

Middletown Township Public Schools

Elementary Science Guidelines for Parents 2016-2017

The Elementary Science Curriculum is aligned to the NJ Core Content Science Standards (adopted in 2009) and as approved by the Board on June 22, 2011.

The elementary science curriculum will be rewritten during the 2016-17 school year for implementation effective as of the 2017-18 school year as required by the NJ Department of Education subsequent to their approval of the “Next Generation Science Standards” (NGSS) on July 9, 2014. In addition to continuing to work on literacy skills in content areas including science, work toward the implementation of the NGSS will continue by:

- focusing further on the “Eight Science and Engineering Practices” and how they intersect with the NJ Student Learning Standards for English Language Arts and for Mathematics, and
- further review of the National Research Council’s *A Framework for K-12 Science Education: Practices, Cross Cutting Concepts, and Core Ideas* to improve content knowledge.
- piloting the NGSS in one classroom in each elementary school, 2 classes from grade level K-5 district-wide, throughout the 2016-17 school year to provide relevant experience for writing the new curriculum and making recommendations for resources to be purchased to support its implementation.

“Learning to read, write, and speak about science in K-5 is not the same thing as learning science. They intersect, not replace good science instruction”.
--Mike Heinz, Science Coordinator, NJ State Dept. of Education

All students should engage in science experiences that promote the ability to ask, find, or determine answers to questions derived from natural curiosity about everyday things and occurrences. The underpinning of the revised standards lies in the premise that science is experienced as an active process in which inquiry is central to learning and in which students engage in observation, inference, and experimentation on an ongoing basis, rather than as an isolated a process. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others in their community and around the world. They actively develop their understanding of science by identifying their assumptions, using critical and logical thinking, and considering alternative explanations.

NJ Core Curriculum Content Standards for Science (adopted 2009 and required for implementation as of September 2011)

1. Programs and Instructional Materials:

A variety of resources are used by teachers to assist them in teaching these standards in grades K-5 including: parts of the *Macmillan-McGraw Hill Science* program (referred to below as MMH); science kits from *Science and Technology for Children* (STC), *Full Option Science System* (FOSS), or *Insights*; materials from other publishers and vendors including *Science Companion* (The Chicago Science Group) and ETA-Hand 2Mind; and numerous online resources such as *United Streaming* videos from Discovery Learning.

Science at the elementary level includes objectives from each of the three areas/strands of science—Physical (denoted PS below), Earth (ES), and Life (LS)—each year from kindergarten through fifth grade.

Kindergarten:

1st & 2nd Marking Period (LS)
Internet resources and print materials
Insights Kit – The Senses
3rd Marking Period (PS)
Insights Kit – Balls and Ramps
The Idea Factory Kit – Forces and Motion
4th Marking Period (ES)
Gardening Kit, “Sprout and Grow Window”

Grade 1:

1st Marking Period (PS)
MMH Unit F – On the Move
MMH Unit E – Matter, Matter Everywhere
2nd Marking Period (ES)
FOSS Kit – Air and Weather
Hands-on materials (soil samples, etc.)
3rd and 4th Marking Period (LS)
Internet resources and print materials
STC Kit – Organisms

Grade 2:

1st Marking Period (ES and PS)
MMH Unit D – Sun and Its Family (ES and PS)
Internet, energy (batteries, etc.), and print resources
2nd Marking Period (ES and PS)
Internet and print resources
MMH Unit C – Changes on Earth
STC Kit – Changes (PS)

3rd Marking Period (ES, PS, and LS)

Internet and print resources
MMH Unit A – Plants and Animals
4th Marking Period
Internet and print resources
MMH Unit B – Homes for Plants and Animals
MMH Unit C – Changes on Earth

Grade 3:

1st Marking Period (ES)
Internet and print resources
MMH Unit D – Cycles on Earth and in Space
2nd Marking Period (ES)
FOSS Kit – Earth Materials
3rd Marking Period (PS)
STC Kit – Chemical Tests
4th Marking Period (LS)
MMH Unit A – Looking at Plants and Animals

Grade 4:

1st Marking Period (LS)
MMH Unit A – The World of Living Things
MMH Unit B – Animals as Living Things
2nd Marking Period (PS)
STC Kit – Motion and Design
Hands-on materials (magnets, scales, mirrors, flashlights, etc.)
Internet & print resources
3rd Marking Period (PS)
STC Kit – Electric Circuits

4th Marking Period (ES)
 MMH Unit A – *The World of Living Things*
 Fossils kit, hands-on materials (sand, thermometers)
 Internet & print resources

Grade 5:
1st Marking Period (LS)
 MMH Unit B – *Living Things and Their Environment*
 Internet & print resources
2nd Marking Period (PS and ES)
 Hands-on materials: Skydome, Optics Kit
 Internet & print resources
 MMH Unit C – *Earth and Its Resources*

MMH Unit D – *Astronomy, Weather, and Climate*
 Science Companion *Our Solar System Unit*
3rd Marking Period (ES)
 MMH Unit D – *Astronomy, Weather, and Climate*
 Science Companion *Our Solar System Unit*
 Internet & print resources
4th Marking Period (PS)
 STC Kit - *Magnets and Motors*

2. Assessments:

Teachers assess the students’ progress in learning the curricular objectives as stated in the 2009 New Jersey Core Content Curriculum Standards for Science. District-wide assessments are administered toward the end of each marking period to ensure consistency in teaching the new standards. In addition to PARCC assessments in language arts and mathematics, the NJ ASK for Science will be administered state-wide again this year (on May 25th) to students in **fourth grade** (and in eighth grade) in order to measure student progress in the achievement of these standards.

3. Curricular Objectives/Standards by Grade Level:

KINDERGARTEN:

LIFE SCIENCE:

Group living and nonliving things according to the characteristics that they share.
Record the observable characteristics of plants and animals to determine the similarities and differences between parents and their offspring.
Determine the characteristic changes that occur during the life cycle of plants and animals by examining a variety of species and distinguish between growth and development.

PHYSICAL SCIENCE:

Investigate and model the various ways that inanimate objects can move.
Predict an object’s relative speed, path, or how far it will travel using various forces and surfaces.

EARTH SCIENCE:

Describe the relationship between the Sun and plant growth.

FIRST GRADE:

PHYSICAL SCIENCE:

Sort and describe objects based on the materials of which they are made and their physical properties.
Identify common objects as solids, liquids, or gases.
Distinguish a force that acts by direct contact with an object (e.g., by pushing or pulling) from a force that can act without direct contact (e.g., the attraction between a magnet and a steel paper clip).

EARTH SCIENCE:

Describe Earth materials using appropriate terms, such as hard, soft, dry, wet, heavy, and light.
Observe and document daily weather conditions and discuss how the weather influences your activities for the day.
Identify and categorize the basic needs of living organisms as they relate to the environment.

LIFE SCIENCE:

Describe the requirements for the care of plants and animals related to meeting their energy needs.
Compare how different animals obtain food and water.
Explain that most plants get water from soil through their roots and gather light through their leaves.
Describe similarities and differences in observable traits between parents and offspring.
Describe how similar structures found in different organisms (e.g., eyes, ears, mouths) have similar functions and enable those organisms to survive in different environments.

SECOND GRADE:

PHYSICAL SCIENCE:

Generate accurate data and organize arguments to show that not all substances respond the same way when heated or cooled, using common materials, such as shortening or candle wax.
Compare, citing evidence, the heating of different colored objects placed in full sunlight.
Apply a variety of strategies to collect evidence that validates the principle that if there is no light, objects cannot be seen.
Present evidence that represents the relationship between a light source, solid object, and the resulting shadow.
Predict and confirm the brightness of a light, the volume of sound, or the amount of heat when given the number of batteries, or the size of batteries.

EARTH SCIENCE:

Determine a set of general rules describing when the Sun and Moon are visible based on actual sky observations.
Observe and discuss evaporation and condensation.
Identify and use water conservation practices.
Identify the natural resources used in the process of making various manufactured products.

LIFE SCIENCE:

Describe the ways in which organisms interact with each other and their habitats in order to meet basic needs.
Identify the characteristics of a habitat that enable the habitat to support the growth of many different plants and animals.
Communicate ways that humans protect habitats and/or improve conditions for the growth of the plants and animals that live there, or ways that humans might harm habitats.

THIRD GRADE:

EARTH SCIENCE:

Formulate a general description of the daily motion of the Sun across the sky based on shadow observations. Explain how shadows could be used to tell the time of day.
Identify patterns of Moon's appearance & make predictions about its future appearance based observational data.
Generate a model with explanatory value that explains both why objects roll down ramps as well as why the Moon orbits Earth.
Analyze and evaluate evidence in the form of data tables and photographs to categorize and relate solar system objects (e.g. planets, dwarf planets, moons, asteroids, and comets).
Create a model to represent how soil is formed.
Categorize unknown samples as either rocks or minerals.
Identify patterns in data collected from basic weather instruments.
Explain how clouds form.
Observe daily cloud patterns, types of precipitation, & temperature, & categorize the clouds by the conditions that form precipitation.
Trace a path a drop of water might follow through the water cycle.
Model how the properties of water can change as it moves through the water cycle.

PHYSICAL SCIENCE:

Identify objects that are composed of a single substance and those that are composed of more than one substance using simple tools found in the classroom.
Plan and carry out an investigation to distinguish among solids, liquids, and gasses.
Predict & explain what happens when a common substance (shortening or candle wax) is heated to melting & then cooled to a solid.

LIFE SCIENCE:

Develop and use evidence-based criteria to determine if an unfamiliar object is living or nonliving.
Compare and contrast structures that have similar functions in various organisms, and explain how those functions may be carried out by structures that have different physical appearances.
Describe the interactions of systems involved in carrying out everyday life activities.
Compare the physical characteristics of the different stages of the life cycle of an individual organism and characteristics of stages among species.
Model an adaptation to a species that would increase its chances of survival, should the environment become wetter, dryer, warmer, or colder over time.

FOURTH GRADE:

LIFE SCIENCE:

Almost all energy (food) and matter can be traced to the Sun.
Predict the biotic and abiotic characteristics of an unfamiliar organism's habitat.
Explain the consequences of rapid ecosystem change (e.g., flooding, wind storms, snowfall, volcanic eruptions), and compare them to consequences of gradual ecosystem change (e.g., gradual increase or decrease in daily temperatures, change in yearly rainfall).
Evaluate similar populations in an ecosystem with regard to their ability to thrive and grow.

PHYSICAL SCIENCE:

Demonstrate through modeling that motion is a change in position over a period of time.
Identify the force that starts something moving or changes its speed or direction of motion.
Investigate and categorize materials based on their interaction with magnets.
Investigate, construct, and generalize rules for the effect that force of gravity has on balls of different sizes and weights.
Determine the weight and volume of common objects using appropriate tools.
Categorize objects based on the ability to absorb or reflect light and conduct heat or electricity.
Compare various forms of energy as observed in everyday life and describe their applications.
Compare the flow of heat through metals and nonmetals by taking and analyzing measurements.
Draw and label diagrams showing several ways that energy can be transferred from one place to another.
Illustrate and explain what happens when light travels from air into water.
Repair an electric circuit by completing a closed loop that includes wires, a battery (or batteries), and at least one other electrical component to produce observable change.

EARTH SCIENCE:

Use data gathered from observations of fossils to argue whether a given fossil is terrestrial or marine in origin.
Develop a general set of rules to predict temperature changes of Earth materials such as water, soil, & sand, placed in the sun & shade.

FIFTH GRADE:

LIFE SCIENCE:

Illustrate the flow of energy (food) through a community.
Explain the impact of meeting human needs and wants on local and global environments.
Predict the impact that altering biotic and abiotic factors has on an ecosystem.
Describe how one population of organisms may affect other plants and/or animals in an ecosystem.
Describe the impact on the survival of species during specific times in geologic history when environmental conditions changed.
Predict the types of ecosystems that unknown soil samples could support based on soil properties.
Create a model of ecosystems in 2 different locations, & compare/contrast the living/nonliving components.
Describe ways that humans can improve the health of ecosystems around the world.

PHYSICAL SCIENCE:

Predict the path of reflected or refracted light using reflecting and refracting telescopes as examples.
Describe how to prisms can be used to demonstrate that visible light from the Sun is made up of different colors.
Model & explain how the description of an object's motion from one observer's view may be different from a different observer's.
Use simple circuits involving batteries and motors to compare and predict the current flow with different circuit arrangements.
Describe the force between two magnets as the distance between them is changed.

EARTH SCIENCE:

Illustrate global winds and surface currents through the creation of a world map of global winds and currents that explains the relationship between the two factors.
Generate and analyze evidence (through simulations) that the Sun's apparent motion across the sky changes over the course of a year.
Construct and evaluate models demonstrating the rotation of Earth on its axis and the orbit of Earth around the Sun.
Predict what would happen to an orbiting object if gravity were increased, decreased, or taken away.
Compare and contrast the major physical characteristics (including size and scale) of solar system objects using evidence in the form of data tables and photographs.
Apply knowledge of Earth's magnetic fields to successfully complete an orienteering challenge.