CRAWFORDSVILLE COMMUNITY SCHOOL CORPORATION

GRADE LEVEL: 9-10 **SUBJECT: Biology** **DATE: June 2016 REVISED BY VEATCH FALL 2021**

GRADING PERIOD: Q1

CONTENT (THE WHAT)	STANDARD INDICATORS	SKILLS (WHAT STUDENTS NEED TO KNOW AND BE ABLE TO DO)	SEPS LTS	ASSESSMENT	VOCABULARY
Scientific Method/Nature of Science					
• Nature of Science • Characteristics of Life		• Compare a theory with a hypothesis • Compare interpretation and observation • Compare quantitative and qualitative data • Compare independent and dependent variables • Construct and label a graph • Generate a conclusion based on scientific data • Construct and test a hypothesis • Identify/classify which characteristics of life are being demonstrated	SEPS.1: Posing questions (for science) and defining problems (for engineering) SEPS.3: Construct and perform investigations SEPS.4: Analyze and interpret data SPES.6: Construct explanations (for science) and design solutions (for engineering) SEPS.7: Engage in argument from evidence SEPS.8: Obtain, evaluate, and	Lab – scientific method -include creating a graph Quiz – vocabulary of scientific method	Hypothesis Theory Control Variable Independent Variable Dependent Variable Quantitative data Qualitative data Interpretation Observation Asexual reproduction Sexual reproduction

			communicate information		
Cellular Chemistry					
• Biological Molecules – Carbohydrates – Proteins – Lipids – Nucleic Acids	**B.1.1**: Compare and contrast the shape and function of the essential biological macromolecules (i.e. carbohydrates, lipids, proteins, and nucleic acids), as well as, how chemical elements (i.e. carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur) can combine to form these biomolecules.	• Classify biological molecules based on their chemical elements, their building blocks, and their function. • Provide examples and identify dietary sources of carbohydrates, proteins, lipids and nucleic acids		• Lab – Compare macromolecules content of different foods -indicators -McDonalds Menu • Compare and contrast monomers and polymers • Multiple Choice Test	• Organic • Inorganic • Starch • Carbohydrate • Protein • Lipid • Nucleic acid • Polymer • Monomer • Amino acid • Nucleotide • Monosaccharide • Polysaccharide • Saturated fats • Unsaturated fats
• Enzymes • Acid/Base/pH • Metabolism • Homeostasis • Growth and Development • Heredity • Denaturation	**B.1.2:** Analyze how the shape of a molecule determines its role in the many different types of cellular processes (e.g., metabolism, homeostasis, growth and development, and heredity) and understand that the majority of these processes involve proteins that act as enzymes.	• Classify substance as acidic, basic or neutral. • Identify the properties of an enzyme. • Predict the effect of change in concentration of substrate or enzyme on reaction. • Predict the effect of heat and change of pH on proteins.	SEPS.1: Posing questions (for science) and defining problems (for engineering) SEPS.2: Developing and using models and tools SEPS.4: Analyze and interpret data SPES.6: Construct explanations (for science) and	• Lab – characteristics of life: apply characteristics of life to different objects/organisms and justify if they are alive or not • Lab – pH: use pH paper to classify substances as acidic, basic, neutral	• Catalyst • Activation energy • Substrate • Active site • pH • Acid • Base • Denaturing • Metabolism • Homeostasis • Stimulus

		• Describe properties of enzymes. •	design solutions (for engineering)	• Lab/Simulation – enzymes: demonstrate the properties of enzymes, demonstrate effect on reaction when amount of substrate changes and when amount of enzyme changes • List the steps of the lock and key mechanism of action of an enzyme and substrate • Lab – denaturing: predict how heat effects the function of enzymes • SHORT ANSWER: Describe the relationship between an enzyme and its substrate • SHORT ANSWER: Compare the structure of a monosaccharide	

				with a polysaccharide	
CELLULAR STRUCTURE					
• Membrane structure – Cholesterol – Phospholipids – Proteins – Carbohydrates	**B.1.3** Develop and use models that illustrate how a cell membrane regulates the uptake of materials essential for growth and survival while removing or preventing harmful waste materials from accumulating through the processes of active and passive transport.	• Construct and label a model of the cell membrane • Identify the function of each membrane component • Deduce if a cell or its environment is hypertonic, hypotonic, or isotonic • Compare active and passive transport • Classify example of transport as active or passive • Deduce if movement across a membrane is active or passive • Predict the direction molecules will move through a membrane	SEPS.2: Developing and using models and tools	• Lab – membrane model: construct a model of semipermeable membrane • Lab – demonstrate osmosis/diffusion: movement of molecules from a high concentration to a low concentration • Identify components that make up a cell membrane • Predict the direction molecules will move through a membrane • Deduce if movement across the membrane is passive or active	• Phospholipid • Hydrophobic • Hydrophilic • Transport protein • Cholesterol • Passive transport • Active transport • Osmosis • Diffusion • Facilitated diffusion • Endocytosis • Exocytosis • Phagocytosis • Pinocytosis • Hypertonic • Isotonic • Hypotonic
• Essential Cell Parts (Cell membrane, DNA,	**B.1.4** Develop and use models to illustrate how specialized structures within cells (i.e. nuclei,	• Identify organelles and their functions from a diagram and from descriptions	SEPS.2: Developing and using models and tools	• Cell Vocabulary and Diagram quizzes	• Lysosome • Vacuole • Cell wall • Golgi

Ribosomes, Cytoplasm) • Additional Cell organelle	ribosomes, Golgi, endoplasmic reticulum) interact to produce, modify, and transport proteins.	• Compare the structure of animal and plant cells		-Identify parts and their functions from a diagram • Create a model cell and identify cell parts and their jobs • SHORT ANSWER: compare plants and animal cells • SHORT ANSWER: identify structures found in all cells	• Centrioles • Nuclear membrane • ATP • Prokaryote • Eukaryote

CRAWFORDSVILLE COMMUNITY SCHOOL CORPORATION

GRADE LEVEL: 9-10 **SUBJECT: Biology** **DATE: June 2016 REVISED**

BY VEATCH SEPT 2021

GRADING PERIOD: Q3

CONTENT (THE WHAT)	STANDARD INDICATORS	SKILLS (WHAT STUDENTS NEED TO KNOW AND BE ABLE TO DO)	SEPS LTS	ASSESSMENT	VOCABULARY
DNA					
• DNA • RNA • Replication	**B.4.1** Develop and revise a model that clarifies the relationship between DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	• Describe the structure and function of DNA • Define the structure of a nucleotide • Predict DNA sequence when given template strand (base-pairing) • Compare/contrast DNA and RNA • Describe the process of DNA replication • Identify the enzymes necessary and their function	SEPS.2: Developing and using models and tools SEPS.4: Analyze and interpret data SPES.6: Construct explanations (for science) and design solutions (for engineering) SEPS.8: Obtain, evaluate, and communicate information	• Use a T-chart to compare DNA and RNA • Lab – model the structure of DNA • Label key structures of a DNA molecule from a model • Predict complementary DNA sequence given a template • Lab – model DNA replication • Apply the correct enzymes to a model of DNA replication • Explain and predict the results of semiconservative replication	• Nucleotide • DNA • RNA • Nitrogen bases • Antiparallel • Complementary • Hydrogen bonding • Base-pairing • Sugar • Phosphate • Semiconservative • Polymerase • Helicase •
Protein Synthesis					
• Transcription • Translation	**B.4.2** Construct an explanation for how the structure of DNA	•		•	•

	determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.				
	B.4.3 Construct a model to explain that the unique shape and function of each protein is determined by the sequence of its amino acids, and thus is determined by the sequence of the DNA that codes for this protein.	• Describe the process, location and product of transcription • Describe the process, location and product of translation • Compare and contrast transcription and translation • Determine the amino acid sequence from a given sequence of DNA undergone meiosis (and thus crossing over) • List crossing over as a Predict an organism's traits from a given amino acid sequence (using a key)	SPES.6: Construct explanations (for science) and design solutions (for engineering)	• Describe the genetic make-up of parent cells compared to daughter cells produced in meiosis • processes of transcription/translation • Label a model of transcription/translation • Sequence the steps involved in the creation of a protein beginning the DNA message and ending with the amino acid sequence • Decode a DNA sequence into the correct amino acid sequence • Compare and contrast transcription/translation • Given a key, predict traits that are coded for from DNA sequence after converting them to an amino acid sequence	• Transcription • Translation • mRNA • tRNA • rRNA • codon • anticodon • amino acid • polypeptide • Codon • Amino acid • Polypeptide • Protein • Trait
Genetic Variation					
	B.4.5 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic	• Use correct vocabulary to describe an organism's genetic makeup • Compare genotype and phenotype		• Describe how an organism looks given the genotype, or describe the genotype given the phenotype.	• Phenotype • Genotype • Hybrid • Purebred • Heterozygous • Homozygous

	combinations through meiosis, (2) viable errors occurring during replication, and (3) mutations caused by environmental factors.	• Calculate probabilities of genotypes and phenotypes for genetic crosses • Describe offspring that could be produced when given the parents of a genetic cross. • Provide examples for each type of cross		• Matching Vocabulary Quiz • Calculate genotype and phenotype ratios given the genetic make-up of the parents	• Ratio • Probability • Monohybrid • Dihybrid • Sex-linked • Codominant • Incomplete dominance • P, F1, F2 generations
Mitosis					
	B.4.4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	• Identify and describe mitotic phases • Justify the results of mitosis as two cells with identical DNA • Predict the effect of uncontrolled cell division		• Lab – mitosis: model cellular division and its stages • Given a diagram, identify stages of mitosis and structures used in cell division • Given a stage of mitosis, describe what is occurring in the cell and predict what will occur next • Predict the effect of mistakes in mitosis on a cell and on an organism	• Mitosis • Interphase • Prophase • Metaphase • Anaphase • Telophase • Cytokinesis • Centrioles • Spindle fibers • Centromeres • Sister chromatids • Chromosomes
Mutation					•
	B.4.5 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and (3)	• Use correct vocabulary to describe an organism's genetic makeup • Compare genotype and phenotype • Calculate probabilities of genotypes and phenotypes for genetic crosses		• Describe how an organism looks given the genotype, or describe the genotype given the phenotype. • Matching Vocabulary Quiz • Calculate genotype and phenotype ratios given	• Phenotype • Genotype • Hybrid • Purebred • Heterozygous • Homozygous • Ratio • Probability • Monohybrid

	mutations caused by environmental factors.	• Describe offspring that could be produced when given the parents of a genetic cross. • Provide examples for each type of cross		the genetic make-up of the parents	• Dihybrid • Sex-linked • Codominant • Incomplete dominance • Polygenic • P, F1, F2 generations

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GRADING PERIOD: Q3 **VEATCH REVISED Sept 2021**

CONTENT (THE WHAT)	STANDARD INDICATORS	SKILLS (WHAT STUDENTS NEED TO KNOW AND BE ABLE TO DO)	SEPS LTS	ASSESSMENT	VOCABULARY
Inheritance					
• Genetic Variation • Meiosis	**B.4.1** Develop and revise a model that clarifies the relationship between DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. **B.4.5** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and (3) mutations caused by environmental factors.	• Compare the genetic content of a parent cell with the genetic content of a cell that has undergone meiosis (and thus crossing over) • List crossing over as a source of genetic variation • Label stages of meiosis given a model • Predict stages and processes that will come before or after a given stage	**SPES.6:** Construct explanations (for science) and design solutions (for engineering)	• Describe the genetic make-up of parent cells compared to daughter cells produced in meiosis • Match descriptions and diagrams to phases • Describe the genetic make-up of parent cells compared to daughter cells produced in meiosis	• Crossing Over • Interphase • Prophase I • Metaphase I • Anaphase I • Telophase I • Prophase II • Metaphase II • Anaphase II • Telophase II • Cytokinesis • Haploid • Diploid
• Mendel's Laws • Probability • Inheritance Patterns	**B.4.6** Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	• Use correct vocabulary to describe an organism's genetic makeup • Compare genotype and phenotype	**SEPS.5:** Use mathematics and computational thinking	• Describe how an organism looks given the genotype, or describe the genotype given the phenotype. • Vocabulary Quiz	• Phenotype • Genotype • Hybrid • Purebred • Heterozygous • Homozygous

		• Calculate probabilities of genotypes and phenotypes for genetic crosses • Describe offspring that could be produced when given the parents of a genetic cross. • Provide examples for each type of cross		• Calculate genotype and phenotype ratios given the genetic make-up of the parents	• Ratio • Probability • Monohybrid • Dihybrid • Sex-linked • Codominant • Incomplete dominance • Polygenic • P, F1, F2 generations
• **Evolution**					
• Evidence - embryology - fossils - DNA - anatomy - biogeography - artificial selection	**B.5.2** Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence including both anatomical and molecular evidence.	• Describe pieces of evidence that scientists use to support the theory of evolution.	**SPES.6:** Construct explanations (for science) and design solutions (for engineering) **SEPS.7:** Engage in argument from evidence	• Describe pieces of evidence that scientists use to support the theory of evolution.	• Vestigial Structure Homologous Structure
• Microevolution - gene pool - types of selection	**B.5.3** Apply concepts of statistics and probability to support a claim that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	• Examine shifts in numerical distribution of traits • Predict the effect on the gene pool of the future populations	**SEPS.7:** Engage in argument from evidence **SEPS.8:** Obtain, evaluate, and communicate information	• Lab – collect data as "population" numbers change over time. Predict changes in future population's gene pool	• Gene pool
Natural Selection	**B.5.4** Evaluate evidence to explain the role of natural selection as an evolutionary mechanism	• Explain how adaptations improve an organism's fitness.	**SEPS.7:** Engage in argument from evidence	• From a given scenario, determine the properties of natural selection	• Adaptation • Fitness • Variation • Mutation

	that leads to the adaptation of species, and to support claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and/or (3) the extinction of other species.	• Explain how fitness can lead to the increase or decline of a trait in a population. • Explain cause and effect for how changes in the environment affect distribution or disappearance of traits. • Give examples and support with evidence for why an organism is more or less fit. Describe how Darwin's experience in the Galapagos influenced his formation of the theory of natural selection.	**SEPS.8:** Obtain, evaluate, and communicate information	exhibited and predict the change in the population over time. • Lab – adaptations and fitness: collect and graph data and use it to determine which organisms were most fit in an environment • Explain factors that determine organisms' fitness and a population's success. •	•
• Natural selection	**B.5.5** Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those	• Explain the influence each of the four factors has on number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species.	**SPES.6:** Construct explanations (for science) and design solutions (for engineering) **SEPS.7:** Engage in argument from evidence	• Explain the requirements for natural selection. Explain the origin of variation in a population	• Adaptation • Fitness • Variation • Mutation • Natural selection

	organisms that are better able to survive and reproduce in the environment.				
•	**B.5.6** Analyze and interpret data for patterns in the fossil record and molecular data that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.		**SEPS.4:** Analyze and interpret data **SPES.6:** Construct explanations (for science) and design solutions (for engineering)		

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GRADING PERIOD: Q4 **VEATCH Revised Sept 2021**

CONTENT (THE WHAT)	STANDARD INDICATORS	SKILLS (WHAT STUDENTS NEED TO KNOW AND BE ABLE TO DO)	SEPS LTS	ASSESSMENT	VOCABULARY
Taxonomy					
• Classification	**B.5.1** Evaluate anatomical and molecular evidence to provide an explanation of how organisms are classified and named based on their evolutionary relationships into taxonomic categories.	• Compare inclusiveness of levels of classification. • Use correct taxonomic categories to create a scientific name • Compare scientific names and determine which are most closely related • Use a cladogram to compare relatedness of organisms	**SEPS.1:** Posing questions (for science) and defining problems (for engineering) **SEPS.2:** Developing and using models and tools	• Correctly write a scientific name • Use a cladogram to compare the relatedness of organisms • Given different taxonomic categories for different organisms, determine which organisms are most related	• Taxonomy • Scientific name • Domain • Kingdom • Genus • Species • Cladogram • Dichotomous key • Heterotroph • Autotroph
Ecology					
• Photosynthesis	**B.2.1** Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	• Use the equation for photosynthesis to explain the reactants and products in the process. • Describe the origin of the reactants in photosynthesis, and the location of the products.	**SEPS.2:** Developing and using models and tools -Diagrams	Correctly write the equation for photosynthesis	• Photosynthesis • Reactants • Products

• Respiration	**B.2.2** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	• Use the equation for respiration to explain the reactants and products in the process. Describe the relationship between the reactants and products of both photosynthesis and respiration.	**SEPS.2:** Developing and using models and tools -Diagrams	Write the equation for cellular respiration	Respiration
• Nutrient cycles • Food webs	**B.2.3** Use mathematical and/or computational representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	• Calculate the amount of energy transferred from one trophic level to the next. • Describe what happens to the energy that is not transferred, or "lost." • Predict the cause and effect relationship that exists when an organism is added to or removed from a food web. • Construct a food web • Label trophic levels • Apply vocabulary to processes as nutrients move from one location to another.	**SEPS.2:** Developing and using models and tools -Diagrams **SEPS.5:** Use mathematics and computational thinking	• Label diagram of processes in nutrient cycles. • Predict the impact of a change in a given food web. • Compare a food chain and a food web. •	• Trophic level • Primary consumer • Secondary consumer • Tertiary consumer • Quaternary consumer
• Human impact	**B.3.2** Design, evaluate, and refine a model which shows how human	• Describe the cause of the ozone depletion	**SPES.6:** Construct explanations	• Given a scenario, explain how humans are impacting the	

	activities and natural phenomena can change the flow of matter and energy in an ecosystem and how those changes impact the environment and biodiversity of populations in ecosystems of different scales, as well as, how these human impacts can be reduced.	and propose solutions to improve it. • Describe the impact of fertilizers and animal wastes on the nitrogen cycle.	(for science) and design solutions (for engineering) **SEPS.8:** Obtain, evaluate, and communicate information	ecosystem, and/or biodiversity.	