



Bedford Public Schools

Grade 5 – Science

As outlined in the 2016 Massachusetts Science and Technology/Engineering Frameworks: “In grade 5, students model, provide evidence to support arguments, and obtain and display data about relationships and interactions among observable components of different systems. By studying systems, grade 5 students learn that objects and organisms do not exist in isolation and that animals, plants, and their environments are connected to, interact with, and are influenced by each other. They study the relationships between Earth and other nearby objects in the solar system and the impact of those relationships on patterns of events as seen from Earth. They learn about the relationship among elements of Earth’s systems through the cycling of water and human practices and processes with Earth’s resources. They also learn about the connections and relationships among plants and animals, and the ecosystems within which they live, to show how matter and energy are cycled through these, building on the theme of grade 4. An ability to describe, analyze, and model connections and relationships of observable components of different systems is key to understanding the natural and designed world.”

Click on the link below to access a copy of the 2016 Massachusetts Elementary and Secondary Science and Technology/Engineering Frameworks.

<http://www.doe.mass.edu/frameworks/scitech/2016-04.pdf>



Learning Expectations

[Life Science](#)

[Physical Science](#)

[Earth Science](#)

[Engineering Design Challenge](#)

Life Science

Enduring Understandings In order to meet the expectations, students will need to understand that...	Essential Questions In order to understand, students will need to consider questions such as...	Knowledge and Skills Learning this material will require students to ...
<ul style="list-style-type: none"> • The sun is the source of energy used for matter and energy to be passed through an ecosystem. • Living things need energy to grow, repair their bodies (or structures), to move, and to carry out life functions. • That food chains and food webs allow energy to flow through an ecosystem. • Decomposers help to complete a food web or chain so that matter and energy can continue to flow through an ecosystem. • An imbalance in an ecosystem could cause great damage to that ecosystem. • Humans can help matter and energy to flow through an ecosystem, and can help the planet have less garbage sitting in landfills, by composting. 	<ul style="list-style-type: none"> • What is the importance of matter and energy? • How do matter and energy move through an ecosystem? 	<ul style="list-style-type: none"> • Reflect on what plants and humans need to survive; Identify that without the sun, neither plants nor animals would be able to produce their own food or get food through consumption of other plants or animals. Identify that food allows plants and animals to carry out life functions, proven through growth. • Identify examples of systems, and observe that if one part of that system is missing, then the system will not function as intended; Explore the impact of invasive species within an ecosystem, as well as what would happen if a piece of the food chain was missing (primary energy source, producers, consumers, decomposers). • Examine and construct food chains and food webs, and recognize that when matter is consumed, the energy from that matter is being passed on to the consumer; • Create or examine composts; compare and contrast hot and cold composting.

Physical Science: Energy and Waves

Enduring Understandings In order to meet the expectations, students will need to understand that...	Essential Questions In order to understand, students will need to consider questions such as...	Knowledge and Skills Learning this material will require students to ...
<ul style="list-style-type: none"> • Why does matter matter? What is matter? • Matter is anything that has mass and takes up space. • Matter is also made up of particles that are too small to be seen. • The properties of matter (color, shape, hardness, magnetism, electrical conductivity, reflectivity, texture, solubility, thermal conductivity) help us to describe materials and determine which materials are best for various needs. • Matter is conserved whether material change state or are mixed. 	<ul style="list-style-type: none"> • Why does matter matter? What is matter? • How can you prove that matter is conserved when materials change state or are mixed? 	<ul style="list-style-type: none"> • Observe objects/materials that represent each state of matter. • Develop a model to prove the true statement: matter is sometimes made up of particles too small to be seen. • Test and observe various objects for the various properties of matter and record results. • Observe changes in states of matter of water/ice/water vapor.

Earth Science: Space and Earth's Spheres

Enduring Understandings In order to meet the expectations, students will need to understand that...	Essential Questions In order to understand, students will need to consider questions such as...	Knowledge and Skills Learning this material will require students to ...
<ul style="list-style-type: none"> • The sun is a star, appearing larger and brighter than other stars even though it is a medium-sized star. • Earth's gravitational pull is responsible for pulling all objects toward the center of Earth; gravity is responsible for keeping the planets aligned. • Earth's tilt, its rotation on its axis, and its revolution around the sun explain why we experience natural, observable patterns. • The revolution of the moon around Earth causes the moon's shape to appear to change. • Earth is made up of four spheres - the biosphere (life), the geosphere (soil & rocks), the atmosphere (air & gases), and the hydrosphere (water). • Earth's major systems are constantly interacting. • Water is billions of years old. • Earth's water comes from different reservoirs. • Humans impact Earth's systems • Humans can help to fix damage done to Earth's spheres. 	<ul style="list-style-type: none"> • How do the Earth, the moon, and the stars interact in the Solar System? • What are the roles of water in Earth's Surface Processes? • What are the human impacts on Earth's Systems? 	<p>Space Science</p> <ul style="list-style-type: none"> • Experiment with light and distance, and observe how distance determines brightness; experiment with size distance. • Experiment with gravity, observing, and noting what happens. • Design and conduct an experiment to show how day and night occur on Earth; observe a model of how Earth's tilt causes the seasons; simulate the sun "rising" and "setting" to observe how shadows change based on Earth's rotation; notice that we observe different constellations at different times of the year. • Simulate and diagram the moon revolving around Earth to show the 8 phases of the moon. <p>Earth Science</p> <ul style="list-style-type: none"> • Research the four spheres of Earth and how humans impact these spheres. • Construct a terrarium and observe how Earth's systems interact within the terrarium. • Observe the water cycle as it occurs inside the constructed terrarium. • Examine data to see the breakdown of the percentage of water found in each reservoir. • Using the EiE kit, identify a problem (polluted water) and use math, science, technology, and engineering to design a device to help solve the problem (water filtration system).

Engineering Design Challenge

The concepts of engineering are applied throughout our science units. However, the criteria below is more specific to the behaviors of what engineers do.

Enduring Understandings In order to meet the expectations, students will need to understand that...	Essential Questions In order to understand, students will need to consider questions such as...	Knowledge and Skills Learning this material will require students to ...
<ul style="list-style-type: none"> • Engineering is a scientific study that combines science, math and problem-solving skills. • The Engineering Design Process is an agreed upon process for designing, building, testing and improving solutions to problems. • Engineers use technology in designing solutions to problems, and different materials have different properties. 	<ul style="list-style-type: none"> • How can you use science, technology, engineering, and math to solve a problem? • How can following the Engineering design Process assist engineers in solving problems? 	<ul style="list-style-type: none"> • Define what an engineer is and does. • Identify the problem from a given story - contaminated water. • Conduct a controlled experiment to test a variety of material available to determine which materials are best to help solve the given problem. Analyze results of controlled experiments to inform decisions about the solution to their problem. • Use the steps of the Engineering Design Process to design a water filter to clean non-toxic contaminated water. • Work in a team to design, build, test, and improve solutions to a problem. • Analyze their models for strengths and weaknesses based on observations made during testing. • Imagine ways to improve their designs and implement some of their improvement ideas.