

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 5

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 that scientific progress is made by asking meaningful questions and conducting 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 Understand that scientific investigations need to be communicated accurately.

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 Identify how science is applied in everyday situations.
- 3.2 Apply Literacy skills to make scientific connections.

THE NATURE OF SCIENCE

Level 5

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 that scientific progress is made by asking meaningful questions and conducting careful investigations.

- θ Develop a testable question. (c6b/n)
- θ Plan and conduct a simple investigation based on a student developed question. (c6c/n)
- θ Write the procedure for an investigation. (c6i/n)
- θ Identify the dependent and controlled variable in an investigation.(c6d/n)
- θ Identify a single independent variable and explain what will be learned by collecting data on this variable. (c6e/n)
- θ Draw conclusions based on scientific evidence and indicate whether further information is needed to support a specific conclusion. (c6h/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 Understand that scientific investigations need to be communicated accurately.

- θ Select appropriate tools (e.g., thermometers, meter sticks, and balances) and make quantitative graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data (analyze and interpret the data). (c6f/n)
- θ Record data using appropriate graphic representations (charts, graphs, and labeled diagrams) and make inferences based on those data (analyze and interpret the data). (c6g/n)
- θ Write a report of an investigation that explains the tests that were conducted, data collected or evidence examined, and conclusions drawn. (c6i/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 Identify how science is applied in everyday situations. (p)

- o Identify examples of science impacting the environment; past, present and in the future.
- o Design a plan for participating in a conservation and recycling effort.

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

- θ Read, view, interpret, and evaluate science information. (R-2.0)
- θ Learn science vocabulary encountered through reading. (R-1.0)
- θ Use technology and reference sources to locate and interpret information on science topics. (W-3.0)
- θ Deliver an informative presentation on science related topics, issues, or events. (L/S-3.0)

EARTH SCIENCE Level 5

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

- 1.1 Understand and explain how the planets and other bodies orbit the sun in predictable paths.

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 Understand and explain that energy from the sun heats the Earth unevenly resulting in changing weather patterns that can be predicted.
- 2.2 Understand that freshwater comes from different and limited sources.

EARTH SCIENCE
Level 5

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.

1.1 Understand and explain how the planets and other bodies orbit the sun in predictable paths.

θ Describe that the solar system includes the planets, satellites, asteroids, meteorites, and comets. (c5b)

θ Explain how gravitational forces cause planets and planetary objects to orbit. (c5c)

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 Understand and explain that energy from the sun heats the Earth unevenly resulting in changing weather patterns that can be predicted.

θ Describe how uneven heating of the Earth causes air movements (convection currents). (c4a)

θ Explain how the atmosphere of the Earth exerts a pressure that decreases with distance above the surface and is the same in all directions. (c4e)

θ Describe how the earth's oceans and water cycle contribute to changing weather conditions. (c4b)

θ Identify causes and effects of different types of severe weather. (c4c)

θ Describe changing variables used to predict current and future weather. (c4d)

θ Use data from local weather maps and forecasts to predict local weather. (c4d)

2.2 Understand that freshwater comes from different and limited sources.

θ Describe that freshwater from rivers, lakes, underground sources and glaciers is limited. (c3d)

θ Identify the sources of freshwater, in our own local community. (c3e)

θ Explain how recycling and decreased usage can positively affect water supplies. (c3d)

LIFE SCIENCE
Level 5

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

1.0 Not addressed at this level.

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 multicellular organisms have specialized structures in order to live in their environment.
- 2.2 Understand that animals have different systems to perform specialized functions within the organism.

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

3.0 Not addressed at this level.

LIFE SCIENCE
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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 multicellular organisms have specialized structures in order to live in their environment.

- θ Describe the cell as the functional unit of a complex organism. (*)
- θ Describe the structures used to support the transport of material in a multicellular organism. (c2a)
- θ Describe how a plant's vascular system of transport moves sugar, water and minerals. (c2e)
- θ Compare and explain how plant and animal cells produce/obtain energy to live; animal cells break down sugar and form CO₂, plant cells use carbon dioxide and CO₂ energy from the sun to build sugars and release oxygen. (c2f,g)
- θ Explain how plants use carbon dioxide CO₂ and energy from the sun to build molecules of sugar and release oxygen. (c2f)

2.2 Understand that animals have different systems to perform specialized functions within the organism.

- θ Describe the circulatory and respiratory systems and explain how they interact, exchanging carbon dioxide and oxygen. (c2b)
- θ Explain the steps in digestion; including the roles of teeth, mouth, esophagus, stomach, small and large intestine and colon. (c2c)
- θ Explain how the excretory system removes cellular waste, including the role of the kidney, bladder, and rectum. (c2d)

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PHYSICAL SCIENCE**Level 5**

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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

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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 elements and their combinations account for all types of matter.
- 3.2 Understand that during chemical reactions, the atoms in the reactants rearrange to form products with different properties.

PHYSICAL SCIENCE

Level 5

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3.1 Understand that elements and their combinations account for all types of matter.

θ Explain how all matter is made of atoms which may combine to form molecules. (c1b)

θ Describe how each element is made of one kind of atom. (c1d)

θ Identify the differences between elements and compounds (e.g., N₂, CO₂, and H₂O, CO₂, NaCl, C₆H₁₂O₆). (*)

θ Explain how the Periodic Table is organized by chemical properties of the elements. (c1d)

θ Use the Periodic Table to show that living and non-living matter are composed of just a few elements. (c1d,h)

3.2 Understand that during chemical reactions, the atoms in the reactants rearrange to form products with different properties.

θ Identify metals that have properties in common, such as electrical and thermal conductivity. (c1c)

θ Explain that some metals such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), and gold (Au) are pure elements while others such as steel and brass are a combination of elemental metals. (c1c)

θ Compare differences in chemical and physical properties of substances that are used to separate mixtures and identify compounds. (c1f)

θ Recognize that scientists use instruments to analyze the arrangement of molecules and atoms. (c1e)

θ Describe properties of solid, liquid and gaseous substances, such as sugar (C₆H₁₂O₆), water (H₂O), helium (He), oxygen (O₂), nitrogen (N₂), and carbon dioxide (CO₂). (c1g)