

Nashoba Regional School District

SCIENCE AND TECHNOLOGY/ ENGINEERING

**Standards and Benchmarks
Grade 3**



Nashoba Regional School District Science and Technology/Engineering Standards and Benchmarks, 2006.

Work in this document is based upon the standards outlined in the Massachusetts Science and Technology/Engineering Curriculum Framework (2001), updated (2006).

SCIENCE AND TECHNOLOGY/ENGINEERING

Acknowledgements

The Science and Technology/Engineering Standards and Benchmarks documents are the result of the work of a cross-section of elementary teachers from within the Nashoba Regional School District. These dedicated teachers spent over a year researching, writing, and editing curriculum that mapped to state mandated standards. The district recognizes the ongoing support of building and district administrators, the excellent work of the Science Task Force, district grade-level teachers, and especially the following people:

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Overview

The Massachusetts Science and Technology/Engineering Curriculum Framework was used as the guide for developing the NRSD Standards and Benchmarks document. “Mastery” expectations have been identified for each grade level in accordance with these documents. Mastery expectations should be based on grade-appropriate developmental performance levels.

Each grade includes curriculum for the four strands: Earth and Space Science, Life Science, Physical Science, and Technology and Engineering. Each strand includes the appropriate Learning Standards, Big Ideas, and Essential Questions. Additionally, further ideas and resources are included to help guide the teaching of the given unit topic/theme. These resources include: Learning Experiences and Investigations, suggested Coverage Timeline, Assessments, and Resources. It is our expectation that this “resource” section will continue to improve and develop over time.

Science and Technology/Engineering by Grade Level

Grade: 3

Standards and Benchmarks

Massachusetts Science and Technology/Engineering Curriculum Framework (2001), updated (2006)

EARTH AND SPACE SCIENCE STRAND

UNIT/TOPIC THEME: Rocks and Minerals

Grade 3 students will demonstrate **MASTERY** of the following learning standards¹

Learning Standard ES 1

Give a simple explanation of what a mineral is and some examples (e.g., quartz, mica).

Learning Standard ES 2

Identify the physical properties of minerals (hardness, color, luster, cleavage, and streak), and explain how minerals can be tested for these different physical properties.

Learning Standard ES 3

Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.

Big Ideas

Rocks have cycles.

Minerals have specific properties that can lead to identification.

Rocks can be sorted into three categories based on how they are formed.

Essential Questions

How are rocks formed?

How are rocks different than minerals?

How can minerals be identified?

Coverage Timeline

- It is recommended that you plan for 5 weeks of instruction, but allow for flexibility based upon resources, student interest, and corresponding opportunities.

Possible Investigations and Learning Experiences

- Observe and describe the characteristics of ore minerals such as magnetite and hematite (two sources of iron).
- Acquire a collection of minerals that includes (a) duplicates of the same mineral, somewhat different in appearance (size, shape, and color) and (b) samples of minerals that look similar but are actually different. Examine minerals using a hand lens.

¹ Expectations should be based on an appropriate developmental performance level.

EARTH AND SPACE SCIENCE STRAND – continued...

Possible Investigations and Learning Experiences

- Look for and record similarities and differences such as heaviness, color, texture, crystal shapes, luster, surface patterns, etc. Sort as accurately as possible. Report total number of different minerals present, and how many duplicates, if any, of each type.
- Sort rocks into igneous, metamorphic, or sedimentary based on their physical properties.

Suggested Extensions to Learning in Technology/Engineering

- Use simple tools to test for hardness (e.g., Moh's Scale of Hardness). (T/E 1.3)
- Discuss the use of rocks in construction based on their physical properties. Test the hardness of various types of rocks used in construction. (T/E 1.1, 1.2)

Assessments

- Data collection sheets
- Investigation write-up

Resources

- Mineral collection (e.g., ore, minerals)
- Hand Lens
- Rocks of various physical properties
- Moh's Scale of Hardness
- Foss Kit – Earth's Materials
- Science Companion – Rocks and Minerals Kit

LIFE SCIENCE STRAND

UNIT/TOPIC THEME: Plants and Animals

Grade 3 students will demonstrate **MASTERY** of the following learning standards:

Learning Standard LS 1

Classify plants and animals according to the physical characteristics that they share.

Learning Standard LS 2

Identify the structures in plants (leaves, roots, flowers, stem, bark, and wood) that are responsible for food production, support, water transport, reproduction, growth, and protection.

Learning Standard LS 3

Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.

Big Idea

Living things can be classified by their physical characteristics.

Essential Questions

- Why do scientists classify living things?
- What are the characteristics of the five kingdoms?
- What are the life cycles of plants and animals?
- How do the life cycles of plants and animals differ?
- What similarities do all living things share?
- What are the parts of a plant and their function?

Coverage Timeline

- It is recommended that you plan for 4-6 weeks of instruction, but allow for flexibility based upon resources, student interest, and corresponding opportunities.

Possible Investigations and Learning Experiences

- Sort plant and animal pictures based on physical characteristics.
- Study maple trees and go maple sugaring. Identify the structures in the maple tree and their functions.
- Grow plants from seed. Document the complete life cycle of the plant. Emphasize emergence of structures and the functions of these structures. Record changes in height over time. Graph the data.
- Set a germinating bean in a glass filled with water next to an asymmetric source of light. Allow the root and stem to grow a few inches. Rotate the bean so that the roots are now touching the water at an angle and the stem is away from the light source. Observe how the root system and stem respond to this change by changing their direction of growth.
- Create a mobile that includes an animal from each of the five kingdoms that describes the features of each kingdom.

LIFE SCIENCE STRAND - continued...

Suggested Extensions to Learning in Technology/Engineering

- Create a simple chart to classify plants and animals that are common to the school's geographical area. (T/E 2.2)
- Collect plants. Make a detailed drawing of a plant. Identify and label its major structures (e.g., leaves, flowers, stems, roots, seeds). Describe the function of each structure. (T/E 2.2, 2.3)
- Design and construct a habitat for a small animal (e.g., insect, butterfly, frog) that has adequate space, and contains the necessities for survival. The habitat should allow for observation of the animal as it goes through the stages of its life cycle. (T/E 1.1, 1.2, 2.1-2.3)

Assessment

- Data collection sheets (graphs, diagrams, & charts)

Resources

- Plants
- Flowers
- Seeds/bulbs
- Diagrams & visual aids
- Hands-on models
- Soil
- Terrarium supplies
- Life Cycle Books

PHYSICAL SCIENCE STRAND

UNIT/TOPIC THEME: Properties and States of Matter

Grade 3 students will demonstrate **MASTERY** of the following learning standards:

Learning Standard PS 1

Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).

Learning Standard PS 2

Compare and contrast solids, liquids, and gases based on the basic properties of each of these states of matter.

Learning Standard PS 3

Describe how water can be changed from one state to another by adding or taking away heat.

Big Ideas

All matter can be classified by properties.
Matter can be classified into one of 3 different states.
Water can change into different states.

Essential Questions

How can we classify objects and materials?
What is the difference between the properties of objects and the properties of materials?
What are the basics properties of each state of matter?
How do we differentiate states of matter?
How can you change the state of water?

Coverage Timeline

- It is recommended that you plan for 4 weeks of instruction, but allow for flexibility based upon resources, student interest, and corresponding opportunities.

Possible Investigations and Learning Experiences

- Gather a variety of solid objects. Describe differences between the properties of each object. Collect data on properties of these objects such as origin (man-made or natural), weight (heavy, medium, light), and length.
- Describe properties of materials, such as odor, color, hardness, and flexibility.
- Use a variety of objects. Identify at least one main material the object is made of (e.g., wood, metal, paper, pottery/ceramic, plastic, glass). Discuss the function of the object and its parts. Discuss how the properties of the materials used are suited to the function of the overall object or some part of it.
- Design several stations, each of which demonstrates a state of matter (e.g., water table, balloon and fan table, sand and block table, etc.).
- Do simple investigations with evaporation, condensation, freezing, and melting. Confirm that water expands upon freezing.

PHYSICAL SCIENCE STRAND - continued...

Suggested Extensions to Learning in Technology/Engineering

- Given a variety of objects made of different materials, ask questions and make predictions about their hardness, flexibility, and strength. Test to see if your predictions were correct. (T/E 1.1)
- Design one container for each of the states of matter, taking into account what material properties are important (e.g., size, shape, flexibility). (T/E 1.1, 2.3)
- Using given insulating materials, try to keep an ice cube from melting. (T/E 1.1)

Assessment

- Data collection sheets (graphs, diagrams, & charts)

Resources

- *A Drop of Water*, Gordon Morrison (picture book)
- Foss Kit, "Water"

TECHNOLOGY AND ENGINEERING STRAND

UNIT/TOPIC THEME: Materials and Tools/Engineering Design

Grade 3 students will be **INTRODUCED** to the following learning standards:

Learning Standard T/E 1.1

Identify materials used to accomplish a design task based on a specific property (e.g., weight, strength, hardness, and flexibility).

Learning Standard T/E 1.2

Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.

Learning Standard T/E 2.1

Identify a problem that reflects the need for shelter, storage, or convenience.

Learning Standard T/E 2.2

Describe different ways in which a problem can be represented (e.g., sketches, diagrams, graphic organizers, and lists).

Learning Standard T/E 2.3

Identify relevant design features (e.g., size, shape, weight) for building a prototype of a solution to a given problem.

Learning Standard T/E 2.4

Compare natural systems with mechanical systems that are designed to serve similar purposes.

Coverage Timeline:

- It is recommended that technology and engineering standards should permeate all other units in such a way that students are able to make connections to real-life applications of the material learned throughout the school year.

Possible Investigations and Learning Experiences:

From Earth and Space Science Strand:

- Use simple tools to test for hardness (e.g., Moh's Scale of Hardness). (T/E 1.3)
- Discuss the use of rocks in construction based on their physical properties. Test the hardness of various types of rocks used in construction. (T/E 1.1, 1.2)

From Life Science Strand:

- Create a simple chart to classify plants and animals that are common to the school's geographical area. (T/E 2.2)
- Collect plants. Make a detailed drawing of a plant. Identify and label its major structures (e.g., leaves, flowers, stems, roots, seeds). Describe the function of each structure.

TECHNOLOGY AND ENGINEERING STRAND - continued...

From Life Science Strand:

- Design and construct a habitat for a small animal (e.g., insect, butterfly, frog) that has adequate space, and contains the necessities for survival. The habitat should allow for observation of the animal as it goes through the stages of its life cycle. (T/E 1.1, 1.2, 2.1-2.3)

From Physical Science Strand:

- Given a variety of objects made of different materials, ask questions and make predictions about their hardness, flexibility, and strength. Test to see if your predictions were correct. (T/E 1.1)
- Design one container for each of the states of matter, taking into account what material properties are important (e.g., size, shape, flexibility). (T/E 1.1, 2.3)
- Using given insulating materials, try to keep an ice cube from melting. (T/E 1.1)