of laboratory equipment. (DOK 2) <ul style="list-style-type: none"> • Safety rules and symbols • Proper use and care of the compound light microscope, slides, chemicals, etc. • Accuracy and precision in using graduated cylinders, balances, beakers, thermometers, and rulers 	1* 2* 3* 4*
1b	Formulate questions that can be answered through research and experimental design. (DOK 3)	1* 2* 3* 4*
1c	Apply the components of scientific processes and methods in classroom and laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 2)	1* 2* 3* 4*
1d	Construct and analyze graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs). (DOK 2)	1* 2* 3* 4*
1e	Analyze procedures, data, and conclusions to determine the scientific validity of research. (DOK 3)	1* 2* 3* 4*
1f	Recognize and analyze alternative explanations for experimental results and to make predictions based on observations and prior knowledge. (DOK 3)	1* 2* 3* 4*
1g	Communicate and defend a scientific argument in oral, written, and graphic form. (DOK 3)	1* 2* 3* 4*

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Competency 2 – Physical Science		Mastery
2a	<p>Explain and compare with the use of examples the types of bond formation (e.g., covalent, ionic, hydrogen, etc.) between or among atoms. (DOK 2)</p> <ul style="list-style-type: none"> • Subatomic particles and arrangement in atoms • Importance of ions in biological processes 	1 2* 3 4
2b	<p>Develop a logical argument defending water as an essential component of living systems (e.g., unique bonding and properties including polarity, high specific heat, surface tension, hydrogen bonding, adhesion, cohesion, and expansion upon freezing). (DOK 2)</p>	1 2* 3 4
2c	<p>Classify solutions as acidic, basic, or neutral and relate the significance of the pH scale on an organism’s survival (e.g., consequences of having different concentrations of hydrogen and hydroxide ions). (DOK 2)</p>	1 2* 3 4
2d	<p>Compare and contrast the structure, properties, and principal functions of carbohydrates, lipids, proteins, and nucleic acids in living organisms. (DOK 2)</p> <ul style="list-style-type: none"> • Basic chemical composition of each group • Building components of each group (e.g., amino acids, monosaccharides, nucleotides, etc.) • Basic functions (e.g., energy, storage, cellular, heredity) of each group 	1 2* 3 4
2e	<p>Examine the life processes to conclude the role enzymes play in regulating biochemical reactions. (DOK 2)</p> <ul style="list-style-type: none"> • Enzyme structure • Enzyme function, including enzyme-substrate specificity and factors that 	1 2* 3 4

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	effect enzyme function (pH and temperature)	
2f	Describe the role of adenosine triphosphate (ATP) in making energy available to cells. (DOK 1) <ul style="list-style-type: none"> • ATP structure • ATP function 	1 2 3* 4
2g	Analyze and explain the biochemical process of photosynthesis and cellular respiration and draw conclusions about the roles of the reactant and products in each. (DOK 3) <ul style="list-style-type: none"> • Photosynthesis and respiration (reactants and products) • Light-dependent reactions and light independent reactions in photosynthesis, including requirements and products of each • Aerobic and anaerobic processes in cellular respiration, including products each and energy differences 	1 2 3* 4
Competency 3 – Life Science		Mastery
3a	Compare and contrast the characteristics of the world’s major biomes (e.g., deserts, tundra, taiga, grassland, temperate forest, tropical rainforest). (DOK 2) <ul style="list-style-type: none"> • Plant and animal species • Climate (temperature and rainfall) • Adaptations of organisms 	1* 2 3 4
3b	Provide examples to justify the interdependence among environmental elements. (DOK 2) <ul style="list-style-type: none"> • Biotic and abiotic factors in an ecosystem (e.g., water, carbon, oxygen, mold, leaves) • Energy flow in ecosystems (e.g., energy pyramids and photosynthetic organisms to herbivores, carnivores, and decomposers) 	1* 2 3 4

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	<ul style="list-style-type: none"> • Roles of beneficial bacteria • Interrelationships of organisms (e.g., cooperation, predation, parasitism, commensalism, symbiosis, and mutualism) 	
3c	Examine and evaluate the significance of natural events and human activities on major ecosystems (e.g., succession, population growth, technology, loss of genetic diversity, consumption of resources). (DOK 2)	1* 2 3 4
Competency 4 - Life Science		Mastery
4a	Differentiate among plant and animal cells and eukaryotic and prokaryotic cells. (DOK 2) <ul style="list-style-type: none"> • Functions of all major cell organelles and structures (e.g., nucleus, mitochondrion, rough ER, smooth ER, ribosomes, Golgi bodies, vesicles, lysosomes, vacuoles, microtubules, microfilaments, chloroplast, cytoskeleton, centrioles, nucleolus, chromosomes, nuclear membrane, cell wall, cell membrane [active and passive transport], cytosol) • Components of mobility (e.g., cilia, flagella, pseudopodia) 	1 2* 3 4
4b	Differentiate between types of cellular reproduction. (DOK 1) <ul style="list-style-type: none"> • Main events in the cell cycle and cell mitosis (including differences in plant and animal cell divisions) • Binary fission (e.g., budding, vegetative propagation, etc.) • Significance of meiosis in sexual reproduction • Significance of crossing over 	1 2 3* 4
4c	Describe and differentiate among the organizational levels of organisms (e.g., cells, tissues, organs, systems, types of tissues.) (DOK 1)	1 2* 3 4
4d	Explain and describe how plant structures (vascular and nonvascular) and cellular functions are related	1 2* 3 4

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	to the survival of plants (e.g., movement of materials, plant reproduction). (DOK 1)	
Competency 5 – Life Science		Mastery
5a	Analyze and explain the molecular basis of heredity and the inheritance of traits to successive generations by using the Central Dogma of Molecular Biology. (DOK 3) <ul style="list-style-type: none"> • Structures of DNA and RNA • Processes of replication, transcription, and translation • Messenger RNA codon charts 	1 2 3* 4
5b	Utilize Mendel’s laws to evaluate the results of monohybrid Punnett squares involving complete dominance, incomplete dominance, codominance, sex linked, and multiple alleles (including outcome percentage of both genotypes and phenotypes.) (DOK 2)	1 2 3* 4*
5c	Examine inheritance patterns using current technology (e.g., pedigrees, karyotypes, gel electrophoresis). (DOK 2)	1 2 3* 4
5d	Discuss the characteristics and implications of both chromosomal and gene mutations. (DOK 2) <ul style="list-style-type: none"> • Significance of nondisjunction, deletion, substitutions, translocation, frame shift mutation in animals • Occurrence and significance of genetic disorders such as sickle cell anemia, Tay-Sachs disorder, cystic fibrosis, hemophilia, Downs Syndrome, color blindness 	1 2 3* 4
Competency 6 – Life Science		Mastery
6a	Draw conclusions about how organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships. (DOK 2)	1 2 3 4*

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	<ul style="list-style-type: none"> • Characteristics of the six kingdoms • Major levels in the hierarchy of taxa (e.g., kingdom, phylum/division, class, order, family, genus, and species) • Body plans (symmetry) • Methods of sexual reproduction (e.g., conjugation, fertilization, pollination) • Methods of asexual reproduction (e.g., budding, binary fission, regeneration, spore formation) 	
6b	Critique data (e.g., comparative anatomy, Biogeography, molecular biology, fossil record, etc.) used by scientists (e.g., Redi, Needham, Spallanzani, Pasteur) to develop an understanding of evolutionary processes and patterns. (DOK 3)	1 2 3 4*
6c	Research and summarize the contributions of scientists, (including Darwin, Malthus, Wallace, Lamarck, and Lyell) whose work led to the development of the theory of evolution. (DOK 2)	1 2 3 4*
6d	Analyze and explain the roles of natural selection, including the mechanisms of speciation (e.g., mutations, adaptations, geographic isolation) and applications of speciation (e.g., pesticide and antibiotic resistance). (DOK 3)	1 2 3 4*
6e	Differentiate among chemical evolution, organic evolution, and the evolutionary steps along the way to aerobic heterotrophs and photosynthetic autotrophs. (DOK 2)	1 2 3 4*

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Pacing Guide Overview 2017 – 2018

Biology I			
1st Term	2nd Term	3rd Term	4th Term
1a	2a	2f	6a
1b	2b	2g	6b
1c	2c	4b	6c
1d	2d	5a	6d
1e	2e	5b	6e
1f	4a	5c	
1g	4c	5d	
3a	4d		
3b			
3c			