	MCAS Prep Biology
	This course is designed to build the capacity of students who need to successfully complete the MCAS for Biology. This course will provide an intensive review of the common characteristics of all living organisms, basic principles of heredity and evolution, and the interdependent nature of ecosystems. Accommodations will be made to incorporate English language skills and content and academic vocabulary through the sheltered instruction approach
	1 year
	Unit One: The Chemistry of Life
Essential Questions	*What does it mean to be alive?* *What do all living things have in common?*
Standards	1.1 Recognize that biological organisms are composed primarily of very few elements. The six most common are C, H, N, O, P, and S. 1.2 Describe the basic molecular structures and primary functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, nucleic acids). 1.3 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature that have an effect on enzymes.
Concepts and Skills	<table><tr><td> - All living things are composed of one or more cells. - All living things contain six common elements. - Living things use different chemical reactions to get the energy needed for life processes. </td><td>SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size</td></tr></table>

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		CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
		CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
		CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Content Objectives	➢ **Create a working definition of "living."** ➢ Determine whether items are living based on observations. ➢ **Identify and describe the importance of each of the six most common elements (SPONCH).** ➢ **Contrast the four organic molecules in terms of structure and function.** ➢ Collect and analyze data to determine the composition of common foods. ➢ Explain why enzymes are important components within the cell in the human body. ➢ **Describe the functions of enzymes and how they are affected by factors such as temperature and pH.** ➢ **Analyze and interpret data to identify patterns, trends, outliers and potential causes.** ➢ Define and identify the components of a chemical reaction. (reactant, product, catalyst) ➢ Define and locate the active site of an enzyme and explain its relationship to a substrate	
Assessments/ Products/Practices	**Quick Labs/Demonstrations/Projects/Practices:** Inquiry Lab: Is it Alive? Inquiry Lab: Yeast Activity Inquiry Lab: Effect of pH and temperature on Chicken liver SPONCH Project Organic Molecule Menu Project **Extended Labs:** Nutrients in Food Lab	

	Enzymes in Detergents Lab **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. ➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
Texts, Materials, and Resources	Holt Biology Textbook Biologycorner.com Discovery education Explorelearning.com Laying the foundation MCAS question book
	MCAS Prep Biology **1 year** **Unit 2: Cell Biology – Structure, Function, and Classifications**
Essential Questions	*What are cells?* *What is the difference between prokaryotic and eukaryotic cells* *How do cells function?* *How do cells make organisms?*
Standards	2.1 Relate cell parts/organelles to their functions. Explain the role of cell membranes as a highly selective barrier.

	2.2 Compare and contrast, at the cellular level, the general structures and degrees of complexity of prokaryotes and eukaryotes. 2.3 Use cellular evidence (e.g., cell structure, cell number, cell reproduction) and modes of nutrition to describe the six kingdoms (Archaebacteria, Eubacteria, Protista, Fungi, Plantae, Animalia).	
Concepts and Skills	➢ A cell's shape reflects the cell's function. ➢ Because of their complex organization, eukaryotic cells can carry out more specialized functions than prokaryotic cells. ➢ The cell membrane maintains homeostasis by controlling the movement of substances across the membrane. ➢ Substances enter and leave the cell through passive transport, osmosis, and diffusion.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Content Objectives	➢ Use scientific tools properly to conduct lab investigations in Ch. 7 & 8. ➢ **Describe the major structures of a cell and their functions.** ➢ Utilize a compound light microscope to observe plant and animal cells. ➢ **Distinguish between plant, animal and bacterial cells.** ➢ **Describe the structure, composition and function of the cell membrane.** ➢ Explain the importance of cell transport to survival. ➢ **Describe the processes of osmosis and diffusion.** ➢ Collect and analyze data related to osmosis. ➢ **Contrast active and passive transport.** ➢ **Develop a model to classify cells as prokaryotic or eukaryotic based on their characteristics.** ➢ **Explain how organisms are placed in the appropriate kingdom based on cellular evidence and mode of nutrition.**
Assessments/ Products/Practices	**Quick Labs/Demonstrations/Practices:** Osmosis Quick Lab Inquiry Lab: Salty Cells Demo: Cell membrane (cut and paste) Demo: Diffusion **Extended Labs:** Using a Microscope Lab Human Cheek Cell Lab Plant Cell and Animal Cell lab-online simulation Osmosis Egg lab **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations.

	➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
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	MCAS Prep Biology **1 year** **Unit 3: Cell Biology – Photosynthesis and Respiration**
Essential Questions	*What are the differences between photosynthesis and cellular respiration?* *How do organisms obtain energy at a cellular level?*
Standards	2.4 Identify the reactants, products, and basic purposes of photosynthesis and cellular respiration in the cells of photosynthetic organisms 2.5 Explain the important role that ATP serves in metabolism.
Concepts and Skills	➢ Organisms' use and store energy in chemical bonds of organic compounds. ➢ In plants, light energy is harvested by pigments located in the thylakoid membrane of chloroplasts. ➢ Cellular respiration is the process used by humans and most other organisms to release the energy stored in the food they consume.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

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Content Objectives	➢ Use scientific tools properly to conduct lab investigations in Ch. 9 ➢ **Write out the photosynthesis reaction using words or chemical symbols.** ➢ Identify the organelles required for photosynthesis. ➢ **Write out the respiration reaction using words or chemical symbols.** ➢ Identify the organelles required for cellular respiration. ➢ **Contrast photosynthesis and respiration in terms of reactants and products.** ➢ Use scientific tools to observe the products of photosynthesis and respiration. ➢ Explain how photosynthesis and cell respiration are interrelated. ➢ Describe the role of ATP in metabolism. ➢ Explain the formation of ATP during Photosynthesis and the utilization of ATP during Cellular Respiration. ➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes. ➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
Assessments/ Products/Practic	**Suggested Lessons/Labs/Projects/Practices:**

es	Quick Lab: Inferring Leaf Function Products of Photosynthesis Quick Lab Photosynthesis and Cellular Respiration Children's book project. **Extended Labs:** Photosynthesis and Cellular Respiration Lab (Online simulation) **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. ➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
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	MCAS Prep Biology **1 year** **Unit 4: Cell Biology – Reproduction**

Essential Questions	*How can heredity be explained?*
Standards	2.6 Describe the cell cycle and the process of mitosis. Explain the role of mitosis in the formation of new cells, and its importance in maintaining chromosome number during asexual reproduction

2.7 Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in sexual reproduction, and how gametes form diploid zygotes in the process of fertilization.

2.8 Compare and contrast a virus and a cell in terms of genetic material and reproduction

4.6 Recognize that the sexual reproductive system allows organisms to produce offspring that receive half of their genetic information from their mother and half from their father, and that sexually produced offspring resemble, but are not identical to, either of their parents. |
| **Concepts and Skills** | <table><tr><td>All newly formed cells require DNA, so before a cell divides, a copy of its own DNA is made for each daughter cell. Mitosis is a continuous process that can be observed in four stages: prophase, metaphase, anaphase, telophase. In sexual reproduction, two parents give genetic material to produce offspring that are genetically different from their parents. Mitosis produces cells that are used during growth, development, repair, and asexual reproduction. Meiosis makes cells that enable an organism to reproduce sexually and it only happens in reproductive structures.</td><td>SIS1. Make observations, raise questions, and formulate hypotheses.
SIS2. Design and conduct scientific investigations.
SIS3. Analyze and interpret results of scientific investigations.
SIS4. Communicate and apply the results of scientific investigations.
Common Core Reading Standards

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| **Content Objectives** | ➢ **Describe the steps in the cell cycle.**
➢ **Explain the purpose and products of mitosis.**
➢ **Give examples of diploid and haploid cells.**
➢ Contrast sexual and asexual reproduction.
➢ Explain the importance of maintaining chromosome number in mitosis.
➢ Construct a karyotype showing the chromosomes of a healthy individual.
➢ **Explain the purpose and products of meiosis**.
➢ Develop a model that shows the various phases of meiosis.
➢ **Contrast mitosis and meiosis.**
➢ Explain how fertilization results in a diploid zygote.
➢ **Contrast cells with viruses.**
➢ Construct a model of a virus.
➢ **Explain how viral reproduction differs from cell reproduction.**
➢ Explain how males and females produce gametes.
➢ Explain why offspring appearance is not exactly like their mother or father.
➢ Produce scientific and/or technical writing and/or oral presentations that communicate scientific ideas.
➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes. |
| **Assessments/ Products/Practices** | **Suggested Lessons/Labs/Practices:**

Extended Labs:

Mitosis in Plant Cells Lab
Mitosis in Plant/Animal Cells Lab
Gametes Inquiry Lab |

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	MCAS Prep Biology **1 year** **Unit 5: Genetics - DNA**
Essential Questions	*What is genetic material composed of?* *How is information organized in a DNA molecule?* *How does DNA make a copy of itself?* *What is the role of DNA mutation in the diversity of life on earth?*
Standards	3.1 Describe the basic structure (double helix, sugar/phosphate backbone, linked by complementary nucleotide pairs) of DNA, and describe its function in genetic inheritance. 3.2 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic processes of

	transcription and translation, and how they result in the expression of genes. Distinguish among the end products of replication, transcription, and translation.
	3.3 Explain how mutations in the DNA sequence of a gene may or may not result in phenotypic change in an organism. Explain how mutations in gametes may result in phenotypic changes in offspring.
Concepts and Skills	<table><tr><td> - DNA is the primary material that causes recognizable, inheritable characteristics in related groups of organisms. - A DNA molecule is shaped like a spiral staircase and is composed of two parallel strands of linked subunits. - The information in DNA is contained in the order of bases, while the base-pairing structure allows the information to be copied. - In DNA replication, the DNA molecule unwinds, and the two sides split. Then, new bases are added to each side until two identical sequences result. - Gene expression produces proteins by transcription and translation. This process takes place in two stages, both of which involve RNA. - For the most part, genetic differences among organisms originate as some kind of mutation. - Genotype determines phenotype. - Modern genetics is based on Mendel's explanations for the patterns of heredity that he studied in garden pea plants. - A Punnett square shows all of the genotypes that could result from a given Punnett cross. </td><td>SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.</td></tr></table>

Content Objectives	➢ Use scientific tools properly to conduct lab investigations in Ch. 13 & 14
	➢ **Describe the structure and function of DNA.**
	➢ Construct a model of DNA.
	➢ **Explain the base pairing rules for DNA.**
	➢ Use Chargaff's rule to predict the amount of a particular nucleotide.
	➢ Describe how the structure of DNA was discovered.
	➢ **Describe the steps involved in Mendel's experiments on garden peas.**
	➢ **Distinguish between dominant and recessive traits.**
	➢ Use a Punnett Square to determine the probability for genotype and phenotype combinations in monohybrid crosses.
	➢ Extract DNA from strawberries.
	➢ **Show how pedigree analysis can be used to illustrate the inheritance of traits.**
	➢ **Describe the process of DNA replication.**
	➢ **Contrast transcription and translation in terms of location, necessary helper molecules, and products.**
	➢ Translate a segment of mRNA from keratin into amino acids.
	➢ Explain the importance of replication, transcription, or translation in terms of our inherited traits.
	➢ **Describe the possible consequences of a mutation.**
	➢ Explain the role of mutations in the evolution of life.
	➢ Use DNA fingerprints to identify a suspect in a criminal casw
	➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
	➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes.
Assessments/ Products/Practices	**Suggested Lessons, Labs, Projects/Practices:**
	Extended Lab:
	DNA Extraction Lab
	Web-based Activities:
	DNA, RNA, and Gene Expression Virtual Lab (my.hrw.com)
	Genes in Action (my.hrw.com)
	Gene Technologies (my.hrw.com)
	Create a DNA Fingerprint at PBS Teachers' Domain
	Putting DNA to Work includes several interactive activities at the Koshland Science Museum website.
	How do cells make proteins? at PBS Teachers' Domain.

	Gene Cloning at PBS Teachers' Domain Website: Genetic Science Learning Center – educational website at the University of Utah Genetic Science Learning Center DNA model project Make a baby project
Texts, Materials, and Resources	Holt Biology textbook Biologycorner.com Discovery education Explorelearning.com Laying the foundation MCAS question book
	MCAS Prep Biology **1 year** **Unit 6: Evolution and Biodiversity**
Essential Questions	*Why is evolutionary theory associated with Charles Darwin?* *How does genetic variation originate?*
Standards	5.1 Explain how evolution is demonstrated by evidence from the fossil record, comparative anatomy, genetics, molecular biology, and examples of natural selection. 5.3 Explain how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity within a population. 5.2 Describe species as reproductively distinct groups of organisms. Recognize that species are further classified into a hierarchical taxonomic system (kingdom, phylum, class, order, family, genus, species) based on morphological, behavioral, and molecular similarities. Describe the role that geographic isolation can play in speciation.
Concepts and Skills	➢ Modern evolutionary theory began when Darwin presented evidence that evolution happens and offered an explanation of how evolution happens. ➢ Darwin's theory of evolution by natural selection predicts that over time, the number of individuals that carry advantageous traits will increase in a population.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a

	- Microevolution can be studied by observing changes in the numbers and types of alleles in populations. - Speciation has occurred when the net effects of evolutionary forces result in a population that has unique features and is reproductively isolated.	complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Content Objectives	- Use scientific tools properly to conduct lab investigations in Ch. 16, 17, 18 - Define evolution **Explain Darwin's two major theories** **Describe the difference between homologous, analogous, and vestigial structures.** **Summarize Darwin's finches.** - Explain how fossils provide evidence for evolution. - Collect and analyze data related to limb structure in related organisms. **Explain how anatomy, genetics, and molecular biology can be used to determine relatedness between organisms.** - Analyze amino acid sequences to determine relatedness between species.	

	➢ **Give examples of natural selection that provide evidence for evolution.** ➢ Model natural selection and collect data on genetic variations. ➢ Explain how evolution affects genetic diversity. ➢ Explain how scientists determine that two organisms are the same or different species. ➢ Develop a model (classification system) based on shared characteristics. ➢ Use a dichotomous key to classify organisms. ➢ **Construct a model (cladogram) that shows how species are related.** ➢ Explain how organisms are assigned to their classification groupings. ➢ Describe with detail/evidence how new species form. ➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes.
Assessments/ Products/Practices	**Suggested Lessons, Labs, Practices:** **Quick Labs:** Limb Structure Quick Lab Natural Selection Quick Lab Random Sampling Lab Classification Systems Lab Cladogram Construction Lab **Extended Labs:** Insect Camouflage Lab Amino Acid Analysis Lab Dichotomous Keys Lab Beak Lab **Web-based Activities:** Evolution and Natural Selection Population Genetics Virtual Lab Classification Virtual Lab (my.hrw.com) Darwin's Diary at PBS Teachers' Domain. Riddle of the Bones at PBS Teachers' Domain. Discover with Darwin at Scholastic.com includes several interactives involving the Galapagos Islands. Evolution Library at PBS Teachers' Domain.

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	MCAS Prep Biology **1 year** **Unit 7: Ecology and Biodiversity**
Essential Questions	*Why is it important to study populations?* *How do predator-prey interaction influence both predators and prey?*
Standards	6.1 Explain how birth, death, immigration, and emigration influence population size. 6.2 Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive, non-native species. 6.3 Describe how relationships among organisms (predation, parasitism, competition, commensalism, and mutualism) add to the complexity of biological

	communities.	
Concepts and Skills	➢ Understanding population growth is important because populations of different species interact and affect one another, including human populations. ➢ Species that involve predator-prey or parasite-host relationships often develop adaptations in response to one another. ➢ Competition for resources between species shapes a species' fundamental niche.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Content Objectives	➢ Use scientific tools properly to conduct lab investigations in Ch. 5 ➢ **Explain how populations are affected by immigration and emigration.**	

	Analyze graphs showing birthrate and death rate. **Explain the difference between population size, density, and dispersion.** - Create graphs showing population changes. - Contrast exponential and logistic growth. - Construct a model of population growth (using beans). **Explain the importance of a population's age.** **Explain why populations reach carrying capacity**. **List reasons why small populations are more vulnerable to extinction.** - Use a compound light microscope to collect and analyze data related to population changes in yeast. - Analyze population changes that result from natural causes, climate change, and human interference. - Give examples of symbioses/coevolution. - Use a stereomicroscope to collect and analyze data related to populations coexisting in a pine cone. **Classify relationships as predation, parasitism, mutualism, or commensalism**. - Analyze and interpret data to identify patterns, trends, outliers and potential causes.
Assessments/ Products/Practices	Quick Labs/Demonstrations/Practices: Population Growth Quick Lab Population Size Inquiry Lab Extended Lab: Yeast Population Lab Pine Cone Lab **Notebooks:** **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of

	planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
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	MCAS Prep Biology **1 year** **Unit 8: Ecology – Ecosystems and the Environment**
Essential Questions	*What is an ecosystem?* *How does an ecosystem respond to change?* *What are human impacts on ecosystems and how should we respond?*
Standards	6.3 Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels. 6.4 Explain how water, carbon, and nitrogen cycle between abiotic resources and organic matter in an ecosystem, and how oxygen cycles through photosynthesis and respiration.
Concepts and Skills	➢ An ecosystem is a community of organisms and their abiotic environment. ➢ In an ecosystem, energy flows from the sun to producers to consumers to decomposers. ➢ Energy is stored at each link in a food web, but some energy that is used dissipates as heat into the environment but is not recycled.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are

appropriate to task, purpose, and audience.

Common Core Math Standards

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CCSS.Math.Content.7.SP.C.6 approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.

CCSS.Math.Content.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Content Objectives	➢ Use scientific tools properly to conduct lab investigations in Ch. 4 & 6
	➢ **Determine relationships between organisms using a food web**
	➢ Construct a model (food web) based on relationships in an ecosystem.
	➢ Utilize dissection tools correctly to collect and analyze data related to feeding relationships (owl pellet.)
	➢ **Classify organisms by trophic level.**
	➢ **Identify the different levels and members of a food chain including; producer, consumer, herbivore, omnivore, carnivore, detrivore, decomposer**.
	➢ Construct a model (energy pyramid) that classifies organisms by trophic level.
	➢ Explain how the 10% rule is applied to calculate energy transferred by living things.
	➢ **Contrast biotic and abiotic factors**.
	➢ Use field guides to collect and analyze data related to biotic and abiotic factors in an ecosystem.
	➢ **Detail the differences between the major biomes.**
	➢ **Explain how water, carbon, and nitrogen cycle through ecosystems**.
	➢ Demonstrate the production of carbon dioxide by humans utilizing a chemical indicator
	➢ **Explain how humans impact ecosystems through erosion, deforestation, and pollution.**
	➢ Creates a model Demonstrating the greenhouse effect by using scientific tools (thermometers and glassware)
	➢ Use trays, soil, and water to create a model that demonstrates the process of erosion.

	➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes. ➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
Assessments/ Products/Practices	**Suggested Lessons/Labs/Projects/Practices:** Quick Labs: Soil Erosion Quick Lab Carbon Cycle Quick Lab Greenhouse Effect Inquiry Lab Extended Lab: Owl Pellets Lab Biotic Factors Lab **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. ➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
Texts, Materials, and Resources	*Holt Biology textbook* Biologycorner.com Discovery education Explorelearning.com Laying the foundation

	MCAS question book
	MCAS Prep Biology **1 year** **Unit 9: Anatomy and Physiology – Digestion and Transport**
Essential Questions	*What does the cardiovascular system do?* *What is the path that air takes from the environment to the lungs?* *How do our bodies use energy from food?*
Standards	4.1Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth. 4.3 Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbon dioxide. 4.2 Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from blood.
Concepts and Skills	<table><tr><td> - Your body needs energy to breathe, pump blood, and grow. - The digestive system takes in food, breaks it down into molecules that the body can use, and gets rid of undigested molecules and waste. - The cardiovascular system carries nutrients, oxygen, hormones, and wastes throughout the body and distributes heat to maintain homeostasis. - The respiratory system includes air entering nasal passages, flowing through the pharynx, the larynx, the trachea, the bronchial tubes, and finally the bronchioles into the alveoli of the lungs. </td><td>SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards** CCSS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with</td></tr></table>

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Content Objectives	➢ **List and describe the four types of tissues that make up the human body.** ➢ **Explain how food travels from the mouth to the anus.** ➢ Contrast the processes of chemical and mechanical digestion and identify the organs that perform them. ➢ Identify the three macromolecules found in food and the building blocks that compose them. ➢ Analyze a nutrition label to determine fat and fiber content. ➢ Design and conduct an investigation collaboratively to determine how the lactase enzyme affects lactose in milk. ➢ Describe the path of oxygen from the mouth and nose to the bloodstream. ➢ Relate bodily respiration to cellular respiration. ➢ **Identify the components of blood and their functions.** ➢ Use baking soda and pH paper to create a model that demonstrates how blood helps to maintain pH. ➢ Describe the path of blood from the heart to the lungs/body and back to the heart. ➢ Collect and analyze data related to pulse rate. ➢ **Contrast veins, arteries, and capillaries.** ➢ Explain the importance of the liver and kidneys. ➢ **Describe the structure and function of the human heart.** ➢ **Describe the functions of the skin.** ➢ **Describe the functions of the lymphatic system.** ➢ **Describe how gases are exchanged in the lungs.** ➢ **Explain the structure and function of the kidneys.** ➢ **List the major organs of the digestive system.** ➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes.

	➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
Assessments/ Products/Practic es	**Suggested Lessons/Labs/Practices:** Quick Labs: Nutrition Facts Quick Lab Blood pH Quick Lab Exercise Pulse Inquiry Lab Extended Labs: Lactose Digestion Inquiry Lab **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. ➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
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	MCAS question book
	MCAS Prep Biology **1 year** **Unit 9: Anatomy and Physiology – Movement and Response**
Essential Questions	*How do humans move and respond to their environment?*
Standards	4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, and motor neurons) mediates communication among different parts of the body and mediates the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works. 4.7 Recognize that communication among cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells produce signals to communicate only with nearby cells. 4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop. 4.5 Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscles, bones, cartilage, ligaments, tendons) works with other systems to support the body and allow for movement. Recognize that bones produce blood cells.
Concepts and Skills	- The central nervous system responds to internal and external information. - Electrical signals in the nervous system are caused by the movement of ions across the cell membrane of neurons. - The endocrine system regulates metabolism; salt, water, and nutrient balance in the blood; controls the body's response to stress; and regulates growth, development, and reproduction. - The five important functions of the skeletal system are support, protection, movement, mineral storage, and blood cell formation. - The human body contains skeletal, smooth, and cardiac muscle. Muscles switch between two processes to produce ATP.	SIS1. Make observations, raise questions, and formulate hypotheses. SIS2. Design and conduct scientific investigations. SIS3. Analyze and interpret results of scientific investigations. SIS4. Communicate and apply the results of scientific investigations. **Common Core Reading Standards** CCRSL.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. CCRSL.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. CCWSL.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **Common Core Math Standards**

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	CCSS.Math.Content.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Content Objectives	➢ **Explain how messages that begin in the brain travel to all the parts of the body.** ➢ Design and conduct an investigation to determine what factors affect reaction time. ➢ Explain how information perceived by the senses travels to the brain. ➢ Identify the parts of a neuron and their functions. ➢ Contrast motor and sensory neurons. ➢ Analyze data related to membrane electronegativity and action potentials. ➢ **Explain the nervous and endocrine systems work together to monitor and react to internal changes.** ➢ Give several examples of homeostasis in the body and how it is achieved. ➢ **Describe the functions of the skeletal system**. ➢ Use vinegar and a chicken bone to demonstrate the importance of calcium for bone strength. ➢ Collect and analyze data related to skeletal joints. ➢ **Describe the importance of bone marrow.** ➢ **Describe a spinal reflex.** ➢ **Describe the structure of a neuron.** ➢ **Contrast smooth, skeletal, and cardiac muscle in terms of structure and function.** ➢ **Explain how muscles, bones, and nerves work together to provide movement.** ➢ Design and conduct an investigation related to muscle fatigue. ➢ **Describe positive and negative feedback loops.** ➢ Analyze and interpret data to identify patterns, trends, outliers and potential causes.

	➢ Summarize complex concepts, found in text, by paraphrasing in simpler but still accurate terms.
Assessments/ Products/Practices	Quick Labs/Demonstrations/Practices: Reflex Quick Lab Action Potential Quick Lab Calcium Quick Lab Skeletal Joints Quick Lab Extended Lab: Reaction Times Lab Touch Receptors Lab Muscle Fatigue Lab **Notebooks:** ➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize). ➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations. ➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim. ➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?
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