Dennis-Yarmouth Regional School District
Science Scope and Sequence
Grade 7

Unit Name	Unit Description / Overview	Stage 1: Desired Results Enduring Understandings - Students will understand that...	Essential Questions	Standards
Master Unit 1 Growth and Development of Organisms	This unit students explore the relationships that exist between animals. Some are mutually beneficially while others can cause harm. Students create food webs and learn matter and energy are transferred among living and nonliving parts of an ecosystem. Students will explain that both matter and energy are conserved through these processes. Then students research how animal behaviors and specialized plant structures increase the probability of successful reproduction of animals and plants. Students will understand that biodiversity is important to have a healthy ecosystem. Students learn that each niche's population can be controlled by carrying capacities as well as things that disrupt (natural or human-made) an ecosystem and can lead to shifts in all its populations.	Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. Animals engage in characteristic behaviors that increase the odds of reproduction. Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features (such as attractively colored flowers) for reproduction. Plant growth can continue throughout the plant's life through production of plant matter in photosynthesis. Genetic factors as well as local conditions affect the size of the adult plant. The growth of an animal is controlled by genetic factors, food intake, and interactions with other organisms, and each species has a typical adult size range. Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving factors. Growth of organisms and population increases are limited by access to resources in any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of	What characteristics do plants and animals have to increase reproduction?	7.MS-LS1-4. Construct an explanation based on evidence for how characteristic animal behaviors and specialized plant structures increase the probability of successful reproduction of animals and plants.

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Master Unit 2 Interdependent Relationships in Ecosystems	This unit students explore the relationships that exist between animals. Students create food webs and learn matter and energy are transferred among living and nonliving parts of an ecosystem. Students will explain that both matter and energy are conserved through these processes. Then students research how animal behaviors and specialized plant structures increase the probability of successful reproduction of animals and plants. Students will understand that biodiversity is important to have a healthy ecosystem. Students learn that each niche's population can be controlled by carrying capacities as well as things that disrupt (natural or human-made) an ecosystem and can lead to shifts in all its populations.	Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. Animals engage in characteristic behaviors that increase the odds of reproduction. Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features (such as attractively colored flowers) for reproduction. Plant growth can continue throughout the plant's life through production of plant matter in photosynthesis. Genetic factors as well as local conditions affect the size of the adult plant. The growth of an animal is controlled by genetic factors, food intake, and interactions with other organisms, and each species has a typical adult size range. Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving factors. Growth of organisms and population increases are limited by access to resources in any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of	What factors can influence an organism's survival in an ecosystem? What are some limited resources that can affect an organism's growth or population increase? How can competitive, predatory, and mutually beneficial relationships affect organisms? What do food webs demonstrate? How do disruptions to components of ecosystems affect populations? How can changes in biodiversity influence humans?	7.MS-ETS1-2. Evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Use a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution. 7.MS-LS2-1. Analyze and interpret data to provide evidence for the effects of periods of abundant and scarce resources on the growth of organisms and the size of populations in an ecosystem. 7.MS-LS2-2. Describe how relationships among and between organisms in an ecosystem can be competitive, predatory, parasitic, and mutually beneficial and that these interactions are found across multiple ecosystems. 7.MS-LS2-3. Develop a model to describe that matter and energy cycle among living and nonliving parts of an ecosystem and that both matter and energy are conserved through these processes. 7.MS-LS2-4. Analyze data to provide evidence that disruptions (natural or human-made) to any physical or biological component of an ecosystem can lead to shifts in all its populations. 7.MS-LS2-5. Evaluate competing design solutions for protecting an ecosystem. Discuss benefits and limitations of each design. 7.MS-LS2-6(MA). Explain how changes to the biodiversity of an ecosystem the variety of species found in the ecosystem may limit the availability of resources humans use.
Master Unit 3 Earth's Systems and Natural Hazards	Students will explore how glaciers, tectonic plates, earthquakes, tsunamis to explain how Earth's surface has changed over scales that range from local to global in size. Students also investigate how data from past geologic events are analyzed for patterns and used to forecast the location and likelihood of future catastrophic events Students will learn how the Earth's water cycle can change the Earth's surface over time. Students will develop a model to explain how the energy of the Sun and Earth's gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earth's hydrosphere.	Earth's processes can occur slowly or quickly and can range from microscopic to global. Water can cause weathering and erosion and shapes the land. Mapping the history of natural hazards in a region can help forecast the locations and likelihoods of future events.	Do Earth's processes occur quickly or slowly? How does water change the land? How can scientists predict the likelihood of natural hazards?	7.MS-ESS2-2. Construct an explanation based on evidence for how Earth's surface has changed over scales that range from local to global in size. 7.MS-ESS3-2. Obtain and communicate information on how data from past geologic events are analyzed for patterns and used to forecast the location and likelihood of future catastrophic events.

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Master Unit 4 The Water Cycle	Students will explore how glaciers, tectonic plates, earthquakes, tsunamis to explain how Earth's surface has changed over scales that range from local to global in size. Students also investigate how data from past geologic events are analyzed for patterns and used to forecast the location and likelihood of future catastrophic events Students will learn how the Earth's water cycle can change the Earth's surface over time. Students will develop a model to explain how the energy of the Sun and Earth's gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earth's hydrosphere.	Water cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, crystallization, and precipitation, as well as downhill flows on land. The Sun's energy and the force of gravity drive the global movement of water.	How is water moved around Earth? How does the Sun affect the water cycle? How does gravity affect the water cycle?	7.MS-ESS2-4. Develop a model to explain how the energy of the sun and Earth's gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earth's hydrosphere.
Master Unit 5 Human Impacts on Earth	Students will studying how human activity impacts the environment and technology that can mitigate these impacts. Students will help produce a documentary about coral bleaching as a result of human-caused climate change. They will study the effects of the changing climate on Earth's oceans and of the potential consequences.	Humans can alter Earth in both positive and negative ways. Humans can reduce the impact of human activity on the environment in many different ways.	What are some positive and negative ways that humans alter the environment? What are some solutions to the negative impact of humans on the environment?	7.MS-ESS3-4. Construct an argument supported by evidence that human activities and technologies can to mitigate the impact of increases in human population and per capita consumption of natural resources on the environment.
Master Unit 6 Forces at a Distance	In this Unit, students explore magnets and magnetic fields. They will learn a magnetic field's strength can be increased and decreased depending on distance. Students will investigate the force of electricity. They will use scientific evidence from classroom labs describe the effect of distance and magnitude of electric charge on the strength of electric forces. They also discover that fields exist between objects with mass, between magnetic objects, and between electrically charged objects that exert force on each other even though the objects are not in contact.	To change an object's motion, either the forces on the object and/or the mass of the object must change. Fields exist between objects and exert forces on each other even when the objects are not touching. Electric, magnetic, and gravitational forces all act at a distance between objects.	What is a force? How do forces change an object's motion? What types of forces exist in our world? How can forces impact objects without directly touching them?	7.MS-PS2-3. Analyze data to describe the effect of distance and magnitude of electric charge on the strength of electric forces. 7.MS-PS2-5. Use scientific evidence to argue that fields exist between objects with mass, between magnetic objects, and between electrically charged objects that exert force on each other even though the objects are not in contact.
Master Unit 7 Potential and Kinetic Energy	Grade 7 students continue to build on their knowledge from prior grades on how energy is transferred and conserved. Students explore the types of energy through labs and interactive activities. Students build Rube Goldberg machines to prove the Theory of Conservation of Energy Students are challenged with building roller coasters to show their knowledge of the relationship between potential and kinetic energy.	Kinetic energy is motion energy, and potential energy is stored energy. Kinetic energy depends on the mass and speed of an object. Potential energy depends on the mass and height of an object. At each point in a system, the kinetic energy and potential energy add up to the same value.	What is the difference between kinetic and potential energy? What does kinetic energy depend upon? What does potential energy depend upon?	7.MS-PS3-1. Construct and interpret data and graphs to describe the relationships among kinetic energy, mass, and speed of an object. 7.MS-PS3-2. Develop a model to describe the relationship between the relative position of objects interacting at a distance and their relative potential energy in the system. 7.MS-PS3-5. Present evidence to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. 7.MS-PS3-7(MA). Use informational text to describe the relationship between kinetic and potential energy and illustrate conversions from one form to another.

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Master Unit 8 Energy Transfer in Temperature	In this unit students will be able to explain how thermal energy is transferred by conduction,. convection, and radiation. Students will see how these forms of heat transfer can affect weather, animal populations, and plate tectonics. Students will explore what makes some materials conductors and others insulators. They will put their knowledge into action building a thermal house or a thermos that will be built to retain heat and minimize thermal transfer.	Temperature is a measurement of molecular movement. Heat can be measured on three scales; Fahrenheit, Celsius, and Kelvin. Heat always moves from an area of high thermal energy to low thermal energy. Heat can move in three ways. Convection is heat moving in a cycle driven by the density. Radiation is heat traveling within a fluid. Conduction is heat moving through touch. Insulators stop heat from transferring. Conductors transfer heat easily. Metals are good conductors.	What is the relationship between temperature and thermal energy? Does energy transfer from hot to cold or cold to hot? What is the difference between conduction, convection, and radiation? What factors affect the amount of energy transfer needed to change the temperature of matter?	7.MS-ETS1-4. Generate and analyze data from iterative testing and modification of a proposed object, tool, or process to optimize the object, tool, or process for its intended purpose. 7.MS-ETS1-7(MA). Construct a prototype of a solution to a given design problem. 7.MS-PS3-3. Apply scientific principles of energy and heat transfer to design, construct, and test a device to minimize or maximize thermal energy transfer. 7.MS-PS3-4. Conduct an investigation to determine the relationships among the energy transferred, how well the type of matter retains or radiates heat, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. 7.MS-PS3-6(MA). Use a model to explain how thermal energy is transferred out of hotter regions or objects and into colder ones by convection, conduction, and radiation.
Master Unit 9 System Design	This unit begins by students understand how information can be encoded and then also decoded. Students create their own formula to encode information. Then the focus is on transportation subsystems and how these systems work together to move people and goods using a variety of vehicles and devices. Student build model bridges to show how the components of a structural system work together to serve a structural function. Students learn the forces that can exist on these structures and how engineering can minimize their effect. Lastly, evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Students use a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution.	The Engineering Design Process is a method that is used to solve technological challenges to change and improve products for the way we live. The engineering design process is how creative ideas are turned into inventions and innovations. The engineering design process is how engineers solve problems. Communication and collaboration is essential to efficient and effective problem solving. Appropriate selection and purpose of various communication systems?	What are the components of a structural, transportation, or communication system? How do these components interact to make up the system as a whole? What are the inputs, processes, outputs, and feedback of the system? How can you model the system to better understand how the system functions?	7.MS-ETS3-1(MA). Explain the function of a communication system and the role of its components, including a source, encoder, transmitter, receiver, decoder, and storage. 7.MS-ETS3-2(MA). Compare the benefits and drawbacks of different communication systems. 7.MS-ETS3-3(MA). Research and communicate information about how transportation systems are designed to move people and goods using a variety of vehicles and devices. Identify and describe subsystems of a transportation vehicle, including structural, propulsion, guidance, suspension, and control subsystems. 7.MS-ETS3-4(MA). Show how the components of a structural system work together to serve a structural function. Provide examples of physical structures and relate their design to their intended use. 7.MS-ETS3-5(MA). Use the concept of systems engineering to model inputs, processes, outputs, and feedback among components of a transportation, structural, or communication system.