Dennis-Yarmouth Regional School District
Science Scope and Sequence
Grade 8

Unit Name	Unit Description / Overview	Stage 1: Desired Results Enduring Understandings - Students will understand that...	Essential Questions	Standards
Master Unit 1 - Chemistry	In this unit the focus is on how atoms combine in a multitude of ways to produce pure substances which make up all of the living and nonliving things that we encounter, (b) atoms form molecules and compounds that range in size from two to thousands of atoms, and (c) mixtures are composed of different proportions of pure substances. It also explains that atoms are rearranged during a chemical reaction to form new substances with new properties. And atoms present in the reactants are all present in the products and thus the total number of atoms is conserved. Students will analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	All matter is made of atoms. Matter has physical and chemical properties. Matter undergoes physical and chemical changes. A change in thermal energy results in a change in the state of matter. Matter has physical and chemical properties. Matter undergoes physical and chemical changes. Matter undergoes physical and chemical changes. A change in thermal energy results in a change in the state of matter. Matter is conserved during chemical and physical changes. Food molecules are used by the body Food molecules are changed to form new molecules. Food molecules are used by the cell for growth and energy.	What is matter? What is the difference between a physical and a chemical property? How can matter change? How does energy interact with matter to cause change? What is the difference between a physical and a chemical property? How can matter change? How can matter change? How does energy interact with matter to cause change? How do the number of atoms in a substance compare before and after a chemical change or physical change? How are food molecules used by your body?	8.MS-LS1-7. Use informational text to describe that food molecules, including carbohydrates, proteins, and fats, are broken down and rearranged through chemical reactions forming new molecules that support cell growth and/or release of energy. 8.MS-PS1-1. Develop a model to describe that (a) atoms combine in a multitude of ways to produce pure substances which make up all of the living and nonliving things that we encounter, (b) atoms form molecules and compounds that range in size from two to thousands of atoms, and (c) mixtures are composed of different proportions of pure substances. 8.MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. 8.MS-PS1-4. Develop a model that describes and predicts changes in particle motion, relative spatial arrangement, temperature, and state of a pure substance when thermal energy is added or removed. 8.MS-PS1-5. Use a model to explain that atoms are rearranged during a chemical reaction to form new substances with new properties. Explain that the atoms present in the reactants are all present in the products and thus the total number of atoms is conserved.
Master Unit 2- Forces and Interactions	Forces and Interactions unit with a focus on Newton's 3 Laws.	The role of the mass of an object must be qualitatively accounted for in any change of motion due to the application of a force. When two objects interact, each one exerts a force on the other, and these forces can transfer energy between them.	What is Newton's 3rd Law and how it can be used to solve a problem involving two colliding objects? How are Newton's 3 Laws connected to each other? What is the relationship between force, mass, and the amount of change in motion? What happens to the motion of two objects when they collide? What is the relationship between mass and speed of an object?	8.MS-PS2-1. Develop a model that demonstrates Newtonâs third law involving the motion of two colliding objects. 8.MS-PS2-2. Provide evidence that the change in an objectâs speed depends on the sum of the forces on the object (the net force) and the mass of the object.

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Master Unit 3- Heredity and Evolution	Heredity unit with a focus on genes, chromosomes, reproductive strategies, and evolution.	In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. In sexually reproducing organisms, each parent gives provides half of the genes (at random) to their offspring Each distinct gene controls the making of specific proteins, which then affects the traits of the individual. Genes are located in the chromosomes of cells and that each chromosome pair has two variants of each of many distinct genes. Variations of inherited traits between parent and offspring come from genetic differences from the subset of chromosomes (and therefore genes) inherited. Individuals have two of each chromosome and so two alleles of each gene â one from each parent. These versions may be identical or may differ from each other. All life on earth evolved from a common ancestor that first appeared billions of years ago. Â Variation exists in all species and allows some individuals to be better able to survive in a particular environment than others. Natural selection is the process by which evolution occurs. Long before Darwin and Wallace, farmers and breeders were using the idea of selection to cause major changes in the features of their plants and animals over the course of decades. Farmers and breeders allowed only the plants and animals with desirable characteristics to reproduce, causing the evolution of farm stock.	How does the information on a gene result in a specific trait in an individual? How do mutations affect traits? Why are offspring not identical to their parents? How can one chromosome result in the development of two possible traits? How can two parents have many offspring that all have different traits. How does genetic variation among organisms affect survival and reproduction? How does the environment influence populations of organisms over multiple generations? What is meant by evolution? Are certain lines of evidence for evolution stronger than others? How do genetic mutations and recombination of genes during meiosis enable evolution to occur? What ties all current life on Earth to single-celled organisms that evolved billions of years ago?	8.MS-LS3-1. Develop and use a model to describe that structural changes to genes (mutations) may or may not result in changes to proteins, and if there are changes to proteins there may be harmful, beneficial, or neutral changes to traits. 8.MS-LS3-2. Construct an argument based on evidence for how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. Compare and contrast advantages and disadvantages of asexual and sexual reproduction. 8.MS-LS3-3(MA). Communicate through writing and in diagrams that chromosomes contain many distinct genes and that each gene holds the instructions for the production of specific proteins, which in turn affects the traits of an individual. 8.MS-LS3-4(MA). Develop and use a model to show that sexually reproducing organisms have two of each chromosome in their nucleus, and hence two variants (alleles) of each gene that can be the same or different from each other, with one random assortment of each chromosome passed down to offspring from both parents. 8.MS-LS4-4. Use a model to describe the process of natural selection, in which genetic variations of some traits in a population increase some individualsâ likelihood of surviving and reproducing in a changing environment. Provide evidence that natural selection occurs over many generations. 8.MS-LS4-5. Synthesize and communicate information about artificial selection, or the ways in which humans have changed the inheritance of desired traits in organisms.
Master Unit 4 - Earth and Space	Earth and Space focuses on seasons, tides, orbits as well as Earth's climate.	Earth's tilt on its axis produces seasons on Earth. Gravity keeps the objects in the Solar System in orbit around the Sun. Gravity of the Earth's moon and the Sun produce the Earth's oceans' tides.	What causes the seasons on Earth? Role of gravity in the Earth's oceans' tides? What is the role of gravity in the motions of objects in the solar system?	8.MS-ESS1-1b. Develop and use a model of the Earth-sun system to explain the cyclical pattern of seasons, which includes the Earthâ tilt and differential intensity of sunlight on different areas of Earth across the year. 8.MS-ESS1-2. Explain the role of gravity in ocean tides, the orbital motions of planets, their moons, and asteroids in the solar system.
Master Unit 5- Earth Systems-Plate Tectonics	Earth Systems unit focuses on Earth's interior and the cycling of Earth's crust including the generation of new crust and recycling of old.	All Earth processes are the result of energy flowing and matter cycling within and among Earth' systems. Earth' plates have moved great distances, collided, and spread apart to shape Earth. Rocks change over time, and these changes are described in the rock cycle. Factors like temperature and pressure influence changes in the weather, causing regional variations. The ocean, ocean currents, and wind patterns play an important roll in the regulation of regional climates.	How do the materials in and on Earth's crust change over time? How does the movement of tectonic plates impact the surface of Earth? What are the complex factors' that create weather? How do the motions and interactions of air masses affect changes in weather conditions? How do the unequal heating and rotation of the Earth determine regional climates? What is the relationship between the complex interactions of air masses and changes in weather conditions? What are the major factors that determine regional climates? What are the complex factors' that create weather? What are the processes involved in the cycling of water through Earth' systems?	8.MS-ESS2-1. Use a model to illustrate that energy from the Earthâ interior drives convection which cycles Earthâ crust leading to melting, crystallization, weathering, and deformation of large rock formations, including generation of ocean sea floor at ridges, submergence of ocean sea floor at trenches, mountain building, and active volcanic chains. 8.MS-ESS2-5. Interpret basic weather data to identify patterns in air mass interactions and the relationship of those patterns to local weather. 8.MS-ESS2-6. Describe how interactions involving the ocean affect weather and climate on a regional scale, including the influence of the ocean temperature as mediated by energy input from the sun and energy loss due to evaporation or redistribution via ocean currents.

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Master Unit 6 - Earth Systems - Weather	This unit deals with interpreting basic weather data to identify patterns in air mass interactions and the relationship of those patterns to local weather. This unit also deals with how interactions involving the ocean affect weather on a regional scale, including the influence of the ocean temperature as mediated by energy input from the Sun and energy loss due to evaporation or redistribution via ocean currents.	Solar energy powers the hydrologic cycle. The Corriolis Effect and uneven heating of Earth's surface drives weather patterns. Ocean cooling and heating affect regional climate conditions.	How do the motions and interactions of air masses affect changes in weather conditions? How do water and solar energy interact to influence weather? How does the uneven heating of Earth's surface and Earth's rotation cause oceanic and atmospheric circulation?	8.MS-ESS2-5. Interpret basic weather data to identify patterns in air mass interactions and the relationship of those patterns to local weather. 8.MS-ESS2-6. Describe how interactions involving the ocean affect weather and climate on a regional scale, including the influence of the ocean temperature as mediated by energy input from the sun and energy loss due to evaporation or redistribution via ocean currents.
Master Unit 7 - Earth and Human Activity	Earth and the Affects of Human Activity	Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. Resources are distributed unevenly around the planet as a result of past geologic processes. Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.	How do Earth's resources provide humans with the things they need to live? Which of Earth's resources have become limited because of the actions of humans? How are Earth's resources distributed around the planet unevenly? What factors interact and influence weather and climate? How have humand actions affected the biosphere? How does growing human population affect the Earth's resources? In what ways have humans begun to try to protect Earth's resources? In what ways have humans begun to address our effect on climate change? How have these factors led to climate change?	8.MS-ESS3-1. Analyze and interpret data to explain that the Earthâs mineral and fossil fuel resources are unevenly distributed as a result of geologic processes. 8.MS-ESS3-5. Examine and interpret data to describe the role that human activities have played in causing the rise in global temperatures over the past century.