

SCIENCE – UNIFYING STANDARDS

THE NATURE OF SCIENCE

- 1.0 **Research and Investigation:** Students understand that science is a way of learning about the natural world. They use scientific inquiry and develop ideas based on data collected from investigations they design.
- 2.0 **Communication:** Students understand that the universe can be described by principles derived through scientific inquiry. They effectively communicate their understanding of ideas developed in scientific investigation through a variety of media.
- 3.0 **Connections and Implications:** Students review the consequences of the process and products of scientific inquiry. They understand the role that scientific advances have had throughout history.

EARTH SCIENCE

- 1.0 **Characteristics of the Universe:** Students understand Earth-based and space-based astronomy reveals the structure, scale, and dynamic nature of the solar system, stars, galaxies, and the universe.
- 2.0 **The Dynamic Earth:** Students understand that the Earth is constantly changing and being shaped due to a variety of natural events, processes, and human activity. The Earth is a collection of interacting cycles, structures, and processes that can be described in terms of space, time, energy, and matter.

LIFE SCIENCE

- 1.0 **Diversity and Interdependence:** Students understand that living things are diverse and interdependent. They recognize the relationship between cooperation and competition among organisms in ecosystems.
- 2.0 **Cellular Structures and Functions:** Students understand that cells are the basic structures of all living systems. They understand the complementary relationship between the structure and function of cells, organs, organ systems, whole organisms, and ecosystems.
- 3.0 **Change and Evolution:** Students understand that living things grow, develop, change, and evolve through time, depending on environmental influences. They know that traits of species can change through generations and that instruction of traits is contained in the genetic material of organisms.

PHYSICAL SCIENCE

- 1.0 **Forces and Motion:** Students understand the nature of forces and the relationship between forces and motion. They recognize that the relationship is described by one set of laws. They understand that all matter is in motion and that motion changes as a result of forces between matter. They realize that these forces affect everyday life, and that the effects can be identified, measured, and predicted.
- 2.0 **Energy, Momentum and Transformation:** Students understand that when matter interacts with matter, energy and momentum can be transferred or distributed, and that energy may be transformed. When matter interacts the total amount of matter, energy, and momentum remain the same.
- 3.0 **Structure and Properties of Matter:** Students understand that all matter is made up of particles. They understand the relationship between the structure and properties of matter. They know that a finite number of basic elements combine in various ways which determine all properties, characteristics, and behaviors of matter.

THE NATURE OF SCIENCE Level 4

1.0 Research and Investigation: Students understand that science is a way of learning about the natural world. They use scientific inquiry and develop ideas based on data collected from investigations they design.

Focus Goals

- 1.1 Understand and use the scientific process to ask meaningful questions and conduct careful investigations.

2.0 Communication: Students understand that the universe can be described by principles derived through scientific inquiry. They effectively communicate their understanding of ideas developed in scientific investigation through a variety of media.

Focus Goals

- 2.1 Communicate hypotheses, results, and conclusions of scientific investigations.

3.0 Connections and Implications: Students review the consequences of the process and products of scientific inquiry. They understand the role that scientific advances have had throughout history.

Focus Goals

- 3.1 Understand and identify the affects of science in daily life.
- 3.2 Apply Literacy skills to make scientific connections.

THE NATURE OF SCIENCE

Level 4

1.0 Research and Investigation: Students understand that science is a way of learning about the natural world. They use scientific inquiry and develop ideas based on data collected from investigations they design.

1.1 Understand and use the scientific process to ask meaningful questions and conduct careful investigations.

- θ Follow a set of written instructions for a scientific investigation. (c6f/n)
- θ Apply appropriate tools and techniques to solve problems. (n)
- θ Differentiate observation from inference (interpretation) and know that scientists' explanations come partly from what they interpret about observations. (c6a/n)
- θ Conduct multiple trials to test a prediction and draw conclusions about the relationships between results and predictions. (c6a/n)

2.0 Communication: Students understand that the universe can be described by principles derived through scientific inquiry. They effectively communicate their understanding of ideas developed in scientific investigation through a variety of media.

2.1 Communicate hypotheses, results, and conclusions of scientific investigations.

- θ Formulate predictions, and justify predictions based on cause and effect relationships. (c6c/n)
- θ Estimate and measure weight, length, and volume of objects. (c6b/n)
- θ Evaluate the evidence of an investigation to support a conclusion. (*)
- θ Construct and interpret graphs and charts from measurements. (c6e/n)

3.0 Connections and Implications: Students review the consequences of the process and products of scientific inquiry. They understand the role that scientific advances have had throughout history.

3.1 Understand and identify the affects of science in daily life. (p)

- θ Identify examples of science impacting the environment, now and in the future.
- θ Determine the significance of conservation and recycling efforts.

3.2 Apply Literacy skills to make scientific connections. (p-Literacy Standards)

- θ Learn science vocabulary encountered through reading. (R-1.0)
- θ Read, view, interpret, and evaluate science information. (R-2.0)
- θ Use technology and reference sources to locate and interpret information on science topics. (W-3.0)
- θ Write multi-paragraph informational reports on science topics. (W-1.0, 2.0)
Deliver informative presentations on scientific topics. (W-3.0)

EARTH SCIENCE
Level 4

1.0 Characteristics of the Universe: Students understand Earth-based and space-based astronomy reveals the structure, scale, and dynamic nature of the solar system, stars, galaxies, and the universe.

Focus Goals

1.0 Not addressed at this level.

2.0 The Dynamic Earth: Students understand that the Earth is constantly changing and being shaped due to a variety of natural events, processes, and human activity. The Earth is a collection of interacting cycles, structures, and processes that can be described in terms of space, time, energy, and matter.

- 2.1 Describe the properties of rocks and minerals and the processes that formed them.
- 2.2 Describe how natural processes shape and reshape the surface of the Earth.
- 2.3 Understand and explain that Earth's water moves between oceans and land as a result of evaporation and condensation processes.

EARTH SCIENCE

Level 4

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2.1 Describe the properties of rocks and minerals and the processes that formed them.

- θ Observe and explain how rocks and minerals vary and formed under different Earth conditions. (p)
- θ Classify the properties of igneous, sedimentary, and metamorphic rocks (rock cycle). (c4a)
- θ Identify common rock forming minerals (including quartz, calcite, feldspar, mica, and hornblende) and ore minerals using a table of diagnostic properties. (c4b)

2.2 Describe how natural processes shape and reshape the surface of the Earth.

- θ Demonstrate that changes in the Earth are due to slow processes, such as erosion and rapid processes such as landslides, volcanic eruptions, and earthquakes. (c5a)
- θ Observe and demonstrate how waves, wind, water, and ice shape and reshape the earth: twisters, hurricanes, freezing/thawing, growth of roots, and rock breakage. (c5b)
- θ Understand and predict the effect moving water has on eroding landforms through weathering, transportation, and deposition of pebbles, sand, silt, and mud in other places. (c5c)

2.3 Understand and explain that Earth's water moves between oceans and land as a result of evaporation and condensation processes. (5c3)

- o Recognize that most of the water on Earth is salt water in oceans. (5c3a)
- o Describe how the water cycle contributes to the processes that shape the Earth's surface.

LIFE SCIENCE
Level 4

1.0 Diversity and Interdependence: Students understand that living things are diverse and interdependent. They recognize the relationships between cooperation and competition among organisms in ecosystems.

Focus Goals

1.1 Understand that living organisms depend on each other and on their environment for survival.

2.0 Cellular Structures and Functions: Students understand that cells are the basic structures of all living systems. They understand the complimentary relationship between the structure and function of cells, organs, organ systems, whole organisms, and ecosystems.

Focus Goals

2.1 Understand that adaptations of an organism are vital to survival.

3.0 Change and Evolution: Students understand that living things grow, develop, change, and evolve through time, depending on environmental influences. They know that traits of species can change through generations and that instruction of traits is contained in the genetic material of organisms.

Focus Goals

3.1 Recognize that all organisms need energy and matter to live, grow, and reproduce.

LIFE SCIENCE

Level 4

1.0 Diversity and Interdependence: Students understand that living things are diverse and interdependent. They recognize the relationships between cooperation and competition among organisms in ecosystems.

1.1 Understand that living organisms depend on each other and on their environment for survival.

- θ Classify living and non-living components of an environment. (c3a)
- θ Understand that the sun is the primary source of energy entering the food chain through producers (plants). (c2a/p)
- θ Draw and explain food chains and food webs to demonstrate transfer of energy and interdependence. (c2b)
- θ Demonstrate how producers and consumers compete with each other for resources in an ecosystem. (c2b)
- θ Explain how plants depend on animals for pollination and seed dispersal and animals depend on plants for food and shelter. (c3c)
- θ Explain how decomposers including microorganisms, fungi, and insects recycle matter from dead plants and animals. (c2c)

2.0 Cellular Structures and Functions: Students understand that cells are the basic structures of all living systems. They understand the complementary relationship between the structure and function of cells, organs, organ systems, whole organisms, and ecosystems.

2.1 Understand that adaptations of an organism are vital to survival.

- θ Describe how an adaptation of an organism (coloration, beaks, feet, etc.) determines its function and role in an environment. (c3b)
- θ Understand that in any environment, some kinds of plants and animals thrive, some survive less well, and some cannot survive. (c3b)

3.0 Change and Evolution: Students understand that living things grow, develop, change, and evolve through time, depending on environmental influences. They know that traits of species can change through generations and that instruction of traits is contained in the genetic material of organisms.

3.1 Recognize that all organisms need energy and matter to live, grow, and reproduce.

- θ Define and explain how energy and nutrients are transferred from plants to animals. (c2a)
- θ Describe how humans affect living things in the environment. (*)

PHYSICAL SCIENCE
Level 4

1.0 Forces and Motion: Students understand the nature of forces and the relationship between forces and motion. They recognize that the relationship is described by one set of laws. They understand that all matter is in motion and that motion changes as a result of forces between matter. They realize that these forces affect everyday life, and that the effects can be identified, measured, and predicted.

Focus Goals

1.0 Understand that electricity and magnetism are related.

2.0 Energy, Momentum and Transformation: Students understand that when matter interacts with matter, energy and momentum can be transferred or distributed, and that energy may be transformed. When matter interacts the total amount of matter, energy, and momentum remain the same.

Focus Goals

2.1 Understand that electric currents can be used to produce magnetic fields.

3.0 Structure and Properties of Matter: Students understand that all matter is made up of particles. They understand the relationship between the structure and properties of matter. They know that a finite number of basic elements combine in various ways which determine all properties, characteristics, and behaviors of matter.

Focus Goals

3.1 Understand that electrical energy can be converted to heat, light, sound, and motion.

PHYSICAL SCIENCE
Level 4

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1.1 Understand that electricity and magnetism are related.

- θ Demonstrate how electrically charged objects attract or repel each other. (c1e)
- θ Use magnets to demonstrate how poles repel each other while unlike poles attract each other. (c1f/n)
- θ Build a simple compass, which detects magnetic effects including Earth's magnetic fields. (c1b)

2.0 Energy, Momentum and Transformation: Students understand that when matter interacts with matter, energy, and momentum can be transferred or distributed, and that energy may be transformed. When matter interacts the total amount of matter, energy, and momentum remain the same.

2.1 Understand that electric currents can be used to produce magnetic fields.

- θ Demonstrate how to build a simple electromagnet. (c1d)
- θ Understand the role of electromagnets in the construction of electric motors, electric generators, and simple devices such as doorbell. (c1d)
- θ Demonstrate the transfer of energy by producing sounds of varying pitch. (p)

3.0 Structure and Properties of Matter: Students understand that all matter is made up of particles. They understand the relationship between the structure and properties of matter. They know that a finite number of basic elements combine in various ways, which determine all properties, characteristics, and behaviors of matter.

3.1 Understand that electrical energy can be converted to heat, light, sound, and motion.

- θ Design and build simple series and parallel circuits using components such as wires, batteries, and bulbs. (c1a/n)
- θ Explain how electrical energy can produce sounds using a device such as a doorbell or amplifier. (*)